JURNAL EKONOMI MALAYSIA
MALAYSIAN JOURNAL OF ECONOMICS

Jilid *Volume* **54(1)** ISSN 0126-1962 Jun *June* **2020**

Makalah/*Article*

Jurnal Ekonomi Malaysia 54(1) 2020 1 - 17
http://dx.doi.org/10.17576/JEM-2020-5401-1

Impacts of Technological Shock on the Agricultural Business Cycle

(Kesan Kejutan Teknologi ke atas Kitaran Perniagaan Pertanian)

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ABSTRACT

The real business cycles in ASEAN-5 countries namely Indonesia, Malaysia, the Philippines, Thailand, and Vietnam over 1971-2015 fluctuated more than their agricultural business cycles. This research utilized the two-sector real business cycle model developed by Da-Rocha and Restuccia (2002) to stimulate such a stylized fact. The model assumes that a social planner makes a decision in an initial period to choose the consumption, capital stock, and working hours in the agricultural and non-agricultural sectors. This will enable a representative agent to attain optimum utility for the entire life under certain economic restrictions and subject to technology shocks occurring in both sectors. The mathematical methods applied to solve this decision-making problem for the social planner includes linear quadratic approximations and stochastic dynamic programming methods. The simulation results suggest that the applied model could reasonably well replicate the fluctuations of the real business cycle, agricultural business cycle, and the non-agricultural business cycle. This reflects the situation where technology shocks in the agricultural and non-agricultural sectors are related to each other and influence the volatility of these two economies.This suggest that the governments should encourage research and development activities in both agricultural and non-agricultural sectors to develop new technology that can generate technology shock to promote greater economic strength.

Keywords: Agricultural business cycle; two-sector RBC model; ASEAN; technological shock; business cycle

ABSTRAK

Kitaran perniagaan benar negara-negara ASEAN-5 iaitu Indonesia, Malaysia, Filipina, Thailand, dan Vietnam bagi 1971-2015 adalah lebih turun naik berbanding kitaran perniagaan pertanian. Bagi mensimulasikan corak fakta yang sama, kajian ini menggunakan model kitaran perniagaan benar dua sektor yang dibangunkan oleh Da-Rocha dan Restuccia (2002). Model ini mengandaikan bahawa perancang sosial membuat keputusan dalam tempoh awal untuk memilih penggunaan, stok modal, dan waktu bekerja di sektor pertanian dan bukan pertanian. Ini akan membolehkan ejen perwakilan mencapai utiliti yang optimum untuk seumur hidup di bawah sekatan ekonomi tertentu dan tertakluk kepada kejutan teknologi yang berlaku di sektor pertanian dan bukan pertanian. Kaedah matematik digunakan untuk menyelesaikan masalah membuat keputusan bagi perancang sosial dalam kajian ini termasuklah penghampiran kuadratik linear dan kaedah pengaturcaraan dinamik stokastik. Hasil simulasi menunjukkan bahawa model yang diaplikasikan dapat menggambarkan corak turun naik kitaran perniagaan benar, kitaran perniagaan pertanian, dan kitaran perniagaan bukan pertanian. Ini mencerminkan keadaan di mana kejutan teknologi dalam sektor pertanian dan bukan pertanian adalah saling berkaitan antara satu sama lain dan mempunyai pengaruh terhadap turun naik kedua-dua sektor ekonomi ini. Ini mencadangkan bahawa kerajaan menggalakkan aktiviti penyelidikan dan pembangunan di kedua-dua sektor pertanian dan bukan pertanian untuk membangunkan teknologi baharu yang dapat menghasilkan kejutan teknologi bagi menghasilkan kekuatan ekonomi yang lebih besar.

Kata Kunci: Kitaran perniagaan pertanian; Model RBC dua sektor; ASEAN; kejutan teknologi; kitaran perniagaan

INTRODUCTION

In considering the key economic indicators for ASEAN countries as held by the Food and Agriculture Organization of the United Nations (FAO) and searchable on their database, it was found that the agriculture, forestry, and fishing value added as a percentage of gross domestic product (GDP) was in the range of 6.7%–22.5% in 2015 (Table 1.). Also, when comparing the percentages to those of Indonesia, Malaysia, the Philippines, and Thailand, the CLMV countries (Cambodia, Lao PDR, Myanmar, and Vietnam) clearly showed higher values. Here, although the agricultural sectors in Indonesia, Malaysia, the Philippines, and

Thailand seem to contribute less to driving their national economies, their agricultural sectors are still important in terms of showing promising growth rates and supporting economic development. Further, the growth rate of the agriculture, forestry, and fishing value added in all these countries was in the range -3.8%–4.0%, with Indonesia showing the highest growth rate followed by Myanmar, Vietnam, and Malaysia, respectively. Thailand, on the other hand, suffered from a serious drought in 2015, which caused a significant decrease in the growth rate of its agriculture, forestry, and fishing value added. At the same time, when considering the population density in ASEAN countries as an indicator, it could be found that the rural population as a percentage of the total population for Thailand was around 50% in 2015, while in Malaysia it was around 25.3%. Moreover, agricultural land as a percentage of total land area for Thailand and the Philippines was 46.3% and 55.6%, respectively. Apart from this, the OECD/FAO (2017) succinctly stated how economic development in the agricultural sector can contribute to the issue of raising food security. At the same time, the development of agricultural international trade is beneficial for both the farmers and consumers in ASEAN countries. Therefore, it is clear that to date, the agricultural sector has played a significant role in the economies of ASEAN countries.

Theoretically, analysis of the economic fluctuation of agricultural output in short-run periods has been an important issue for informing policy-makers aiming to drive economic development in the agricultural sector over the past three decades. According to the real business cycle (RBC) school of thought, the main cause of business cycle volatility in the short term tends to originate from technological shocks. This article, therefore, starts by analyzing the key issues behind the stylized fact accepted as the case for the agricultural sectors in the ASEAN-5 countries, namely Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. That is, this research article focuses only on ASEAN-5 countries. This is because the agriculture, forestry, and fishing value added indicators in ASEAN-5 countries generally show higher values than for the other ASEAN countries. At the same time, the ASEAN-5 countries' economic development opportunities in the agricultural sector have higher promise (Table 1.).

By applying values for the annual real GDP and real agriculture, forestry, and fishing value added gathered from the FAO databases to estimate the cycle components, starting from being adapted to the natural logarithm and then setting aside the trend growth component using the Hodrick–Prescott (HP) filter, Hodrick and Prescott (1997) proposed that, theoretically, time series data

TABLE 1. Contextual indicators for selected ASEAN countries, 2015

	Gross Domestic Product[a]	Gross Domestic Product	Agriculture, Forestry and Fishing Value Added[a]	Agriculture, Forestry and Fishing Value Added	Agriculture, Forestry and Fishing Value Added	Rural Population[b]	Agricultural Land[b]
	(USD, 2005 prices)	(Annual growth,%)	(USD, 2005 prices)	(Share of GDP, %)	(Annual growth,%)	(Share of total population, %)	(Share of total land area, %)
Cambodia	12,297.6	7.0	2,721.8	22.1	0.2	79.3	30.9
Indonesia	526,206.1	4.8	53,704.1	10.2	4.0	46.3	31.5
Lao PDR	5,807.5	7.6	1,308.1	22.5	0.6	61.4	10.2
Malaysia	231,175.1	5.0	15,375.4	6.7	1.1	25.3	23.9
Myanmar	28,884.0	7.3	8,558.6	29.6	3.4	65.9	19.4
The Philippines	174,660.3	5.9	15,745.0	9.0	0.1	55.6	41.7
Thailand	261,840.4	2.8	20,089.3	7.7	-3.8	49.6	43.3
Vietnam	104,331.0	6.7	14,565.7	14.0	2.4	66.4	35.1

Source: [a]FAOSTAT, http://www.fao.org/faostat/en/#data. [b]OECD/FAO (2017).

TABLE 2. Business cycle volatility in ASEAN-5 countries from 1971 to 2015 according to standard deviation values

	Indonesia	Malaysia	The Philippines	Thailand	Vietnam
Standard deviation of real business cycle	3.817%	3.571%	3.440%	4.274%	2.781%
Standard deviation of agricultural business cycle	1.410%	2.900%	2.598%	2.539%	2.515%

Source: Author's calculations.

would comprise a trend growth component and cyclical components. The former could be derived from solving the minimization problem of the loss function, while the latter could be calculated by removing the trend growth component of the data. Here, the movement of the real GDP cycle, the so-called real business cycle, as well as the real agriculture, forestry, and fishing value added cycle, the so-called agricultural business cycle, were plotted from the data and the results are displayed in Figure 1, which shows that the agricultural business cycle in the ASEAN-5 countries tends to move together with the real business cycle. Specifically, it can be seen that the movement of the agricultural business cycle with its peaks and turning points nearly aligns with the movement of the real business cycle. With respect to the RBC paradigm, its characteristic is known as a "procyclical movement." Interestingly, during recession periods, the real business cycle is severely reduced more than the agricultural business cycle, as occurred, for example, during the 1981 to 1986 Iran–Iraq war, which had significant negative economic impacts on Indonesia, Malaysia, the Philippines, and Thailand due to the great collapse in prices. Another crash occurred during 1997 to 1999 related to the Asian financial crisis, which originated with issues in the financial sector in Thailand but then spilled over to other countries in Asia, although the negative economic impacts on the agricultural sectors in Thailand and the Philippines were not as great as the overall economic impacts. Moreover, the stylized fact of the volatility of the agricultural business cycles of ASEAN-5 countries could be confirmed by looking at the standard deviation values (Table 2.). It could be seen that during 1971 to 2015, the real business cycle in the ASEAN-5 countries fluctuated in the range of 2.781%–4.274%; with the lowest figures being seen for Vietnam and the highest ones for Thailand compared to the other countries. On the other hand, by only focusing on the agricultural business cycle, it could be revealed that over the past 45 years, the agricultural business cycle has shown lower levels of fluctuation than those of the real business cycle. This leads to the research question from an RBC school economist's point of view: "How do technological shocks in the agricultural and non-agricultural sectors of each ASEAN country influence the volatility of the agricultural business cycle?"

LITERATURE REVIEW

According to the literature review performed, it appeared that the two most common approaches for analyzing short-term economic volatility are time series analysis in the econometric model and the microfoundation of macroeconomics model. Some interesting reported findings from using the first approach include, for instance, if the aggregate output is driven by integrating productivity shocks, then a sectoral output series should display few, if any, co-integrating relationships. Similarly, a serial correlation co-feature should be a rare occurrence. These conjectures were confirmed in an analysis using West German data by Lucke (1998). In addition, it was discovered that industry-level VAR models for United States' manufacturing supported both sticky-wage dynamic general equilibrium (DGE) and RBC models over sticky-price DGE models (Malley et al., 2005), while vector autoregression (VAR) analysis was applied to identify news shocks using data on four advanced small open economies (Kamber et al., 2017). More recently, the first approach was applied to several issues, such as environmental and labor economics. A structural vector autoregression (SVAR) model was used to analyze the impact of technology shocks on the correlation between carbon emissions and the United States business cycle. Also, anticipated investment technology shocks, and government spending and monetary policy shocks were added into such a model (Khan et al., 2019). Another study used SVAR and a dynamic stochastic general equilibrium (DSGE) model of a small open economy for analysis of the impact of migration shocks, and revealed that migration shocks can make a crucial contribution to the fluctuation of GDP per capita (Smith & Thoenissen 2019).

Delving extensively into the literature on ASEAN countries, further interesting findings were found such as from the use of an augmented VAR model, in which the Granger non-causality test indicated that the real business cycle of the United States did not correlate with that of ASEAN countries, while the real business cycles of ASEAN countries were more likely to correlate among themselves (Ong & Habibullah 2004). Estimations using a structural VAR model indicated that in the case of Vietnam, the major cause of macroeconomic fluctuations came from the supply side. However, in the long term, these were likely to have less significance (Ha 2015). Further, estimations using a VAR model reflected that although the Chinese market plays a very significant role in ASEAN countries at the present date, trading among other ASEAN member countries is also still important for movement of the real business cycle in each country (Lestari 2016). Apart from this, a qualitative discussion of the economic mechanisms and econometric model with panel data was applied for analysis of the impacts of a produced shock in the agricultural sector on the allocation of labor across sectors for rural India's economy. It was revealed that short-term gains in agricultural productivity stimulated the growth of manufacturing, construction, retail, and education sectors (Emerick 2018). Notice that although the majority of the empirical results for business cycle fluctuations have been drawn from time series analysis in econometric models, several previous literature studies have attempted to support their results using models derived from the notion of microeconomics, the so-called microfoundation of macroeconomics model.

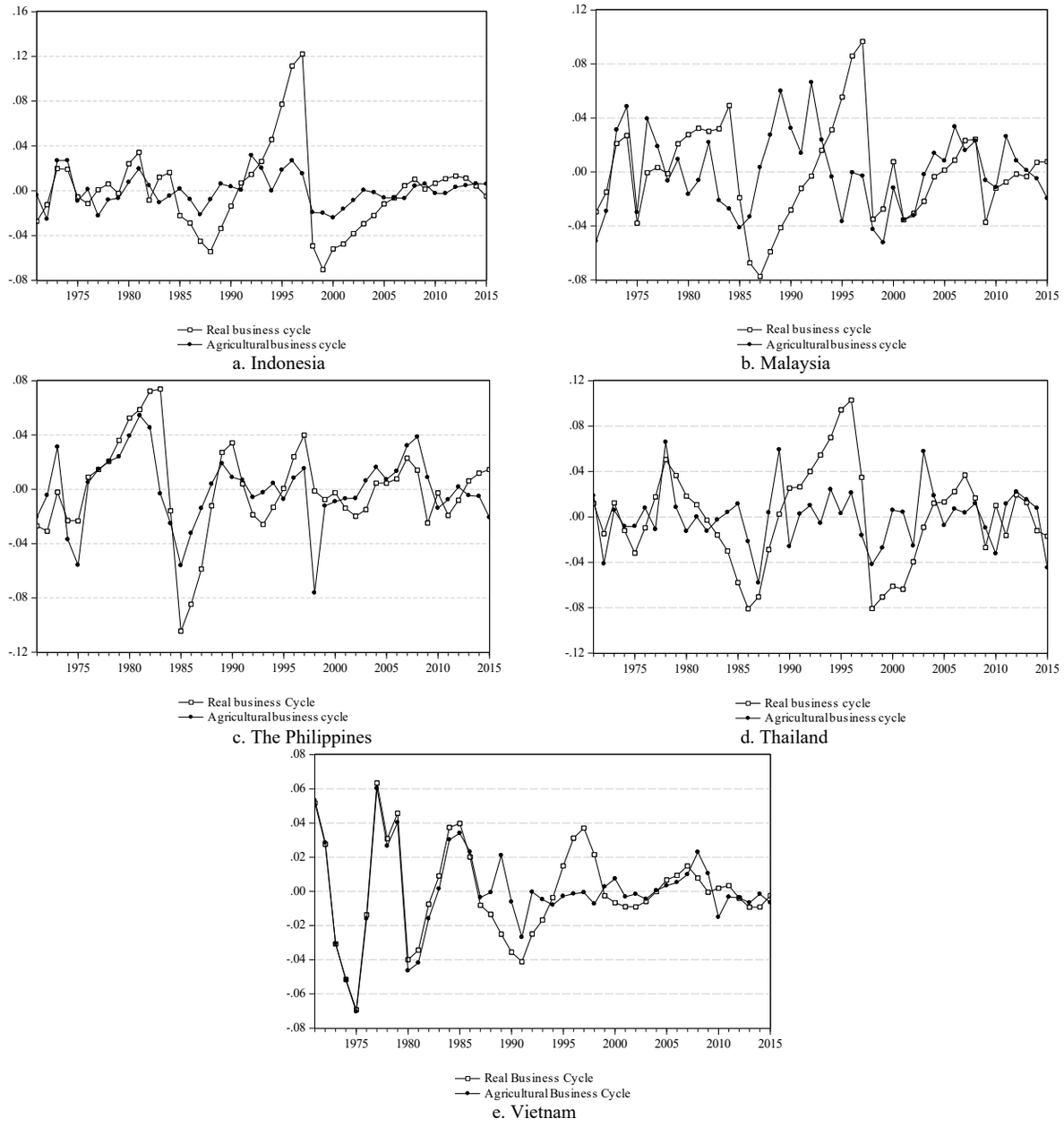


FIGURE 1. Volatility of the real business cycle and agricultural business cycle in the ASEAN-5 countries

It has been three decades since the real business cycle approach was first applied for macroeconomic analysis, as manifested in Kydland and Prescott's time to build and Long and Plosser's real business cycle models (Altug & Young 2015). In more deeply investigating the impacts of technology shocks or supply shocks, it was found that the research papers in the past have revealed some interesting findings; for instance, the introduction of the RBC models has been influential in refocusing attention on supply issues in macroeconomic analyses after the long postwar focus on aggregate demand management in Australia and most other Western economies (Crosby & Otto 1995). Meanwhile, research on the importance of technology shocks on the US business cycle has sharply decreased after a structural break in the late 1960s (Atella et al. 2008). At the same time, the RBC model has been further developed for looking at specific issues of shocks in a wide range of areas, e.g., the issue of how representative consumers have to do housework and how shocks in this area can affect the real business cycle (Benhabib et al. 1991), the application of the RBC model to the durable- and nondurable-goods-producing sectors (Hornstein & Praschnik 1997; Martín-Moreno et al. 2014), the

inclusion of stochastic research and development (R&D) for new technologies in a continuous time RBC model with risk-averse agents (Wälde 2002), examination of the validity of the identification assumption in a DGE model with several possible sources of permanent shocks (Francis & Ramey 2005), the role of agricultural output in an RBC model (Da-Rocha & Restuccia 2002; 2006), the use of an RBC model with investment-specific technology shocks (Araújo 2012), the distinction between consumption and investment-goods-producing technologies (Ireland & Schuh 2008), and the use of a DSGE model with two types of financial shocks (Kaihatsu & Kurozumi 2014), etc. Furthermore, the model has also been developed based on the new Keynesian DGE model with sticky prices to analyze the business cycle in developing countries (Male 2009). It can thus be concluded that with respect to the standard RBC model, several literature reports have attempted to propose new shock issues, so as to describe business cycle fluctuations in short-run periods.

More recently, a standard RBC model was developed for the two-sector RBC model to handle specific issues, such as home production, the informal sector, capacity utilization, and international economics. Calibration of the RBC model with home production found that the number of OECD countries' tax-rate combinations that fall into the instability region rises when home goods account for a larger share of the aggregate consumption. It was also reported that persistent cycles could easily take place following a fundamental shock or even a "sunspot" shock (Xue & Yip 2018). With respect to the two-sector RBC model, volatility of the business cycle in both formal and informal sectors was analyzed for emerging countries (Horvath 2018). Also, an augmented RBC model with capacity utilization, investment adjustment cost, and indivisible labor was developed and utilized for analysis of the effects of temporary and permanent productivity shocks on the business cycle of hours worked and employment for a group of 15 emerging markets as well as for the United States (Coşkun 2019). Moreover, a two-country, two-sector international RBC model with investment and consumption goods sectors was developed with investment-specific technology shocks and used for an analysis of the volatility of the business cycle in emerging markets (Dogan 2019). At the same time, the two-countries RBC model was used to explain cross-country correlations between the loan rates, deposit rates, and loan premiums for both the United States relative to the Euro-area and the United States relative to China (Csabafi et al. 2019). Also, a medium-scale open-economy DSGE model was used for a comparative analysis of the volatility of Ethiopia's business cycle under interest rate and money growth rules, where it was found that the model with the money growth rule was essentially less powerful for the transmission of exogenous shocks originating from government spending programs, monetary policy, technological progress, and exchange rate movements (Melesse 2019).

According to the literature survey on research relating to short-term economic volatility in the case of Asia, many interesting findings were revealed from analyses of the stylized fact of the business cycles in Asian countries. For example, an analysis of a comprehensive set of stylized facts for business cycles in India from 1950 to 2010 implied that India looks similar to many advanced economies and less like other emerging market economies (Ghate et al. 2013). At the same time, an RBC model was used to mimic the Chinese business cycle from 1996 to 2005 (Li & Liu 2009). However, some disadvantages of the model have also been found, such as the RBC model is not supported and the new Keynesian model or the labor reallocation model was instead a good candidate to explain Japanese business cycles (Miyagawa et al. 2006). Also, it was found that the RBC model driven by both stationary and non-stationary productivity shocks was not successful at replicating some of the key features of the economic fluctuations in Turkey (Taştan 2013). Furthermore, an analytical issue called "synchronization" has also been widely researched. Such research includes a study on how it relates to business cycle correlations between countries in the Asia–Pacific region (Crosby 2003), another that allowed the degree of synchronization to fluctuate across the phases of the ASEAN-5's business cycles (Dufrénot & Keddad 2014), the synchronization of growth cycles between China, Japan, the United States, and other Asia-Pacific countries (Berdiev & Chang 2015), synchronization among 10 major East Asian countries (Huh et al. 2015), and the synchronization of key macroeconomic variables, such as gross domestic product, inflation, exports, and exchange rates within ASEAN countries (Sethapramote 2015). More recently, the DSGE model with asymmetric preferences, incomplete financial markets, and the terms of trade shocks was used to explain fluctuations of the stylized fact of the business cycle in China. It was also reported it could perform well for cases of a negative international co-movement of investment (Han 2019). Further delving into cases related to the agricultural sector, some simulation results derived from the use of a two-sector RBC model revealed that Thailand's agricultural business cycle has shown greater fluctuations than its non-agricultural business cycle has (Jaroensathapornkul 2010). On the other hand, a static general-equilibrium model with Stone–Geary preferences was used to describe how productivity shocks in the agricultural sector could generate large volatility in the industrial output of developing countries (Lee 2018).

From the above studies and up to the present time, both time series analysis in an econometric model and the microfoundation of macroeconomics model for analyzing short-term economic volatility in ASEAN countries have been continuously applied and

developed. Nevertheless, literature reports concentrated on fluctuations of the agricultural business cycle can be rarely found. The key features of the business cycles in the Asian economies were proposed by Kim et al. (2003), who found that the movements of the real business cycles of various Asian countries shared similar characteristics. At the same time, Jaroensathapornkul (2010) used the two-sector RBC model of Da-Rocha and Restuccia (2006) to replicate the stylized fact of agricultural business cycle volatility in Thailand between 1997 and 2007. However, the stylized fact of this research article is based on the annual data sets between 1975 and 2015, while those of Jaroensathapornkul (2010) were based on quarterly data sets between 1997 and 2007. Also, the simulation results in this research article were derived from a new data set of parameters. This is important as the extent of the body of research for the rest of the ASEAN-5 countries is still quite limited. The research findings discussed in this article, therefore reflect an effort to explain the impact of technology shocks on the agricultural and non-agricultural sectors to add to the literature related to the use of the RBC model in ASEAN-5 countries. The findings from this research lead to some policy implications for ASEAN-5 countries in order to promote economic strength in the agricultural sector. In addition, the present work expands the knowledge frontier toward ASEAN countries, especially from the date of the formal establishment of the ASEAN Economic Community in December 2015.

METHODOLOGY

Based on the previous literature, the research methodology is separated into two parts. In the first part, a theoretical model is outlined. The economic environment of the model can be schematically represented as involving the scarcity of resources, production, and preferences. Further, a standard RBC model was developed as a two-sector RBC model for the agricultural and non-agricultural sectors. Ultimately, with respect to the theoretical model, the dynamic stochastic optimization problems of the social planner can be presented. In the second part, a method for solving the theoretical model and the simulation procedures are presented. The theoretical models, i.e., linear-quadratic methods, for approximating the dynamic programming problems with the two-sector RBC model are summarized. Then, the simulation procedures are separated into three steps: parametrization or calibration, dynamic response, and experiment. These are explained in more detail below.

THEORETICAL MODEL

The two-sector RBC model developed and utilized in the present study was based on Da-Rocha and Restuccia (2002) with the notion that a representative consumer consumes agricultural and non-agricultural products in order to obtain maximum utility of these resources for their entire indefinite life under a certain economic environment as follows:

SCARCITY OF RESOURCES

In the model described as follows, the agricultural sector is represented by a and the non-agricultural sector is represented by n. The model's variables are counted per capita, while the number of the population at the start is equal to 1 $\left(L_0 = 1\right)$. Therefore, the number of population at time t $\left(L_t\right)$ is equal to $\eta^t L_0 = \eta^t$, which refers to population growth rate at time t. The scarcity of resources starts with a representative consumer consuming non-agricultural products $\left(c_{n,t}\right)$ combined with a representative firm increasing its capital goods or investing $\left(i_t\right)$ in an economic system not beyond non-agricultural products produced in a certain period of time $\left(y_{n,t}\right)$. At the same time, the representative consumer consumes agricultural products $\left(c_{a,t}\right)$ not beyond those produced in a certain period of time $\left(y_{a,t}\right)$ as demonstrated in the equations below:

$$c_{n,t} + i_t \leq y_{n,t} \tag{1}$$

$$c_{a,t} \leq y_{a,t} \tag{2}$$

The investment in the present period $\left(i_t\right)$ is the accumulation of capital stock for the following period of time $\left(k_{t+1}\right)$ as demonstrated by the equation below:

$$k_{t+1} = i_t + \left(1-\delta\right)k_t \tag{3}$$

where δ refers to the depreciation rate with the assumption that it is a constant value in any period of time and where capital stock $\left(k_t\right)$ is allocated for the agricultural and non-agricultural sectors as follows:

$$k_{a,t} + k_{n,t} \leq k_t \tag{4}$$

PRODUCTION

The aforementioned representative firm in the agricultural and non-agricultural sectors employs a production function, which exhibits a constant return to scale, under a certain technological level or Solow residual $\left(z_{i,t}; i \in \{a,n\}\right)$. Further, the technological level may be disturbed by external factors, i.e., so-called technological shocks $\left(\varepsilon_{i,t}; i \in \{a,n\}\right)$, the movement of which can be defined by a first-order autoregressive model as follows:

$$\begin{bmatrix} z_{a,t+1} \\ z_{n,t+1} \end{bmatrix} = \begin{bmatrix} \rho_{a,a} & \rho_{a,n} \\ \rho_{n,a} & \rho_{n,n} \end{bmatrix} \begin{bmatrix} z_{a,t} \\ z_{n,t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{a,t+1} \\ \varepsilon_{n,t+1} \end{bmatrix} \tag{5}$$

where $\begin{bmatrix}\varepsilon_{a,t+1}\\ \varepsilon_{n,t+1}\end{bmatrix} \sim N\left(\begin{bmatrix}0\\0\end{bmatrix},\begin{bmatrix}\sigma_{a,a}^2 & \sigma_{a,n}^2\\ \sigma_{n,a}^2 & \sigma_{n,n}^2\end{bmatrix}\right)$ and i.i.d..

The coefficient matrix in equation (5) reflects that the technological shocks propagate between the agricultural and non-agricultural sectors. In other words, the technological shocks in the agricultural (non-agricultural) sector have impacts on the technological level in the non-agricultural (agricultural) sector. This causes a volatility in the output of the agricultural $\left(y_{a,t}\right)$ and non-agricultural $\left(y_{n,t}\right)$ sectors. In addition, the conventional inputs in the agricultural sector include capital stock $\left(k_{a,t}\right)$, labor $\left(\pi_{a,t}\bar{h}_a\right)$, and the cultivated area $\left(t\right)$; while for the non-agricultural sector, they are capital stock $\left(k_{n,t}\right)$ and labor $\left(\pi_{n,t}\bar{h}_n\right)$, as shown in the equations below:

$$y_{a,t} = \lambda_a e^{z_{a,t}} k_{a,t}^{\mu}\left(\pi_{a,t}\bar{h}_a\right)^{\phi} t^{1-\phi-\mu} \tag{6}$$

$$y_{n,t} = \lambda_n e^{z_{n,t}} k_{n,t}^{\theta}\left(\pi_{n,t}\bar{h}_n\right)^{1-\theta} \tag{7}$$

where μ and θ refer to the capital share parameter in the agricultural and non-agricultural sectors, respectively, and ϕ refers to the labor share parameter in the agricultural sector. The probability that the representative consumer shall work in each production sector is represented by the symbol $\pi_{i,t}; i \in \{a,n\}$ and the number of average working hours in the agricultural and non-agricultural sectors is represented by $\bar{h}_i; i \in \{a,n\}$. In addition, the time invariant technology parameter is represented by $\lambda_{i,t}; i \in \{a,n\}$

PREFERENCES

The representative consumer is allocated a consumption of agricultural products $\left(c_{a,t}\right)$ and non-agricultural products $\left(c_{n,t}\right)$ as well as a resting time $\left(l_t = \left(1-\bar{h}_a\right)^{\pi_{a,t}}\left(1-\bar{h}_n\right)^{\pi_{n,t}}\right)$ to obtain maximum utility for their entire indefinite life by applying a utility function of each period of time $\left(U_t\right)$ as demonstrated in equation (8). The resting time combined with the average working time $\left(h_i; i \in \{a,n\}\right)$ is equal to 1 for each economic sector and the possibility that the representative consumer will choose to work in the agricultural or non-agricultural sector $\left(\pi_a, \pi_n\right)$ is collectively equal to 1 in each period of time, so the utility function is:

$$U_t = \left(\frac{b}{e}\right)\ln\left(\psi c_{a,t}^{e} + (1-\psi)c_{n,t}^{e}\right) + \left(1-b\right)\ln\left(l_t\right) \tag{8}$$

where e refers to the rate of substitution of the consumption of agricultural and non-agricultural products. The model refers to the second welfare theorem, whereby that allocation of such resources will create an optimal Pareto the same as resource allocation by a price mechanism. Further, the social planner will decide in the initial period their allocation of consumption $\left(c_{a,t}, c_{n,t}\right)$, capital stock $\left(k_{t+1}, k_{n,t}\right)$, and probability of working hours $\left(\pi_{a,t}, \pi_{n,t}\right)$ in the agricultural and non-agricultural sectors that will be sufficient for the representative consumer to attain their maximum expected utility for their entire life $\left(E_0\sum_{t=0}^{\infty}\hat{\beta}^t U\left(c_{a,t}, c_{n,t}, l_t\right)\right)$ under the equations and constraint inequalities (1)–(7). Therefore, the dynamic stochastic optimization problems can be expressed as follows:

$$\underset{\left\{c_{a,t}, c_{n,t}, k_{t+1}, k_{n,t}, \pi_{a,t}, \pi_{n,t}\right\}_{t=0}^{\infty}}{Max} \quad E_0\sum_{t=0}^{\infty}\hat{\beta}^t U\left(c_{a,t}, c_{n,t}, l_t\right)$$

, where $\hat{\beta}^t = \eta\beta$, and η and β represent the population growth rate and discount factor, respectively.

METHOD AND PROCUDURES

METHOD OF SOLVING

With respect to the linear-quadratic methods of approximating dynamic programming problems, first, it is necessary to find the variables at a steady state subject to $z_a = z_n = 0$ starting from the solution to maximize the above utility of the representative consumer. When solving the equation from the first-order condition, at steady state, the equation for the capital stock variables in the non-agricultural sector $\left(k_n\right)$ and agricultural sector $\left(k_a\right)$ will be as follows:

$$k_n = \pi_n\bar{h}_n\left(\frac{\xi+\delta}{\theta\lambda_n}\right)^{1-\theta} \tag{9}$$

where $\xi \equiv \frac{\eta}{\hat{\beta}} - 1$, and η and $\hat{\beta} = \eta\beta$ represent the discount factor and population growth rate, respectively. On the other hand, $\pi_n, \bar{h}_n, \delta, \left(1-\theta\right)$, and λ_n stands for the probability that the representative consumer will choose to work in the non-agricultural sector, the number of average working hours in the non-agricultural, the depreciation rate, the labor share parameter in the non-agricultural sector, and the time invariant technology parameter in the non-agricultural sector.

$$k_a = \frac{\mu k_n}{\theta}\left(\frac{s_a}{1-s_a}\right), \tag{10}$$

where $s_a \equiv \frac{p_a y_a}{p_a y_a + y_n}$, and can be identified as a percentage of GDP in the agricultural sector to total GDP. On the other hand, μ and θ represent the capital share parameters in the agricultural and non-agricultural sectors, respectively. Then, we use these to realize c_a, c_n, y_a, y_n, and i at the steady state subject to $z_a = z_n = 0$ (Da-Rocha & Restuccia 2002). Also, when wishing to get numeric figures, the parameter is substituted in the equation.

Then, to map the social planner's problem into a discounted stochastic optimal linear regulator problem, linear quadratic approximations are applied. First, we substitute the non-linear constraints into the objective function. Next, we perform a second-order Taylor series expansion around the steady state and define a transpose of a new state matrix, $\tilde{x}'$, as well as a transpose of a new control matrix, $\tilde{u}'$, as follows: $\tilde{x}_t' = \begin{bmatrix} 1 & \tilde{k}_{t+1} & \tilde{z}_{n,t} & \tilde{z}_{a,t} \end{bmatrix}$ and $\tilde{u}' = \begin{bmatrix} \tilde{k}_{n,t} & \tilde{\pi}_{a,t} & \tilde{\pi}_{n,t} & \tilde{i}_t \end{bmatrix}$. Then, to solve the new optimization problem, stochastic dynamic programming methods are used. We start by formulating Bellman's equation and guess that the value function is quadratic. Next, we solve for the value function by performing Ricatti equation iterations. The solution to the linear quadratic optimization problem is presented ultimately by a state-space representation (state equation and observation equation) (Hansen 1997).

SIMULATION PROCEDURES

Simulation procedures can be separated into three steps: parametrization or calibration, dynamic response, and experiment. In the first step, calibration is performed starting from defining the parameters, which can be categorized into 3 groups based on their origin: 1st group from the average of the figures in each country, 2nd group estimated by an econometric model, and the last group borrowed from previous literature (Table 3.). In the second step, simulation is performed starting from causing a technological shock to occur in the initial period. Basically, this is the so-called dynamic response. Then, we consider the convergence of the technology variable, After that, in the third step, we carry out the experiment by allowing this technological shock to occur in all periods of time and we analyze and compare the results with the stylized fact of each country before conducting a sensitivity analysis of the crucial parameter e.

RESULTS AND DISCUSSION

DYNAMIC RESPONSE

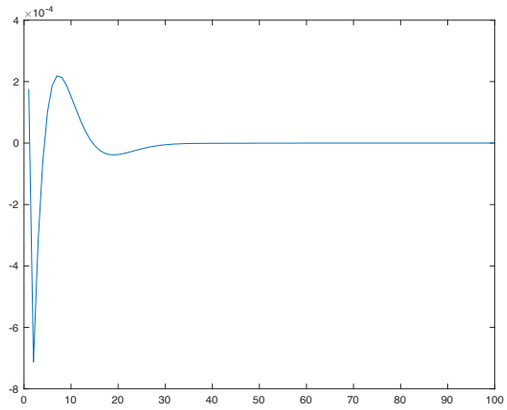
Upon experimentally creating a positive technology shock in the non-agricultural sector only in the initial period, it was discovered that the technology level response by the non-agricultural sector to such a shock followed a similar pattern in all the countries under investigation (Figure 2.). Further, the technology level was better in the early stage, but then converged to the level of a steady state, while the technology level response in the agricultural sector to such a shock showed a somewhat similar pattern in Indonesia, Malaysia, Thailand, and Vietnam. In particular, although the shock occurred in the non-agricultural sector, it could, however, still spill over to the agricultural sector. During the initial stage of such a shock, the technology level responded in a negative direction for a short period of time and then returned to a positive direction before converging to a steady state level. In the case of the Philippines, the technology level responded in the positive direction immediately and then converged to a steady state level. These discoveries in ASEAN-5 countries support the research findings for the cases reported for some Organization for Economic Cooperation and Development (OECD) countries and the United states, Thailand, India, and for the developing countries covered in Da-Rocha and Restuccia (2006), Jaroensathapornkul (2010), Emerick (2018), and Lee (2018), respectively, in studies assessing the impacts of shock on the agricultural sector. Apart from this, as the result of the dynamic responses, the cycles for the macroeconomic variables, namely capital stock, consumption, working hours, and output, in ASEAN-5 countries converged to the steady state in the long-run period. According to the experimental results above, this suggests that the theoretical model, i.e., the two-sector RBC model, for each country had enough credibility to take be taken on board for other experiments.

SIMULATION RESULTS

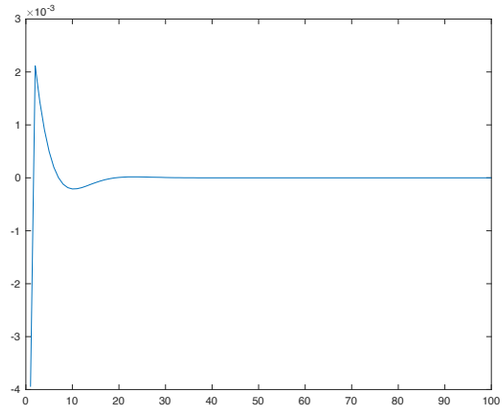
Upon allowing a technological shock to occur in all periods of time (100 simulated periods of time) and comparing the simulation results with the stylized fact of ASEAN-5 countries, it was revealed that the standard deviation reflected the volatility of the real business cycle, implying that the two-sector RBC model could reasonably well replicate the economic fluctuation in a real situation (Table 3). Further, in the cases of Indonesia, the Philippines, and Vietnam, it appeared that the agricultural business cycle showed lower volatility than the real business cycle and the non-agricultural business

cycle. This supports the research findings of Han and Kim (1999), who found that a financial shock would cause more damage to the non-agricultural sector than to the agricultural sector in terms of GDP and investment in Korea. On the other hand, in the case of Malaysia, although the model could not well simulate the volatility of the agricultural business cycle, it could, nevertheless, fairly well simulate the volatility of the non-agricultural business cycle to the extent that the volatility was lower than that of the agricultural business cycle. In the case of Thailand, although the model could not simulate the volatility of the non-agricultural business cycle, it could, however, adequately simulate the volatility of the agricultural business cycle similarly to the stylized fact. These experimental results confirmed the notion of the economists in the RBC school that the actual cause of volatility in the real business cycle is a technological shock that can propagate among the various economic sectors of each country.

Considering the coefficients of autocorrelation reflecting the persistence of the business cycle, it was revealed that in the cases of Indonesia, Malaysia, the Philippines, and Vietnam, the two-sector RBC model could replicate the stylized fact to the extent that the real business cycle and agricultural business cycle correlated with their respective Lag in the 1st period in a positive director (Table 4). This implied that the technology shock was embedded and correlated between three periods of time. In addition, upon considering the parameter for correlation reflecting the characteristics of the cycle and if it was procyclical or countercyclical, it was suggested that in all countries, the model could obviously simulate the stylized fact; that is, in all countries, the agricultural business cycle and the non-agricultural business cycle manifested as procyclical. This experimental result reflected how the agricultural business cycle and non-agricultural business cycle moved in the same direction with the

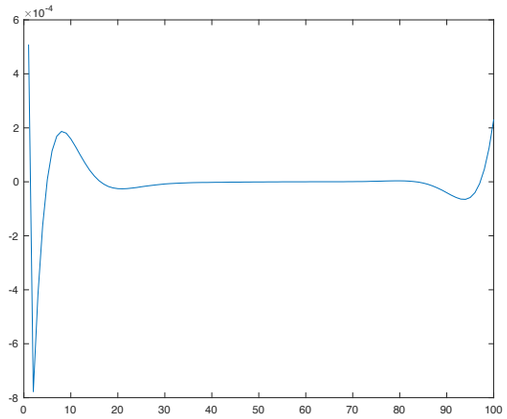


Agricultural sector

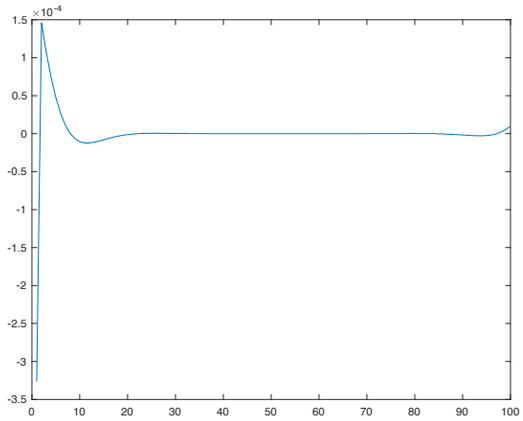


Non-agricultural sector

a. Indonesia



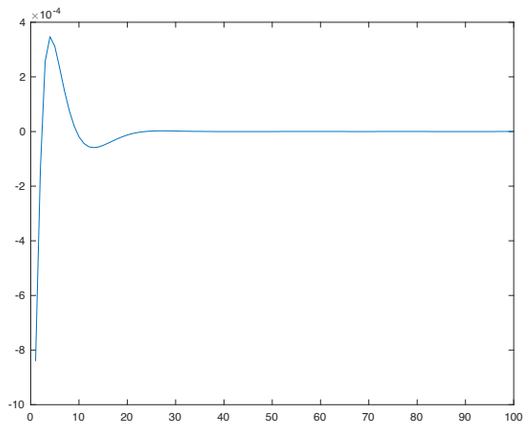
Agricultural sector



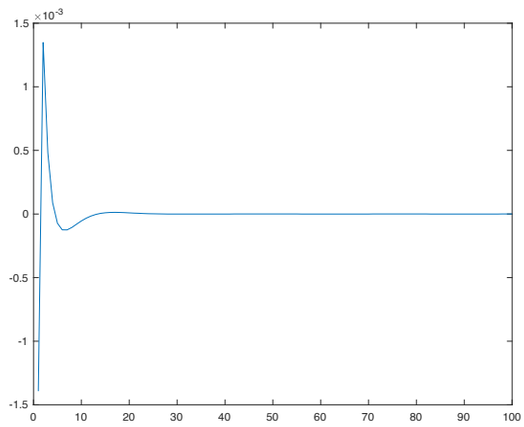
Non-agricultural sector

b. Malaysia

FIGURE 2. Dynamic response of the technology level toward one-standard-deviation of innovation in the RBC model

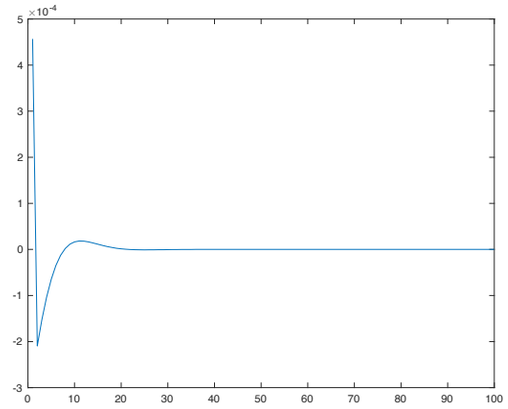


Agricultural sector

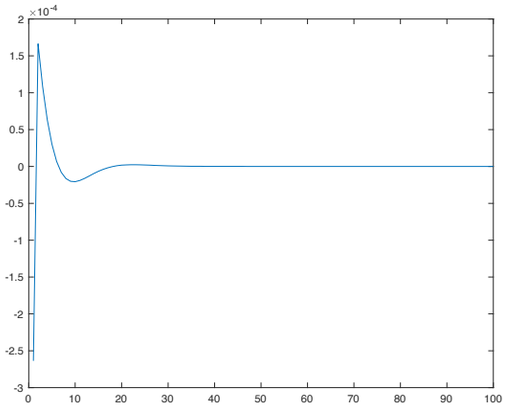


Non-agricultural sector

c. The Philippines

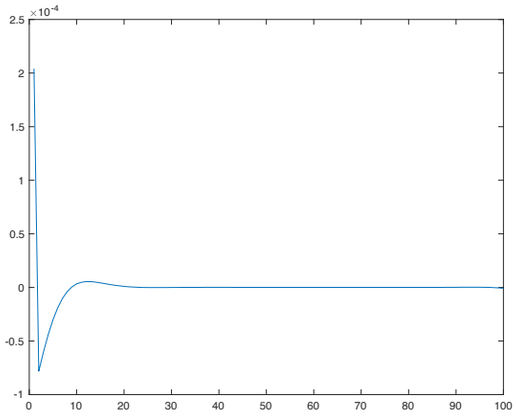


Agricultural sector

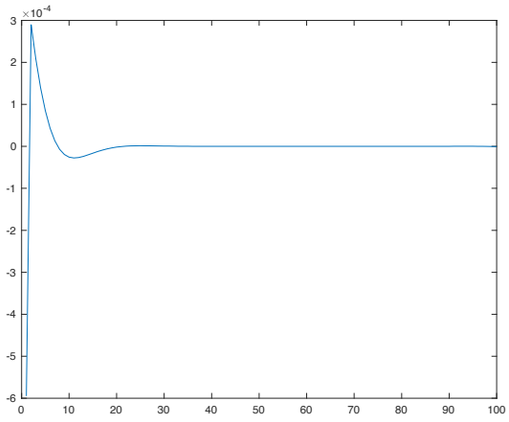


Non-agricultural sector

d. Thailand



Agricultural sector



Non-agricultural sector

e. Vietnam

Continues… FIGURE 2. Dynamic response of the technology level toward one-standard-deviation of innovation in the RBC model

TABLE 3. Parameterization

Parameter	Explanation	Indonesia	Malaysia	Philippines	Thailand	Vietnam
η	Population growth rate[a.]	0.0179	0.0229	0.0231	0.0134	0.0170
λ_a	Time invariant technology parameter in the agricultural sector[c.]	0.7209	0.3142	0.6527	0.8294	0.8691
π_a	Probability that the representative consumer will choose to work in the agricultural sector[a.]	0.4777	0.2082	0.4325	0.5496	0.5759
λ_n	Time invariant technology parameter in the non-agricultural sector[b.]	1	1	1	1	1
t	Cultivated area[b.]	1	1	1	1	1
$\overline{h}_a$	Number of average working hours in the agricultural sector[b.]	0.36	0.36	0.36	0.36	0.36
$\overline{h}_n$	Number of average working hours in the non-agricultural sector[b.]	0.5	0.5	0.5	0.5	0.5
ϕ	Labor share parameter in the agricultural sector[d.]	0.2543	0.0713	0.1702	0.1953	0.4617
$1-\theta$	Labor share parameter in the non-agricultural sector[d.]	0.5036	0.8892	0.4120	0.4959	0.4084
s_a	Percentage of GDP in the agricultural sector to total GDP[a.]	0.1606	0.1451	0.1400	0.1282	0.2481
$1-\phi-\mu$	Cultivated area parameter in the agricultural sector[b.]	0.1	0.1	0.1	0.1	0.1
$\rho_{a,n}$	Impact of a technological shock in the non-agricultural sector on the technology level in the agricultural sector[c.]	0.1458	2.5909	0.2690	0.0165	-0.0248
$\rho_{n,a}$	Impact of a technological shock in the agricultural sector on the technology level in the non-agricultural sector[c.]	0.0332	-6.20e-05	0.1959	0.0597	0.0868
$\rho_{n,n}$	Impact of a technological shock in the non-agricultural sector on the technology level in the non-agricultural sector[c.]	0.9146	1.0211	0.6120	0.8976	0.9310
$\sigma^2_{a,a}$	Variance of a technology shocks in the agricultural sector originating from a technological shock in the agricultural sector[c.]	5.10e-06	9.90e-05	2.04e-05	1.79e-05	1.65e-07
$\sigma^2_{a,n}$	Variance of a technology shock in the agricultural sector originating from a technological shock in the non-agricultural sector[c.]	-2.20e-06	-1.39e-07	2.57e-06	-1.74e-06	-2.91e-07
$\sigma^2_{n,a}$	Variance of a technology shock in the non-agricultural sector originating from a technological shock in the agricultural sector[c.]	-2.20e-06	-1.39e-07	2.57e-06	-1.74e-06	-2.91e-07
$\sigma^2_{n,n}$	Variance of a technology shock in the non-agricultural sector originating from a technological shock in the non-agricultural sector[c.]	3.88e-05	2.75e-07	7.52e-06	1.55e-05	7.78e-07
δ	Depreciation rate[e.]	0.10	0.10	0.10	0.10	0.10
β	Discount factor[e.]	0.96	0.96	0.96	0.96	0.96
ψ	Weight parameter between the consumption of agricultural and non-agricultural products[b.]	0.50	0.50	0.50	0.50	0.50
b	Weight parameter between consumption and leisure[b.]	0.36	0.36	0.36	0.36	0.36
e	Rate of substitution of the consumption of agricultural and non-agricultural products[b.]	0.52	0.52	0.52	0.52	0.52

Source: [a.] Author's calculations (Source of data: http://www.fao.org) [b.] Da-Rocha and Restuccia (2002). [c.] Author's estimations (The estimated First-Order Autoregressive Model from equation (5)). [d.] Author's calculations (Source of data: Malaysia, Thailand, and Vietnam: Average monthly earnings of employees, International Labor Organization (http://www.ilo.org), the Philippines: Average Daily Basic Pay of Wage Workers by Major Industry Group, the Philippines Statistics Authority (http://www.psa.gov.ph), Indonesia: Average of Net Salary per Month of Employee by Main Industry, National Labor Force Survey (http://www.bi.go.id/sdds), Employment in agriculture and non-agriculture, Food and Agriculture Organization of the United Nations (http://www.fao.org)). [e.] Zimmermann (1997).

real business cycle. This was particularly true for Indonesia and the Philippines, where the model could obviously simulate the stylized fact.

SENSITIVITY ANALYSIS

As the consumption rates of agricultural and non-agricultural products (e) are key parameters in the model and as they are derived from existing research, this study, therefore conducted a sensitivity analysis starting from 0.1 up to 0.6. The simulation results suggested that changes to those parameters could influence the standard deviation reflecting the volatility in the real business cycle, agricultural business cycle, and non-agricultural business cycle in the ASEAN-5 countries (Table 5). Furthermore, by considering an approximation of the standard deviation of the real business cycle, agricultural real business cycle, and non-agricultural real business cycle in the simulated model and those of the stylized fact, in the case of Indonesia, it was implied that parameter e should be in the range of 0.1–0.2 and 0.1–0.3 for the Philippines. This is because, in the case of Indonesia, if parameter e is greater than 0.2, the standard deviations of the real business cycle and agricultural real business cycle in the simulated model will not be able to replicate those of the stylized fact. On the other hand, in the case of the Philippines, the standard deviation of the agricultural real business cycle was around 2.598. However, when parameter e was increased from 0.3 to 0.4, the standard deviation of the agricultural real business cycle in the simulated model decreased from 2.418 to 1.833. Apart from this, parameter e was rather sensitive to volatility of the real business cycle in the cases of Thailand, Malaysia, and Vietnam. In the case of Thailand, when the parameter was increased to 0.6, the standard deviation of the real business cycle in the simulated model decreased from 3.527 to 0.565. At the same time, when the parameter was decreased to 0.4, the standard deviation of the real business cycle in the simulated model decreased from 3.527 to 0.565. It could be said then that such derived parameters (e = 0.52) were rather appropriate. On the other hand, in the cases of Malaysia and Vietnam, these

TABLE 4. Simulation results

a. Indonesia

	Stylized fact				
	SD[b.] (%)	Autocorrelation			Cor.[c.]
		Lag1	Lag2	Lag3	
Real business cycle	3.817	0.887	-0.320	-0.0001	1.000
Agricultural business cycle	1.410	0.612	-0.281	0.101	0.659
Non-agricultural business cycle	4.289	0.875	-0.309	0.004	0.998
	Two-Sector RBC Model[a.]				
Real business cycle	4.671 (0.442)	0.551 (0.089)	0.131 (0.106)	-0.117 (0.115)	1.000
Agricultural business cycle	1.827 (0.187)	0.503 (0.080)	0.104 (0.101)	-0.117 (0.113)	0.646 (0.088)
Non-agricultural business cycle	3.743 (0.331)	0.268 (0.112)	0.021 (0.101)	-0.098 (0.100)	0.929 (0.011)

b. Malaysia

	Stylized fact				
	SD[b.] (%)	Autocorrelation			Cor.[c.]
		Lag1	Lag2	Lag3	
Real business cycle	3.571	0.727	-0.216	0.040	1.000
Agricultural business cycle	2.900	0.441	-0.063	0.120	0.107
Non-agricultural business cycle	0.389	0.832	-0.243	0.004	0.991
	Two-Sector RBC Model[a.]				
Real business cycle	2.898 (0.587)	0.058 (0.290)	0.077 (0.147)	-0.081 (0.144)	1.000
Agricultural business cycle	6.950 (0.965)	0.025 (0.145)	0.123 (0.115)	-0.119 (0.111)	0.270 (0.415)
Non-agricultural business cycle	6.671 (0.944)	-0.201 (0.129)	0.123 (0.137)	-0.100 (0.125)	0.071 (0.422)

Continues…

c. The Philippines

	Stylized fact				
	SD[b.] (%)	Autocorrelation			Cor.[c.]
		Lag1	Lag2	Lag3	
Real business cycle	3.440	1.041	-0.485	-0.064	1.000
Agricultural business cycle	2.598	0.531	-0.152	-0.002	0.651
Non-agricultural business cycle	3.758	1.064	-0.520	-0.052	0.996
	Two-Sector RBC Model[a.]				
Real business cycle	3.629 (0.567)	0.537 (0.102)	0.112 (0.106)	-0.164 (0.099)	1.000
Agricultural business cycle	1.275 (0.119)	0.399 (0.106)	0.053 (0.108)	-0.157 (0.091)	0.527 (0.130)
Non-agricultural business cycle	3.629 (0.567)	0.298 (0.129)	0.028 (0.106)	-0.161 (0.097)	0.938 (0.014)

d. Thailand

	Stylized fact				
	SD[b.] (%)	Autocorrelation			Cor.[c.]
		Lag1	Lag2	Lag3	
Real business cycle	4.274	1.054	-0.312	-0.120	1.000
Agricultural business cycle	2.539	-0.013	-0.269	-0.041	0.411
Non-agricultural business cycle	4.687	1.038	-0.258	-0.156	0.997
	Two-Sector RBC Model[a.]				
Real business cycle	3.527 (0.493)	0.291 (0.185)	0.002 (0.108)	-0.188 (0.113)	1.000
Agricultural business cycle	2.743 (0.318)	0.352 (0.171)	0.025 (0.109)	-0.191 (0.121)	0.995 (0.001)
Non-agricultural business cycle	0.843 (0.240)	0.068 (0.167)	-0.093 (0.088)	-0.179 (0.094)	0.940 (0.027)

e. Vietnam

	Stylized fact				
	SD[b.] (%)	Autocorrelation			Cor.[c.]
		Lag1	Lag2	Lag3	
Real business cycle	2.781	0.588	-0.007	-0.469	1.000
Agricultural business cycle	2.515	0.404	-0.88	-0.456	0.854
Non-agricultural business cycle	3.045	0.680	-0.014	-0.431	0.987
	Two-Sector RBC Model[a.]				
Real business cycle	1.462 (0.272)	0.417 (0.148)	0.063 (0.134)	-0.152 (0.119)	1.00
Agricultural business cycle	0.222 (0.026)	0.491 (0.111)	0.099 (0.116)	-0.130 (0.120)	0.375 (0.223)
Non-agricultural business cycle	1.391 (0.278)	0.306 (0.159)	0.014 (0.129)	-0.148 (0.110)	0.989 (0.003)

Note: [a.] Number in parentheses denotes the simulation's standard deviation. [b.]SD denotes the standard deviation. [c.]Cor. denotes the correlation coefficient.

TABLE 5. Sensitivity analysis of *e* in the volatility of the real business cycle

a. Indonesia[a.]

Standard Deviation (%)	*e* = 0.1	*e* = 0.2	*e* = 0.3	*e* = 0.4	*e* = 0.52	*e* = 0.6
Real business cycle	2.589	3.875	4.185	4.513	4.671	6.108
	(0.597)	(0.614)	(0.702)	(0.541)	(0.442)	(0.759)
Agricultural business cycle	1.439	1.774	1.802	1.888	1.827	1.832
	(0.505)	(0.519)	(0.290)	(0.260)	(0.187)	(0.207)
Non-agricultural business cycle	1.751	2.904	3.275	3.600	3.743	4.599
	(0.570)	(0.624)	(0.804)	(0.738)	(0.331)	(0.608)

b. Malaysia[a.]

Standard Deviation (%)	*e* = 0.1	*e* = 0.2	*e* = 0.3	*e* = 0.4	*e* = 0.52	*e* = 0.6
Real business cycle	1.294	1.705	1.763	2.740	2.898	Na
	(0.616)	(0.636)	(0.519)	(0.784)	(0.587)	
Agricultural business cycle	1.301	2.000	2.508	4.473	6.950	Na
	(0.568)	(0.661)	(0.572)	(0.883)	(0.965)	
Non-agricultural business cycle	0.369	0.734	1.334	2.414	6.671	Na
	(0.033)	(0.100)	(0.144)	(0.363)	(0.944)	

c. The Philippines[a.]

Standard Deviation (%)	*e* = 0.1	*e* = 0.2	*e* = 0.3	*e* = 0.4	*e* = 0.52	*e* = 0.6
Real business cycle	3.760	3.961	3.980	3.881	3.629	4.812
	(0.937)	(0.472)	(0.504)	(0.535)	(0.567)	(1.247)
Agricultural business cycle	2.308	2.499	2.418	1.833	1.275	1.222
	(0.993)	(0.269)	(0.326)	(0.113)	(0.119)	(0.076)
Non-agricultural business cycle	2.467	2.581	2.903	3.271	3.629	3.941
	(0.962)	(0.447)	(0.679)	(0.750)	(0.567)	(1.303)

d. Thailand[a.]

Standard Deviation (%)	*e* = 0.1	*e* = 0.2	*e* = 0.3	*e* = 0.4	*e* = 0.52	*e* = 0.6
Real business cycle	2.585	2.943	3.557	2.901	3.527	0.565
	(0.352)	(0.489)	(1.495)	(0.752)	(0.493)	(0.083)
Agricultural business cycle	2.281	2.446	2.020	2.228	2.743	0.351
	(0.326)	(0.445)	(1.064)	(0.529)	(0.318)	(0.038)
Non-agricultural business cycle	0.344	0.652	1.576	1.025	0.843	0.338
	(0.070)	(0.140)	(0.477)	(0.278)	(0.240)	(0.039)

e. Vietnam[a.]

Standard Deviation (%)	*e* = 0.1	*e* = 0.2	*e* = 0.3	*e* = 0.4	*e* = 0.52	*e* = 0.6
Real business cycle	0.284	0.466	0.683	0.885	1.462	1.772
	(0.069)	(0.115)	(0.190)	(0.246)	(0.272)	(0.860)
Agricultural business cycle	0.112	0.158	0.188	0.210	0.222	0.198
	(0.015)	(0.023)	(0.023)	(0.028)	(0.026)	(0.022)
Non-agricultural business cycle	0.196	0.363	0.589	0.787	1.391	1.714
	(0.082)	(0.128)	(0.215)	(0.271)	(0.278)	(0.887)

Note: [a.]Number in parentheses denotes the simulation's standard deviation.

sets of sensitivity analysis could not render clarity of such a parameter e, especially in the case of Malaysia, as when $e = 0.6$, the model could not simulate the real number in the standard deviation, autocorrelation, or correlation coefficient.

CONCLUSIONS

During the period between 1971 and 2015, the stylized fact of the business cycles of Indonesia, Malaysia, the Philippines, Thailand, and Vietnam suggested that in all of the said countries, their real business cycles showed more volatility than that of their agricultural business cycles. This research study, therefore, aimed to simulate such a stylized fact using the two-sector RBC model developed by DA-Rocha and Restuccia (2002). The theoretical modeling was initiated by assuming that a representative consumer would consume both agricultural and non-agricultural products. From that point, the model utilized the second welfare theorem assuming the case of a social planner making a choice in the initial stage about the consumption of capital stock and working hours in the agricultural and non-agricultural sectors in order to allow a representative agent to achieve maximum utility for their entire life under certain economic constraints and technology shocks occurring in the agricultural and non-agricultural sectors. The mathematical methods applied for solving such problems for the social planner included linear quadratic approximations and stochastic dynamic programming methods.

The result of the dynamic response analysis suggested that the model was credible, as when a technology shock occurred in the initial period, it had influence upon the variables during such an initial stage and the variables then gradually converged to a steady state. By furthering the experiment by allowing the technology shock to occur in all periods, it was revealed that the model could still well simulate the stylized fact, in terms of the volatility of the real business cycle, agricultural business cycle and non-agricultural business cycle. In other words, although this model may be far from the real economic situation, it could, however, pretty well explain short-term economic volatility in ASEAN countries. It could be implied that a technology shock in the agricultural and non-agricultural sectors was correlated to each other and could have an influence upon economic volatility in the two such sectors. However, efforts to minimize such volatility through fiscal and monetary policy may not be the basic approach of the RBC school as such volatility occurs under the maximum utility of the representative agent. The government should therefore use their best efforts to manage public goods efficiently. Moreover, the result of the dynamic response implied that the positive impact on agricultural GDP in ASEAN-5 countries was derived from not only the positive technological shock in the agricultural sector but also in the non-agricultural sector. Therefore, in order to improve the technological level in ASEAN countries, the government should play a significant role in promoting research and development (R&D) by budget allocation and the use of tax instruments. Apart from this, some limitations of this study should be noted and addressed in future research, including: (1) Instead of the HP filter, the Baxter–King (BK) filter is another method for smoothing time series data. Conceptually, Baxter and King (1999) proposed a modification of the HP filter that provides a wider chance to remove a cyclic component of a time series data. (2) The two-sector RBC model focused on agricultural and non-agricultural sectors in ASEAN-5 countries could be developed into an international two-sector RBC model among heterogeneous countries. Last but not least, (3) parameterization could be improved for each country since several parameters in this research article were derived from the previous literature.

ACKNOWLEDGEMENT

This research article was financially supported by the Faculty of Economics, Srinakharinwirot University.

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Jurnal Ekonomi Malaysia 54(1) 2020 19 - 32
http://dx.doi.org/10.17576/JEM-2020-5401-2

Credit Card Usage and Inflation: A Case Study of a Small Open Economy

(Penggunaan Kad Kredit dan Inflasi: Satu Kajian Kes Ekonomi Kecil Terbuka di Malaysia)

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ABSTRACT

This study examined the influence of credit card usage on inflation in a small open economy, Malaysia. The existing studies used money supply, and bank lending as the key monetary determinants of inflation in Malaysia. These two variables had also been re-examined separately for comparison purpose. Other macroeconomic variables were economic activity and imports. The paper employs The Autoregressive Distributed Lag (ARDL) approach using time series data with monthly observations over 1997-2017. The results of this study showed that the price level, the imports and economic activity were cointegrated. In the long-run, credit card usage was more elastic than bank lending. The economic activity remained the most elastic determinant of price level. In the short-run, bank credit growth, and money supply growth determine the inflation. Meanwhile, imports growth and economic growth did not influence the inflation. The past inflation rates were found to be informative to the current inflation. Hence, this study suggested that inflation in Malaysia was due to 'too much financing'. This study also provided policy implications.

Keywords: Bank credit; credit card usage; cointegration; inflation; money supply

ABSTRAK

Kajian ini mengkaji kesan penggunaan kad kredit terhadap inflasi di sebuah ekonomi kecil terbuka di Malaysia. Kajian sedia ada telah menggunakan penawaran wang, dan pinjaman bank sebagai penentu kewangan utama bagi inflasi di Malaysia. Kedua-dua pemboleh ubah ini juga dikaji semula secara berasingan bagi tujuan perbandingan. Pemboleh ubah makroekonomi yang lain adalah aktiviti ekonomi dan import. Kertas ini menggunakan pendekatan Autoregressive Distributed Lag (ARDL) dengan data siri masa meliputi pemerhatian bulanan bagi tempoh 1997-2017. Hasil kajian ini menunjukkan bahawa tingkat harga, import, dan aktiviti ekonomi adalah berkointegrasi. Dalam jangka masa panjang, penggunaan kad kredit adalah lebih anjal daripada pinjaman bank. Aktiviti ekonomi masih kekal sebagai penentu paling anjal bagi tingkat harga. Dalam jangka masa pendek, pertumbuhan pinjaman bank, dan penawaran wang mempengaruhi inflasi. Sementara itu, pertumbuhan import, dan pertumbuhan ekonomi adalah tidak mempengaruhi inflasi. Kadar inflasi lepas didapati mengandungi maklumat terhadap inflasi semasa. Oleh itu, kajian ini mendapati inflasi di Malaysia adalah disebabkan oleh "terlalu banyak pembiayaan". Kajian ini juga membincangkan implikasi dasar.

Kata kunci: Pinjaman bank; penggunaan kad kredit; kointegrasi; inflasi; penawaran wang

INTRODUCTION

Inflation is generally defined as an average rate of increase in the overall price level of goods and services which is measured by the consumer price index (CPI) in a country over a respective period. It reflects an increase in the cost of living because of the falling in the value of fiat money. More generally, classical view considered inflation as a monetary phenomenon which was assumed to have happened in every country because there was "too much money" in the markets (Friedman, 1970). This was to say that an increase in money supply by the country would bring an increase in the general price level. Meanwhile, Keynesian theory (Keynes, 1936) postulated that when the increase in the aggregate demand exceeded the aggregate supply, the price level increased- under an assumption of full employment, a rise in consumption would result in higher aggregate demand by households, which consequently increased the general price level.

Figure 1 illustrates how Malaysia's inflation behaves historically from1960 to 2016. It was interesting to highlight that the country had recorded an unfavourable inflation episodes almost every decade from the mid-1970s to the late 2000s. The average inflation rates were about 14%, and 8.2% in 1973-1974, and 1980-198, respectively, in which the first inflation shock was due to the sharp world oil price increased that resulted in world inflation, while similarly external factors contributed to the second episode of the inflation. On 2nd June 1995,

Malaysia had initiated the so-called 'zero inflation' campaign that zero inflation could be achieved if prices of necessities remained stable; mentioning that zero inflation was not only desirable but also achievable. Indeed, Cheng and Tan (2002) had forwarded that Malaysia was able to maintain a stable and low inflation rate during 1988-1996. Additionally, as noted by Syarisa (2002) Malaysia's inflation rate hiked up from 2.7% in 1997 to 5.3% in 1998 due to the Asian financial crisis because of the increase in food prices. In the early 2000s, Malaysia's inflation rates were in the range of about 1-2%, and it had recorded 5.4% in 2008 because of the global financial crisis where the sub-prime mortgage and housing bubble had led to a banking crisis in the United States; that shock had been transmitted to the Malaysian economy (Abidin & Rasiah, 2009). The recent inflation rates in Malaysia were relatively *controllable* about 2-3% averaged per annum between 2010 and 2016. As noted by the Monetary Policy Statement by Bank Negara Malaysia on 12 September 2019, the average headline inflation year-to-date was 0.3%., and it was projected to average higher for the remaining months of the year and into 2020.

A fundamental concern forwarded by this study was that, according to a statement by the Bank Negara Malaysia (Central Bank of Malaysia), in 2017, "*Malaysia's inflation surges to its highest in 8 years and economists believed that the global oil price was the principal reason for the escalation of the inflation*".[1] As noted by Nolt, "*Inflation is better understood as too much credit chasing too few goods. The major cause of inflation through history is credit and not just money, expanding faster than real output*."[2] There were a few studies (e.g. Tang 2001a; Tang 2001b; Tang 2004) that looked at the effect of bank lending expansion on inflation in Malaysia. Their studies acknowledged this hypothesis. In fact, the widespread use of credit cards could increase trading efficiency, but would consequently result in inflation (Geanakoplos & Dubney 2010, p. 325). As of June 2017, there were about 3.6 million credit card holders in Malaysia, and their outstanding balance was RM36.9 billion where 7.3% or RM2.7 billion was overdue balance.[3] The number of credit card transactions had been increasing throughout the years from 359.6 million in 2015 to 383.8 million in 2016, and 406.5 million in 2017.[4] As such, there was a 6.73% increased from 2015 to 2016, and a 5.91% increased from 2016 to 2017 in credit card transactions, respectively. These statistics reflected a positive correlation between credit card usage and the inflation in Malaysia. Nevertheless, there were only two studies available (e.g. Geanakoplos & Dubney 2010; Yilmazkuday 2010) that examined this hypothesis about the effect of credit cards on inflation, but none in Malaysia. This study filled this gap.

This study aimed to explore the inflation (price level) behaviour in Malaysia by further considering the effect of credit cards usage as suggested by Yilmazkuday (2010). This study also re-estimated the effect of money supply and bank credit on inflation in Malaysia for comparison purpose. A feasible research question to be answered in this study was "*Does either too much money or too much financing (via credit cards) result in inflation in a small open economy, in Malaysia?"* The answer was '*too much financing via credit cards"*. This study found that credit card usage had increased Malaysia's inflation rate in the long-run. It was based on the long-run estimates of the Autoregressive Distributed Lag (ARDL) approach for monthly data between 1997 and 2017. Conversely, this study extended the body of knowledge of the Malaysian inflation that the existing studies in Malaysia had over-looked this variable, i.e. credit cards usage that financed households' consumption. Mansor (2000), Cheng and Tan (2002), Fahmi et al. (2008), Shahidan et al. (2012),

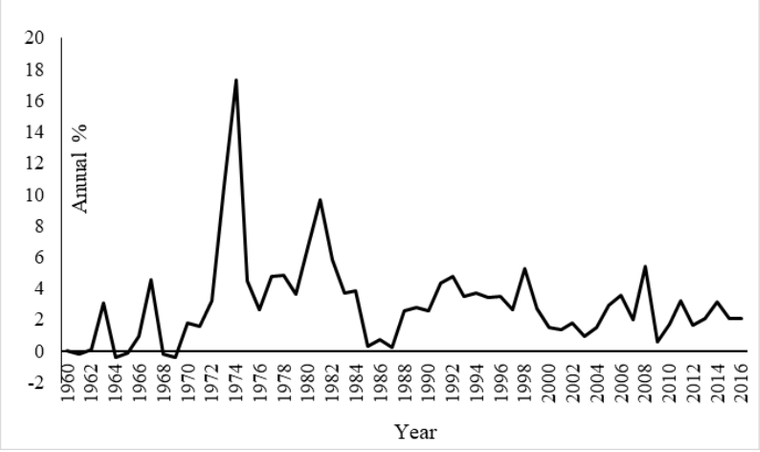


FIGURE 1. The Malaysian inflation, 1960-2016
**Source*: https://data.worldbank.org/

and Venkadasalam (2015) found the cointegration property of inflation (price) equations at the most to be the macroeconomic variables (e.g. money supply, interest rate, income, private consumption, government expenditure, exchange rate, trade balance and capital inflows). Maryam et al. (2014), and Rabiul et al. (2017) had directly estimated the inflation model without testing its cointegration. Abdul Majid (2007) only considered the causalities among money supply, industrial production index, and CPI, while Zaidi et al. (2016) was based on SVAR estimates. The existing studies had heavily trusted the traditional inflation (price) model where Milton Friedman was believed to have once said, "*Inflation is always and everywhere a monetary phenomenon".* They had examined the influence of money (e.g. money supply) as a fundamental determinant of inflation in Malaysia. Indeed, the potential influence of "finance" was ignored, except for Tang (2001a; 2001b; 2004) who had incorporated bank lending in order to estimate the inflation models in Malaysia. However, Tang (2001a) found that bank lending, and money supply M3 were statistically insignificant. This study applied credit card usage that assumed to finance the households' consumption as 'fresh' determinant of inflation in Malaysia, in the comparison of money supply, and bank lending. Undoubtedly, this study offered a better understanding of inflation determination to policy makers, especially to the central banker, Bank Negara Malaysia on monetary policy- that credit card usage was more feasible as policy instrument along with money supply, and bank lending.

The next section was about literature review for the selected studies, globally as well as those that examined the case of Malaysia. Section3 described the empirical inflation models, variables, and estimation procedure -ARDL (autoregressive-distributed lag) procedure. The empirical results were reported in Section 4 that included the cointegration tests, and both the long-run and short-run estimates. The major findings were summarised in Section 5 including a brief policy implication.

LITERATURE REVIEW

Over the past decades, inflation had been extensively studied as a fundamental economic topic by both theorist and empiricist, especially in modelling and estimating the macroeconomic determinants that explained inflation. One of the early studies was Laidler and Parkin (1975) entitled "Inflation: A Survey" in *The Economic Journal* that described the core concept of inflation where the role of money in co-ordinating economic activity ensured that changes in its value over time impinged upon the well-being of everyone. Generally speaking, most of the past studies were country-specific oriented, with empirical estimation of the macroeconomic determinants of inflation. This section looked at the recently published empirical studies on inflation around the world, in general, followed by the studies of inflation in Malaysia. Lim and Sek (2015) estimated inflation behaviour for a panel data of 14 high and 14 low inflation groups for the period 1970-2011. The results of dynamic panel autoregressive distributed lag (ARDL) tests suggested that GDP (gross domestic product) growth, and imports of goods and services had long-run impact on inflation in low inflation countries, while money supply, national expenditure, and GDP growth were found to be important in high inflation countries. In the short-run, none of the variables was significant in the high inflation group, but money supply, imports of goods and services, and GDP growth were significant to explain inflation in the low inflation group. Deniz et al. (2016) studied how inflation rates of an emerging panel data of 17 and 23 industrial economies (2002-2012) were affected by money growth, real effective exchange rate, budget balance, GDP growth, real wages, and output gap. Their results showed that the real effective exchange rate had a higher negative impact on inflation in the emerging economies than that of the industrialised economies. Money growth explained inflation in emerging economies, but was insignificant for industrialised economies. Demand for currencies of industrialised economies prevented the link from money growth to inflation. Real wage impacted inflation positively in emerging economies, but was negative for industrialised economies. Budget balance for emerging economies and inflation targeting industrialised economies had a negative implication on inflation, but had opposite sign for non-inflation targeting industrialised economies.

In a case study of India, Mohanty and John (2015) considered crude oil prices, output gap, fiscal policy, monetary policy, and intrinsic inflation persistence as the determinants of inflation that were to be examined. Their data covered quarterly observations between 1996/97 and 2013/14, where the structural vector auto regression (SVAR) model was applied. They found that the inflation dynamics in India had changed over time with various determinants showing significant time variation in the recent years, in particular after the global financial crisis. Alam and Alam (2016) found that wholesale price index, money supply, exchange rate, world oil price, and supply bottleneck (i.e. the difference between actual GDP and potential GDP) were cointegrated, in India. The study applied ARDL procedure for data between 1989/90 and 2012/13. Their empirical estimates showed that money supply, depreciation of the rupee, and supply bottleneck increased domestic price level in the long-run. A similar finding was obtained in the short-run.

Abbas and Seyyed (2016) employed simultaneous equations in order to examine the determination of inflation in Iran for the period 1975-2012. Money was found to be the main determinant of inflation, while budget deficit was through an increase in money

supply which indirectly affected inflation. The expected inflation rates resulted in inflation. Ellahi (2017) discussed the determinants of inflation in Pakistan based on the observations between 1975 and 2015. ARDL tests suggested a long-run relation among inflation, money supply, national expenditure, imports of goods and services, and GDP growth. More precisely, national expenditure, and imports of goods and services had a positive impact on inflation, but money supply and GDP growth had implied a negative impact on inflation. A study by Hossain and Mitra (2017) found that the U.S. inflation rate, unemployment rate, long-term interest rate, trade openness, budget deficit, money supply, economic growth, exchange rate were cointegrated over the period of 1978-2014. The long-term interest rate and trade openness had significant positive short-run effects on inflation rate, but no significant short-run trade-off was observed between inflation and unemployment rates. Also, Heim (2017) in his chapter entitled "*Determinants of inflation- the Phillips curve model*" found that the U.S. inflation was determined by unemployment, money supply, trade deficit to GDP, savings to GDP, foreign borrowing, and the oil price shocks of the 1970s.

Using the ARDL procedure, Bane (2018) investigated the determinants of inflation in Ethiopia from 1975 to 2015. Inflation in Ethiopia was found to be a monetary phenomenon (i.e. money expansion, government spending, and real interest rate) in the short-run and long-run, and could also be explained by structural factors (i.e. shocks to the real sector). The underlying variables were found to be cointegrated. Mohammad (2018) investigated the major determinants of inflation in Bangladesh. The determinants were categorised by monetary sector (i.e. money supply, and exchange rate), real sector (i.e. GDP), external sector (i.e. exports, and imports), and fiscal sector (i.e. government expenditure, and government revenue). These variables were cointegrated over the period of 1980-2016. In the long-run, GDP, and imports were the two major determinants of the country's inflation, while the government revenue and money supply had moderate effects. Exports, government expenditure, and exchange rate had negatively affected the Bangladesh's inflation. In the short-run, the previous year's inflation had a strong influence, and it was followed by the previous year's imports. Chaudhary and Li (2018) looked at the impacts of macroeconomic variables on inflation in Nepal from 1975 to 2016. The estimates of a multiple OLS (ordinary least square) regression model showed that Nepal's inflation was positively associated with broad money supply, and Indian prices, but negatively related to the real GDP. Muktadir-Al-Mukit (2018) examined both demand-side and supply-side factors causing inflation in Bangladesh. A long-run relation was confirmed between inflation and its determinants (i.e. real GDP, money supply, imports, interest rate, remittances, and exchange rate) for the period of 1977- 2014. In the long-run, all the variables were statistically significant with a positive sign, except for imports, remittances, and exchange rate that had a negative sign. The real GDP was found to be highly elastic. Also, the Granger non-causality tests suggested a unidirectional causality from money supply to inflation and from exchange rate to inflation. A bilateral causality was observed between inflation and GDP, inflation and imports, inflation and interest rate, and between inflation and remittance. Alnefaee (2018) employed Johansen and Julius cointegration tests (Johansen & Juselius 1990) and found a cointegration among inflation, money supply, domestic demand, exchange rate, and oil prices in Saudi Arabia for the period of 1987-2017. Inflation was positively explained by money supply, domestic demand, and oil prices, but it was negatively determined by the exchange rate in the long-run. Inflation in Saudi Arabia was also highly affected by money supply, and domestic demand in the short-run. The Granger non-causality tests supported a bi-directional causality between the money supply and inflation, while a unidirectional causality was observed from domestic demand and oil prices to price level. Using ARDL procedure, Adjei (2018) found a strong positive relationship between Ghana's inflation and money growth, both in the long run and short run. The results were based on the annual observations between 1965 and 2012. Inflation, broad money M2, imports of goods and services, domestic credit (to private sector), broad money to GDP ratio, and GDP per capita were found to be cointegrated.

Rehman et al. (2019) examined the nonlinear impact of oil prices and inflation on residential prices, which had also been included as a component of inflation in the U.S., the U.K., and Canada for the quarterly period from 1975 to 2017. The nonlinear autoregressive distributed lag (NARDL) results showed that oil prices, interest and inflation rates, and income had an asymmetric relationship with residential prices. Jongwanich and Wongcharoen (2019) estimated the determinants of producer and consumer price (CPI) inflation in 10 Asian countries for the period of 2000–2015. The study found that the external cost-push factors (oil and food prices) were more important in explaining producer price inflation than that of CPI, while demand-pull factors still explained much of the variation for the CPI inflation. More interestingly, Chen (2019) considered the GlaxoSmithKline (GSK) corporation as a sample and analysed the inflation risk and its determinants. The dependent variable, i.e. inflation rate was expected to be explained by the return on assets (ROA), return on equity (ROE), corporate governance index, Tobin's Q, Altman-Z score, GDP growth rate, and the unemployment rate. The macroeconomic determinants, i.e. GDP growth, and unemployment rate had a larger effect than that of the firm-specific factors in explaining the inflation rate (and inflation risks) faced

by GSK corporation. Al-Mutairi et al. (2020) examined whether inflation in Kuwait was influenced by exchange rate, interest rate, taxation, imports, current account, unemployment, GDP, and money supply or not for the period of 1979-2015. The multiple linear regressions showed that the country's inflation was positively affected by interest rate spreads, imports of goods and services, and money supply, but was negatively affected by tax revenue, and the current account balance. In fact, GDP and unemployment were found to be statistically insignificant.

For a small open economy, Malaysia, an early study by Tang (2001a) reviewed 9 studies (e.g. Lajman1975; Ministry of Finance 1978; Leong et al. 1976; Malaysia Institute of Economic Research, MIER1990; Dhakal & Kandil 1993; Merican et al. 1994; Wong 1995; Mansor 1996; Cheng & Tan 2000). The study employed an *ad hoc* inflation equation that related Malaysia's inflation (price level) to GDP, exports of goods and services, import prices, exchange rate, government expenditure, and oil price (Tang 2001a, pp. 276-277). There were more studies that aimed to re-examine the inflation (price level) behaviour in Malaysia with a set of macroeconomic determinants by employing the standard testing methods for cointegration (long-run), short-run estimates, and or non-causality (e.g. Mansor 2000; Cheng & Tan 2002; Abdul Majid 2007; Fahmi et al. 2008; Tang 2008; Tang 2001a; 2001b; 2014; Shahidan et al. 2012; Venkadasalam 2015; Zaidi et al. 2016; Rabiul et al. 2017).

Mansor (2000) examined the dynamic relationship between the consumer price index, and the effective exchange rates by considering a set of control variables, namely money supply M1, income (industrial production Index), and interest rate (3-month Treasury bill rate. The results of Johansen multivariate cointegration tests showed that the underlying variables were cointegrated over a period, from 1975 to 1997. The estimated long-run coefficients were in their expected sign as the theories said i.e. negative for income, and positive for money supply M1, and interest rate, respectively. However, the Ringgit effective exchange rate had a negative effect (between -0.96 and -0.78) where the depreciation had resulted in an inflation in Malaysia. Cheng and Tan (2002) re-examined the Malaysian inflation behaviour by considering more macroeconomic determinants, namely money supply M1, interest rate, income, private consumption, government expenditure, exchange rate, trade balance, capital inflows, the rest of ASEAN's inflation, and the rest of the world's inflation. They found that these variables were cointegrated for the period 1973-1997. More specifically, the exchange rate, and the rest of ASEAN's inflation had directly caused domestic inflation. Other variables (e.g. money supply, government expenditure, interest rate, and private consumption) had indirectly caused Malaysia's inflation. However, income, trade balance, capital inflow, and the rest of the world's inflation had no causal effect on Malaysia's inflation.

Abdul Majid (2007) investigated the inter-linkages (causality) among monetary aggregates (e.g. M1, M2 and M3), industrial production index, and the CPI in Malaysia for the period of 1979-2000. Toda and Yamamoto (1995) non-causality tests showed that monetary aggregates caused CPI, but no reversed direction. Fahmi et al.'s (2008) study found a cointegrating relation between money supply, and CPI for the period 1974-2006. Tang's (2008) study had also delivered a finding that aggregate price, money supply M2, and industrial production index were cointegrated during the observed periods of 1971-2008. Money supply and output were statistically significant in inflating the CPI. Also, the study confirmed a unidirectional causality from money supply to CPI.

Shahidan et al. (2012) estimated a price equation that related CPI to crude oil price, and the exchange rates. The results were based on the monthly observations between 2005 and 2012, and the price equation was confirmed to be cointegrated. In the short-run, the vector error correction model (VECM) showed that oil price affects inflation, and a bi-directional causality existed between the oil crude price and inflation. Maryam et al. (2014) found that GDP, government expenditure, imports, and interest rate had a negative relationship with inflation, while there was a positive sign for money supply. Venkadasalam's (2015) study documented that CPI, broad money, exports of goods and services, GDP, and household final consumption were cointegrated over the period of 1960-2012 as based on the results of Johansen multivariate cointegration tests. All of these determinants had a positive sign. Household expenditure was the most important factor with an estimated elasticity of 2.08, while money supply was the smallest (i.e. 0.347). The estimated elasticities of exports and GDP were 0.638, and 0.375, respectively. Zaidi et al. (2016) explored the effect of policy change on disaggregated inflation of 9 prices (food; beverages and tobacco; clothing and footwear; gross rent, fuel and power; furniture, furnishings and household equipment and operation; medical care and health expenses; transport and communication; recreation, entertainment, education and cultural services; and miscellaneous goods and services) in Malaysia for the sample period of 1982-2008. The SVAR estimates showed that a modest monetary policy shock resulted in varying degree of responses in disaggregated inflation. Rabiul et al. (2017) also studied the inflation determination in Malaysia by using annual observations between 1980 and 2014. The underlying determinants were money supply, exchange rate, and unemployment rate. The estimated regression equation showed that the dollar exchange rate and unemployment rate had a negative sign with -1.688, and -0.596, respectively. Surprisingly, money supply was statistically insignificant.

Nevertheless, there were a few empirical studies that considered the role of financial variable (i.e. financing) in explaining the inflation behaviour in Malaysia. For example, Tang (2001a) explored the influence of bank lending on CPI in Malaysia for the period 19731997. The results of ARDL tests showed that the price level in Malaysia was cointegrated with bank credit, import price, money supply M3, and real GDP. Import price, and real GDP were the major determinants in explaining the country's inflation in the long-run. However, bank credit and money supply M3 were statistically insignificant. By the same token, Tang (2001b) re-investigated a long-run relation of price level by adding interest rate to capture a monetary policy for the annual data 1968-1997. Other variables were as in Tang (2001a), namely money supply, imports price, bank credit, and domestic demand. These variables were found to be cointegrated. Interestingly, all the variables including interest price are statistically significant, and in their expected sign, except for money supply (i.e. in a negative sign). Similar work by Tang (2004) found that CPI, bank credit, imports, money supply M1, and the real GNP were cointegrated as the Johansen multivariate cointegration tests had suggested over the period from 1959 to 1997. However, money supply was found to be statistically insignificant, whereas bank lending, imports and GNP are statistically significant with their estimated elasticities of 0.23, 0.31 and -0.66, respectively.

Based on the literature review several gaps had been identified, in particular for the Malaysian context. First and foremost, money supply a traditionally theorised variable by the quality theory of money was found to be inconclusive. The past studies had heavily employed money supply while other important financial sector variable(s) were ignored such as bank credit, interest rate, and so on. 'Financing' might be a better explanatory variable to inflation than just 'money' in the era of globalisation as well as financial markets integration (liberalisation). Second, past studies had included as many variables as possible to estimate the inflation behaviour in Malaysia, but most of them were found to be statistically insignificant, and they had caused infeasible estimates due to huge loss of the degree of freedom in the estimated regression equation(s). Lastly, several studies had either partially or solely applied the non-causality tests randomly, which might not offer better understanding on the factors explaining inflation, or had priced level as "*an effect cannot occur before its cause"*– it was a concern about the 'effect' instead of the 'cause' by the policymakers.

There were two studies that had examined the influence of 'new' monetary variable (or financing) that was credit cards on the behaviour of inflation. The first study was based on a series of theorems theoretically developed by Geanakoplos and Dubney (2010) that credit cards had inflationary effects on price levels. They assumed an absence of monetary intervention, the widespread of credit cards increased trading efficiency, as well as the velocity of money, that would result in higher inflation rates. If, default on credit cards exists, the increased price levels would be greater i.e. there were less efficiency gains. Stagflation might be occurred, if the monetary authority did not cut efficiency below pre-credit card levels. The second study was an empirical work by Yilmazkuday (2010) that examined the volume of credit card transactions to explain inflation in Turkey, which was the credit channel of the monetary transmission mechanism. The study analysed the monthly data between 2002 and 2009 that depicted an implicit-targeting regime in 2002 as well as an explicit inflation targeting regime in 2006. The empirical results showed that credit card usage had a negative effect on inflation over the sample period. The study recommended that more policies are necessary on the credit channel, and that credit cards were being considered as a policy instrument. This study followed this fashion by looking at a case study in Malaysia.

RESEARCH METHODOLOGY

BASELINE MODEL – INFLATION MODEL

Over the past decades, the existing studies provided sufficient empirical ground on the relevant determinants that explained how inflation behaved. Quantity theory of money had long acknowledged the role of money in a baseline model of inflation. Friedman (1970) outlined the underlying assumptions that this monetarist model of inflation to take place. First, there is the role of mechanism in the market clearing, i.e. goods, labour, and money markets. Second, the respective economic agents behave rationally, and they are not suffering from the 'money illusion'. Thirdly, 'supply creates its own demand', and lastly, an economy is always in equilibrium with full employment. More technically, the association between money supply and inflation could be expressed as, where M is stock of money in circulation, $V$is velocity of money which is eventually small (assumed to be exogenous, and is fixed in respect to the equation), P is general price level, and Y is real income or economic activity that is assumed to be constantly given full employment. A value of is a total value of payments which should be made to which is the money value of national income or economic activities. Re-arranging P to the left-hand side, a price equation could be written in a form of which is positively related to the stock of money supply with one-to-one equivalent. That was an excess money supply by 10% in an economy would lead to domestic inflation by 10%, for example.

An alternative baseline model of inflation replaced 'money' by 'financing' that was the usage of credit cards

(Yilmazkuday, 2010) by the mean of credit channel of monetary transmission mechanism. It was expected to have a positive effect on inflation in Malaysia. For simplicity purpose, this study followed an *ad hoc* inflation model that was employed by Tang (2004, p. 7) which related CPI to money supply, commercial bank lending, value of imports, and real gross national product. The empirical equations (1), (2), and (3) considered credit card usage (CC), bank lending (BC), and money supplyM3, respectively with other two determinants, namely imports (IM), and income or activity variable (Y). These models incorporated demand-side variables that might affect inflation in a small open economy. The supply-side factors were assumed to be absent here as were also in previous studies because of their data unavailability, e.g. costs of production (prices of raw materials, wages, and so on), quantities supplied, and so on. Also, it was feasible to keep an inflation model as simple as possible by including a few regressors, in particular for Malaysia with small sample size in order to safeguard a sufficient degree of freedom. Meanwhile, this study used total imports instead of price of imports because the data is not available from International Financial Statistics (IFS) and Monthly Bulletin of Statistics, Bank Negara Malaysia. Imports in local currency captures the price effect i.e. import price and considered exchange rate element.

$$P_t = \beta_0 + \beta_1 CC_t + \beta_2 IM + \beta_3 Y_t + e_t \quad (1)$$

$$P_t = \beta'_0 + \beta'_1 BC_t + \beta'_2 IM + \beta'_3 Y_t + e'_t \quad (2)$$

$$P_t = \beta''_0 + \beta''_1 M3_t + \beta''_2 IM + \beta''_3 Y_t + e''_t \quad (3)$$

All the determinants were assumed to have a positive sign as postulated by the past studies (see, Tang, 2004). The variables were transformed into natural logarithm (*ln)*, so that the estimated coefficient could be interpreted directly as elasticity, and they could be compared among the equations (1)-(3). These equations avoided the potential multicollinearity bias among credit card usage, bank credit, and money supply those were expected to be strongly correlated. Tang (2001a; 2001b; 2004) incorporated both bank credit and money supply simultaneously; therefore, his results might be interpreted with caution.

DATA AND VARIABLES EXPLANATION

The variables used in this study were described in Table 1. The observations covered monthly data between 2007m1 and 2017m12 with 132 observations given their data availability. Table 2 summarises the statistics of the underlying variables that are presented in their raw values. More importantly, Table 3 reports the results of the unit root tests, namely the Augmented Dicky-Fuller (ADF)(Dickey & Fuller 1979) and Phillips-Perron (PP) (Phillips & Perron, 1988) in order to determine the degree of integration, *I*(d) of the underlying variables. Conversely, a *I*(0) time series variable indicated a time series that was stationary at levels, which fluctuated around a mean value with a tendency to converge to the mean. However, a *I*(1) variable was non-stationary at levels, but it became stationary after differencing once, and a *I*(2) variable was stationary after differencing twice. Conventional estimator such as OLS (ordinary least squared) on non-stationary variables would yield the so-called 'spurious' regression, in which the estimates were invalid. According to Engle and Granger (1987), if a linear combination of two or more non-stationary series was stationary *I*(0), or to say a cointegrating relation, OLS estimates (i.e. static) were valid, and an error correction model (ECM) could be estimated for the short-run (i.e. dynamic). This study found that the

TABLE 1.The variables

Variable	Measured by	Source
Price level, P	Consumer Price Index (CPI) captured the expenditure pattern of all households in Malaysia (2010=100).	Table 3.5.8, Consumer Price Index, Monthly Highlights and Statistics, Bank Negara Malaysia.
Money supply, M3	M3 is sum of M2 and deposits placed with other banking Institutions. It was reported in RM millions.	Table 1.3.1, Broad Money M3, as above.
Imports, IM	Retained imports- Its value was derived by deducting the estimated import value of re-exports of goods from the value of imports of goods (in RM millions).	Table 7.10 Imports by End-use, as above.
Income or economy activity, Y	Proxied by Industrial Price Index, an index that measures real output in the manufacturing, mining, public utilities such as electricity, gas and water, relative to a base year (2010=100).	Table 3.5.1 Industrial Price Index, as above.
Bank lending, BC	Both of commercial banks and Islamic banks. The data were measured in RM millions.	Table 1.7.2 Commercial Banks and Islamic Banks: Statement of Assets, as above.
Credit card usage, CC	Measured by the number of card transactions, in unit of millions.	Table 1.30 Credit Card Operations in Malaysia, as above.

Note: Money supply M3, imports, and bank lending were deflated by CPI.

TABLE 2. Summary statistics

	P	Y	CC	BC	M3	IM
Mean	106.4	111.0	6,606.0	959,742	1,180,036	38,959.8
Median	104.8	110.0	6,851.9	989,786	1,251,221	42,577.2
Standard Deviation	6.9	10.5	1,608.7	235,468	211,618	11,618.5
Minimum	99.3	88.4	3,525.1	560,928	781,377	3,568.0
Maximum	120.9	136.5	10,185.4	1,286,906	1,433,048	54,204.8

TABLE 3. Results of ADF and PP unit roots tests

Variable	ADF	PP	Degree of Integration, *I*(d)
$ln\mathrm{P}_t$	-2.136[2] (0.520)	-2.018[8] (0.586)	
$\Delta ln\mathrm{P}_t$	-8.261[1] (0.000)***	-8.155[4] (0.000)***	*I*(1)
$ln\mathrm{CC}_t$	-1.531[12] (0.813)	-7.871[5] (0.000)***	
$\Delta ln\mathrm{CC}_t$	-5.458[11] (0.000)***	-39.645[34] (0.000)***	*I*(0) / *I*(1)
$ln\mathrm{BC}_t$	-0.711[0] (0.999)	1.479[9] (0.999)	
$\Delta ln\mathrm{BC}_t$	-4.758[2] (0.000)***	-9.260[4] (0.000)***	*I*(1)
$ln\mathrm{M3}_t$	-0.463[0] (0.984)	-0.454[5] (0.985)	
$\Delta ln\mathrm{M3}_t$	-10.251[0] (0.000)***	-10.259[2] (0.000)***	*I*(1)
$ln\mathrm{IM}_t$	-3.503[1] (0.043)**	-3.058[3] (0.121)	
$\Delta ln\mathrm{IM}_t$	-13.632[0] (0.000)***	-13.633[0] (0.000)***	*I*(0) / *I*(1)
$ln\mathrm{Y}_t$	-1.752[11] (0.722)	-9.169[5] (0.000) ***	
$\Delta ln\mathrm{Y}_t$	-3.457[12] (0.011)**	-49.842[44] (0.000)***	*I*(0) / *I*(1)

Notes: ***, **, * denote significant level at 1%, 5% and 10% based on MacKinnon's critical value (MacKinnon, 1996) respectively. The constant and time trend was included into unit root regression for data at levels, while only constant for data at first differences. The reported value is *t*-statistic, value in square brackets [.] is optimum lag, and parentheses (.) for *p*-value. The null hypothesis for both tests is that the series has a unit root.

consumer price index (*ln*P), money supply (*ln*M3), and bank credit (*ln*BC) were stationary at first difference or *I*(1) as both the ADF and PP tests statistics reject the null hypothesis of a unit root (at least, at 10% level) for the first-differenced data. However, credit cards usage (*ln*CC), imports (*ln*IM), and real income (*ln*Y) were inconclusive between the two tests that credit cards usage, and real income showed *I*(1) by ADF tests, but PP tests suggested to be *I*(0). The opposite story was revealed for imports variable. These findings helped to determine the testing methods used for estimating both the long-run and short-run effects of the underlying variables on inflation determination in Malaysia as described in the next sub-section.

ESTIMATION PROCEDURE - ECONOMETRIC PROCEDURES

Given *ln*CC, *ln*IM, and *ln*Y were inconclusive between *I*(0) and *I*(1), ARDL (autoregressive-distributed lag) of bounds testing procedure proposed by Pesaran et al. (2001) was appropriate and employed by this study. Unlike the conventional cointegration methods (e.g. Engle & Granger 1987; Johansen & Juselius 1990) and by Jenkinson (1986) those required all of the underlying variables were *I*(1). The ARDL procedure could be applied irrespective of the regressors were *I*(0) or *I*(1), see Pesaran and Pesaran (1997, pp. 302-303). This approach could be carried out by an error correction version of ARDL equation which was written as (4).

where X is either credit cards usage (*ln*CC), bank lending (*ln*BC), or money supply (*ln*M3) a 'financing' or 'money' variable that to be tested. Other determinants were as defined in Table 1. The equation (4) was estimated by OLS estimator. A level (long-run) relationship among the underlying variables (*ln*P, *ln*X, *ln*IM, and *ln*Y) could be tested for the null hypothesis, (i.e. no level relationship) against the alternative hypothesis that (i.e. a level relationship) by running a

$$\Delta lnP_t = c + \sum_{i=1}^{n} \beta_{1i} \Delta ln\, P_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta\, lnX_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta\, lnIM_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta ln\, Y_{t-i} + \gamma_0 lnP_{t-1} + \gamma_1 lnX_{t-1} + \gamma_2 lnIM_{t-1} + \gamma_3 lnY_{t-1} + u_t \quad (4)$$

usual *F*-test (i.e. bounds tests). The respective statistical inferences were described as follows:

1. if the computed *F*-statistic exceeds the upper bound of the critical value band *I*(1) as in the Table F (Pesaran & Pesaran, 1997, p. 478), the null hypothesis can be rejected (at a conventional level of significant, 1%, 5%, or 10%) and the underlying variables are cointegrated (i.e. a long-run relation);
2. if the computed *F*-statistic falls below the lower bound of the critical value band *I*(0), the null hypothesis cannot be rejected, hence no cointegration among the variables (i.e. no level relationship) can be delivered; and
3. given the computed *F*-statistic is between the critical value band *I*(0) and *I*(1), no conclusion can be inferenced. It is a requirement to run a unit root test(s) in order to ensure the degree of integration *I*(d) among the variables are either *I*(0) or *I*(1), but not all *I*(0) or all *I*(1), and none of *I*(2) regressor(s).

An error correction version of the ARDL equation (4) captured the long-run and short-run models. The long-run model such as in equations (1)-(3) was captured by the bottom line of equation (4) , in which a long-run coefficient (or elasticity) of regressor X_t was calculated as $-(Y_1/Y_0)$, while $-(Y_2/Y_0)$ and $-(Y_3/Y_0)$ were for imports and income, respectively(see, Pesaran, Shin, & Smith, 2001, p. 294). By the way, these values were computed directly by *Eviews* statistical software.The estimated represented the coefficient of error correction term, ect_{t-1}, in which its statistically significant (i.e. in a negative sign) reaffirmed a long-run (or cointegrating) relation of inflation (price) equation. The upper line of equation (4) was the short-run model that the short-run coefficients were the estimated parameter of the first-differenced variables as denoted by Δ. The estimated were the short-run elasticities of X_{t-1}, and for imports, and for economic activity (income).

EMPIRICAL RESULTS

First of all, Table 4 presents the bound test *F*-statistics for the cointegration property among the underlying variables of price equations (1), (2) and (3), that are respectively based on the error correction version of ARDL equation (4). The computed *F*-statistics were 6.760, 5.426,and 8.939 for credit card usage, bank credit, and money supply M3, repectively that exceeded the critical upper 'bound' value *I*(1), 5.61 at 0.01 level of signficant. Therefore, the null hypothesis of no level relationship (i.e. no cointegration) was rejected indicating that the CPI price level in Malaysia, and its determinant either credit card usage, bank credit, or money supply, and imports, and economy activities (income) were cointegrated (i.e. moving together) in the long-run. That was to achieve its equilibirum among the variables.

Table 5 reports the estimated long-run estimates of price equations (1), (2), and (3) by the ARDL procedure (equation 4) given the presence of a cointegration relation of the respective price equations. It was interesting to tell that credit card usage, and bank credit were statistically

TABLE 4. ARDL *F*-statistics bound test for cointegration

Equation (1): F(*ln*P | *ln*CC, *ln*IM, *ln*Y) = 6.760***		
Equation (2): F(*ln*P | *ln*BC, *ln*IM, *ln*Y) = 15.426***		
Equation (3): F(*ln*P | *ln*M3, *ln*IM, *ln*Y) = 8.939***		
Critical values (k=3)	*Lower bound, I*(0)	*Upper bound, I*(1)
10%*	2.72	3.77
5%**	3.23	4.35
1%***	4.29	5.61

Notes: k is the number of regressors. Given a sample of 132 observations (1997-2017), a lag length of 12 is included ARDL (3,1,0,0) suggested by SIC(Schwarz Information Criterion). Null hypothesis is no levels relationship.

TABLE 5. Long-run estimates of price equation

Variable	Equation (1)	Equation (2)	Equation (3)
$lnCC_t$	0.201(0.028)**	-	-
$lnBC_t$	-	0.128(0.036)**	-
$lnM3_t$	-	-	0.177(0.166)
$lnIM_t$	-0.014(0.498)	0.005(0.784)	0.005(0.847)
lnY_t	0.460(0.017)**	0.350(0.014)**	0.542(0.017)**
Constant	0.928(0.146)	1.283(0.002)***	-0.331(0.774)

Notes: ***, **, * denote significant level at 1%, 5% and 10% based on MacKinnon's critical value respectively. The value in (.) is *p*-value. The trend specification assumes a restricted constant and no trend.

significant, but it was not the case for money supply M3 which was supported by previous studies (Tang 2004; Rabiul et al. 2017; Venkadasalam 2015) that found money supply had the smallest impact on CPI in Malaysia then of other included determinants. The results showed that credit card usage variable was found to have a higher elasticity (0.201) than that of bank credit (0.128). This finding was important to affirm that *there is too much financing by credit card for inflation in Malaysia.* Meanwhile, imports variable was statistically insignificant for the three long-run relations. It indicated that the so-called 'imported-inflation' was not the case for the country. More generally, economy activity (or real income) was found to be the most influential determinant of CPI price level in Malaysia, with the estimated elasticities between 0.35 and 0.542. This explained a trade-off between inflation and economic growth (Behera, 2014), that an increase in real income resulted a higher purchasing power that increased households' consumption which would contribute to a higher aggregate demand that consequently demand '*pulled*' the price level to a higher new level of market equilibrium.

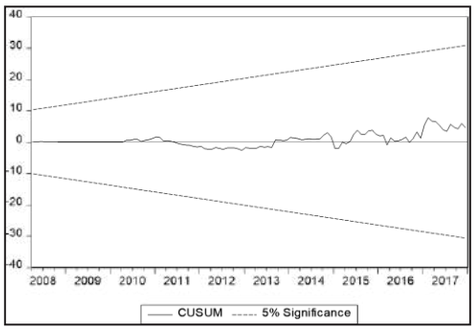
Table 6 reports the short-run (static) component of equation (4), or more formally the estimated error correction model (ECM) that the short-run elasticities were captured by their first-differenced variables (as labelled Δ), and their past inflation rates. The three ECMs were in a parsimonious form of ARDL (3, 1, 0, 0) as selected by SIC that the 'least important' determinants (regressors) were dropped out systematically, e.g. economic growth ($\Delta ln Y_t$), and imports growth ($\Delta ln IM_t$) in the short-run. The R^2 of the estimated ECMs were relatively low between 21% and 39%, but feasible as there were no severe problems with a number of diagnostic tests. The statistics of Durbin Watson test, Breusch-Godfrey Serial Correlation LM test, and Ramsey RESET test revealed that the estiamted ECM equations were free from autocorrelation, serial correlation, and general specification erros. The plots of CUSUM tests suggested that the test statistics were within the 5% bands that the estimated parameters of ECMs were stable over the sample period.

The estimates showed that in the short-run, bank credit growth, and money supply M3 growth were statistically significant in explaining the Malaysian inflation ($\Delta ln P_t$), except for the credit card usage growth. It still acknowledged the role of money supply in explaining the country's inflation, but in the short-run. Unexpectedly, both bank credit growth, and money supply growth were in the negative sign i.e. -0.241, and -0.109 respectively, which could be explained by the intuition that inflation was because too much money in the long-run, but remained ambiguous in the short-run. It highlighted their potential interactive effects in the short-run with other relevant variables, those not implemented in this study. The past one and two months inflation rates were statistically significant with a net positive effect (i.e. 0.06 = 0.306 -0.246) on the current inflation rate. Lastly, the estimated error correction term, ect_{t-1} was statistically significant at 1% level with a negative sign that reaffirmed a cointegrating relation of equations (1), (2), and (3) as suggested by the *F*-statistics (bounds tests) in Table 4. Its estimated coefficient captured the speed of adjustment that any disequilibrium in the short-run would be corrected by 3.2%, 3.7%, and 2.4% per month towards an equilibrium (i.e. 100%), respectively. With the bank credit variable (equation 2), the long-run relation was achieved in 2.25 years, which was quicker than the credit card usage (2.6 years), and money supply (3.47 years).

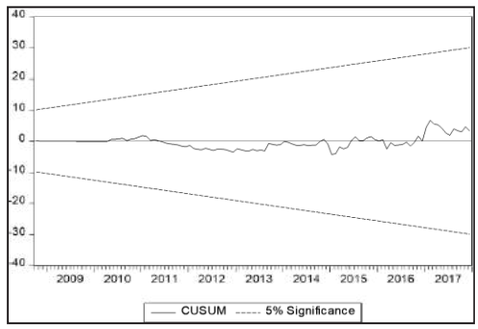
TABLE 6. Error correction equations (dependent variable: inflation rate, $\Delta ln P_t$)

Variable		Equation (1)	Equation (2)	Equation (3)
$\Delta ln P_{t-1}$		0.306 (0.000)***	0.291 (0.000)***	0.277 (0.001)***
$\Delta ln P_{t-2}$		-0.246 (0.004)***	-0.183 (0.014)**	-0.235 (0.004)***
$\Delta ln CC_t$		-0.002(0.549)		
$\Delta ln BC_t$			-0.241(0.000)***	
$\Delta ln M3_t$				-0.109 (0.000)***
ect_{t-1}		-0.032 (0.000)***	-0.037 (0.000)***	-0.024 (0.000)***
Adjusted R^2		0.208	0.389	0.273
Durbin-Watson		1.954	1.902	1.942
LM test (*F*-statistics)	1 lag	0.274 (0.602)	0.942 (0.334)	0.350 (0.555)
	2 lags	3.555 (0.032)	0.588 (0.557)	2.447 (0.091)
	3 lags	1.772 (0.139)	-	1.654 (0.181)
Reset test (*F*-statistics)	1 lag	0.002 (0.968)	0.090 (0.765)	0.036 (0.850)

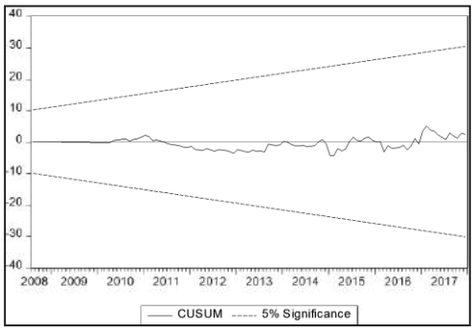
Notes: Their lag specification is based on ARDL (3, 1, 0, 0) for ARDL (*ln*P|*ln*X, *ln*IM, *ln*Y) as has been suggested by SIC, see Notes, Table 4. The estimated coefficients are reported with *p*-value in (.). ***, and **denote significant level at 1%, and 5% of *t*-statistics, while the coefficient of ect_{t-1} is based on MacKinnon's critical value respectively. The constant and time trend was included into unit root regression for data at levels, while only constant for data at first differences. LM test refers to Breusch-Godfrey Serial Correlation LM test.(Godfrey, 1996). Reset test is the Ramsey RESET test (Ramsey, 1969).



Estimated ECM equation (1)



Estimated ECM equation (2)



Estimated ECM equation (3)

FIGURE 2. Plots of CUSUM tests

SUMMARY AND CONCLUSIONS

This study contributed to the existing literature by investigating further the influence of 'financing' pertaining to credit card usage on price level (inflation) for a small open economy, Malaysia. The traditional monetary variable- money supply M3, and the 'financing' variable- bank lending, were included for analysis separately for comparison purpose. Other conventional determinants of inflation that were included were economy activity (real income) and imports.

This study answered the research question, "*Does either too much money or too much financing (i.e. credit cards) results inflation in Malaysia?"* The answer was *"too much financing"*, especially credit cards usage, and bank lending rather than that of money supply that generated higher price level of goods and services in Malaysia in the long-run. This was labelled as 'credit inflation' which eventually increased the households' purchasing power that pushed up the current demand for goods and services, and resulted in higher price level at the new equilibrium level of the market(s).

The main findings obtained from this study could be summarised as follows: (1) Credit cards usage as well as bank lending, and money supply M3 were cointegrated with the price level, real income, and imports in Malaysia; (2) Credit cards usage was the most dominant factor explaining the price level behaviour in Malaysia's inflation than by bank lending in the long-run;(3) Surprisingly, the money supply M3 had no role in the long-run, and was negative in the short-run; (4) Real income, indeed was the most influential (positive) factor among others in the long-run; and (5) Real imports variable had no influence on the Malaysian price level in both the long-run and short-run.

In view of policy implication, the monetary authority- Bank Negara Malaysia was in a feasible position to stabilise (reduce) the price level in the country that was to maintain (lower) the people's cost of living by implementing appropriate policies on credit cards, in particular on its usage. Indeed, Bank Negara Malaysia had announced several new measures in 2011 to ensure reasonable financial and debt management among credit card users including a review on the eligibility requirements for credit cards. For example, minimum income eligibility for new credit card holders at RM24,000 per annum, and the maximum credit limit.[5] Furthermore, 'enhancing' macroeconomic (i.e. aggregate demand) as well as microeconomic (i.e. consumer behaviour) policies for households were needed since this study finds that lower credit card usage was expected to have positive implication on the inflation in Malaysia. On the other hand, fiscal policies that could be acted in order to smooth the long-run economic growth might help to stabilise the price level. A raise of tax was expected to lower the consumption by households, and also to increase the government's

revenue. This scenario would eventually reduce the budget deficits.

There were a few drawbacks that could not be avoided in this study. First, some other conventional determinants were excluded in this study such as interest rate, government spending, unemployment rate, oil price, exchange rate volatility and so on. There were also the supply-side variables such as the costs of production (i.e. wages, prices of raw materials and so on). Secondly, this study applied the testing methods without considering the potential of threshold specification. In fact, some variables might have their effects on the price level if they were above a threshold. It might explain the reason why money supply M3 was found to be statistically insignificant in the long-run where the conventional fashion-quantity theory of money had illustrated that the more money, the higher the price level, and this had a negative short-run elasticity. Further research should consider other relevant variables as outlined above, for a richer price equation. Appropriate threshold techniques could be applied, in which the threshold levels of credit card usages, bank credit, and money supply M3 determined that to take effect on the price level or inflation for Malaysia.

ACKNOWLEDGEMENT

We would like to acknowledge that this study is from the first author's Graduation Exercise (EIA3005) Session 2017/2018 entitled "*Does Too Much Money or Too Much Finance Cause Inflation in Malaysia?*" for fulfilling the Bachelor's Degree in Economics at the Faculty of Economics and Administration, University of Malaysia.

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Jurnal Ekonomi Malaysia 54(1) 2020 33 - 42
http://dx.doi.org/10.17576/JEM-2020-5401-3

The Trade Competitiveness of Palm-Biodiesel in Renewable Energy Market

(Daya Saing Perdagangan Biodiesel Sawit di Pasaran Tenaga Boleh Diperbaharui)

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ABSTRACT

Following the decline of Malaysian biodiesel export revenue since 2009, the value has been fluctuating in recent years amid fierce global competition. Thus, it is important to assess the competitiveness of Malaysia-produced biodiesel. In comparison to other major biodiesel-producing countries including Indonesia, the United States of America, and Germany. Hence, this paper aimed to investigate the competitiveness of the Malaysian biodiesel industry based on the Relative Trade Advantage (RTA) indices with respect to the main competitors. Data from 2012 to 2016 were analyzed for selected biodiesel commodities. The RTA index indicated that Malaysia could potentially grow further despite being a minor producer. Hence, there is a need to strengthen the palm oil industry as it can be a definite source of higher export earnings.

Keywords: Competitiveness; palm oil; biodiesel; Relative Trade Advantage (RTA)

ABSTRAK

Hasil pendapatan eksport biodiesel dilihat semakin merosot dan menunjukkan trend yang tidak stabil sejak 2009. Oleh itu, adalah penting untuk menilai industri biodiesel di Malaysia masih mempunyai daya saing yang positif diperingkat antarabangsa atau sebaliknya. Artikel ini bertujuan untuk mengkaji daya saing Malaysia bagi produk biodiesel berdasarkan indeks kelebihan perdagangan relatif (RTA) berbanding dengan negara pegeluar utama produk biodiesel. Antara negara pengeluar biodiesel yang utama termasuk Indonesia, Amerika Syarikat dan Jerman. Data tahunan dari tahun 2012 hingga 2016 digunakan untuk tujuan analisis bagi komoditi biodiesel terpilih. Hasil kajian ini menunjukkan bahawa Indeks RTA bagi Malaysia mempunyai nilai positif. Ini bermaksud Malaysia mempunyai potensi untuk berkembang walaupun merupakan pengeluar kecil. Sehubungan itu, terdapat keperluan untuk mengukuhkan industri biodiesel di Malaysia, kerana ia dapat menjadi sumber pendapatan eksport yang lebih tinggi.

Kata Kunci: Daya saing; kelapa sawit; biodiesel; Kaedah Kelebihan Perdagangan Perbandingan

INTRODUCTION

The rise in fossil fuel prices caused by high demand has led the global oil industry to seek for alternative sources of fuel from renewable energy sources (e.g., biodiesel, bioethanol, biomethanol, and biohydrogen). Biodiesel is made in a chemical process called transesterification in which organically derived from combination of both vegetable oils or animal fats with an alcohol to form fatty esters with some chemical alteration, as for example polyethylene glycol esters trimethyl, propane esters and Methyl ester (Yusuf et al. 2011; Singh & Singh 2010).

Biodiesel is associated with the ability to reduce carbon monoxide emission and particulates, while degrading at a much faster rate than normal diesel fuel (Zhang et al. 2003; Demirbas 2007). The oils that most commonly used for its production include the following vegetable oils: soybean, palm, sunflower, rapeseed,

cottonseed, peanut, and Jatropha (Singh & Singh 2010). International practices have lead to the use of a single nomenclature for the identification of biodiesel volume percentage in the diesel mixture. More specifically, B5, B10, and B100 are fuels with a concentration of 5%, 10%, and 100% of biodiesel, respectively (Yusuf et al. 2011).

Furthermore, palm oil is particularly known for its far better potential as the main feedstock for biodiesel production compared to other vegetable oils (Rahyla, Firdaus & Purwaningrum 2017). Such association is attributable to its production to be the most productive in terms of land use. Palm oil covers just 0.3% of agricultural land worldwide and yet has the highest yield compared to any other oilseed crops (MPOC 2019). For example, a global output of 65 million tons of palm oil in 2016 required the cultivation of merely 15 million hectares in comparison with a staggering 194 million hectares needed to produce 87 million tons of oil from soybean and rapeseed crops. Therefore, this renders oil palm plantations as having the highest oil yield per hectare compared to other vegetable oil crops. Figure 1 illustrates palm oil yield from palm plantations as ten times higher than that of soybean plantations and six times higher than rapeseed crops.

In particular, Malaysia is the second-largest supplier of palm oil in the global market after Indonesia and has supplied approximately 30% of the global export market, in contrast Indonesia's 60% dominance. However, the country is not among the top biodiesel producers, as seen in Figure 2. The United States is the world largest biodiesel producer; in 2016, it produced 5.5 billion liters. Meanwhile, Brazil produced 3.8 billion liters in that same year. Both countries utilize soybean as their biodiesel feedstock. In contrast, four European Union (EU) countries (i.e., Germany, France, Spain, and Belgium) produced more than 6 billion liters in 2016 and used rapeseed oil as their main feedstock. The neighbouring country of Indonesia ranked fourth in that same year by producing 3 billion liters of biodiesel and used palm oil as the major feedstock.

Figure 2 leads to the question whether Malaysia is competitive in biodiesel production. Despite the large production of palm oil (i.e. world's second-largest producer and exporter), why is the country not one of the top scorers in biodiesel production? Previously in 1982, Malaysia embarked on a comprehensive palm oil biofuel program through the aggressive stance of the Malaysian Palm Oil Board (MPOB). As a result, the government of Malaysia established the NBP (National Biofuel Policy) in 2006 to promote sustainable production and utilization of environmentally-friendly biofuel use of the five percent blend mandate (B5). The nomenclature indicates 5% biodiesel and 95% petrodiesel mixture, which serves as fuel for the transportation and industrial sectors. Apart from domestic consumption, local palm biodiesel has also been exported, which is mainly to the EU, Asia, and the USA. As of 2017, 16 biodiesel plants in Malaysia were operating with a total production capacity of 2.34 billion liters per year. However, domestic production of biodiesel recorded merely 0.907 billion liters, which were significantly below the full annual capacity.

Regardless, it remained to be seen that Malaysia's biodiesel exports increased from 95 thousand tonnes in 2014 to 180 thousand tonnes in 2015. The increment was partly due to the declining export supply from Indonesia due to their government-sanctioned increased local biodiesel consumption in 2015. Moreover, the devaluation of Malaysian currency relative to major trading currencies in 2015 was an additional factor resulting in biodiesel exports being cheaper in terms of the United States (US) dollar. As a result, the quantity of biodiesel exported by Malaysia increased. However, the export volume declined by about 50% to 80 thousand tonnes in 2016, whereby the export value was down by 48.8% to RM247.70 million in 2016 compared to RM483.57 million in 2015 (Figure 3). The decline in biodiesel exports in 2016 was mainly due to lower demands from the EU as a result of higher domestic soybean oil (SBO) usage as feedstock. That year, it

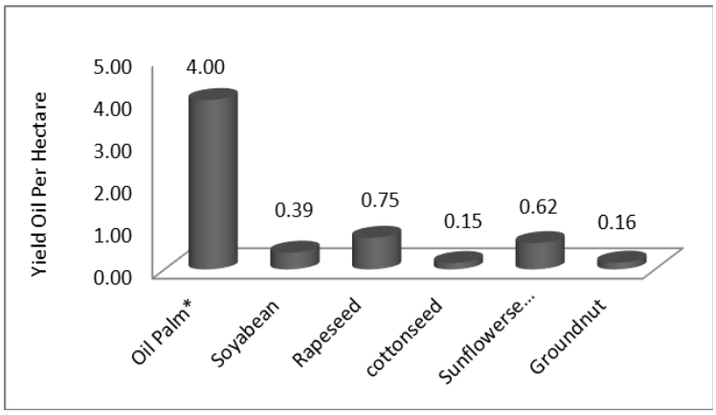

FIGURE 1. Major Oilseeds Yield Per Hectare, 2016
Source: Malaysia Palm Oil Board (MPOB), 2017

increased by 20.8% to 0.58 million tonnes compared to 0.48 million tonnes in 2015 (MPOB 2017). Regardless, the EU has remained a major export destination of biodiesel for Malaysia; in total, 83.5%, or 69,766 tonnes of the total biodiesel exports were destined to the locality in 2016.

In general, renewable energy from biodiesel is well-known as one of the most reliable substitutes for petroleum-derived diesel (Mekhilef, Siga & Saidur 2011; Lee, Johnson & Hammond 1995). Therefore, having an abundance of feedstock for biodiesel such as palm oil provides an opportunity for Malaysia to increase its trade competitiveness in the global market. Throughout this study, we endeavor to answer the following questions: (1) What is the level of trade competitiveness for Malaysia's biodiesel products in the global market relative to other major producers? and (2) How have the trade competitiveness patterns changed over the analyzed period? The remainder of the paper is organized as follows: the literature review section delineates a brief review on previous literature conducted on the studies of competitiveness related to palm oil industry. Following this, the methodologies applied in assessing the trade competitiveness and the results and discussion are presented accordingly, while a summary and conclusions made on the topic are included in the last section.

LITERATURE REVIEW

In terms of international trade, the concept of competitiveness is equivalent with the theory of national competitive advantage which are pioneer by Adam Smith in the year 1776 and David Ricardo in 1817 (Bojnec & Fertő 2009). In general, the absolute advantage theory

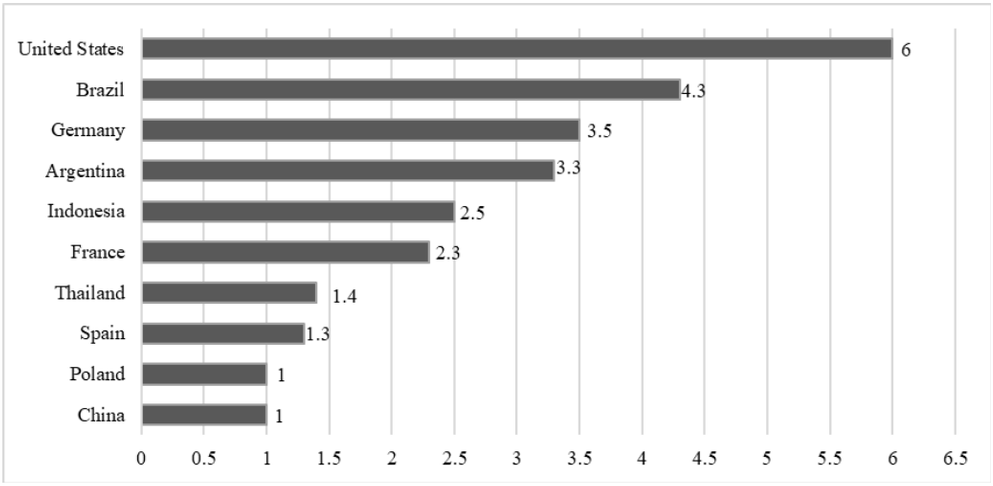

FIGURE 2. Top biodiesel producers worldwide in 2017 (billion liters)
Source: Renewables 2018 Global Status Report

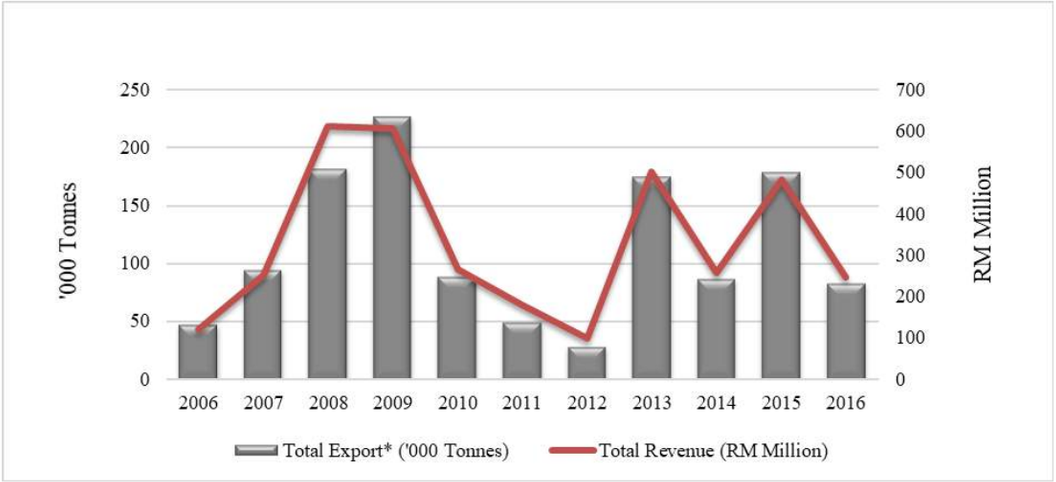

FIGURE 3. Total Exports and Total Revenue of Malaysia's Biodiesel (2006-2016)
Source: MPOB 2017

proposed by Smith (1776) states that a competitive nation holds at least one absolute advantage in one productive sector. However, the theory does not explain trade between countries with no absolute advantage in any of the production sectors. Due to the palpable vacuum in the absolute advantage theory, one is incapable of explaining the trades in countries that do not possess an absolute advantage in any sector, thus rendering the theory of comparative advantage in international trade to gain more importance. Accordingly, the concept of comparative advantage within the international trade theory was initially developed by Ricardo (1817). It revolves around the fact that it is not necessary for a country to possess an absolute advantage in a sector for higher exports. As per Smith (1776), if a country has the ability to produce one goods at a lower opportunity cost relative to another country, then that country can export such product as it has a comparative advantage for that particular goods. Hence, countries that specialize in certain goods generally have a lower opportunity cost of production compared to other countries. Even if it is not an efficient producer of the goods, it can still benefit from the trade activity as long as it specializes and exports the goods for which it possesses either relatively lower opportunity cost of production or higher comparative advantage (Davis & Weinstein 2003).

Heckscher and Ohlin (H-O) have further developed the Ricardian model in the early 20th century. In their model, the assumption of only one-factor input is replaced by the two factors of production comprising of land and labor. It is also assumed that the two goods being produced are either land-intensive or labor-intensive in nature. Following this, the comparative advantage of the country is determined by its relative factor endowments. In other words, a country specializes in the production of products requiring the factor endowments that are naturally more abundant in its locality (Husted & Melvin 1998). Therefore, a land-abundant country will specialize in land-intensive products, whereas a labor-abundant country will specialize in labor-intensive products. Thus, the H-O model explains international trade based on production and long-term natural advantages.

Some empirical studies based on classical international trade theory proposed to measure country specialization and trade competitive advantage with the consideration of an export commodity relatively. In other word, measuring the comparative advantage based on the "revealed" data is the best option since there is always lack of availability for the data for cost and productivity for every specific commodity and sector. The index of revealed comparative advantage (RCA) proposed by Balassa (1965) is based on the classical international trade theory (Ismail & Abdullah 2013). The index utilises revealed export data to calculate the ratio of a country's export share for one specific commodity in the international market to the country's export share of all other commodities.

However, the Balassa index has limitations such as 'double-counting' issue (i.e., country and sector considered are not exclude in the aggregates benchmarks) and not considering the importance of import simultaneously in the measurement. To eliminates any double-counting problem, Vollrath (1991) as cited by Bojnec and Fertő (2009) has suggested for the relative trade advantage (RTA) to be calculated as the difference between the relative export advantage index (RXA) and its counterpart, relative import specialization advantage index (RMA).

Most empirical studies for palm oil-related products have implemented traditional international trade performance as the key measure for international competitiveness. These works include those undertaken by Hassanpour and Ismail (2010); Rifin (2010); Arip et al. (2013); and Salleh et al. (2016). First, Hassanpour and Ismail (2010) have examined the Malaysian competitiveness of palm oil exports relative to other industrial plantation products in selected Association of Southeast Asian Nations (ASEAN) countries and China by using the RCA and Revealed Symmetric Comparative Advantage (RSCA) indices. The results obtained are indicative of Malaysia having a competitive advantage in palm oil and palm kernel oil production. In particular, Indonesia has ranked first in palm oil commodities while Malaysia ranks second in the competitiveness of palm oil products. While this study has considerable importance, the product categories taken into account in the study have not considered higher value-added products, such as biodiesel in the palm oil industries. In contrast, Rifin (2010) has utilized the constant market share (CMS) to analyze the export competitiveness for Indonesian and Malaysian palm oil exports across three regions, namely Asia, Europe, and Africa. The results have shown that Indonesia gains an increasing market share compared to Malaysia in Asian and African regions, whereas Malaysia's share is higher in the European market. This particular study has also limited the products chosen to the upstream sector of the palm oil industry made up of crude palm oil (CPO) and processed palm oil (PPO).

Besides these studies, the empirical analysis by Arip et al. (2013) has assessed the comparative advantage for the palm oil related products in Malaysia and Indonesia by using RCA. Their findings have shown that Malaysia is more competitive comparing with Indonesia in the most of their downstream palm oil products. However, this study has merely investigated 20 related palm oil products in which biodiesel products are not included. Moreover, Salleh et al. (2016) have claimed that there are limited empirical studies on the relative competitiveness of palm oil export products in the downstream sectors. Therefore, the work has opted to analyze the comparative advantage of CPO and PPO exports between the Malaysian and Indonesian palm oil sectors to five major markets, namely India, China, Pakistan, the USA and the European Union (EU). The

study has employed the RCA index spanning from year 1999 to year 2014, with the results shows that Indonesia has a higher comparative advantage compared with Malaysia for the market in India, the EU, and China. Contrastly, Malaysia has a significant comparative advantage as compared with Indonesia for the market in USA and Pakistan. In this particular study, a noteworthy limitation is that the products related to the downstream sector are only restricted to PPO.

As such, the current work highlights several empirical gaps noted from previous studies. First, a limited amount of studies on palm oil competitiveness with a focus on biodiesel products has been underlined. Second, most of the previous studies have measured trade competitiveness by utilizing the RCA index (Bojnec & I. Fertő, 2006; Arip, Yee & Fang, 2013; Ismail & Abdullah 2013) in which the technique has been criticized by most scholars due to asymmetric values and double-counting issue. Third, comparative studies done to estimate palm oil competitiveness have been limited to Malaysia and Indonesia only, except for Hassanpour and Ismail's (2010) work, which includes ASEAN and China. Therefore, this study is attempting to fill the gaps by taking into account the biodiesel product at the harmonized system code (HS code) 6-digit code using RTA proposed by Volrath (1991). It further includes other major producers of biodiesel, such as Indonesia, the USA, Brazil, Germany, France, Thailand, and Spain. In summary, the current work aims to assess the relative trade competitive advantage/ disadvantage of Malaysia's biodiesel products in the global market in comparison with other major biodiesel-producing countries.

METHODOLOGY

The competitive advantage is demonstrated by the individual commodity trade performance, in the sense that trade patterns will stimulate relative market costs (Bojnec & Fertő 2009). Therefore, it is important to determine the extent to which this sector is successful in selling its products from time to time in the world market compared to its competitors. To measure the competitiveness level under real-world conditions where its trade regime varies, the RTA is considered a suitable technique.

The indices offered by Vollrath (1991) is associated with three specifications, namely: (1) the revealed comparative export advantage index (RXA); (2) the relative import specialization index (RMA); and (3) the relative trade advantage index (RTA). The RXA calculation is as follows:

$$RXA_{ij} = \frac{\left({}^{X_{ij}}/_{\sum_{t,t\neq j} X_{it}}\right)}{\left({}^{\sum_{n,n\neq i} X_{nj}}/_{\sum_{n,n\neq i}\sum_{t,t\neq j} X_{nt}}\right)} \quad (1)$$

Where X indicates exports, *i* is the selected country, *j* is the biodiesel product, *t* is the total number of commodities, and *n* is all countries in the world. X_{ij} describes country exports for a specific product *j* (i.e., biodiesel) in world market, while X_{it} denotes the country exports without a given biodiesel product *j*. X_{nj} is all countries' total exports excluding country *i* to the whole world. To eliminates any double-counting issues, the biodiesel product, *j* is excluded from X_{nt} and X_{it}, while the country *i* is also excluded from X_{nt} and X_{nj}. Finally, X_{nt} is the total commodities exports by all countries excluding country *i* and the biodiesel product *j* (Vollrath 1991, as adapted by Bojnec & Fertő 2009).

Meanwhile, the RMA calculation is as follows:

$$RMA_{ij} = \frac{\left({}^{M_{ij}}/_{\sum_{t,t\neq j} M_{it}}\right)}{\left({}^{\sum_{n,n\neq i} M_{nj}}/_{\sum_{n,n\neq i}\sum_{t,t\neq j} M_{nt}}\right)} \quad (2)$$

Where M indicates imports, *i* is the selected country, *j* is the biodiesel product, *t* is the total number of commodities, and *n* is all countries in the world. M_{ij} describes country imports for a particular product *j* (i.e., biodiesel) to the world, while M_{it} denotes the country imports without a given biodiesel product *j*. M_{nj} is all countries total imports excluding country *i* to the whole world. To overcome double-counting problem, the biodiesel product *j* is also excluded from M_{it} and M_{nt}, while the country *i* is excluded from M_{nj} and M_{nt}. Finally, M_{nt} indicates the total merchandise imports by all countries excluding the biodiesel product *j* and the country *i* (Vollrath, 1991, as adapted by Bojnec & Fertő 2009).

Next, the RTA index introduced by Vollrath (1991) simultaneously accounts for exports and imports. It is calculated by the difference between the RXA and RMA:

$$RTA_{ij} = RXA_{ij} - RMA_{ij} \quad (3)$$

The RTA is classified into three groups: (1) RTA < 0, which indicates the products with an absence of a relative trade advantage; (2) RTA = 0, which indicates the product groups at a break-even point, with neither a relative trade advantage nor a relative trade disadvantage; and (3) RTA > 0, which indicates the product groups with a relative trade advantage. The annual biodiesel export and import data by country were retrieved from the United Nations (UN) Comtrade database. In particular, there are two subgroups of biodiesel products, namely: (1) HS382600 (i.e., biodiesel when the petroleum base is less than 70%), and (2) HS271020 (i.e., biodiesel when the petroleum base is more than 70%).

It is also worth highlighting the reason for the cut-off point of 70% for biodiesel. According to Rosi (2009) as cited in the European Commission report, Ecofys (2019) has stated that biogas from organic waste digesters usually contain from 60% to 70% of

methane, 30% to 40% carbon dioxide, and less than 1% nitrogen. To enable comparisons between international competitors, the RTA of biodiesel for Indonesia, the USA, Brazil, Germany, France, Thailand, and Spain were also calculated. The most recent trade data available provided the value of imports and exports spanning from 2012 to 2016.

RESULTS AND DISCUSSION

Table 1 displays the RXA index value, which reflects the relative export advantage of biodiesel for Malaysia and other major biodiesel-producing countries. The RXA value index more than one indicates an export advantage for the country, whereas values less than one indicate a comparative export disadvantage (Bojnec & Ferto 2009). For the period under investigation, the results revealed that Germany had a relatively high comparative export advantage for both biodiesel products of HS271020 and HS382600, followed by Spain. In contrast, Malaysian biodiesel products for both subgroups yielded positive RXA indices over the five years of data, but less than one.

In comparing Malaysia with Indonesia as the world's major palm oil producer, the result indicated that Indonesia surpassed Malaysia for both biodiesel exports between 2012 to 2016. Therefore, Malaysia is technically lagging behind Indonesia in terms of competitive export advantage in biodiesel despite being the second-largest palm oil producer globally.

The RMA index value in Table 2 indicates the relative import specialization advantage of biodiesel for Malaysia and other major biodiesel-producing countries. The RMA index value more than one indicates an import specialization disadvantage for the country, whereas RMA index value less than one indicates an import specialization advantage (Bojnec & Ferto 2009). Accordingly, Germany and France both displayed a positive value and RMA indices more than one for both products. In contrast, Spain only had a positive value and its RMA indices were more than one for one product, specifically HS 382600, over the five years of data.

Next, the RTA results are reported in Table 3. The results revealed Malaysia's positive relative trade advantage in biodiesel for HS 382600 and a slight disadvantage in the export market for HS 271020. In particular, the latter recorded a negative RTA value in 2015. Meanwhile, Germany recorded the best performance over the five years for both products, whereas Indonesia, Brazil, Thailand, and Spain had a positive RTA for HS382600 for all five consecutive years.

Figure 4 and Figure 5 shows the comparison of biodiesel trade competitiveness position among major producing countries. A line graph is drawn based on the RTA indices for each product (HSC 271020 and HSC 382600) to compare the competitiveness trend among these countries. It is vital for the country to have a stable competitive position of these commodities to set the seal on the future competitiveness level in the global market is sustained. A downward trend for the non-competitive product reflects that the country will have higher levels of competitiveness in the future biodiesel products, whereas an upward trend for a non-competitive product

TABLE 1. Relative Export Advantage (RXA) for Biodiesel Product, 2012-2016

Country	HSC	2012	2013	2014	2015	2016
Malaysia	271020	0.0000	0.0008	0.0045	0.0000	0.0044
	382600	0.0000	0.3099	0.5965	0.5498	0.3054
Indonesia	271020	0.1149	0.9131	0.0063	0.0000	0.0211
	382600	6.4634	6.5085	4.7304	0.9316	0.9466
U.S.	271020	0.0065	0.0434	0.0096	0.0124	0.0284
	382600	1.1298	1.2184	0.4515	0.5104	0.3308
Brazil	271020	0.0001	0.0003	0.0002	0.0004	0.0012
	382600	0.0000	0.4194	0.3483	0.1069	0.0001
Germany	271020	7.1601	9.6957	12.4180	9.0283	10.8152
	382600	10.6714	12.4843	9.8946	7.4399	4.7724
France	271020	0.3842	0.3197	0.3311	0.4684	0.5923
	382600	0.4600	0.5748	0.7813	1.2089	1.3162
Thailand	271020	0.2175	1.1881	0.5324	0.0450	2.0881
	382600	0.1223	0.1157	0.1605	0.2996	0.2855
Spain	271020	1.3262	1.5502	2.4111	1.6745	1.2814
	382600	9.0201	10.1398	6.7780	8.7010	10.5884

reflects that the country will have lower competitiveness levels for biodiesel in the future.

Accordingly, Germany displayed the highest RTA values; however, these values were declining. Besides, the trend for Indonesia was similar to Germany. On the other hand, Spain showed an improving competitiveness level where the RTA values were positive and even surpassed Germany's values in 2015. Meanwhile, the USA yielded a negative RTA value in 2015 and 2016 both. For Malaysia, its RTA value showed a stagnant trend over the years; despite this, it generated a positive RTA value regardless over the year of 2012 through 2015. Additionally, France did not seem to be competitive since it produced negative RTA values across all five consecutive years for both products.

The aforementioned results thus suggest that Germany policies would be a good benchmark for the Malaysian especially the government and agency like Malaysia Palm Oil Board (MPOB) in drafting strategies for the local palm oil biofuel industry development, especially widespread biofuel mandates. In Germany, legislation to stipulate reductions of life-cycle carbon intensity via transportation fuels has stimulated its biofuels industry development support market growth

TABLE 2. Relative Import Advantage (RMA) for Biodiesel Product, 2012-2016

Country	HSC	2012	2013	2014	2015	2016
Malaysia	271020	0.0000	0.0001	0.0001	0.2435	0.0000
	382600	0.0000	0.0296	0.0165	0.0015	0.0040
Indonesia	271020	0.0001	0.0002	0.0001	0.0000	0.0002
	382600	0.0343	0.1570	0.0001	0.0001	0.0001
US	271020	0.0957	0.1934	0.2656	0.1987	0.2432
	382600	0.1016	1.1710	0.5676	1.2665	2.3636
Brazil	271020	0.0004	0.0008	0.0024	0.0013	0.0029
	382600	0.0000	0.0000	0.0000	0.0000	0.0000
Germany	271020	1.3169	1.4203	2.2489	2.1090	1.8779
	382600	2.0778	1.3943	1.5020	1.3057	1.3103
France	271020	4.6761	3.0392	3.5068	3.2861	1.9432
	382600	1.5785	1.7965	2.1812	2.0147	2.5063
Thailand	271020	0.0100	0.1403	0.5467	0.0052	0.1330
	382600	0.0824	0.0229	0.0194	0.0203	0.0192
Spain	271020	2.0565	0.7810	0.5504	0.1918	0.5624
	382600	8.5971	3.5240	1.7141	1.8334	2.1044

TABLE 3. Relative Trade Advantage (RTA) for Biodiesel product, 2012-2016

Country	HSC	2012	2013	2014	2015	2016
Malaysia	271020	0.0000	0.0006	0.0044	-0.2435	0.0043
	382600	0.0000	0.2803	0.5800	0.5484	0.3014
Indonesia	271020	0.1148	0.9129	0.0062	0.0000	0.0210
	382600	6.4291	6.3515	4.7303	0.9315	0.9466
United States	271020	-0.0892	-0.1500	-0.2560	-0.1864	-0.2148
	382600	1.0282	0.0474	-0.1161	-0.7560	-2.0328
Brazil	271020	-0.0003	-0.0004	-0.0022	-0.0009	-0.0017
	382600	0.0000	0.4194	0.3483	0.1069	0.0001
Germany	271020	5.8433	8.2754	10.1690	6.9193	8.9373
	382600	8.5936	11.0900	8.3926	6.1342	3.4621
France	271020	-4.2919	-2.7196	-3.1758	-2.8177	-1.3509
	382600	-1.1185	-1.2217	-1.3999	-0.8057	-1.1901
Thailand	271020	0.2076	1.0479	-0.0142	0.0399	1.9551
	382600	0.0399	0.0928	0.1411	0.2793	0.2663
Spain	271020	-0.7303	0.7692	1.8607	1.4827	0.7191
	382600	0.4230	6.6158	5.0638	6.8676	8.4840

even though the implementation of the B10 biodiesel mandate merely came into effect in February 2019. Therefore, the Malaysian government should be more aggressive in implementing the B10 program, which would attract more investments into this industry. Moreover, in Malaysia, many players, especially the small-scale producers are not able to maintain their operations due to high production costs in the biodiesel industry. Thus, support from the government encompassing tax incentives and subsidies is important to facilitate the industrial activities. It can also be viewed based on agricultural structures in the production of raw commodities (or feedstock), costs of labor, improvements in supply marketing chains, and more.

CONCLUSION

This paper successfully provided empirical evidence on the biodiesel trade competitiveness of Malaysia versus other major biodiesel-producing countries, such as Indonesia, the USA, Brazil, Germany, France, Thailand, and Spain. Data spanning from year 2012 to year 2016 were analyzed for the following commodities accordingly: HSC271020 (i.e., biodiesel with petroleum base less than 70%) and HSC382600 (i.e., biodiesel with petroleum base more than 70%). Current trends in exports indicated that Malaysian biodiesel fluctuated over the year. One of the reasons behind this weak export performance is the lack of production, whereby high

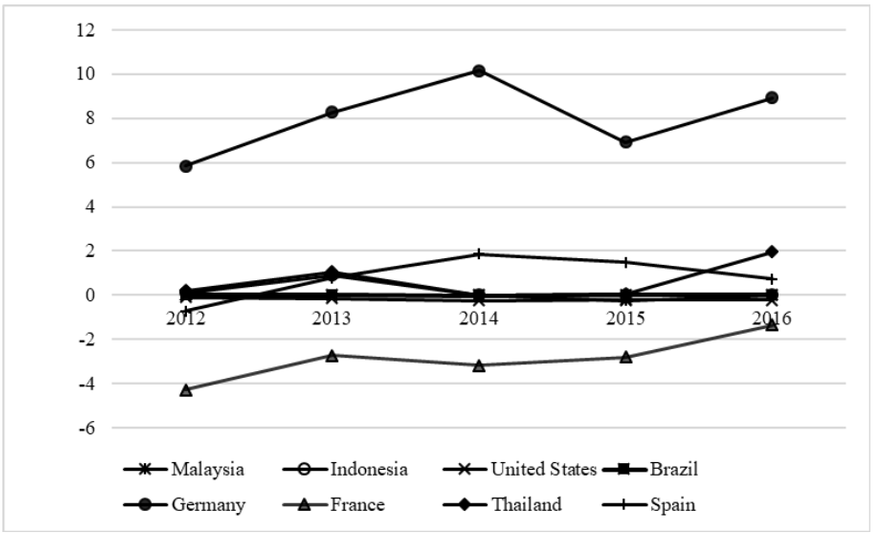

FIGURE 4. Relative Trade Advantage (RTA) for Biodiesel Product HS271020, (2012-2016)

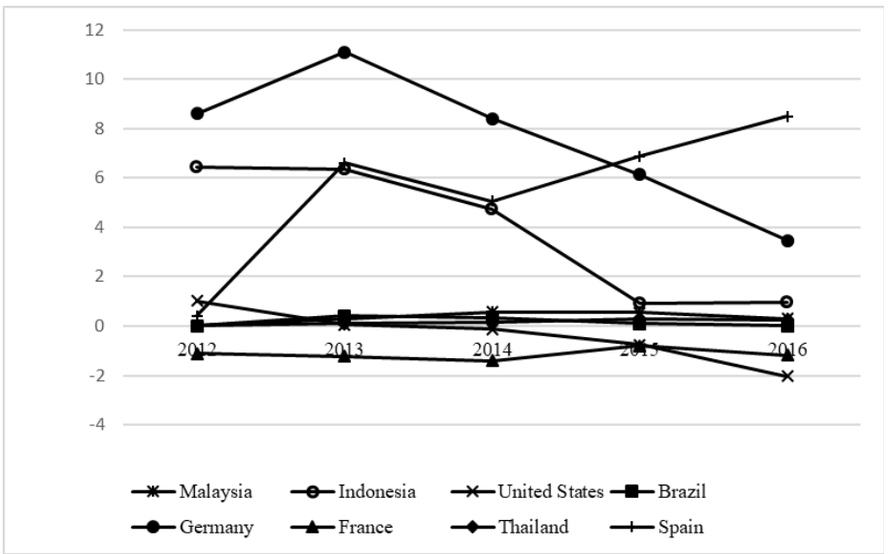

FIGURE 5. Relative Trade Advantage (RTA) for Biodiesel Product HSC 382600, (2012-2016)

production costs in the Malaysian biodiesel industry cause many players, especially small-scale producers, to be incapable of maintaining their operations. In view of its current domestic production, it is expected that Malaysia's biodiesel export in the future will further decline. However, the findings obtained suggest that although Malaysia is not a top biodiesel-producing country, its RTA index value is indicative of the potential for growth. As the second-largest producer of palm oil, which is one of the most cost-effective feedstocks for biodiesel, it is not impossible for Malaysia to become a highly prominent producer of quality biodiesel in the global market. Hence, the support from the government of Malaysia is crucial to enhance and promote biodiesel competitiveness in order for the nation to increase, recover, and sustain its strong global position against other key players.

ACKNOWLEDGMENT

The authors thankfully acknowledge the financial support received from the Putra Business School (PBS) research grant.

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Jurnal Ekonomi Malaysia 54(1) 2020 43 - 67
http://dx.doi.org/10.17576/JEM-2020-5401-4

Kointegrasi Antara Perbelanjaan Awam, Hasil Awam dan Output bagi Sektor Terpilih

(Cointegration between Public Expenditure, Public Revenue and Output in Selected Sectors)

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ABSTRAK

Dasar fiskal sememangnya penting dalam mencapai keseimbangan dan kestabilan ekonomi. Justeru, objektif utama kajian ini adalah untuk menguji kointegrasi antara hasil awam, belanja awam dan output bagi sektor pertahanan, sektor keselamatan serta sektor tenaga dan air. Analisis ini penting memandangkan permintaan masyarakat terhadap barangan awam di sektor tersebut menjadi semakin kompleks apabila pendapatan negara semakin meningkat seperti kes Malaysia. Menerusi aplikasi model Autoregressive Distributed Lag (ARDL) terhadap data siri masa fiskal bagi tempoh 30 tahun bermula 1986 sehingga 2016, tiga dapatan penting telah diperolehi. Pertama, umumnya Malaysia mengamalkan hipotesis belanja-hasil. Kedua, wujudnya teori Wagner bagi ketiga-tiga sektor terbabit. Ketiga, sektor pertahanan serta sektor tenaga dan air mempraktiskan hipotesis hasil-belanja manakala sektor keselamatan mengamalkan hipotesis pengasingan institusi. Kesemua dapatan ini menuntut agar pengukuhan fiskal dilakukan dalam ketiga-tiga sektor terbabit bagi merancakkan lagi pertumbuhan ekonomi.

Kata kunci: hasil awam; belanja awam; output negara; model Autoregressive Distributed Lag (ARDL); sektor awam

ABSTRACT

Fiscal policy is important in achieving the economic equilibrium and stability. Therefore, the main objective of this study is to examine the cointegration between public revenue, public spending and output for three sectors, namely defence, security and energy and water sectors. This analysis is important as public demand for public goods in those sectors become more complex when the country's income is increasing as a case of Malaysia. By applying Autoregressive Distributed Lag (ARDL) model on time series fiscal data for a period of 30 years starting from 1986 to 2016, three, as well as the energy and water sector, defence findings have been obtained. First, Malaysia generally adopts a spending-revenue hypothesis. Secondly, the existence of Wagner's theory of the three sectors involved. Thirdly, the defence sector, as well as the energy and water sector, are practising the revenue-spending hypotheses while the security sector adopts the institutional separation hypothesis. These findings demand that fiscal consolidation should be carried out in all three practising in order to accelerate economic growth.

Keywords: Public revenue; public spending; national output; Autoregressive Distributed Lag (ARDL) model; public sector

PENDAHULUAN

Dasar fiskal sememangnya memainkan peranan penting dalam mencapai keseimbangan dan kestabilan ekonomi terutamanya di negara sedang membangun seperti negara Malaysia. Ini kerana dasar fiskal yang berkesan perlu dalam mencapai pertumbuhan yang mapan, kestabilan harga dan peningkatan guna tenaga dalam ekonomi. Perlu diingatkan bahawa pertumbuhan berterusan dalam perbelanjaan kerajaan di negara sedang membangun juga merupakan salah satu ciri utama dunia kontemporari (Safa 1999). Rentetan itu, tidaklah menghairankan apabila saiz perbelajaan kerajaan dan kesannya terhadap pertumbuhan ekonomi jangka panjang menjadi isu yang berterusan sejak dua dekad yang lalu (Loizides & Vamvoukas 2004). Banyak negara juga telah menyedari perlunya penyelarasan fiskal dan penyusunan semula sektor awam menerusi pelarasan terhadap struktur komponen perbelanjaan kerajaan mengikut sumbangan setiap komponen kepada pertumbuhan ekonomi (Devarajan et. al, 1996).

Jika diperhalusi kepada situasi Malaysia, imbangan fiskal keseluruhan kerajaan persekutuan Malaysia pada 2014 mengalami defisit sebanyak -3.4 peratus daripada KDNK, dan kadar ini merosot kepada -3.2 peratus daripada KDNK pada 2015 dan -3.1 peratus daripada KDNK pada tahun 2016. Pengurangan kadar defisit ini walaupun sedikit sebenarnya mencerminkan komitmen

kerajaan melaksanakan langkah konsolidasi fiskal bagi memastikan kedudukan kewangan fiskal yang kukuh dalam jangka panjang. Antara usaha kerajaan tersebut adalah melalui langkah mengoptimumkan perbelanjaan awam dengan menyusun keutamaan program dan projek yang memberikan kesan pengganda yang tinggi kepada ekonomi. Tindakan kerajaan ini dilihat penting untuk menyokong pelaburan sosial yang diingini dan seterusnya mengharmonikan konflik di antara kepentingan sosial dan swasta serta menangani eksplotasi asing (Grossman 1988).

Sebenarnya, dari juruspandang teoritikal, terdapat dua kumpulan utama yang mendasari hubungan antara perbelanjaan kerajaan dan pertumbuhan ekonomi iaitu Wagner dan Keynesian. Kedua-dua kumpulan ini membincangkan arah sebab menyebab di antara perbelanjaan kerajaan dan pertumbuhan ekonomi, iaitu sama ada perbelanjaan adalah penyebab kepada output atau pertumbuhan ekonomi, dan sebaliknya (Biswal et al. 1999). Namun, secara spesifiknya, Wagner mengatakan perbelanjaan kerajaan adalah endogenus dan berhubungan positif dengan pertumbuhan ekonomi. Ini bermakna apabila pertumbuhan ekonomi tinggi maka perbelanjaan kerajaan juga akan menjadi tinggi. Dalam kata lain, perbelanjaan kerajaan bergantung kepada output pertumbuhan ekonomi. Sebaliknya, Keynesian pula mengatakan perbelanjaan kerajaan sebagai pemboleh ubah eksogenus yang boleh meningkatkan pertumbuhan ekonomi. Ini bererti peningkatan perbelanjaan kerajaan akan merangsang pertumbuhan ekonomi. Selain itu, menurut Keynes, faktor-faktor yang boleh mempengaruhi pertumbuhan ekonomi adalah permintaan berkesan atau perbelanjaan agregat yang terdiri daripada penggunaan, pelaburan, perbelanjaan kerajaan dan eksport bersih. Lantas, kerajaan adalah digalakkan untuk campur tangan secara aktif melalui dasar fiskal dan kewangan yang bersesuaian untuk memastikan tercapainya guna tenaga penuh, kestabilan harga dan pertumbuhan ekonomi.

Walau begitu, kupasan secara teoritikal oleh kebanyakan pengkaji terdahulu juga menunjukkan sektor kerajaan kurang efisien berbanding sektor swasta dan peningkatan campur tangan kerajaan akan mengurangkan pertumbuhan ekonomi (Khan & Kumar 1997). Hal ini terkesan daripada peningkatan perbelanjaan kerajaan akan menyebabkan pertambahan hutang yang akan membawa kepada cukai yang tinggi pada masa hadapan, dan seterusnya mengurangkan permintaan agregat yang mungkin menjadi penyebab kepada output negara yang rendah (Barro 1989). Lantas, perdebatan tentang peranan sektor kerajaan dalam pertumbuhan ekonomi tersebut telah memotivasikan kajian ini untuk melakukan inovasi dengan memahami kepentingan perbelanjaan bagi tiga sektor yang tidak kurang pentingnya iaitu sektor pertahanan, keselamatan serta tenaga dan air. Perlu diperjelaskan terlebih dahulu di sini bahawa Wagner telah menggariskan peningkatan terhadap kemudahan sosial di samping kegiatan pertahanan dan keselamatan akibat daripada pertumbuhan ekonomi merupakan satu tanggungjawab asas kerajaan yang bertujuan untuk meningkatkan kebajikan dan taraf hidup rakyat. Lantas, secara langsung kajian ini akan memberi ruang untuk kita mengesahkan sama ada ketiga-tiga sektor terbabit penting dalam penjanaan pertumbuhan ekonomi serta bagaimana pengurusan hasil dan belanja awam untuk sektor tersebut dilakukan bagi mengukuhkan imbangan fiskal negara. Namun, sekadar untuk makluman, objektif utama sektor pertahanan di Malaysia yang ditadbir oleh Kementerian Pertahanan Malaysia adalah melindungi dan mempertahankan kepentingan negara yang menjadi teras kepada kedaulatan, keutuhan wilayah dan kesejahteraan ekonomi. Manakala objektif sektor keselamatan yang diletakkan di bawah pentadbiran Kementerian Dalam Negeri (KDN) adalah memastikan keselamatan negara dan ketenteraman awam sentiasa terjamin dan terpelihara melalui kemantapan tindakan penguatkuasaan undang-undang dan kecekapan pelaksanaan dasar-dasar bagi program-program yang berorientasikan perkhidmatan teras KDN. Seterusnya, sektor tenaga dan air pula diuruskan oleh Kementerian Tenaga, Teknologi Hijau dan Air Malaysia (KeTTHA) dengan dua objektif utama. Pertama, objektif dasar tenaga negara akan mempastikan penyediaan bekalan tenaga yang mencukupi, selamat dan kos efektif melalui pembangunan sumber-sumber tenaga asli yang tidak boleh diperbaharu mahupun yang boleh diperbaharu, menggunakan pilihan-pilihan kos yang paling rendah dan kepelbagaian sumber-sumber bekalan dari dalam dan luar negara. Kedua, objektif dasar berkaitan air adalah untuk mewujudkan industri perkhidmatan bekalan air dan perkhidmatan pembetungan yang telus dan bersepadu bagi memberikan perkhidmatan yang berkesan dan cekap kepada pengguna agar dapat menjamin kepada penggunaan air yang efektif.

Justeru, kajian ini akan mengupas isu berkaitan hubungan antara hasil awam, belanja awam dan output bagi sektor pertahanan, sektor keselamatan serta sektor tenaga dan air di Malaysia yang merupakan negara kecil yang mengamalkan ekonomi terbuka. Kajian ini memberikan sumbangan yang signifikan kepada bidang ekonomi fiskal daripada beberapa aspek. Pertama, kajian ini menggunakan kedua-dua data agregat dan komponen yang lebih spesifik mengikut sektor bagi mengelakkan masalah *potential aggregation bias*. Ini membolehkan perbezaan pengaruh antara hasil, belanja awam dan output dilihat secara terperinci. Kedua, ketiga-tiga sektor ini dipilih memandangkan permintaan terhadap barangan awam dari ketiga-tiga sektor tersebut sebenarnya semakin menjadi kompleks dan berkualiti apabila pendapatan negara semakin meningkat seperti Malaysia. Dalam masa yang sama, setiap sektor tersebut adalah berbeza dari sudut struktur pentadbiran dan operasinya. Rentetan itu, dengan

menganalisis data setiap sektor secara berasingan, maka sudah pasti gelagat setiap sektor dapat diketahui secara jelas. Ketiga, kajian ini turut mengambil kira impak penduduk, hutang awam dan imbangan fiskal. Keempat, kajian ini mengaplikasikan model autoregresi lat tertabur (*autoregressive distributed lagged model - ARDL*) yang dicadangkan oleh Pesaran et al. (2001), iaitu suatu model yang membenarkan penganggaran bagi pemboleh ubah penerang yang mencapai kepegunan pada peringkat paras, I(0), pembezaan pertama atau I(1), atau gabungan pemboleh ubah siri masa sama ada yang bersifat I(0) atau I(1), dan model ini juga lebih sesuai digunakan untuk saiz sampel yang pendek. Kelebihan menggunakan model ARDL adalah ia dapat mengenal pasti kewujudan hubungan jangka panjang (kointegrasi) di kalangan pemboleh ubah, dan juga dapat menentukan arah sebab-menyebab jangka pendek dan jangka panjang.

Kertas ini dibahagikan kepada beberapa bahagian. Bahagian kedua membincangkan secara ringkas sorotan kajian lepas. Bahagian ketiga menjelaskan spesifikasi data dan model kajian. Bahagian keempat membentangkan keputusan empirikal, manakala bahagian kelima meringkas dan merumuskan hasil kajian.

SOROTAN KAJIAN LEPAS

Perdebatan mengenai hubungan hasil dan perbelanjaan kerajaan masih hangat sehingga kini, tidak kira sama ada di pelbagai peringkat kerajaan mahupun pelbagai sektor. Namun, berdasarkan kepada sorotan literatur terdahulu, terdapat empat hipotesis utama yang sering membincangkan hubungan antara hasil dan perbelanjaan awam.

Hipotesis pertama adalah hipotesis hasil-belanja (the revenue-spend hypothesis) atau cukai-belanja (the tax-and-spend hypothesis) yang disarankan oleh Buchanan dan Wagner (1977) dan Friedman (1978). Menurut hipotesis ini, apabila hasil kerajaan meningkat, maka perbelanjaan kerajaan juga meningkat. Dalam kata lain, hasil kerajaan mempengaruhi perbelanjaan kerajaan yang mana ini menunjukkan kewujudan hubungan satu hala daripada hasil kepada perbelanjaan awam. Menurut Friedman (1978), cukai yang tinggi biasanya akan menggalakkan lebih banyak perbelanjaan awam dilakukan yang akhirnya mengarah kepada defisit bajet yang lebih besar. Hipotesis ini turut dibuktikan oleh Chang dan Ho (2002) untuk negara Taiwan, Eita dan Mbazima (2008) bagi Namibia serta Mohsen dan Abbas (2014) untuk negara Iran. Namun begitu, selain wujudnya hubungan positif antara hasil dan belanja awam, kes di Pakistan pula juga menunjukkan kejutan negatif dalam hasil akan mengarah kepada peningkatan drastik dalam perbelanjaan awam pada saiz yang besar, lantas hubungan hasil-belanja ini dilihat lebih bersifat asimetri (Syed Ali et al. 2019).

Hipotesis kedua iaitu hipotesis belanja-hasil (the spend-revenue hypothesis) atau belanja-cukai (spend-and-tax hypothesis) oleh Barro (1974) serta Peacock dan Wiseman, (1979) pula menegaskan perubahan dalam perbelanjaan kerajaan akan mengubah hasil awam. Mereka mengutarakan bahawa *displacement effect* iaitu sekiranya berlaku sebarang masalah eksogenus yang signifikan seperti perang, ketidakstabilan politik atau bencana alam yang menyebabkan peningkatan perbelanjaan kerajaan akan seterusnya membawa kepada peningkatan hasil kerajaan. Peningkatan hasil ini pula sebenarnya banyak diperolehi menerusi peningkatan cukai yang dilaksanakan. Natijahnya, peningkatan cukai bagi menutupi perbelanjaan yang telah dilakukan dilihat menyebabkan aliran modal keluar kerana pengguna tidak mahu membayar cukai yang lebih tinggi (Eita & Mbazima 2008). Walaupun begitu, kewujudan hipotesis ini telah dibuktikan oleh Lojanica (2015) bagi jangka panjang di Serbia, Fazal dan Muhammad (2010) di Pakistan, Adebayo (2018) di Nigeria serta Komain (2018) di Thailand.

Seterusnya, hipotesis ketiga berkaitan hubungan dua hala di antara hasil dan belanja atau turut dikenali sebagai '*the fiscal synchronization hypothesis*' menyatakan kedua-dua hasil dan belanja saling mempengaruhi di antara satu sama lain seperti yang disarankan oleh Musgrave (1966) dan kemudian oleh Meltzer dan Richard (1981). Ini bererti keputusan terhadap hasil dan perbelanjaan kerajaan dibuat serentak bagi memperbaiki atau menambahbaik kedua-dua hasil dan perbelanjaan (atau dalam kata lain mengimbangi imbangan fiskal) ke arah menangani (mengawal) masalah defisit bajet. Hipotesis ini juga telah dibuktikan bagi kedua-dua jangka panjang dan jangka pendek oleh Khalid (2005) untuk kerajaan Arab Saudi dan Takumah (2014) bagi kes Ghana, Manuchehr (2018) bagi kerajaan Sweden, Qazi dan Jalil (2010) bagi jangka panjang di negara Romania serta Yashobanta dan Behera (2012) untuk kes India. Manakala Vaseem dan Badri (2019) pula mendapati hipotesis penyelarasan fiskal ini turut diaplikasi di 26 kerajaan negeri di India serta Adebayo (2018) membuktikan kewujudan hubungan dua hala antara hasil petroleum dengan perbelanjaan kerajaan dalam jangka pendek di Nigeria.

Hipotesis terakhir pula adalah tiada hubungan di antara hasil dan belanja atau juga dipanggil pengasingan institusi (institutional separation). Ini menunjukkan kedua-dua pemboleh ubah fiskal tersebut saling bebas atau tidak bergantungan seperti yang ditegaskan Baghestani dan McNown (1994). Ketiadaan hubungan ini sebenarnya disebabkan oleh kepentingan dan agenda yang berbeza (Hoover & Sheffrin 1992) serta ketidaksepakatan antara pihak atau kumpulan dalam proses membuat keputusan yang akhirnya menjadi penyebab terhadap corak hutang awam yang berkembang (Drazen 2001; Persson & Tabellini 2000).

Dalam konteks Malaysia pula, keputusan yang didapati adalah berbeza-beza. Tsen dan Ping (2005) mendapati hasil mempengaruhi perbelanjaan kerajaan dalam jangka panjang bagi tempoh 1965 hingga 2002. Namun, Rohaiza dan Nanthakumar (2008) pula membuktikan wujudnya hubungan dua hala hasil cukai langsung dan hasil cukai tidak langsung kepada perbelanjaan kerajaan, tetapi tiada hubungan antara hasil bukan cukai kepada perbelanjaan kerajaan bagi tempoh 1970 hingga 2006. Sebaliknya, Nazim (2016) menyokong hipotesis belanja-hasil bagi tempoh 2002 hingga 2013. Jelas sekali, sememangnya hubungan hasil dan belanja awam bagi kerajaan persekutuan sesebuah negara adalah pelbagai.

Berkaitan hubungan perbelanjaan awam dan output negara pula, Faris (2002) membuktikan hipotesis Wagner berlaku di kebanyakan negara-negara *Gulf Cooperation Council* (GCC) untuk tempoh 1970 hingga 1997 yang bererti pendapatan negara mempengaruhi perbelanjaan awam secara positif. Dapatan ini menggambarkan berlaku kointegrasi antara jumlah perbelanjaan kerajaan sebenar dengan komponen pertumbuhan ekonomi seperti modal dan pengeluaran semasa. Dalam masa yang sama, hipotesis Keynesian (iaitu belanja awam yang mempengaruhi output negara) dilihat tidak digunakan di negara-negara ini kerana sebahagian besar perbelanjaan kerajaan dikhaskan untuk perbelanjaan semasa seperti diskaun bil utiliti, kemudahan rekreasi dan perbelanjaan pertahanan yang mana item perbelanjaan ini kurang membantu dalam meningkatkan pertumbuhan ekonomi negara. Sebaliknya, didapati hanya negara Bahrain yang mengaplikasi kedua-dua hipotesis Wagner dan Keynesian. Di samping itu, kewujudan kedua-dua hipotesis Wagner dan Keynesian disokong oleh Katrakilidis dan Tsaliki (2009) di Greece serta Erdal dan Rza (2019) di negara South Caucasus untuk jangka panjang mahupun jangka pendek, lantas ini mencerminkan wujudnya hubungan dua hala antara belanja kerajaan dan output negara. Katrakilidis dan Tsaliki (2009) juga mendapati bahawa pelaburan dalam infrastruktur sosial dan ekonomi meningkatkan pelaburan, pengeluaran dan produktiviti swasta yang boleh memaksimumkan potensi pertumbuhan ekonomi. Tetapi Kumar et al. (2012) pula dengan menggunakan teknik ARDL *'bound testing'* mengesahkan aplikasi hipotesis Wagner bagi jangka panjang dan hipotesis Keynesian bagi jangka pendek untuk ekonomi New Zealand. Selain itu, belanja awam di Nigeria pula dipengaruhi oleh output negara dan hasil petroleum, yang mana ini mengesahkan kewujudan hipotesis Wagner dan hipotesis hasil-belanja secara serentak di negara tersebut (Adamu 2019). Manakala Ebaid dan Bahari (2019) membuktikan aplikasi teori Keynesian dalam ekonomi Kuwait.

Bagi negara Malaysia, analisa Samundram et al. (2009) menunjukkan kewujudan kointegrasi antara perbelanjaan awam agregat termasuk perbelanjaan pendidikan, pertanian, pertahanan dan pembangunan dengan Keluaran Dalam Negeri Kasar (KDNK). Secara spesifik, hipotesis Wagner berlaku dalam jangka panjang untuk semua kategori perbelanjaan awam kecuali untuk sektor pentadbiran dan kesihatan. Begitu juga Abdullah dan Mamoor (2010) yang mendapati Malaysia mengamalkan hipotesis Wagner dalam kes perbelanjaan pembangunan untuk tempoh 1970 hingga 2007.

Seterusnya, di peringkat sektoral pula, Deger dan Smith (1983) mendapati hubungan negatif di antara perbelanjaan awam dalam bidang pertahanan dan pertumbuhan ekonomi di 44 negara sedang membangun. Hubungan yang negatif ini sebenarnya menunjukkan bahawa peruntukan kepada sektor pertahanan sepatutnya dibelanjakan kepada kategori perbelanjaan awam lain yang lebih produktif (Ward & David 1992). Manakala Arshian dan Sahar (2018) pula membuktikan berlakunya hubungan dua hala di India dan sehala di Pakistan antara belanja pertahanan dan ketidaksamaan pendapatan. Lantas, kerajaan seharusnya menitikberatkan peruntukan belanjawan terhadap belanja sosial dan pembangunan kebajikan sebagai alternatif untuk memperbaiki taraf hidup rakyat serta mengurangkan ketidaksamaan pendapatan di kedua-dua negara tersebut. Sebaliknya, Frederiksen dan McNab (2001) menunjukkan hubungan positif daripada belanja pertahanan kepada pertumbuhan ekonomi. Keputusan yang sama turut diperolehi oleh Pradhan (2010) di negara Kesatuan Eropah serta Dash et al. (2016) di Brazil, Rusia, India dan China. Tetapi yang agak menariknya, Dunne (2010) tidak menemui sebarang hubungan positif di antara perbelanjaan pertahanan dan pertumbuhan ekonomi di negara Sub-Afrika walaupun negara tersebut sering terlibat dengan peperangan. Manakala Dakurah et al (2001) memperolehi keputusan yang berbeza-beza bagi negara membangun, yang mana 13 negara menyokong teori Keynesian, 10 negara selari dengan teori Wagner, 7 negara mempunyai hubungan dua hala antara perbelanjaan pertahanan dan pertumbuhan ekonomi dan 18 negara menunjukkan tiada hubungan antara belanja pertahanan dengan pertumbuhan ekonomi. Untuk kes negara ASEAN, Hirnissa et al (2009) membuktikan hubungan dua hala bagi negara Singapura, hubungan satu hala nagi negara Thailand dan Indonesia dan tiada hubungan dijumpai bagi negara Malaysia dan Filipina.

Seterusnya, hubungan yang kuat antara sektor tenaga dan pertumbuhan ekonomi mencerminkan penggunaan tenaga memberikan kadar pertumbuhan ekonomi yang positif (Smulders & de Nooij 2003) serta aspek fizikal dalam proses pengeluaran perlu diberikan perhatian yang lebih dalam teori pertumbuhan ekonomi (Georgescu-Roegen 1971). Hubungan satu hala daripada sektor tenaga kepada pertumbuhan ekonomi ini juga disokong oleh Erol dan Yu (1987) bagi kes Jepun dan Shiu and Lam (2004) untuk kes China. Tetapi Kraft dan Kraft (1978) menemui hubungan

sehala daripada output kepada penggunaan tenaga di Amerika Syarikat dan Mozumder and Marathe (2007) di Bangladesh sedangkan Jumbe (2004) membuktikan hubungan dua hala antara antara sektor tenaga dan output di Malawi.

Akhir sekali, berkaitan sektor air yang selama ini dilihat sebagai faktor utama yang boleh mengekang proses urbanisasi dan juga perkembangan sosio-ekonomi (Varis & Vakkilainen 2001; Okadera et al. 2006), Barbier (2004) menyatakan kadar penggunaan air mempengaruhi faktor endogenus pertumbuhan ekonomi yang dibina dalam model pertumbuhan ekonomi oleh Barro dan Sala-I-Martin (1992). Kesimpulannya, cerapan terhadap kajian terdahulu menunjukkan pelbagai bentuk dan arah hubungan antara belanja awam, hasil kerajaan dan output negara termasuklah dalam kes sektor pertahanan serta sektor tenaga dan air.

METODOLOGI KAJIAN

SPESIFIKASI MODEL

Berdasarkan kepada perbincangan dalam bahagian sorotan kajian lepas, telah dinyatakan bahawa terdapat empat hipotesis berkaitan hubungan hasil dan belanja awam, iaitu hipotesis hasil-belanja, hipotesis belanja-hasil, hipotesis dua hala dan tiada hubungan antara hasil dan belanja. Manakala dua hipotesis, iaitu teori Wagner dan Keynesian mendasari hubungan antara output negara dan perbelanjaan awam. Justeru, kesemua hipotesis tersebut yang ditulis secara umum seperti persamaan berikut akan diuji secara berasingan untuk mengenal pasti arah dan magnitud hubungan antara pemboleh ubah.

$$JH_t = \rho_0 + \rho_1 JP_t + \rho_2 A_t + u_t \quad (1)$$

$$JP_t = \rho_0 + \rho_1 JH_t + \rho_2 A_t + u_t \quad (2)$$

$$Y_t = \rho_0 + \rho_1 JP_t + \rho_2 A_t + u_t \quad (3)$$

$$JP_t = \rho_0 + \rho_1 Y_t + \rho_2 A_t + u_t \quad (4)$$

yang mana JH merupakan jumlah hasil, JP ialah jumlah perbelanjaan, Y adalah output atau pendapatan negara, t menunjukkan tahun dan A merupakan pemboleh ubah kawalan (control variables) yang merupakan faktor fiskal dan bukan fiskal lain (iaitu hutang awam, imbangan fiskal, modal dan jumlah penduduk mengikut kategori tertentu) yang turut dimasukkan walaupun ia bukan merupakan matlamat utama kajian ini. Persamaan (1) di atas bakal mengkaji kewujudan hipotesis belanja-hasil manakala persamaan (2) pula mengenal pasti kewujudan hipotesis hasil-belanja. Sekiranya analisis menunjukkan kedua-dua hipotesis berlaku, maka ini bererti wujudnya hipotesis penyelarasan fiskal. Sebaliknya, jika kedua-dua hipotesis tidak signifikan, maka jelas wujud hipotesis pengasingan institusi. Seterusnya, persamaan (3) akan menguji kewujudan teori Keynesian dan persamaan (4) menganalisis teori Wagner.

Walaupun begitu, kajian terhadap kesemua hipotesis di atas akan dilakukan dengan dua inovasi. Pertama, semua hubungan tersebut diuji secara total (agregat) dan komponen. Ini dibuat dengan memecahkan pemboleh ubah hasil dan belanja kepada komponen utama atau kombinasi komponen utama seperti yang telah diterangkan di bahagian spesifikasi data sebelum ini. Lantas, ia membolehkan kita mengenal pasti sama ada hubungan jangka panjang dan jangka pendek antara hasil, belanja dan output cenderung wujud pada peringkat total (agregat) atau pun komponen. Kedua, belanja awam akan dianalisis secara spesifik bagi tiga sektor utama iaitu sektor pertahanan, sektor keselamatan serta sektor tenaga dan air. Hal ini membolehkan pula kita melihat variasi dalam hubungan tersebut yang mencerminkan keunikan bagi setiap sektor terbabit. Dalam masa yang sama, kajian ini turut mengambil kira hubungan hutang awam, imbangan fiskal, modal dan jumlah penduduk mengikut kategori tertentu terhadap hasil awam, belanja kerajaan dan output negara, lantas ini membolehkan kita mengenal pasti bagaimana pengukuhan fiskal dapat dilakukan menerusi interaksi dinamik antara pemboleh ubah berkenaan.

Seterusnya, kajian ini akan menganggar kesemua persamaan di atas dengan menggunakan model ARDL seperti yang dicadangkan oleh Pesaran et al. (2001) memandangkan objektif utama kajian ini adalah untuk mengenal pasti hubungan jangka panjang antara hasil, belanja awam dan ouput bagi ketiga-tiga sektor pertahanan, sektor keselamatan serta sektor tenaga dan air. Namun, terlebih dahulu ujian kepegunan dilakukan bagi memastikan kepegunan setiap pemboleh ubah tidak berada pada tahap I(2). Perlu dijelaskan bahawa ujian kointegrasi berasaskan pendekatan ARDL boleh terus diaplikasi tanpa mengambil kira sama ada kesemua pemboleh ubah dalam bentuk I(0), I(1) atau campuran I(0) dan I(1). Justeru, bagi menguji kehadiran *unit root* dalam siri masa, maka ujian Augmented Dickey-Fuller (ADF) telah digunakan seperti berikut:

$$\Delta X_t = \eta_0 + \eta_1 X_{t-1} + \sum_{i=1}^{k} \eta_i \Delta X_{t-i} + \varepsilon_t \quad (5)$$

yang mana Δ adalah operator pembezaan pertama, ε_t ε_t adalah sebutan ralat pegun (*white noise*), dan X_t X_t adalah siri masa pemboleh ubah. Hipotesis yang perlu diuji adalah hipotesis nol: $\eta_1 = 0$, yang bererti wujud *unit root* (siri masa tidak pegun), manakala hipotesis alternatif: $\eta_1 < 0$ yang menunjukkan siri masa adalah pegun. Sekiranya hipotesis nol ditolak, maka ini menunjukkan siri masa $X_t X_t$ adalah pegun dengan nilai min sifar. Bagi mengesahkan lagi keputusan ujian ADF tersebut, maka kajian ini turut melakukan ujian kepegunan Phillip Perron (PP).

Seterusnya, untuk tujuan penganggaran model ARDL, maka tiga langkah berikut perlu diikuti. Langkah pertama ialah untuk menganggar hubungan jangka panjang (kointegrasi) dalam kalangan pemboleh ubah siri masa. Rentetan itu, semua persamaan (1) hingga (4) perlu ditulis semula. Sebagai contoh, persamaan (1) perlu ditulis semula seperti berikut:

$$\Delta \boldsymbol{H}_t = \theta_1 + \sum_{i=1}^{p} \lambda_1 \Delta \boldsymbol{H}_{t-i} + \sum_{i=0}^{q} \lambda_2 \Delta \boldsymbol{P}_{t-i} + \pi_1 \boldsymbol{H}_{t-1} + \pi_2 \boldsymbol{P}_{t-1} + \mu_{1t} \quad (6)$$

yang mana, Δ adalah operator pembezaan pertama, (p,q) adalah lat optimum dan μ pula merujuk kepada sebutan ralat. Bagi mengenal pasti kewujudan hubungan jangka panjang di antara pemboleh ubah dalam persamaan (6), maka hipotesis nol dan hipotesis alternatif diuji dengan menggunakan ujian statistik-F seperti berikut:

H_0 : tiada kointegrasi: $(\pi_1 = \pi_2 = 0)$

H_1 : ada kointegrasi: $(\pi_1 \neq \pi_2 \neq 0)$

Jika nilai statistik F yang teranggar melebihi daripada nilai kritikal had atas (*upper bound critical value*), maka hipotesis nol perlu ditolak, yang mana menjelaskan wujud hubungan jangka panjang (kointegrasi) di kalangan pemboleh ubah siri masa tersebut. Sebaliknya, jika nilai statistik F yang teranggar kurang daripada nilai kritikal had bawah (*lower bound critical value*), maka hipotesis nol gagal ditolak. Selain itu, jika nilai statistik F yang teranggar berada di antara nilai kritikal had bawah dan had atas, maka tidak dapat dikenal pasti sama ada wujud kointegrasi ataupun tidak kerana darjah integrasi pemboleh ubah penerang tidak diketahui sejelasnya.

Selanjutnya, setelah disahkan kewujudan kointegrasi, maka langkah kedua pula adalah menganggar model bersyarat $ARDL(p,q)$ jangka panjang seperti persamaan berikut:

$$\boldsymbol{H}_t = \theta_1 + \sum_{i=1}^{p} \pi_1 \boldsymbol{H}_{t-i} + \sum_{i=0}^{q} \pi_2 \boldsymbol{P}_{t-i} + \mu_{1t} \quad (7)$$

Dalam langkah yang terakhir, model ARDL jangka pendek perlulah dianggar dengan mengambil kira sebutan pembetulan ralat (ECT) yang diperolehi daripada penganggaran model jangka panjang. Model pembetulan ralat (ECM) tersebut boleh dinyatakan seperti persamaan berikut:

$$\Delta \boldsymbol{H}_t = \theta_{111} + \sum_{i=1}^{p} \lambda_{111} \Delta \boldsymbol{H}_{t-i} + \sum_{i=0}^{q} \lambda_{222} \Delta \boldsymbol{P}_{t-i} + \varphi_2 ECT_{t-1} + \mu_{111t} \quad (8)$$

Dalam persamaan (8), nilai koefisien ECT boleh menerangkan dua perkara. Pertama, ia mengukur kelajuan pelarasan (speed of adjustment) ke arah keseimbangan jangka panjang, iaitu masa yang diambil oleh pemboleh ubah penerang untuk menumpu (converge) ke arah keseimbangan jangka panjang. Kedua, ECT juga boleh menerangkan arah sebab-menyebab jangka panjang di kalangan pemboleh ubah penerang terhadap pemboleh ubah bersandar.

Namun begitu, memandangkan terdapat 419 persamaan yang telah diuji bagi ketiga-tiga sektor, maka kertas ini akan hanya membentangkan keputusan bagi persamaan yang wujud hubungan jangka panjang sahaja.

SPESIFIKASI DATA

Kajian ini menggunakan data siri masa hasil kerajaan, perbelanjaan awam serta hutang awam secara total dan komponen serta modal dan jumlah penduduk Malaysia mengikut kategori tertentu seperti di Jadual 1. Namun begitu, data perbelanjaan awam akan hanya difokuskan terhadap belanja dalam sektor pertahanan, keselamatan serta sektor tenaga dan air. Data untuk tempoh 30 tahun bermula 1986 sehingga 2016 ini diperolehi daripada Penyata Kewangan Kerajaan Persekutuan yang diterbitkan oleh Jabatan Akauntan Negara Malaysia (JANM), laporan yang diterbitkan oleh Kementerian Kewangan Malaysia (MOF), laporan yang diterbitkan oleh Bank Negara Malaysia (BNM), laporan yang diterbitkan Jabatan Perangkaan Malaysia (DOSM) dan laporan perbelanjaan kerajaan yang diterbitkan oleh Unit Perancang Ekonomi (EPU). Tempoh masa tersebut dipilih berdasarkan kesediaaan data yang seragam untuk ketiga-tiga sektor. Kesemua pemboleh ubah tersebut telah ditransformasi dalam log semulajadi disebabkan oleh tiga faktor. Pertama, ia memudahkan pemboleh ubah yang pencong diubah menjadi pemboleh ubah yang mempunyai taburan yang hampir normal. Kedua, ia membolehkan kewujudan hubungan tidak linear antara pemboleh ubah bersandar dengan pemboleh ubah tidak bersandar dikenal pasti secara efektif. Ketiga, interpretasi nilai koefisien dalam bentuk peratus perubahan di kalangan pemboleh ubah penerang terhadap pemboleh ubah bersandar lebih mudah dilakukan menerusi model dalam fungsi log, lantas ia turut memudahkan penggubal dasar belanjawan memahami arah dan saiz hubungan antara instrumen fiskal tersebut bagi tujuan perancangan dan pengukuhan fiskal pada masa hadapan.

KEPUTUSAN EMPIRIKAL

Bahagian ini membincangkan keputusan ujian dengan menggunakan kaedah ADF dan PP, ujian kointegrasi serta ujian model ARDL jangka panjang dan jangka pendek. Berdasarkan ujian ADF dan PP yang telah dilakukan terlebih dahulu, didapati semua pemboleh ubah siri masa mencapai kepegunan di peringkat pembezaan pertama, I(1), iaitu pada pelbagai aras

JADUAL 1. Senarai pemboleh ubah

Singkatan	Pemboleh ubah	Singkatan	Pemboleh ubah
Y	Keluaran Dalam Negara Kasar	PKBTs1	Pemberian dan Kenaan Bayaran Tetap Sektor Pertahanan
K	Modal	BPs1	Belanja Pembangunan Sektor Pertahanan
P	Jumlah Penduduk	BPs1D	Belanja Pembangunan Tentera Darat
P1	Jumlah Penduduk Kumpulan Umur 0-14	BPs1L	Belanja Pembangunan Tentera Laut
P2	Jumlah Penduduk Kumpulan Umur 15-64/ Golongan Produktif	BPs1U	Belanja Pembangunan Tentera Udara
P3	Jumlah Penduduk Kumpulan Umur 65+	BS2	Belanja Keseluruhan Sektor Keselamatan
P4	Jumlah Golongan Tidak Produktif (Gabungan P1 dan P3)	BMs2	Belanja Mengurus Sektor Keselamatan
HA	Hutang Awam	EMOs2	Emolumen Sektor Keselamatan
HDN	Hutang Awam Dalam Negeri	PBs2	Perkhidmatan dan Bekalan Sektor Keselamatan
HLN	Hutang Awan Luar Negeri	PKBTs2	Pemberian dan Kenaan Bayaran Tetap Sektor Keselamatan
		BPs2	Belanja Pembangunan Sektor Keselamatan
IF	Imbangan Fiskal	BPs2Po	Polis Diraja Malaysia
H1	Jumlah Hasil Keseluruhan	BPs2Pe	Penjara
H2	Jumlah Hasil (Tanpa Hasil Wilayah Persekutuan)	BPs2I	Imigresen
HC	Hasil Cukai	BS3	Belanja Keseluruhan Sektor Tenaga dan Air
HBC	Hasil Bukan Cukai	BMs3	Belanja Mengurus Sektor Tenaga dan Air
JH	Jenis Hasil (Gabungan HC dan HBC)	EMOs3	Emolumen Sektor Tenaga dan Air
TBH	Terimaan Bukan Hasil	PBs3	Perkhidmatan dan Bekalan Sektor Tenaga dan Air
BS1	Belanja Keseluruhan Sektor Pertahanan	PKBTs3	Pemberian dan Kenaan Bayaran Tetap Sektor Tenaga dan Air
BMs1	Belanja Mengurus Sektor Pertahanan	BPs3	Belanja Pembangunan Sektor Tenaga dan Air
EMOs1	Emolumen Sektor Pertahanan	BPs3T	Tenaga
PBs1	Perkhidmatan dan Bekalan Sektor Pertahanan	BPs3A	Bekalan Air

keertian. Namun, jadual keputusan ujian tersebut tidak disertakan di dalam kertas ini memandangkan pemboleh ubah yang diuji adalah banyak tetapi keputusan yang diperolehi adalah seragam.

Keputusan ujian kointegrasi kaedah ARDL atau '*bound testing'* ditunjukkan dalam Jadual 2. Untuk menentukan kewujudan kointegrasi, nilai statistik-F yang diperolehi daripada ujian hipotesis perlulah dibandingkan dengan nilai kritikal daripada Jadual *Case III: unresricted intercept and no trend* dalam Narayan (2005). Didapati wujud pelbagai keputusan bagi setiap sektor. Secara spesifik, hipotesis nol dapat ditolak pada pelbagai aras keertian untuk persamaan (32), (35), (36), (37) dan (39) yang menggabungkan pemboleh ubah dari ketiga-tiga sektor. Namun, keputusan bagi sektor pertahanan menunjukkan persamaan (16), (17), (95), (96), (249), (265), (266), (267), (270), (271), (280), (282), (283), (287), (288), (289), (290), (291), (304), (305), (306), (309), (311), (312), (313) dan (314) signifikan pada pelbagai aras keertian. Manakala bagi sektor keselamatan, kointegrasi wujud bagi persamaan (132), (148), (149), (151), (153), (155), (156), (157), (158), (342), (343), (348), (355), (371), (372), (403) dan (405). Seterusnya persamaan (13), (14), (196), (197), (201), (203), (205), (206), (417), (427), (431), (432), (448), (468), (472), (473), (477), (479), (481), (482), (483) dan (487) pula mempunyai nilai statistik-F yang sigifikan pada pelbagai aras keertian bagi sektor tenaga dan air, lantas ia menunjukkan kewujudan hubungan jangka panjang di kalangan pemboleh ubah bersandar dan tidak bersandar dalam persamaan tersebut.

Langkah selanjutnya pula adalah penganggaran bagi koefisien jangka panjang berasaskan model ARDL terhadap persamaan yang melepasi ujian statistik-F sahaja seperti yang dihamparkan di Jadual 3 hingga Jadual 6. Menerusi Jadual 3, persamaan (32) membuktikan hasil bukan cukai (HBC) signifikan dipengaruhi secara positif oleh belanja keseluruhan sektor keselamatan (BS2) serta belanja keseluruhan sektor tenaga dan air (BS3). Manakala persamaan (35) menunjukkan HBC dipengaruhi secara negatif oleh belanja mengurus sektor tenaga dan air (BMs3) tetapi dipengaruhi secara positif

JADUAL 2. Keputusan ujian kointegrasi statistik-F

Persamaan	Pemboleh ubah bersandar	Nilai statistik F	Persamaan	Pemboleh ubah bersandar	Nilai statistik F
13	ΔBMs3	9.3585*	287	ΔBPs1D	4.3820***
14	ΔBMs3	9.3928*	288	ΔBPs1D	4.6858***
16	ΔBPs1	7.9516**	289	ΔBPs1D	4.0973***
17	ΔBPs1	7.9414**	290	ΔBPs1D	4.0569***
32	ΔHBC	4.7780***	291	ΔBPs1D	4.5752***
35	ΔHBC	3.8899***	304	ΔBPs1U	5.6351**
36	ΔTBH	7.9256*	305	ΔBPs1U	4.7194***
37	ΔTBH	4.1729***	306	ΔBPs1U	4.1401***
39	ΔTBH	4.0859***	309	ΔBPs1U	4.2406***
95	ΔBPs1	4.3389***	311	ΔBPs1U	5.0106**
96	ΔBPs1	4.0810***	312	ΔBPs1U	6.0947**
132	ΔBS2	5.3788**	313	ΔBPs1U	4.5588***
148	ΔBPs2	6.1358**	314	ΔBPs1U	4.5350***
149	ΔBPs2	5.3020**	342	ΔPBs2	6.2534**
151	ΔBPs2	4.2749***	343	ΔPBs2	5.7142**
153	ΔBPs2	4.2948***	348	ΔPBs2	7.0237*
155	ΔBPs2	5.4452**	355	ΔPKBTs2	7.4728*
156	ΔBPs2	6.6642**	371	ΔY	6.6897*
157	ΔBPs2	4.7621***	372	ΔY	4.0167***
158	ΔBPs2	4.7706***	403	ΔBPs2I	4.8162**
196	ΔBMs3	6.7453**	405	ΔBPs2I	4.4471***
197	ΔBMs3	4.5995***	417	ΔY	4.1375***
201	ΔBMs3	4.9409**	427	ΔEMOs3	4.8617**
203	ΔBMs3	4.6117***	431	ΔEMOs3	6.1229**
205	ΔBMs3	4.5724***	432	ΔEMOs3	5.2734**
206	ΔBMs3	4.5761***	448	ΔPKBTs3	4.4844***
249	ΔPBs1	6.6304**	468	ΔY	4.1929***
265	ΔPKBTs1	4.5167***	472	ΔBPs3T	5.6047**
266	ΔPKBTs1	4.5133***	473	ΔBPs3T	7.6139*
267	ΔPKBTs1	4.2348***	477	ΔBPs3T	4.3534***
270	ΔY	4.4664***	479	ΔBPs3T	4.6389***
271	ΔY	3.9464***	481	ΔBPs3T	4.7536***
280	ΔBPs1D	4.7241***	482	ΔBPs3T	4.7034***
282	ΔBPs1D	7.3395*	483	ΔBPs3T	5.6475**
283	ΔBPs1D	7.8102*	487	ΔBPs3A	7.2697*

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Ujian statistik –F berdasarkan Narayan (2005). Lat optimum bagi ujian ini adalah satu yang dijana menerusi kaedah Akaike Info Criterion (AIC).

oleh belanja pembangunan sektor keselamatan (BPs2) serta sektor tenaga dan air (BPs3). Ini mencerminkan belanja sektor keselamatan serta sektor tenaga dan air lebih dominan menentukan tingkat hasil bukan cukai. Walaupun begitu, terimaan bukan hasil (TBH) pula dilihat dipengaruhi oleh belanja keseluruhan sektor pertahanan (BS1) secara negatif tetapi dipengaruhi secara positif oleh belanja keseluruhan sektor keselamatan (BS2) serta sektor tenaga dan air (BS3). Dalam masa yang sama, TBH juga dipengaruhi secara negatif oleh belanja mengurus sektor pertahanan (BMs1) dan dipengaruhi secara positif oleh belanja mengurus sektor keselamatan (BMs2) serta belanja pembangunan sektor tenaga dan air. Agak mengejutkan apabila hanya peningkatan perbelanjaan dalam sektor keselamatan serta tenaga dan air menuntut peningkatan dalam HBC dan TBH sedangkan peningkatan perbelanjaan dalam sektor pertahanan hanya akan mengurangkan HBC

JADUAL 3. Keputusan penganggaran koefisyen jangka panjang berasaskan model ARDL bagi persamaan umum ketiga-tiga sektor

Persamaan	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar									
[Pemboleh Ubah Bersandar]		BS1	BS2	BS3	BMs1	BMs2	BMs3	BPs1	BPs2	BPs3	C
32 [HBC]	{1,1,0,0}	-0.10 (-0.60)	0.65 (2.62)**	0.21 (2.36)**	-	-	-	-	-	-	-0.19 (-0.17)
35 [HBC]	{1,0,0,1,1,1,1}	-	-	-	0.52 (1.46)	0.29 (1.15)	-0.10 (-2.03)***	-0.07 (-1.49)	0.16 (2.12)**	0.15 (1.78)***	-2.62 (-1.93)***
36 [TBH]	{1,2,2,2}	-1.87 (-3.24)*	2.33 (4.01)*	-0.50 (-1.82)***	-	-	-	-	-	-	17.74 (3.93)*
37 [TBH]	{1,2,2,2}	-	-	-	-1.96 (-1.16)	2.58 (2.14)**	0.25 (1.04)	-	-	-	21.08 (2.74)**
39 [TBH]	{1,2,2,2,1,0,1}	-	-	-	-4.98 (-2.86)*	3.66 (2.92)*	0.28 (1.27)	0.09 (0.37)	-0.38 (-0.95)	1.10 (2.32)**	29.74 (3.56)*

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan merujuk kepada statistik-t.

JADUAL 4. Keputusan penganggaran koefisyen jangka panjang berasaskan model ARDL bagi sektor pertahanan

(a) Penentu belanja pembangunan sektor pertahanan

Persamaan	Model Bersyarat ARDL								
[Pemboleh Ubah Bersandar]		Y	HA	HDN	HLN	H1	H2	BMs1	C
16 [BPs1]	{1,1}	-	-	-	-	-2.19 (-2.82)*	-	-	0.78 (0.35)
17 [BPs1]	{1,1}	-	-	-	-	-	-2.20 (-2.83)*	-	0.79 (0.35)
95 [BPs1]	{1,0,1,1}	1.37 (2.70)**	0.38 (1.00)	-	-	-	-	-1.95 (-2.98)*	4.36 (1.74)***
96 [BPs1]	{1,0,1,1,0}	1.25 (2.34)**	-	0.40 (0.99)	0.19 (0.83)	-	-	-1.90 (-2.87)*	0.98 (0.16)

Jadual 4(b) Penentu lain-lain pemboleh ubah sektor pertahanan

Persamaan [Pemboleh Ubah Bersandar]	Model bersyarat ARDL	Pemboleh Ubah Tidak Bersandar																		
		Y	K	P	P2	P4	HA	HDN	HLN	H1	H2	JH	TBH	IF	EMOs1	PBs1	PKBTs1	BPs1D	BPs1L	BPs1U	C
249 [PBS1]	{1,1,1,1,0}	0.58 (2.61)**	-	-	-	-	-	-	-	-	-	-	-	-0.73 (-1.21)	-0.80 (-1.50)	-	-0.02 (-0.34)	-	-	-	2.92 (1.55)
265 [PKBTS1]	{1,0,1,1,0}	-1.44 (-0.99)	-	-	-	-	-	-	-	2.97 (1.96)***	-	-	-	-	-0.95 (-1.33)	0.18 (0.29)	-	-	-	-	-8.31 (-1.39)
266 [PKBTS1]	{1,0,1,1,0}	-1.45 (-0.99)	-	-	-	-	-	-	-	-	2.98 (1.95)***	-	-	-	-0.95 (-1.33)	0.16 (0.27)	-	-	-	-	-8.39 (-1.40)
267 [PKBTS1]	{1,2,1,1,2,1}	-3.57 (-2.51)**	-	-	-	-	-	-	-	-	-	3.90 (2.55)**	-	-	-2.19 (-1.34)	0.08 (0.09)	-	-	-	-	-12.86 (-2.08)
270 [Y]	{1,1,0,1,0}	-	-	4.20 (6.08)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.02 (-2.60)**	-0.02 (-2.26)	0.06 (4.84)*	-45.42 (-5.99)*
271 [Y]	{1,1,1,1,1,1}	-	-	-	2.62 (5.97)*	0.70 (1.99)***	-	-	-	-	-	-	-	-	-	-	-	-0.02 (-2.48)**	0.01 (0.55)	0.06 (4.83)*	-30.67 (-4.54)*
280 [BPS1D]	{1,1,1,1}	0.68 (2.28)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.04 (-0.29)	-0.21 (1.30)	-2.58 (-0.58)
282 [BPS1D]	{1,1,1,1,1}	-4.45 (-1.50)	-	21.93 (1.77)***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.10 (-0.80)	0.03 (0.16)	-240.04 (-1.75)
283 [BPS1D]	{1,0,1,1,1,1}	6.01 (1.71)***	-	-	-18.85 (-1.86)***	12.06 (2.02)***	-	-	-	-	-	-	-	-	-	-	-	-	-0.43 (-2.68)**	-0.67 (-2.68)**	-7.60 (0.96)
287 [BPS1D]	{1,1,1,1,0}	1.68 (1.99)***	-	-	-	-	-0.91 (-1.27)	-	-	-	-	-	-	-	-	-	-	-	-0.19 (-1.08)	-0.35 (-1.81)***	0.16 (0.03)
288 [BPS1D]	{1,0,1,0,0,0}	2.81 (3.25)*	-	-	-	-	-	-1.57 (-2.38)**	1.41 (2.71)**	-	-	-	-	-	-	-	-	-	-0.32 (-2.00)***	-	-44.69 (-2.90)**
289 [BPS1D]	{1,0,0,0,1}	4.16 (3.04)*	-	-	-	-	-	-	-	-3.90 (-2.64)*	-	-	-	-	-	-	-	-	-0.07 (-0.58)	-0.09 (-0.61)	-1.79 (-0.43)
290 [BPS1D]	{1,0,0,0,1}	4.21 (3.06)*	-	-	-	-	-	-	-	-	-3.96 (-2.67)**	-	-	-	-	-	-	-	-0.07 (-0.59)	-0.10 (-0.65)	-1.79 (-0.43)
291 [BPS1D]	{1,0,1,1,1,1}	4.12 (2.82)*	-	-	-	-	-	-	-	-	-	-3.79 (-2.38)**	0.12 (0.51)	-	-	-	-	-	-0.07 (-0.54)	-0.05 (-0.30)	-5.65 (-1.08)
304 [BPS1U]	{1,1,2,1}	-0.22 (-1.06)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.24 (1.91)***	-0.05 (-0.52)	-	9.54 (2.77)**
305 [BPS1U]	{1,0,1,1,1}	-0.74 (-1.32)	-1.73 (-2.68)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.17 (1.38)	0.05 (0.51)	-	-3.60 (1.07)
306 [BPS1U]	{1,0,1,1,1}	6.74 (2.29)**	-	-28.96 (-2.30)**	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30 (1.92)***	0.03 (0.30)	-	317.97 (2.34)**
309 [BPS1U]	{1,1,2,1,2}	-0.27 (-1.35)	-	-	-	-	-	-	-	-	-	-	-	-2.51 (-1.73)***	-	-	-	0.23 (1.88)***	0.03 (0.33)	-	8.61 (2.56)**
311 [BPS1U]	{1,0,1,0,1}	1.42 (1.94)***	-	-	-	-	6.58 (2.82)*	-	-	-	-	-	-	-	-	-	-	0.34 (2.04)***	-0.32 (-2.16)**	-	4.40 (1.21)
312 [BPS1U]	{1,0,1,0,1,1}	2.33 (2.56)**	-	-	-	-	-	6.68 (3.30)*	2.34 (3.55)*	-	-	-	-	-	-	-	-	0.27 (1.70)	-0.40 (-2.59)**	-	-11.88 (-0.79)
313 [BPS1U]	{1,0,1,1,1}	0.10 (0.06)	-	-	-	-	-	-	-	-3.97 (-2.69)**	-	-	-	-	-	-	-	0.23 (1.36)	0.17 (1.35)	-	1.80 (0.51)
314 [BPS1U]	{1,0,1,1,1}	0.20 (0.12)	-	-	-	-	-	-	-	-	-4.05 (-2.74)**	-	-	-	-	-	-	0.23 (1.39)	0.16 (1.30)	-	1.79 (0.51)

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan merujuk kepada statistik-t.

dan TBH. Ini mungkin disebabkan sektor pertahanan tidak menyumbang secara langsung kepada pendapatan negara, lantas peningkatan perbelanjaan dalam sektor ini tidak menjana kepada pertambahan kutipan hasil kepada kerajaan. Keputusan terhadap HBC dan TBH ini juga menggambarkan Malaysia mengamalkan hipotesis belanja-hasil dalam jangka panjang.

Bagi sektor pertahanan pula seperti di Jadual 4, panel (a) membuktikan belanja pembangunan sektor pertahanan (BPs1) dipengaruhi oleh jumlah hasil (H1 dan H2) dan belanja mengurus sektor pertahanan (BMs1) secara negatif dan dipengaruhi oleh Keluaran Dalam Negeri Kasar (Y) secara positif. Hal ini terkesan daripada peruntukan yang lebih kepada belanja mengurus akan mengurangkan pengagihan kepada belanja pembangunan dan sebaliknya, manakala peningkatan Y yang menunjukkan kerancakan aktiviti ekonomi dalam negara menuntut lebih peruntukan untuk menjaga kedaulatan dan sempadan negara daripada ancaman anasir luar yang tidak baik. Seterusnya, panel (b) menunjukkan pendapatan negara (Y) secara positif lebih dominan ditentukan oleh faktor populasi (P, P2 dan P4), secara positif hanya dipengaruhi oleh belanja pembangunan tentera udara (BPs1U) pada peratusan yang kecil (0.06 peratus), dan Y turut dipengaruhi secara negatif oleh belanja pembangunan tentera darat (BPs1D). Walaupun begitu, Y didapati signifikan mempengaruhi kebanyakan komponen perbelanjaan sektor pertahanan secara positif kecuali bagi pemberian dan kenaan bayaran tetap sektor pertahanan (PKBTs1) yang dipengaruhi secara negatif oleh Y. Dapatan ini menunjukkan Malaysia lebih mengaplikasi hukum Wagner bagi kes sektor pertahanan yang mana output negara lebih cenderung mempengaruhi perbelanjaan awam. Selain itu, PKBTs1 yang juga merupakan salah satu komponen belanja mengurus dilihat lebih dipengaruhi oleh hasil kerajaan (H1, H2 dan JH) secara positif. Namun, belanja pembangunan tentera darat (BPs1D) terbukti dipengaruhi oleh faktor populasi (P dan P4) serta hutang awam luar negeri (HLN) secara positif tetapi ia dipengaruhi secara negatif oleh populasi yang produktif (P2), hutang awam dalam negeri (HDN), hasil awam (H1, H2 dan JH) serta belanja pembangunan tentera laut (BPs1L) dan tentera udara (BPs1U). Manakala belanja pembangunan tentera udara (BPs1U) dipengaruhi secara positif oleh hutang awam (HA, HDN dan HLN) serta belanja pembangunan tentera darat (BPs1D) tetapi ia dipengaruhi secara negatif oleh modal (K), jumlah penduduk (P), imbangan fiskal (IF), hasil awam (H1 dan H2) serta belanja pembangunan tentera laut (BPs1L). Rentetan itu, dapatlah dikatakan bahawa hipotesis hasil-belanja diaplikasi bagi sektor pertahanan. Namun apa yang menariknya adalah hasil awam berhubungan positif dengan komponen belanja mengurus tetapi ia berhubungan negatif dengan komponen belanja pembangunan.

Seterusnya, bagi sektor keselamatan, panel (a) dan (b) di Jadual 5 membuktikan bahawa Y mempengaruhi kebanyakan komponen belanja awam bagi sektor keselamatan secara positif, sedangkan Y hanya dipengaruhi oleh hutang awam dalam negeri (HDN) dan belanja pembangunan bagi penjara (BPs2Pe) juga secara positif. Justeru, teori Wagner wujud bagi sektor keselamatan di Malaysia dalam jangka panjang. Di samping itu, panel (a) turut menunjukkan hutang awam dalam negeri (HDN) dan luar negeri (HLN) mempengaruhi belanja keseluruhan sektor keselamatan (BS2). Manakala belanja pembangunan sektor keselamatan (BPs2) dipengaruhi secara positif oleh faktor populasi (P1) dan hutang awam (HA) tetapi ia dipengaruhi secara negatif oleh imbangan fiskal (IF) dan belanja mengurus sektor keselamatan (BMs2). Panel (b) pula membentangkan bahawa perkhidmatan dan bekalan sektor keselamatan (PBs2) yang merupakan komponen belanja mengurus ditentukan secara positif oleh jumlah penduduk (P), hutang awam luar negeri (HLN) serta pemberian dan kenaan bayaran tetap sektor keselamatan (PKBTs2) tetapi ia dipengaruhi secara negatif oleh emolumen sektor keselamatan (EMOs2). Sebaliknya, satu lagi komponen belanja mengurus iaitu PKBTs2 didapati dipengaruhi secara positif oleh EMOs2 dan secara negatif oleh PBs2. Bagi komponen belanja pembangunan pula, dapatan membuktikan belanja pembangunan bagi imigresen (BPs2I) dipengaruhi secara positif oleh imbangan fiskal (IF) dan belanja pembangunan bagi penjara (BPs2Pe) tetapi ia ditentukan secara negatif oleh jumlah populasi yang produktif (P2). Daripada dapatan untuk sektor keselamatan ini, tidak diperolehi hubungan secara langsung antara hasil awam dan belanja sektor keselamatan, lantas ini menunjukkan sektor keselamatan mengaplikasi hipotesis pengasingan institusi dalam jangka panjang. Walaupun hasil awam dan belanja sektor keselamatan dilihat saling bebas dan tidak bergantungan, tetapi apa yang ketara adalah belanja sektor keselamatan ini baik dari segi total mahupun komponen cenderung dipengaruhi oleh item hutang awam secara positif. Hal ini menunjukkan apabila hutang negara meningkat, maka belanja awam terhadap aspek keselamatan juga perlu dipertingkatkan agar ketenteraman awam dapat dikekalkan.

Selanjutnya, keputusan bagi sektor tenaga dan air seperti yang dipaparkan di panel (a) dan (b) pada Jadual 6 membuktikan pendapatan negara (Y) signifikan mempengaruhi kebanyakan komponen perbelanjaan awam sektor tenaga dan air secara positif. Namun, Y hanya dipengaruhi secara positif oleh hutang awam luar negeri (HLN) dan perkhidmatan dan bekalan sektor tenaga dan air (PBs3). Ini mencerminkan sektor tenaga dan air cenderung mengaplikasi teori Wagner dalam jangka panjang. Selain itu, keputusan di panel (a) juga menjelaskan bahawa belanja mengurus sektor tenaga dan air (BMs3) signifikan dipengaruhi secara

JADUAL 5. Keputusan penganggaran koefisyen jangka panjang berasaskan model ARDL bagi sektor keselamatan

(a) Penentu belanja keseluruhan dan belanja pembangunan sektor keselamatan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar												
		Y	K	P1	P2	P3	HA	HDN	HLN	H1	H2	IF	BMs2	C
132 [BS2]	{1,0,0,1}	0.40 (4.01)*	-	-	-	-	-	0.18 (2.24)**	0.08 (2.06)**	-	-	-	-	-3.05 (-2.66)**
148 [BPs2]	{1,0,1}	0.64 (1.72)***	-	-	-	-	-	-	-	-	-	-	-0.54 (-1.56)	1.97 (1.16)
149 [BPs2]	{1,0,0,1}	1.06 (2.02)***	-0.33 (-1.49)	-	-	-	-	-	-	-	-	-	-0.67 (-1.68)	2.07 (1.17)
151 [BPs2]	{1,0,1,2,1,1}	0.21 (0.21)	-	13.68 (1.78)***	13.85 (0.53)	-1.56 (-0.39)	-	-	-	-	-	-	0.17 (0.15)	-26.23 (-0.64)
153 [BPs2]	{1,0,1,0}	1.16 (2.82)*	-	-	-	-	-	-	-	-	-	-1.89 (-2.30)**	-1.02 (-2.66)**	0.29 (0.17)
155 [BPs2]	{1,0,2,0}	1.68 (4.37)*	-	-	-	-	0.75 (2.51)**	-	-	-	-	-	-2.25 (-4.01)*	-4.59 (-1.73)
156 [BPs2]	{1,0,1,1,1}	0.83 (1.98)***	-	-	-	-	-	-0.21 (-0.47)	0.26 (1.52)	-	-	-	-0.45 (-0.61)	-4.01 (-0.80)
157 [BPs2]	{1,1,1,2}	1.47 (2.40)**	-	-	-	-	-	-	-	-1.01 (-1.65)	-	-	-0.44 (-1.13)	2.54 (1.39)
158 [BPs2]	{1,1,1,2}	1.46 (2.37)**	-	-	-	-	-	-	-	-	-1.00 (-1.63)	-	-0.43 (-1.12)	2.54 (1.38)

(b) Penentu lain-lain pemboleh ubah sektor keselamatan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar														
		Y	P	P2	P4	HA	HDN	HLN	IF	EMOs2	PBs2	PKBTs2	BPs2Po	BPs2Pe	BPs2I	C
342 [PBs2]	{1,0,1,0,1}	-0.17 (-0.50)	2.59 (1.84)***	-	-	-	-	-	-	-0.54 (-2.32)**	-	0.19 (3.81)*	-	-	-	-25.32 (-1.71)
343 [PBs2]	{1,0,1,0,1,0}	-0.09 (-0.26)	-	2.36 (1.58)	-0.08 (-0.06)	-	-	-	-	-0.68 (-2.06)***	-	0.18 (3.39)*	-	-	-	-17.00 (-1.06)
348 [PBs2]	{1,0,1,0,1,1}	0.57 (4.37)*	-	-	-	-	0.13 (0.74)	0.24 (3.30)*	-	-0.30 (-1.09)	-	0.15 (3.42)*	-	-	-	-7.37 (-2.54)***
355 [PKBTs2]	{1,0,1,1,1,1}	0.84 (0.77)	-	-4.37 (-0.83)	31.78 (1.63)	-	-	-	-	2.60 (2.25)**	-2.03 (-3.71)*	-	-	-	-	65.60 (1.37)

Jadual 5(b) sambungan…

371 [Y]	{1,1,1,0,1}	-	-	-	-	0.10 (1.6)	-		-	-	-	-	-0.02 (-0.71)	0.02 (1.79)***	0.01 (0.47)	0.44 (1.10)
372 [Y]	{1,1,1,0,1,1}	-	-	-	-	-	0.17 (2.38)**	-0.04 (-1.06)	-	-	-	-	-0.04 (-1.39)	0.03 (2.42)**	0.01 (0.69)	1.85 (1.82)
403 [BPs2I]	{1,0,1,0,1,1}	2.91 (1.30)	-	-10.86 (-1.78)***	35.04 (1.07)	-	-	-	-	-	-	-	-0.16 (-0.43)	0.08 (0.43)	-	-28.39 (-0.22)
405 [BPs2I]	{1,0,1,1,1}	0.47 (1.87)***	-	-	-	-	-	-	5.35 (2.87)*	-	-	-	-0.05 (-0.17)	0.24 (1.78)**	-	-3.55 (-0.60)

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan merujuk kepada statistik-t.

JADUAL 6. Keputusan penganggaran koefisyen jangka panjang berasaskan model ARDL bagi sektor tenaga dan air

(a) Penentu belanja mengurus sektor tenaga dan air

Persamaan	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar							
[Pemboleh Ubah Bersandar]		Y	K	HA	H1	H2	IF	BPs3	C
13 [BMs3]	{1,0}	-	-	-	0.76 (4.37)*	-	-	-	-0.83 (-0.29)
14 [BMs3]	{1,0}	-	-	-	-	0.79 (4.39)*	-	-	-0.84 (-0.29)
196 [BMs3]	{1,0,0}	0.60 (2.68)**	-	-	-	-	-	0.23 (0.92)	-1.06 (-0.38)
197 [BMs3]	{1,0,1,1}	1.18 (2.19)**	-0.39 (-0.87)	-	-	-	-	-0.16 (-0.54)	0.65 (0.21)
201 [BMs3]	{1,0,0,1}	0.70 (2.96)*	-	-	-	-	-1.58 (-1.23)	0.16 (0.65)	-2.06 (-0.71)
203 [BMs3]	{1,0,0,0}	0.58 (1.84)***	-	0.03 (0.09)	-	-	-	0.22 (0.83)	-1.17 (-0.38)
205 [BMs3]	{1,0,1,2}	2.20 (1.73)***	-	-	-0.57 (-0.46)	-	-	-0.04 (-0.16)	-1.74 (0.59)
206 [BMs3]	{1,0,1,2}	2.21 (1.73)***	-	-	-	-0.62 (-0.49)	-	-0.04 (-0.14)	-1.80 (-0.57)

Jadual 6(b) Penentu lain-lain pemboleh ubah sektor tenaga dan air

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar																	
		Y	K	P2	P4	HA	HDN	HLN	H1	H2	JH	TBH	IF	EMOs3	PBs3	PKBTs3	BPs3T	BPs3A	C
417 [Y]	{1,1,0,0,1}	-	-	-	-	-	-	-	-	-	-	-	-0.04 (-0.30)	0.03 (0.52)	0.05 (1.82)***	0.01 (0.66)	-	-	2.07 (2.63)**
427 [EMOs3]	{1,0,1,0,0,1}	1.24 (2.50)**	-	0.18 (0.18)	-4.45 (-3.60)*	-	-	-	-	-	-	-	-	-	0.14 (1.77)***	-0.01 (-0.53)	-	-	51.86 (2.80)**
431 [EMOs3]	{1,1,1,0,1}	0.17 (1.63)	-	-	-	0.31 (3.13)*	-	-	-	-	-	-	-	-	0.18 (2.19)**	-0.01 (0.80)	-	-	-1.68 (-0.92)
432 [EMOs3]	{1,0,1,0,1,0}	0.18 (1.67)	-	-	-	-	0.52 (4.33)*	-0.17 (-2.24)**	-	-	-	-	-	-	0.20 (2.71)**	0.00 (-0.25)	-	-	1.62 (0.80)
448 [PKBTs3]	{1,0,1,1}	2.84 (1.79)***	-	-	-	-	-	-	-	-	-	-	-	-2.25 (-1.01)	0.58 (0.55)	-	-	-	-14.78 (-0.61)
468 [Y]	{1,2,1,2,2}	-	-	-	-	-	0.04 (0.95)	0.06 (1.75)***	-	-	-	-	-	-	-	-	-0.01 (-0.71)	-0.04 (-1.10)	-0.57 (-0.64)
472 [BPs3T]	{1,1,1}	0.91 (2.75)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.55 (-1.20)	6.04 (1.14)
473 [BPs3T]	{1,1,1,1}	1.65 (1.79)***	-0.68 (-0.86)	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.75 (-1.46)	-	8.95 (1.42)
477 [BPs3T]	{1,1,1,1}	0.99 (2.68)**	-	-	-	-	-	-	-	-	-	-	-1.21 (-0.52)	-	-	-	-	-0.64 (-1.29)	5.64 (1.03)
479 [BPs3T]	{1,1,1,1}	1.09 (2.24)**	-	-	-	-0.32 (-0.51)	-	-	-	-	-	-	-	-	-	-	-	-0.43 (-0.84)	7.1 (1.23)
481 [BPs3T]	{1,0,0,0}	5.50 (3.12)*	-	-	-	-	-	-	-5.29 (-2.72)**	-	-	-	-	-	-	-	-	0.01 (0.02)	8.05 (1.54)
482 [BPs3T]	{1,0,0,0}	5.45 (3.05)*	-	-	-	-	-	-	-	-5.24 (-2.66)**	-	-	-	-	-	-	-	0.01 (0.03)	7.87 (1.50)
483 [BPs3T]	{1,0,0,1,0}	-1.31 (-0.70)	-	-	-	-	-	-	-	-	2.23 (1.13)	-0.49 (-1.86)***	-	-	-	-	-	-0.22 (-0.49)	9.54 (1.59)
487 [BPs3A]	{1,1,1,1,1}	0.78 (0.94)	-	0.05 (0.02)	57.06 (4.15)*	-	-	-	-	-	-	-	-	-	-	-	-0.02 (-0.38)	-	102.99 (2.36)**

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan merujuk kepada statistik-t.

positif oleh jumlah hasil (H1 dan H2). Manakala panel (b) membentangkan keputusan bagi komponen belanja mengurus iaitu emolumen sektor tenaga dan air (EMOs3) yang dipengaruhi secara positif oleh hutang awam (HA dan HDN) serta perkhidmatan dan bekalan sektor tenaga dan air (PBs3) tetapi ia dipengaruhi oleh populasi tidak produktif (P4) dan hutang awam luar negeri (HLN) secara negatif. Bagi komponen belanja pembangunan pula, didapati belanja pembangunan untuk tenaga (BPs3T) ditentukan secara negatif oleh hasil awam (H1, H2 dan TBH), manakala belanja pembangunan untuk air (BPs3A) hanya dipengaruhi oleh populasi tidak produktif (P4) secara positif. Dapatan ini mencerminkan kewujudan hipotesis hasil-belanja bagi sektor tenaga dan air. Namun, keunikan hubungan tersebut adalah hasil awam mempengaruhi belanja mengurus sektor ini secara positif, dan sebaliknya hasil awam mempengaruhi komponen belanja pembangunan sektor air dan tenaga secara negatif.

Keputusan model ARDL jangka pendek menerusi ujian ECM pula dipaparkan di Jadual 7 hingga Jadual 10. Secara umumnya seperti keputusan di Jadual 7, hasil bukan cukai (HBC) dipengaruhi secara positif oleh belanja keseluruhan sektor keselamatan (BS2) serta sektor tenaga dan air (BS3), belanja mengurus sektor pertahanan (BMs1) dan sektor keselamatan (BMs2), serta belanja pembangunan sektor keselamatan (BPs2) serta sektor tenaga dan air (BPs3), tetapi HBC dipengaruhi secara negatif oleh belanja mengurus sektor tenaga dan air (BMs3) dalam jangka pendek. Manakala terimaan bukan hasil (TBH) dipengaruhi secara positif oleh BS2 dan BPs3 serta secara negatif oleh BMs1. Keputusan bagi HBC dan TBH ini menunjukkan ia agak selari dengan keputuan dalam jangka panjang, lantas ia menjelaskan kewujudan hipotesis belanja-hasil di Malaysia dalam jangka pendek. Nilai ECT yang negatif dan signifikan pula menggambarkan kelajuan pelarasan yang tinggi ke arah keseimbangan jangka panjang.

Keputusan ECM bagi sektor pertahanan seperti yang tertera di Jadual 8 pula membuktikan pendapatan negara (Y) mempengaruhi kebanyakan komponen belanja awam sektor pertahanan secara positif kecuali bagi belanja pembangunan tentera darat (BPs1D) di persamaan (282) yang dipengaruhi oleh Y secara negatif. Dalam masa yang sama, Y pula hanya dipengaruhi oleh jumlah penduduk (P) dan belanja pembangunan tentera udara (BPs1U) secara positif, tetapi ia dipengaruhi secara negatif oleh belanja pembangunan tentera darat (BPs1D) dan tentera laut (BPs1L). Justeru, seiring dengan keputusan jangka panjang, didapati sektor pertahanan masih dominan mengaplikasi teori Wagner dalam jangka pendek.

Di samping itu, panel (a) di Jadual 8 membuktikan belanja pembangunan sektor pertahanan (BPs1) dipengaruhi oleh jumlah hasil (H1 dan H2) dan belanja mengurus sektor pertahanan (BMs1) secara negatif yang mana keputusan ini sama dengan keputusan jangka panjang. Panel (b) pula menjelaskan pemberian dan kenaan bayaran tetap sektor pertahanan (PKBTs1) dipengaruhi secara positif oleh hasil (H1, H2 dan JH) dan secara negatif oleh emolumen sektor pertahanan (EMOs1). Seterusnya, belanja pembangunan tentera darat (BPs1D) ditentukan secara positif oleh jumlah penduduk (P) dan hutang awam luar negeri (HLN) tetapi ia ditentukan secara negatif oleh hasil (H1 dan H2) serta belanja pembangunan tentera laut (BPs1L) dan tentera udara (BPs1U). Manakala BPs1U juga dipengaruhi secara positif oleh hutang awam (HA, HDN dan HLN) serta BPs1D dan sebaliknya ia dipengaruhi secara negatif oleh imbangan fiskal (IF), BPs1L serta hasil awam (H1 dan H2). Lantas, sektor pertahanan masih lagi mempertahankan hipotesis hasil-belanja dalam jangka pendek. Kesemua nilai ECT yang negatif dan signifikan di Jadual 9 mencerminkan kelajuan pelarasan ke arah mencapai keseimbangan jangka panjang.

Selanjutnya, Jadual 9 menunjukkan Y mempengaruhi belanja pembangunan sektor keselamatan (BPs2) secara positif. Dalam masa yang sama, Y dipengaruhi secara positif oleh belanja pembangunan bagi penjara (BPs2Pe) secara positif dan secara negatif oleh hutang awam (HA) dan belanja pembangunan Polis Diraja Malaysia (BPs2Po). Tetapi, berdasarkan nilai koefisyen, didapati pengaruh Y terhadap BPs2 adalah lebih besar, lantas ini menjustifikasikan kewujudan teori Wagner bagi sektor keselamatan dalam jangka pendek. Selain itu, panel (a) juga membuktikan belanja pembangunan sektor keselamatan (BPs2) ditentukan secara positif oleh belanja mengurus sektor keselamatan (BMs2) dan secara negatif oleh imbangan fiskal (IF). Berdasarkan panel (b) pula, perkhidmatan dan bekalan sektor keselamatan (PBs2) dipengaruhi secara positif oleh pemberian dan kenaan bayaran tetap sektor keselamatan (PKBTs2), dan sebaliknya PKBTs2 mempengaruhi PBs2 secara negatif. Namun begitu, belanja pembangunan bagi imigresen (BPs2I) dipengaruhi oleh penduduk produktif (P2), imbangan fiskal (IF) dan belanja pembangunan bagi penjara (BPs2Pe) secara positif dan secara negatif oleh populasi tidak produktif (P4). Memandangkan tiada hubungan secara langsung antara hasil dan belanja, maka hipotesis pengasingan institusi turut wujud bagi sektor keselamatan dalam jangka pendek. Nilai ECT yang negatif dan signifikan pula menggambarkan kelajuan pelarasan yang tinggi ke arah keseimbangan jangka panjang.

Bagi sektor tenaga dan air, dapatan di Jadual 10 jelas menunjukkan bahawa Y mempengaruhi emolumen sektor tenaga dan air (EMOs3) secara positif. Tetapi Y juga dipengaruhi oleh imbangan fiskal (IF), EMOs3 dan perkhidmatan dan bekalan sektor tenaga dan air (PBs3) secara positif serta ia dipengaruhi oleh belanja pembangunan bekalan air (BPs3A) secara negatif. Bertentangan dengan keputusan jangka panjang, dapatan dalam jangka pendek ini menggambarkan bahawa wujud teori Keynesian bagi sektor tenaga

JADUAL 7: Keputusan ECM bagi persamaan umum ketiga-tiga sektor

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar											Ujian Diagnostik			
		DL BS1	DL BS2	DL BS3	DL BMs1	DL BMs2	DL BMs3	DL BPs1	DL BPs2	DL BPs3	ECT	C	JB	FB	FA	FW
32 [HBC]	{1,1,0,0}	-0.34 (-1.49)	1.33 (3.11)*	0.26 (2.75)**	-	-	-	-	-	-	-1.49 (-5.07)*	-0.04 (-1.12)	1.24	0.40	0.50	1.12
35 [HBC]	{1,0,0,1,1,1,1}	-	-	-	0.54 (2.22)**	0.89 (2.41)**	-0.11 (-4.09)*	-0.04 (-1.18)	0.12 (1.98)***	0.17 (3.12)*	-1.5 (-7.77)*	-0.06 (-2.30)***	0.44	0.14	0.54	0.88
36 [TBH]	{1,2,2,2}	-1.01 (-1.51)	3.62 (2.73)**	-0.44 (-1.35)	-	-	-	-	-	-	-1.37 (-4.80)*	-0.17 (-1.18)	4.53	0.56	0.14	1.43
37 [TBH]	{1,2,2,2}	-	-	-	0.44 (0.32)	2.17 (1.04)	-0.09 (-0.48)	-	-	-	-1.52 (-5.33)*	-0.13 (-0.82)	3.64	0.06	0.38	0.96
39 [TBH]	{1,2,2,2,1,0,1}	-	-	-	-4.38 (-2.49)**	4.67 (2.28)	0.17 (1.23)	0.35 (1.56)	-0.34 (-0.82)	1.55 (4.24)*	-1.13 (-4.20)*	-0.17 (-0.99)	2.16	1.12	0.02	1.5

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

JADUAL 8. Keputusan ECM bagi sektor pertahanan

(a) Penentu belanja pembangunan sektor pertahanan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar									Ujian Diagnostik			
		DL Y	DL HA	DL HDN	DL HLN	DL H1	DL H2	DL BMs1	ECT	C	JB	FB	FA	FW
16 [BPs1]	{1,1}	-	-	-	-	-2.54 (-2.32)**	-	-	-1.27 (-3.27)*	0.09 (0.76)	2.71	1.88	0.14	0.37
17 [BPs1]	{1,1}	-	-	-	-	-	-2.57 (-2.35)**	-	-1.27 (-3.28)*	0.09 (0.77)	2.72	1.84	0.15	0.35
95 [BPs1]	{1,0,1,1}	2.90 (2.51)**	0.44 (0.42)	-	-	-	-	-1.42 (-1.92)***	-1.13 (-4.05)*	-0.13 (-0.83)	0.45	2.12	0.40	1.96
96 [BPs1]	{1,0,1,1,0}	2.75 (2.51)**	-	0.01 (0.01)	-0.15 (-0.44)	-	-	-1.62 (-2.28)**	-1.26 (-4.37)*	-0.08 (-0.54)	0.70	2.52	2.51	4.33

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

Jadual8(b) Penentu lain-lain pemboleh ubah sektor pertahanan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar																		
		DL Y	DL K	DL P	DL P2	DL P4	DL HA	DL HDN	DL HLN	DL H1	DL H2	DL JH	DL TBH	DL IF	DL EMOs1	DL PBs1	DL PKBTs1	DL BPs1D	DL BPs1L	DL BPs1U
249 [PBs1]	{1,1,1,1,0}	1.12 (2.60)**	-	-	-	-	-	-	-	-	-	-	-	0.17 (0.41)	0.47 (1.31)	-	-0.02 (-0.72)	-	-	-
265 [PKBTs1]	{1,0,1,1,0}	-2.49 (-1.22)	-	-	-	-	-	-	-	2.54 (1.82)***	-	-	-	-	-3.67 (-2.32)**	-	-0.17 (-0.22)	-	-	-
266 [PKBTs1]	{1,0,1,1,0}	-2.45 (-1.20)	-	-	-	-	-	-	-	-	2.51 (1.79)***	-	-	-	-3.64 (-2.30)**	-	-0.18 (-0.23)	-	-	-
267 [PKBTs1]	{1,2,1,1,2,1}	-1.72 (-0.95)	-	-	-	-	-	-	-	-	-	2.42 (2.38)**	-	-	-3.78 (-2.97)*	-0.00 (-0.00)	-	-	-	-
270 [Y]	{1,1,0,1,0}	-	-	3.43 (2.24)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.02 (-2.74)**	-0.03 (-3.36)*	0.09 (5.42)*
271 [Y]	{1,1,1,1,1,1,1}	-	-	-	1.62 (0.91)	0.85 (1.10)	-	-	-	-	-	-	-	-	-	-	-	-0.02 (1.69)***	0.01 (2.07)***	0.06 (5.77)*
280 [BPs1D]	{1,1,1,1,1}	-1.02 (-0.45)	-	-			-	-	-	-	-	-	-	-	-	-	-	-	0.08 (0.59)	-0.07 (-0.37)
282 [BPs1D]	{1,1,1,1,1}	-6.36 (-3.12)*	-	44.22 (1.83)***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.02 (-0.21)	0.00 (-0.00)
283 [BPs1D]	{1,0,1,1,1,1}	8.96 (3.67)*	-	-	-33.31 (-1.09)	6.18 (0.45)	-	-	-	-	-	-	-	-	-	-	-	-	-0.28 (-2.18)**	-0.67 (-3.23)*
287 [BPs1D]	{1,1,1,1,0}	1.33 (0.54)	-	-	-	-	0.58 (0.25)	-	-	-	-	-	-	-	-	-	-	-	0.00 (0.02)	-0.07 (-0.32)
288 [BPs1D]	{1,0,1,0,0,0}	5.19 (2.86)*	-	-	-	-	-	0.28 (0.18)	1.34 (2.76)**	-	-	-	-	-	-	-	-	-	-0.20 (-2.01)***	0.07 (0.48)
289 [BPs1D]	{1,0,0,0,1}	6.37 (3.08)*	-	-	-	-	-	-	-	-2.44 (-1.86)***	-	-	-	-	-	-	-	-	0.00 (0.01)	-0.22 (-1.19)
290 [BPs1D]	{1,0,0,0,1}	6.40 (3.10)*	-	-	-	-	-	-	-	-	-2.50 (-1.90)***	-	-	-	-	-	-	-	0.00 (0.01)	-0.23 (-1.22)
291 [BPs1D]	{1,0,1,1,1,1}	7.81 (3.55)*	-	-	-	-	-	-	-	-	-	-0.70 (-0.48)	0.19 (1.30)	-	-	-	-	-	-0.15 (-1.12)	-0.59 (-2.61)**
304 [BPs1U]	{1,1,2,1}	3.19 (1.99)***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18 (1.62)	-0.13 (-1.28)	-
305 [BPs1U]	{1,0,1,1,1}	-0.56 (-0.28)	-1.13 (-1.56)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.08 (-0.70)	-0.09 (-0.97)	-
306 [BPs1U]	{1,0,1,1,1}	6.83 (3.66)*	-	-26.41 (-1.42)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05 (0.44)	-0.05 (-0.52)	-
309 [BPs1U]	{1,1,2,1,2}	2.96 (1.91)***	-	-	-	-	-	-	-	-	-	-	-	-3.65 (-2.51)**	-	-	-	0.27 (2.42)**	-0.03 (-0.34)	-
311 [BPs1U]	{1,0,1,0,1}	2.61 (1.13)	-	-	-	-	5.64 (2.19)**	-	-	-	-	-	-	-	-	-	-	0.12 (0.84)	-0.32 (-2.69)***	-
312 [BPs1U]	{1,0,1,0,1,1}	2.79 (1.52)	-	-	-	-	-	5.95 (3.63)*	1.64 (3.14)*	-	-	-	-	-	-	-	-	0.17 (1.52)	-0.3 (-3.21)*	-
313 [BPs1U]	{1,0,1,1,1}	3.05 (1.51)	-	-	-	-	-	-	-	-4.27 (-2.64)**	-	-	-	-	-	-	-	0.07 (0.56)	0.15 (1.17)	-
314 [BPs1U]	{1,0,1,1,1}	3.17 (1.58)	-	-	-	-	-	-	-	-	-4.34 (-2.71)**	-	-	-	-	-	-	0.07 (0.59)	0.15 (1.13)	-

Jadual 8(b) sambungan…

Persamaan	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar					
[Pemboleh Ubah Bersandar]		ECT	C	JB	FB	FA	FW
249 [PBs1]	{1,1,1,1,0}	-1.47 (-5.47)*	-0.12 (-2.35)**	4.05	0.39	1.96	0.43
250 [PBs1]	{1,1,1,1,0,0}	-1.47 (5.3)*	-0.12 (-2.31)**	3.76	0.39	2.02	0.46
265 [PKBTs1]	{1,0,1,1,0}	-1.27 (-4.36)*	0.29 (1.27)	2.15	2.12	2.81	9.06
266 [PKBTs1]	{1,0,1,1,0}	-1.27 (-4.36)*	0.29 (1.26)	2.14	2.17	5.91	11.13
267 [PKBTs1]	{1,2,1,1,2,1}	-1.48 (-5.75)*	0.10 (0.49)	0.14	0.01	0.30	1.36
270 [Y]	{1,1,0,1,0}	-1.40 (-5.53)*	-0.01 (-0.21)	0.71	2.27	0.32	4.03
271 [Y]	{1,1,1,1,1,1}	-1.33 (5.77)*	0.01 (0.26)	1.29	1.15	0.09	0.60
280 [BPs1D]	{1,1,1,1,1}	-1.43 (-4.37)*	0.15 (0.63)	0.44	0.21	0.11	0.39
282 [BPs1D]	{1,1,1,1,1}	-1.59 (-5.89)*	-0.33 (-0.62)	1.31	0.41	0.04	3.56
283 [BPs1D]	{1,0,1,1,1,1}	-1.10 (-4.04)*	0.18 (0.23)	1.42	0.42	0.46	1.30
287 [BPs1D]	{1,1,1,1,0}	-1.43 (-4.44)*	-0.10 (-0.29)	0.87	0.92	0.46	0.62
288 [BPs1D]	{1,0,1,0,0,0}	-1.43 (-6.07)*	-0.40 (-1.56)	3.50	0.34	0.00	0.83
289 [BPs1D]	{1,0,0,0,1}	-1.25 (-4.50)*	-0.31 (-1.33)	4.40	0.44	0.05	0.40
290 [BPs1D]	{1,0,0,0,1}	-1.25 (-4.48)*	-0.30 (-1.31)	4.16	0.45	0.05	0.41

Jadual 8(b) sambungan…

291 [BPs1D]	{1,0,1,1,1,1}	-1.28 (-4.84)*	-0.55 (-2.09)	2.81	0.65	0.10	1.02
304 [BPs1U]	{1,1,2,1}	-1.40 (-5.00)*	-0.31 (-1.75)	1.70	0.18	0.20	0.56
305 [BPs1U]	{1,0,1,1,1}	-1.41 (-4.55)*	0.00 (0.02)	1.47	0.33	1.36	0.79
306 [BPs1U]	{1,0,1,1,1}	-1.68 (-5.96)*	-0.03 (-0.08)	1.44	2.34	0.24	3.72
308 [BPs1U]	{1,0,2,1,0}	-1.34 (-4.03)*	-0.10 (-0.46)	0.70	0.56	0.00	1.64
309 [BPs1U]	{1,1,2,1,2}	-1.33 (-5.14)*	-0.28 (-1.67)	1.20	1.11	0.46	1.78
311 [BPs1U]	{1,0,1,0,1}	-1.19 (-3.76)*	-0.15 (-0.49)	1.45	2.12	0.74	0.76
312 [BPs1U]	{1,0,1,0,1,1}	-1.60 (-5.89)*	-0.12 (-0.49)	1.60	0.27	1.39	0.65
313 [BPs1U]	{1,0,1,1,1}	-1.57 (-4.35)*	-0.16 (-0.70)	0.13	1.95	1.49	0.76
314 [BPs1U]	{1,0,1,1,1}	-1.58 (-4.43)*	-0.16 (-0.72)	0.12	1.94	1.63	0.77

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

JADUAL 9. Keputusan ECM bagi sektor keselamatan

(a) Penentu belanja keseluruhan dan belanja pembangunan sektor keselamatan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar													Ujian Diagnostik			
		DL Y	DL K	DL P1	DL P2	DL P3	DL HA	DL HDN	DL HLN	DL H1	DL H2	DL IF	DL BMs2	ECT	C	JB	FB	FA	FW
132 [Bs2]	{1,0,0,1}	0.32 (1.63)	-	-	-	-	-	0.24 (1.30)	-0.05 (-0.81)	-	-	-	-	-1.44 (-5.28)*	0.04 (-1.12)	2.05	0.41	0.62	0.35
148 [BPs2]	{1,0,1}	0.95 (1.26)	-	-	-	-	-	-	-	-	-	-	1.66 (2.55)**	-1.45 (-4.21)	-0.22 (-2.15)	0.53	0.61	1.75	0.85
149 [BPs2]	{1,0,0,1}	0.56 (0.62)	-0.11 (-0.35)	-	-	-	-	-	-	-	-	-	-0.09 (-0.12)	-1.18 (-3.01)*	-0.02 (-0.22)	2.02	2.42	2.71	0.98
151 [BPs2]	{1,0,1,2,1,1}	0.45 (0.56)	-	4.75 (0.37)	18.41 (1.06)	-9.11 (-1.19)	-	-	-	-	-	-	2.14 (2.72)**	-1.2 (-3.59)*	0.35 (0.61)	2.17	0.07	2.72	1.43
153 [BPs2]	{1,0,1,0}	1.32 (1.79)***	-	-	-	-	-	-	-	-	-	-2.76 (-3.60)*	0.68 (1.09)	-1.13 (-3.84)*	-0.16 (-1.63)	3.15	0.74	1.14	1.20
155 [BPs2]	{1,0,2,0}	1.10 (1.21)	-	-	-	-	0.27 (0.35)	-	-	-	-	-	-2.26 (-3.39)*	-0.97 (-3.10)*	0.10 (0.66)	0.64	0.07	0.72	2.06
156 [BPs2]	{1,0,1,1,1}	0.43 (0.55)	-	-	-	-	-	0.02 (0.03)	-0.08 (-0.36)	-	-	-	1.22 (1.91)***	-1.44 (-4.69)*	-0.14 (-1.15)	0.24	0.61	1.63	0.68
157 [BPs2]	{1,1,1,2}	0.59 (0.72)	-	-	-	-	-	-	-	-0.76 (-1.44)	-	-	0.98 (1.32)	-1.31 (-3.82)*	-0.05 (-0.49)	1.34	1.30	0.02	0.93
158 [BPs2]	{1,1,1,2}	0.58 (0.71)	-	-	-	-	-	-	-	-	-0.75 (-1.43)	-	1.00 (1.34)	-1.32 (-3.82)*	-0.05 (-0.50)	1.40	1.33	0.03	0.95

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

(b) Penentu lain-lain pemboleh ubah sektor keselamatan

Persamaan [Pemboleh Ubah Bersandar]	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar														Ujian Diagnostik					
		DL Y	DL P	DL P2	DL P4	DL HA	DL HDN	DL HLN	DL IF	DL EMOs2	DL PBs2	DL PKBTs2	DL BPs2Po	DL BPs2Pe	DL BPs2I	ECT	C	JB	FB	FA	FW
342 [PBs2]	{1,0,1,0,1}	0.32 (0.93)	2.04 (0.44)	-	-	-	-	-	-	0.16 (0.54)	-	0.18 (3.74)*	-	-	-	-1.19 (-4.44)*	-0.08 (-0.72)	1.92	0.19	0.14	1.23
343 [PBs2]	{1,0,1,0,1,0}	0.38 (1.10)	-	-1.41 (-0.27)	1.49 (0.59)	-	-	-	-	0.12 (0..39)	-	0.17 (3.56)*	-	-	-	-1.24 (-4.59)*	-0.01 (-0.11)	0.75	0.27	0.00	0.91
348 [PBs2]	{1,0,1,0,1,1}	0.48 (1.50)	-	-	-	-	0.10 (0.36)	0.14 (1.53)	-	0.20 (0.71)	-	0.12 (2.81)**	-	-	-	-1.37 (-5.43)*	-0.03 (-0.53)	0.05	0.36	1.70	1.53

Jadual 9(b) sambungan…

355 [PKBTs2]	{1,0,1,1,1,1}	-1.36 (-2.02)	-	3.95 (0.38)	2.69 (0.15)	-	-	-	-	2.71 (4.13)*	-1.84 (-4.76)*	-	-	-	-	-1.79 (-8.40)*	-0.19 (-0.67)	0.39	0.50	0.17	0.90
371 [Y]	{1,1,1,0,1}	-	-	-	-	-0.37 (-2.45)**	-	-	-	-	-	-	-0.06 (-2.43)**	0.01 (1.25)	-0.01 (-1.02)	-1.56 (-5.00)*	0.04 (1.23)	0.31	2.04	2.11	0.48
372 [Y]	{1,1,1,0,1,1}	-	-	-	-	-	-0.10 (-0.69)	-0.03 (-0.51)	-	-	-	-	-0.07 (-2.61)**	0.03 (2.54)**	0.00 (-0.13)	-1.60 (-4.89)*	0.01 (0.44)	3.25	1.37	1.06	1.68
403 [BPs2I]	{1,0,1,0,1,1}	0.33 (0.20)	-	75.06 (2.85)*	-104.76 (-2.30)**	-	-	-	-	-	-	-	-0.04 (-0.13)	0.31 (2.45)**	-	-0.90 (-3.68)*	-2.02 (-2.85)	0.87	3.60	0.78	1.91
405 [BPs2I]	{1,0,1,0,1}	1.02 (0.57)	-	-	-	-	-	-	3.16 (1.83)***	-	-	-	-0.03 (-0.08)	-0.17 (-1.28)	-	-1.15 (-4.24)*	0.01 (0.04)	0.57	1.72	0.66	1.16

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

JADUAL 10. Keputusan ECM bagi sektor tenaga dan air

(a) Penentu belanja mengurus sektor tenaga dan air

Persamaan	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar								Ujian Diagnostik			
[Pemboleh Ubah Bersandar]		DL Y	DL K	DL HA	DL H1	DL H2	DL BPS3	ECT	C	JB	FB	FA	FW
13 [BMS3]	{1,0}	-	-	-	1.29 (1.20)	-	-	-1.20 (-4.52)*	-0.07 (-0.55)	1.11	1.49	2.79	1.34
14 [BMS3]	{1,0}	-	-	-	-	1.30 (1.21)	-	-1.20 (-4.53)*	-0.07 (-0.56)	1.04	1.46	2.83	1.36
196 [BMS3]	{1,0,0}	0.93 (0.57)	-	-	-	-	0.38 (1.44)	-1.19 (-4.48)*	-0.06 (-0.34)	0.09	2.13	1.96	1.22
197 [BMS3]	{1,0,1,1}	1.02 (0.60)	-0.16 (-0.26)	-	-	-	-0.34 (-1.19)	-1.19 (-4.45)*	-0.02 (-0.11)	0.83	1.82	1.54	0.69
201 [BMS3]	{1,0,0,1}	0.42 (0.26)	-	-	-	-	0.40 (1.52)	-1.24 (-4.66)*	0.00 (-0.16)	0.08	1.96	1.43	2.22
203 [BMS3]	{1,0,0,0}	0.93 (0.50)	-	0.10 (0.06)	-	-	0.38 (1.40)	-1.19 (-4.39)*	-0.07 (-0.25)	0.07	1.96	1.96	2.27
205 [BMS3]	{1,0,1,2}	1.59 (0.95)	-	-	-1.17 (-0.98)	-	-	-1.23 (-4.70)*	0.05 (0.21)	0.93	0.73	2.64	1.13
206 [BMS3]	{1,0,1,2}	1.60 (0.96)	-	-	-	-1.26 (-1.05)	-	-1.23 (-4.71)*	0.05 (0.22)	0.90	0.72	2.76	1.14

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

(b) Penentu lain-lain pemboleh ubah sektor tenaga dan air

Persamaan	Model Bersyarat ARDL	Pemboleh Ubah Tidak Bersandar																	Ujian Diagnostik				
[Pemboleh Ubah Bersandar]		DL Y	DLK	DL P2	DL P4	DL HA	DL HDN	DL HLN	DL H1	DL H2	DL JH	DLTBH	DL IF	DL EMOs3	DL PBs3	DL PKBTs3	DL BPs3T	DL BPs3A	ECT	C	JB	FB	FA	FW
417 [Y]	{1,1,0,0,1}	-	-	-	-	-	-	-	-	-	-	-	0.07 (0.47)*	1.76 (2.92)*	0.06 (2.27)**	0.01 (120.00)	-	-	-1.13 (-3.32)*	0.01 (0.45)	1.98	0.75	0.47	0.31
427 [EMOs3]	{1,0,1,0,0,1}	1.03 (2.49)**	-	1.16 (0.26)	-3.00 (-1.19)	-	-	-	-	-	-	-	-	-	0.05 (0.80)	0.01 (0.64)	-	-	-1.51 (-5.59)*	-0.04 (-0.37)	2.00	1.74	0.41	1.36
431 [EMOs3]	{1,1,1,0,1}	0.24 (0.66)	-	-	-	-0.49 (-1.32)	-	-	-	-	-	-	-	-	0.10 (1.67)	0.00 (-0.28)	-	-	-1.67 (-5.78)*	0.03 (0.59)	0.28	2.01	2.06	2.71
432 [EMOs3]	{1,0,1,0,1,0}	0.08 (0.24)	-	-	-	-	0.48 (1.74)***	-0.28 (-3.11)*	-	-	-	-	-	-	0.08 (1.29)	0.01 (0.63)	-	-	-1.42 (-5.72)*	-0.01 (-0.23)	7.06	2.38	0.00	1.11
448 [PKBTs3]	{1,0,1,1}	5.37 (1.02)	-	-	-	-	-	-	-	-	-	-	-	-5.60 (-2.60)**	1.15 (1.24)	-	-	-	-1.22 (-4.29)*	-0.02 (-0.04)	1.46	0.44	0.48	1.00
468 [Y]	{1,2,1,2,2}	-	-	-	-	-	0.09 (0.62)	0.02 (0.35)	-	-	-	-	-	-	-	-	0.00 (-0.33)	-0.09 (-3.19)*	-1.29 (-3.83)*	0.01 (0.28)	1.40	2.59	1.77	1.02
472 [BPs3T]	{1,1,1}	-4.07 (-1.71)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.58 (-1.45)	-0.99 (-4.27)*	0.43 (1.65)	1.48	0.01	2.40	1.24
473 [BPs3T]	{1,1,1,1}	2.07 (0.72)	-3.61 (-3.33)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.75 (-2.06)***	-1.23 (-5.27)*	0.19 (0.77)	0.77	0.51	2.67	0.63
477 [BPs3T]	{1,1,1,1}	-3.41 (-1.33)	-	-	-	-	-	-	-	-	-	-	-3.10 (-1.26)	-	-	-	-	-0.62 (-1.49)	-0.95 (-4.00)*	0.38 (1.41)	0.33	0.22	0.98	1.02
479 [BPs3T]	{1,1,1,1}	-3.79 (-1.37)	-	-	-	-0.11 (-0.04)	-	-	-	-	-	-	-	-	-	-	-	-0.55 (-1.37)	-1.03 (-4.24)*	0.40 (0.69)	1.24	0.10	2.53	1.28
481 [BPs3T]	{1,0,0,0}	3.76 (1.45)	-	-	-	-	-	-	-6.03 (-3.58)*	-	-	-	-	-	-	-	-	0.25 (0.60)	-1.06 (-4.02)*	0.18 (0.67)	1.04	0.42	1.56	1.71
482 [BPs3T]	{1,0,0,0}	3.70 (1.43)	-	-	-	-	-	-	-	-5.99 (-3.54)*	-	-	-	-	-	-	-	0.25 (0.61)	-1.06 (-4.01)*	0.18 (0.67)	1.05	0.40	1.64	1.67
483 [BPs3T]	{1,0,0,1,0}	0.95 (0.41)	-	-	-	-	-	-	-	-	-3.16 (-1.89)***	-0.08 (-0.36)	-	-	-	-	-	0.44 (1.07)	-1.44 (-6.76)*	0.15 (0.56)	0.33	0.48	1.16	3.63
487 [BPs3A]	{1,1,1,1,1}	-0.62 (-0.80)	-	7.03 (0.59)	26.29 (1.24)	-	-	-	-	-	-	-	-	-	-	-	-0.05 (-1.32)	-	-1.58 (-6.19)*	-0.09 (-0.27)	1.65	1.12	0.01	0.83

Nota: *signifikan pada aras keertian 1%. ** signifikan pada aras keertian 5%. *** signifikan pada aras keertian 10%. Nilai dalam kurungan ( ) merujuk kepada statistik-t. JB merujuk kepada *Jarque-Bera Statistic of Normality Test*, FB merujuk kepada *F-Statistics of Breusch-Godfrey Serial Correlation LM Test*, FA merujuk kepada *F-Statistics of ARCH Test*, FW merujuk kepada *F-Statistics of White Heteroskedasticity Test*.

dan air. Di samping itu, panel (b) juga membuktikan EMOs3 dipengaruhi oleh hutang dalam negara (HDN) secara positif tetapi secara negatif oleh hutang luar negara (HLN). Dalam masa yang sama, EMOs3 turut mempengaruhi pemberian dan kenaan bayaran tetap sektor tenaga dan air (PKBTs3) secara negatif. Manakala belanja pembangunan untuk tenaga (BPs3T) signifikan dipengaruhi secara negatif oleh modal (K), hasil awam (H1, H2 dan JH) serta belanja pembangunan untuk bekalan air (BPs3A). Dapatan ini mencerminkan sektor tenaga dan air masih mengaplikasi hipotesis hasil-belanja dalam jangka pendek. Walaupun panel (a) menunjukkan tiada pemboleh ubah yang signifikan mempengaruhi belanja mengurus sektor tenaga dan air (BMs3), tetapi nilai ECT yang negatif dan signifikan di kedua-dua panel (a) dan (b) menggambarkan kelajuan pelarasan yang tinggi ke arah keseimbangan jangka panjang.

RUMUSAN DAN IMPLIKASI DASAR

Kajian ini bertujuan untuk mengenal pasti hubungan jangka panjang (kointegrasi) antara hasil, belanja dan output atau pendapatan negara bagi kes sektor pertahanan, keselamatan serta tenaga dan air. Rentetan itu, kaedah ARDL diaplikasi untuk melihat kewujudan hubungan jangka panjang (kointegrasi) serta arah sebab-menyebab dalam jangka pendek dan jangka panjang antara pemboleh ubah fiskal dan bukan fiskal terbabit. Dapatan kajian membuktikan secara umumnya Malaysia mengamalkan hipotesis belanja-hasil. Namun, wujud teori Wagner dan hipotesis hasil-belanja untuk sektor pertahanan, teori Wagner dan hipotesis pengasingan institusi untuk sektor keselamatan serta teori Wagner dan hipotesis hasil-belanja bagi sektor tenaga dan air.

Perlu dijelaskan bahawa kewujudan teori Wagner bagi ketiga-tiga sektor bererti kenaikan pendapatan negara bakal meningkatkan perbelanjaan awam di sektor terbabit. Lantas, komponen perbelanjaan awam yang akan ditambah perlulah dipantau dan diagihkan mengikut dua perkara. Pertama, darjah produktiviti komponen tersebut supaya seterusnya ia dapat kembali menyumbang kepada kenaikan output negara. Secara tidak langsung, pembaziran terhadap item yang kurang produktif dapat dielakkan. Kedua, ia seharusnya selari dengan citarasa dan keperluan masyarakat kini yang kian kompleks agar masyarakat terus meminta barangan awam tersebut dan sanggup menanggung beban cukai atas pengeluaran barangan awam terbabit.

Di samping itu, bagi tujuan pengukuhan fiskal, adalah lebih baik sekiranya kesemua sektor mengamalkan hipotesis penyelarasan fiskal (the fiscal synchronization hypothesis). Ini membolehkan kedua-dua item hasil dan belanja diambilkira secara serentak dalam perancangan dan penentuan belanjawan kerajaan, lantas defisit fiskal dapat dikurangkan serta ia turut mengurangkan dominasi birokrat dalam menentukan belanjawan mengikut kepentingan mereka.

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Jurnal Ekonomi Malaysia 54(1) 2020 69 - 79
http://dx.doi.org/10.17576/JEM-2020-5401-5

The Estimation of Risk Management Efficiency and its Determinants

(Anggaran Kecekapan Pengurusan Risiko dan Penentunya)

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ABSTRACT

This research aims at finding risk management efficiency and its determinants of non-life insurers operating in Pakistan. This study applies Data Envelopment Analysis (DEA) to determine the efficiency scores for risk management practices of firms over the period 2009-2018. Tobit model is applied to identify factors influencing risk management efficiency of firms. DEA results obtained indicate that the overall average efficiency score increases from 68% in 2009 to 76% in 2018. Tobit estimates show that the age and firm size has a significantly positive relationship with risk management efficiency of firms. The study suggests that firms at lower efficiency frontier could improve their efficiency level by performing better in terms of underwriting and investment activities as well as enhancing the value-added of the firms. The study also recommends that non-life insurers should adopt a multifaceted approach in managing the risks to derive greater benefits from their businesses.

Keywords: Risk management; efficiency; Data Envelopment Analysis

ABSTRAK

Penyelidikan ini bertujuan untuk mengkaji kecekapan pengurusan risiko dan penentunya bagi syarikat selain insurans nyawa yang beroperasi di Pakistan. Kajian ini menggunakan Analisis Pengumpulan Data (DEA) untuk menentukan skor kecekapan bagi amalan pengurusan risiko firma dalam tempoh 2009-2018. Anggaran Tobit menunjukkan faktor-faktor yang mempengaruhi kecekapan pengurusan risiko firma. Keputusan DEA menunjukkan bahawa skor purata keseluruhan kecekapan meningkat dari 68% pada tahun 2009 kepada 76% pada tahun 2018. Anggaran Tobit menunjukkan bahawa umur dan saiz firma mempunyai hubungan positif yang signifikan dengan kecekapan pengurusan risiko firma. Kajian ini mencadangkan bahawa firma yang mempunyai tahap kecekapan yang rendah dapat meningkatkan tahap kecekapan mereka dengan menunjukkan prestasi yang lebih baik dari segi aktiviti penaja jaminan dan pelaburan serta meningkatkan nilai tambah firma. Kajian ini juga mengesyorkan agar syarikat insurans selain insuran nyawa seharusnya menggunakan pendekatan pelbagai aspek dalam menguruskan risiko bagi memperoleh manfaat yang lebih besar dari perniagaan mereka.

Kata Kunci: Pengurusan risiko; kecekapan; Analisis Pengumpulan Data

INTRODUCTION

The important objective for the establishment of the insurance business is to cover various types of risks faced by individuals, businesses and institutions. Since policyholders pass on their risk to insurance firms, therefore, insurers not only have to manage the risk of policyholders (insured) but also their own risk. Along with underwriting risk, insurance firms also play a vital role in the mobilization of resources for long term investments through its intermediation function; thus, making it an key pillar in the financial sector of an economy (Kokobe & Gemechu 2016). The risk predicting and managing function of insurers promotes the stability in the financial market under chaotic conditions. Without the insurance industry, it would not be sustainable for businesses to retain various types of risks. Insurance business offers the opportunity to larger industries having more risks, to expand its business by insuring their physical assets including machinery and plant. According to Magezi (2003), mismanagement of risk by insurance firms will increase the losses in the settling of claims by policyholders which will result in the poor financial performance of the firm.

To play its due role in the economy, it is very much important for insurers to optimally manage risks. Optimal risk management practices contribute to the soundness and robustness of insurance business which is essential to ensure the stability of the country's financial sector and sustainable growth in the economy (Financial Stability Review 2011). Iqbal and Mirakhor (2007) state that effective risk management practices play significant role in determining the financial performance of institutions. Yusop (2011) highlights that "financial institutions that can handle their risk efficiently are most likely to succeed and remain in the business".

Considering the importance of risk management activity in the firm's financial performance, it is motivating to investigate the efficiency of that activity. Over the past 30 years, numerous studies have been carried out globally to evaluate the overall performance of firms in terms of efficiency. Despite several studies around the globe, there is a very limited number of studies related to the efficiency analysis of the insurance sector in Pakistan, (For example, Afzal & Asghar 2010; Afzal & Asghar 2012; Khan & Noreen 2014; Janjua & Akmal 2015; Noreen & Ahmed 2016). All of the above-mentioned studies in Pakistan were based on the overall efficiency of insurance firms instead of efficiency analysis of single activity/operation. While the traditional efficiency measures are usually considered good indicators of overall performance and have important implications for the firms; however, it is challenging for inefficient firms to identify which of its activity is causing inefficiency (Yusop et al., 2014).

The major goal of this research is to assess risk management efficiency of general insurers in Pakistan for the period 2009-2018. The outcome of this study will be helpful for the insurance service providers to identify their weak areas in risk management operations and adopt efficient strategies to boost their risk management performance. Moreover, the suggestions based on the findings of the study will contribute to enhancing the risk management performance of general insurers in Pakistan. The remainder of the paper is outlined as follows. Section 2; briefly review the literature related to risk management efficiency studies. Section 3 provides the methodological framework. Section 4 defines input, output, and explanatory variables. Section 5 and Section 6 detail out the results, discuss the findings and suggest policy implications.

LITERATURE REVIEW

Over past three decades, extensive research has been conducted related to insurance industry based on the traditional measures of efficiency such as cost, allocative and profit efficiency by using various frontier models of efficiency measurement (Eling & Luhnen 2010b). For instance, Noreen and Ahmed (2016) examine the cost efficiency and total factor productivity of life and non-life firms in Pakistan for the period 2000-2009. They find that insurance firms in Pakistan are inefficient in terms of choosing a cost-minimizing combination of inputs. However, there was an improvement in productivity. Nourani et al. (2018) use network DEA to estimate the performance of Malaysian general and life insurers in terms of premium accumulation and investment capability. They identify that lack of investment and high input usage were the main factors causing low efficiency. They also highlight that foreign insurers outperform the local insurers in investment capability. Similarly, Sen (2019) use DEA to compute efficiencies of Life Insurance Industry of India over the period 2006-2015. He reported the prevalence of cost inefficiencies and suggested that life insurers need to reallocate resources for improving efficiency.

Viverita (2019) uses output-oriented DEA to investigate the efficiency of Indonesian private health insurance after the implementation of BPJS regulations in 2014. The study documented no substantial differences in the efficiency of companies before and after the application of BPJS. However, results highlighted that local insurance firms gain more benefit as compared to joint venture due to enhanced competition in the market. Almulhim (2019) performed two-stage DEA to examine the efficiency of Saudi Takaful and conventional firms. The study reveals declining average efficiency scores for both conventional and takaful firms. The study suggests new consolidation and regulation related to foreign participation to help the firms to become more dynamic and robust.

Recently, insurance firms have increased their focus on enhancing risk management practices because of change in the risk profile, deregulation, privatization and enhanced competition. According to Banks (2004) focusing on risk management enables the firm to save the cost by controlling the risk, hence making risk management important particularly for businesses dealing with risk. Although rich and diverse literature focuses on overall efficiency over the past decades, however, few studies exist in the literature to measure the performance of various activities (operations) of insurers such as underwriting process, risk and investment management. For instance, Yang (2006), Hsiao and Su (2006), Wu et al. (2007), Yusop et al. (2011), Yakob et al. (2014) and Ertugrul et al. (2016) measure the firm's performance in terms of underwriting, risk or investment management.

Cummins et al. (2009) explore the impact of financial intermediation and risk management activities in enhancing the performance of the insurance firm. The authors highlight that both of these activities play an instrumental role in the overall reduction of cost. This benefit of cost reduction may then be transferred to improvements inefficiency. Similarly, Acharyya (2013) investigate whether or not enterprise risk management (ERM) added value to insurers. Based on U.S. Property/Casualty insurance companies' data, they find that effective adoption of ERM plays a critical role in reducing risk and increasing value addition for all stakeholders. Lin and Wen (2008) also analyze the influence of risk management on the average cost efficiency by using the data of USA's property-liability insurers. They point out the enhancement in cost efficiency due to managing investment risk; however, they do not find any significant influence of managing underwriting risks on the efficiency of firms.

Although, these studies incorporated that managing risk is an important factor in a determining the overall firm's financial management performance, however, neither of these studies investigates the efficiency of firms in their risk management activities. Some studies (such as Ren 2007; Yusop et al. 2011; Yakob et al. 2014) directly measure the performance of the risk management process instead of the overall performance of the firm. Ren (2007) gave the idea to look at the efficiency of risk management operation of firms. Later, Yusop et al. (2011) and Yakob et al. (2014) measure the performance of insurance firms in Malaysia in terms of risk management activity. These studies focus on the efficiency of the insurance sector with dual system of insurance service (conventional and takaful insurance) providers in terms of risk and investment management and correlate these with the overall performance of firms. For example, Yakob et al. (2015) evaluate the risk and investment performance of conventional and takaful firms in Malaysia. They find that the Takaful operator's efficiency level in risk management remained higher than that of the conventional firms. They propose mergers and acquisitions of inefficient firms to get the benefits of large-scale operations, hence improving efficiency. Yusop et al. (2011) conclude that risk and investment management efficiencies are important drivers to ensure the overall efficiency and profitability of insurance firms.

Several studies focus on the determinants of insurance sector efficiency. For instance, Hsu and Petchsakulwong (2010) look into the impact of corporate governance and efficiency of the non-life insurer in Thailand. They find out that board independence and firm size are positively correlated with a firm's efficiency while audit committee size, diligence, board tenure and age, as well as board ownership, harm the efficiency performance. The connection between firm size and efficiency is explored by Afza and Kausar (2010) for Pakistani non-life insurers. High-efficiency scores of large insurers imply that the size of the firm is one important determinant of efficiency. Similarly study of Adu et al. (2012) on insurance firms in Ghana also identifies that size and market share are important determinants of efficiency.

Sharew and Fentie (2018) analyze the factors influencing the 'performance/efficiency' of the insurance companies' in Ethiopia over the period 2006-2015. They documented that number of branches and firm size significantly affects the efficiency of firms. Sen (2019) also investigates the impact of non-discretionary factors on the cost efficiency of life insurers in India. The study reveals that the growth rate in premium, age, and market share significantly affects the cost-efficiency. Moreover, this study notes that the solvency ratio has also a significant relationship with cost efficiency implying that adequate solvency margin could be important for determining a firm's efficiency. Jaloudi (2019) perform a study to identify the external and internal determinants of technical efficiency of insurance firms operating in Jordan for years 2006-2016. Their study evidences a significant correlation between type, size, and ROA and efficiency of the firm. Based on the findings study suggests mergers to gain the benefits of operating at large scale, thus, improve efficiency.

As mentioned above, several researchers from developed and developing countries focus on overall efficiency with different perspectives and by using different methodologies. We also highlight some studies explore the link between the efficiency of firms in risk management practices and performance. We note that efficiency in risk management activities is positively influencing the firm's performance. Despite the importance of risk management in determining firm profitability and soundness, we find few studies on the subject around the globe but none about Pakistan. After financial sector reforms in Pakistan, the regulatory environment has been changed and the openness of insurance markets also enhanced competition that leads to significant growth in the insurance business in Pakistan. Thus, it is motivating to explore the efficiency of this important component (i.e. risk management) of insurance business in Pakistan which will determine the overall long-term performance of the insurance sector.

METHODOLOGICAL FRAMEWORK

Contemporary research applied frontier models for the measurement of efficiency. Frontier approaches can further be classified into mathematical and econometric approaches with further subtypes. The mathematical and econometric approaches, both are used to construct the best frontier. The parametric method requires the specification of functional form about the production frontier and distributional assumptions about the error term while mathematical approach does not assume any specific functional form nor it takes into account the error term. There is no consensus in the literature about the choice of methodology as both approaches have their own set of merits and limitations (Noreen & Ahmed 2016; Eling & Luhnen 2010b).

We apply Variable Returns to Scale model (VRS) DEA method to compute the risk management technical efficiency scores. The DEA method is preferred over the stochastic frontier technique due to certain advantages. The first advantage of this approach is it does not impose any functional form like Cobb-Douglas or Translog functional form. Another important advantage is DEA easily accommodates multiple inputs-output especially in case of insurance firms. DEA model also works well even if the sample size is small. However, its principle limitation lies in assuming no measurement error, therefore, entire deviation from the frontier is considered as inefficiency hence yields unreliable

results if the integrity of data is not guaranteed (Avkiran 1999). Based on actual data, DEA constructs efficiency frontier, firms on the frontier are considered efficient otherwise inefficient. This efficiency measure is relative, means the efficient firm is the best practice firm in the given sample.

Farrell (1957) gave the idea of technical and price efficiency. Charnes et al. (1978) introduce the Data Envelopment Analysis method to measure the efficiencies. Later on, Banker et al. (1984) extended the initial model.

The DEA method aims to calculate the relative efficiency of each DMU (Decision Making Unit) to make a comparison. In this study, we calculate the technical efficiency of risk managing activity of DMUs in the insurance industry. Efficiency scores can be calculated using the Input or output-oriented DEA model. A firm is considered technically efficient if it minimizes inputs (input-oriented) for given output or maximizes output (output-oriented) for given input resources, while technically inefficiency occurs when a firm fails to produce either given output by using minimum inputs or produce maximum output from the given level of inputs. In other words, output-oriented version of DEA means that firm is not on the efficient frontier if it is possible to increase output for a given level of inputs vice versa.

Following Coelli (1996) output-oriented linear programming problem (LP) is solved to calculate efficiency score:

$$\begin{aligned} &\max_{\theta,\lambda} \ \theta \\ &subject\ to \\ &-\theta o_i + O\lambda \geq 0, \\ &i_i - I\lambda \geq 0, \\ &\lambda \geq 0 \end{aligned} \tag{1}$$

where θ is a scalar, λ is an $n \times 1$ vector of constants. Assuming data on k inputs and m outputs for N firms, O is the $(m \times n)$ matrix of outputs produced by firms and I is the $(k \times n)$ matrix of inputs utilized by firms (DMUs) in the production. For the i^{th} DMU, inputs and outputs are represented by the vectors i_i and o_i, respectively, θ represent the efficiency score (must lie between 0 and 1) for the i^{th} DMU after solving LP given in (1). The above-mentioned linear programming problem is solved for N times, once for each firm in each year of analysis. We have 13 firms; hence for each year, this problem is solved thirteen times.

In LP (2), assumption of CRS is relaxed by introducing the convexity constraint $NI'\lambda = 1$ in to (1) to write where NI is an $n \times 1$ vector while all other symbols are defined as previously. We obtain the VRS DEA model by substituting $NI'\lambda = 1$ restriction with $NI'\lambda \leq 1$in (1).

$$\begin{aligned} &\max_{\theta,\lambda} \theta \\ &subject\ to \\ &-\theta o_i + O\lambda \geq 0, \\ &i_i - I\lambda \geq 0, \\ &NI'\lambda = 1 \\ &\lambda \geq 0 \end{aligned} \tag{2}$$

The approach forms a convex hull of intersecting plans which envelope the data point more closely than CRS hull, thereby providing efficiency score greater than or equal to those obtained using the CRS model. We choose DEAP software by Coelli (1996) to compute efficiency scores.

This study also uses the Tobit model to examine the impact of those specific characteristics of the firm which characterize the same on the risk management efficiency scores (generated through DEA using the first set of variables). We apply the Tobit model as OLS regression give inconsistent estimates of parameters because efficiency scores obtained through DEA are censored between 0 and 1. Following Tobit model equation is formulated and proposed to capture the effects of the firm's specific features on the efficiency of risk management activity:

$$y_{it} = \alpha_0 + \sum_{i=1}^{k} \alpha_{iZ_{it}} + \varepsilon_{it} \tag{3}$$

In the above relation, we use risk management efficiency score as dependent variable (y_i) computed through DEA, Zi is a vector of explanatory variables including firm size, market share, the tangibility of assets, and age of firm to describe the differences in efficiency across firms (Noreen & Ahmed 2016).

VARIABLE DESCRIPTION AND DATABASE

Specifying an input-output variable in the insurance industry is the most challenging and complicated task. Results can be misleading in case variables are poorly defined (Cummins & Weiss 1998). For efficiency analysis and performance differences among firms, we use two sets of variables. In the first set input-output variables are collected for the measurement of efficiency scores; while the second set consists of firm-specific variables to explain inter firm's efficiency differences.

INPUT-OUTPUT VARIABLES

International Actuarial Association (IAA 2004) identifies five main types of risk facing insurance firms. IAA risk types include underwriting, credit, market, operational and liquidity risk. Doff (2007) divides risk into three main categories i.e. underwriting risk (non-life & life risk), investment risk (credit and market risk) and non-financial risk (operational and business risk). The inputs

for risk management should be the risks born by an insurer as risk absorption is the core activity of insurance firms. According to Ren (2007), the main determinant of risk for insurers is underwriting and investment risk because of its risk pooling and intermediation activities. Ren (2007) also highlighted the importance of leverage as a financial risk for insurance. It is crucial to note that the selection of firm's input-output variables should be based on the activity/service for which we intend to assess efficiency. Thus, leverage, underwriting risk, and investment risk are the important inputs for this analysis as this study is based on the valuation of risk management operation of firm.

The underwriting process is important in evaluating the risk to be insured and determining the premiums rate for that policy. Underwriting risk may result due to an incorrect estimation of the risks associated with writing an insurance policy or factors beyond the control of underwriter. This is one of the major risks factors in the insurance business since an inaccurate assessment of risk results in an inaccurate calculation of the premium rates. As a result, the policy may cost businesses a lot more than it earned in premiums. Following Ren (2007), we use the variance of loss ratio to calculate underwriting risk (I_1). Loss ratio is calculated by taking the ratio of claims to premiums paid.

Following (Ren 2007; Yasop et al. 2014) investment risk (I_2) computed by taking the variance of return on investment. According to Doff (2007) investment risk consist of market and credit risk. Akotey (2013) explains that Credit risk arises due to the uncertainty in counterparty's inability to meet its obligations (decrease in counterparty's credit quality), while market risk related to the investment's activities of firms. It is the risk that value of an investment will decrease (the possibility that actual return may be very different from the expected return) resulting from a change in the prices of market parameters like interest rates, equities and currencies. Further, riskier investments can potentially affect the claim repayment ability of an insurance company. Leverage (I_3) is set as the third input of risk management analysis. Leverage is computed by taking the liability to equity ratio which reflects the firm's ability to fulfil an obligation to their policyholders (See Figure 1).

Choosing an output variable is another crucial task for efficiency analysis in the services sector. Outputs are "final goods or goals" that firm wants to increase. The key objective of the risk management process is to eliminate or reduce possible future losses and enhance the firm's solvency. Another core objective is to increase the value addition of risk-bearing through higher profitability (Ren 2007). Based on the above-mentioned objectives, two measures solvency and value addition of risk-bearing are selected as output keeping in mind the inputs used in this analysis. Return on assets (ROA) is used as a proxy output for value addition of risk-bearing. As the return on assets illustrates how efficient management is utilizing available resources and generating profit. Solvency measures the firm's ability to meet its obligations. Ren (2007) explains that firms good at-risk management have a lower possibility of bankruptcy. Solvency ratio for the insurance firm is calculated by taking the ratio of net assets to net premium written.

EXPLANATORY VARIABLES

The second set of variables consists of some exogenous variable that determines the efficiency differences among firms. These explanatory variables for this study include market share, asset's tangibility, total assets and age. The efficiency score obtains in the first stage is regressed again these variables in Tobit analysis. To evaluate the impact of size on efficiency we use the log of total assets Yakob et al. 2007; Hao and Chou 2005; Ashraf and Kumari 2016; Afzal and Kausar 2010, use log of total assets to study the impact of the firm's size on efficiency. Their results documented that larger firms take advantage of the economies of scale, which improve the efficiency of the firm. According to Caporale (2017) growth in the gross premium reveals the good financial

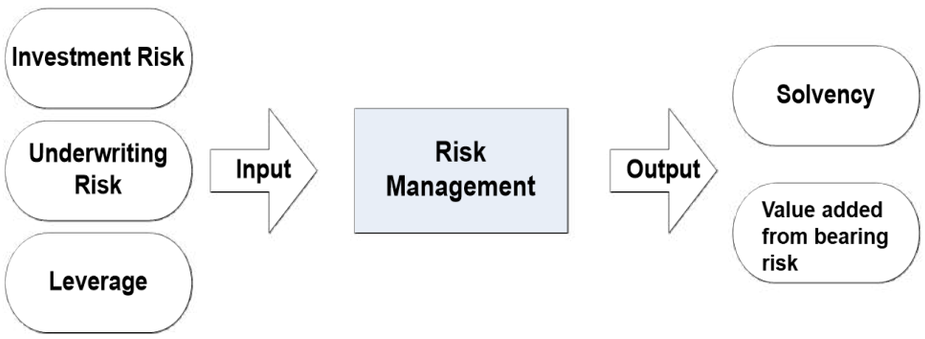

FIGURE 1. Input-Output Variables for calculating risk management efficiency
Source: Ren (2007)

position of the firm. Following Kripa and Ajasllari (2016) and Carpole (2017), we add the growth rate of gross premium written.

To explore the linkage of assets tangibility with firm's efficiency in risk management we use fixed assets to total assets ratio. Various studies have been performed to explore the link between a firm's performance and tangibility of assets but found contradicting results. (see Pouraghajan et al. 2012; Derbali 2014; Ajayi & Zahiruddin 2016; Kamran 2017). For instance, the study of Pouraghajan et al. (2012) evidences a positive relationship between firms' performance and assets tangibility. Derbali (2014) performs a study to identify the determinants of insurance firms in Tunisia. He finds that tangibility was not a significant factor of the firms' performance. While the study conducted by Kamran (2017) on Pakistani financial firms reported a significantly inverse impact of assets tangibility on firms 'performance.

Hao and Chou (2005) point out that firm with larger market share can raise more revenue and profit; hence improve the overall efficiency of the firm. Similarly, Adu et al. (2012) also documented a positive link between market share and firm efficiency. We also include market share (firm premium to industry premium) variable to validate whether firms having more market share likely to perform better than those of having less share.

Karim (2005) included Age of the firm based on the argument that experienced firms are more efficient in utilizing their resources as compared to fewer experience firms. Therefore, "Age" of the firm is included in the analysis to capture the effect of "learning by experience". The age variable is measured by finding the difference between the establishment year and the observation year of the firm.

DATABASE

The sample consists of 13 non-life insurers operating in insurance industry of Pakistan, ranges over the period from 2009 to 2018. The sample constitutes more than 75% of non-life insurance industry both in terms of premium and assets. For each firm-annual observation, data has been collected from the yearly reports of firms and the Year Book of Insurance Association of Pakistan. The selected sample is in line with DMUs requirement of DEA. With 2 outputs and 3 inputs model, Golany and Roll (1989) and Dyson et al. (2001) recommend using 12 firms. The summary statistics for the variables is presented in Table 1.

ESTIMATION RESULTS

In this part, we discuss the result of the firm's VRS technical efficiency scores obtained using DEA and results in efficiency determinants retrieved through Tobit analysis. In this study, 13 general insurance firms operating in Pakistan were taken as DMUs to assess their efficiency in terms of risk management activity. We compute the efficiency scores separately for each year. The year-wise average efficiency scores obtained through VRS-DEA model are presented in Table 2, while Table 3 comprises of the efficiency scores of individual firms included in the sample.

The average efficiency score increases from 68% in 2009 to 76% in 2018. However, there was a decrease in 2014 and 2017. This decline in efficiency might be due to deterioration in the profitability of non-life insurers because of passive investment income due to low-interest rate. Moreover, net claims also rose during that time (Financial Stability Review 2017). However, year 2018 again witnessed improvement in efficiency gain.

TABLE 1. Summary statistics of selected variables

Variables	Description	Mean	Median	Standard Deviation
	Output Variables			
O_1	Return on Assets	0.057	0.054	0.038
O_2	Solvency	4.812	1.697	9.808
	Input Variables			
I_1	Variance of Loss Ratio	0.122	0.108	0.057
I_2	Variance of ROI	0.013	0.010	0.019
I_3	Leverage	1.878	1.221	3.457
	Explanatory Variables			
Z_1	Log of Total Assets	22.29	22.04	1.195
Z_2	Gross Premium Growth (%)	11.46	12.20	0.192
Z_3	Tangibility of Assets	0.045	0.029	0.051
Z_4	Age	47.35	56.00	24.83
Z_5	Market Share (%)	6.11	3.00	0.772

TABLE 2. Risk Management Efficiency Scores of Non-Life Insurance (2009-2018)

Year	Average Efficiency	Standard Deviation	Min	Max	Firms on Efficient Frontier
2009	0.682	0.425	0.008	1	53%
2010	0.690	0.420	0.018	1	54%
2011	0.701	0.314	0.181	1	54%
2012	0.749	0.363	0.027	1	62%
2013	0.718	0.322	0.144	1	54%
2014	0.541	0.318	0.111	1	23%
2015	0.684	0.308	0.246	1	38%
2016	0.778	0.303	0.085	1	54%
2017	0.705	0.323	0.074	1	46%
2018	0.769	0.247	0.398	1	38%

TABLE 3. Risk Management Efficiency Scores across Firms (2009-2018)

Firms	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Adamjee	1.00	0.34	0.31	1.00	0.75	0.47	1.00	1.00	1.00	1.00
EFU Gen	0.20	0.09	0.34	0.63	0.35	0.39	1.00	1.00	1.00	1.00
Askari Gen	0.01	0.54	0.50	0.33	0.38	0.42	0.54	0.77	0.77	1.00
IGI	1.00	1.00	1.00	1.00	1.00	0.11	1.00	1.00	0.37	0.77
Jubilee Gen	1.00	1.00	1.00	1.00	1.00	0.59	0.65	0.63	0.62	0.78
Premier	1.00	1.00	1.00	1.00	0.30	0.28	0.26	0.08	0.07	0.40
Habib	1.00	1.00	0.62	1.00	1.00	0.71	0.52	0.75	0.44	0.49
Shaheen	0.19	0.02	0.18	0.03	1.00	0.16	0.25	1.00	1.00	1.00
Atlas	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Security	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
United Gen	0.53	0.94	0.50	0.59	0.57	0.67	0.85	0.52	0.48	0.57
UBL Ins.	0.02	0.04	0.67	0.17	0.14	0.23	0.26	0.36	0.41	0.54
East West	1.00	1.00	1.00	1.00	1.00	1.00	0.58	1.00	1.00	0.45

According to Financial Stability Review (2018) even though the return on investment slightly decreased but overall profitability increased due to better underwriting performance of non-life insurers. Overall average efficiency score remained 70% for the period of analysis implies potential improvement in the firm's performance by 30% if it were to perform according to best risk management practices. The efficiency level could be improved both from the output and input perspective. The input dimensional improvement requires firms to perform better in terms of underwriting and investment activities, while output dimensional improvement could be achieved by increasing a firm's value addition and solvency. Also, results reveal that on average 48% of firms included in the sample remained relatively efficient (efficiency score equal to 1) in managing risk.

Table 3 reports the efficiency score of all firms included in the analysis for the period 2009-2018. Our results of the firm-level analysis show that among thirteen firms, only Security Gen insurer remained on efficient frontier throughout the analysis period while Atlas insurer also obtained the efficiency score of 1 except for the year 2009. Besides, the performance of Adamjee, EFU, IGI, Jubilee, Premier, and East West was also promising as they achieved maximum efficiency score four to five times. Apart from UBL and United Gen. rest of the firms enjoyed risk management efficiency for at least one year.

It is to mention that insurance companies with efficient risk management have better performance in terms of solvency, return on assets, and cost minimization. Figure 2 illustrates the average efficiency level of all the firms included in the sample. The efficient insurer in Pakistan's non-life insurance sector was the Security general and serves as a reference point for all other firms. The remaining 12 firms have technical efficiency score of less than 1. The results, thus, indicate a presence of marked deviations of the insurers from the best practice frontier, hence need to improve their efficiency by increasing output for given inputs.

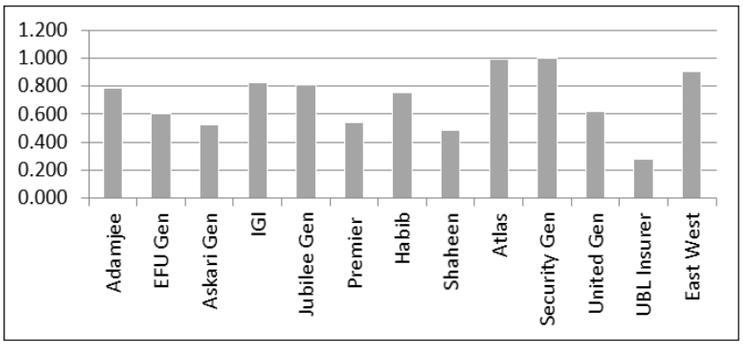

FIGURE 2. Average Efficiency across Firms (2009-2018)

TABLE 4. Determinants of Risk Management Efficiency

Variables	Coefficients	Standard Error	p-value
Log of Total Assets	0.104	0.037	0.006
Tangibility	-0.297	0.580	0.609
Growth Rate of Gross Premium	0.002	0.001	0.211
Age	0.003	0.001	0.025
Market Share	-0.015	0.005	0.005
Constant	-1.681	0.797	0.000
	Observation	130	
	LR chi2(5)	22.81	
	Prob>chi2	0.0004	
	Pseudo R^2	0.2769	
	Log Likelihood -29.78		

We use Tobit model to determine if firm's related specific variables such as total assets, assets tangibility, growth rate of gross premium written, firm's age and market share affect the risk management efficiency of general insurance sector in Pakistan. Table 4 present the estimated coefficients, standard errors and respective probabilities.

We observe a positive and significant impact of assets size on firm's performance in managing risk. The large companies are expected to enhance value addition through economies of scale and able to deal with the risk in an efficient way. This result supports the theoretical behavior and is in line with other empirical findings (See Hao & Chou 2005; Ashraf & Kumari 2016; Afzal & Kausar 2010).

We also find a positive influence of age on the risk management performance because older firms can benefit from experienced staff, accumulated knowledge, improved skills and a better understanding of the industry. However, our results of market share indicate the inverse relationship between risk management efficiency and share of the firm in the market. According to Simon (2010), there are good and bad market shares. He explained that good market share is achieved by superior services, better quality and innovation while bad market share is earned through price reductions. Carpole (2017) also notes that firms with good premium rate may be due to mispricing that increases the sales by charging less premium rate.

In sum, we find an overall improvement in the efficiency of non-life insurance firms over the study period. It is also noticed that risk management efficiency varies significantly with the firm's size. The study also confirms that firm with more years of experience is very good at managing the risk efficiently as compare to new entrants.

CONCLUSION

Although, an extensive literature is concerned with the overall performance of insurance industry, however, very few studies exist in literature to focus on the efficiency of insurance firms in its different operations like risk and investment.

This study contributes to the insurance industry efficiency literature by providing information on the risk management efficiency and factor influencing the firm's performance in terms of risk management. This study applies Data Envelopment Analysis (DEA) to compute the efficiency scores for the risk management practices of the firms over the period 2009-2018. Tobit

model is also applied to identify factors affecting the risk performance of firms. The results of the firm-level analysis indicate that among 13 firms, Security general was the best peer in terms of managing risk and maximizing benefits. Further, we also find enhancement in efficiency performance over time particularly from 2009-2013, after a decrease in mid-years, it again increased. We observe that Security General and Atlas are most efficient in managing their risks among others. These firms have small market share in terms of premium, business volume and outreach as compare to other firms with large market share. It is suggested that firms lower on efficiency frontier need to employ the best strategies to cope with risk to catch up with the efficient firms. The inefficient firms can enhance their efficiency level by improving underwriting and investment activities, which will increase the risk management efficiency of firms by increasing firm's value addition and solvency Finally, we employ Tobit model to explore the relationship between efficiency in risk management and firm-specific characteristics. We find a significant explanatory power of some of the firm's specific factors over risk efficiency such as size and age.

The study recommends that to enhance financial management performance and profitability, inefficient firms should adopt a multifaceted approach for managing the risks to derive greater benefits from their businesses. A comprehensive risk management framework plays a major role in determining the financial soundness of insurers. The study further recommends that firms should continuously update their risk management strategies considering the changes in the operating environment. Focusing on effective corporate governance, training of employees to increase risk management capacity, installation and upgrading of information technology for risk assessment and mitigation is essential for effective risk management. Efficiency in risk identification and mitigation will derive significant benefits to firms. The insurance firms in the non-life sector should improve the risk assessment and risk diversification to enhance the returns from this activity.

The future projects a constructive and affirming picture for the non-life insurance business in Pakistan, as per the findings of this study. Although there are many challenges ahead, however insurers should revise not only their risk strategies but also focus on other operations such as investment management to improve the company's overall financial performance. This research can be extended in several directions. For example, parametric and non-parametric frontier models could be applied to investigate and compare the efficiency scores under various models and assumptions. Other firm-specific factors such as nature of ownership etc. and macroeconomic variables could also be added for explaining the efficiency differences among firms.

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Jurnal Ekonomi Malaysia 54(1) 2020 81 - 96
http://dx.doi.org/10.17576/JEM-2020-5401-6

The Impact of Social Capital on the Performance of Small Micro Enterprises

(Kesan Modal Sosial ke atas Prestasi Usaha Mikro Kecil)

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ABSTRACT

Social capital is an important for the performance of small micro enterprises. The objective of this study is to identify the effect of social capital in terms of trust, networks, and norms on the performance of small micro enterprises. The paper measures the performance of small micro enterprises from the aspects of output production, internal processes, and resource capabilities. The data was obtained from 150 snack businesses in Padang Regency, West Sumatra, Indonesia. The effect of social capital on the performance of SMEs was analyzed using SEM-PLS. The results show that social capital improves the performance of SME snack businesses. Thus, social capital consisting of trust, networks, and norms has a significant influence on the performance of small micro enterprises in terms of the output produced, internal processes, and resource capabilities.

Keywords: Social capital; small micro enterprises; firm performance

ABSTRAK

Modal sosial merupakan salah satu aspek yang penting dalam meningkatkan prestasi Usaha Mikro Kecil (UMK). Objektif kajian ini adalah untuk mengenal pasti kesan modal sosial rasa percaya, jejaring dan norma terhadap prestasi Usaha Mikro Kecil. Kertas ini mengukur prestasi Usaha Mikro Kecil daripada aspek keluaran produksi, proses dalaman dan kemampuan sumber. Data diperolehi daripada 150 perniagaan makanan ringan di Kota Padang, Sumatera Barat, Indonesia. Pengaruh modal sosial terhadap prestasi UMK dianalisis dengan menggunakan SEM-PLS. Hasil kajian menunjukkan bahawa modal sosial meningkatkan prestasi UMK bagi perniagaan makanan ringan di Kota Padang. Dengan itu, modal sosial yang terdiri daripada rasa percaya, jejaring dan norma mempunyai pengaruh yang signifikan terhadap UMK dalam aspek keluaran produksi, proses dalaman dan kemampuan sumber.

Kata Kunci : Modal sosial; Usaha Mikro Kecil; prestasi firma

INTRODUCTION

The role of social capital in development is as important as other types of capital such as natural, physical, and human capital. Development has traditionally focused on natural resources, physical capital, and human capital as the main determinants of economic growth (Iyer et al. 2005). However, Field (2008) contends that social capital probably has a similar or even higher contribution to development compared to other types of capital. The studies on the contribution of capital to development show that types of traditional capital (natural, human, and physical resources) only partially determine the overall process of economic growth and the remaining growth depends on social capital. Social capital includes the role of economic actors who interact and organize themselves to produce better economic development.

Initially, economic development was referred to as the achievement of the level of economic growth.

Thus, physical capital was considered the only factor to contribute to the success of the development process (Meier & Stiglitz 2001). This led to a shift in thinking about gradual capital accumulation, which initially only emphasized the accumulation of physical capital and was accompanied by the accumulation of human capital, science, and ultimately social capital. This evolution of the economic thought is depicted in Figure 1.

The accumulation of social capital can contribute to economic development because of the existence of networks, norms, and beliefs or trust (Fukuyama 1995). Putnam et al. (1993) illustrate the positive correlation of economic growth and social capital. Inkpen and Tsang (2005) state that social capital could be a driver to realize the ability of the industry to benefit from existing networks. These benefits include access to knowledge, human resources, technology, markets, finance, and non-finance. Previous research results show that social capital measured by trusts, networks, and norms is very important and necessary for small, micro, and medium enterprises (SMEs).

The performance of SMEs in Padang Regency, West Sumatra, is strongly influenced by the strength of social capital managed by businessmen. Morosini (2004) states that social networks as a part of social capital are an essential factor in improving the performance of small micro enterprises. One of the SMEs in Padang is snack businesses. In West Sumatra, social capital is influenced by traditional customs or the local wisdom of the Minangkabau tribe. The tradition of the matriarchal society in the Minangkabau tribe has supported the custom of the society to trade and become entrepreneurs. Therefore, many people in Padang are involved in the restaurant business and snack industry. The local wisdom also encourages the people to create groups (entities). In his book *Trust the Social Virtue and the Creation of Prosperity*, Fukuyama (2001) mentions that local wisdom is a vital tool for developing and empowering the community.

A study by Ramadhan and Maftuh (2015) shows how Minangkabau traditional wisdom could create high solidarity among the Minangkabau community. As a result, members of the Minang community who live in other regions could have harmonious relationships. Wibisono (2012) explains how the Minangkabau ethnic people utilize the strength of networks and reciprocity behavior in trading, and thus, they could survive in other places or other regions. Hastuti et al. (2015) state that the Minangkabau ethnic group uses their local wisdom in their trading behavior in Jakarta. These local wisdoms could not be separated from the history of the Minang traders' community in other places (bonding social capital). According to Johar (2016), three essential aspects contribute to the effectivity of "lumbung pitih nagari" as a part of social capital: trust, network, and norms. In her study, Welsa (2017) shows how the traditional customs of Minang people could have a significant impact on the performance of SMEs: specifically, entrepreneurships, business ability, and business performances.

Social capital in the form of trust, networks, and norms could govern the group. By working in groups, traders could use social capital networks to find partners (investors) with whom they can cooperate. The strong ties due to trust, network, and norms in the way Minangkabau people live is also characterized by what is called social capital bonding (the social capital inherent in individuals and in community groups). Strong relationships are an economic activity that is socially and economically situated and embedded in personal and group social networks. According to Saha and Banerjee (2015), social capital has an important role in the sustainability of SMEs. The results of their study indicate how formal and informal networks empower small companies to produce social capital by utilizing network linkage, building trust, and sharing visions among stakeholders. Therefore, it is possible for SMEs to obtain the resources, information, and knowledge needed. Suryono (2012) also states that social capital is formed by behavioral factors such as the willingness and habit to cooperate, grouping, and the willingness to commit to their long-term goals.

Restaurant and snack businesses are favored by most SMEs in Padang Regency. By referring to how the traditional wisdom of the Padang community influences the sustainability of SMEs in Padang, it becomes interesting to analyze the impact of social capital on the performance of SMEs in Padang. Therefore, the objective of this study is to analyze the impact of trust, networks, and norms as part of the social capital on the performance of SMEs in the restaurant and snack industry in Padang Regency.

LITERATURE REVIEW

THE CONCEPT OF SOCIAL CAPITAL

Several researchers play an important role in the introduction of social capital concepts such as Bourdieu, Coleman, and Putnam (Sabatini & Sabatini 2006). Bourdieu (1986) states that social capital is an aggregation of resources and has the potential to link ownership of a long-lasting and institutionalized network through knowing one another and forming mutual membership in a group. According to Bourdieu (1986), there are three dimensions of capital related to social classes: economic, cultural, and social capital. Social capital is a social relationship utilized by the businessperson to pursue his or her interests (Bourdieu 1986).

Coleman (1988) completes the study by Bourdieu (1986) by differentiating social capital according to its function as follows: (1) social capital as part of the

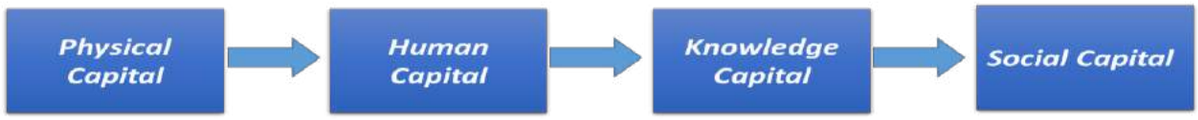

FIGURE 1. The evolution of development thought in capital accumulation (Meier & Stiglitz 2001).

TABLE 1. Some definitions of social capital

Researchers	Definition of Social Capital
Bourdieu (1986)	A set of actual and potential resources that are formed individually or in groups with strong network ownership of more or less unrelated relationships.
Coleman (1988)	The diversity of entities with their two general elements all consist of several aspects of social structure and facilitate certain actions of both individual and corporate actors within the structure.
Putnam et al. (1993)	Social organization features such as trust, norms, and networks that can improve community efficiency through facilities for coordinated action.
Fukuyama (2000)	The existence of a set of certain informal values that are temporary in nature or norms that are shared with all group members that allow cooperation between members of the group
Westlund (2003)	A non-formal social network that is formed, managed, and used by actors in the network to distribute norms, values, preferences, characteristics, and other social attributes. But there are also results that arise as a result of the intrinsic activity of the perpetrators through these social attributes.

Source: Westlund (2003).

social structure and (2) social capital facilitating how the businessperson could behave well in the structure. Coleman (1988) defines social capital further as vertical and horizontal associations. Vertical associations are characterized by hierarchical relationships and the unequal distribution of power among members of the community. They have positive and negative consequences. Meanwhile, horizontal associations are egalitarian relationships with a more equitable distribution of power (Coleman 1988).

Robert Putnam is well known as the researcher who introduced the concept of social capital. According to Putnam et al. (1993), social capital has several characteristics that social organizations have such as trust, networks and norms. These characteristics facilitate the ease of coordination and cooperation to obtain mutual benefits. Mawardi et al. (2011) reveal that social capital could be in the form of a network, informal social capital, and trust. Social capital could also be defined as the sum of actual and potential resources embedded in, available through, and derived from a network of relationships owned by individuals or social units (Nahapiet & Ghoshal 1998). Adler and Kwon (2002) develop a conceptual model of social capital further by distinguishing it according to substance, source, and effect.

Trust is an essential element in developing relationships. Trust could be considered a catalyst that should exist before the relationship and is considered an element that must exist before the relationship moves forward in order to stabilize it (Granovetter 1985). The results could be seen in the form of successful transactions between individuals or organizations (Kandemir et al. 2006; Morrissey & Pittaway 2006). Social norms have a very important role in controlling the different behaviors of society. One key to the success of building social capital lies in the strength of the network. Barnir and Smith (2002) and Gulati (1986) state that the strength of networks is an investment for SMEs. The different concepts of social capital previously discussed have led to several definitions of social capital as shown in Table 1.

The study by Putnam et al. (1993) shows how social capital is not only influenced by the micro level and individual relationships, but is also influenced the macro level. Helliwell and Helliwell (1996) support the previous research results and state that social capital could facilitate the ability of the government to achieve economic growth through convergency and high-income balance. Knack and Keefer (1997) analyze further the result of Putnam et al. (1993) that reveals how the associations facilitate growth by increasing trust. Cristoforou (2003) finds that social capital contributes to the economic growth of Greece.

TRUST

Trust has a significant impact on the performance of every company since it can reduce transaction costs and conflict. Trust is the expectation of two or more entities (people and organizations) that the daily behavior of the entities will be honest, cooperative, and predictable according to the sharing norms (Fukuyama & Fukuyama 2001). Trust encourages

knowledge sharing by increasing the disclosure of knowledge to others and giving others access to one's knowledge. Even other benefits, increasing sales, and a higher return of investment can also be identified as a direct result of trust. Trust is the main requirement for the successful business and the essential factor for developing the sustainability of the small business. The establishment of trust creates good network relationships that ultimately result in the exchange of important knowledge for the sustainability of SMEs (Murat & Dulupçu 2006).

NETWORK

The concept of network includes four components: (1) actors, (2) link, (3) flows, and (4) mechanisms (Conway et al. 2001). Actors are individuals and entities that form networks. A link is a trunk that connects individuals and represents relationships between actors. Flows show the exchange that occurs between actors in the system and mostly involve the flow of resources. The network mechanism is the mode and interaction rules used by actors in the system. Field (2003) reveal that the benefits obtained by SMEs because of networks include (1) increasing job opportunities and income, (2) the acceleration of knowledge transfer and technology advancement, 3) increasing skills, standards, and capacity, 4) the enhancement and expansion of the market, 5) harmonious relationships between consumers and producers, 6) ease of access to capital, and 7) opportunities to innovate and improve the competitiveness. Batjargal (2003) and Najib et al. (2014) describe trust and networking as the important tools for SMEs to develop innovation because of their limited resources.

NORMS

Another factor contributing to the strength of social capital is that some rules or norms govern the lives of individuals in a society (Woolcock & Nayaran 2000). Coleman (1999) gives a similar statement that social capital in the structure of social relations and social networks in a society creates different kinds of social obligation, fosters mutual trust, brings information, and sets norms and sanctions for members of the community. Ancok (2003) further defines social capital as an institutional dimension for creating relationships and rules that shape the quantity and quality of social relations and the social ties, as well as maintaining the unity of group members. Accordingly, social capital always comes together with the prevailing norms, culture, and customs that exist in the community and determines the formation of social capital. Therefore, social capital is the source of social interaction and can improve the economic performance of the community.

SOCIAL CAPITAL AND THE PERFORMANCE OF SMES

The success of a business is measured by its performance in the industry. The strength and the success of the business cannot be separated from the role of social capital aside from other types of capital (physical, natural, and human capital). Social capital is considered one of the potentials for business development (Bosma et al. 2004; Lengnick-Hall & Lengnick-Hall 2003; McElroy 2001; Trigilia 2001; Westlund 2003; Williamson 2010). There are three types of social capital: network link, trust, and sharing vision. Figure 2 presents a model of social capital and business performance and Table 2 illustrates the research on social capital in SMEs.

The performance of a business, both large and small, can be measured in terms of its financial, economic, social, and environmental sustainability. Previous research has shown that social capital plays a vital role in determining the business performance (Chen et al. 2007; Felício et al. 2014; Kamaluddin 2016). Rapih (2015) shows that the better the social capital, especially in the SMEs sector, the better the

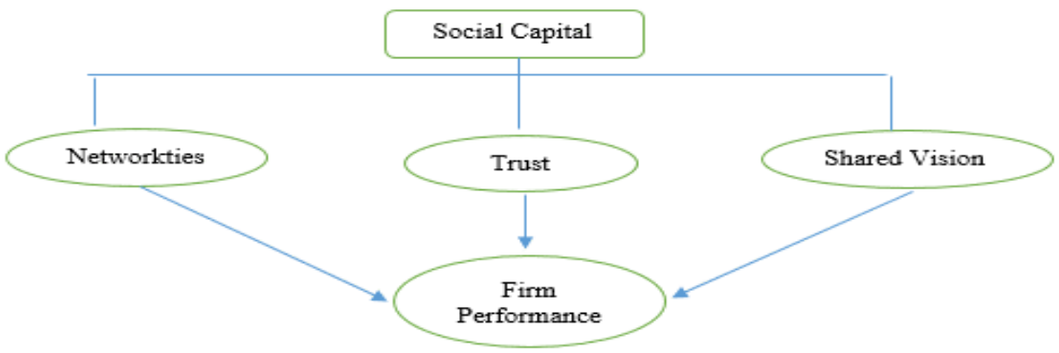

FIGURE 2. Social capital and performance SMEs: conceptual model

TABLE 2. Studies on the relationship between social capital and SMEs

Author	Independent Variable	Identification of Related Variables	Results
Knack and Keefer (1997)	Economic growth indicators	*Trust, civic norm* Student enrollment at the primary and secondary level Price of investment good stash	Trust and civil cooperation have a substantial impact on the economic effectiveness.
Brata (2004)	Access to crediting institutions	Total membership, attendance, participation in making decisions • Social position	Presence affects the acquisition of formal credit while the number of memberships in the organization in the acquisition obtaining informal credit.
Akhtar et al. (2015)	Social capital towards three dimensions of the sustainability of SMEs	Structural social capital • Relational social capital Cognitive, social capital	Structural and relational social capital has a significant influence on the viability of SMEs Cognitive, social capital does not have a considerable effect on the sustainability of SMEs
De Chiara (2017)	Social capital is a strategic source of sustainability for SMEs	Trust in relational values • Network • Consensus, credibility	To increase social money and relational value trust, agreement, credibility, etc. make it clear to MSMEs that the principle of sustainability must be applied through a network-based approach
Rafiy et al. (2014)	The role of government and social capital in empowering small industries	The part of the government Social capital	The purpose of a good government will increase social capital and empowerment of small industries in Southeast Sulawesi Province. This study also yields findings that to expand the presence of small industries a variable role of government and social capital needs to be managed optimally.
Hoq et al. (2017)	The correlation of the social capital with organizational performance in SMEs	Social capital SMEs' performance	SMEs have established a positive relationship between social capital and the successful performance of SMEs in both developed and developing countries.
Kiefhaber and Spraul (2015)	Increasing the strength of social capital in the context of SME sustainability	Sustainability Manager's sustainability orientation	Social capital contains the resources, information, and the orientation of the manager (owner) for the sustainability of SMEs.
Rostin (2016)	Effect of empowerment and social capital on the welfare of coastal communities	The well-being of coastal communities • Empowerment • Social capital	Economic empowerment of coastal communities has a positive and significant impact on the well-being of coastal communities.
Kamaluddin (2016)	Social capital and social innovation towards the performance and sustainability of SMEs	Performance of SMEs • Sustainability of SMEs	Social capital and innovation capital affect the performance and the ability of SMEs to be sustained in the long-term.
Batjargal (2003)	This study examines the effects of entrepreneur social capital on company performance	Structural forces • Relational embeddedness • Resource embeddedness in the performance of the company	The integration of resources is directly positive on company performance, while structural embeddedness does not have a direct impact on performance.
Saha and Banerjee (2015)	What is the impact of social capital on the performance of SMEs in West Bengal?	Construction of a formal and informal network relationships • Trust • Shared vision	The effect of social capital on company performance is significantly higher for companies involved in formal and informal networks that are different from companies that are only embedded in an informal network.

performance of its business. Dai et al. (2015) also state that social capital influences financial performance and organizational innovation.

Many factors influence the performance of SMEs. Wibisono (2012) proposes three perspectives of production activity as one of the indicators to measure the performance of business: (1) production output such as financial and non-financial aspects, (2) internal processes of business activities consisting of intellectual capital, and (3) resource capabilities of business

activities (including knowledge management, social responsibility, and social institutions).

METHODOLOGY

This study uses primary and secondary data. The primary data was collected in 2016 by interviewing 150 business actors or SMEs directly who produce snacks in Padang Regency, West Sumatra Province. The interviewers used a questionnaire as a tool to gather information related to the performance of business actors. Meanwhile, the secondary data was collected from various relevant agencies such as the Statistic Center, the Office for Cooperatives and MSMEs, and the Office for Human Resources and Industry in Padang Regency.

RESEARCH VARIABLES

TRUST

Franco and Haase (2010) see trust as a relevant economic component. Trust is inherent in the culture of society and contributes to the richness of social capital. Table 3 illustrates the indicators of trust used in this study.

NETWORK

Coleman (1988) argues that the density of social networks will increase the efficiency of strengthening cooperative behavior in an organization. Table 4 gives a description of the indicators used in developing the network.

NORMS

Fukuyama (1995) describes social capital as an informal norm. It is instantaneous and could develop cooperation between two or more individuals. Table 5 shows the indicators of norms used in this study.

The data is analyzed using the SEM-PLS (*structural equation model-partial least square*) to validify this model. The SEM-PLS is also used for structural modeling with reflective and formative indicators. Indicators in SEM-PLS are reflections of variations from latent variables, so that the direction of causation is from latent variables to indicators. So, changes to the indicator will be reflected in changes in the latent variable. Figure 3 illustrates the model used in this study to analyze the influence of social capital on the performance of SMEs in Padang City.

RESULTS AND DISCUSSION

Social capital is the energy of development. Social capital is an energy, since it could influence the strength of the community in solving problems. Social capital provides a motivation for various parties to succeed because it can encourage the community to achieve maximum goals independently. Field (2003) reveals that social capital is a pattern of social life that consists of networks, norms, and trust. The existence of networks, norms, and trust could support people to act effectively

TABLE 3. Indicators of trust

Manifest Variables	Description
Believe in the surrounding environment (KL)	The relationship between business people and the surrounding environment
Trust in the Nagari (KN)	Believe in the rules of the Nagari
Believe in the government (KP)	Believe in government policies
Believe in fellow business actors	Trust in people who conduct similar business
Trust in internal business (KM)	Trust in investors, consumers, and suppliers

TABLE 4. Indicators of network

Manifest Variable	Description
Innovation in business (IN)	Change related to business development
Ease of information (INV)	Information is easy and it is related to internal transactions
Access to loans (KAP)	Ease of access to loans
Collaboration with the private sector	Ease of access to individual assistance such as CSR
Participation in organizations (ORG)	Involvement in business organizations
Ease of production process (PR)	Continuity of raw materials and auxiliary materials
Ease of market entry (PS)	The ability to enter the market easily

TABLE 5. Indicators of norms

Manifest Variables	Description
Religious norms (NA)	Religious values adopted by business actors
Norms to others (NO)	Collaboration with other people outside the business
Traditional criteria that apply (NR)	Traditional values in the industry
Norms with neighbors (NT)	Willingness to help neighbors
Norms with brothers (NS)	Willingness to help relatives

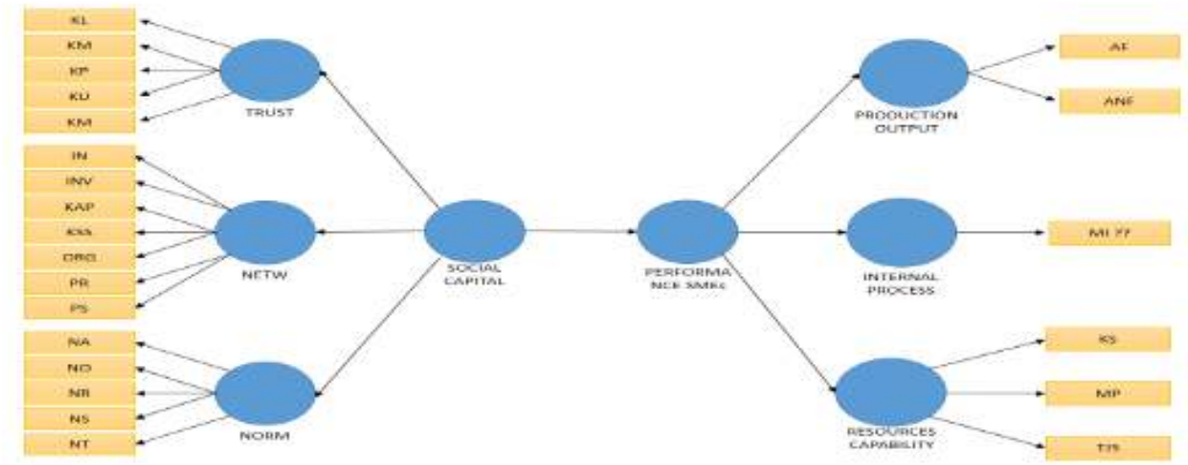

FIGURE 3. The PLS-SEM pathway model for the influence of social capital (trusts, networks, and norms) to the performance of SMEs in Padang Regency.

Notes:

KL: environmental beliefs
KN: Nagari's trust
KP: government trust
KU: the confidence of stakeholders
KM: community trust
IN: ease of information
INV: business innovation
KAP: ease of access to loans
KSS: private cooperation
ORG: organization follows
PR: production process
PS: ease of entering the market
NA: religious norms
NO: the rule in other people
NR: traditional standards
NS: family norms
NT: pattern with neighbors
AF: financial aspects
AFF: non-financial aspects
MI: management intellectual
KS: social institutions
MP: knowledge management
TJS: social responsibility

together. Social capital facilitates the flow of information and helps many business people to be innovative, and ultimately, it could improve business performance and sustainability (Griffith & Harvey 2004; Suryono 2012). The previous statements are also supported by studies by Kiefhaber and Spraul (2015), Akhtar et al. (2015), and De Chiara (2017). Those studies explain how social capital, information, and owner orientation could construct together and have significantly influenced the sustainability of SMEs.

Putnam (1995) states that social capital refers to the characteristics of social organizations. These characteristics are referred to the existence of networks, norms, and beliefs that are facilitated by mutual coordination and cooperation. Networks can be used by individuals or businessmen to obtain information on the market knowledge, tools, and capital assistance (Suryono 2012). The strength of social capital, innovation, and networking in improving the performance of SMEs is also supported by the studies of Karaev et al. (2007),

Mawardi et al. (2011), Prihadyanti (2013), Ahmad et al. (2013), and Jenatabadi (2014).

Trust first comes between individuals. If individuals have shared a common trust, it becomes an inter-group trust. The trust developed from social institutions could lead to a set of shared values and expectations of the whole society (Bourdieu & Wacquant 1992; Putnam et al. 1993). There are several values and elements related to social capital such as the participatory attitude, caring attitude, give and take, and mutual trust. These elements are strengthened by supporting values and norms (Coleman 1988; Fukuyama 2000). The supporting element for social capital as an investment is participation in networks, reciprocity, trust, and the existence of proactive norms, values, and attitudes (Putnam et al. 1993).

Padang Regency is one of the cities in West Sumatra Province. In West Sumatra Province, the Minang ethnic group are famous for their entrepreneurial spirit. It is common to see Minang people in almost every region in Indonesia who generally work as entrepreneurs. Their businesses are diverse from culinary ventures (restaurants, catering, satay, and others), industrial sectors (food, clothing, bags), and trade (Primadona 2016). Primordialism has brought the elements of social capital to play a significant role in job opportunities or job creation (Hastuti et al. 2015; Prasetyo et al. 2013). Many workers who quit and get other jobs often find success by using usual social capital: namely, trust, network, norms, and reciprocity (Zhao 2002).

The research results show that the majority of the respondents (91%) in this study are female and the remaining are men with only 14 people. The education level of the majority of respondents is high school, and the remaining respondents have the following education levels: junior high school (17%), undergraduate (15%), elementary (9%), third year diploma (D3) (7%), and first year and second year diploma (D1& D2) (3%). The age of most respondents ranges between 21 and 40 years (64%), while the others are more than 40 (25% for 41-60 and 11% for > 60 years). Additionally, the respondents in general have been in the business for quite a long time, which is between 1 and 7 years (46%). The long involvement in business of the majority of the respondents could be an indication that the respondents in the research area have a long experience in the snack processing industry.

TRUST

The study shows that the types of social capital used in the snack businesses include trust, networks, and norms. This is similar to the studies of Adler and Kwon (2002) and Gulati (1986). According to Adler and Kwon (2002) and Gulati (1986), trust will facilitate the flow of information as the primary factor of social capital and significantly affect business performance. Trust could be seen from the beliefs of the actors to the external parties (traders, customers, and the surrounding community). Trust is not only limited to interpersonal levels, and essentially, to the network-based collaboration among MSEs (Neergaard & Ulhøi 2006).

The example of trust between actors and external parties could be seen in the purchase of raw material. The businessmen do not use a contractual system or agreement with the traders since they have established cooperation for a long time. The actors even borrow raw materials from other businessmen when there is scarcity or difficulty in finding raw materials. The businessmen usually purchase the raw materials on average from Padang, Pariaman, and Bukittinggi Regency at IDR 150,000 per sack at an average of 30 kilograms per sack. Most of the time, the actors purchase the raw material only by calling or making an appointment with the merchant at the time of the last purchase.

Trust is also seen in the marketing aspect. There are no contracts or agreements in marketing product either to the loyal customers or end consumers. The snack businessmen in Padang Regency also sell their products to the souvenir outlets of ethnic Chinese on a consignment basis. The businessmen receive payment once their first product is sold out. However, this type of payment is not an obstacle for the businessmen in marketing their products. In addition, support from the environment around the business provides a high value as well, which is 84%. The business people also show their trust in government programs such as training, counseling, assistance in writing business permits, promotion, and exhibitions, as well as in accessing capital that the Padang Regency Office for Cooperatives and MSMEs has provided.

NETWORK

The social network theory of Håkansson and Ford (2002) has defined networks as collaborative arrangements that are formed through interactions between actors embedded in the social contexts. The study by Ulhøi (2009) states that, by managing or organizing the networks, the mutual commitment and trust as well as long-run multidimensional relationships will exist. Granovetter (1973) and Westlund (2003) describe networks as a series of regular relationships or similar social relationships among individuals or groups. Information is widely considered not only as one of the main benefits of social capital (Adler & Kwon 2002), but also as an essential aspect for the performance of SMEs (Gulati 1986).

Strong networking is a necessity in SMEs. By cooperating with external parties, the businessmen actually try to maintain strong networking. By keeping good networking with other parties, the businessmen could sustain their businesses in the long run or networking for sustainability Saha & Banerjee (2015).

Social capital in the form of network ties, trust, and a sharing vision among network members has been found to influence the performance of small companies in generating resources, providing information and knowledge, and developing new capabilities (Koka & Prescott 2002; Kotabe et al. 2003; Uzzi & Gillespie 2002; Wu 2008). A study by Sulaiman et al. (2007) on Malay entrepreneurs in the small micro business sector in Peninsular Malaysia shows that social capital (networks) have an effect on the level of competitiveness and the performance of small micro-enterprises. Social capital, both formal and informal networks, also influence the development and innovation of a business (Lee & Law 2016).

The business network formed by MSEs in Padang Regency is an attempt to develop and strengthen business. Wibisono (2012), Hastuti et al. (2015), and Welsa (2017) support the idea that the pattern of network developed is in the form of kinship or friendship, and it will finally create a network within a community of ethnic Minang traders. The strength of the network could make the production process easier. The production process is related to the availability of raw materials and auxiliary materials. Developing the business network will have a big impact on businessmen, since it will enhance their ability to cooperate with suppliers, financial institutions, labor, and intermediary traders (Hendriyanto 2015).

In the marketing aspect, a strong network can also be seen from the collaboration with other business actors. Armstrong (2004) states that business networks involve other business units in both production and marketing activities. This is related to the payment system that applies both directly and indirectly. The results of the study show that business actors will have direct payments when they have cooperated with well-known traders in the city such as Cristine Hakim, Rohana Kudus, Sherly, Ummy Aufa Hakim, and Mahkota. Sometimes, obstacles arise in determining price and the terms proposed. However, this has not been a big obstacle for the business actors themselves. Normally, the businessmen will have their money transferred once their products are received. Indirect payments occur when there is risk sharing between the trader and the business actor for every product they sell in the store. However, this type of payment costs the businessmen since they have to sell their product lower than the selling price.

The results of the previously mentioned studies describe how micro-networks and meso-networks develop in snack businesses in Padang Regency. Micro-networks relate to networks that are built between business actors and customers. Meanwhile, meso-networks are the relationships developed by actors with and/or within groups. The example of a meso-network is the relationship between businessmen and government institutions that support the existence of SMEs. This result is in accordance with the research of Worku (2008) and Kiefhaber and Spraul (2015) who explain the ability of social networks to improve the performance and sustainability of small businesses.

Therefore, the network is the second latent variable that forms social capital in SMEs. A strong network could influence 94% of the production process of SMEs. SMEs could be sustainable in the long-run when the quantity output produced increases and the market is certain. As a result, the businessmen could obtain higher profits, which could bring prosperity to the industry. The variable indicators of the network used in this study are the organizations in which the businessmen are participating; the innovation in business; the ease of the production process, the process of entering the market, and the process of obtaining information related to business; the ease of access to loans; and the existence of cooperation with the private sector.

SOCIAL NORMS

The norms consist of understandings, hopes, and goals that are believed to be carried out together. Norms are built and developed based on shared history in the past and applied to the climate of cooperation. Norms can also be pre-conditions and products of social trust (Putnam et al. 1993; Fukuyama 2000; Westland 2003). They are a set of rules that are expected to be obeyed and followed by community members in a particular group and entity. In other words, norms are institutionalized and contain social sanctions that can prevent individuals as group members from doing something that is contradictory or deviates from the expected goals (Hasbullah 2006).

The research results show that the social norms occurring in the snack businesses in Padang Regency are strong religious values. These strong religious values have supported the development of the businesses. The majority of the Minang community are Muslims who use religion as their guide for conducting all of their activities. Religious values come together with the traditional values that govern the activities of the community. The harmonization between religion and traditional values is similar to the philosophy of the Minang people "Adat basandi syarak, syarak basandi kitabullah."

Norms are unwritten rules that every member of the community understand and that determine the behavior of the community. In other words, the members of the community will behave as expected by the community. Those expected behaviors include common rules, honesty, not cheating each other, respecting other people's opinions, helping others, and mutual tolerance. Social norms, in this case, can also be customary norms and religious norms that regulate the activities of the community. Another norm indicated in this study is showed by the manifest variable of willingness to help each other such as the ability to get help from neighbors, the number of siblings/neighbors helping when in

trouble, traditional values that have been handed down from generation to generation, and religious values regarding how to do business.

Performance is the achievement obtained by a person or company in achieving a goal. According to Mulyadi (2007), performance is the successful personnel, teams, or organizations in realizing the goals, objectives, mission, and vision of the organization. In his theory, Armstrong (2004) formulates performance as an output of a job. The output relates to organizational goals, customer satisfaction, and the ability to contribute to the economy as a whole. The excellent performance in all sectors, including finance, production, distribution, and marketing, is a must for the sustainability of SMEs (Wu 2008).

STRUCTURAL EQUATION MODEL - PARTIAL LEAST SQUARE (SEM-PLS)

The Structural Equation Model - Partial Least Square (SEM-PLS) presents the relationship between constructs and among constructs. The purpose of evaluating the

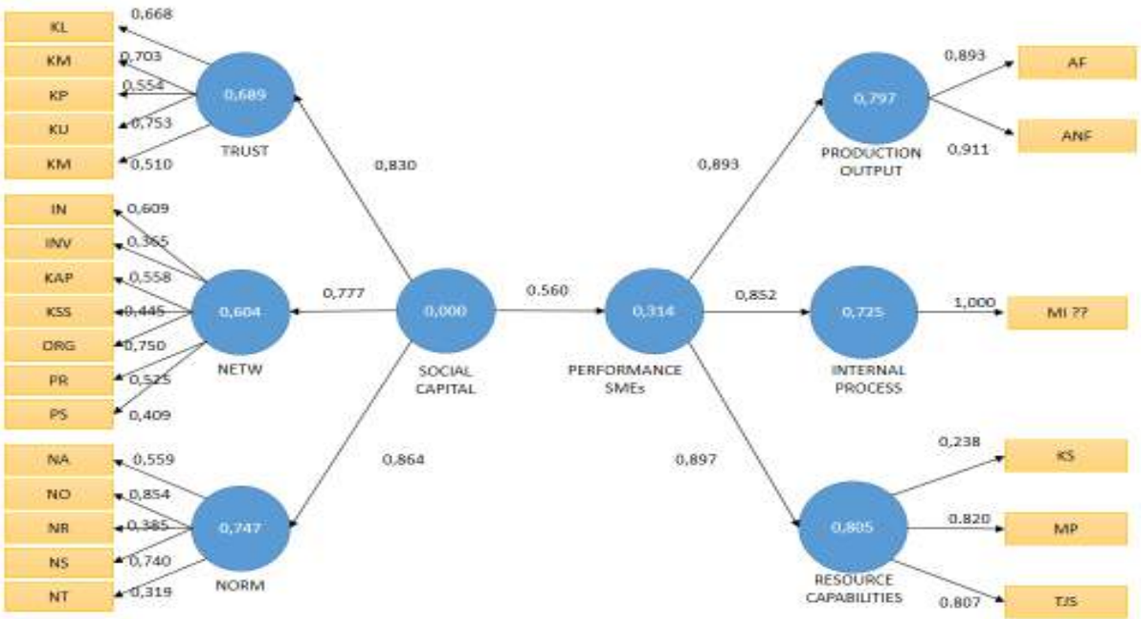

FIGURE 4. The initial model

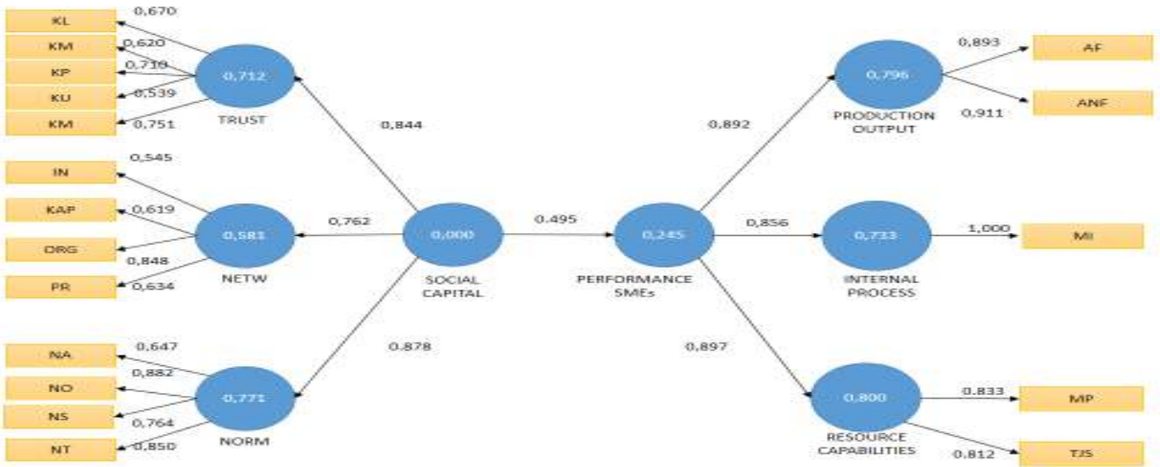

FIGURE 5. The modified model

measurement model (outer model) is that the model developed has indicators that can explain the construct of all indicators individually consistent with the measurements. Evaluation of the measurement model (outer model) consists of evaluating validity (convergent validity and discriminant validity); evaluating the reliability of convergent validity based on loading factor parameters and Average Variance Extracted (AVE); and evaluating the reliability of discriminant validity through cross-loading criteria discriminant validity and the discriminant validity of the Fornell-Lacker criteria. Additionally, Composite Reliability (CR) parameters are used to evaluate the reliability.

Figure 4 illustrates four indicator variables with the loading value (λ) <0.5 which is in the indicator variables INV, KSS, PS, NR, and KS. Therefore, those indicators must be discarded (dropped). Figure 5 presents the modified model after the indicators are discarded.

Figure 4 shows that the strength of trust could be seen from the amount of trust among business people and between businessmen and the external supplier as well as the government: the trust regarding the rules of *nagari* and the environment supporting the existence of business. Cheung et al. (2011) and Selnes and Sallis (2003) mention how a good relationship between business actors and external parties (suppliers) could increase the efficiency and effectiveness. The effectiveness as the result of a good relationship could be seen in the development of new products, the improvement of product quality, and other factors that are able to increase innovation and competitiveness, while efficiency is in reducing costs, increasing on-time delivery, and shortening lead times (Cheung et al. 2011).

The strength of the network in this study is shown by the higher participation in the organization, the capability in the production process, the ability of the products to enter the market, the flexibility of updating information, and the ease of access to loans. The ease of access to loans in the Minang community is as the impact of strengthening their social capital. The Minang community has *Lumbung Pitih Nagari* that has an important role in collecting money from the *Nagari* and for *Nagari* (Johar 2016). The shariah micro financial institution (LKMS) in West Sumatra which is based on local wisdom is also a means of communication and information, which is related to the ease of access to loans in the *Nagari* community (Mursal 2016).

The norms or values and rules governing the continuity of a business could be seen in the aspect of willingness to help others; the ability to get assistance from neighbors; colleagues who care and are ready to help when businesspeople experience disaster in a business; as well as traditional and religious values to maintain relationships with other business actors and the communities. Customary norms and religious norms in the Minang community are important aspects of being an entrepreneur. Norms govern how they behave, and thus, they could live harmoniously and develop their

TABLE 6. The cross-loading value of each variable

	The Resources Ability	*Trust*	*Network*	*Norms*	Ouput Production	Internal Process
AF	0.53716	0.30973	0.44779	0.30718	0.89301	0.52953
ANF	0.64468	0.23837	0.46445	0.27667	0.91084	0.60874
IN	0.32403	0.04710	0.54513	0.15850	0.50996	0.28039
KAP	0.13589	0.30090	0.61931	0.22109	0.23530	0.20713
ORG	0.31623	0.45072	0.84820	0.50290	0.35002	0.35206
PR	0.18128	0.37971	0.53393	0.33001	0.31656	0.37133
KL	0.12426	0.67021	0.15190	0.43445	0.09121	0.17565
KM	0.01008	0.62042	0.19362	0.34637	0.12986	0.14838
KN	0.05898	0.70965	0.30983	0.30172	0.15657	0.29505
KP	0.33510	0.53912	0.36353	0.22906	0.39563	0.31807
KU	0.21342	0.75070	0.56202	0.56638	0.24017	0.28069
MI	0.71904	0.36836	0.46740	0.41995	0.63265	1
MP	0.83349	0.00791	0.23347	0.13890	0.59995	0.57612
TJS	0.81190	0.39129	0.36423	0.42264	0.47891	0.60830
NA	0.29954	0.33855	0.31351	0.64668	0.33016	0.41045
NO	0.45483	0.50577	0.46332	0.88175	0.35939	0.47746
NS	0.06202	0.40367	0.34391	0.76447	0.09248	0.20240
NT	0.22956	0.58607	0.47440	0.84954	0.23962	0.24960

Source: Data processed (2018)

TABLE 7. Correlation of latent variables, AVE, and root AVE

	Ability Resource	*Network*	*Norms*	Output Production	Process Internal	*Trust*	*AVE*	Root *AVE*
Resource ability	1						0,677	0,823
Network	0,361	1					0,421	0,649
Norms	0,336	0,512	1				0,625	0,791
Output production	0,657	0,506	0,323	1			0,814	0,902
internal prosess	0,719	0,467	0,420	0,633	1		1,000	1,000
Trust	0,226	0,505	0,591	0,302	0,368	1	0,438	0,662

Source: Data processed (2018)

sense of solidarity (Ramadhan & Maftuh 2015; Welsa 2017).

The next step is to test the discriminant validity. It is conducted by analyzing the cross-loading criteria. Cross-loading is a criterion for evaluating measurements. It is required that the correlations for every latent variable to other latent variables have a higher value than the relationship to other latent variables as presented in Table 6.

Discriminant validity could also be measured by the Fornell-Lacker criterion. This criterion compares the correlation of a latent variable with other latent variables by using the AVE square root. According to Table 7, since the discriminant validity criterion based on Fornell-Lacker is fulfilled, the measurement model is valid convergently and discriminantly.

As the convergent and discriminant validity criteria is fulfilled, the next step is to test the reliability by using the Cronbach's alpha (CA) and the composite reliability (CR) values. A variable is reliable if the value of CA is more than 0.5 and the CR is more than 0.7 (Ghozali 2015). Table 8 presents the value of CA and CR. According to Table 5, the indicators are valid and reliable in measuring the latent variables. In other words, the indicators can be used as a consistent measurement tool.

TABLE 8. Cronbach's alpha (CA) and composite variable reliability values

	Cronbach's Alpha	*Composite Reliability*
Trust	0.67916	0.79402
Network	0.53848	0.73698
Norms	0.79576	0.86827
Ability Resource	0.52306	0.80733
Output Production	0.77123	0.89718
Process Internal	1	1

Source: Data processed (2018)

This study uses a second order condition (SOC) model. The latent variables are reflected in the dimensions measured from the indicators. The performance variables of SMEs are estimated from three possible dimensions: (1) output production, (2) resource capabilities, and (3) internal processes. Table 9 gives a preview regarding how the dimensions contribute to the latent variables. The contributions are significant if the t-statistical value is higher than 1.96 (α=5%).

The results in Table 6 show the value of Q^2 for all latent variables that are higher than 0 (zero). This means the exogenous latent variables are appropriate to be explanatory variables and are able to predict the endogenous variables. The results of the bootstrap analysis and t-statistical values are shown in Figure 6.

Social capital has a positive impact on the performance of SMEs around 0.494. This indicates that the increasing social capital will improve the performance of SMEs (Table 10). The path parameter coefficient is obtained from the relationship between the variables of social capital and performance around 0.494 with a t-statistical value of 7.623> 1.96 at a significance level of $\alpha = 0.05$. The value confirms the significant influence of social capital to the performance of SMEs. The positive value on the parameter coefficient demonstrates how the increasing social capital could improve the performance of SMEs in Padang Regency.

The results mentioned above are supported by the studies of Batjargal (2003), Musimba (2012), Akhtar et al. (2015), Saha and Banerjee (2015), Kiefhaber and Spraul (2015), Kamaluddin (2016), De Chiara (2017), and Hoq et al. (2017). These studies point out social capital as an embedded resource in SMEs and the ability of social capital to improve the performance and sustainability of SMEs. Stam et al. (2014) and Kushnirovich (2010) emphasize the significant role of social capital to the production of SMEs. In the studies of Sukoco and Hardi (2013), social capital has been proven to affect the activities of suppliers and buyers. Similar research has been done by Durojaiye et al. (2013) and the results explain how social capital has a positive role and is significant in increasing the profit of food vendors in Nigeria.

TABLE 9. Evaluation of the Second Order Condition (SOC)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Performance Small Micro Enterprises -> Resource Capability	0.894397	0.895348	0.016662	0.016662	53.680414*
Performance Small Micro Enterprises-> Output Production	0.892045	0.891089	0.014516	0.014516	61.453501*
Performance Small Micro Enterprises-> Process internal	0.856245	0.854144	0.021571	0.021571	39.694808*
Social Capital -> Network	0.762037	0.768258	0.030116	0.030116	25.303659*
Social Capital -> Norms	0.878106	0.878023	0.021505	0.021505	40.831794*
Social Capital -> Trust	0.843938	0.849462	0.027209	0.027209	31.017130*

Source: Data processed (2018). SOC testing (* significant with α 5%).

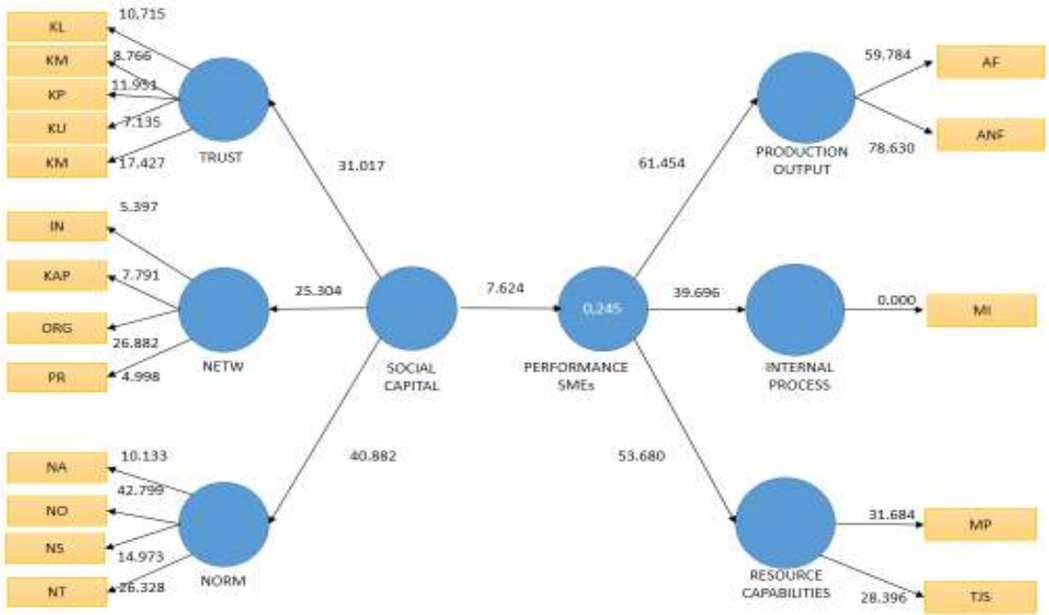

FIGURE 6. The t-statistical value of social capital to the performance of SMEs in Padang City

TABLE 10. Bootstrapping results for testing hypotheses

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Social Capital -> Performance small micro enterprises	0,494569	0,498396	0,064873	0,064873	7,623671

Source: Data processed (2018).

The hypothesis in the path coefficients is tested using the t-test statistics. If the t-statistical value is higher than 1.96 (α 5%), the coefficient is significant. The bootstrapping results in the path coefficients are shown in Table 10.

CONCLUSIONS

Social capital in the form of trust, networks, and norms have been proven to influence the performance of SMEs in Padang, West Sumatra Province. This

study illustrates how the uniqueness and character of the Minang community builds strong social capital in the form of mutual trust, networks, and norms. As a result, the performance of MSME groups in Padang is excellent. This could be seen from the information flow and technology that is delivered directly to other group members when one or some of the members receive training. Internal relations among member groups are well established, and thus, the distribution process of information is well delivered.

RECOMMENDATIONS

Social capital is a capital that can be obtained by businessmen through establishing a better network with other parties in the market, having recurring transactions with partners, and maintaining a high level of trust between the company, its stakeholders, and other partners. As a result, the business performance will be better, and the products and services will be innovative. These will ultimately lead to a higher probability of success and smaller opportunities for failure. Finally, it is recommended that all snack business owners in Padang Regency develop good relationships with other parties in the market, modify their transaction methods to the newest transaction methods, develop and maintain mutual trust between companies and market players, guide their businesses into success, and reduce the possibility of failure.

ACKNOWLEDGEMENT

We would like thank the Ministery of Research, Technology ang Higher Education for funding this research. We also would like to acknowledge the Andalas University of Padang Sumatera Barat. We also would like to acknowledge the Corporarative Office and the UMKM Padang for facilitating the research data collection.

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Jurnal Ekonomi Malaysia 54(1) 2020 97 - 110
http://dx.doi.org/10.17576/JEM-2020-5401-7

The Moderating Role of Corporate Social Responsibility in Determining Islamic Bank Margin

(Peranan Tanggung Jawab Sosial Korporat sebagai Pemboleh Ubah Moderasi dalam Menentukan Margin Bank Islam)

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ABSTRACT

The ability to generate profit is the most important factor for a bank. One of the indicators to asses bank profitability is Bank Margin which is influenced by internal and external factors. However, the survival of a bank does not only depend on the profitability, but also depends on its responsibility to the stakeholders including the community. Islamics bank are obliged to distribute some of their profits to support Corporate Social Responsibility (CSR) and disclose those activities in the bank annual report. This study aims to analyze internal factors that determining Islamic Bank Margin in Malaysia. The internal factors include capital, assets quality, management, earning and liquidity. This study further investigates the moderating role of CSR on the relationship between capital, asset quality, management, earning, liquidity and bank margins. The sample used are 10 Malaysian Islamic Banks. The method used is multiple regression. The findings show that 75.8% of Islamics Bank Margin is influenced by capital, asset quality, management, earning and liquidity. Partially, assets quality and earning significantly influence on Islamic Bank Margin, while capital, management and liquidity have no effect on bank margins. In addition, CSR is the potential variable to moderate the influence of capital, asset quality, management, and liquidity on Bank Margins.

Keywords: Bank Margins; Corporate Social Responsibility; Islamic Social Reporting; Islamic Banks.

ABSTRAK

Keupayaan untuk mendapatkan keuntungan adalah faktor yang paling penting bagi sebuah bank. Salah satu penunjuk untuk menilai keuntungan bank adalah Margin Bank yang dipengaruhi oleh faktor dalaman dan luaran. Walau bagaimanapun, kemandirian sebuah bank tidak hanya bergantung kepada keuntungan yang diperoleh, tetapi juga bergantung kepada tanggungjawabnya kepada pemegang taruh termasuk masyarakat. Bank Islam berkewajipan untuk mengagihkan sebahagian keuntungan mereka untuk menyokong aktiviti Tanggungjawab Sosial Korporat (CSR) dan mendedahkan aktiviti CSR dalam laporan tahunan bank. Kajian ini bermatlamat untuk menganalisis faktor dalaman yang menentukan Margin Bank Islam di Malaysia. Faktor dalaman termasuk modal, kualiti aset, pengurusan, pendapatan dan kecairan. Seterusnya kajian ini bermatlamat untuk menyiasat peranan moderasi CSR dalam hubungan antara modal, kualiti aset, pengurusan, pendapatan, kecairan dan margin bank. Sampel yang digunakan dalam kajian ini sebanyak 10 buah bank Islam di Malaysia. Kaedah yang digunakan adalah regresi berganda. Penemuan kajian menunjukkan bahawa 75.8% Margin Bank Islam dipengaruhi oleh modal, kualiti aset, pengurusan, pendapatan dan kecairan. Secara separa, kualiti aset dan pendapatan mempengaruhi secara signifikan Margin Bank Islam, sementara pengurusan dan kecairan tidak memberi kesan kepada Margin Bank. Di samping itu, CSR adalah pemboleh ubah yang berpotensi untuk memoderasi pengaruh modal, kualiti aset, pengurusan, pendapatan dan kecairan terhadap Margin Bank.

Kata kunci: Margin Bank; Tanggungjawab Sosial Korporat; Pelaporan Sosial Islam; Bank Islam

INTRODUCTION

Islamic banking currently has very good prospects, especially in countries that are predominantly Muslims, such as Saudi Arabia, United Arab Emirates (UAE), Kuwait, Qatar, Turkey, Bahrain, Indonesia, and Malaysia. In 2016, Malaysia had 16 Islamic bank institutions with an office network of 2197 (Annual Report of Bank Negara Malaysia, 2016). Board, I. F. S. (2018) reported that market share of Malaysia Islamic Banking Industry account for 24.9% of the country bank assets and market share of Malaysian Islamic banking were ranked fourth after Iran, Saudi Arabia and UAE.

Bank Negara Malaysia (BNM) reported that the average pre-tax profit achieved by Malaysian Islamic banking was RM4.530 billion and the average percentage increase was 11.16% (Annual Report of Bank Negara Malaysia, 2016). The ability to generate profits is one of the indicators to assess banking performance. Studies of Islamic banking profitability have been carried out by several researchers. Haron (1996) stated that interest rate and inflation significantly influenced the profitability of Islamic banks in Malaysia. Bashir (2003) conducted a study on conventional and Islamic banks in Indonesia, which showed that there was a relationship between profitability, bank characteristic factors, and macroeconomic indicators. Hutapea and Kasri (2010) found that the capital ratio had a positive relationship in Islamic Bank Margin while liquidity risk and interest rate volatility had a negative relationship with Islamic Bank Margin. Khrawish et al. (2011) stated that the provision loan losses, the ratio of total equity to total assets, and the ratio of total income to total assets significantly affected the Return of Assets (ROA) of Islamic banks in Jordan. Arif and Anees (2012) found that deposit and cash had a positive correlation with banks' earning. In addition, Wibowo and Syaichu (2013), and Puspitasari (2014) concluded that the operational income and operational cost ratio significantly had a negative influence on ROA, while other factors such as inflation, interest rate, Capital Adequacy Ratio (CAR) and Non Performance Loan (NPL) had not. Raharjo et al. (2014) conducted a study on 30 commercial banks, and he found that size, CAR, Loan-to-Deposit Ratio (LDR), NPL, ROA, and inflation had an influence on Net Invest Margin (NIM). In addition, Ramlan and Adnan (2015) found that the ratio of total equity to total assets (TE/TA) had a significant effect on the ROA and ROE of the Islamic banks, and also a significant effect on the ROE of conventional banks. Those studies mostly used the ROA or ROE as an indicator of profitability, while the study that used Bank Margin as an indicator of profitability is still very limited.

The CAR shows the ability of the bank to bear all the possible risks (financial risk, security, and investment). The higher the CAR is, the better the ability of the bank to risk each of the productive asset at risk. Non-Performing financing (NPF) shows the quality of financing in which the higher the value of NPF reflects the worse quality of financing. A high NPF will have an impact on the loss of opportunity to make a profit from the provided financing. The ability of banks to generate profits depends on the banks' ability to manage their funds. The efficiency of fund management is reflected in the ratio of operating costs and operating income. The more efficient the bank manages its funds, the greater the profit that can be achieved. Financing-to-Deposit Ratio (FDR) is one of the indicators to measure the level of bank liquidity. The higher FDR indicates that the greater the fund is disbursed to financing. Therefore it provides opportunities for the banks to obtain greater profits. The level of liquidity can be measured by the Cash Ratio (CR). CR is a ratio to measure cash availability to pay for withdrawal of savings or checking accounts, or to meet a new financing request. If a bank does not have a sufficient cash, then the CR will encourage the bank to seek an emergency funds with higher cost of funds. This situation encourages the bank to increase its financing margins as well so that its margin income will also increase.

Economic institutions like banks are not only required to seek benefits but also to carry out social responsibilities in order to create prosperity and justice in society. Corporate Social Responsibility (CSR) has recently become an important issue in the world of business. Yusuf (2017) stated that the survival of a company depended on the form of corporate responsibility towards the community as a part of the company's business activities. In Islam, social responsibility is not something new. The concept of social responsibility and justice have been realized since the prophetic period. The Prophet Muhammad SAW carried out social responsibility based on instructions from the Qur'an. CSR practices have been carried out by Islamic banks in Malaysia, but so far, the CSR framework or guidelines has not been standardized yet. Jusoh and Ibrahim (2016) found that Islamic banking practitioners were still waiting for a standard and comprehensive CSR based on shari'ah principles. Rahman et al. (2010) argued that the disclosure of CSR in the company's financial statements was not yet fully an obligation of the bank but voluntary. Some studies showed that there was a positive correlation between CSR and financial performance. Othman et al. (2009) conducted a research on 56 companies in Malaysia, and they found that the size, profitability, and Muslim directors have the influence on the extent of Islamic Social Reporting (ISR). Arsyad et al. (2012), conducted on 16 Islamic banks in Malaysia, and stated that the extent of Islamic CSR disclosure had a significant effect on ROA and ROE.

The result of previous studies is still inconsistent. Therefore, a future study is still needed. This study will investigate the determinants of Islamic Banks' Margin

in Malaysia. The aims of this study are: (1) to examine the determinants of Islamic Banks' Margin in Malaysia, and (2) to explain the moderating role in determining Islamic Banks' Margin. Previous studies mostly used ROA or ROE as an indicator of profitability, while the study that uses Bank Margin as an indicator of profitability is still very limited. The significance in using Bank Margin is that Bank Margin reflects more of the level of profit achievement by a bank because it measures the income earned by the bank from total productive assets. As explained in the previous section, CSR disclosure has a positive relationship with financial performance. Therefore, this study will investigate the impact of moderating CSR on Bank Margin.

LITERATURE REVIEW

ISLAMIC BANK

Islamic bank or interest free bank is a bank which operates on a profit and loss sharing basis. Usman (2009) emphasized that there were three prohibitions in Islamic banking i.e, riba (interest), gharar (uncertainty), masyir (speculation). The first Islamic bank was Mit Ghamir Bank. It was established in Egypt in 1967. Malaysia has been practicing Dual Banking System since 1983. The first Islamic bank in Malaysia was Bank Islam Malaysia Berhad (BIMB) which was established in 1983. The second full-fledged Islamic bank was Bank Muamalat Malaysia Berhad (BMMB). In 2004, Bank Negara Malaysia introduced provisions for establishment of Islamic banks subsidiaries. Stapah et al. (2018) found that until 2005 there were eleven Islamic subsidiaries of conventional banks. The growth of Islamic banking in Malaysia was dominated by Islamic subsidiaries of conventional banks. The total assets of Islamic subsidiaries was RM430.68 billion and the full-fledged Islamic Banks were only 92.89. This statement supported by Furqani and Mulyany (2009), they stated that in 2005 Government of Malaysia issued licences for foreign Islamic bank to operates in Malaysia and transforms the Islamic windows in conventional bank to Islamic subsidiaries.

BANK PROFITABILITY

Profitability is a bank ability to generate the profit. Some indicators used to measure the profitability of commercial banks are Return on Assets (ROA) and Return on Equity (ROE). ROA is used to measure the bank's ability to generate income (earnings) from the total owned assets. ROE is used to measure the bank's ability to generate income of the owned total equity. Profitability can also be measured by Net Interest Margin (NIM) and Net Financing Margin (NFM). Raharjo et al. (2014) explained that NIM is the ratio of the interest income earned by bank and the interest paid to depositors and creditors divided by the average earning assets. According to Malim et al. (2017) NFM is calculated as the difference between financing income and income paid to depositors over the average earning assets. Stapah et al. (2018) measured Net Profit Margin (NPM) by the ratio of net financing income to average earning assets.

Bank financial performance is influenced by many factors. In this study, several factors will be discussed, among others:

1. Capital Adequacy Ratio (CAR)
   Bank capital plays an important role on the development and progress of the bank. Banks that have sufficient capital will be trusted by the community. Latumaerissa (2014) stated that banks that have sufficient capital will be able to save money owned by depositors if business liquidity is forced or business solvency problems arise. Regulation of the Bank of International Settlement (BIS) stated that CAR that must be obeyed by banks throughout the world is 8% of capital to risk assets (Muhamad 2014).
2. Non Performing Financing (NPF)
   One of the risks faced by banks in their business activities is the possibility of credit or financing problems. NPF are financing that is given to customers who cannot be billed again. NPF is calculated by comparing the amount of non performing financing with the amount of disbursed financing.
3. Financing to Deposit Ratio (FDR).
   FDR is a comparison between demand deposits, savings and others used to meet financing requests. This ratio shows the extent to which deposits are used for lending. Large banks tend to have high FDR even reaching 100% although it does not rule out the possibility that small banks can also have a high FDR rate. The FDR also shows the ability of banks to channel credit or financing from funds obtained from third parties.
4. Operation Cost to Operation Revenue Ratio (OCOR)
   Ratio of operating costs to operating income is called the efficiency ratio. This ratio is used to measure how effective bank management controls the operating costs.
5. Cash Ratio
   Cash ratio is used to measure the bank's ability to meet its short-term obligations that is the withdrawal of funds from time to time made by the depositors. Cash ratio shows the level of bank liquidity. The bank is said to be liquid if the bank can pay the withdrawal of savings and current accounts whenever the owner of the fund is needed. Banks that are illiquid will affect the performance and reputation of the bank.

THEORY OF BANK MARGIN

The literature on Bank Margin for Islamic banks are very limited. Hutapea and Kasri (2010) stated that original model of Bank Margin was introduced by Ho and Saunders in 1981. They developed the dealership approach to study Bank Margin. His study was focused on US commercial banks. Ho and Saunders (1981) found that the pure interest spread or margin depended on four factors, they are the degree of managerial risk aversion, the size of transaction, the bank market structure and the variance of interest rate.

Haron and Shanmugam (1995) used autoregressive models to examine the relationship between the rates of return and the level of deposit in Islamic banks in Malaysia. Malim et al. (2017) found that bank size, default risk, capital, overhead cost and inflation have a positive and significant effect on Islamic Bank Margin in Asian countries. In contrast, market concentration and GDP growth have a negative and significant effect on Islamic Bank Margin.

THEORY OF CORPORATE SOCIAL RESPONSIBILITY (CSR)

Retno and Priatinah (2012) argued that some theories behind the implementation of CSR are (1) Milton Friedman's Capitalism Theory, (2) Theory of Social Contact, (3) Instrument Theory, (4) Legitimacy Theory, and (5) Stakeholder Theory. Theory of capitalism explains that companies may carry out CSR activities as long as they do not conflict with the interests of shareholders and the CSR activities provide benefits for the company. Based on social contact theory, the company can run its business activities if it is supported by the surrounding community. Instrument theory has the view that CSR can be used as a strategy tool to achieve corporate goals such as creating a positive image. Meanwhile, according to theory of legitimacy, companies carry out CSR activities because of political, social and economic pressures from outside the company. Therefore, the company will do CSR to meet the demands of the community. The next theory is the theory of stakeholders that considers that CSR activities are carried out to fulfill the wants and needs of the stakeholders. From several theories, it can be concluded that CSR activities provide not only benefits to the community, but also provide benefits to the company which is creating a positive reputation and the company is better known by the public.

Concept of CSR developed in the western word is different from the Islamic CSR (I-CSR). Yusuf (2017) stated that CSR based on western point of view only relay on logic and reason. In contrast, I-CSR is based on the relationship to God (Allah), to human and to surrounding environment. I-CSR in the Islamic financial institution such as Islamic banks should seek not only profit or to fulfill obligations mandated in the law, but it must reach the basic needs of the community to strengthen the community's economy towards a better and preserve natural environment for future generation.

Nor (2016) stated that most Islamic banks have implemented CSR activities and disclosed these activities in their annual report. However, the CSR activities carried out are still limited to distribution of zakat and charitable activities rather than developing systematic strategies to resolve social problem.

PREVIOUS EMPIRICAL RESEARCH

Bashir (2003) examined the determinants of profitability in Islamic banks in Middle Eastern countries between the period of 1993-1998. The results showed that the banks characteristic variables are the ratio of equity to total assets, and ratio of profit loss sharing loans to total assets. Non-interest expense on total assets had a positive correlation with bank profitability as measured by ROA (Return on Assets), ROE (Return on Equity) and the ratio of income before tax to total assets.

The results by Hutapea and Kasri (2010) on Islamic banks and conventional banks showed different results. In Islamic banks, the default risk, the capital ratio, implicit cost, and opportunity cost of bank reserve have a positive correlation with the margins of Islamic banks, while the interest rate volatility and liquidity risk have a negative correlation with the margins of Islamic banks. In conventional banks, there is a positive relationship between Bank Margin with the default risk, liquidity risk, capital ratio, implicit return, bank reserve and quality management. While Bank Margin and interest rate volatility show a negative relationship.

Khrawish et al. (2011) study of banks listed on the Amman Stock Exchange stated loan loss reserves (provision for loan losses), the ratio of total equity to total assets (TE/TA), and the ratio of total income to total assets (TI / TA) have a positive correlation of ROA, While the bank size, the ratio of total loans to total assets (TL / TA), GDP growth (GDPGR), inflation rate (annual inflation rate), foreign exchange rate (exchange rate) negatively correlates with ROA.

Arif and Ahmed (2012) conducted a study on the relationship between liquidity risk to the performance of the banking system in Pakistan. The study concluded that the amount of deposits and cash positively correlated to earnings before taxes, while the liquidity gap and Non Performing Financing (NPL) were negatively correlated with the earnings before taxes. Wibowo and Syaichu (2013) concluded that BOPO has a significant effect on ROA, while CAR, NPF, inflation and interest rates have no effect on ROA.

Raharjo et al. (2014) conducted a study on the factors that determine the bank interest rate (banks interest margin) of commercial banks in Indonesia. The conclusion of this study stated that the growth of bank assets, ROA and CAR have a positive effect on Net

Interest Margin (NIM). While the minimum statutory reserve (GWM) and Non-Performing Loans (NPL) negatively affect the Net Interest Margin (NIM). Loan market power and inflation have a positive effect on the NIM while the interest rate has a negative effect on the NIM.

Furthermore, Puspitasari (2014) examined NPL, the ratio of operating costs to operating income, the capital adequacy ratio and the volume of transactions against Net Interest Margins of commercial banks listed on the Indonesia Effect Exchange (IDX). The results of the study concluded that the ratio of operating costs to operating income and transaction volume have a significant positive effect on NIMs while NPLs and CAR did not affect the NIM.

Study on NPM determinants at subsidiaries of conventional banks in Malaysia conducted by Stapah et al. (2018) found that operating cost has a positive impact on NPM, while credit risk has a negative impacts on the NPM. In addition, liquidity was found insignificant on NPM. Malim et al. (2017) studied on Islamic banks in Asia Countries. The result of the study showed that Net Profit Margin was influenced by bank size, default risk, capitalization, overhead cost and inflation.

Othman et al. (2009) examined the relationship between firm size, profitability of the composition of the board of commissioners, and type of industry against ISR (*Islamic Social Reporting*) disclosure. The results of the study concluded that the size of the company, profitability, composition of the board of directors had a significant effect on ISR disclosure, while the type of industry had no significant effect on ISR disclosure. Similar research was carried out by Lestari (2013). Which supported the results of Othman's research that firm size, profitability has a significant effect on ISR disclosure, while the company age and the proportion of independent board of directors do not affect the ISR disclosure.

Rahman et al. (2010), examined the trend of ISR disclosure themes which are widely expressed in the annual report of Bank Islam Malaysia Berhad (BIMB). He concluded that theme of employees (labour) was more frequent disclosed compare with the product and services, community involvement, investment and finance and shariah supervisory councils. This study also examined which parts of the annual report were more often used to report on BIMB social activities. The results showed that the chairman statement, financial statement and director report are part of the annual report that is often used to report BIMB social activities.

Othman and Thani (2010) examined the extent to which companies with shariah systems conduct ISR disclosures. The results of this study indicated that the level of ISR disclosure in the annual report is still very low, this indicates a lack of transparency in disclosure. Arshad et al (2012) who studied at Islamic banks in Malaysia, concluded that the disclosure of Islamic CSR had a positive effect on the company's reputation. Furthermore, i-CSR disclosure has a significant positive effect on the performance of Islamic banks in Malaysia as measured by profit before tax.

Jusoh and Ibrahim (2016) carried out a study of CSR in Islamic banks in Malaysia, the study concluded that nearly 60% of the respondents agreed that CSR was an institutional obligation and more than 70% of respondents stated that Islamic banks must have a specific CSR framework to serve as guidelines. Although many of Islamic banks are still follow the conventional framework. Jusoh and Ibrahim (2016) continued the study of CSR at Bank Islam Malaysia Berhad (BIMB). They found that BIMB has been practicing CSR, that is not only limited to the distribution of zakat and charity, but also to programs of public service (community service) and environmental project.

METHODOLOGY

This study uses secondary data obtained from annual reports and financial reports of selected banks for the period of 2012 to 2017, the website of Bank Negara Malaysia (BNM), as well as articles relevant to this research. The samples in this study consist of 10 full-fledge Islamic banks and subsidiaries. These banks selected based on some considerations as follows:

1. Banks that issued annual reports or financial statement continuously.
2. The Bank whose annual reporting period ends on 31 December.
3. Banks that have a complete data required in the analysis.
4. Banks that published CSR reports on their websites or annual reports.

TABLE 1. Bank Samples

No	Name	Code
1	Affin Islamic Bank Berhad	AFFIN
2	Al Rajhi Banking & Investment Corporation Berhad	ARB
3	Bank Islam Malaysia Berhad	BIMB
4	CIMB Islamic Malaysia Berhad	CIMB
5	Kuwait Finance House	KFH
6	Maybank Islamic Bank Berhad	MIBB
7	OCBC Al- Amin Bank Berhad	OCBC
8	Public Islamic Bank Berhad	PIBB
9	RHB Islamic Bank Berhad	RIBB
10	Standard Saadiq	SCS

Source: Bank Negara Malaysia (BNM), 2016

VARIABLES' DEFINITION

The dependent variable is Bank Margin. The word Bank Margin is taken from Hutapea and Kasri (2010). Bank Margin is the ratio of net financing income and average earning assets. Another researcher, Stapah et al. (2018) used the word Net Profit Margin.

On the other hand, the independent variables are:

1. Capital measured by capital adequacy ratio (CAR)
2. Asset Quality measured by non performing financing (NPF)
3. Management measured by financing to deposit ratio (FDR)
4. Earning measured by operating cost to operating revenue ratio (OCOR)
5. Liquidity measured by cash ratio (CR)

Next, moderation variable is CSR disclosure. It is measured by ISR Items adopted from Othman (2009), as disclosed in appendix 1.

METHOD OF ANALYSIS

The first objective of the research is to answer the research question related to the determinant factors of Malaysia Islamic Bank Margin. It uses panel data equation model as follows:

$$BM_{it} = \beta_{it} + \beta_1 CAR_{it} + \beta_2 NPF_{it} + \beta_3 FDR_{it} + \beta_4 OCOR_{it} + \beta_5 CR_{it} + e_{it} \quad (1)$$

Where:

BM_{it} : Bank Margin of Islamic bank.
CAR_{it} : Capital Adequacy Ratio.
NPF_{it} : Non Performing Financing
FDR_{it} : Financing To Deposits Ratio
$OCOR_{it}$: Operating Cost to Operational Revenue
CR_i : Cash Ratio
i dan t : *i* represents bank and *t* represents time period.
β_i : intercept
$\beta_1 - \beta_5$: estimated parameter.
e_{it} : random variable

To examine the role of moderating variables (ISR) whether to strengthen or weaken the influence of

TABLE 2. Definition of Operational Variable and Measurement

Variable/Indicators	Definition	Measurement	Scale
Bank Margins (BM)	The ability of bank to generate income from borrowed fund	(Net Financing Income : Average Earning Assets) x 100%	Ratio
Capital Adequacy Ratio (CAR)	The ability of bank to meet its capital adequacy	Core capital : Weighted Assets by Risk)	Ratio
Non Performing Financing (NPF)	The risk of financing indicated by the amount of bad financing.	Non performing financing : Total financing	Ratio
Financing to Deposits ratio (FDR)	The ability of bank to distribute third party fund	Total financing provided : third party fund	Ratio
Ratio of Oprating Cost to Operating Revenue (OCOR)	OCOR reflect bank efficiency to conduct its operational activity.	Operting Cost : operating revenue	Ratio
Cash Ratio	The availability of cash and other current assets to pay for withdrawals of savings current account and new financing	Cash and other short term fund : customers deposits	Ratio
Corporate Social Responsibilty	Disclosure of index ISR in the company annual report	Number of items disclosed : all items	Ratio

TABLE 3. Descriptive Statistics of Research Variables

Statistic	BM	CAR	NPF	FDR	OCOR	CR	ISR
Mean	0.0277	0.1640	0.0139	0.9607	0.8075	0.1942	0.3312
Max	0.0700	0.2916	0.0713	1.9700	1.1000	0.6400	0.7200
Min	0.0100	0.1148	0.0012	0.1100	0.6200	0.0100	0.0900
Std.Dev	0.0117	0.0378	0.0013	0.2919	0,1021	0.1529	0.1796
Skewness	1.5512	0.0152	0.0254	0.2973	0.9081	1.2972	0.7546
Kurtosis	5.2015	0.0493	0.1049	6.1797	3.3239	3.7700	2.4738
Jarque-Bera	36.1805	0.3254	204.629	26.1601	8.5099	18.3099	6.3874
Probability	0.0000	0.0000	0.0000	0.0000	0.0142	0.0001	0.0410

each independent variable on the dependent variable presented as follow:

$$MB_{it} = \alpha + \beta_1 CAR.ISR + \beta_2 NPF.ISR + \beta_3 FDR.ISR + \beta_4 OCOR.ISR + \beta_5 CR.ISR + e \quad (2)$$

RESULT AND DISCUSSION

DESCRIPTIVE STATISTICS

Summary of descriptive statistics of each variable can be seen in the Table 3.

The table shows that average BM of Islamic banks in Malaysia is 2.76%, the lowest BM is 1% and the highest is 7%. The average CAR is 16.4%, moreover the lowest CAR is 11.48%, and the highest CAR is 29.16%. Based on the regulation from BIS, banks should have minimum CAR of 8%. The average NPF is between 0.12%-7.13% and the average of NPF is 1.39%. It can be concluded that Islamic banks in Malaysia have very low NPF. FDR reflects the ability of banks to distribute third party fund in the form of financing. The average FDR is 96.06%. The figure indicates that the Islamic banks have run a good intermediary function. Furthermore, the ratio of operating cost to operating revenue ranging from 62% to 110% and its average is 80.75%. Cash ratio (CR) reflects bank liquidity, it measures by comparing total cash and deposits from the customers. The average CR is 19.42%. the lowest of CR is 15.29% and the highest CR is 65%.

Islamic banks in Malaysia have been disclosing their social activities through their annual reports. This study identifies the social activity of the Islamic banks which based on ISR Index developed by Othman et al. (2009). The average ISR disclosure (ISRD) of Islamic banks in Malaysia is 33.12%, the highest ISRD is 70% and the lowest ISRD is 9%.

DETERMINING FACTORS OF BANK MARGIN

The first objective in this study is to answer whether the variables CAR, NPF, FDR, OCOR, and CR are determinants of MB. Panel data regression analyses were done in order to answer the research question. The analysis process is done by firstly determine the right model of three models, namely Common Effect Model (CEM) or Pooled Least Square, Fixed Effect Model (FEM) and Random Effect Model.

The steps are as follows:

1. Common Effect Model (CEM)
   Results of CEM (in Appendix 3) show that the probability value (F) = 0.094322 (> 0.05), then it is concluded that this model is not significant. The next step is analysis with FEM.
2. Fixed Effects Model (FEM) .
   A dummy variable technique known as least squares dummy variable (LSDV) is used in order to estimate the FEM. The hypothesis used is that H0: Common Effect Model; H1: Fixed Effect Model. with the criteria:

   If Chi Square > 0.05 then H0 is accepted (the model used is CEM)

   If Chi Square <0 .05 then H0 is rejected (the model used is FEM)

   The results of FEM testing are presented in appendix 5, then to determine the most appropriate model between CEM and FEM is done by using Chow Test through Redundant-Likelihood Ratio. The analysis shows that Chi-Square value 0.0000 is smaller than α (alpha) 0.05. According to the criteria, the FEM model is selected. The next step is to compare the FEM with the Random Effect Model (REM).

TABLE 4. Estimation Result of Effect of CAR, NPF, FDR, OCOR,CR on Bank Margin

Variable	FEM		
	Coefficient	t-Statistic	Probability
Capital (CAR)	-0.000504	-1.287464	0.2045
Asset Quality (NPF)	0.003056	1.893103	0.0648
Management (FDR)	-0.002736	-0.669660	0.5065
Earning (OCOR)	-0.069505	-4.313449	0.0001
Liquidity (CR)	0.012615	1.289887	02037
Constant	0.087961	0,014812	0.0000
R-Squared	0.757600		
Adjusted R-Squared	0.682187		
F-Statistic	10.04600		
Prob (F-Statistic)	0.000000		

Source: Appendix 4

3. Random effect Model (REM)
   There are two residual components in REM. Firstly, overall residual which is a combination of cross section and time series. Secondly, residual is an individual residual which is a random characteristic of the observation unit i and remains constant all the time. Then the test is conducted by using the Hausman test. The result of the Hausman test (appendix 5) shows that the probability value 0.000. It is smaller than α (alpha) 0.05. Therefore, the right model is FEM.

The next step is to explain the determinant of the determinant variables of MB with FEM. Based on the regression model and the analysis result on Table 4, we can be formed equation model as follow:

$$MB_{it} = 0.087961 - 0.000504\ CAR_{it} + 0.003056\ NPF_{it} - 0.002736_3\ FDR_{it} - 0.002736\ OCOR_{it} + 0.012615 CR_{it} + e_{it} \quad (3)$$

Table 4 shows that F-statistic value is 10.04600 with a probability of 0.000. It is smaller than the level of significance (α) 0.05, so that it can be concluded that the simultaneously independent variables (CAR, NPF, FDR, OCOR and CR) have an effect on BM. The magnitude of the effect is 75.8% ($R^2 = 0.757600$), while 24.2% is influenced by other variables outside studied the variables.

Coefficient of the capital is -0.000504 with a probability of 0.2045. It means that CAR does not affect Bank Margin of Malaysia Islamic banks. CAR does not have any effect on BM because the CAR value of Islamic banks is quite high with an average of 16.15% above the minimum CAR requirement of 8%.

Asset quality is measured by NPF. The lower NPF indicates the better asset quality. NPF coefficient is 0.003056 with a probability of 0.0648, which indicates that NPF has a significant effect on the Bank Margin at a significance level of 10%. NPF increases as a result of an increase in the amount of financing greater than the increase in the amount of third-party funds collected by banks. This condition causes the Bank Margin income to be greater than the margin fee that must be paid by the bank. If the amount of financing increases, banks must also increase the reserve fund to anticipate potential losses caused by bad loans. This condition encourages banks to increase their margin income by increasing financing margins.

FDR shows the ability of banks to distribute third-party funds in the form of financing. The analysis shows that coefficient of FDR is -0.002736 with a probability of 0.5065 which means that FDR does not have any effect on the Bank Margin. As shown in Table 4, the average FDR of Islamic banks in Malaysia is 0.9607, which means that 96.07% of the third-party funds are distributed to financing.

Coefficient of Earning (OCOR) is -0.069505 with a probability of 0.0001. Its means that the earning which is measured by the ratio of operating cost to operating revenue is significantly influence the Bank Margin at significance level of 1%. Negative coefficient values

TABLE 5. Estimation Results of Moderation Regression

Equation	Explanation
MB = α + β1 CAR MB = α + β1 CAR + β2 ISR + β3CAR.ISR	To determine the effect of CAR on MB with ISR as moderation
MB = α + β1 NPF MB = α + β1 NPF + β2 ISR + β3NPF.ISR	To determine the effect of NPF on MB with ISR as moderation
MB = α + β1 FDR MB = α + β1 FDR + β2 ISR + β3 FDR.ISR	To determine the effect of FDR on MB with ISR as moderation
MB = α + β1 OCOR MB = α + β1 OCOR + β2 ISR + β3 OCOR.ISR	To determine the effect of OCOR on MB with ISR as moderation
MB = α + β1 CR MB = α + β1 CR + β2 ISR + β3 CR.ISR	To find out the effect of CR on MB with ISR as moderation

TABLE 6. Regression Analysis Results Moderation

Variables	R^2 (X → Y)	R^2 Moderating	Coefficient (X * Z)	Probability (sig) *			Moderation Criteria
				(X → Y)	Z → Y	Moderating effect	
CAR	0.556773	0.560492	0.002478	0.0053	0.6074	0.5419	potential moderation
NPF	0.630291	0.641308	0.014725	0.0000	0.7392	0.2788	potential moderating
FDR	0, 526212	0.527992	-0.022090	0, 0332	0.8305	0.7444	potential moderation
OCOR	0.688383	0.706057	0.189870	0.0000	0.0999	0.1122	predictor moderation
CR	Predictor 0.487768	0.488328	-0, 031093	0.3860	0.8528	0.8245	potential moderation

indicates that any increase in the ratio of operating costs to operating income will reduce BM.

Liquidity is measured by the ratio of available cash and other short-term funds to the amount of customers deposits (Cash Ratio). Coefficient of liquidity is -0.012615 with a probability of 0.2037. It means that the cash ratio has no effect on BM.

EFFECT OF ISR MODERATION VARIABLES

Moderating regression analysis is done in order to find out whether the ISR is a moderating variable or not. The equation model is formed as Table 5.

Based on the analysis obtained the following results on Table 6. From Table 6, it can be explained that ISR disclosure is potential to be a moderating variable that strengthen that the effect of independent variables (capital adequacy ratio, non performing financing, financing to deposit ratio, and liquidity) and dependent variable (Bank Margin). This means that the increase in the level of ISR disclosure will also increase Bank Margin.

CONCLUSION

Bank Margin (BM) of Malaysia Islamic banks is determined by several factors. All the variables used in this study, namely Capital Adequacy Ratio (CAR), Non Performing Financing (NPF), Financing to Deposit Ratio (FDR), Operating Cost to Operating Revenue (OCOR), and Cash Ratio (CR) are simultaneously affecting on Bank Margin (BM). The magnitude of the effect is 75.8% ($R^2 = 0.757600$), while the other 24.2% is influenced by variables outside of the variables studied in this research. Partially, NPF has a significant effect on Bank Margin at 10% level, earning measured by ratio of operating cost and operating revenue has a significant effect at 1% level, meanwhile the CAR, FDR, and CR have no any effect on BM.

In general, Islamic banks in Malaysia have been disclosing their social activities in their annual reports, eventhough the average level of disclosure is only 33.12%. The analysis shows that ISR disclosure is potential to be a moderating variable. It means that ISR disclosure will strengthen the effect of independent variables (capital adequacy ratio, non performing financing, financing to deposit ratio, and liquidity) on the dependent variable (Bank Margin). Therefore, Islamic banks Malaysia should increase their social activities since increasing the ISR disclosure will increase their Bank Margin.

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APPENDIX 1. Disclosure of Islamic Social Reporting

Disclosure of Islamic Social Reporting

No	Keywords	No	Keywords
A	*Finance And Investments Theme*	*D*	*Society Theme*
1	Riba Activities	21	Saddaqa/Donation
2	Gharar	22	Waqf
3	Zakat: method used, zakatable amount, beneficiaries	23	Qard Hasan
4	Policy on Late Repayments and Insolvent Clients/Bad Debts written-off	24	Employee Volunteerism
5	Current Value Balance Sheet (CVBS)	25	Education School Adoption Scheme: Scholarship
6	Value Added Statement (VAS)	26	Graduate Employment
B	*Product And Service Theme*	27	Youth development
7	Green product	28	Underprivileged community
8	Halal status of the product	29	Children care
9	Product safety and quality	30	Charities/Gifts/Social activities
10	Customer Complaints/incidents of non-compliance with regulation and voluntary codes (if any)	31	Sponsoring public health/recreational project/sports/ cultural events
C	*Employees Theme*	*E*	*Environment Theme*
12	Education and training/human capital development	33	Endangered wildlife
13	Equal Opportunities	34	Environmental pollution
14	Employee involvement	35	Environmental education
15	Health and safety	36	Environmental products/process related
16	Working environment	37	Environmental audit/independent verification statement/ governance
17	Employment of other special interest group (i.e. Handicapped, ex-convicts, former drug-addicts)	38	Environmental management system/policy.
18	Higher echelons in the company perform their congregational prayers with lower and middle level managers.	*F*	*Corporate Governance Theme*
		39	Shariah compliance status
19	Muslim employees are allowed to perform their obligatory prayers during specific times and fasting during Ramadhan on their working day	40	Ownership structure: Number of muslim shareholders and its shareholdings
		41	Board structure-muslim vs non-muslim .
20	Proper place of worship for the employees.	42	Forbidden activities: monopolistic practice, hoarding necessary goods, price manipulation, fraudulent business practice, gambling.
		43	Anti-corruption policies

Sources: Othman dan Thani, 2010

APPENDIX 2a. CAR, NPF, FDR, BOPO, CR, BM, ISRD 2012-2017

No	Name of Bank	Period	CAR (%)	NPF (%)	FDR (%)	BOPO (%)	CR (%)	BM (%)	ISRD (%)
1	Alfin Islamic BB	2012	15.15	2.49	0.57	0.79	0.45	0.03	0.37
2	Al Rajhi Banking & ICB	2012	13.46	1.74	0.94	0.99	0.32	0.07	0.28
3	Bank Islam Malaysia Berhad	2012	13.86	1.55	0.60	0.84	0.05	0.04	0.58
4	CIMB Islamic Bank Berhad	2012	13.27	0.91	0.94	0.75	0.18	0.02	0.63
5	Kuwait Finance House (Malaysia)	2012	18.89	7.13	0.98	0.81	0.25	0.05	0.35
6	Maybank Islamic Bank Berhad	2012	12.59	0.54	0.86	0.69	0.18	0.03	0.35
7	OCBC Al-Amin Bank Berhad	2012	15.24	0.51	0.96	0.83	0.01	0.02	0.12
8	Public Islamic Bank Berhad	2012	12.07	0.86	0.85	0.62	0.20	0.03	0.16
9	RHB Islamic Bank Berhad	2012	14.74	2.51	0.92	0.81	0.17	0.02	0.14
10	Standard Chatered Saadiq	2012	11.48	0.76	0.86	0.76	0.40	0.04	0.21
11	Alfin Islamic BB	2013	14.28	2.15	0.65	0.81	0.49	0.03	0.26
12	Al Rajhi Banking & ICB	2013	14.43	1.17	1.09	0.98	0.10	0.05	0.28
13	Bank Islam Malaysia Berhad	2013	13.97	1.18	0.64	0.69	0.10	0.04	0.67
14	CIMB Islamic Bank Berhad	2013	14.02	0.88	0.91	0.77	0.18	0.02	0.63
15	Kuwait Finance House (Malaysia)	2013	21.20	6.04	1.13	0.74	0.27	0.05	0.28
16	Maybank Islamic Bank Berhad	2013	13.71	0.59	1.04	0.69	0.21	0.02	0.37
17	OCBC Al-Amin Bank Berhad	2013	14.13	0.90	1.01	0.71	0.14	0.04	0.12
18	Public Islamic Bank Berhad	2013	12.36	0.90	0.81	0.67	0.24	0.03	0.16
19	RHB Islamic Bank Berhad	2013	14.42	2.30	0.88	0.81	0.16	0.02	0.14
20	Standard Chatered Saadiq	2013	13.72	0.48	1.04	0.85	0.47	0.03	0.28
21	Alfin Islamic BB	2014	13.67	1.79	0.73	0.82	0.19	0.02	0.23
22	Al Rajhi Banking & ICB	2014	20.17	0.66	0.87	0.97	0.07	0.05	0.28
23	Bank Islam Malaysia Berhad	2014	13.32	1.14	0.72	0.70	0.08	0.04	0.67
24	CIMB Islamic Bank Berhad	2014	15.49	1.25	0.87	0.77	0.12	0.02	0.63
25	Kuwait Finance House (Malaysia)	2014	24.63	3.79	1.69	0.75	0.39	0.04	0.26
26	Maybank Islamic Bank Berhad	2014	16.09	0.47	1.08	0.71	0.13	0.02	0.40
27	OCBC Al-Amin Bank Berhad	2014	15.46	1.41	0.92	0.85	0.12	0.02	0.09
28	Public Islamic Bank Berhad	2014	13.86	0.90	0.83	0.71	0.09	0.02	0.16
29	RHB Islamic Bank Berhad	2014	16.34	1.30	1.04	0.79	0.17	0.02	0.14
30	Standard Chatered Saadiq	2014	13.76	0.20	1.08	0.96	0.32	0.02	0.23

APPENDIX 2b. CAR, NPF, FDR, BOPO, CR, BM, ISRD 2012-2017

No	Name of Bank	Period	CAR (%)	NPF (%)	FDR (%)	BOPO (%)	CR (%)	BM (%)	ISRD (%)
31	Alfin Islamic BB	2015	14.42	1.88	0.92	0.80	0.19	0.02	0.30
32	Al Rajhi Banking & ICB	2015	22.39	0.46	0.97	0.94	0.03	0.06	0.28
33	Bank Islam Malaysia Berhad	2015	15.28	1.09	0.79	0.73	0.07	0.03	0.70
34	CIMB Islamic Bank Berhad	2015	16.27	1.05	0.91	0.79	0.13	0.02	0.65
35	Kuwait Finance House (Malaysia)	2015	24.95	3.25	1.97	1.10	0.44	0.01	0.26
36	Maybank Islamic Bank Berhad	2015	16.49	0.65	1.23	0.74	0.08	0.02	0.40
37	OCBC Al-Amin Bank Berhad	2015	14.75	1.96	0.97	0.77	0.11	0.03	0.12
38	Public Islamic Bank Berhad	2015	13.48	0.66	0.81	0.75	0.08	0.02	0.16
39	RHB Islamic Bank Berhad	2015	14.61	1.17	0.11	0.81	0.22	0.02	0.26
40	Standard Chatered Saadiq	2015	15.71	0.12	0.12	0.95	0.51	0.02	0.33
41	Alfin Islamic BB	2016	13.60	0.99	1.13	0.80	0.1	0.02	0.47
42	Al Rajhi Banking & ICB	2016	17.36	0.59	0.99	0.98	0.02	0.02	0.28
43	Bank Islam Malaysia Berhad	2016	15.48	0.98	0.85	0.72	0.09	0.03	0.56
44	CIMB Islamic Bank Berhad	2016	18.03	0.98	0.89	0.75	0.16	0.02	0.56
45	Kuwait Finance House (Malaysia)	2016	26.97	3.74	1.51	1.07	0.55	0.02	0.26
46	Maybank Islamic Bank Berhad	2016	18.55	0.79	1.39	0.75	0.15	0.02	0.40
47	OCBC Al-Amin Bank Berhad	2016	18.43	2.16	0.85	0.76	0.17	0.03	0.12
48	Public Islamic Bank Berhad	2016	13.53	0.60	0.88	0.76	0.02	0.02	0.16
49	RHB Islamic Bank Berhad	2016	14.00	1.15	1.15	0.80	0.12	0.02	0.14
50	Standard Chatered Saadiq	2016	18.74	0.46	1.39	0.90	0.58	0.02	0.28
51	Alfin Islamic BB	2017	16.25	1.12	1.08	0.85	0.10	0.02	0.40
52	Al Rajhi Banking & ICB	2017	18.44	0.39	0.82	0.97	0.09	0.03	0.28
53	Bank Islam Malaysia Berhad	2017	16.41	0.93	0.91	0.73	0.09	0.03	0.72
54	CIMB Islamic Bank Berhad	2017	16.29	0.66	0.89	0.76	0.22	0.02	0.67
55	Kuwait Finance House (Malaysia)	2017	29.16	2.70	1.27	0.91	0.10	0.03	0.33
56	Maybank Islamic Bank Berhad	2017	20.78	0.80	1.25	0.72	0.13	0.02	0.40
57	OCBC Al-Amin Bank Berhad	2017	19.82	2.52	0.86	0.70	0.09	0.03	0.12
58	Public Islamic Bank Berhad	2017	15.98	0.58	0.84	0.78	0.07	0.02	0.16
59	RHB Islamic Bank Berhad	2017	14.13	0.80	1.13	0.80	0.05	0.02	0.33
60	Standard Chatered Saadiq	2017	24.50	0.20	1.25	0.92	0.64	0.02	0.30

APPENDIX 3. Output of CEM

Common Effect Model (CEM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018735	0.012046	1.555318	0.1257
CAR (X1)	-0.000119	0.000551	-0.216180	0.8297
NPF (X2)	0.003489	0.001279	2.727053	0.0086
FDR (X3)	-0.008224	0.006129	-1.341718	0.1853
BOPO (X4)	0.019584	0.016948	1.155511	0.2530
CR (X5)	-0.009828	0.010378	-0.946963	0.3479
R-squared	0.155817	Mean dependent var		0.027667
Adjusted R-squared	0.077651	S.D. dependent var		0.011698
S.E. of regression	0.011234	Akaike info criterion		-6.045042
Sum squared resid	0.006815	Schwarz criterion		-5.835607
Log likelihood	187.3513	Hannan-Quinn criter.		-5.963120
F-statistic	1.993428	Durbin-Watson stat		1.010701
Prob(F-statistic)	0.094322			

APPENDIX 4. Output of FEM

Fixed Effect Model (FEM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.087961	0.014812	5.938314	0.0000
CAR (X1)	-0.000504	0.000391	-1.287464	0.2045
NPF (X2)	0.003056	0.001614	1.893103	0.0648
FDR (X3)	-0.002736	0.004086	-0.669660	0.5065
BOPO (X4)	-0.069505	0.016114	-4.313449	0.0001
CR (X5)	0.012615	0.009780	1.289887	0.2037
R-squared	0.757600	Mean dependent var		0.027667
Adjusted R-squared	0.682187	S.D. dependent var		0.011698
S.E. of regression	0.006595	Akaike info criterion		-6.992824
Sum squared resid	0.001957	Schwarz criterion		-6.469238
Log likelihood	224.7847	Hannan-Quinn criter.		-6.788021
F-statistic	10.04600	Durbin-Watson stat		1.682257
Prob(F-statistic)	0.000000			

Jurnal Ekonomi Malaysia 54(1) 2020 111 - 120
http://dx.doi.org/10.17576/JEM-2020-5401-8

Household Debt and Household Spending Behavior: Evidence from Malaysia

(Hutang Isi Rumah dan Tingkah Laku Perbelanjaan Isi Rumah: Bukti dari Malaysia)

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ABSTRACT

Using data collected from urban households in the Klang Valley, Malaysia, this study examined the impact of household debt on urban household consumption decisions. The findings revealed that household debt does not generally affect consumption decisions, except in the case of expenditure on vacation, which tends to be reduced for households facing high levels of debt. Furthermore, general financial wellness tends to be the main factor affecting consumption rather than debt. Households with poorer financial wellness make more frequent cuts to daily meals, fruit, utility, transportation, clothing, medical care, vacations, and leisure activities. Although the impact of debt on consumption is not extensive, it must be closely monitored to ensure that the risk is contained and that the wellbeing of households is not adversely affected.

Keywords: Household debt; spending cut; investment loan; consumption loan; Malaysia

ABSTRAK

Dengan menggunakan data yang dikumpul adalah daripada isi rumah penduduk bandar di Lembah Klang, Malaysia, kajian ini dilaksanakan untuk meneliti kesan hutang bagi isi rumah dalam membuat keputusan penggunaan isi rumah. Dapatan kajian ini menunjukkan bahawa hutang isi rumah secara amnya tidak mempengaruhi keputusan dalam penggunaan isi rumah, melainkan di dalam kes perbelanjaan percutian, di mana ianya boleh dikurangkan bagi isi rumah yang menghadapi tekanan hutang yang tinggi. Tambahan lagi, kesejahteraan kewangan secara umum adalah menjadi faktor utama yang mempengaruhi penggunaan isi rumah dan bukannya hutang. Isi rumah yang mempunyai kesejahteraan kewangan yang rendah lebih kerap membuat pemotongan kepada makanan harian, buah-buahan, utiliti, pengangkutan,baju, perubatan, percutian dan aktiviti masa lapang. Walaupun kesan hutang terhadap penggunaan adalah tidak meluas, ianya mestilah dipantau dengan teliti untuk memastikan risiko dapat dibendung dan tidak merugikan bagi kesejahteraan perbelanjaan isi rumah.

Kata kunci: hutang isi rumah; potongan perbelanjaan; pinjaman pelaburan; pinjaman penggunaan; Malaysia

INTRODUCTION

For modern economies, credit remains a crucial financial resource to assist households with their consumption expenditure. Available credit enables households to expand their purchasing ability and increase utility. However, credit obtained will rapidly turn from being a financial resource to being a financial burden in the form of debt. The increase in utility through higher current consumption may not prevail indefinitely as portions of a household's future income need to be allocated for debt repayments. The resulting build-up of indebtedness may expose households not only to the higher potential of financial risk (Chichaibelu & Waibel 2017; Iii & Pressman 2019; Son & Park 2019) but also to financial stress (Rani et al. 2017). Indebtedness may also lead to other economic implications such as a reduction of future consumption (Dynan & Edelberg 2013; Kukk 2018), higher potential of late debt repayment (Chantarat et al. 2020), and even foreclosure or bankruptcy (Athreya, et al. 2018; Calem et al. 2017; Moorman & Garasky 2008).

Among the choices faced by debtors suffering repayment stress, cutting consumption could be one coping strategy to relieve the financial burden (Dynan & Edelberg 2013; Kukk 2016). Although empirical studies have long been interested in testing the relationship between debt and consumption, the focus of the literature on the micro-level has been limited in investigating the impact of household debt on the overall level of household consumption expenditure per se (Dynan 2012; Kukk 2018; Nakajima 2020). Less attention has been given to examining the effect of household debt on the consumption of specific goods and services.

Malaysia is a country which has experienced a high pace of household debt increase over the past two decades and the household debt-to-GDP ratio has risen

to a historical high in recent years[1]. Consequently, the financial situation for many Malaysian households has already reached a vulnerable level (Rani et al. 2017; Yusof et al., 2015). However, the question of how indebtedness relates to consumption decisions in the case of Malaysians has rarely been examined so far. What types of goods and services may be affected by the choices of indebted Malaysian households also requires investigation. Therefore, this study attempts to extend the literature in this area where by using Malaysian urban household data to investigate the implications of household debt on the consumption of different types of goods and services.

Compared to previous macro-level analyses of debt and consumption (Khan et al. 2016; 2017), a study using household-level data will be better able to identify responses in terms of consumption decisions for indebted households and the potential of those households for applying certain coping and adaptation approaches. Rather than investigating the impact of debt on the overall consumption levels, this study also breaks down consumption into different categories. By doing so, the impact of household debt on the consumption of specific types of goods and services might be properly analyzed. The examination of which goods and services are affected by debt is crucial to understand since it is related to household well-being. Reduction of different types of consumption may result in a reduction of well-being differently (Annink et al. 2016; Noll & Weick 2015; Wu 2019). Furthermore, this research also analyzed whether different types of household debt affects consumption decisions for urban Malaysian households. Existing research on household debt has shown that different types of loans have varying effects on wellbeing (Dynan 2012; Mian et al. 2013). In this regard, this study extends the analysis further to include the effect of debts from secured and unsecured loans separately on consumption behavior.

This paper proceeds with a literature review in the next section, followed by the methodology of this study. The measurement of overall consumption, consumption items, overall household debt, types of household debt, and other variables will be presented in the methodology. The subsequent section consists of a discussion of the empirical analysis and findings, with the conclusion being given in the last section.

THE LITERATURE ON HOUSEHOLD DEBT AND CONSUMPTION

Although households can increase their current consumption using future income through loan borrowing, during the repayment period they have to allocate part of their income to finance their debt obligations and other expenditure. When households become more financially vulnerable due to high debt obligations, other parts of expenditure may be constrained if financial resources are limited.

There are mainly two standard explanations of the relationship between household debt and consumption. The first is the life-cycle/permanent income hypothesis (LCPIH) which predicts that households tend to smooth their consumption by credit and savings when expected permanent income remains the same (Modigliani & Brumberg 1954; Friedman 1957). When households presume their future income is stable, their discretionary consumption will remain constant even though a loan was undertaken. The anticipated debt payment or unanticipated income change will not impact the consumption level as long as the permanent income is unchanged. Households will use their financial resources to buffer the shocks (Agarwal & Qian 2014; Browning & Collado 2001; Hsieh 2003; Jappelli & Pistaferri 2010; Leth-petersen 2010). Mixed results were found in testing this hypothesis. As Jappelli and Pistaferri (2010) reviewed and summarized, consumption tends to change due to unanticipated income shocks rather than as anticipated.

The second explanation examines debt and consumption from the perspective of financial vulnerability. Households with a high level of indebtedness will be led to an increase in their financial vulnerability, exposing them to more financial risks (Chichaibelu & Waibel 2017; Iii & Pressman 2019; Rani et al. 2017; Son & Park 2019). These financial risks may impact consumption in two ways. Firstly, when households face any unexpected negative shock such as job loss, an increase in interest rates, a reduction in housing prices, or recession, a drop in their income or wealth and their ability to service their debt results, which affects their discretionary consumption. They may resort to withdrawing from their savings, borrowing further from financial institutions, borrowing from friends or relatives, delaying household payments, or reducing consumption. Secondly, the hypothesis of precautionary motive states that households cut spending when faced with high leverage. Even in the absence of a negative shock, households may reduce consumption if there are uncertainties about future income. This precaution is taken to self-insure against the potential of financial constraints in the future. They may voluntarily reduce consumption to ensure that they can meet their regular long-term debt repayments.

Aside from the above theoretical arguments, the increasing level of household debt in recent decades has raised research interest in the implications of household debts. However, at the micro-level, most of these studies were in the area of psychology and related fields of studies which focused on the impact of household debt on general psychological wellbeing (Dackehag et al. 2019; Hojman et al. 2016; Turunen & Hiilamo 2014), physiological wellbeing (French & Vigne 2018; Keese & Schmitz 2014; Sweet et al.

2012), and family relationships (Cai et al. 2020; Dew & Dakin 2011; Dew 2007, 2008). Research in the area of economics mainly concentrated on delinquencies and bankruptcies (Athreya et al. 2018; Getter 2003; Gross & Souleles 2002) while the implications of household debt on consumption at the micro-level have received less attention. Studies concerning consumption are limited to investigating the response of aggregate consumption to household indebtedness, especially during and after periods of recession. For instance, Ogawa & Wan (2007) used three waves of Japanese household data to investigate the impact of the accumulation of household debt on consumption during and after the financial bubble during the 1990s. Their study found that while household debt led to a consumption increase during a bubble, it depressed consumption after the bubble had burst. Research by Dynan (2012) examined whether debt contributed to weakness in consumer expenditure between 2007 and 2009 in the U.S. She found that the highly leveraged households had larger declines in expenditure, suggesting that excessive leverage contributes to weakened consumption. Mian, et al. (2013) found similar results examining the consumption reaction after the 2006-2009 housing market collapse in the U.S. Another study by Dynan and Edelberg (2013), which used data from the Survey of Consumer Finances, investigated the relationship between leverage and household spending behavior during 2007-2009 in the U.S. and concluded that households with higher leverage tend to report cutbacks in spending.

Bunn and Rostom (2014), focused instead on the UK's experience of the 2008 recession and found that tighter credit conditions and increased concern over future debt repayment both explained large cuts in household spending. They estimated that debt had led to a reduction of about 2 percent in aggregate private consumption from 2008 to 2012. Brown et al. (2012) examined data from emerging European countries and find that households with foreign currencies dominated by mortgages, which is a riskier situation to be in, had to reduce consumption when shocked by negative income. More current research by Kukk (2016) on the relationship between household indebtedness and consumption used rich panel data of over 100,000 individuals living in Estonia and concluded that the debt burden was stronger during recessions than pre and post-recession periods. The author suggested that household indebtedness may amplify the situation of recession and increase the repayment burden of the household.

Although these studies do provide some insight into the effect of household debt on consumption, there is little analysis of the impact on specific types of items of household consumption when households face financial stress. Kukk (2018) acknowledged this concern but only investigated how debt repayment problems affect overall spending behavior in the short and long run. Naturally, when household debt suppresses consumption, a household typically makes choices as to what consumption needs be reduced. Households not only need to adjust their overall level of consumption but the debt may further force them to forego consumption of certain goods and services. For example, Kalousova and Burgard (2013) found that debtors in South-eastern Michigan U.S. tend to forego medical or dental care. This type of choice of reduction will have a much larger overall impact on a household's wellbeing compared to forgoing goods and services which are considered non-necessities. Additionally, it will be interesting to examine if unsecured debt affects household consumption differently compared to secured debt.

To the best of the authors' knowledge at the time of writing this paper, there has not been any study on Malaysia that specifically investigated the impact of household debt on consumption decisions. Research on Malaysia has generally focused on household balance sheet consumption (Murugasu et al. 2015), consumption patterns (Mien & Said 2018), expenditure patterns on food (Habib et al. 2011; Heng & Guan 2007; Ishida et al. 2003), energy consumption (Ong et al. 2012) and financial vulnerability (Yusof et al. 2015). Khan, et al. (2016) suggested that mortgage debt has an impact in terms of increasing income levels, housing prices, and population growth in the long run. However, the increasing cost of living then contributes to the rising levels of debt. The authors stated that Malaysians tend to use debt as a substitution for income to finance the rising cost of living. Norhana and Hua (2009) argued that the banking sector responds to increasing demand for loans to finance consumption, especially for housing mortgages. Nevertheless, consumption credit may not be able to sustain increases in consumption over a long period as it can only assist a household by redistributing consumption over time (Murugasu et al. 2013).

METHODOLOGY

SAMPLE DATA AND MEASUREMENTS

This paper used cross-sectional data collected from Klang Valley, the largest urban area in Malaysia, and the main economic center of the country. The area is nearly 100 percent urbanized, consisting of 1.6 million households and a population of 6.37 million in 2017. Based on the 2010 census sampling frame of the Department of Statistic Malaysia, 600 households were randomly selected. The survey on these 600 households was conducted between February to August 2017. The respondents were the head of the household or the main financial decision-maker of the household. Two sets of identical bi-lingual questionnaires were prepared using three different languages: Malay, English, and Chinese, due to the multiracial characteristics of the Malaysian

society. Each respondent was interviewed or was given the survey to complete. The final sample size was 407, with a response rate of 67.8%.

To measure spending cuts for different items, nine common consumption items were considered. These items were grouped into two due to differences in the frequency of spending on the items. The first group consisted of expenditure on (i) daily meals, (ii) fruits (iii) utilities, and (iv) transportation. Respondents were asked, for example, "In the past 6 months, how many months have you cut spending on ..." for each of these items. The options for the response were "0" to "6" months. Hence, a higher number indicates a more severe cut in spending for that particular item.

The second group represented items which would incur relatively less frequent expenditure than those items in the first group. These items were (i) clothing, (ii) vacations, (iii) medical care, (iv) leisure activities, and (v) child education. Respondents were asked, "In the past 6 months, how often do you cut spending on …." for each of the items. The possible responses were: (1) Never; (2) Rarely; (3) Sometimes; (4) Often; and (5) Always. A larger number would imply a more severe spending cut for that item.

Household indebtedness is measured as a ratio of household debt to income. A variety of ways to measure indebtedness are employed in the recent literature. This study adopted debt to income ratio as a measure as it also reflects, to some extent, potential credit constraints in the future. Firstly, the survey collected the average amount of housing loan, property loan, vehicle loan, personal loan, and other loans (education loan, etc.) which the respondent and his/her spouse/partner pay in a month. Secondly, the number of housing loans and property loans for each household were summed up to generate the amount of secured loan held by each household. Then, the number of unsecured loans of the household was also generated by summing up the number of vehicle loans, personal loans, and other loans the household needed to pay. Finally, after the total of the above loans was accumulated, the debt to income ratio of each loan was calculated by dividing the household income level. The ratio of debt for all of the above loans is the variables of household debt for these analyses.

The measurement of financial wellness applied the strength of subjective measurement of financial wellness (Prawitz et al. 2006). This measurement was based on the financial situation of the households and their ability to pay their financial commitment. The first question was "How is the financial situation of your household at the moment?" Respondents had to reveal his/her expenses in comparison to their income. The answers to the question were labeled on a scale from "1" which indicates "Expenses much higher than income" to "5" for "Expenses much lower than income." If the expenses revealed by the respondents were higher than the income, a lower level of financial wellness was indicated. Similarly, if the expenses revealed were lower than the income, a higher level of financial wellness was indicated. The second question was as follows: "In the past 6 months, which of the following statements best describes how well you and your immediate family have been keeping up with your bills and other financial commitments?" The choices of response provided were labeled either as "3", which indicated "Able to pay all bills and financial commitments without any problem", "2", which indicated "Able to pay all bills and financial commitments, but it is sometimes a struggle" and "1", which indicated "Having a real financial problem and falling behind with bills or credit commitments". Based on the answers from these two questions, the financial wellness index was generated by summing up the scores for both questions. The minimum score was "2", which represented the lowest level of financial wellness and the maximum possible score was "8", which represented the highest level of financial wellness.

Demographic variables and other variables were included in the analysis as control variables. The first was *Household income*, which was the total monthly income of the household. The second was a dummy variable *Male* equals to 1 if the head or financial decision-maker of the household is a male and 0 otherwise. The third was Age which represented the age of the respondent and was measured in years. The variable *education* reflected the highest level of education completed. It is equal to 1 if the respondent had no formal education, 2 if respondent completed primary education, 3 for secondary education, 4 for attaining a diploma at college or vocational level, 5 for a bachelor's or professional degree, 6 for master's degree, and 7 for a Ph.D. Marital status was represented by the dummy variable *Married*, which equalled 1 if the respondent was married, and 0 otherwise. *Employed* was a dummy variable equal to 1 if the respondent was employed, and 0 otherwise. The last control variable was the health of the respondent, which identified specifically minor health conditions.

This study applied ordinary least squared and ordered logistic regression estimation to examine the relationship between household indebtedness and spending cuts for each item. This was due to the ordinal characteristic of the dependent variables. All of the regressions included the same control variables which were *financial wellness, gender, age, education, employment status, household income, marital status*, and *minor health conditions*. There was no change of controlling variable for all of the regressions. This was because the main test variable was between household debt variables with consumption variables.

TABLE 1. Descriptive statistics of demographics

		N (407)	%
Household position	Head	209	51.4
	Spouse/partner	142	34.9
	Others	56	13.8
Marital status	Married/Living together	330	81.1
	Separated/Divorced/ Widowed	12	2.9
	Single	65	16
Gender	Male	214	52.6
	Female	193	47.4
Age (years)	< 25	16	3.9
	25 - 34	110	27.0
	35 - 44	124	30.5
	45 - 54	111	27.3
	55+	46	11.3
Education	<=Secondary	161	39.6
	Diploma	116	28.5
	Bachelors/Professional	91	22.4
	Masters/PhD	39	9.6
Employment status	Not employed	59	14.5
	Employed	348	85.5
Income (RM)	< 1000	1	.2
	1000 - <2000	23	5.7
	2000 - <3000	61	15.0
	3000 - <4000	50	12.3
	4000 - <5000	73	17.9
	5000 - <6000	59	14.5
	6000 - <8000	40	9.8
	6000 - <12000	65	16.0
	12000+	35	8.6

TABLE 2. Summary of financial wellness

Item 1: Financial situation	N = 407	%
Expenses are much higher than income	50	12.3
Expenses are higher than income	87	21.4
Expenses are about the same as income	162	39.8
Expenses are lower than income	95	23.3
Expenses are much lower than income	13	3.2
Item 2: Ability to pay all bills and financial commitments	N = 407	%
Having real financial problems and falling behind	22	5.4
Sometimes struggling	203	49.9
Without any problems	182	44.7

DESCRIPTIVE STATISTICS

The sample given in Table 1 consists of a total of 407 respondents of which over half were heads of households. The majority of them were married or living with a partner and between the ages of 25 and 54. Slightly more than half were males and about 60 percent of the respondents had at least a diploma or degree. Over 85 percent of them were in employment and 33.2 percent were earning a monthly income of less than RM4000.

The results presented in Table 2 for financial wellness from two measurements showed a less positive situation in general. As for the financial situation, one-third of the respondents' expenses which were greater than their actual income. More worrying still were the results which showed that more than half the respondents reported having struggles or as not even being able to meet their financial commitments at all. Table 3 presents the state of spending cuts that households had to make for various items. In general, a daily meal was relatively less likely to be subjected to spending cuts. Almost half (47%) did not cut back spending on daily meals within the 6 months of the survey. For those who did, on average, the frequency of spending cuts was about 1.47 months out of the 6 months. Comparatively, spending cuts were made more for expenditure on transportation, fruit, and utilities. Over 60 percent of the households reported having to make such cuts and the frequency of cuts to spending was about 1.8 months in the past 6 months, on average.

However, consumption on items such as clothing, vacations, and leisure activities were relatively more affected. About 60 percent of the respondents reported that they sometimes or more often had to make reductions on clothing, vacations, and leisure activity expenditure. On the other hand, expenditure on child education was rarely subjected to spending cuts but on the other hand, although 31.7 percent of the households stated that they did not cut spending on medical care, another 25.6 percent indicated that they sometimes had to do so, while 14 percent often or always had to reduce this type of expenditure. This finding is of great concern since medical care is a basic necessity and reduction in spending on it may have serious implications on the health and wellbeing of those households.

RESULTS AND DISCUSSION

This study examined the effect of household debt on specific household expenditure items in the case of urban households in Malaysia. The overall results in Table 4 reveal that the household debt-to-income ratio has no significant relationship with the frequency of spending cuts on most items of consumption. Whether

TABLE 3. Household Items Spending Cuts

Months need to cut spending									
Items	0	1	2	3	4	5	6	N	Mean
Meals	47%	15%	12%	13%	5%	3%	6%	407	1.47
Utilities	39%	12%	16%	15%	9%	3%	6%	407	1.74
Fruit	39%	12%	16%	14%	5%	5%	8%	407	1.81
Transportation	35%	15%	15%	16%	5%	5%	8%	407	1.89
		Never	Rarely	Sometimes		Often	Always	N	
Clothing		12.0%	21.4%	36.9%		18.4%	11.3%	407	
Medical care		31.7%	29.7%	25.6%		9.6%	3.4%	407	
Vacations		13.0%	22.56%	27.0%		16.5%	20.9%	407	
Leisure Activities		16.2%	25.1%	31.2%		18.9%	8.6%	407	
Child Education		60.2%	20.4%	9.9%		4.3%	5.1%	372*	

*: 35 respondents did not answer this question due to either not having children or not having children needing education.

under an OLS or an ordered logistic regression model, the household debt-to-income ratio did not show any significant positive relationship with spending cuts on meals, fruit, utilities, transportation, clothes, medical services, leisure activities, and child education. The only impact the household debt had on the Malaysian urban households of this study was spending on vacations. Under the OLS, the 1% increase in the household debt-to-income ratio may lead to a 0.55-unit increase in the frequency of cutting vacations. Under the ordered logistic regression, the odds ratio of cutting spending on vacation is 2.2 ($e^{0.8}$) compared to the lower frequency of a one-unit increase in the household debt ratio. Such results are not consistent with findings in the previous literature which focused on sample data of the UK and US, where a higher leveraged household tends to cut back overall spending (Bunn & Rostom 2014; Dynan & Edelberg 2013; Kukk 2017). Even though the present study analyzed the impact on specific items, the impact of household debt did not appear for most items of consumption. This different result shown in the sample data of Malaysian urban households may mainly be due to two reasons.

Firstly, unlike previous studies which used panel data, this study examined the relationship between household debt and spending cuts only using cross-sectional data. The limitation of cross-sectional data is, of course, not being able to capture dynamic changes of other factors that may influence the relationship. As Nakajima (2020) find that compared to the household with little-to-no debt, the income elasticity of consumption is significantly higher for highly-indebted households when income change is negative. Similar to most past research which used data collected during the 2008 financial crisis, the poor economic environment may amplify the impact of indebtedness due to reduction of income, credit constraint, unemployment, etc. (Bunn & Rostom 2014; Dynan & Edelberg 2013). This is also supported by Kathleen and Geng (2007) who studied U.S. data from a healthier economic period:1992 to 2005 and suggested that the higher sensitivity of consumption to a change in income is not only caused by a high debt-to-service ratio alone.

Secondly, in contrast to the previous literature, this study analyzed the relationship between household debt and consumption expenditure and included a further factor: the financial wellness of the household. When financial wellness is included in the analyses, it has a controlling effect on the impact of debt. Unlike the impact of household debt, the result in Table 4 shows that financial wellness is significantly related to most cuts in consumption. The negative relationship results from both models are quite supportive of the discussion above, in which the financial situation may be the main reason behind any spending cuts made by households. The financial vulnerability hypothesis assumes that indebtedness may have a direct impact on consumption. A highly indebted household may feel the pressure of debt payments and accordingly cope with the financial situation by cutting back consumption. However, the results of this study show that the decision of cutting back consumption is more dependent on general household financial wellness, rather than on the pressure from debt. The effects of consumption may also interact with changes in the financial situation such as changes in income expectations or credit conditions (Bunn & Rostom 2014).

Moreover, regarding the other controlled variables of this study, the results showed that age is also a determinant of spending cut behavior in the case of Malaysian urban households. Younger households tend to cut spending more frequently on utilities, transportation, and medical services compared to older households. This result can be validated from both models. It was also found that the more educated Malaysian urban households tend not to cut spending on

TABLE 4. OLS & Logistic Regression results of debt impact on spending cuts on different items

OLS	Meals	Fruit	Utility	Transportation	Clothes	Medical services	Vacations	Leisure Activities	Child Education
Debt-to-Income Ratio	0.117	0.292	0.053	-0.107	0.125	0.271	0.548*	-0.187	0.339
Financial Wellness	-0.446**	-0.429**	-0.491**	-0.580**	-0.269**	-0.393**	-0.246**	-0.286**	-0.140
Gender	-0.284	-0.335*	-0.160	-0.289	-0.134	-0.058	-0.135	0.141	0.083
Age	-0.020*	-0.013	-0.029**	-0.030**	-0.002	-0.010*	0.004	-0.006	0.004
Education	-0.043	-0.090	-0.142	0.012	-0.006	-0.118*	0.031	-0.106*	-0.147**
Employment	-0.354	-0.140	-0.007	-0.132	0.248	-0.253	-0.162	0.042	0.118
Household Income	-0.001	-0.063	0.013	0.001	-0.024	0.036	0.013	0.048	0.012
Marital Status	-0.029	0.121	0.354	0.312	0.108	-0.219	-0.362*	0.068	0.089
Minor Health Problems	-0.063	-0.023	0.126	0.142	0.094	0.097*	0.135*	0.166**	0.005
Constant	4.521	4.809	4.449	4.632	3.626	4.043	3.526	3.206	2.014
Ordered Logistic									
Debt-to-Income Ratio	0.143	0.324	-0.003	0.008	0.295	0.451	0.800*	-0.307	0.551
Financial Wellness	-0.474**	-0.461**	-0.560**	-0.597**	-0.455**	-0.682**	-0.337**	-0.464**	-0.319*
Gender	-0.204	-0.291	-0.175	-0.225	-0.186	-0.138	-0.161	0.196	0.094
Age	-0.018	-0.012	-0.032**	-0.030**	-0.003	-0.021*	0.005	-0.012	0.005
Education	-0.053	-0.072	-0.156	0.004	-0.028	-0.226**	0.019	-0.169*	-0.259**
Employment	-0.244	-0.082	0.101	0.013	0.372	-0.379	-0.230	-0.007	0.228
Household Income	-0.023	-0.075	0.023	0.005	-0.034	0.066	0.023	0.081*	0.045
Marital Status	-0.124	0.109	0.297	0.221	0.193	-0.326	-0.488	0.119	0.386
Minor Health Problems	-0.037	-0.002	0.143	0.179	0.159	0.202	0.172	0.273	0.022

** p<0.01, * p<0.05

TABLE 5. OLS & Logistic Regression results of different types of debt impact on spending cuts on different items

Models	Variables	Meals	Fruit	Utility	Transportation	Clothes	Medical services	Vacations	Leisure Activities	Child Education
OLS	Investment Loan	-0.326	0.192	0.194	0.047	-0.104	0.310	0.390	-0.211	0.283
	Financial Wellness	-0.460**	-0.439**	-0.489**	-0.573**	-0.278**	-0.399**	-0.264**	-0.282**	-0.151
Ordered Logistic	Investment Loan	-0.428	0.177	0.085	0.212	-0.090	0.405	0.577	-0.406	0.363
	Financial Wellness	-0.490**	-0.473**	-0.558**	-0.593**	-0.471**	-0.699**	-0.357**	-0.458**	-0.339*
OLS	Consumption Loan	0.866	0.656	0.035	-0.235	0.397	0.326	0.783*	-0.131	0.322
	Financial Wellness	-0.424**	-0.423**	-0.493**	-0.582**	-0.263**	-0.397**	-0.249**	-0.281**	-0.147
Ordered Logistic	Consumption Loan	0.938	0.726	0.043	-0.135	0.781	0.694	1.159*	-0.154	0.550
	Financial Wellness	-0.445**	-0.454**	-0.558**	-0.604**	-0.452**	-0.684**	-0.346**	-0.453**	-0.330*

** p<0.01, * p<0.05

medical services, leisure activities, and child education. Inconsistent results appeared for minor health problems. From the OLS, the household head who more frequently experiences minor health problems has a higher frequency of spending cuts on medical services, vacations, and leisure activities. However, such a result did not appear in the ordered logistic model.

Furthermore, the analyses of household consumption were extended to determine the effects of specific debts or loans on spending cuts to household items. For the sake of brevity, the result reported in Table 5 is a condensed version which shows only the estimated coefficients for the debt variable for the regressions on each consumption item. The coefficient estimates of the control variables (except financial wellness) are not reported but the results for these variables are similar to the ones found earlier. Investment loans, which consist of housing loans and loans for commercial properties were found to have no impact on any consumption item. As with the observation above, financial wellness is the main determinant for spending cut behavior rather than the debt itself. Although the literature consistently argued that unsecured consumption loans are more damaging than investment loans, such results are not reflected in the spending cuts described in this study. Consumption loans were only shown to affect spending cuts on vacations. The main determinant of household spending cut decisions for the majority of consumption items was financial wellness rather than the debt itself.

CONCLUSION

The rise of household debt is a phenomenon which not only exists in developed countries but is also on the rise at a fast pace in many developing countries. Malaysia is one of the countries which now typically experiences a high household debt to GDP ratio. This study has focused on the implications of household debt in Malaysia at the household level, particularly on their consumption of different items. Using data collected from Malaysian urban households and controlling for other socio-economic factors, this study found that higher levels of household debt do not lead to significant cuts in household spending. This result for household consumption expenditure is unlike the results of previous studies which generally found a negative impact of indebtedness on consumption spending from data collected during and after periods of recession. A possible reason is that the data for this study is cross-sectional. The limitation of cross-sectional data lies in its inability to capture dynamic changes caused by other factors that may influence the relationship such as economic downturns. However, the positive aspect of this cross-sectional study is its ability to examine the possible crowding-out effect at the stages of high debt to income level. As the result of this study indicate, urban Malaysian households with high levels of debt may not be too concerned about their current or future financial situation and hence may not feel that it is necessary to reduce consumption for precautionary purposes. Households may begin adjusting their consumption only when the financial situation becomes more serious.

It could be said then, in conclusion, that in the urban Malaysian context, even though items of consumption are generally not affected, households make adjustments to spending on some items. Specifically, expenditure on vacations is reduced for households facing high levels of debt. Different types of loans also have little impact on household expenditure on different consumption items; only when it comes to vacations. Compared to secured debt, households with a higher amount of unsecured debt make more frequent cuts to vacations. Lastly, the analysis also reveals that households with poorer financial wellness tend to cut their spending on most of the consumption items. Also, the household heads (or main financial decision-makers) with lower levels of education are more prone to reduce spending on child education. These findings are of concern and indicate, to a certain degree, the poor financial situation such households are in which in terms of overall wellbeing. The findings of this study suggest, then, that household debt, taken in general, does not affect consumption. However, perhaps unsurprisingly, further examination shows that households with poorer financial situations are the ones which are the most affected. More attention, therefore, should be given to these households in terms of both research, community action, and government policy, as their wellbeing is more likely to be impacted.

NOTE

[1] The household debt-to-GDP ratio in Malaysia increased sharply in 2009 and kept increasing until 2015 when it reached its highest level of 89.1% of GDP. This ratio was one of the highest household debt-to-GDP ratios in the world at that time. In recent years, due to control by the Central Bank of Malaysia, the growth of household debt in Malaysia has been slower and the household debt-to-GDP ratio has fallen to 83% in 2018.

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Jurnal Ekonomi Malaysia 54(1) 2020 121 - 134
http://dx.doi.org/10.17576/JEM-2020-5401-9

Early Warning Indicators for Systemic Banking Crises: Household Debt and Property Prices

(Penunjuk Amaran Awal untuk Krisis Perbankan Bersistem: Hutang Isi Rumah dan Harga Perumahan)

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ABSTRACT

The 2008 financial crisis was the result of escalating house prices and a hasty increase in household debt. In a sample of 41 advanced and emerging countries, this paper employs a logit estimation model to examine the role of household debt and house price as indicators of systemic banking for the period of 1980 until 2018. The results confirm that a high growth in household debt and house price increase enhances the probability for crises to erupt. While this is a consistent evidence for advanced economies, an observation of emerging economies suggests that only a change in household debt and not a change in house prices may cause banking crises to erupt. Policymakers can thus design predictive EWS models based on the surge in household debt and house prices prior to the crises which would lessen, if not alleviate, the effect of upcoming economic shocks by monitoring the macroeconomic changes.

Keywords: Early Warning Signal; household debt; house prices; banking crises; logit

ABSTRAK

Hutang isi rumah dan harga hartanah telah meningkat dengan ketara dipercayai penyebab kepada krisis kewangan 2008. Makalah ini mengkaji peranan hutang isi rumah dan harga rumah sebagai penunjuk krisis perbankan sistemik melalui 41 sampel negara maju dan negara sedang pesat membangun untuk tempoh 1980 hingga 2018 menggunakan model logit. Penemuan kajian ini mengesahkan bahawa krisis cenderung untuk berlaku apabila terdapat pertumbuhan hutang isi rumah yang tinggi serta kenaikan harga rumah. Manakala penemuan ini konsisten dengan negara maju, pemerhatian mendapati bahawa hanya perubahan hutang isi rumah dan bukan perubahan harga rumah penyebab krisis di negara pesat membangun. Oleh itu, penggubal dasar boleh merekabentuk model ramalan EWS berdasarkan peningkatan mendadak dalam hutang isi rumah dan harga rumah sebelum krisis yang dapat membantu mengurangkan, jika tidak meringankan, kesan kejutan ekonomi yang akan datang melalui pemantauan perubahan makroekonomi.

Kata Kunci: Sistem Amaran Awal; hutang isi rumah; harga rumah; krisis bank; logit

INTRODUCTION

According to Alter and Mahoney (2020), a country's economic stability is significantly influenced by house price and household debt. Kim (2020) asserts that the surge in house price along with a hasty increase in household debt were the causes of the 2008 economic recession. Mian et al. (2017) further contend that household debt vitally enhances the probability for banking crises to erupt. Household debt may link to the symptoms of financial crises in numerous ways. For instance, evidence from the 2008 economic recession among European countries, the United Kingdom and United States suggests a deeper subsequent recession following the strong increase in credit expansion during the boom (see Alter et al. 2018; Bunn & Rostom 2015; Justiniano et al. 2016; Mian et al. 2015). Jorda et al. (2013) provide further proof over this consistency in which similar features were observed on more than 200 recessions with slower recovery among 14 advanced countries using regional data of 1870-2008. Others have found that the pre-financial crisis period eased credit constraints, but that house price surged in tandem with aggregate mortgage debt (see Dagher & Kazimov

2015; Haughwout et al. 2019; Justiniano et al. 2016). Whereas house price was evidently a symptom of the 2008 Great Recession, the increase in available credit with connected to a declined standard of lending and financial liberalisation were further causes of the crisis, and these strongly relate to corruption (Jha 2019).

Hence, the likelihood for banking crises to erupt in many countries is explained by the phenomenon of escalating debt within households and the effect of house prices. The gravity of the issue has caused the International Monetary Fund (IMF) to produce two reports pertaining to household debt and house prices for the year 2017 and 2018 respectively to caution any relevant parties against disregarding the matter. The IMF (2017) report claims that economic growth was affected by the reversed effect of household debt which significantly increased the odds of a financial crisis. Hence, rising household debt must be taken into serious consideration when it comes to economic stability and to avoid a similar crisis. According to IMF (2019), the high magnitude of economic crises observed for the past few decades was led by a price boom in the housing sector. Widespread in some markets, house price gains have been, in others, rather brisk. In many cities and countries within emerging and advanced market economies, house price growth runs parallel to the crisis's run-up (IMF 2018). Additionally, there have been strong evidences proving that escalating household debt which leads to crises in many advanced economies is in tandem with high house prices (Goodhart & Hofmann 2008; Kim, Son & Yie 2017).

Motivated by this scenario, we focus our study in analysing the indicators for Early Warning Signal or EWS (i.e. household debt and house price) as important indicators for systemic banking crises. Limited studies have emphasised the impact of household debt on banking crises. Büyükkarabacak and Valev (2010) and recent studies highlight its relationship with economic recession (see Alter et al. 2018; Garcia 2020; Kim 2020). Few, on the other hand, have focused on house price together with rising household debt as an important indicator for banking crises. This issue demands an urgent study to recommend appropriate policies before another round of crisis. Thus, there is a need examine the issue of systematic banking crises via EWS that is comprised of house price and household debt.

This study contributes to the literature in three-fold. It extends existing EWS banking crises model with household debt and house prices as simultaneous indicators. The study also uses split sample advanced and emerging economies in its analysis. A plethora of studies have discussed the matter of household debt and crises in the context of advanced countries. Hence, this study fills the gap by contributing to the literatures with evidence inclusive for the economies of emerging and advanced countries. This study further contributes through its provision of comparable proofs between the said economies. Barrell and Karim (2013) had earlier raised a similar issue which brought attention to the inherent heterogenous country which may lead to bias in the result. Though most advanced countries show a median increase in household debt between 50 to 65 percentage of GDP (IMF 2017), there is also a tremendous increase in household debt in emerging markets post- financial crisis with a sharp increase by more than 50 percentage of GDP in Thailand, Malaysia and Korea according to BIS statistics. Hence, the study analyses the panel data by pooling all countries together and to also split sample in order to obtain consistent and robust results. As preview, empirical findings prove that banking crises are likelier to erupt due to changes in household debt and house price. Additionally, the results in relation to advanced economies are in accordance to prior studies. The likelihood for crises in the banking sector to happen can be prompted by a growth in household debt, albeit statistically insignificant with the change in house price for emerging economies.

The paper adheres to the following structure: section 2 details the review of literature, section 3 presents the used dataset and testable equations; section 4 discussed the employed method of estimation together with the empirical findings; and section 5 concludes the study and offers several recommendations in relation to related policies.

LITERATURE REVIEW

Previous studies have largely focused on early warning models with various approaches. A seminal study in this area was Kaminsky and Reinhart's (1998) effort in using the signal approach to examine 76 currency crises and 26 banking calamities among five industrial countries and 15 developing ones from 1970 to 1995. The evolution of their work was extended to banking, financial, and economic crises. Later, using the multivariate logit model in their sample of developing as well as developed nations, Demirgüç-Kunt and Detragiache (1998) attempted to identify EWS associated with banking crises for the period 1980 to1994. The model was extended when Bussiere and Fratzscher (2006) employed the multinomial logit regression-based EWS to capture three differing financial observations (i.e. periods of tranquillity, crisis and post-crisis) among 20 emerging economies from 1993 until 2001, and proved that their multinomial logit model was consistent and robust.

THE ROLE OF HOUSEHOLD DEBT AND HOUSE PRICE IN BANKING CRISES MODEL

Analysts have shown that the US economic crisis in the 1980s was led by mortgage lending (Holt 2009). The collapse in the mortgage markets, which were part and

parcel of household debt composition, had been cited as the main reason for the recession in 2008 and 2009 in the country (Dynan 2012; Stockhammer 2013). The identical reason had caused the financial crisis in 2008 and its aftermath to be widely referred to as the "Great Recession." Analysing a dataset covering 48 US states from the years 1929 to 1939, Gärtner (2013) confirmed that household debts overhangs (i.e. lower income ration to debt) slowed down the economic recovery. Considerable empirical evidences had been collected and the latest findings matched the facts presented above (see Alter et al. 2018; Lombardi et al. 2017; Mian et al. 2017; Samad et al. 2020).

A similar correlation was discovered by Schularick and Taylor (2012) using a long historical panel of 14 developed countries from 1870 to 2008 as increases in household leverage was a powerful predictor of financial crises in post-war crises. Jorda et al. (2013) proved that debt accumulation caused costlier financial crises than normal recessions since the calamities were not only on output but also on investments, lending, interest rate and inflation. Mian et al. (2015) employed panel vector-autoregressions (VARs) to produce cross-sectional evidence for 30 economies and elucidated that household debt was at a peak during the economic boom from 1960 to 2012 and saw remarkable reduction during the burst of the financial crisis in 2008. In a further study, it was confirmed that a unique business cycle was observable for household debt and its increase to GDP led to lower succeeding growth in GDP, higher unemployment and forecasted to cause negative global growth in developing and developed economies (Mian et al. 2017). Bańbuła and Pietrzak (2017) asserted that the credit boom prior to the recent financial crisis was mainly contributed by rising household debt based on their data in Sweden. Their study was focused on the EWS for non-crises countries. In another recent study, Alessi and Detken (2018) argue that household debt is useful as indicator to assess economic stability among European Union members. Relatively, limited studies have focused on emerging countries, particularly on household debt as indicator for crises.

Mendoza and Terrones (2008) argued that even though credit booms tend to associate with a majority of market crises in emerging economies, not all booms would result in financial crises. They postulated that booms in credit were experienced in 22 emerging economies and 27 industrial countries. However, their study and another research by Gorton and Ordonez (2020) similarly concluded that as not all credit boom would end with crises. Providing a contrasting view, Büyükkarabacak and Valev (2010) showed that economic instability was generated by a hasty increase in household debt that can hurry a banking crisis in their analysis of 37 emerging and developed markets for the period 1990-2007. Although a considerable number of researches showed a link between debt growth and crises as discussed, Barrell and Karim (2013) opine that the pool of study combining developing and developed markets could be biased due to country heterogeneity. Here, they showed that the role of credit growth was stronger in a country with financial constrains (i.e. emerging economy). Tamadonejad et al. (2016) analysed the indicators of EWS for banking crises in East Asian countries and proved that the chances for a depreciation in exchange rate and short-term debt caused a higher chance for crises with political instability and ineffective regulatory framework. In their study of an emerging country, Garber et al. (2019) proved that the tremendous increase in household debt preceded Brazil's economic recession. Nevertheless, in a more recent study of 23 emerging economies, Tunay et al. (2020) found opposite evidence showing that crises in the banking sector were headed by the current account deficit and systemic risk as consequence from credit default which explained the twin crisis hypothesis.

In their study, Jorda et al. (2015) extended an earlier dataset to 17 advanced economies and made clear that the sharp increase in housing lending during the pre-2008 crisis caused a deeper economic downturn and sluggish recovery. They extended their research by scrutinising the function of credit lending and interest rate and proved that both played significant roles in house price bubble. Cecchetti and Kharroubi (2015) displayed that resource allocation was distorted by credit booms especially in the construction sector, leading to a slowdown in productivity growth. Lowe (2017) found that household debt placed upward pressure on house prices accompanied with slowed household earnings, and created a high demand from Australia's population growth and foreign investors. He concluded that the recent increase in household debt relative to earnings made the economy less resilient to future shocks. Another study made evident of household debt's inherent pivotal role in mortgage defaults during the crisis using a panel of credit file data between 1999 and 2013 (see Albanesi et al. 2017). Meanwhile, Barrell et al. (2020) proved that economic growth was dampened by the acceleration of house price as driven by credit booms on a sample of 18 OECD countries during 1978 to 2016. These studies highlight the strong role of household debt accompanied with house price on financial crises.

House price can also be attributed as a trigger to banking crises aside from household debt (Kaminski & Reinhart 1999; Reinhart & Rogoff 2010; 2013). While some studies claim that credit can potentially be an early warning indicator, on the contrary, house price can therefore be a late warning indicator. Cardarelli et al. (2009) found that the strong downward trend in house prices resulted in an economic downturn and that financial crashes affected the banking system. However, Babecký et al. (2013) studied among OECD and EU countries between 1970 and 2010 and found evidence which suggest the decrease in house price

during the crisis, hence considered as an ultra-early warning indicator. Haughwout et al. (2019) explained that before the Great Recession, there was a strong rise in housing price during the 2003-2006 period. The rise even exceeded 10 percent during the boom years. As such, empirical evidences have provided a clear picture of how house price triggers the probability for banking crisis to erupt. Indeed, vast studies have found that credit, particularly mortgage credit, would increase tremendously a few years prior to the crises as a consequence of asset prices inflation (IMF 2017; Kim et al. 2017). On a sample of OECD countries, this precisely proved that lagged house prices were prone to banking crises based (see Barrell et al. 2010). Alter and Mahoney (2020) reconfirmed that house price and household debt may precipitate economic recession based on their analysis of US counties. In a panel sample analysis of 53 countries, Cerutti et al. (2017) postulate that household debt and house price are linked together and in turn cause twin crises. Thus, the phenomenon confirmed the hypothesis in which house price and household debt growth could be significantly measured as early warning signals for systemic banking crises.

Pertaining to emerging countries, Yip et al. (2017) put forward that the rapid house price appreciation triggers housing market bubble in Malaysia which connects with debt within the household at a high level. Daud and Marzuki (2019) confirm that asset accumulation is a key contributor to Malaysia's high level of household debt. Similarly, Ohnishi et al. (2019) found house price volatility may precipitate banking instability. In other country, Coskun et al. (2020) present a different finding in which the Turkish housing market experienced a boom because of price overvaluation but did not lead to a housing bubble. In Korea, Jang et al. (2018) claim that the previous financial crisis was associated with real estate market. However, this scenario will not likely cause a future crisis. Nonetheless, they suggest vigilance against other economic activities. These evidences highlight the role of household debt and house price as early indicators for systemic crises in banking. Hence, the present study adds to the current literature by providing further empirical evidence in its comparison of advanced and emerging economies.

METHODOLOGY

Demirgüç-Kunt and Detragiache's (1998) seminal work introduced us to systemic banking crises through a multivariate logit analysis. As such, the current study adheres to their method. However, data in the present study is updated to include more years of the crises than that in Demirgüç-Kunt and Detragiache's (2005)

TABLE 1. List of Countries and Systemic Banking Crises

Country	Systemic Banking Crisis (Laeven & Valencia, 2013)	Country	Systemic Banking Crisis (Laeven & Valencia, 2013)
Australia			
Austria	2008	Japan	1997
Belgium	2008	Korea	1997
Brazil	1990, 1994	Luxembourg	2008
Canada		Malaysia	1997
Chile	1976, 1981	Mexico	1981, 1994
China, P.R.	1998	Netherlands	2008
Colombia	1982, 1998	New Zealand	
Czech Republic	1996	Norway	1991
Denmark	2008	Poland	1992
Finland	1991	Portugal	2008
France	2008	Russia	1998, 2008
Germany	2008	Singapore	
Greece	2008	South Africa	
Hong Kong		Spain	1977, 2008
Hungary	1991, 2008	Sweden	1991, 2008
India	1993	Switzerland	2008
Indonesia	1997	Thailand	1983, 1997
Ireland	2008	Turkey	1982, 2000
Israel	1977	United Kingdom	2007
Italy	2008	United States	1988, 2007

investigation. As this study aims to prove that the 2008 financial crisis was triggered by household debt and house prices, the study therefore focuses on the crises which occurred around that time. For an updated version of the dependent variable, Laeven and Valencia's (2013) recorded dataset of banking crisis was adopted, in which the binary dummy is defined as in either two conditions: (i) significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations); and (ii) significant banking policy intervention measures in response to significant losses in the banking system. Hence, the dummy value is 1 for each observation, otherwise taking a zero value. The dummy variable is denoted by CRISIS. Table 1 identifies the years when the study's sample countries experienced systemic banking crises. To note, the data for household debt and house price was retrieved from Bank International Settlement (BIS). However, the data for household debt across the countries is limited to only 43 countries. Hence, the study analyses 41 countries from advanced and emerging countries within a timeframe of 1980-2018 in the empirical analysis, excluding Argentina and Saudi Arabia due to data unavailability.

BASELINE SPECIFICATIONS

As for the fundamental explanatory variables, data was sourced from Demirgüç-Kunt and Detragiache (1998). The study confirmed for crises eruption likelihood upon observing the macroeconomic variables (i.e. low GDP growth, large fiscal deficits, high interest rates and inflation). Apparently, crises also occurred when the monetary side (i.e. broad money to foreign exchange reserves, the credit to private sector/GDP and lagged credit growth) were positive and significant. Meanwhile, institutional factors (i.e. insurance deposits and high GDP per capita) also lower the likelihood of crises.

This study follows a modified version of Davis and Karim's (2008) method in a previous study. It considers macroeconomic factors along with the monetary side in the equation and does not include GDP per capita due to the huge difference between advanced and emerging economies following a prior study by Barrell et al. (2010). The testable equation with an extension of household debt (HD), growth of household debt ($HDTG_{t-1}$) and real house prices ($HPIR_{t-1}$) is as follows:

$$SBC = \beta_0 + \beta_1 GDP + \beta_2 OPEN + \beta_3 DEP + \beta_4 RIR + \beta_5 INF + \beta_6 FISCAL + \beta_7 FC + \beta_8 HD + \beta_9 HDTG_{t-1} + \beta_{10} HPIR_{t-1} + \varepsilon_t \quad (1)$$

Thus, the testable equation for crisis in this study is where $SBC_{i,t}$ at i cross country and t time index depends on β_0 as constant measure and β_j, (j = 1…10) as coefficients with respect to real GDP growth *GDPG*, trade balance *OPEN*, nominal depreciation *DEP*, real interest rate *RIR*, inflation *INF*, fiscal surplus *FISCAL*, and financial contagion *FC*, household debt *HD*, growth of household debt $HDTG_{t-1}$ and real house price $HPIR_{t-1}$. This study is interested in investigating the role of household debt as part of the leading indicators for economic crises. The empirical literature highlights credit growth as a powerful predictor of economic misery (see Büyükkarabacak & Valev, 2010; Jorda et al., 2013; Mian et al., 2017; Schularick & Taylor, 2012). This has been confirmed in a recent study by Geršl and Jašová (2018) which showed that the ratio between credit to GDP was a powerful signal to crises. However, as this study wishes to challenge a prominent idea in that household debt serves as the best signaling variable, it thus focuses exclusively on indicators that are available from the same sources, i.e. BIS data on credit to the household.

On other spectrum, the study views the growth of total credits to household prior the economic downturn as part of the leading indicators for crises. The hypothesis centres around the sudden decline in household debt prior to the US's 2008 economic downturn (see Mian et al. 2017). Many studies have claimed household debt as one of the leading indicators for EWS or EWM (see Babecký et al. 2013; Joy et al. 2017). Though there have been no conclusive findings to show that household debt is associated to crises, Babecký et al. (2012)we examine stylized facts of banking, debt, and currency crises. Banking turmoil was most frequent in developed economies. Using panel vector autoregression, we confirm that currency and debt crises are typically preceded by banking crises, but not vice versa. Banking crises are also the most costly in terms of the overall output loss, and output takes about six years to recover. Second, we try to identify early warning indicators of crises specific to developed economies, accounting for model uncertainty by means of Bayesian model averaging. Our results suggest that onsets of banking and currency crises tend to be preceded by booms in economic activity. In particular, we find that growth of domestic private credit, increasing FDI inflows, rising money market rates as well as increasing world GDP and inflation were common leading indicators of banking crises. Currency crisis onsets were typically preceded by rising money market rates, but also by worsening government balances and falling central bank reserves. Early warning indicators of debt crisis are difficult to uncover due to the low occurrence of such episodes in our dataset. Finally, employing a signaling approach we show that using a composite early warning index increases the usefulness of the model when compared to using the best single indicator (domestic private credit contend that the rising household debt during economic expansions anticipates banking crises as a consequence which leads to currency crises. The definition of data used is described in Table 2.

TABLE 2. Data and Sources

Dependent Variable				
Dummy	SBC	Crisis =1, otherwise zero		Laeven and Valencia (2013)
Independent Variables				
Household debt	HD	Credit to the household percentage of GDP of the country.	+	BIS
Growth of household debt	HDTG	The total of real credit to the household in US Dollar of the country.	+	BIS
Real house price	HPIR	Real house price index of the country.	+	BIS
Real GDP growth		The growth of Gross Domestic Product at constant price.	-	The World Bank
Trade balance	OPEN	A country's trading terms.	-	The World Bank
Nominal depreciation	DEP	A country's rate of nominal exchange.	+	International Monetary Fund (IMF)
Interest rate	RIR	A country's treasure/short term rate of interest.	+	IMF/The World Bank/OED
Inflation	INF	A country's consumer index prices.	+	The World Bank
Fiscal surplus/GDP	FISCAL	Fiscal balance of the country.	-	The World Bank
Financial contagion	FC	The bank liquid reserves of total asset of the country.	+	The World Bank/Financial Structure Database

Note: Measurement for all variables is based on yearly frequency.

METHOD OF ESTIMATION

This study estimates the panel model using a distribution of cumulative logistic. It links the likelihood in which the dummy takes a value of one to the logit of the cross section explanatory variables' vector. The probability of crises for each economy *i* at given date *t* is given by:

$$Prob\left(SBC_{i,t}=1\right)=F\left(\beta X_{it}\right)=\frac{e^{\beta X_{it}}}{1+\ e^{\beta X_{it}}}, \quad (2)$$

where $SBC_{i,t}$ is the banking crisis dummy SBC=1 for country i at time t otherwise SBC=0, β is the vector of coefficients, X_{it} is the vector of explanatory variables with respect to real GDP growth *GDPG*, change in terms of trade *OPEN*, nominal depreciation *DEP*, real interest rate *RIR*, inflation *INF*, fiscal surplus *FISCAL*, and financial contagion *FC*, household debt *HD*, growth of household debt $HDTG_{t-1}$ and house prices $HPIR_{t-1}$. $F(\beta X_{it})$ is the cumulative logistic distribution. The estimation of eq. (2) requires linearising the relationship $F(\beta X_{it})$ as in eq. (3):

$$log_e\ L = \sum_{i=1}^{n}\sum_{t-1}^{T}[\begin{pmatrix} SBC_{i,t} log_e\ F\left(\beta' X_{it}\right)) \\ +(1-SBC_{i,t} \end{pmatrix} log_e \begin{pmatrix} 1- \\ F\left(\beta' X_{it}\right) \end{pmatrix}] \quad (3)$$

The maximum likelihood (ML) approach is adopted to estimate the coefficients of eq. (3) and to forecast the probability of total financial emergencies. The presenting signs β directly interprets the X_{it} may increase or lower the crisis probability, but the values are meant for direct marginal effect or relationship.

The next step is to access the quality of model specification. Three different types of model evaluators were employed, i.e. Akaike's information criterion (AIC) in-sample classification accuracy of crisis episodes, and Receiver Operating Characteristic (ROC) statistics. The AIC and non-parametric approach of crisis episodes model evaluators are widely used to compare the best Early Warning Signal model following Kaminsky and Reinhart (1999). AIC involves a comparison of the regressors' model with the intercept model in order to determine their joint significance, in which a smaller AIC indicates a better model. The prediction of crisis episodes reports the percentage of crises, non-crises, and observations that are correctly classified. Attaining a 70 percent accurate overall classification of banking crises signals the fairly well performance of the model. Another model accessor, ROC, follows Minoiu et al. (2013) and Comelli (2014). It is used to measure and augment the benchmark model's forecast ability. ROC reports the link between true and false positives for a series of likelihoods. A higher ROC statistic depicts a better model. These model evaluators are very useful for policymaking purposes in choosing the most consistent and best parsimonious model.

RESULTS AND DISCUSSION

The variables included are; systemic banking crises (SBC), growth of gross domestic product (GDPG), trade openness (OPEN), depreciation (DEP), real interest rate (RIR), inflation (INF), fiscal balance (FISCAL), broad money (FC), household debt (HD), household debt growth (HDTG) and house price index

(HPIR). Table 3 demonstrates a descriptive summary of systemic banking crises model. The systemic financial emergencies are indicated by dummy variable 0 or 1. The average for GDP growth is 2.83 and the lowest value is -9.13 percent (Greece) and highest growth is 25.9 percent (Ireland). The trade balance has mean 0.78 percent with the lowest value equals to -14.7 percent (Portugal) and highest is 25.92 percent (Singapore). The depreciation stands for foreign exchange exposure has average value of 98.5 percent, ranging from 48 percent (Russian Federation) to 165.88 percent (Korea).

TABLE 3. Summary of Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
SBC	0.028	0.165	0	1
GDPG	2.829	2.921	-9.132	25.117
OPEN	0.78	5.627	-14.652	25.92
DEP	98.483	14.348	47.953	165.877
RIR	6.978	7.941	-.554	67
INF	4.92	10.091	-5.992	143.693
FISCAL	-2.66	4.116	-34.315	16.267
FC	81.429	53.501	14.212	431.354
HD	50.28	29.69	0.1	139.4
HDTG	11.308	37.845	-83.934	1094.005
HPIR	91.208	27.726	24.372	187.96

The mean of real interest rate was 7 percent, with the lowest value -0.55 percent (Finland) and the highest value 67 percent (Turkey). Conjunctly, the average value of inflation was 4.9 percent, with lowest value -6 percent (Malaysia) and the highest value 143.7 percent (Turkey). It is not surprising that the inflation and interest rates were very high in Turkey since the country experienced financial crisis in 2000 and 2001. The fiscal balance had a mean equal of -2.7 percent with variation ranging from –34.32 percent (Portugal) to 16.27 percent (Singapore). Financial contagion, on the other hand, had an average value of 81.4 percent with the lowest value equal to 14.2 percent (Colombia) and 431.4 percent (Luxembourg). The average value of household debt ratio was 50.3 percent with variation ranging from 0.1 percent (Turkey) to 139.4 percent (Denmark). The growth of household debt averaged at 11.3 percent, with the lowest growth -84 percent (Turkey) and the highest growth 1,094 percent (Turkey). Finally, the mean for house price index was 91.2 percent with the variation ranging from 24.37 percent (Brazil) to 188 percent (Japan).

Table 4 lists the main variables' (i.e. household debt and house price) average values for the investigated economies. Generally, the statistics suggest much variation in household within the countries and in the advanced and emerging economies, but small variation in GDP growth. The level of household debt on average is higher in advanced countries but few other emerging

TABLE 4. List of Countries and Average Values of Selected Variables

Country	GDPG	HD	HPIR	Country	GDPG	HD	HPIR
Switzerland	1.908	113.455	99.131	Finland	2.209	43.99	76.43
Denmark	1.757	107.444	90.08	Singapore	5.81	42.825	87.28
Netherlands	2.162	92.145	81.613	Belgium	1.88	42.454	70.475
Ireland	4.823	80.512	109.214	France	1.807	39.036	71.403
Australia	3.148	75.036	68.069	Greece	0.981	38.328	84.928
United States	2.634	71.349	100.642	Israel	4.008	38.126	101.662
New Zealand	2.808	70.269	88.086	South Africa	1.664	37.8	99.91
Norway	2.475	67.723	70.178	Chile	3.865	33.459	114.116
United Kingdom	2.16	66.887	71.3	China	8.932	31.492	98.205
Canada	2.384	66.162	75.677	Italy	1.234	26.723	79.441
Korea	5.114	65.438	103.292	Poland	4.202	21.425	90.979
Malaysia	4.925	62.092	123.236	Czech Rep.	2.735	20.146	103.375
Japan	1.955	62.085	130.541	Brazil	2.287	18.887	83.818
Sweden	2.171	60.038	70.547	Hungary	2.141	18.11	104.221
Germany	1.801	58.367	118.428	Colombia	3.259	17.443	97.928
Luxembourg	2.683	55.741	110.138	Indonesia	5.293	13.283	111.168
Hong Kong	3.763	54.759	94.414	Mexico	2.474	12.036	104.351
Thailand	4.211	50.032	108.275	India	6.826	9.867	142.041
Portugal	1.966	49.113	93.665	Russia	3.467	9.133	70.052
Spain	2.316	48.792	64.262	Turkey	4.723	7.245	109.649
Austria	1.914	48.692	104.085				

economies inherent a similar feature such as Korea, Malaysia, Hong Kong and Thailand. Meanwhile, the lower level of household debt is mostly inherent in emerging countries except for Finland, Belgium, France, Greece and Italy in which these countries experienced banking crises in 2008. Additionally, house price is dispersed across the countries regardless of advanced or emerging economies.

Table 5 reports the pairwise correlation analysis with p-values for both groups of countries for the studies variables. The upper matrix of the table shows pairwise correlations for emerging economies, whereas the lower matrix presents the pairwise correlations for advanced economies. First, the correlations between household debt and banking crises are positive and significant in advanced countries and comparable to emerging countries. In a finding that is similar to that of many previous studies, there is a pronounced correlation between crises and household debt in advanced economies. However, there is a significant and negative change and growth in household debt. Second, the correlation of house prices and crises is stronger in advanced economies and statistically insignificant. Third, the significance of the interest variables in emerging countries are absent except for trade balance which signify statistically significant and negative correlations. As the findings appear puzzling, a logit estimator may therefore be appropriate to respond to this puzzle.

The growth of GDP, trade balance, real interest rate, fiscal balance and change in household debt growth are negatively correlated with banking crises. Meanwhile, depreciation, inflation, broad money and household debt are positively correlated with crises. Among the variables in the table of correlation matrix, GDPG, OPEN, DEP, INF, FISCAL, FC, HD and HPIR are consistent with theoretical assumption. Table 6 shows the explanatory variables' VIF values and the variables' VIF do not exceed the cut-off of 10 and stand at 1.55, indicating no serious collinearity problems.

Report of the estimates and predictive power of the logit model for determinants of systemic banking crises is presented in Table 6 with four different models. The report also demonstrates three reported quality model specifications; AIC, predictive classification of crises periods, and ROC statistics. The models were adjusted with different combinations of household debt, change of household debt, house price and change in house price in order to obtain the final and best model specification.

TABLE 5. Pairwise Correlation Matrix for Systematic Banking Crises Model

	SBC	GDPG	OPEN	DEP	RIR	INF	FISCAL	FC	HD	HDTG	HPIR
SBC	1	-0.08	-0.088	-0.024	0.055	0.064	-0.036	-0.081	-0.071	-0.03	0.019
		(0.1)	(0.07)	(0.62)	(0.26)	(0.19)	(0.51)	(0.11)	(0.14)	(0.54)	(0.73)
GDPG	-0.136	1	0.116	0.122	-0.137	-0.024	0.273	0.052	-0.018	0.224	0.083
	(0.00)		(0.02)	(0.01)	(0.01)	(0.63)	(0.00)	(0.32)	(0.71)	(0.00)	(0.13)
OPEN	-0.061	0.077	1	0.188	-0.213	-0.11	0.634	0.432	0.403	-0.027	-0.272
	(0.12)	(0.05)		(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.59)	(0.00)
DEP	0.099	-0.102	-0.059	1	-0.226	-0.377	0.274	0.411	0.605	-0.034	0.065
	(0.01)	(0.01)	(0.13)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.5)	(0.24)
RIR	-0.014	0.009	-0.253	0.052	1	0.556	-0.294	-0.205	-0.325	0.136	-0.209
	0(.71)	(0.81)	(0.00)	(0.16)		(0.00)	(0.00)	(0.00)	(0.00)	0.006	(0.00)
INF	-0.025	0.092	-0.165	-0.013	0.552	1	-0.164	-0.303	-0.447	0.218	-0.114
	(0.5)	(0.01)	(0.00)	(0.73)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.04)
FISCAL	-0.046	0.151	0.305	-0.08	-0.218	-0.1	1	0.204	0.295	0.061	-0.271
	(0.26)	(0.00)	(0.00)	(0.05)	(0.00)	(0.01)		(0.00)	(0.00)	(0.27)	(0.00)
FC	0.083	-0.091	0.195	-0.088	-0.334	-0.276	0.067	1	0.617	-0.087	0.036
	(0.03)	(0.02)	(0.00)	(0.02)	(0.00)	(0.00)	(0.12)		(0.00)	(0.09)	(0.55)
HD	0.08	-0.134	0.181	-0.006	-0.552	-0.467	0.213	0.272	1	-0.149	0.17
	(0.03)	(0.00)	(0.00)	(0.87)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
HDTG	-0.092	0.232	-0.09	-0.006	0.109	0.12	0.055	-0.075	-0.143	1	-0.141
	(0.01)	(0.00)	(0.02)	(0.88)	(0.00)	(0.00)	(0.18)	(0.06)	(0.00)		(0.01)
HPIR	0.083	-0.065	0.057	0.002	-0.537	-0.414	0.14	0.485	0.495	-0.02	1
	(0.03)	(0.09)	(0.16)	(0.96)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.61)	

Probability value respected to significance level in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table 7 shows the estimated coefficients of macroeconomic and monetary variables with a focus on the variables of interest (i.e. household debt and change in household debt growth) in predicting the systemic banking crises in Model 1. Household debt and change in household debt growth showed a positive and significantly predictive power in triggering a crisis, thus a consistency with Büyükkarabacak and Valev's (2010) finding in which household debt triggers crisis and causes negative growth to the economy. The lagged household credit growth shows a positive coefficient and significantly preceded the crisis. Mian et al. (2017) reported that household debt to GDP prior to the global economic emergency in the US recorded the highest point since the past decades. Additionally, Cecchetti et al. (2011) and Alter and Mohaney (2018) forecasted that the current household debt could cause a negative growth in the future using a cross country analysis.

GDP growth and trade balance were statistically negative, indicating that higher GDP growth and improvement of trade openness will likely decrease the likelihood of a crisis. It suggests that countries

TABLE 6. Variance Inflation Factor

	RIR	OPEN	INF	HPIR	FISCAL	FC	HD	GDPG	HDTG	DEP	Mean VIF
VIF	2.32	1.767	1.74	1.62	1.558	1.47	1.45	1.276	1.251	1.061	1.551
1/VIF	0.431	0.566	0.575	0.617	0.642	0.68	0.69	0.784	0.799	0.943	

TABLE 7. Early Warning Signal Model for Systemic Banking Crises

Variables	(1) SBC	(2) SBC	(3) SBC	(4) SBC
GDPG	-0.354***	-0.353***	-0.352***	-0.244***
	(0.09)	(0.096)	(0.094)	(0.082)
OPEN	-0.098	-0.04	-0.053	-0.111*
	(0.06)	(0.071)	(0.072)	(0.065)
DEP	0.076***	0.062***	0.062***	0.059***
	(0.022)	(0.023)	(0.023)	(0.019)
RIR	-0.138	-0.002	-0.024	-0.049
	(0.113)	(0.118)	(0.115)	(0.099)
INF	0.185*	0.163	0.124	0.186***
	(0.1)	(0.099)	(0.096)	(0.069)
FISCAL	0.035	0.049	0.074	0.141
	(0.087)	(0.097)	(0.096)	(0.089)
FC	0.007*	0.005	0.005	0.007*
	(0.004)	(0.004)	(0.004)	(0.004)
HD	0.022**	0.012		
	(0.01)	(0.011)		
LAG HDTG	0.048***	0.054***	0.053***	
	(0.013)	(0.014)	(0.014)	
LAG HPIR	0.049***	0.051***	0.043***	
		(0.014)	(0.014)	(0.012)
Constant	-13.444***	-16.646***	-15.741***	-14.065***
	(2.609)	(3.098)	(2.885)	(2.379)
N	664	588	588	645
Pseudo R2	0.2648	0.3296	0.323	0.2489
Log-Likelihood	49.38***	57.54***	56.39***	46.09***
BIC	202.0712	187.1562	181.9312	197.2848
AIC	157.073	139.012	138.164	157.062

Probability value respected to significance level in parentheses *** p<0.01, ** p<0.05, * p<0.10

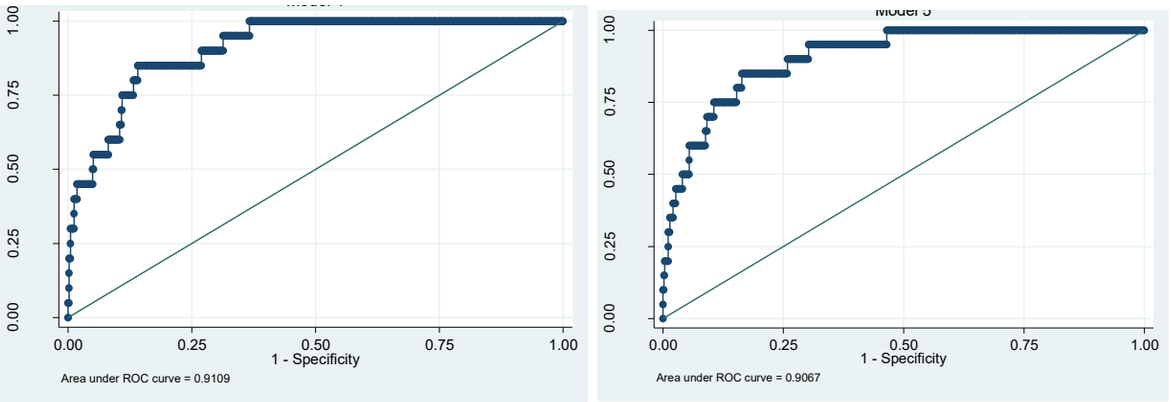

FIGURE 1. ROC Statistics

TABLE 8. ROC Statistics and Predictive Ability (cut-off probability = 0.05)

	(1)	(2)	(3)	(4)
Variables	SBC	SBC	SBC	SBC
ROC Statistics	0.7914	0.8046	0.8794	0.9109
P-values comparing ROC statistic Model 2 and 3			0.5113	
Total correct	13	15	15	14
% crises correct	61.9	75	75	66.67
% no crises correct	85.09	86.8	87.5	86.38
% total correct	84.36	86.39	87.07	85.74

with a serious current account deficit amidst economic slowdown are prone to crisis. Meanwhile, depreciation, inflation and broad money were significant and positive predictive power for crises. A higher exposure to foreign exchange and further inflated consumer price index will intensify the likelihood for a country to face a financial crisis. Conversely, the chance for capital flight and subsequent probability of a twin crisis or pure banking is intensified with the positive probability on broad money which indicates an increase in un-backed money (Davis & Karim 2008). Although the signs of coefficients are consistent with the underlying theory, private credit and credit growth show an insignificant probability for crises which is opposite to the credit crunch theory narrated by Demirgüç-Kunt and Detragiache (1998).

Additionally, Model 2, 3 and 4 include house prices to reassess the predictive power of systemic banking crises, particularly for a global financial crisis. It was a further aim of this investigation to assess whether the global financial crises might be the outcome of household credit crunch and the theory of liquidity trap by Fisher-Minsky-Koo (see Eggertsson & Krugman 2012). The literature has shown that house price and household debt stood at the highest point prior to the global financial crisis. Therefore, this study includes house price at t-1 and household debt growth at t-1. This is similar to a study by Cerutti, et al. (2017) which clarifies upon three consecutive events before a recession as discussed earlier (i.e. tight link between house price booms and credit, the regular occurrence of house price boom with twin credit boom for firm and household credit and the likelier booms in house price for countries with higher mortgage funding models and loan to value ratios). Finally, the majority of house price booms end up with recession.

The results in Model 2 and 3 present a better model fit and confirm that credit growth to household and house price increase significantly and likelier to precede banking crises. Indeed, positive broad money, change in household debt growth, and real house price reconfirm the liquidity trap theory. During the high inflated price of property followed by high household debt growth, impatient debtors will start to hold their financing and deleverage their borrowings when they perceive that the assets are overpriced, and to cut their consumption. Hence, the low consumption causes the economy to fall under liquidity stagnation or the so-called liquidity trap. Looking at the control variables, GDP growth and depreciation remain significant throughout the models. Inflation was no longer significant as both real credit

growth and house price were included. This does mean the probability of the credit growth and house price outperform inflation in prompting the crisis. Additionally, while banking industries are attentive to credit risk, they enjoy lax lending regulation due to heavy activities in the housing market. Unfortunately, once the asset price collapses, the bank runs out of liquidity, exposing itself to macroeconomic shocks caused by high default which will turn credit into non-performing loans. As such, the accumulation of domestic growth features the crises' likelihood (Alter et al. 2018; Justiniano et al. 2016).

In the next stage, two diagnostic measures were performed on the different specifications for two states; crisis or no-crisis. Following Minoiu et al. (2013) and Comelli (2014), ROC statistic was employed for each estimated model and EWS specification with the largest ROC statistic was selected. The ROC curve interprets a more accurate diagnostic test to differentiate between crises and non-crises based on a larger the ROC statistic. Table 8 depicts that Model 2 and 3 had the largest ROC. For policymakers to decide on the best model, comparing the p-values of ROC statistics was employed with H0 denoting that Model 2 equalled to Model 3. Thus, the probability value was insignificant as it failed to reject H0. Therefore, Model 2 and Model 3 are indifferent.

Figure 1 exhibits the ROC curve, interpreting that the best model would likely approach 1, in which the x-axis denotes sensitivity (i.e. correctly calls for crisis). In contrast, the specificity refers to correctly calls for non-crisis. Thus, Model 3 consistently remains as the best model estimated since the ROC statistic is above 90 percent.

The second diagnostic is in sampling the predictive ability to accurately call crises and non-crises episodes. As shown, the predictive power with a cut-off probability of 0.05 is similar to Demirgüç-Kunt and Detragiache (1998). This predictive power is interpreted as such – the higher the total percentage of correctly calling crisis is better. Model 3 is notably the highest at predicting events of crises with 87 percent of the episodes correctly called. As such, the study determines Model 3 as the best model since it consistently exhibits the correct theoretical assumption and in line with the credit crunch theory. Moreover, the Model 3 has the highest ROC statistic and correctly calls for crisis.

We further examine our models by analysing advanced and emerging economies in split samples to capture any heterogeneous effect for different characteristics of countries depicted in Table 9. The results for advanced economies are consistent with the findings in Table 7. Household debt and the change in household debt show a positive and significantly predictive power in triggering a crisis in Model 1. Model 2 and Model 3 demonstrate that the change in household debt growth had a positive coefficient and significantly preceded the crisis. Moreover, real house price index plays an important role in prompting the banking crises as depicted in all models and estimated with positive sign. In contrast, change in household debt growth has positive probability with banking crises in emerging economies, albeit the change in house price has insignificant links with probability in causing the crises shown in Model 2 and Model 3. The logical explanation behind this estimation result is the list of banking crises in 2008 in emerging countries received little reporting except for Hungary and Russia. Asian countries, in particular, were affected by crises in 1997. According to previous studies around that time, such as that conducted by Corsetti, Pesenti and Roubini (1999), the sharp currency depreciation and investors' panic were reasons for the crises, as demonstrated in Model 3 and Model 4 for emerging economies. Our results are consistent with a recent study by Tunay et al. (2020) which argues that banking crises in emerging economies are likely caused by systemic risk with high credit default. Thus, the effect of house price coupled with household debt is more pronounced in advanced economies.

Overall, Model 2 and 3 present a better model fit with lower AIC in both samples. Additionally, the ROC statistics suggest that Model 2 and Model 3 are appropriate to explain the role of house price and household debt as early warning indicators for systemic banking crises. In reference to the specificity of correctly calls for crisis and non-crisis, both samples obtain about the similar percentage with prior results and demonstrate that the EWS for banking crises model is well explained with the change in household debt and better analysed with the change in house price.

We can conclude that a higher growth in household debt and changes in house prices increase the possibility of banking crises. Consequently, the growth of household debt and changes in house price have significant influence on triggering banking crises, hence worsening the crises in the advanced countries. Additionally, instabilities in macroeconomic factors delay the process of implementing crises prevention policies and worsen the effect of credit shocks as well as asset prices slump, which in turn accentuates liquidity trap. Moreover, macroeconomic changes such as shocks in household income as consequence of job loss may lead to household debt insolvency and spark the crisis. In emerging economies, our results suggest that higher household debt increases the probability of banking crises, followed by currency deprecation as described in the twin crises hypothesis. Thus, the findings from this study may assist policymakers in identifying the probabilities of crises. The EWS may help them to adopt proactive approaches to avoid or reduce the repercussions of systemic banking crises. The findings suggest that policymakers should constantly monitor the changes related to household debt activities as well housing sector as they are important indicators for EWS. In addition, pre-emptive strategies also should be

TABLE 9. EWS Model for Systemic Banking Crises for Advanced and Emerging Economies

Variables	Advanced economies				Emerging economies			
	(1) SBC	(2) SBC	(3) SBC	(4) SBC	(1) SBC	(2) SBC	(3) SBC	(4) SBC
GDPG	-0.299***	-0.304***	-0.305***	-0.210**	-0.218	-0.679*	-0.578**	-0.438**
	(0.100)	(0.109)	(0.108)	(0.096)	(0.189)	(0.347)	(0.240)	(0.207)
OPEN	-0.032	0.026	0.026	-0.019	-0.287*	-0.284	-0.288	-0.247
	(0.052)	(0.054)	(0.054)	(0.057)	(0.173)	(0.295)	(0.216)	(0.172)
DEP	0.041*	0.019	0.019	0.026	0.043	0.084	0.090**	0.063*
	(0.024)	(0.029)	(0.028)	(0.026)	(0.032)	(0.059)	(0.043)	(0.034)
RIR	-0.010	0.062	0.061	0.041	-0.025	0.063	0.004	0.006
	(0.099)	(0.111)	(0.109)	(0.087)	(0.048)	(0.141)	(0.105)	(0.093)
INF	0.034	0.115	0.114	0.228*	0.196***	0.645	0.294	0.233*
	(0.139)	(0.141)	(0.139)	(0.118)	(0.071)	(0.400)	(0.184)	(0.121)
FISCAL	-0.037	-0.014	-0.013	0.012	0.176	0.038	0.178	0.347
	(0.083)	(0.087)	(0.084)	(0.082)	(0.255)	(0.414)	(0.283)	(0.304)
FC	0.007	0.003	0.003	0.005	0.005	-0.023	0.012	0.008
	(0.004)	(0.005)	(0.005)	(0.004)	(0.027)	(0.070)	(0.030)	(0.027)
HD	0.019*	0.001			0.043	0.162		
	(0.011)	(0.013)			(0.039)	(0.121)		
LAG HDTG	0.068***	0.080***	0.080***		-0.006	0.116**	0.072**	
	(0.019)	(0.022)	(0.022)		(0.017)	(0.057)	(0.033)	
LAG HPIR		0.044***	0.044***	0.041***		0.119	0.071	0.047
		(0.015)	(0.013)	(0.012)		(0.077)	(0.051)	(0.040)
Constant	-10.162***	-11.128***	-11.066***	-10.715***	-10.401**	-35.884*	-23.218**	-15.645**
	(3.010)	(3.363)	(3.150)	(2.804)	(4.136)	(19.524)	(9.790)	(7.359)
N	482	454	454	461	281	220	220	224
Pseudo R2	0.2166	0.2811	0.2811	0.1788	0.0822	0.5546	0.4775	0.3269
Log-Likelihood	34.68***	42.58***	42.57***	27.19***	15.33**	22.17**	19.09**	13.12
BIC	187.2163	176.1966	170.0812	180.0484	91.2518	77.14127	74.82867	75.7178
AIC	145.4368	130.8975	128.9003	142.8478	54.86826	39.81136	40.8924	45.01298
ROC statistics	0.8343	0.8732	0.8735	0.8182	0.9254	0.978	0.9757	0.9534
Total correct	19	18	18	18	5	4	4	4
% crises correct	63.16	77.78	77.78	66.67	60	75	75	100
% no crises correct	82.07	83.03	83.26	79.68	94.57	93.52	94.91	93.18
% total correct	81.33	82.82	83.04	79.18	93.95	93.18	94.55	93.3

Probability value respected to significance level in parentheses *** p<0.01, ** p<0.05, * p<0.10

applied for emerging countries pertaining to systemic risk exposure which often transpires with crises.

CONCLUSION

This study has developed EWS for systemic banking crises using household debt as well as house prices as indicators. It estimated the probability of banking crises in 41 advanced and emerging economies using logit models during the period of 1980 to 2018. The results illustrate that as the change in household debt growth increased in tandem with the growth of house prices which may lead to a systemic banking crisis. Other than that, a rise in GDP growth and low inflation could decrease the probability of a crisis. Furthermore, this paper has proven that the two indicators (i.e. tremendous increase in household debt and house price growth) are

critical factors in estimating the probability of a near-future crisis. The evidence is consistent for advanced economies while the change of household debt may precede crises in emerging economies but not together with a change in house price. Hence, the findings are very useful for the involved authorities to monitor the environmental changes taking place in household debt and house prices to reduce the economic shocks that may lead to banking crises. It is suggested for future research to take into account other factors relating to institutional quality as early indicators for EWS model in predicting banking crises.

ACKNOWLEDGEMENT

We gratefully acknowledge financial support from the Malaysian Ministry of Higher Education under the Fundamental Research Grant Scheme (FRGS) (Grant number: 600-IRMI/FRGS 5/3 (063/2017)).

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Jurnal Ekonomi Malaysia 54(1) 2020 135 - 151
http://dx.doi.org/10.17576/JEM-2020-5401-10

Value Chains, Production Networks and Regional Integration: The Case of Indonesia

(Rantai Nilai, Jaringan Produksi dan Integrasi Wilayah: Kes Indonesia)

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ABSTRACT

This study analyses the development of Indonesia within the Global Value Chain (GVC) and the transformation in its pattern of trade as a result of broader regional integration and more active participation within fragmented production networks. By employing an Inter-Country Input-Output model covering 64 countries and 34 different sectors, this study measures the integration of Indonesia within the Global Value Chain by breaking down its gross exports into components of value-added, covering the period of 1995 to 2015. The involvement of Indonesia within the GVC is analyzed through a set of indicators derived from a decomposition of the Leontief Input-Output system that completely splits gross exports into components of value-added. The system allows for differentiating value-added exports through intermediate inputs or final products, as well as direct exports, and indirect ones. The value-added components help to measure multiple-cross-border trade, domestic value, and foreign value embedded in exports, as well as to track how value-added travels across regional and global chains. The results indicate that Indonesian value-added exports expanded by more than 300% from 1995 to 2011, suggesting a change in the pattern of growth as the trade focus was re-directed towards Asian partners, mainly to specific sectors in East Asia: within mining (33% of the increase) and within manufacturing (41% of growth). Indonesia shifted towards exports of intermediate inputs within the initial section of the GVC. A substantial share of value-added goods traveled via regional partners towards international markets, although most of the domestic value-added remained in Asia. Indonesia differs from its ASEAN partners as it incorporates larger shares of domestic value-added in its exports than they do; it has a stronger role than they in exports of intermediate goods; it is more oriented towards regional partners; and has a lower presence than others within high technological exports.

Keywords: Global Value Chain; Production Networks; Regional Integration; Value-added trade; Vertical Specialization

ABSTRACT

Kertas ini menganalisis pembangunan Indonesia dalam Rantaian Nilai Global (GVC) dan transformasi dalam pola perdagangan akibat daripada adanya integrasi wilayah yang lebih luas dan penglibatan yang lebih aktif dalam fragmentasi jaringan produksi. Dengan menggunakan model Input-Output Antara Negara yang terdiri daripada 64 buah negara dan 34 buah sektor yang berbeza, kajian ini mengukur integrasi Indonesia dalam Rantaian Nilai Global (GVC) dengan memecahkan pertumbuhan eksport kepada komponen nilai tambah yang meliputi tahun 1995 hingga 2015. Penglibatan Indonesia dalam Rantaian Nilai Global (GVC) dianalisis melalui sejumlah indikator yang diterbitkan dari penguraian sistem Input-Output Leontief yang membahagikan pertumbuhan eksport kepada komponen nilai tambah. Sistem tersebut mampu membezakan nilai tambah eksport melalui input pengantaraan dan produk terakhir, begitu juga dengan eksport langsung dan tidak langsung. Komponen nilai tambah dapat membantu untuk mengukur gandaan lintas batas perdagangan, nilai domestik dan nilai asing terbenan dalam eksport dan juga untuk mengesan bagaimana nilai tambah berjalan melangkaui rantaian daerah dan global. Hasil membuktikan bahawa nilai tambah eksport berkembang melebihi 300% daripada tahun 1995 hingga ke 2011, mencadangkan perubahan dalam corak pertumbuhan dan focus perdagangan diarahkan semula ke rakan kongsi Asian, kebanyakannya kepada sektor yang spesifik di Asia Timur: perlombongan (33% peningkatan) dan perkilangan (41% pertumbuhan). Peralihan Indonesia kepada input pengantaraan pada bahagian awal GVC. Perkongsian kekayaan bagi nilai tambah barang adalah dalam lingkungan wilayah sehingga pasaran antarabangsa, walaupun kebanyakan nilai tambah domestik kekal di Asia. Indonesia berbeza daripada rakan kongsi ASEAN kerana menggabungkan nilai tambah domestik yang lebih besar dalam eksportnya berbanding apa yang dilakukannya; ia mempunyai peranan yang lebih besar daripada mereka dalam eksport barang perantaraan

Keywords: Jejaring Produksi; Integrasi Regional; Indonesia; Rantai Nilai Global; Nilai Tambah Eksport

INTRODUCTION

Exports from Indonesia expanded more than 300% from 1995 to 2015, with Indonesia experiencing changes in its pattern of trade and finding new sources of growth as it re-directed export efforts towards Asian partner (Southeast and East Asia Networks), focusing on exports within the natural resource sectors and re-orienting attention towards intermediate inputs and raw goods rather than final products. The rapid development of fragmented production networks in Asia most likely influenced the deeper internationalization of Indonesia. Additionally, between 1995 and 2011, Indonesia benefited from a sharp increase in the prices of commodities (where the country possessed a clear advantage); from a vast expansion in demand for exports across Asia; and from its more active and conscious policy towards trade liberalization and integration. With the rapid growth of the fragmented networks across Asia, demand for intermediate parts and components (hereafter IPC) throughout the region increased, leading to the formation of 'Factory Asia' (Baldwin & Lopez-Gonzalez, 2015).

Although countries within Asia have changed in the way they participate within the vertical trade and fragmented networks (World Bank 2019), Indonesia seems to rely on large exports of one-way trade, which means it is missing out on being part of those fragmented networks where production is carried out in multiple locations, accounting for nearly 70% of total trade by 2015. Indonesia is playing an active role within the initial stage of the Global Value Chain (GVC), relying more on exports of intermediate parts, and strengthening its participation within Asian networks, but lagging in the sectors employing high technology, where its ASEAN partners are doing better (Padilla et al. 2019). Indonesia's long-forgotten participation in the GVC (especially in the manufacturing sector) suggests the need for a further analysis of how sectors across Indonesia might integrate into the GVC.

This study questions whether Indonesian sectors are becoming more interconnected within the GVC, whether fragmentation of production networks from Indonesia was mainly directed at regional partners or across regional blocs. While Indonesia expanded in gross export terms to regional Asian partners, it is less known to what extent production fragmentation has led Indonesian value-added exports to global markets (non-Asian). The study aims to understand: how extensive the change in participation across sectors in Indonesia is within the GVC; which sectors have experienced the most profound benefits from fragmentation in production networks; how the value-added exports from Indonesia travel across value chains (regional and global).

Several studies covering trade analysis within the context of production networks and vertical specialization and integration, offer contributions to value-added measurements Koopman et al. (2014), participation in GVC across countries and sectors (Los et al. 2015), and the determinant factors stimulating more extensive involvement within the GVC (Rasiah et al. 2016). On the other hand, this paper deals with a single country case as trade data is far-reaching, and literature in the field of Global Value Chain has rarely thoroughly examined how Indonesia integrates with other countries in the GVC. Previous studies, including Indonesia, have presented regional comparisons, but were limited in scope, and missed giving a complete picture of where Indonesia stands. Indonesia plays a different role in the GVC when compared to its Southeast Asian (ASEAN) and other Asian partners, following a different path of growth, as commonly suggested in the literature (Kiyota et al. 2017; López González 2017; Purwono et al. 2019). Few papers have emphasized the gains offered by the GVC across the export sectors in Indonesia; the changes in Indonesia's participation in vertical trade; the threats created by liberalization; or the opportunities offered by fragmented networks. The GVC impact analysis missing at both the sectoral level and across Indonesia's top regional partners, opens an empirical gap.

The implications of Indonesia's greater integration within the GVC are important, not only as such participation impacts the structure of production and specialization, but also as it has to do with gains/threats in changes to global demand. Bems et al. (2011) point out that vertical linkages in the GVC account for a large share of the decline in international trade after 2011. Simola (2019) finds that GVC is a channel in which shocks due to tariff wars or economic shocks could be transmitted across countries. Besides, a clear understanding of how sectors participate within the GVC has implications for the incomes of workers (Aswicahyono et al. 2011), job creation, the participation of small and medium enterprises (SMEs), and industrial upgrading (Baldwin & Lopez-Gonzalez 2015; World Bank 2019).

Employing a World Input-Output table (OECD) covering 64 countries and 34 different sectors, this paper uses the Koopman et al. (2014) model to break down exports into indicators of value-added trade. The methodology allows separating value-added exported goods from intermediate inputs or final goods, direct and indirect exports (value-added), and domestic and foreign value-added that were embedded in exports for the years 1995 and 2011. Additional indicators are provided for the year 2015. However, this study focuses on the 1995-2011 period, which accounts for Indonesia's large expansion in global trade, whereas a decline in global trade characterizes the 2011-2015 period. From the different value-added terms, indicators of vertical specialization are derived and used to analyze integration within the GVC, the role played by sectors in vertical trade and patterns of integration across partners.

LITERATURE REVIEW

The vigorous growth of fragmented networks within Asia has attracted attention to the literature covering the global value chain. The dynamic development of cross-border trade, the more active participation (inclusion) of developing countries in regional and global contexts, adjustments from global to regional trade, and changes in leadership in global trade, suggest that Asian countries have gained in terms of relevance when it comes to vertical trade (R. Banga 2014). The widespread integration-liberalization in Asia, the significant reduction in tariffs, and the more coordinated implementation of facilitation measures seem to explain part of the rapid growth in regional trade in recent decades (Athukorala 2012; Baldwin & Lopez-Gonzalez 2015). Nevertheless, the literature covering fragmented networks suggests that linking producers to the global value chain is not sufficient for them to benefit from growth in the vertical specialization chain, as a substantial share in value-added (nearly 67%) originates from OECD members (R. Banga 2014). Emerging countries have expanded their participation within GVCs, but often retain significant dependency on the foreign intermediate parts and components needed to produce their exports (Esquivias Padilla et al. 2017). While substantial dependence on foreign inputs could drain the gains of developing countries participating in the GVC, the opposite (limited access) could constrain the ability of those countries to engage more deeply in fragmented production networks by preventing the exporters from achieving the strategic inputs required to be more competitive (López González 2017).

A significant challenge in measuring integration and participation in global trade now appears as the growth of fragmented structures has substantially increased over time (Hummels et al. 2001; Johnson & Noguera 2012; Timmer et al. 2014). More fragmented trade implies multiple cross-border transactions under the form of back-and-forth trade, and numerous intuitive accounting of value-added across different countries (Koopman et al. 2014). For instance, capturing a more precise indicator of vertical specialization requires decomposing gross exports into components of value-added.

Several studies offering an assessment of participation within vertical trade across countries and sectors are available (R. Banga 2014; Kowalski et al. 2015). Others, like that of Timmer et al. (2014), have decomposed value-added at a product level, focusing on gains of factors of production (labor and capital). However, studies covering Indonesia in more detail are missing, opening an empirical gap that needs to be filled about finding the potential gains to be made on Indonesia's deeper integration in vertical trade. A more precise analysis of Indonesia could allow comprehension of the benefits to be enjoyed from its greater participation within the GVC, and a better understanding of how liberalization and integration are re-shaping production activity across sectors. Issues at sectoral and country-level often remain beyond the scope of most GVC literature, where the focus tends to be multi-country.

Literature covering Indonesia has identified the critical role that the country plays as a producer of intermediate goods, which constituted nearly 60% of its exports in 2012, thereby locating Indonesia within the initial section of the global value chain (Esquivias Padilla et al. 2017). Compared to regional partners within the ASEAN, Indonesia exports much larger shares of domestic value-added (88%), while it remains less vertically integrated (32%) versus ASEAN country partners (55%) (Padilla et al. 2019). The dissimilarity between Indonesia and its regional partners suggests the former's lower engagement in fragmented networks, its lower share of exports from manufacturing sectors, and reflects an inevitable delay in the adoption of strategies oriented towards exports (Athukorala 2011; 2012). Apart from that, Indonesia remains focused on sectors employing large shares of natural resources where domestic value-added is elevated (Koopman et al. 2014; López González 2017).

A large share of domestic value-added through natural resource sectors is linked to the strong forward position that Indonesia plays within the GVC, mainly as a supplier of raw goods and intermediate inputs. By contrast, ASEAN partners participate more actively through backward links (more common across higher technological sectors), which include large shares of foreign parts and components (Rasiah et al. 2016; World Bank 2019). Another characteristic of Indonesia is that it has lower engagement in sectors characterized by a widespread vertical sharing, which is noticeable with its lower access to foreign inputs needed in sectors such as automotive, electronics, machinery, and others (López González 2017). Malaysia, Singapore, Thailand, and Vietnam have expanded more rapidly within the GVC via backward participation and increasing sophistication of exports (World Bank 2019), with almost 40% of value-added in exports originating from foreign inputs (Esquivias Padilla et al. 2017).

By contrast, Indonesia has gained far more in global integration through forward linkages (Esquivias Padilla et al. 2017; López González 2017). While it is positive to have large domestic value-added content in exports, the low participation of Indonesia in vertical trade through backward linkages suggests that the country may be missing potential growth in exports, jobs, and income from more rapidly expanding export-oriented sectors' (López González 2017). The case of India displays similarities with Indonesia, indicating that lower gains can arise from joining the GVC (K. Banga 2016). Studies such as that of Rasiah et al. (2016b) covering the automotive sector in Indonesia,

suggest that regional links have supported the country's upgrading of its technological capabilities, suggesting that stronger backward and forward integration could help to increase Indonesia's competitiveness and greater participation in GVC.

More recently, the increasing integration of Indonesia with Asian countries has raised the issue of Indonesia's dependency on the sourcing of crucial inputs for its value-added exports from East Asian countries. Indonesia has increased its links with countries in East Asia, and in doing so, both developing a dependency on them for parts and components needed for domestic industries and increasing its dependence on markets (Athukorala & Yamashita 2006; Haddad 2007; Padilla et al. 2019).

The broad differences across sectors' participation in the GVC have opened an empirical gap for Indonesia. While the mining, food, and some manufacturing sectors are more vertically integrated within the GVC, others (e.g., electronics, transportation, machinery, and chemicals) have been outpaced by more competitive regional partners with implications of Indonesia growing at lower rates of expansion in global trade. Indonesia reports low involvement in the worldwide trade in services (nearly 20%) when compared with OECD countries (more than 50%), as noted by Banga (2014), thereby missing an opportunity to grow faster in global trade.

While regional studies covering ASEAN or East Asia are highly valuable, the conclusions raised at the local level may not reflect the role of Indonesia in terms of vertical trade. Implications arising from issues such as the share of foreign inputs included in a country's exports (Upward et al. 2013), and the position of a country/industry within the GVC (Los et al., 2015) need to be cautiously analyzed with respect to cases such as that of Indonesia.

METHODOLOGY

The objective of this paper is to estimate and analyze the development of Indonesia within the global value chain and to look at changes taking place within the pattern of trade arising from the fragmentation of production and the extension of vertical trade. The study considers the years of 1995 – 2015, although the focus centers on the 1995-2011 period (expansion in GVC). The engagement or participation of Indonesia in the GVC is measured by breaking down its gross exports into a set of value-added components to distinguish between the origin of the value-added and the final destination of value that travels through exports of intermediate inputs and final goods. Decomposing gross exports allows researchers to recognize the stage of production of the export item, either raw-intermediate or final, and to identify the industries and countries that serve as paths for the goods before reaching the final point of consumption. A set of measurements and indicators of global value chain participation are derived by an additional elaboration of the Leontief input-output model that completely decomposes exports into different elements of value-added in exports. The methodology allows for the identification of intermediate parts and components or final goods and differentiation between direct trade, indirect flows and multiple cross-border trade. Additionally, the domestic content of value-added in goods and the foreign share of value is also captured. By distinguishing value-added in exports across the different sectors and across the different trade partners, it is possible to identify whether there is a new pattern of trade in Indonesia, whether new challenges have arisen, and to assess the potential impacts of further liberalization of trade and further integration.

Trade figures are presented in million USD (current prices), while the indicators are mainly reported in percentage terms. This study uses the data provided in the Trade in Value Added TiVA dataset by the OECD and the WTO, covering 64 countries and a total of 34 sectors. The Inter-Country Input-Output (ICIO) model serves as a framework and includes a set of matrices of inputs and output linking the 64 countries and the 34 sectors through flows of intermediate inputs and final demand for goods. A particular contribution of this study originates in the measuring and presenting of value-added trade indicators tracing the origin of value-added and the final point of consumption, with specific attention given to links between Indonesia and the largest trading partners, captured in blocs: South East Asian countries (ASEAN), the European Union (EU 15), the North American bloc (NAFTA), and countries within East Asia (. Particular focus is given to the ASEAN community, a regional agreement within South East Asia, where Indonesia belongs.

A more detailed methodology is found in Koopman et al. (2014). Following the Leontief Input-Output mode, this methodology splits gross exports into nine components of value-added based on the origin of the value-added and the flow of products across sectors and nations. The first step is to construct an input-output matrix. It is considered that countries (G) create products across different sectors, N. Goods are either intermediate inputs or final products, and both could be traded domestically or internationally

$$X_s = \sum_{r}^{G} \left(A_{Sr} X_r + Y_{sr} \right), \;\; r, s \ldots . G \qquad (1)$$

X_s represents the gross output matrix of the country *s of* Nx1 dimension. The vector Y_{sr} of Nx1 dimension captures the demand for final goods in country *r* that originated in country *s*. The input-output coefficient vector is represented by A_{sr} of NxN dimension, indicating country r's use of intermediate inputs produced in s (Koopman et al. 2014).

A further decomposition of equation (1) considering the gross output vector, the G-nation, N-sector production-trade system, and a matrix capturing value-added is presented as a block matrix as in Koopman et al. (2014).

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_3 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12}\dots & A_{1G} \\ A_{22} & A_{22}\dots & A_{2G} \\ \vdots & \vdots & \vdots \\ A_{G1} & A_{G2} \dots & A_{GG} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_G \end{bmatrix} + \begin{bmatrix} Y_{11}+ & Y_{12}+\dots+ & Y_{1G} \\ Y_{22}+ & Y_{22}+\dots+ & Y_{2G} \\ & \dots\dots & \\ Y_{G1}+Y_{G2}+\dots+ & & Y_{GG} \end{bmatrix} \quad (2)$$

and rearranging,

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_G \end{bmatrix} = \begin{bmatrix} I-A_{11} & -A_{12}\dots & -A_{1G} \\ -A_{21} & I-A_{22}\dots & -A_{2G} \\ \vdots & \vdots & \vdots \\ -A_{G1} & -A_{G2} \dots & I-A_{GG} \end{bmatrix}^{-1} \begin{bmatrix} \sum_r^G Y_{1r} \\ \sum_r^G Y_{2r} \\ \vdots \\ \sum_r^G Y_{Gr} \end{bmatrix} \quad (3)$$

$$= \begin{bmatrix} B_{11} & B_{12}\dots & B_{1G} \\ B_{21} & B_{22}\dots & B_{2G} \\ \vdots & \vdots & \vdots \\ B_{G1} & B_{G2} \dots & B_{GG} \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_G \end{bmatrix}$$

$$\begin{bmatrix} X_{11} & X_{12}\dots & X_{1G} \\ X_{21} & X_{22}\dots & X_{2G} \\ \vdots & \vdots & \vdots \\ X_{G1} & X_{G2} \dots & X_{GG} \end{bmatrix} \quad (4)$$

$$= \begin{bmatrix} B_{11} & B_{12}\dots & B_{1G} \\ B_{21} & B_{22}\dots & B_{2G} \\ \vdots & \vdots & \vdots \\ B_{G1} & B_{G2} \dots & B_{GG} \end{bmatrix} \begin{bmatrix} Y_{11} & Y_{12}\dots & Y_{1G} \\ Y_{21} & Y_{22}\dots & Y_{2G} \\ \vdots & \vdots & \vdots \\ Y_{G1} & Y_{G2} \dots & Y_{GG} \end{bmatrix}$$

The vector Y_s of dimension N×1 captures the foreign use of final goods produced by country *s*. B_{sr} is the total requirement matrix of N×N dimension, known as the Leontief inverse matrix. The vector X_{sr} is the gross output vector indicating that the output originated in s and was taken in by r.

To capture the value-added content in goods produced, the *Vs* matrix is incorporated, indicating the direct share of domestic content in the output of the country s.

$$\hat{V} = \begin{bmatrix} \hat{V}_1 & 0\dots & 0 \\ 0 & \hat{V}_2\dots & 0 \\ \vdots & \vdots & \vdots \\ 0 & 0 \dots & \hat{V}_G \end{bmatrix} \quad (5)$$

Multiplying the *Vs* matrix with the Leontief inverse matrices results in the *VB,* the value share vector.

$$VB = \begin{bmatrix} V_1B_{11} & V_1B_{12}\dots & V_1B_{1G} \\ V_2B_{21} & V_2B_{22}\dots & V_2B_{2G} \\ \vdots & \vdots & \vdots \\ V_GB_{G1} & V_GB_{G2} \dots & V_GB_{GG} \end{bmatrix} \quad (6)$$

To estimate the domestic value-added in each country's gross output, the value share vector is multiplied by the gross output vector, generating a new matrix of dimensions of GNxGN that contains along the diagonal components, the direct value-added terms (matrix). The off-diagonal coefficients contain the value-added, which is incorporated in exports.

$$\hat{V}BY = \begin{bmatrix} \hat{V}_1 & 0\dots & 0 \\ 0 & \hat{V}_2\dots & 0 \\ \vdots & \vdots & \vdots \\ 0 & 0 \dots & \hat{V}_G \end{bmatrix} \begin{bmatrix} X_{11} & X_{12}\dots & X_{1G} \\ X_{21} & X_{22}\dots & X_{2G} \\ \vdots & \vdots & \vdots \\ X_{G1} & X_{G2} \dots & X_{GG} \end{bmatrix}$$

$$= \begin{bmatrix} V_1\sum_r^G B_{1r}Y_{r1} & V_1\sum_r^G B_{1r}Y_{r2} \dots & V_1\sum_r^G B_{1r}Y_{rG} \\ V_2\sum_r^G B_{2r}Y_{r1} & V_2\sum_r^G B_{2r}Y_{r2} \dots & V_2\sum_r^G B_{2r}Y_{rG} \\ \vdots & \vdots & \vdots \\ V_G\sum_r^G B_{Gr}Y_{r1} & V_G\sum_r^G B_{Gr}Y_{r2} \dots & V_G\sum_r^G B_{Gr}Y_{rG} \end{bmatrix} \quad (7)$$

From the off-diagonal components, it is possible to capture the total value embodied in exports by each country as in:

$$VT_{s*} = \sum_{r\neq s}^{G} VX_{sr} = V_s \sum_{r\neq s}^{G}\sum_{g=1}^{G} B_{sg}Y_{gr} \quad (8)$$

Equation (8) is modified according to where the value-added travels, and how the value-added is incorporated: as intermediate good or as a final good. Rewriting equation (8), the total exports (gross) in each country is expressed as:

$$VT_{s*} = V_s \sum_{r \neq s}^{G} B_{ss} Y_{sr} + V_s \sum_{r \neq s}^{G} B_{sr} Y_{rr} + V_s \sum_{r \neq s}^{G} \sum_{t \neq s,r}^{G} B_{sr} Y_{rt} \quad (9)$$

Equation (9) identifies the value-added incorporated in exports through three components (channels). The first term indicates the value-added in final goods exported from country s to r. The second term captures the value-added in intermediate inputs exported by country s to country r, destined to remain in country r. The last term computes value-added exports of intermediate goods exported from country *s* to *r*, to be re-exported by country *r* to third countries *t*. The cross-border exports of country s is then presented as :

$$E_{s*} = \sum_{r \neq s}^{G} E_{sr} = \sum_{r \neq s}^{G} A_{sr} X_r + Y_{sr} \quad (10)$$

E_{sr} includes the intermediate goods exported by country *s* to *r*. Gross exports captured in equation (10) are decomposed according to the destination where inputs (IPCs) and final products are consumed.

$$\begin{aligned} uE_{s^*} &= V_s B_{SS} E_{s^*} + \sum_{r \neq s}^{G} V_r B_{rs} E_{s^*} \\ &= VT_{s^*} + \left\{ V_s \sum_{r \neq s}^{G} B_{sr} Y_{rs} + V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} X_s \right\} \quad (11) \\ &+ \left\{ \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} Y_{sr} + \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} A_{sr} X_r \right\} \end{aligned}$$

Equation (11) contains five terms; the first (VT_{s*}) denotes the value-added exports in final products, while the other four components indicate value added in intermediate goods according to the final destination. To identify the destination of value added, the output identity of each nation is employed, expressed as:

$$X_s = \left(I - A_{ss}\right)^{-1} Y_{ss} + \left(I - A_{ss}\right)^{-1} E_{s*} \quad (12)$$

$$X_r = \left(I - A_{rr}\right)^{-1} Y_{rr} + \left(I - A_{rr}\right)^{-1} E_{r*} \quad (13)$$

Finally, substituting Xs and Xr in equation 11, a new equation with nine terms is obtained as :

$$\begin{aligned} uE_{s*} &= \left\{ V_s \sum_{r \neq s}^{G} B_{ss} Y_{sr} + V_s \sum_{r \neq s}^{G} B_{sr} Y_{rr} + V_s \sum_{r \neq s}^{G} \sum_{t \neq s,r}^{G} B_{sr} Y_{rt} \right\} \\ &+ \left\{ V_s \sum_{r \neq s}^{G} B_{sr} Y_{rs} + V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} \left(I - A_{ss}\right)^{-1} Y_{ss} \right\} \\ &+ V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} \left(I - A_{ss}\right)^{-1} E_{s*} \quad (14) \\ &+ \left\{ \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} Y_{sr} + \sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} A_{sr} \left(I - A_{rr}\right)^{-1} Y_{rr} \right\} \\ &+ \sum_{t \neq s}^{G} V_t B_{ts} A_{sr} \sum_{r \neq s}^{G} \left(I - A_{rr}\right)^{-1} E_{r*} \end{aligned}$$

The step-by-step proof of how value-added exports are decomposed is offered in Koopman et al. (2014). Exports (in value-added terms) are grouped into three blocks, and sliced into nine terms that account for gross exports of each country. The number represents the term position in equation (14). The first three terms account for direct value-added exports. The fourth and fifth terms capture value-added in exports through intermediate goods that ultimately return to the country of origin. The seventh and eighth terms include the value-added incorporated in exports, as domestic players employ foreign inputs. The sixth and the ninth terms are components of the value-added that are accounted for by two countries' (double-counting value-added), arising from back-and-forth trade.

Combinations of the nine different terms are employed to derive indicators on Global Value Chain participation. Domestic Value-Added exports = (1) + (2) + (3) + (4) + (5) + (6). Multiple Cross Border trade (more than one border) includes elements from the fourth to the ninth terms, also denoted as a share of vertical specialisation. Domestic Value-added in exports (VT) = (1)+(2)+(3); Foreign value-added content in exports (VS = 7 + 8 + 9). Gross Domestic Product in Exports (GDP Ex = 1 + 2 + 3 + 4 + 5). Multiple cross border trade (MCB = 4 + 5 + 6 + 7 + 8 + 9). Indirect Value in Foreign Exports (VS1); Total Vertical Specialization (VS + VS1).

RESULTS AND DISCUSSION

CHANGES IN PATTERNS OF GROSS EXPORTS

From 1995 to 2011, total exports from Indonesia increased from almost US$58 billion to nearly US$233 billion. Higher integration of Indonesia in the Global Value Chain seems to play a role in explaining the three-fold growth in exports. Total cross-border exports of merchandise reached nearly 78.5%, expanding by more than 325% from the year 1995. Three sectors account for nearly 65% of the total expansion, namely, mining goods contributing with 35% of growth, exports of food contributing with nearly 15% of growth, and chemicals with close to 12%. If two other sectors are added, metals and agro goods, the combined contribution to total growth in exports reaches 75%. It is noticeable that all five sectors are mainly natural resource-related, and raw goods dominate the exports. Production fragmentation related to natural resource goods expanded more rapidly than other products, partly as prices have surged, but also because natural resources that are traded tend to have fewer available substitutes (Los et al. 2015). However, the fall in prices and a decrease in global demand after 2011 drove the same three sectors to experience the largest flop on trade (Table 1).

TABLE 1. Gross Exports, share of final products, and share of intermediate parts and components from Indonesia

Sector	Gross Exports (US$ million)			% of total Growth		Share of Final Products to Total Exports (%)			% of total Growth		Share of Intermediate inputs to Total Exports			% of total Growth	
	1995	2011	2015	1995-2011	2005-2011	1995	2011	2015	1995-2011	2005-11	1995	2011	2015	1995-2011	2005-2011
Mining, quarrying	11.684	73.770	36.998	35%	-68%	1%	4%	3%	2%	-1%	99%	96%	97%	34%	-65%
Agriculture, Forestry, Fishing	2.620	9.806	5.034	4%	-9%	11%	35%	38%	2%	-1%	89%	65%	62%	2%	-6%
Manufacturing	26.436	110.858	98.362	48%	-23%	41%	43%	45%	21%	-2%	59%	57%	55%	27%	-18%
- Food, beverages, tobacco	3.000	29.140	27.650	15%	-3%	70%	62%	66%	9%	0%	30%	38%	34%	6%	-3%
- Chemicals, non-metallic minera	4.119	23.225	16.640	11%	-12%	31%	18%	18%	2%	-1%	69%	82%	82%	9%	-10%
- Basic metals, fabricated meta	1.669	12.657	8.547	6%	-8%	11%	5%	5%	0%	0%	89%	95%	95%	6%	-7%
- Computer, electronic, optical	2.253	7.177	5.104	3%	-4%	41%	49%	40%	1%	-1%	59%	51%	60%	1%	-1%
- Computers, electronic, electrical	1.839	9.786	7.382	5%	-4%	41%	48%	41%	2%	-1%	59%	52%	59%	2%	-1%
- Textiles, Leather, Footwear	7.053	14.683	14.930	4%	0%	62%	65%	57%	3%	-1%	38%	35%	43%	1%	2%
- Wood, Paper, Printing	5.939	8.359	8.609	1%	0%	8%	13%	12%	0%	0%	92%	87%	88%	1%	0%
- Transport equipment	545	4.583	5.057	2%	1%	54%	71%	70%	2%	0%	46%	29%	30%	1%	0%
Total *	57.845	232.992	178.825	303%		36%	30%	36%	27%		64%	70%	64%	73%	

Source Data processed from Trade in Value Added database (OECD-WTO).

The expansion of Indonesian exports was most reliable in the intermediate parts and components (including raw goods) section, as they account for nearly 75% of the total increase in exports, which claim is in line with the findings of Bems et al. (2011), who also reported that IPCs accounted for the largest growth of trade after 1990 via vertical specialization. As an example, 96% of the exports within the mining sector were intermediate goods, 83% of chemicals were also intermediate inputs, and more than 95% of metals were raw goods. The substantial contribution of those three sectors to total exports illustrates the large concentration of exports within the intermediate goods sections rather than in the final goods category. A large concentration of exports within a few categories and markets could lead to sharp declines in times of price or economic shock, as noted in Lee (2019), perhaps explaining why those three sectors (mining, chemicals, and metal) reported a large drop after 2011. Among manufacturing sectors, electrical and optical equipment reported large shares of exports in parts and components (more than 60%) and displayed more resilience in the period 2012-2015.

The substantial expansion of exports under parts and components was unusually large towards the ASEAN markets (Table 2), where they expanded nearly 550%. Exports of IPC to countries within East Asia also grew by more than 300%, suggesting a profound integration of Indonesia in the regional production networks, a claim in line with Baldwin and Lopez-Gonzalez (2015), who support that production networks expanded regionally during the same period of analysis. Most noticeable are the four sectors that strengthened their role as exporters of parts and components: metals, chemicals, electrical equipment, and wood (Table 1).

Related to exports of final goods, a change in the pattern of exports is noticed in agriculture, which substantially increased its share of exports of final products (to 31% of exports), and was previously characterized by exporting mainly raw goods (Table 2 and Table 3). Some other sectors that reported substantial shifts in the share of exports from raw goods to final products are food goods (57% growth in the share of final products), textiles (88% growth), transportation equipment (65%), and miscellaneous manufacturing (more than 55%).

As noted in Pangestu et al. (2015) a large share of the growth in exports in Indonesia after the 1997 financial crisis was supported by a weak Indonesian Rupiah (massive depreciation), substantial reforms in trade policies (e.g., removal of tariffs and non-trade barriers (NTBs), removal of export bans, export taxes, and domestic content requirements), a surge in demand for raw materials (e.g., palm oil, rubber, coal), and relatively competitive labor-intensive sectors (e.g., textiles, apparel, and furniture). Nevertheless, after 2004, the labor-intensive sectors entered into a considerably more pressurised export market due to the rise of stronger rivalry from China and other Asian countries (World Bank, 2012). The share of trade (exports and imports) to both the European Union and NAFTA fell during the 1995-2011 period suggesting Indonesia's lower dependency on its traditional partners in the West and a shift of attention to the East (Table 2). Lower shares to the West are also linked to China's large global trade expansion, meaning a loss in competition for Indonesia's labor-intensive exports.

On the other hand, exports of services increased at a significantly lower share (180%) than merchandise exports in the 1995-2011 period, suggesting that Indonesia may be missing further gains in trade as it lacks competitiveness within services. Exports of services are beyond the scope of this study.

VALUE-ADDED TRADE ACROSS GLOBAL PRODUCTION NETWORKS

By employing gross exports, some shifts in the pattern of trade were identified in the previous section. Nevertheless, to trace how value-added travels across the GVC, gross exports are decomposed into three main blocs: value-added, originating in Indonesia (domestic content, DVA); second, foreign content of value-added in exports (FVA); and back-and-forth trade. From 1995 to 2011, the Indonesian value-added content in exports (domestic value-added) expanded by more than 300%, reporting nearly US$200 billion value-added exports. The largest share of domestic value-added was shipped to East Asian partners, who consumed nearly 47% of the total increase in domestic value-added (DVA) of Indonesia. The second-largest destination of domestic value-added exports was ASEAN, which absorbed 17% of the total DVA expansion, suggesting that 65% of the expansion in domestic value-added remained within East and Southeast Asia. Aggregated by sectoral groups, exports of mining and quarrying recorded 33% of the total DVA of Indonesia. In comparison, manufacturing exports accounted for more than 40% of DVA exports and services for less than 20% (Table 2 and Table 3).

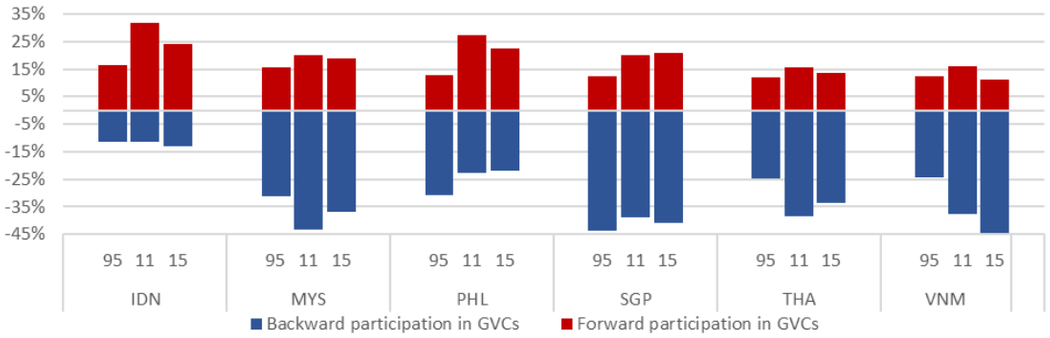
The pattern of domestic value-added content in final goods within natural resources changed from 1995 to 2011 in two sectors, previously characterized as being exporters of raw commodities, that increased their share of value-added in final products, agricultural exports, and wood & paper. The increase in the domestic value-added in final goods is most likely related to technological upgrades that natural resource-based sectors experienced, as well as to impacts from policies launched during the period, aimed at increasing the participation of local producers as well as aiming at higher processing of goods within national borders. Removal of export bans, a depreciation of the Rupiah (after 1997), high global prices, and changes in the investment environment supported the expansion of investment and trade within natural resources (Pangestu et al. 2015).

TABLE 2. Share of Gross Exports and Value-added Exports from Indonesia to Main Trading Blocks 1995 and 2011

	ASEAN (%)			East Asia (%)			EU (%)			NAFTA (%)		
	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015
Gross exports, partner shares												
Agriculture, forestry and fishing	12,2	8,4	13,9	17,7	35,5	30,2	24,0	14,8	11,3	25,9	23,1	22,4
Manufacturing	14,3	17,5	14,3	32,5	28,1	28,6	19,5	10,7	8,6	21,1	13,1	15,4
Mining and quarrying	5,1	10,9	14,2	82,7	69,2	57,4	2,4	2,3	1,5	4,3	1,7	2,7
Total services	14,7	17,4	17,9	31,5	33,4	31,5	19,6	12,6	11,6	15,4	10,5	11,4
TOTAL	12,4	15,0	15,0	41,9	42,3	35,2	16,3	8,5	7,9	16,2	9,5	12,1
Gross imports, partner shares												
Agriculture, forestry and fishing	1,1	4,8	2,7	8,8	11,2	14,1	3,7	1,1	1,6	37,6	26,9	25,9
Manufacturing	10,7	27,2	26,4	39,0	45,0	47,5	23,9	7,6	8,4	11,2	5,7	4,5
Mining and quarrying	9,2	25,7	18,4	5,0	1,2	4,4	5,0	0,6	0,6	5,0	1,0	1,2
Total services	17,5	23,0	23,2	35,0	25,1	23,6	17,0	15,1	16,6	12,9	13,4	13,7
TOTAL	12,4	25,2	24,2	35,6	36,4	37,3	20,5	8,7	10,0	12,5	8,1	7,6
Domestic value added (DVA) in gross exports,partner shares												
Agriculture, forestry and fishing	12,2	8,4	13,9	17,7	35,5	30,2	24,0	14,8	11,3	25,9	23,1	22,4
Manufacturing	13,5	17,2	14,0	33,5	28,2	28,8	19,8	10,7	8,6	20,6	12,6	14,8
Mining and quarrying	5,1	10,9	14,2	82,7	69,2	57,4	2,4	2,3	1,5	4,3	1,7	2,7
Total services	14,6	17,3	17,8	31,5	33,4	31,5	19,6	12,7	11,6	15,5	10,7	11,5
TOTAL	11,9	14,7	14,9	43,0	43,4	35,7	16,2	8,4	7,8	15,6	9,0	11,6
Domestic value added (DVA) in exports of intermediate products (IPC), partner shares												
Agriculture, forestry and fishing	12,6	6,8	11,5	16,9	36,4	31,7	24,8	15,1	11,6	26,0	26,5	26,8
Manufacturing	14,7	20,7	17,0	40,8	36,5	38,9	15,5	10,1	8,1	18,0	7,6	10,7
Mining and quarrying	5,0	11,0	14,0	83,1	70,2	57,5	2,4	2,4	1,6	4,3	1,7	2,7
Total services	11,1	19,2	20,3	48,2	41,3	36,7	19,0	12,3	11,8	11,5	6,4	8,1
TOTAL	10,5	15,5	16,5	55,0	52,7	44,4	12,5	7,1	6,7	12,5	5,5	8,0
Domestic value added in foreign final demand, partner shares												
Agriculture, forestry and fishing	8,9	8,5	9,0	30,4	27,8	26,4	21,4	13,2	10,1	20,3	15,5	15,2
Manufacturing	11,4	10,9	10,1	30,2	27,9	27,7	20,6	11,9	9,7	22,7	15,8	17,7
Mining and quarrying	5,6	7,6	9,2	70,7	52,0	44,4	6,3	6,4	5,4	9,4	8,5	10,4
Total services	11,2	11,0	11,1	32,8	31,2	30,1	19,7	12,6	11,1	18,5	14,8	16,0
TOTAL	9,8	9,5	10,1	40,2	37,4	32,3	17,2	10,3	9,2	17,9	12,9	15,2
Backward participation in GVCs		2,0	2,1		3,7	4,6		1,1	1,2		1,0	1,1
Forward participation in GVCs	3,4	7,4	6,5	6,6	14,2	9,7	3,1	3,0	2,5	1,7	1,3	1,4

Note: Domestic Value-Added (DVA), Final Goods (FG), Intermediate Parts, and Components (IPC), Foreign Value-Added (FVA). ASEAN (Association of Southeast Asian Countries), East Asia (EASIA), European Union (EU15), North America FTA (NAFTA)

On the other hand, sectors within manufacturing experienced less dynamic changes as the domestic value-added in exports of final goods, and intermediates remained similar in 2011 (at 43%) to what it had been in 1995 (at 41%). The share of foreign inputs embedded in exports also remained at nearly 20%, a substantially lower percentage than that of Indonesia's Top ASEAN neighbors (almost 45% of FVA in exports), who expanded more rapidly in trade within manufacturing (Padilla et al., 2019). Two exceptions within manufacturing sectors that experienced significant shifts in larger value-added exports in final goods (1995-2011) were: 1) computers, electronics, and optical, and 2) transportation equipment. Rasiah et al. (2016) found that stronger regional linkages, larger investment flows, and institutional support within the automotive sector in Indonesia supported improvements in technological capability and competitiveness. Deregulation, which allowed foreign investment and reduced domestic content requirements, along with liberalization in the late 1990s - early 2000s, attracted foreign producers of IPC and supported greater processing of goods at home



Note. Backward Linkage display with negative sign for the purpose of friendly visualization. Backward and Forward participation as percentage of total gross exports per country. Indonesia (IDN), Malaysia (MYS), Philippines (PHL), Singapore (SGP), Thailand (THA), and Vietnam (VNM)

FIGURE 1. Backward and Forward Participation Top ASEAN countries. 1994, 2011, and 2015

and a lowering of the use of foreign inputs (Pangestu et al. 2015).

Nevertheless, the commodity boom of 2003-2012 led Indonesia towards a re-orientation to natural resources (entering a new stage of Dutch Disease, Pangestu et al. (2015), while failing to implement important industrial reforms. During the last two decades, the share of manufacturing to total GDP and total exports fell (Sugiharti et al. 2019). Additionally, the percentage of value-added exports of final goods within manufacturing decreased for most trading partners in the West and shifted mainly towards ASEAN countries and East Asia.

The concepts of forward and backward participation help to assess the role played by Indonesia in the GVC. For instance, the forward linkage measures the value-added content of Indonesia embedded in exports of partner countries. Indonesia reported a substantial increase in forward linkages, which increased from 16% in 1995 to nearly 33% in 2011. The largest expansion in forward participation came from stronger links with ASEAN members, rising from 3.4% in 1995 to 7.4% in 2011. Forward participation with East Asian countries also increased from 6.6% in 1995 to 14.2%. While the forward links with Asia are extensive (23% of total value-added exports), those with NAFTA and the European Union are relatively small, remaining at a comparable level with those of 1995. Forward linkages (IPCs) expanded to a greater extent than backward linkages, as noted in Esquivias Padilla et al. (2017), driven by the growth of Asian partners. Five sectors recorded the most substantial improvements in forward linkages: 1) wood, pulp, and paper; 2) coke; 3) rubber; 4) machinery equipment; and 5) transport equipment. Nevertheless, industrial players in downstream positions (forward links) often experience larger effects amid economic shocks (Lee, 2019), perhaps explaining why the drop in Indonesian exports during the collapse of commodity prices and the economic slowdown of 2009 was larger than that of its ASEAN neighbors (Fitrianti 2017; Sugiharti et al. 2020).

In 1995 nearly 75% of DVA from Indonesia were direct exports (one-way trade), while nearly 13% were indirect domestic exports (exporting firms at home demanding goods and services from other local players). Indirect domestic exports increased more significantly within basic metals, machinery, and equipment. López González (2017) pointed out that SMEs could reach foreign markets by indirectly exporting through Multinational Enterprises (MNEs) or larger firms at home. For instance, a key policy in manufacturing in Indonesia (automotive) was to further promote the internationalization of SMEs by strengthening links with MNEs (Rasiah et al. 2016).

Another set of indicators to assess the participation of a country in the GVC are those illustrating multiple cross-border trade, either in the form of re-exports foreign, re-exports domestic, or re-imports (Table 4). Though total exports increased, Indonesia has relatively low participation in sectors characterized by multiple-cross-border trade, staying as a player in one-way trade. Re-exports from foreign indicates the domestic value-added exports in IPC re-processed in foreign countries and re-exported to third countries. The value-added of Indonesian IPCs through re-exports increased by nearly 290% to nearly US$40 billion in the year 2011. Sectors that recorded the largest expansion were: 1) food, beverages, and tobacco; 2) chemicals; 3) metals; and 4) electric and optical equipment. Regional value chains across Asia are essential drivers of trade for Indonesia, helping it to both increase its regional presence and reach global markets. As an example, stronger links from ASEAN to China helped increase value-added exports through indirect channels (Yu & Cui 2017).

The re-exports from the domestic market include those foreign IPCs that will be employed by local firms and re-exported to third countries. The total value of re-exports expanded by nearly 2.5 times from 1995 to

TABLE 3. Domestic and Foreign Value-Added Export Shares in Indonesian Exports 1995 and 2011

	Domestic value added in exports of intermediate products, partner shares												Domestic value added in foreign final demand, partner shares											
	ASEAN			EASIA			EU15			NAFTA			ASEAN			EASIA			EU15			NAFTA		
	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015
Agriculture and fishing	13	7	11	17	36	32	25	15	12	26	27	27	9	9	9	30	28	26	21	13	10	20	16	15
Mining and quarrying	5	11	14	83	70	58	2	2	2	4	2	3	5,6	7,6	9,2	71	52	44	6	6	5	9	8	10
Total services	11	19	20	48	41	37	19	12	12	12	6	8	11	11	11	33	31	30	20	13	11	19	15	16
Manufacturing	15	21	17	41	37	39	15	10	8	18	8	11	11	11	10	30	28	28	21	12	10	23	16	18
- Basic metals and fabricated	25	32	26	44	41	45	9	5	3	16	4	7	23	15	13	35	34	35	13	9	7	19	12	16
- Chemicals and non-metallic	23	20	21	37	38	35	13	11	7	12	8	10	13	11	12	33	34	31	18	12	9	19	14	17
- Computers, electronic, electric	28	19	16	9	38	37	13	10	11	49	16	22	11	9	8	15	28	29	20	14	14	44	20	23
- Food, beverages. tobacco	9	20	14	33	23	25	36	14	12	10	6	10	13	10	9	32	20	20	23	12	9	14	8	10
- Machinery and equipment	32	34	33	19	24	16	5	8	5	36	18	17	22	21	19	30	32	24	13	6	5	22	11	12
- Other manufacturing	27	16	15	32	16	22	13	19	16	23	14	16	20	7	6	18	24	23	22	17	14	27	25	29
- Textiles, apparel, leather	11	6	5	17	34	38	23	17	14	35	10	14	6	3	3	15	14	20	29	17	14	35	40	37
- Transport equipment	30	47	44	16	26	32	28	5	5	12	7	6	26	35	27	21	18	17	21	6	4	15	11	13
- Wood and paper	6	8	6	62	55	65	11	6	3	10	7	7	7	8	7	49	40	48	15	10	7	14	13	13
TOTAL	11	15	17	55	53	44	12	7	7	13	6	8	10	9	10	40	37	32	17	10	9	18	13	15

Note Domestic Value-Added (DVA), Final Goods (FG), Intermediate Parts and Components (P&C), Foreign Value-Added (FVA). ASEAN (Association of Southeast Asian Countries), East Asia (EASIA), European Union (EU15), North America Free Trade Agreement (NAFTA)

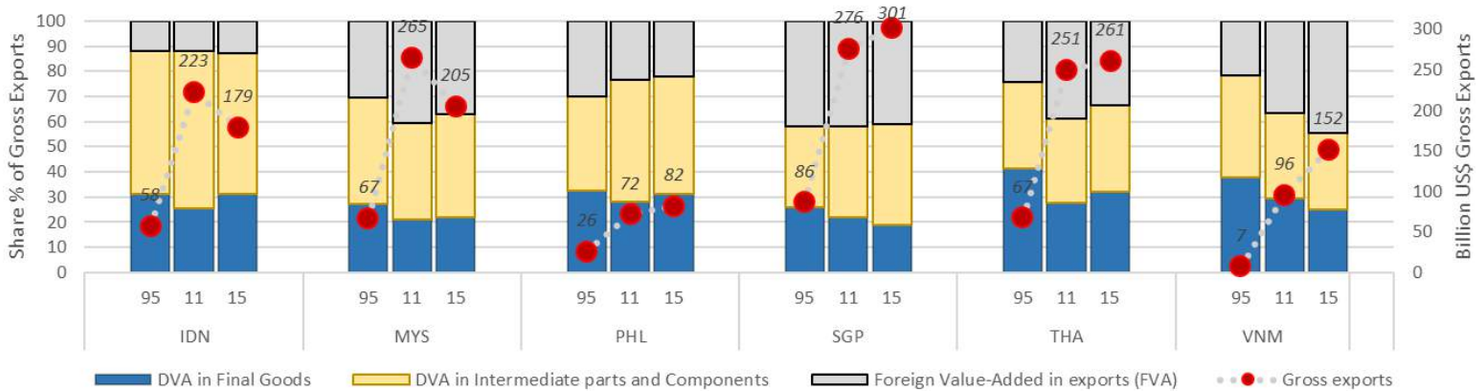


FIGURE 2. Value-Added in Gross Exports. Six Top ASEAN Countries 1995, 2011, and 2015

2011, although, as a percentage of total IPCs, it remains similar to that in the 1995-2011 period. The sector most actively involved in re-exports (as a percentage of total sectoral IPCs) was textiles, chemicals, and machinery. Sectors such as metals, electrical and optical goods, reported substantial growth (Table 4). The Indonesian government has launched policies aimed to increase export-oriented investments, likely attracting firms that require imported inputs to support exports. Although the government has also supported policies to boost domestic value-added content in exports, there are no apparent signs of successful implementation of such policies. Incoming Foreign Direct Investment (FDI) within manufacturing has supported vertical spillovers (across sectors) through backward and forward linkages (Sari 2019), but not positive horizontal ones (effects within the same sector).

Finally, the concept of re-imports captures those goods initially exported but returning home after being re-processed abroad. In Indonesia, value-added through re-imports increased nearly fifteen times from 1995 to 2011, although the amounts are low compared with regional partners (from US$22 million to nearly US$464 million). Three sectors accounted for most of the growth in 2011: primary and fabricated metals (more than US$ 80 million in 2011), electrical and optical, and chemical non-metallic exports. Although re-imports remained small in value terms, the rate of growth was extremely rapid, a characteristic of GVCs (Table 4).

Exports within the GVC commonly employ multiple-cross-border trade, meaning that connectivity, coordination, and the logistic cost is essential. Although the three components of multiple cross-border trade are low relative to those of advanced countries or even relative to ASEAN champions of trade, they signal that Indonesia is expanding through its integration with other Asian countries in the regional value chain, and taking part in fragmented production networks (López González 2017).

OPPORTUNITIES FOR FURTHER EXPANSION AND INTEGRATION WITHIN THE GVC

This section highlights which sectors benefited the most from vertical integration and helps to asses which sectors may offer Indonesia the largest potential for further expansion. Flows of exports to major trade blocs help to identify the significance of regional and global integration. Changes in the patterns of value-added exports are more noticeable in the following aspects. First, five sectors gained from participation within the GVC by supplying larger value-added exports embedded in final goods: 1) agricultural products; 2) computer, electronics and optical; 3) textiles; 4) wood, paper and pulp; and 5) transportation equipment (Tables 1 and 4). Second, groups that participated more actively in the GVC by supplying intermediate parts and components were food products, machinery and equipment, electrical and optical, and metals. Policies to increase FDI, the lowering of export bans, and export taxes are likely to have benefited these three groups (Pangestu et al. 2015). Third, exports that increased the share of foreign content (FVA share) were textiles and footwear, along with products related to wood, paper, and pulp. Larger portions of FVA are often associated with gains on more competitive inputs (case of textiles, footwear, and wood), or with participation in sectors which are highly fragmented and specialized as in computers, electronics, and transportation, where Indonesia also expanded exports (López González, 2017). On the other hand, Indonesia has developed a certain level of dependency on the supply of inputs from East Asia (computers, machinery, and transport), perhaps explaining why exports from East Asia to Indonesia have increased more rapidly over time than the other way around (Ing & Kimura 2017).

The liberalization of markets in Indonesia, although offering broader access to ASEAN and East Asia countries, also brings stronger competition at home (Yu & Cui 2017). Indonesia lost in specific sectors to the more open markets of East Asian and ASEAN countries (Padilla et al. 2019; World Bank 2012). As opposed to the ASEAN markets, Indonesia's share of exports in agricultural goods, chemical products, miscellaneous manufactured goods, electrical and optical equipment, transportation goods, and wood-paper, fell as it faced considerable competition from other ASEAN countries or East Asian ones. A possible explanation for the drawback for Indonesia derives from the late liberalization and diversification of trade which mainly started in 1995, as a result of incorporation to the WTO and the implementation of the ASEAN Free Trade Agreement AFTA (Pangestu et al. 2015). Besides, productivity growth in former champion sectors in Indonesia (mainly labor-intensive ones) are lagging, as opposed to the growth in its rivals in Asia, as wages rose too fast, skills remained low and technological absorption capability remains weak (Sugiharti et al. 2019; World Bank 2012).

The re-focus of exports to regional Asian partners has been clear, either because gross exports expanded more rapidly to Asian partners than to non-Asian ones, or because Indonesia's backward and forward linkages are mainly within Asia. Exports to ASEAN partners grew more than three times during the period of this study, suggesting that implementation of the ASEAN Free Trade Agreement (AFTA), removal of non-tariff barriers, and other regional deals, supported trade integration (Ing & Kimura, 2017).

The last two decades introduced Indonesia to the booming fragmented networks that were expanding across Asia, initially steered by Japan but more recently led by China (Padilla et al. 2019; Yu & Cui 2017). At the end of 2011, nearly 60% of value-added exports

TABLE 4. Back-and-Forth Trade Concepts Indonesia 1995 and 2011 (US$ 000)

	Direct DVA % of gross exports			InDirect DVA % of gross exports			FVA % of gross exports			Re-exported IPC imports as % of IPC imports			Re-imported DVA content of gross exports		
	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015	1995	2011	2015
Agriculture	90,3	89,1	89,5	4,7	4,6	5,0	5,0	6,3	5,5	13,0	21,3	20,1	0,5	11,9	3,1
Mining, quarrying	91,5	89,1	85,4	4,1	4,7	7,0	4,5	6,2	7,6	25,2	30,5	25,6	2,2	90,8	29,5
Total services	81,9	83,9	84,9	11,5	7,7	8,0	6,6	8,3	7,1	24,2	22,4	20,1	4,8	64,5	30,3
Manufacturing	60,5	62,5	63,8	20,2	18,2	18,6	19,3	19,3	17,6	22,2	23,3	21,2	20,1	296,9	138,3
-Food, beverages, tobacco	67,9	69,4	70,2	23,2	21,4	21,8	8,9	9,2	8,0	13,1	17,0	16,8	0,9	33,5	16,6
-Chemicals	58,5	61,1	62,7	20,2	17,2	17,6	21,3	21,7	19,7	24,5	25,3	22,3	3,5	81,2	29,8
-Basic metals	62,6	67,5	65,7	13,9	18,4	19,3	23,5	14,1	15,0	11,3	19,7	18,4	0,8	24,4	10,2
-Computers, electronic	38,1	46,6	56,3	27,0	17,9	14,3	34,9	35,5	29,5	47,9	21,4	16,6	2,3	40,1	14,7
-Textiles, apparel, leather	64,0	62,8	61,4	18,2	15,1	16,3	17,8	22,1	22,2	41,8	35,6	38,0	5,4	38,4	22,8
-Wood, paper products	67,3	72,3	70,0	19,8	14,8	16,9	12,9	12,9	13,1	22,0	23,7	24,4	2,8	15,2	9,5
-Transport equipment	55,7	52,2	59,6	17,5	17,1	15,8	26,9	30,7	24,6	17,3	15,3	16,8	0,6	17,9	9,8
-Machinery, equipment,	39,1	39,1	42,1	21,1	25,1	24,7	39,9	35,8	33,3	24,7	26,2	22,7	1,1	23,9	11,2
-Other manufacturing;	52,8	64,7	64,2	21,4	16,5	17,1	25,8	18,8	18,7	33,1	21,8	20,4	1,3	10,8	8,6
TOTAL	75,1	76,2	74,0	12,9	11,0	13,1	12,0	12,8	12,9	22,4	23,7	21,3	27,9	464,0	201,3

Notes. Direct Domestic value-added (DVA) share (%) of gross exports; InDirect Domestic value-added share of gross exports; Foreign value-added share of gross exports (FVA); Re-exported intermediate imports as % of intermediate imports; Re-imported domestic value-added content of gross exports (in $ USD 000)

stayed either with ASEAN and East Asian countries, as did nearly 62% of gross imports. More significantly is the point that nearly 69% of total value-added in parts and components remained within the region, an increase from the previous 41% in the year 1995. The findings strongly suggest that Indonesia has gained through regional rather than global integration. Although, the re-orientation of Indonesia's export trade and its greater immersion in the regional production networks also supported larger shares of Indonesian exports going out to the World, as indirect exports increased substantially.

A consequence of greater immersion in GVC is that although gross exports from Indonesia to East Asia increased in most sectors, the share of domestic value-added reported a decrease, and the share of foreign inputs increased. Other cases, like that of Vietnam, have had greater impacts on dependency on foreign inputs, although gross exports from Vietnam expanded more rapidly than total exports from Indonesia (Ing & Kimura 2017).

SECTORAL GAINS ARISING FROM PRODUCTION FRAGMENTATION IN THE GVC

Additional gains and losses experienced in Indonesia at sectoral level are as follows. First, three sectors increased contributions to total value-added exports to the three principal trading blocs: food products, mining and quarrying, and basic metals. However, the three groups of products also faced acute adverse effects due to volatility in prices, exchange rate, and demand to a higher degree than non-commodities after 2011 (Sugiharti et al. 2020). Second, the share of exports of textiles and transport equipment decreased for almost all regional partners, partly as China was incorporated into the WTO, and more competitive Asian neighbors emerged (World Bank 2012). Third, in agricultural exports, chemicals, and electrical-optical equipment, Indonesia increased total exports and shares to all destinations but ASEAN (meaning, extra-ASEAN trade gains). Fourth, sectors that have gained substantially

from deeper participation in the GVC by way of exports of parts and components are metal goods, machinery equipment, and inputs within the transport sector. Fifth, Indonesia benefited from higher demand from East Asian production networks within agricultural goods, mining, metals, chemicals, and wood (Table 3). Indonesia improved its relations with East Asia by increasing the share of value-added exports in parts and components in all but food and miscellaneous manufacturing sectors.

Challenges are revealed as Indonesia lowered the share of exports to ASEAN countries in different sectors. First, in 1995, 8% of the total value-added exports of Indonesia were recorded under exports of electrical equipment to ASEAN countries; that share fell to 5% in 2011. Second, within textiles, leather, and footwear, the value-added exports previously absorbed by ASEAN fell from 7% of total DVA exports to only 1% in 2011. Third, the sector of transportation and machinery lowered its role in total value-exports from 11% to 5%. Products within wood, paper, and pulp also collapsed, decreasing from 6% to 3%. The loss across sectors in exports to ASEAN may indicate a loss in competition against ASEAN partners or East Asian countries. The Global Value Chain has opened new possibilities for countries, but competition has tightened as well. Yu and Cui (2017) found that stronger integration between China and ASEAN leads both to complementarity and competition - substitution effects.

DISCUSSION

A loss in share of exports could be attributed to a loss in competition compared to other emerging countries, a reorientation of production activities (driven by commodity prices and changes in comparative advantage) and a change in industrial and trade policy (Yu & Cui 2017). Those three factors most likely played a role in loss of export share, as noted in the literature related to Indonesian industrial and trade development (Aswicahyono et al. 2011; Esquivias 2017; Kis-Katos & Sparrow 2015).

The share of value-added Indonesian exports through final goods to Southeast Asia, Europe, and NAFTA decreased in almost all sectors. Exports from Indonesia rely more on parts and components and downstream links and less on final products. Larger shares of parts and components imply the stronger forward integration of Indonesia in regional value chains, with some implications. The first of these, the value-added of Indonesia, needs to cross multiple borders before getting to its final point of consumption, putting pressure on more efficient service links. A second implication is that Indonesia may face stronger effects arising from global variation: either adverse shocks or positive effects from demand and prices (Lee 2019; Sugiharti et al. 2020). The third implication is that the multiple cross-border trade will demand higher costs for transportation and require stronger coordination of policies with trade partners. The fourth implication is that taking the role of a large supplier of parts and components may be associated with low profits, as the highest returns in value are either from supplying high tech intermediates or from engaging in the last segments of the supply chain (Banga 2014). For instance, Indonesia was able to upgrade its integration with the GVC by moving from mainly being an exporter of commodities (1990s) to being an exporter of simple manufacturing goods (World Bank 2019). Nevertheless, ASEAN neighbors (e.g., the Philippines, Thailand, and Malaysia) make deeper transformations (higher backward linkages) moving to exports of advanced manufacturing.

As noted in Los et al. (2015), fragmentation took place more rapidly in capital intensive sectors related to metals, electronics, chemicals, transportation goods, than in labor-intensive and light manufacturing ones (food, textiles, and leather). Differences in transportation – coordination cost, tariffs, and prices of inputs are factors influencing differences in the speed and degree of fragmentation. Indonesia has a larger share of manufacturing in low skill, labor-intensive, and light sectors, partly explaining why fragmentation is low relative to ASEAN neighbors.

Benefits arising from Indonesian exports will most likely be linked to deeper regional ties with production networks in East Asia. The stronger connections are also made manifest in the greater participation of ASEAN and East Asian countries as suppliers of inputs to Indonesia (Yu & Cui 2017). Most sectors in Indonesia saw an increase in the share of inputs from East Asia or ASEAN countries in 1995-2011, with few exceptions but that of transportation equipment. The implementation of the ASEAN agreements with six strategic partners in East and South Asia have led to deeper Indonesian integration in trade agreements with its neighbors (Ing & Kimura 2017).

In sectors that are highly fragmented (e.g., electrical, machinery, and transportation), Indonesia was left behind by southeast Asian partners who created stronger regional links within the GVC. ASEAN countries with large shares of exports within manufacturing sectors tend to be more vertically specialized, as is the case with Malaysia (32% of vertical trade), Vietnam (nearly 23%), and Thailand (18%). Additionally, the small and medium enterprises in ASEAN countries gained more from integration within the GVC through indirect exports than Indonesian ones (López González 2017). Higher skill and higher-tech sectors commonly require a high share of strategic foreign inputs (FVA). Although foreign inputs expanded by nearly 215% in Indonesia, only a few sectors accounted for most of the change: agricultural goods, chemicals, metals, and electrical-optical.

A deeper integration in the GVC requires more policy efforts to improve the development of fragmented structures across sectors. Similarly, creating a more conducive environment for multinationals (MNE) and supporting infrastructure to facilitate logistics and coordination could support Indonesia's deeper links with global players. Efforts to connect domestic players with foreign firms operating in Indonesia via vertical links should continue, helping domestic firms to meet quality and volumes. Nevertheless, the lack of evidence of horizontal spillover effects arising from FDI suggests that technological transfers from foreign firms remain weak (Sari 2019), either as technological absorption capability in Indonesia remains low, or as foreign firms are unwilling to support the efforts. For instance, efforts to attract FDI that can support the increase in capital, technology, and skills are crucial (World Bank 2019).

Indonesia has practiced the picking-winner approach since the liberalization of markets in the 1990s. However, changes in sectors, priorities, incentives, and targets resulted in poor achievements in industrialization efforts and greater participation in the GVC. The volatility of global prices affecting key sub-sectors (e.g., coal mining, edible oils, rubber, cocoa, and metals), the more aggressive competition from global players (e.g., textiles, footwear, and furniture), and the lack of technological capability and local supplies (e.g., electronics, machinery, shipbuilding) have forced the constant re-orientation of priority sectors in the last two decades.

Changes in the export structure from the final good to intermediate parts and components during the 1995-2011 period required a better policy environment to encourage higher export growth as a consequence of higher economic growth targets. One policy agenda that still requires a breakthrough is in the area of ease of doing business. Exports can grow higher if the Indonesian government can consistently improve the facilitation of export activities in terms of reducing costs and time for handling export documents (EoDB 2020). At the same time, to improve stronger backward connections with the global market, simplification of documents, and more efficient time for import activities is needed. The World Bank Report (2020) states that Indonesia ranks 116th in the performance of trading across borders among the 190 countries studied. Another aspect of doing business that needs to be improved is licensing in starting a business, which is still far behind compared to other ASEAN countries.

Liberalization of markets, implementation of trade facilitation, and the removal of non-tariff barriers could promote the further integration of Indonesia within GVC (Ing & Kimura 2017). Such changes should be accompanied by structural transformation reform by providing tax allowances and tax holidays, for pioneer industries in the upstream sector may support further upgrading of Indonesia within the GVC. This step would increase the capacity of the domestic industry to increase domestic value-added in sectors that offer higher gains (World Bank 2019) while encouraging industries that export intermediate parts and components. At the same time, reforms in the labor market to loose labor regulations are needed, as they have remained too rigid compared to other ASEAN. Besides, appropriate labor reforms could support higher innovation and trade competitiveness (Ing & Kimura 2017). Labor reforms accompanied by vocational training as a response to industry requirements could support simultaneous improvements in wages and skills. Yu and Cui (2017) pointed out that improvements in labor productivity are crucial for greater participation in GVC for ASEAN countries.

A deeper integration in the GVC requires more policy efforts to improve the development of fragmented structures across sectors. Similarly, creating a more conducive environment for multinationals (MNE) and supporting infrastructure to facilitate logistics and coordination could support Indonesia's deeper links with global players. Though total exports increased, Indonesia has stayed as a player in one-way trade within intermediate goods. A more strategic industrial and trade policy for Indonesia, directed to build more widespread and specialized domestic networks, could support the country's participation in GVC and higher gains from trade. Regional value chains across Asia are essential drivers of trade for Indonesia, helping it to both increase its regional presence and reach global markets. A stronger regional integration could drive additional demand for Indonesian exports through re-export channels.

CONCLUSION

This study analyses the development of Indonesia within the global value chain and looks at the changes across sectors and partners arising from deeper regional integration and wider fragmentation of production. The paper uses an Inter-Country Input-Output dataset (TiVA) comprising 64 countries and 34 sectors, covering the 1995-2015 period, although the main focus is on 1995-2011 (the large expansion). The study decomposes the value-added content in exports into domestic and foreign shares, as well as into different indicators to study vertical specialization, and participation in the global value chain. The total value-added exports from Indonesian expanded by more than 300% within the 1995–2011 period, suggesting significant changes in export patterns as larger flows were re-oriented towards regional partners (Asia). Value-added to East Asia grew particularly fast, accounting for 47% of the total expansion. Particular sectors such as that of mining and some within manufacturing also grasped considerable benefits. Indonesia became more focused

on exports of intermediate parts and components rather than of final goods. Countries within Asia account for almost three-quarters of the total value-added exports from Indonesia. Stronger links with the dynamic Asian fragmented networks have been identified, as Indonesia increased exports/imports of parts and components, which signals more robust integration with regional value chains. Besides, its larger exports to Asia were a path towards larger exports to the World, as re-exports notably increased.

Some fundamental transformations in Indonesia have been identified. First, the share of domestic content in exports was large in 1995-2011 (almost 42%) as raw goods, and natural-resources largely dominated exports. Second, most of the fast-growing sectors were those belonging to the natural resources; sectors like agriculture, food, chemicals, metals, and most importantly, minerals, expanded particularly fast within the GVC. Third, the labor-intensive sectors lost steam (textile, wood, and miscellaneous manufacturing), most likely as competition from Asian countries became stronger, and industrial policy shifted to natural resources. Fourth, there were only small improvements within higher technological manufacturing activities where global value chains tended to be more dynamic (e.g., electrical-optical, machinery, and transportation equipment). Fifth, as opposed to its Southeast Asian partners, Indonesia had a large share of domestic value-added and a low share of foreign content, which suggests lower participation in vertical trade. Sixth, Indonesia strengthened its role as a downstream player, increasing its share in forward linkages, mainly within Asia. Finally, an expansion occurred in the share of services to total DVA, even though it remains small in comparison with advanced countries (20% compared to the 50% of the advanced countries).

The implementation of multiple regional trade agreements under the ASEAN umbrella may have supported stronger regional integration in the value chain, with the largest gains in natural resource-based sectors and, to some extent in, transportation and electrical components. Nevertheless, liberalization also drove strong competition in textiles-footwear, transportation, and wood-paper within the Asia region in final products. Exports of natural resources suffered greatly after 2011, suggesting that they are highly sensitive to prices and demand shocks.

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Jurnal Ekonomi Malaysia 54(1) 2020 153 - 165
http://dx.doi.org/10.17576/JEM-2020-5401-11

Macroeconomic Determinants of House Prices in Malaysia

(Penentu Makroekonomi ke atas Harga Rumah di Malaysia)

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ABSTRACT

House prices in Malaysia are considered to be seriously unaffordable as the median all-house price is relatively higher than the annual median income. Although the issue of house prices is prevalent in the country, few studies have been done to determine factors that influence its movement. The current paper, therefore, attempts to investigate the causal relationship between macroeconomic variables and house prices in Malaysia by accounting for the existence of a structural break for the variables. It is identified that in the long run, macroeconomic variables are collectively significant in influencing house price movement while the individual impact of macroeconomic variables is varied. The rise in the level of interest rates, housing supply, and inflation will result in the decline in house prices while gross domestic product and local currency appreciation cause the price to increase. It was found that stock prices do not significantly influence house prices. Of all the macroeconomic factors analyzed, exchange rate fluctuations appear to be most significant in explaining the movement of house prices. In the short-run, all macroeconomic factors are individually significant in influencing house prices and it is also identified that house prices tend to move back into their long-run state after temporary macroeconomic shocks with the speed of adjustment around 5.2 percent quarterly. It is advised for the policymakers to constantly monitor the movement of macroeconomic factors and take necessary actions to cushion the adverse impact of the movement of house prices in the country.

Keywords: house price; macroeconomic variable; causal relationship

ABSTRAK

Harga rumah di Malaysia dianggap sangat tidak mampu dimiliki yang mana harga median semua jenis rumah secara relatifnya adalah lebih tinggi berbanding dengan median pendapatan tahunan. Walaupun isu harga rumah adalah lazim dalam negara, terdapat sedikit kajian yang dilakukan bagi menentukan faktor-faktor yang mempengaruhi pergerakannya. Maka, kertas ini mengkaji perhubungan bersebab di antara pemboleh ubah makroekonomi dan harga rumah di Malaysia dengan mengambil kira kewujudan 'structural break' bagi pemboleh ubah. Didapati bahawa dalam jangka masa panjang, pemboleh ubah makroekonomi secara kolektif adalah signifikan dalam menerangkan pergerakan harga rumah, manakala kesan makroekonomi secara individu adalah berbeza. Kenaikan kadar bunga, penawaran rumah dan inflasi membawa kepada penurunan harga rumah, manakala pertumbuhan ekonomi dan peningkatan nilai mata wang tempatan akan meningkatkan harganya. Harga saham pula adalah tidak signifikan dalam mempengaruhi harga rumah. Dalam semua pemboleh ubah yang dianalisis, turun naik kadar pertukaran dilihat lebih penting dalam menerangkan pergerakan harga rumah. Dalam jangka masa pendek, semua faktor makroekonomi adalah signifikan secara individu dalam mempengaruhi harga rumah dan turut dikenal pasti adalah harga rumah yang mempunyai kecenderungan untuk bergerak semula ke dalam hubungan jangka panjang selepas kejutan sementara makroekonomi dengan kelajuan pelarasan sekitar 5.2 peratus dalam tempoh suku tahunan. Kajian ini menyarankan agar penggubal dasar perlulah sentiasa memantau pergerakan faktor makroekonomi dan mengambil tindakan yang sewajarnya dalam mengurangkan kesan negatif pergerakan tersebut terhadap harga rumah dalam negara.

Kata kunci: harga rumah; pemboleh ubah makroekonomi; perhubungan bersebab

INTRODUCTION

The house is an essential asset that individuals require for shelter and social activities. Based on the Maslow Hierarchy of Needs, house ownership is related to all five-tier needs, from the basic physiological to the most advanced self-actualization needs. For those who are economically capable to purchase multiple houses, it is also an attractive asset for economic reasons where it can be used to generate wealth through rental and property sales.

Bank Negara Malaysia (2012) has acknowledged the importance of the housing industry on the Malaysian economy as can be seen by its dominance in the financial market. Bank lending that includes debt securities held by banks is arguably mostly concentrated on real estate,

particularly the residential segment, then on other market areas of the economy. Bank Negara Malaysia (2012) reported that the banking system aggregate financing for property development and procurement reached RM454.3 billion or 41 percent of total financing at the end of 2012. From this amount, the exposure of banks to the residential property market in the form of financing for property purchases amounted to RM303.9 billion or 27.4 percent of total loans in the banking system, while RM19 billion were loans on working capital and construction property connecting loans. With the substantial size of the housing market with respect to the financial sector, any discouraging movements or issues in the housing market will, directly and indirectly, expose the country to certain degrees of economic risk.

One of the currently highly debated topics in Malaysia is the issue that house prices are said to be too high in comparison to income growth. As shown in Figure 1, the house price in Malaysia in general increased by 149 percent in 16 years from RM135,293 per unit in the first quarter of 2000 to RM337,096 in the last quarter of 2016. However, the income of Malaysians that is reflected by the gross domestic product per capita is comparatively more volatile throughout the years and in a downward trend starting from 2010. It is demonstrated that the rate of increase in gross domestic per capita for Malaysia in the same period increased by just 135 percent from RM16,949 to RM39,840, 14 percent lower than the rate of increase in house prices[1].

This situation leads to the issue of housing affordability among Malaysians. Based on the report made by Ismail et al. (2019) for the Khazanah Research Institute, the Malaysian residential market has surpassed the affordability threshold of 3.0 times median annual household income and has constantly exceeded 4.0 times from 2002 to 2016. From Table 1, four markets are considered severely unaffordable, namely Kelantan, Sabah, Pulau Pinang, and Negeri Sembilan. In these markets, the median house price is five times higher than the yearly median income. Bank Negara Malaysia (2017) said that houses in Malaysia are still considered unaffordable in 2016 based on the international standard of Median Multiple 5.0. The maximum median price of a house considered affordable in Malaysia is estimated to be RM282,000 and lower than the real median house price of RM313,000. Comparatively, the average median monthly income of Malaysians is only RM5,288.

Besides the issue of affordability, high house prices also lead to other serious economic and social problems. Bank Negara Malaysia (2012) reported that developments in the housing market can have a significant influence on monetary or financial stability. Variations in house prices are believed to demonstrate a direct and indirect influence against the demand for loans by households and their capability to pay off debts. This is more severe in the case of escalating house prices that are not accompanied by rigorous lending standards and may lead to excessive accumulation of debt by households and housing developers.

Based on a report made by Carter (2013), high house prices dampen economic growth, placing growing pressure on current infrastructure, escalating business costs, aggravating skill deficiencies, and preventing individuals from relocating to a successful city. Case et al. (2013) and Mian et al. (2014), meanwhile believe that house price-induced changes in wealth cause substantial movements in household expenditure and were a significant force in the recent recession. Stroebel (2015) argues that high house prices can lead to an increase in the prices of retail goods. This happens due to the wealth effect. As homeowners feel wealthier due to the increase in house prices, they will then pay less attention to the prices of retail goods. Retailers then respond by increasing their price mark-ups.

On social aspects of the matter, the high cost of acquiring or renting a house pushes city dwellers to live in informal settlements such as squatters and put themselves vulnerable to health and social problems due to the lack of facilities such as electricity, sanitary, and clean water in these areas. A high crime rate that is related to squatters may put city dwellers who are not able to stay in a properly developed area in danger. This is reflected by Mat Zin (2001) who reported that cases such as stealing, burglary, car theft, and drugs frequently occurred in squatters around Kuala Lumpur. Meth (2017) meanwhile contextualized the concern on housing structures in informal settlements in relation to high crime and violence rates. Meth (2017) argues that the incidents of crime can be indicated to the relatively high permeability of informal residential areas.

Analyzing factors that cause house prices to increase, it is demonstrated by many researchers abroad that macroeconomic factors play a big part in determining their movement. Sutton (2002) for example pointed that house price volatility can be linked to the movement in stock prices, interest rates, and income. A more recent study by Glindro et al. (2011) meanwhile argues that higher income, an increase in the real effective exchange rate, institutional factors, and broad credit availability are also associated with the increase in house prices.

In the case of Malaysia however, few attempts were performed to explore this relationship even though the issue of high house prices is prevalent in the country. Among the very few researches conducted in Malaysia was Lean and Smyth (2014), Trofimov et al. (2018), Sukrri et al. (2019a), and Sukrri et al. (2019b). Yet many other macroeconomic factors that could potentially influence house prices were left unchecked and need to be analyzed to deepen the understanding of this prolonged issue. Using findings from abroad to understand the relationship in the local context may be less ideal due to the heterogeneity of house price factors. Glindro et al. (2011) for example believe that

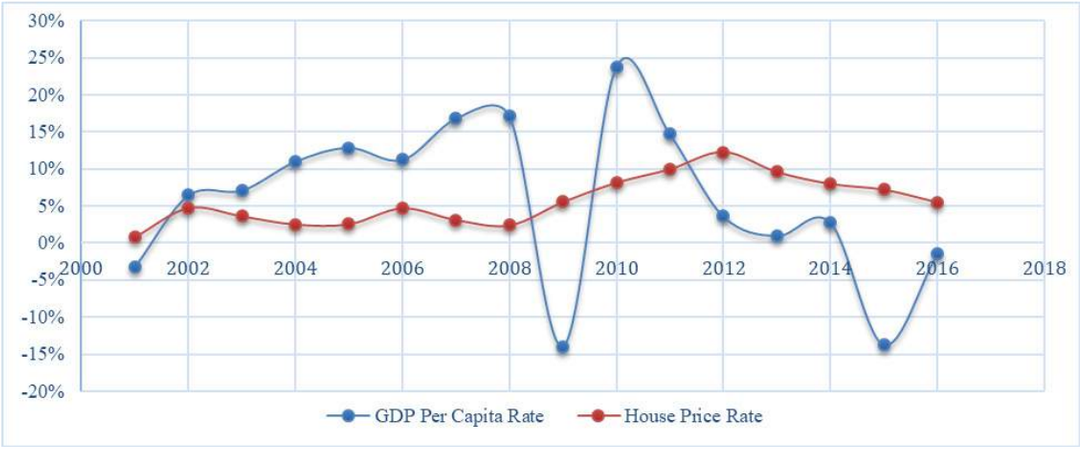


FIGURE 1. Comparison between gross domestic per capita growth and house price change rate *Source*: National property information centre of Malaysia (2016) and the world bank open data (2018)

TABLE 1. Median multiple affordability by states in Malaysia, 2002 - 2016

State/Area	2002	2004	2007	2009	2012	2014	2016	Affordability Classification
Kelantan	5.1	5.4	4.4	4.5	6.2	7.1	5.5	
Sabah	6.3	6.7	10.0	6.2	5.8	5.6	5.5	Severely unaffordable
Pulau Pinang	4.1	4.3	4.1	4.0	4.1	5.8	5.5	5.1 and over
Negeri Sembilan	3.4	3.1	3.3	3.4	2.8	5.0	5.1	
Pahang	5.0	4.2	3.7	3.9	3.8	5.3	5.0	
Johor	4.9	4.9	3.5	3.7	3.7	4.3	5.0	
Malaysia	4.1	4.3	4.4	4.4	4.0	5.1	5.0	
Terengganu	4.7	4.8	5.0	5.2	5.3	6.2	5.0	Seriously unaffordable
Kuala Lumpur	4.7	5.4	5.0	4.6	4.9	5.6	4.9	4.1 to 5.0
Selangor	3.7	3.5	3.6	3.6	3.6	5.2	4.7	
Perak	3.9	4.1	3.5	3.5	3.3	5.1	4.6	
Kedah	4.6	4.1	4.1	4.0	3.6	3.4	4.3	
Sarawak	N.A.	N.A.	3.7	4.1	4.0	4.2	4.0	Moderately unaffordable
Perlis	4.4	3.7	3.6	4.5	4.3	4.5	4.0	3.1 to 4.0
Melaka	3.4	3.5	2.9	2.9	2.6	3.1	3.1	

Source: Ismail et al. (2019).

Note: 1. Median multiple affordability is determined based on the ratio of the median all-house price by the household median income.
2. N.A. refers to the non-availability of the data.

the leading determinants of house prices are market-specific and it is important for these differences to be taken into account in the analysis.

The research documented in this paper has two objectives with the first being to identify the impact of selected macroeconomic factors on house prices in Malaysia for both long-run and short-run. Additionally, this paper attempts to identify the time it takes for house prices to move back into their long-run state due to temporary macroeconomic movements. These attempts were set by considering the shortcomings of previous literature in analyzing the topic in Malaysia. It is imperative to extend the knowledge obtained from previous analyses and broaden the understanding of this issue so that necessary actions or plans can be drawn to address the problem of house prices in the country. Moreover, this study can also be used as a reference or extended for future analyses.

The remainder of this paper is organized as follows: Section 2 discusses previous literature on house price determinants. Section 3 meanwhile describes the data as well as causal relationship assessment methods. Section

4 shows the estimation results, and the paper ends with conclusions in Section 5.

LITERATURE REVIEW

UNDERLYING THEORIES

According to Nakajima (2011), it is possible to have three groups of theories that attempt to explain the movement of house prices. The first group of literature focuses on the inflexible nature of housing supply that is associated with a longer period to build houses and the scarcity of land, particularly in urban areas. Based on the study conducted by Glaesar et al. (2002) who investigated the supply-side restrictions, it is identified that tightened housing supply regulations contribute to the increase of house prices. This is similar to the findings of Hilber and Vermeulen (2013) who discovered that the English planning system is an important determining factor towards the issue of housing affordability, particularly in urban areas. Another factor that can be linked to the housing supply side is the role of a limited supply of land and this is agreed by Ho and Ganesan (1998). Based on their findings, Ho and Ganesan (1998) identified that an increase in land supply will bring forth a decrease in housing prices.

The second group of theories mentioned by Nakajima (2011) investigates the demand side of the housing with factors such as demographics and income or wealth being identified as dominant factors. Adding to the theory, Ho and Ganesan (1998) noted that house prices in Hong Kong are mainly influenced by demographic factors particularly its growing population and income. Nakajima (2011) believes that house prices increase when income is more volatile since the household is encouraged to save their total wealth. Meanwhile, Glindro et al. (2011) elaborated that there are two ways on how demand can be affected, namely based on the substitution and wealth effects. The substitution effect causes the price of two substituting assets to move in opposing directions and eventually causes the price of the assets to exhibit negative relationships. Conversely, the wealth effect leads to an increase in the demand for an asset as the wealth of an individual grows.

The other strand of literature investigates the role of expectation on house price dynamics. Based on this theory, house prices are determined by the changes in the expectation of their future prices. It is believed that the expectation theory is rather important since house prices are more volatile than the movement of fundamental factors. Based on the theory of Irrational Exuberance explained by Schiller (2016), it is the extreme enthusiasm of the investors that drives house prices further upward and expects further increases in price and returns. Eventually, when the house price exceeds the changes in fundamental factors, a price bubble takes place. The increase in expectation is associated with several fundamental variables including sustained income growth (Kahn 2008) and house price momentum (Piazzesi & Schneider, 2009).

EMPIRICAL STUDIES IN INTERNATIONAL MARKETS

Sutton (2002) examined the degree to which house price variations can be attributed to fluctuations in incomes, stock prices and interest rates. Focusing on six advanced economies, namely the United States, the United Kingdom, Canada, Ireland, the Netherlands, and Australia, Sutton (2002) collected the quarterly data from the 1970s to 2002 and employed the small-scale vector autoregressive (VAR) model. It was identified that the factors studied were significant in explaining changes in house prices. It was also demonstrated that the growth of national income leads to an increase in house prices for each country. Meanwhile, shocks to real interest rates exhibit a negative relationship with house prices where a fall in real long- and short-term interest rates leads to an increase in house prices. The estimated model also implies the presence of a positive relationship between changes in equity and house prices for all countries. In addition to detecting the reaction of house prices to a specific shock, Sutton (2002) also employed the VAR to examine the relative importance of different disturbances in explaining the movement of house prices. According to Sutton (2002), the relative significance of different disruptions differs across countries. For most, changes in stock prices seem to be more significant in explaining larger variances of house price growth.

Unlike Sutton (2002) that investigated the housing price factors in various developed countries, Capozza et al. (2002) focused solely on the single-family housing market in the U.S. The analysis made can be considered extensive from another perspective as it employs both a time series and a large panel data set that includes demographic, economic and political determinants in 62 US metropolitan areas based on the data from 1979 to 1995. Based on the Ordinary Least Square (OLS) and panel data estimator to gauge the long-run relationship, Capozza et al. (2002) argued that house prices are positively related to the total population, population growth, construction cost and real median income where the increase in these macroeconomic and demographic variables will lead to a similar movement towards house prices. In line with the supply-side theory of house prices, the cost of housing and the land supply index are demonstrated to exhibit an inverse relationship with the prices.

Using quarterly data from 1970 to 2003, Tsattsaronis and Zhu (2004) analyzed house price determinants for 17 industrialized economies and focused both on the supply side and demand side of the house price theories. One of the key features of the

study by Tsattsaronis and Zhu (2004) that sets it apart from Sutton (2002) and Capozza et al. (2002) is that it identifies the dominant impact of inflation and short-term interest rates. However, Tsattsaronis and Zhu (2004) share a similar method with Sutton (2002) by employing the VAR model in analyzing the relationships and identified that inflation is an important determinant of housing prices where around 50 percent of the total variation in house prices are accounted by inflation for most of the countries analyzed. On the other hand, the short-term interest rate is identified to be the second most important determinant as it explains 10 percent of the movement in house prices. Sutton (2002) reported that two other variables related to mortgage finance that are significant in explaining house prices are bank credit and term spreads. Meanwhile, household income is identified to have a small effect on house price movements.

Geng (2018) analyzed the impact of macroeconomic factors towards housing prices for 12 advanced OECD economies based on panel cointegration tests and explained that the fundamental causes of house prices can be separated into three factors: demand, supply, and structural or institutional factors. This is an addition to the strands of literature explained by Nakajima (2011) that included the influence of expectation as the third theory of housing price determinants. For the demand factors, Geng (2018) corroborated the findings of Sutton (2002) and Tsattsaronis and Zhu (2004) where it is believed that variables such as household disposable income, net financial wealth, demographic trends, and interest rates are important. Similar to Capozza et al. (2002), it was also identified that supply lags that react to demographic needs lead to sustained increases in the ratio of population to the stock of dwellings in the long-run. This response is said to lead to housing prices rising faster than income. On the other hand, Geng (2018) argued that structural or institutional factors affect house prices through tax incentives for mortgage financing as well as rent controls. Geng (2018) adds that the effect of demand and supply factors on long term house prices differs across countries depending on the policy and structural aspects[2].

Apart from Geng (2018), another research that focuses on OECD countries is by Sabyasachi (2019). Based on data from 1970 to 2017, Sabyasachi (2019) employed the Random Effects model to investigate the impact of macroeconomic factors on house prices and it was demonstrated that determinants such as gross domestic product, price-to-income ratio, money supply, inflation, exchange rate, and urbanization exhibit a positive relationship with house prices. Sabyasachi (2019) extended the analysis on demographic factors and coincided with the literature on the supply side of house price theory such as Ho and Ganesan (1998) and Capozza et al. (2011) where the population was proven to be a significant variable. Sabyasachi (2019) added that an increase in the services sector's share of employment will cause house prices to fall.

EMPIRICAL STUDIES IN MALAYSIA

Glindro et al. (2011) examined house price movements in nine economies in the Asia Pacific region that included Australia, China, Hong Kong, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand by attempting to determine the influence of macroeconomic and institutional factors on house price movements as well as gauging whether there is a housing bubble. They used quarterly data from 1993 to 2006 for the residential property sector in 32 cities across the nine countries selected. Utilizing the panel data regression analysis, their findings are in line with Sutton (2002), Capozza et al. (2002), and Geng (2018) by arguing that higher income, index of land supply, institutional factors, and greater credit availability influence the development of house prices. It was also identified that the depreciation of real effective exchange rates and increasing real mortgage rates and equity prices dampen house prices. Glindro et al. (2011) also identified that the evidence of a housing price bubble or overvaluation is weak at the national level. However, speculative housing bubbles may be present in certain or specific market segments.

Based on quarterly data from 2001 to 2012, Bank Negara Malaysia (2012) employed a similar method to Capozza et al. (2002) by employing the OLS method to find the significance of variables in macroeconomic, financial, and government policies towards house prices and identify the dominant variables. Real gross domestic product, consumer sentiment, population, and inflation were found to be positively related to housing prices while the increase in property gains tax and base lending rates lowers the price level. On the other hand, the inverse relationship between the construction material cost and house prices contradicts the findings of Capozza et al. (2002). From the year 2010 to 2012, it was also observed that the loan to value ratio and lagging of house prices were also significant in influencing current house prices. Adding to the third strand of literature mentioned by Geng (2018), Bank Negara Malaysia (2012) acknowledged the impact of government policies towards house prices even though their influence is shown to be minimal.

Lean and Smyth (2014) meanwhile analyzed to find out the dynamic relationship between house prices, interest rates, and stock prices in Malaysia. Utilizing the ARDL bounds test for cointegration, it was identified that a long-run relationship did not exist between house prices, interest rates, and stock prices for Malaysia as a whole. However, there are numerous indications of interest rates and stock prices influencing house prices in more urban states such as Selangor, Kuala Lumpur, and Penang. Lean and Smyth (2014) argued that the rising foreign ownership of shares, combined with

rapid growth in property ownership by foreigners may explain the deficiency of cointegration for Malaysia as a whole. Strengthening the findings of Sutton (2002), the coefficient for stock prices is identified to be positive and significant, while the interest rates' coefficient is negative and insignificant. Although the speed of adjustment of house prices to equilibrium differs between regions, Lean and Smyth (2014) believe that house prices adjust fairly quickly towards long-run relationships if there are any shocks in the stock prices and interest rates. In the short-run, there are no clear patterns in the relationship between interest rates and stock prices with the movement of house prices for several housing markets. This suggests the segmentation of the housing market in Malaysia.

Trofimov et al. (2018) used quarterly data from 2001 to 2015 to explain the contributing factor of demographics and macroeconomic variables on Malaysian property prices by focusing on the demand side of the house price theory. Based on the Vector Error Correction Model (VECM) employed, it was identified that the population had a significant and positive relationship with the demand for residential properties. The increase in residential property demand causes house prices to move upward. Similar to Bank Negara Malaysia (2012), Trofimov et al. (2018) included the gross domestic product and base lending rate in the analysis and both variables were identified to be negatively related to the prices of residential properties where an increase in the gross domestic product and base lending rate dampens house prices. In line with Tsattsaronis and Zhu (2004), a positive and significant relationship was also identified between the consumer price index and residential property prices in the country.

Further developing the enhanced house price index model for Malaysia, Sukrri et al. (2019a) followed a Laspeyres Approach where the index is modeled by integrating the demand and supply determinants of house prices. According to Sukrri et al. (2019a), a Laspeyres Approach is an index formula used to gauge the price growth of a basket of goods and services consumed over a base period. The advantage of this approach is that the index can be extended to include additional prices observed. Similar to Lean and Smyth (2014), the ARDL model is then employed to assess the dynamics between house prices and their determinants. In the long-run, it is identified that the overnight policy rate, employment, and consumer price are positively related to housing prices while housing loans dampens its movement. Contradicting Capozza et al. (2002) and Bank Negara Malaysia (2012), the increase in land supply was identified to cause house prices to move upward while construction costs were found to be insignificant.

Utilizing quarterly data from the period 2008 until 2017, Sukrri et al. (2019b) extended the analysis made by Sukrri et al. (2019a) by investigating the impact of macroeconomic factors on house price index in Malaysia for both long-run and short-run. Similar to Sukrri et al. (2019a), the analysis also utilizes the Laspeyres Approach to obtain a type of enhanced house price index that incorporates demand and supply determinants. In order to identify the long-run relationship between the variables, Sukrri et al. (2019b) employed the ARDL model and identified that macroeconomic factors are jointly significant in explaining the movement of the enhanced house price index. Based on the individual macroeconomic analysis, construction cost and housing loans are identified to be significant in influencing house prices with positive relationship, while overnight policy rate and land supply are not. The Error Correction Model (ECM) is then employed to identify the short-run impact and Sukrri et al. (2019b) demonstrate that about 40 percent of the disequilibrium in the relationship that happens due to the macroeconomic shocks is corrected within one period.

As briefly discussed in the Introduction, there are limited researches that have been performed for Malaysia to analyze the relationships between macroeconomic factors and house prices. Even though there are studies conducted such as Trofimov et al. (2018), Sukrri et al. (2019a), and Sukrri et al. (2019b), these researches did not incorporate the existence of structural breaks in analyzing the impact of macroeconomic factors. According to Perron (1989), ignoring the existence of structural breaks may weaken the power of rejecting a false null hypothesis. On the other hand, research such as Lean and Smyth (2014) who considered the structural breaks focused only on the demand side of house price theory by exploring the dynamic interaction between house prices, interest rates, and stock prices. Meanwhile, other macroeconomic variables including the supply side of house price factors that may be important were excluded. Thus, the current paper tries to fill in the gap by investigating the impact of macroeconomic variables on both the demand and supply sides while incorporating the existence of structural breaks in the unit root and cointegration analysis. To extend the contribution on the supply side of house price theory, the current paper explores the impact of housing supply rather than looking into the influence of land availability as investigated by Ho and Ganesan (1998) and Capozza et al. (2002).

DATA AND METHODOLOGY

The analysis covers 17 years of housing prices and macroeconomic quarterly data from 2000 until 2016. There are six macroeconomic factors selected based on previous studies: i) base lending rate, ii) real gross domestic product, iii) housing stock (to represent the level of housing supply), iv) consumer price index (to represent inflation), v) real effective exchange rate, and vi) stock prices. The housing price and macroeconomic

variables are transformed into natural logarithms. The long-run and short-run relationship between macroeconomic factors and house prices in Malaysia are analyzed using cointegration and error correction modeling[3].

UNIT ROOT TEST WITH STRUCTURAL BREAK

The first step in analyzing the relationship between macroeconomic determinants and house prices is by conducting the unit root test. However, Perron (1989) reported that the existence of structural breaks on data that is trend stationary causes conventional unit root tests to become biased towards a false null hypothesis of a unit root. In relation to that, the current paper employed a unit root test that allows for a one-time break where the breaking point date is selected based on the minimum Dickey-Fuller t-statistics. This model also follows an assumption that the data is non-trending while the break occurs gradually. The number of lags is selected based on the Schwarz info criterion.

AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL FOR LONG-RUN RELATIONSHIP

The cointegration test that is used in this research is based on the Autoregressive Distributed Lag Model (ARDL). Besides its ability to analyze the model with structural breaks and causal relation for variables in different orders of integration (Pesaran and Pesaran, 1997), the ARDL model also solves the problem of autocorrelated errors that is suffered by the finite distributed lag model (Hill et al., 2008). Pesaran and Shin (1997) added that the ARDL estimate for long-run coefficients are also consistent whether the regressors are all I(0) or I(1).

The estimation of the long-run relationship between variables by using the basic ARDL (p,q) model is shown below;

$$y_t = \alpha + \sum_{i=1}^{p} \theta_i y_{t-i} + \sum_{i=0}^{q} \beta_i x'_{t-i} + \lambda_1 y_{t-1} + \lambda_2 x'_{t-1} + \varepsilon_t \quad (1)$$

Where ε_t is the error term and α, θ, β and λ are the coefficients that need to be estimated. In the current paper, y is referred to as the house price while x' is a set of macroeconomic variables selected, namely the interest rate, real gross domestic product, housing stock, inflation, exchange rate and stock price.

Optimal lags in the ARDL model for this analysis are determined by the Akaike Info Criterion (AIC) where a model with a certain number of lags in the right-hand side of the variable that produces the lowest value of AIC is considered optimal. The current paper sets the maximum number of lags into four, which is equivalent to one year[4].

To test for the significance of breaking point in explaining the level of housing price, a dummy variable that accounts for the breakpoint periods of macroeconomic factors and housing price as well as the intercept are treated as fixed regressors.

To identify the existence of a long-run relationship, bounds test of Pesaran, Shin and Smith (2001) is conducted to test the following hypotheses:

1. H_0: $\lambda_1 = \lambda_2 = 0$, indicating the non-existence of a long-run relationship among variables.
2. H_1: $\lambda_1 \neq \lambda_2 \neq 0$, indicating the existence of a long-run relationship among variables.

The hypotheses are assessed or tested by comparing the estimated F-statistics of bounds test with two critical bounds values for a given significance level, namely lower bound and upper bounds critical values, obtained from Pesaran et al. (2001). The null hypothesis is rejected when the value of F-statistics is higher than the upper critical bound and the rejection of the null hypothesis indicates there is a long-run relationship between the housing price and macroeconomic factors. On the other hand, if the F-statistics is smaller than the lower critical bound, then the null hypothesis is failed to be rejected and indicates no significant long-run relationship between the variables. However, when F-statistics is between the upper and lower critical bound, then the relationship between the variables is inconclusive or undetermined in the long-run.

SHORT-RUN RELATIONSHIP AND SPEED OF ADJUSTMENT

The short-run relationship is obtained from an Error Correction Model (ECM) as shown in Equation (2) with Error Correction Terms (ECT) representing the speed of adjustment for the model to reach equilibrium or long-run relationship. Based on Engle and Granger (1987), the error correction model shows the reaction of the dependent variable to shocks of the regressors or independent variables and it also indicates the proportion or fraction of the disequilibrium from one period that is corrected in the next period.

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{i=0}^{q} \beta_i \Delta x'_{t-i} + \lambda_1 ECT_{t-1} + \varepsilon_t \quad (2)$$

Where $ECT_{t-1} = \varepsilon_{t-1} = y_{t-1} - \alpha - \beta x'_{t-1}$.

A least square estimation is carried out to analyze the ECM model and the number of lags in the model is determined based on the lowest Akaike Info Criterion values. If $\beta \neq 0$ then it shows that x' is significant in influencing y in the short-run. This implies that there exists a short-run relationship between the housing price and macroeconomic determinants.

Meanwhile for the ECT terms, $-1 < \lambda < 0$ indicates a significant adjustment of the model towards equilibrium in the long-run. Since ECT indicates the proportion or percentage of the disequilibrium from one period that is

corrected in the next period as mentioned by Engle and Granger (1987), then the period for the disequilibrium to be completely corrected is equal to 1 divided by the value of the ECT coefficient, or ($1/\lambda$). Since this research is using quarterly data, then ($1/\lambda$) shows the total number of a quarter(s) for the model to reach its equilibrium or long-run relationship.

DIAGNOSTIC AND STABILITY TESTS

The existence of a serial correlation in the ARDL and the ECM models will be tested by using the Breusch-Godfrey serial correlation LM test meanwhile the stability of the models is examined by using the CUSUM test. Ramsey (1969) Regression Specification Error Test (RESET) on the other hand is utilized to identify whether the models are correctly specified or otherwise. To test the presence of heteroskedasticity, this paper conducted the Breusch-Pagan test with the null hypothesis that suggests the non-existence of heteroskedasticity.

RESULT ANALYSIS

This research employs a unit root test that allows a one-time structural break where the number of lags is determined according to the Schwarz criterion. Based on the results as shown in Table 2, it is identified that the level of stationarity is mixed with the interest rate, real gross domestic product, housing supply, inflation, stock price and the exchange rate is stationary at the first difference or I(1) while the house price is stationary at level, I(0). The mixture of stationary levels of the variables justifies the use of the ARDL model to analyze the relationship between housing prices and macroeconomic factors in the long-run.

In determining the period of the structural break for each variable, minimum Dickey-Fuller t-statistics is used and it appears that the breakpoint period for the interest rate and house price occurs at a similar period, that is 2008 Q3. The breakpoint period for the real gross domestic product occurred in 2011 Q1 while a similar phenomenon is experienced by housing supply in a more recent period. The earliest breaking point is shown by the level of inflation where it appears in the last quarter of 2004. Stock prices exhibit breakpoint in the first quarter of 2013 while the breakpoint period for the exchange rate is shown in 2009 Q4. The existence of a structural break in the unit roots shows the significance of incorporating the element in exploring the impact of the macroeconomic determinants on house prices.

The optimal ARDL lags in the analysis are (4, 3, 4, 3, 3, 4, 4) as the model produces the lowest value of AIC. As demonstrated in Figure 2, the house price, real gross domestic product, exchange rate, and stock price are set to 4 lags while the interest rate, house stock, and inflation contain 3 lags.

Table 3 shows the bounds test based on the ARDL model that is applied to analyze the joint significance of the regressors in explaining the housing price in Malaysia in the long-run. It is identified that the F-statistics is higher than the upper critical bound at any significance level and suggests the rejection of the null hypothesis of no cointegration between variables in the model. This implies that the macroeconomic variables are jointly significant in influencing house prices in the country. By referring to the diagnostic tests, it is evident that the model did not exhibit the problem of serial correlation and is also free from heteroskedasticity as shown by the Breusch-Pagan-Godfrey test. The Ramsey RESET test on the other hand suggests that the cointegration model is correctly specified.

By referring to the long-run coefficient of the independent variables in Table 4, the majority of macroeconomic factors are significant in determining the level of housing price. The interest rate is identified to demonstrate a negative relationship with the housing price and significant at a 10 percent level where an

TABLE 2. Unit root test with breakpoint

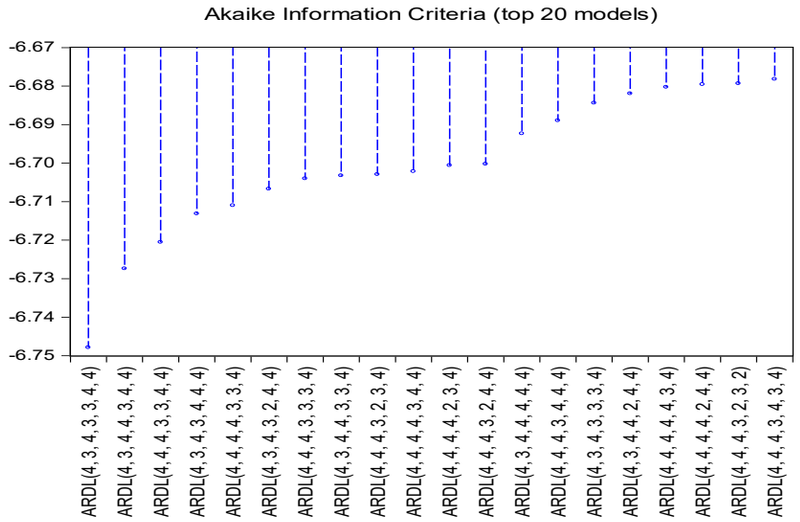
Variable	Breakpoint Period	ADF Test Statistics	
		At level	At 1st difference
House price	2008 Q3	-5.7851***	-9.4780***
Interest rate	2008 Q3	-3.8703	-10.1512***
Real gross domestic product	2011 Q1	-4.4585	-8.9448***
Housing supply	2015 Q4	-4.3809	-10.9010***
Inflation	2004 Q3	-4.0847	-8.2179***
Stock price	2013 Q1	-4.3932	-6.4839***
Exchange rate	2009 Q4	-3.1154	-8.4020***

Note: 1. The model assumes that the break occurs gradually and follows the same dynamic path as the innovations.
2. The data is also assumed trending with breaks in the intercept and trend.
3. The number of lags is selected based on Schwarz information criterion while the breaking point date is selected based on the minimum Dickey-Fuller t-statistics.
4. Null Hypothesis: The model tested contains a unit root.

TABLE 3. Long-run relationship between housing price and macroeconomic movement

ARDL Model: (4,3,4,3,3,4,4) F-Statistic: 6.8202		
Critical Value	Lower Critical Bound	Upper Critical Bound
10% Significance	2.12	3.23
5% Significance	2.45	3.61
1% Significance	3.15	4.43
Breusch-Pagan Serial Correlation LM Test	F-statistic 0.8284 Prob. Chi-Square(2) 0.1488	
Breusch-Pagan-Godfrey Heteroskedasticity	F-statistic 0.8178 Prob. Chi-Square(32) 0.5888	
Ramsey RESET Test	F-statistic 1.8567 Probability 0.1852	

Note: 1. The long-run relationship between Housing Price and macroeconomic factors is analyzed based on the Bounds test of cointegration with hypothesis null assuming no correlation between variables.
2. The model includes a constant term while the breaking point is treated as a fixed regressor.



Note: The number of lags for the independent variables in the model is selected based on the lowest Akaike info criterion value with the maximum number of lags is set to four.

FIGURE 2. ARDL lag selection criteria

increase in the level of interest rates by 1 percent will cause the housing price to fall by 1.7 percent. The reason for an increase in the interest rates to cause house prices to fall can be seen from the demand side of house price theories where the interest rate increases the cost of financing and adversely impacts the level of demand for houses. With fewer housing demand in the economy, house prices will tend to fall.

Validating the income effect of the demand side of house price theory, a positive relationship is exhibited between real gross domestic product and housing price. Based on the coefficient value, 1 percent growth in the variable will cause an increase in housing prices by 2.4 percent at 1 percent significance level. The positive relationship between real gross domestic product and house prices happens because an increase in economic growth causes incomes to rise. Following the movement of income, housing demand will increase and push house prices upward.

The level of housing supply and price on the other hand exhibits a significant negative relationship at 5 percent level. A fall in the housing supply by 1 percent leads to an increase in prices. The impact of housing supply on house prices can be explained through the supply side of house price theory where an increase in house supply causes house prices to fall.

Due to the wealth effect, an increase in the level of inflation causes the household's purchasing power to fall and leads to decreasing demand for houses. This adverse impact of inflation on housing demand causes

TABLE 4. Long-run coefficient

Independent Variable	Coefficient
Interest rate	-1.7452*
Real gross domestic product	2.4393***
Housing stock	-2.4563**
Inflation	-0.2482*
Exchange rate	4.8746*
Stock price	-0.4208
Structural break	0.0591
Constant	22.2122

Note: 1. Long-run coefficients of macroeconomic factors with respect to Housing Price is analyzed based on the ARDL (4,3,4,3,3,4,4) model.
2. Standard errors are shown in parentheses with *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

house prices to drop in the long-run. The negative relationship between inflation and house prices shows the seriousness of the housing unaffordability in the country where an increase in inflation incapacitates the ability of individuals to purchase a house. Based on the analysis, it is identified that a 1 percent rise of inflation causes house prices to fall by 0.25 percent and this relationship is significant at 1 percent level.

The exchange rate, represented by the REER, exhibits the largest magnitude of impact on housing prices as shown by high coefficient value. A 1 percent increase in the exchange rate, which indicates that exports become expensive while imports become cheaper, causes the housing price to increase by 4.9 percent and significant at the 10 percent level. This corroborates the wealth effect based on the demand side of house price theory since the appreciation of local currency can be translated to the growth in wealth due to international trade. As wealth or income grows, the housing demand will expand and eventually lead to an increase in house prices. Based on Glindro et al. (2011), an increase in the real effective exchange rate is associated with the increase in house prices due to the prospect of higher capital gains from the exchange rate.

The movement in stock prices exhibits no impact on house prices in the long-run as shown by the coefficient level that is not significant at any level. This situation is believed to happen due to the contradicting impact of the substitution and wealth effects on the demands on an asset. According to Glindro et al. (2011), the substitution effect dictates an inverse relationship between the prices of two assets where the high return in one market causes investors to leave the other market. The wealth effect meanwhile expects a positive relationship since the high returns obtained from one market will increase the investors' total wealth and their capacity of investing in different assets. Although an upsurge in stock prices may cause the demand and price of houses to fall as explained by the substitution effect, this impact is canceled by the wealth effect and ultimately leaves the price of houses to remain unaffected in the long-run.

Since the unit root tests indicate the presence of structural breaks for the variables, the current paper includes the factor as a fixed regressor in the model. While the structural breaks exhibit positive signs on its coefficient and imply the adverse effect on house prices, the impact is identified to be insignificant in the long-run. This suggests that although macroeconomic variables experience structural breaks due to certain factors, these effects may be momentary or fail to be translated into the movement of house prices.

The result of the Wald test to identify the significance of individual macroeconomic movements towards short-run house prices is shown in Table 5. By referring to the probability value of the F-Statistics, the null hypothesis assumes no causal relation between house prices and macroeconomic factors is rejected at a 5 percent significance level or lower. This indicates that movements in individual macroeconomic determinants are significantly transmitted into the house price in the short-run.

TABLE 5. Short-run relationship between house price and individual macroeconomic movement

Macroeconomic Factor	Wald Test F-statistics (Probability)
Base Lending Rate	4.1895 (0.0131)
Gross Domestic Product	12.4953 (0.0000)
House Stock	17.1222 (0.0000)
CPI	2.5921 (0.0698)
Exchange Rate	6.1198 (0.0009)
Stock Price	4.6804 (0.0044)

Note: 1. The short-run relationship between macroeconomic factors and housing price is analyzed based on the F-statistics obtained from the Wald test with hypothesis null assumes no causal relationship between variables.
2. Probability value is shown in parenthesis with 0.10(10%), 0.05(5%) and 0.01(1%) significance level.

Based on Table 6, the error correction term is significant at a 1 percent significance level. The negative sign on its coefficient indicates the significant correction of the model into a long-run equilibrium when short-run macroeconomic movements occurred. The value of the coefficient indicates that the 5.3 percent gap between the actual price and equilibrium price is closed within a quarter year. This speed of correction is

rather low and indicates a slow reaction of prices since disequilibrium that occurs due to a short-term deviation in macroeconomic factors is fully corrected only within 19 quarters or 4 years and 3 quarters.

TABLE 6. Short-run adjustment

Variable	Coefficient
Error Correction Term	-0.052607***

Note: 1. The coefficient for ECT is identified by inserting the lag value of the ECT as one of the independent variables in the Error Correction Model.
2. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

As can be seen from Table 7, the Breusch-Godfrey LM test indicates that the model is free from serial correlation up to 2 orders while the Breusch-Pagan test conducted suggests that the model did not exhibit heteroskedasticity. Meanwhile, the CUSUM stability test shows that all models are stable against the critical bound of a 5 percent significance level. The Ramsey RESET test, on the other hand, implies that the model is well specified in a linear model since the null hypothesis's correctly specified model is failed to be rejected even at a 10 percent significance level.

TABLE 7. Residual and stability diagnostics

Test	F-Statistics	Probability
Breusch-Godfrey Serial Correlation LM Test	0.969557	Chi-Square: 0.1761
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.805930	Chi-Square: 0.6145
Ramsey RESET Test	0.026494	0.8717
Cusum Stability Test	Stabile at 5%	
Cusum of Squares Test	Stabile at 5%	

Note: The number of lags included in the Breusch-Godfrey serial correlation LM test is two (2) while the number of fitted terms in the Ramsey RESET test is one (1).

CONCLUSION

The current study investigates the relationship between macroeconomic determinants and house prices in Malaysia from 2000 to 2016. Based on the results, the relationship between the variables is consistent with the demand and supply sides of house price theories. In analysing the long-run relationship, the current paper employed the ARDL model and it is found that the joint movement of macroeconomic factors is significant in explaining housing prices in Malaysia. Similar to the findings of Sutton (2002) and Bank Negara Malaysia (2012), interest rates are identified to have an inverse relationship with house prices where an increase in the said macroeconomic factor causes house prices to fall. Meanwhile as argued by Capozza et al. (2002), Sutton (2002), and Bank Negara Malaysia (2012), a fall in gross domestic product growth is demonstrated to dampen house price growth and validates the income effect. Sharing the same effect as the interest rate, an increase in housing supply and inflation rate causes house prices to fall. The impact of housing supply on lowering the house price extends the findings of previous literatures on the supply side of the house price theory such as Ho and Ganesan (1998) and Capozza et al. (2002). On the other hand, the exchange rate exhibits a positive relationship with house prices as demonstrated by Glindro et al. (2011). According to Glindro et al. (2011), in countries where foreign investment acts as an important contributor to the economy, such as those in Asia, an appreciation of the exchange rate is normally related with housing booms. The relationship between stock prices and house prices meanwhile is identified to be insignificant in the long-run and happens due to the contradicting effect of wealth and substitution effects. Referring to the argument made by Lean and Smyth (2014), a deficiency of cointegration between stock price and house price in the Malaysian market can also occur due to the increasing ownership of shares and property by foreigners. Meanwhile, although the structural break is present on the macroeconomic variables as demonstrated based on the unit root tests, it is shown to be insignificant in explaining the movement of house prices in the long-run.

In analysing the short-run relationship based on the error correction modeling, it is identified that all macroeconomic variables are individually significant in explaining housing price growth. In terms of the speed of adjustment to equilibrium or long-run relationship, short-run shocks in the macroeconomic factors are identified to be corrected within 4 years and 3 quarters. This is in line with the conclusion made by Zaemah (2010) who acknowledged the inefficiency of the housing sector in Malaysia as demonstrated by the slow adjustment process of the housing market towards long-run equilibrium.

By referring to the findings, it is vital for policymakers to constantly monitor the movements of these macroeconomic variables given their significant impact on house prices in the country for both long-run and short-run. Strategies must be constructed to stimulate the growth of housing supply so that it can cushion the impact of the expansion of real gross domestic product and the exchange rate on house prices. Apart from that, monetary policy should also be adjusted to dampen the negative effect of interest rates and inflation since the increased level of these variables weaken the economic ability of the individuals to acquire the asset and leads to a fall in their demand. Since the current paper is

conducted on the aggregate level, it is recommended for future research to consider analysing the relationship based on specific markets and including microeconomic variables. This will expand the understanding of the topic and help to build more precise policies that cater to distinctive characteristics of each specific market in Malaysia.

NOTES

1 Bank Negara Malaysia (2017) reported that from 2007 to 2016, house price rise by 9.8 percent, while household income has increased by just 8.3 percent. This issue is said to be most prevalent between the year 2012 and 2014 where the house price has increased by 26.5% and double the rate of increase in income, which is 12.4%.

2 Housing investment tax relief will drive housing demand upwards and lead to the increase of house prices. Positive income shocks lead to a higher price impact in countries with higher tax relief. The long-run supply responsiveness, meanwhile, mainly affects house price elasticities with respect to mortgage rate, with higher long-run impact on real house prices in markets with less elastic supply. Moreover, rent control moderately dampens the effect of supply increases on house prices.

3 According to Hill et al. (2008), cointegration analysis is a test to identify the stationarity of the error term where an error term that is stationary indicates the cointegration between the dependent variable and the regressors. When two variables are proved to be cointegrated, it means that their value will not diverge too far from each other and demonstrates a fundamental relationship. Conversely, an error term that is non-stationary implies that the two variables are not cointegrated.

4 The Schwarz criterion is not included in the test to avoid the risk of under-fitting the model as the Schwarz criterion tends to select a simpler model specification. This is consistent with Koehler and Murphee (1988), who said that Schwarz criterion leads to a lower model for forecasting.

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Jurnal Ekonomi Malaysia 54(1) 2020 167 - 179
http://dx.doi.org/10.17576/JEM-2020-5401-12

Does Market Competition Motivate Corporate Social Responsibility? Insight from Malaysia

(Adakah Persaingan Pasaran Memotivasikan Tanggungjawab Sosial Korporat? Pengalaman Malaysia)

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ABSTRACT

This study aims to examine the role of product market competition on Corporate Social Responsibility (CSR) by engaging altruism and utilitarianism views. Using dynamic Generalized Method of Moment panel regression for 524 Malaysian non-financial industry listed companies from 2010 to 2016, we find that firms in a more competitive environments increase their CSR activities. We interpret these results as evidence that CSR is strategically chosen by firms not for the societal benefits, but more on business as usual; a support for utilitarianism view, i.e profit maximizations. It explains the rationale that CSR activities are less employed in a more monopolistic or oligarchic industry. Practically, this study suggests that the CSR activities are forced by market competition. Firms in a more competitive market need CSR as their non-market strategies.

Keywords: Product market competition; product differentiation; market size; market concentration; corporate social responsibility

ABSTRAK

Kajian ini bertujuan untuk mengkaji peranan bagi persaingan pasaran produk terhadap Tanggungjawab Sosial Korporat (CSR) dengan melibatkan pandangan altruisme dan pandangan utilitarianisme. Berdasarkan regresi panel Generalized Method of Moment dinamik, melibatkan 524 syarikat industri bukan kewangan tersenarai di Malaysia bagi tempoh 2010 hingga 2016 didapati, aktiviti CSR lebih tertumpu kepada firma dalam persekitaran yang lebih kompetitif. Dapatan ini menjadi bukti terhadap pandangan utilitarianisme, iaitu pemaksimum untung yang mana, aktiviti syarikat memilih CSR sebagai strategi untuk tujuan perniagaan dan bukan untuk kepentingan sosial. Ini jelas menunjukkan bahawa aktiviti CSR kurang dilakukan dalam industri yang bersifat monopolistik atau oligarki. Secara praktikal, kajian ini menunjukkan bahawa aktiviti CSR disebabkan oleh persaingan antara pasaran. Syarikat dalam pasaran yang lebih kompetitif menjadikan aktiviti CSR ini sebagai strategi bukan pemasaran.

Kata Kunci: Persaingan pasaran produk; pembezaan produk; saiz pasaran, penumpuan pasaran; tanggungjawab sosial korporat

INTRODUCTION

Corporate Social Responsibility (CSR) has been traditionally trusted as the bridge between business and society. However, the motive behind it is still the subject of much debate, straddling two schools of thought: altruism and utilitarianism. According to the altruistic view, firms are willing to share their profit proportionally simply because of the good nature of such deeds (Elahuge 2005). Meanwhile, the utilitarian view argues that the motive behind CSR is profit maximization (Baron 2001). Both perspectives coexist without a clear consensus as to whether firms demonstrate CSR because they want to help communities or because it is profitable.

There are vast empirical findings devoted to the utilitarian view, but none of the results are conclusive or they lack a strong strategic rationale. Margolis and Walsh (2003) provide survey results based on 109 empirical studies concerning the CSR-utilitarian view. The objective is to portray the relationship between

CSR and financial performance under the stakeholder view. The survey found that 50% of studies concluded positive and significant associations between CSR and profitability. Meanwhile, 7% of studies demonstrated a negative relationship, another 18% showed no CSR effect, and 25% produced mixed results. This implies that CSR studies have not yet found a consensus about the purpose of CSR related to its financial performance.

On the one hand, implementing a corporate strategy backed by fully societal motives is an absurd idea; completely against the objective of profit organization. CSR is a growing trend not purely due to altruism, but because it is a tactic to improve a firm's image among society and consumers (Lee 2015). Firms exercise CSR to achieve the benefits of a good reputation, integrity, and friendly relationships between firms and investors. The outcome is to distinguish their firms apart from the competitors. According to Baron (2006), CSR practices are to differentiate a firm from competitors, earning the firm a better reputation and image, and thereby increasing the confidence of its stakeholders. Such stakeholders include employees who, upon witnessing the charitable efforts of the firm, feel motivated to work harder and stay longer at the firm. As a consequence, the CSR activities improve the firm's retention of employees. This is tally with agency theory that suggests that CSR may be championed by managers, not for the sake of social initiatives, but rather to increase their reputation (managerial alignment) or power (managerial entrenchment).

This study proposes a strategic management view to explain the motive behind CSR actions. Rather than a conventional examination of the CSR-profit linkage, we investigate CSR as a strategic market competition tool. We argue that CSR is a non-market strategy imposed by a firm to survive in a competition. If there is a high level of market competition, firms will demonstrate CSR as a means of market penetration (branding or marketing), new market access, or to lower contingency liabilities part of the firm's competitive advantage. Such strategic efforts are undertaken with the hope of enhancing firm performance. It means we argue that CSR is practiced not due to ethical exercise as suggested by the altruism's proponents, but it is motivated by strategic market competition (utilitarian).

Malaysia presents an ideal case study for other developing countries with similar institutional and market features based on our four observations. First, Malaysian firms have begun to stress CSR as one of the most important instruments to help sustain themselves in the marketplace, where most firms utilize CSR as their non-market strategy (Nair 2013; Teo 2012; Yeen 2015). Second, as a developing country, the number of new businesses registered in Malaysia is increasing steadily. This indicates that the level of product market competition (PMC) is increasing annually due to many new competitors' entry into the market According to the Trading Economics, new businesses registered in Malaysia was last measured at 46,555 units in 2016, and previously measured around 32,000 units newly registered. Meanwhile, the competitive index in Malaysia according to Trading Economics (2016) shows that new players' entry into the market has led to an increase in Malaysia's productivity. Third, Malaysian firms have been also aggressively adopting CSR. As many as 16 Malaysian firms published Global Reporting Initiative (GRI) reports in July 2012, only three years after the initiative began. The number of Malaysian firms publishing reports climbed to 37 in 2015 (Global Reporting Initiative 2016). Additionally, the number of capitalization in FTSE4Good[1] Bursa Malaysia steadily increases year to year.

In sum, we investigate whether market competition is the driver for CSR actions by Malaysian firms. We modify Fernandez-Kranz and Santalo (2010), in which we use three different measures for market competition. Our study is different from that study in three respects. First, instead of using a developed market as the sample, we choose a developing country such as Malaysia. Note that developing markets have a different market intensity compared to market competition in developed markets as the former market's business cycle is still in the growth phase. Second, we do not use secondary data from KLD Database[2] due to its availability. Instead, our methodological is more robust by calculating the CSR from annual reports. Further details are provided in Section 3. Lastly, our research differs from Fernandez-Kranz and Santalo (2010) in its market competition measures. Instead, we follow the lead of Brahmana et al. (2019), Karuna (2007), and Li et al. (2013) since their measures better fit the Malaysian context and data availability.

This study's contribution is threefold. First, we further establish that the altruism and utilitarianism associated with CSR can be described using strategic management. We propose a new explanation of CSR motivation by gauging strategic points of view, rather than accounting and finance perspective. Second, we report the empirical findings of a competitive market's effect on the CSR of Malaysian firms. Third, we add to the literature by extending the understanding of this research area. Lastly, we introduce different methodologies with a robust estimation model.

The rest of this paper is organized as follows: Section 2 addresses the literature review; Section 3 describes data and methodology; Section 4 provides the empirical results and discusses the significance of the results; lastly, Section 5 concludes the research.

LITERATURE REVIEW

Previous studies have extensively examined the relationship between firm characteristics and CSR with different setting such as United States (Wickert et al. 2016), New Zealand (Dobbs & Staden, 2016), Singapore and Australia (Loosemore et al. 2018), developed countries (Ali et al. 2017), or even Malaysia (Sadou et al. 2017). To our knowledge, few studies report about the relationship between PMC and CSR amid several recent empirical findings with slightly different approaches such as Dupire and M'Zali (2018), Lee et al. (2018), and Sheikh (2019).

This study is built by contesting two schools of thought: altruism and utilitarianism. The firm utilizes CSR to achieve its ultimate purpose, which is outstanding economic effectiveness. This explanation is supported by Friedman (1970), stating that firms exercise CSR to rebuild their reputation on goodwill. The confidence and trust of stakeholders are effectively the returns on the expenditure of CSR (Friedman 1970).

Utilitarianism proponents elaborate on the trust, confidence, and other types of wealth that CSR helps firms to pocket. The theory suggests that firms carry out CSR to improve their competitive advantage, thereby gaining wealth and achieving economic effectiveness. Prahalad and Hammond (2002) stated that large firms intentionally invest in the poorest market to maintain welfare and improve the economic growth of society. By doing this, these firms generate more revenue due to economic efficiency. Large firms use this investment as a competitive advantage since they can generate more money and support from their good deeds, robbing potential revenue from their competitors (Prahalad & Hammond 2002). Falkenberg and Fall (2006) also report that 91% of CEOs agree that exercising CSR increases the profit of the firm, as well as the engagement between a firm with customers, workers as well as society. Loyal workers also prefer to work with firms that are responsive to CSR, thus the reduced cost of worker turnover is also a benefit of CSR. CEOs admit that CSR is a major competitive advantage firm can pursue to increase the economic (Falkenberg & Fall 2006).

Instrumental theory from utilitarianism links CSR to PMC by indicating when competition in the market increases, firm will conduct more CSR activities. Russo and Fouts (1997) provide evidence to confirm the theory by showing the link between the increase in market competition and higher willingness in pollution prevention investment. They surmise that being a "virtue" company will attract the attention of stakeholders resulting in a greater potential to earn high profits. Sousa-Filho et al. (2010) reveal that high competition levels in the market can lead to a firm to follow its competitors' CSR levels. In other words, firms that focus on improving their CSR involvement are assured to not fall behind their market competitors. Firms that fail to stay aligned with competitors in exercising CSR will eventually slump in the market.

Meanwhile, institutional theory denotes the procedures and instruments (such as structures, rules, and systems) to regulate and guide the firm in conducting any activities related to social well-being (Scott 2004). The theory also conceptualizes the scheme or system of a firm in conducting social behavior and enhancing social welfare. This theory postulates how the scheme effects ultimately impact the firm (Scott 2004). According to Campbell (2007), the fluctuations of the PMC levels can affect a firm's intentions of carrying out CSR. When the level of competition in the market is moderate, a firm shows greater intentions to carry out CSR, but if the level of competition in the market is either extremely high or low, a firm is generally less interested in performing CSR.

HYPOTHESIS DEVELOPMENT

Previous studies has been conducted within the developed market context in testing the relationship between PMC and CSR. For example, Hillman and Keim (2001) use Standard and Poor 500 firms to test the relationship between the market competition of investment capital and a firm's level of participation in CSR activities. They suggest that the increases in market competition prompt firms to seek and create irreplaceable value that sets their business apart from others. Therefore, firms strategically participate in any social issues-related practices to create irreplaceable values that are unique to their firm. By generating and promoting its irreplaceable values, a firm can obtain a competitive advantage that differentiates itself from other firms. There is also Chih, Chih, and Chen (2009) who include a sample of 520 firms across 34 countries using data from the Compustat Global Vantage database over the period 2003 to 2005. Their study concludes that an increase in market competitiveness correlates with an increase in firms practicing CSR. Fernández-kranz and Santaló (2010) use Russel 1000 firms and combine them with the KLD CSR index from 1998 to 2000. The study purports that a firm's involvement in CSR can increase the willingness of consumers to pay for the firm's products/services. Moreover, the results indicate that CSR is one of the instruments that firms utilize to distinguish themselves from competitors and generate more profit.

Flammer (2014) investigates the relationship between CSR and PMC based on 508 firms listed in the S&P 500 Index and Domini 400 Social Index from 1992 to 2005. The study adopts a difference-in-differences methodology by categorizing treatment and control groups. The results indicate that when a tariff reduction causes an increase in foreign firms entering the domestic market, firms, in turn, perform more CSR. The results support the hypothesis that the product

market competition is a significant factor in the firm's CSR practices.

In more topical research, Declerck and M'Zali (2012) use a sample of 3100 listed firms from the 400 Social Index, S&P 500, 1000 largest, Large Cap Social Index, 2000 Small-Cap Social Index and Broad Market Social Index from 1991 to 2001. The results indicate that the social performance of firms affected by market competition. One explanation for the positive relationship is that firms demonstrate CSR to improve their image and reputation.

Motivated by the possibility that market competition influences the CSR activities of a firm, we test the following hypothesis in alternative form:

H_1: *Higher market competition leads higher CSR activities conducted by Malaysia listed firms*

METHODOLOGY

Because the main objective of this study is to examine the relationship between PMC and CSR, we provide a brief discussion of the data used in the main analysis and their respective model specifications. Following that, the discussion about all the variables used in the analysis is described as the variable definition. A complete list of all variables used in this study is adapted from previous study. The detailed discussions for that matter are provided in the last sub-section.

DATA

This study uses all non-financial industry listed companies in Bursa Malaysia. Our initial sample covers the entire population of 844 firms. The Corporate Social Responsibility (CSR), Product Market Competition (PMC), and financial information are taken directly from the annual reports. This includes the CSR index construction where we employed content analysis. The items are attached in Appendix A.

We decided to exclude the financial and utilities industries because of their different nature of business with other industries. There is also different regulation in Malaysia for these industries. Additionally, we remove any firms that have missing data throughout that five-year period. Our final sample comprises 524 firms with a total of 3,668 pooled observations over the seven period with complete data.

MODEL SPECIFICIATION

This research uses dynamic Generalized Moment Method (GMM) panel regression to analyze the impact of firm characteristics on CSR. We follow the lead of previous research on CSR to construct our baseline model. According to Waddock and Graves (1997), Haniffa and Cooke (2005), and Vintila and Florinita (2013), CSR is a function of firm age (AGE), firm profitability (ROA), and firm leverage (LEVERAGE). Our baseline model is as follow:

$$CSR_{i,t} = a_1 + \beta_1 AGE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (1)$$

where, CSR is the corporate social responsibility as measured by the CSR Index, Age is the firm's age, Leverage is the firm's total debt divided by total equity (LEV), and Profitability is the firm's net income divided by total assets (ROA).

We add Product Market Competition (PMC) into our baseline model to meet our main research objective. We follow and modify the estimation model of Fernandez-Franz and Santalo (2010). We have three different measures for PMC which are product differentiation (DIFF), market size (MKTSIZE), and market concentration (CONC). Our CSR estimation model is:

$$CSR_{i,t} = a_1 + \beta_1 DIFF_{i,t} + \beta_2 AGE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$CSR_{i,t} = a_1 + \beta_1 MKTSIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$CSR_{i,t} = a_1 + \beta_1 CONC_{i,t} + \beta_2 AGE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (4)$$

Our panel regression estimations are tested following several procedure as suggested by Baltagi (2008) and Law (2019). We run the set of heterogeneity tests which are Breusch Pagan LM Test, Hausman Test, and Chow Test. After obtaining the appropriate estimation model, then we perform various diagnostic test to ensure there is no estimation bias. We run VIF, modified Wald test, and Wooldridge test for multicollinearity, heteroscedasticity, and autocorrelation, respectively. Meanwhile, for our final estimation of model (2), (3), and (4), we run it under panel GMM test. The post-estimation test is conducted to ensure the validation of the instruments are correlated with the error term. We run Sargan test and AB test for overidentifying restriction test and residual correlation test.

CORPORATE SOCIAL RESPONSIBILITY (CSR)

We follow the traditional measure of CSR rather than following Fernandez-Franz and Santalo (2010) which use Kinder, Lyndenberg and Domini (KLD), a firm that rates CSR. This decision was made due to the data limitation of KLD's CSR data for the Malaysian context. We follow the traditional CSR measure wherein there are several dimensions of the CSR construct such as

community, environment, workplace, and marketplace. We refer to Othman et al. (2011) who measure CSR in the Malaysian context. The dimensions by Othman et al. (2011) are also tally with the CSR definition by the Bursa Malaysia Framework.

The CSR construct uses indexation with the following procedure: (a) assess the availability of the CSR item; and (b) give score of "1" for each available item provided in the annual report (c) sum the score and index it by using equal weighted index. Overall, there are 40 constructs for scoring the CSR. The CSR index (Ij) is constructed as follows:

$$Ij = \sum_{i=1}^{mj} \frac{dj}{N} \quad (5)$$

where N shows the number of relevant constructs performed by the company, dj = 1 if the company has initiative to describe the constructs; otherwise is 0.

MARKET COMPETITION MEASURES

We measure PMC in three ways by following Brahmana et al (2019), Botosan and Haris (2000), Karuna (2007), Li et al. (2013) and Fernandez-Kranz and Santalo (2010)[3]. First, we use the product differentiation adjusted by its industry market share; Hirschman-Herfindahl Index (HHF). We take cost uniqueness approach where product differentiation is explained as price-cost margin which is the ratio of net profit margin divided by median's net profit margin of industry. Higher profit margin implies low competition. Second, we use market size ratio adjusted by its market share HHI. The formula is ratio of total sales of firm to total industrial sales. Higher concentration means that low competition. Lastly, we take market concentration as the product market competition measure. The formula is similar with the other two measures. We calculate first the ratio of the biggest segment revenue to total revenue of a firm. Then, we divide it with Industry average ratio. Higher value of market concentration means low competition.

As shown in Table 1, the association between PMC and competition level is in inversed relationship. Higher product differentiation or market size or market concentration means lower competition level. Assuming PMC has positive relationship with CSR, this means low competitive market leads to higher CSR. To avoid this confusing interpretation and ambigousity, we inverse the final value of product differentiation and market size to align that higher values of those variables mean higher competition. Therefore, the interpretation of positive relationship between PMC with the inverse value and CSR can be defined as higher competition level leads to higher CSR activities.

RESULTS AND DISCUSSION

DESCRIPTIVE RESULTS

Table 2 reports the summary statistics for the variables in our estimation models. Focusing on the key variables, the mean value of CSR is 42%, which is slightly higher than the average value of 32% reported by Haji (2013), or slightly lower than 52% average value reported by Rahman et al. (2011). The number of items and increasing CSR awareness are the rationales behind those differences. Relatively, our PMC scores of each measure show considerable values, where it has similar value with the reported values by Brahmana et al. (2019). This also implies that Malaysia has medium-scale competitive market. Comparing with countries like

TABLE 2. Descriptive Statistics

Variables	Mean	Standard deviation	Maximum	Minimum
CSR	0.4124	0.2445	0.8260	0.0000
MKTSIZE	1.2565	0.6800	6.0000	0.0000
DIFF	2.0147	0.5492	7.8800	-6.3400
CONC	4.2886	3.0811	15.0681	-4.6052
(LOG)AGE	1.4334	0.2966	5.6700	0.0300
ROA	1.3601	1.2604	6.4762	-4.6052
LEVERAGE	0.7089	1.8920	51.4600	-13.9500

TABLE 1. Proxy of Product Market Competition

Proxy	Original Interpretation	Inversing Value	Interpretation after Inversion
Product Differentiation (DIFF)	Higher DIFF means low Competition	Yes	Higher PD means high Competition
Market Size (MKTSIZE)	High MKTSIZE means low competition	Yes	High MKTSIZE means high competition
Market Concentration (CONC)	High CONC means Low competition	Yes	High CONC means high competition

US (Dasgupta et al. 2018) and China (Meng et al. 2016), the PMC in Malaysia is relatively better. Additionally, the mean and standard deviations values show deviation of data and imply that the data is normally distributed.

CORRELATION ANALYSIS

Table 3 reports the correlations for all variables. It shows that CSR has a significant relationship with our main variables, PMC. The correlations are medium where the coefficients are 0.2739, 0.3124, and 0.4616 for market size (MKTSIZE), product differentiation (DIFF), and market concentration (CONC), respectively. Meanwhile, there are also significant correlations among the proxies for PMC. The magnitude of the correlation is high whereby all coefficient values are higher than 0.5. This indicates that these three variables share similar information about PMC. In terms of collinearity among independent variables, Table 3 reports a relatively low value of correlation. Even though it is an indication of the non-existence of multicollinearity issues among independent variables, we still run Variance Inflation Factor (VIF) as the main diagnostic test as a multicollinearity test.[4]

Table 3 shows the significant correlation among the independent variables such as between age (AGE) and product market competition (MKTSIZE, DIFF, CONC), profitability and market size (MKTSIZE), LEVERAGE, and market size (MKTSIZE), LEVERAGE and market concentration (CONC), and leverage and profitability. This is an early signal of multicollinearity. However, after running the variance inflation factor test (VIF), the score is lower than 10 concluding there is no multicollinearity issue in our estimation model.

REGRESSION RESULT

Table 4 consists of the estimation model of baseline model and estimation model of product market competition (PMC). Firstly, we estimate our baseline model following the recommendation of Petersen (2009) and Law (2019). The results of our Breusch Pagan LM test, Hausman Test, and Chow test conclude that our baseline model is estimated under Fixed Effect Model. Even though the baseline model is not our main analysis, we still examine the probability of endogeneity. It is necessary to examine whether our estimation obtained by least square is consistent as per Davidson and MacKinnon (1993) and Petersen (2009). To achieve this objective, we estimate the baseline model under Durbin-Wu-Hausman test, and found out there is no endogeneity issue in our baseline estimation model (p-value>0.05). This is consistent with the theoretical framework about firm characteristics which is CSR is less likely be affected by endogeneity issue[5].

The estimation results in Table 4 reports the coefficient estimated of baseline model for all control variables, whereas all variables have significant effect on CSR. This implies two important findings. First, all variables are the important control variables for further estimation of PMC-CSR association. Second, the positive signs from all variables' coefficients indicate higher value of Firm age (AGE), firm profitability (ROA), and firm leverage (LEVERAGE) leading to an increase of CSR activities. The findings are consistent with previous research such as Haniffa and Cooke (2005), Trencansky and Tsaparlidis (2014), and Kansal, Joshi and Batra (2014).

Meanwhile, the estimates of PMC (product differentiation or DIFF) and CSR is run under Panel GMM due to the endogeneity issue. It is a two-step system GMM panel regression. The over-identification specification model test shows that our model is robust. Lagged dependent variables are added to all models and statistically significant in all estimations. The diagnostic tests also behave properly where AR(1) and Hansen test statistics are expected to be significant, but not for AR(2) and Sargan test statistics. Basically, GMM estimation is acceptable and there is no over-identification problem.[6]

Table 4 reports the results where it shows that the inverse value of DIFF has significant effects on CSR (β= 0.0072 SE=0.0020) implying higher competition contributes leads to higher CSR activities by a firm. Practically, an increase of a unit of competition level

TABLE 3. Correlation Matrix

	CSR	MKTSIZE	DIFF	CONC	AGE	ROA	LEVERAGE
CSR	1						
MKTSIZE	0.2739**	1					
DIFF	0.3124***	0.7015***	1				
CONC	0.4616**	0.5904***	0.6296***	1			
AGE	0.1208***	0.1493**	0.0422**	0.1782*	1		
ROA	0.1630**	-0.2096**	0.0059	-0.068	0.0096	1	
LEVERAGE	0.1854**	0.0725*	-0.0044	0.1501*	-0.0173	-0.2985**	1

The symbols *, ** and *** denote the level of significance at 10%, 5%, and 1% respectively

leads to an increase of 0.0072 CSR activities. This is in line with previous research by Bagnoli and Watts (2003), Chih, Chih, and Chen (2009), and Fernández-kranz and Santaló (2010). [7]

TABLE 4. Estimation Model Results

	Baseline	PMC (DIFF)
CSR(-1)		0.5810**
		(0.218)
DIFF(INVERSE)		0.0072***
		(0.002)
AGE	0.2063***	0.2043***
	(0.067)	(0.067)
ROA	0.0648***	0.0647***
	(0.013)	(0.013)
LEVERAGE	0.1459***	0.1460***
	(0.020)	(0.020)
Constant	1.9807***	1.9764***
	(0.109)	(0.109)
Cluster Industrial Effect	Yes	Yes
Cluster Time Period Effect	Yes	No
AR(1)	NA	2.192**
AR(2)	NA	1.126
Sargan	NA	39.27

Notes: The figures stated are beta coefficients and the figures inside the parenthesis are standard error. The symbols *, ** and *** denote levels of significance at 10%, 5%, and 1% respectively.

USING OTHER PROXIES OF PRODUCT MARKET COMPETITION: ROBUSTNESS CHECK

We re-run the estimation model by replacing DIFF with market size (MKTSIZE) and market concentration (CONC) as the proxy of PMC. Note that the values of PMC proxies are still the inverse value as stated earlier in Section 3. The regression approach still employs dynamic two-step GMM panel regression. Results in Table 5 have the same conclusion about the relationship between competition and CSR with the results in Table 4. It shows the positive association between competition and CSR. When the proxy of PMC is the inverse value of market size (MKTSSIZE), it shows higher inversed market size leads to higher CSR ((β= 0.1182 SE=0.0130). In economic term, it means that a single unit increase of competition level induces the CSR activities of a firm up to 0.12. To confirm this result, we take another measure which is market concentration (CONC). The results in Table 5 reveal the nontrivial relationship between inversed market concentration and CSR activities (β= 0.0885 SE=0.0050). Practically, this result means when market concentration decreases a single unit, the CSR of a firm will increase 0.09. In short, higher competition leads a firm to have more CSR confirming the results from Fernández-kranz and Santaló (2010).

TABLE 5. Results of Robustness Check

	Market Size (MKTSIZE)	Concentration (CONC)
CSR(-1)	0.0893*	0.1270**
	(0.054)	(0.060)
PMC(INVERSE)	0.1182***	0.0885***
	(0.013)	(0.0050)
AGE	0.1347**	0.0572***
	(0.062)	(0.016)
ROA	0.0853***	0.0402 **
	(0.0126)	(0.0188)
LEVERAGE	0.1296***	0.0628***
	(0.018)	(0.011)
CONSTANT	2.0299***	1.8914***
	(0.099)	(0.074)
Clustered Industrial Effect	Yes	Yes
AR(1)	3.1048***	3.857**
AR(2)	1.2093	1.1697
Sargan	39.3	33.91

Notes: The figures stated are beta coefficients and the figures inside the parenthesis are standard error. The symbols *, ** and *** denote levels of significance at 10%, 5%, and 1% respectively.

CONTROL VARIABLES

Additionally, we report the results of control variables' effects on CSR. The findings of the control variables in Table 4 and Table 5 share similar conclusions, wheareas, all control variables have positive and significant effects on CSR. First, firm age has a significant effect on CSR with coefficient values of 0.2043, 0.1347, and 0.0402 for product differentiation, market size, and concentration ratio, respectively. The results are consistent with the findings of Roberts (1992), Moore (2001), Trencansky and Tsaparlidis (2014), Kansal, Joshi, and Bata (2014), and Withisuphakorn and Jiraporn (2015). Second, firm profitability (ROA) also has a significant effect on CSR. The coefficient values are 0.0647, 0.0853, and 0.0628 for product differentiation, market size, and concentration ratio, respectively. The results are in line with Roberts (1992), Waddock and Graves (1997), Haniffa and Cooke (2005), and also Vintila and Florinita (2013). Lastly, firm leverage (LEVERAGE) demonstrates a significant relationship with CSR. The coefficient values are 0.1460, 0.1296, and 0.0572 for product differentiation, market size, and concentration ratio, respectively. The results in line with Parsa and Kouhy (2008).

DISCUSSION

This current study concludes the positive effect of the inversed market competition (PMC) on corporate social responsibility (CSR). Put it in a simple way, PMC has a negative effect on CSR. Due to PMC and competition has an inverse relationship, we conclude firms in highly competitive markets are more socially responsible. These findings are consistent with a utilitarianism view of CSR in which stakeholders perceive CSR activities as an additional attribute that increases their willingness to deal with firm business activities. Firms will have more CSR activities due to tough competition - assisting their competitive advantage – rather than due to deed. Our results also support the findings of Bagnoli and Watts (2003), Chih, Chih, and Chen (2009), and Fernández-kranz and Santaló (2010). For instance, Bagnoli and Watts (2003) address the theoretical argument that CSR practices by firms are due to the competitiveness of the private good market. Meanwhile, Chih et al. (2009) reveal that listed firms in the US would act in more socially responsible ways when the market competitiveness is more intense. It is tally with the findings from Fernández-kranz and Santaló (2010) who find that CSR activities by Spanish firms are strategically chosen to maintain competitiveness within the industry. Our findings are consistent with those previous findings surmising that when there is higher PMC, CSR also increases.

High competition urges the firm to retain its market position by having good reputation and image (Horner 2002; You et al. 2018). However, having direct marketing to build a reputation and image often resulting inefficiency (Chiu et al 2018; Sellers-Rubio 2018), costly (Stead & Hastings 2018), and taking a long time (Santini et al. 2016). In the meantime, CSR may offer an alternative way to survive in a competitive market. Research findings such as Aksak et al. (2016), and Lii and Lee (2012) show that CSR is an effective tool to gain long-term reputation. Popoli (2011) highlights CSR as the firm brand image, where consumers are apt to buy a product from positive social attributes' firm, and might help firms retaining their customers due to the social values attributed. In more recent research, Iglesias et al (2019) reveal the role of CSR as a non-market strategy. They show that customer perceived ethicality from CSR has a positive and indirect impact on brand equity, whereas CSR activities are perceived by the customer as a good social activity. Ramesh et al. (2019) confirm this customer behavior towards CSR by revealing that customer may not remember the explicit detail of firm's CSR activities, but they are unconscious to include the brand from that particular firm which conducted CSR as a set of purchasing decision. Additionally, Martínez and Nishiyama (2019) address CSR as a key component to generate functional and affective brand loyalty, where it leads the firm to sustain its profit market and market size.

Our findings are consistent with the utilitarian perspective, whereas fluctuations of market competition levels affect the intentions of firms to carry out CSR. When the level of competition in the market is high, the firm shows higher intentions to perform CSR. Conversely, if the level of competition in the market is low, firms are less interested in CSR practices (Campbell 2007). The firm treats CSR as a non-market strategy. It is the same way of firm treats accounting reporting or cash management for the strategy of shareholders' wealth. It is not about because the firm is willing to be virtuous like what altruism view proposed, but it is more on rational expectation towards shareholders' wealth.

Another utilitarianism perspective on the PMC-CSR association is the stakeholder theory. Flammer (2013) states that participation in CSR shows the stakeholders that the firm is interested in addressing a strong image for better welfare. The study argues CSR as an instrumental resource for firms to improve their competitiveness in a dense market and retain its stakeholders. Saeed and Arshad (2012) suggest that firms carry out CSR activities, such as managing environmental issues and addressing workers' benefits, to enhance their reputation among stakeholders. A strong reputation can help firms to nurture and motivate workers, and instill confidence in customers in terms of the firm's product and service quality. Therefore, a firm may survive in a competitive market by increasing CSR activities because it is a good strategy in strengthening the stakeholder's trust.

Additionally, the perception created from CSR activities assists the firm in surviving in a competitive market. Fernández-kranz and Santaló (2010) argue that customers perceive the firm's socially responsible contributions as a "bonus", hence, they are willing to pay more for products and services from that firm. Customers latch onto positive news of corporate social responsibility done by the firms. They will compare the deeds of one firm to another firm. Hence, firms are cautious to avoid negative news regarding their social involvement. This makes the firm can retain its market even though the market is congested. In a nutshell, a firm in a high competition market will participate in more CSR activities. By doing so, the firm expects to gain reputation, image, and trust from stakeholders, hence, retain their market. Yet, if the competition goes lower, the firm probably has less participation in CSR.

CONCLUSION

This study aims to investigate the link between product market competition and Corporate Social Responsibility.

The scope of this study is non-financial companies listed in the Malaysia Stock Exchange during the 2010-2016 period. The sample of this study includes seven industries, namely construction, consumer, plantation, property, industrial property, technology, and the trading and service industry. Furthermore, this study contains several control variables such as the firm's leverage, the firm's age, and profitability. Three components are used to measure product market competition, which helps to check the robustness of the results. The estimation model for this study is based on prior literature reviews including Fernández-kranz and Santaló (2010) and Othman et al. (2011). The developed models are estimated using the run under dynamic GMM panel regression method.

Our results confirm that the utilitarian motives for CSR, whereas the market competition is the key dictating force for the level of CSR performed by firms. That is to say, the higher competition will influence firms to demonstrate CSR. Stakeholders are thusly positioned to approve this social good and deem the firm as a worthwhile investment. The perception of an ethical business creates a competitive advantage for the firm, leading to better performance and higher profits.

The findings of this study have several implications for investors and sample industries. Firstly, CSR should be seen as utilitarianism rather than an altruistic view. The investor should recognize that firms or industries with higher levels of CSR are responding to the higher competition. Indeed, higher competition can signal a low margin. Investors might also see CSR as a telling choice of resolution for managers facing competition with their peers.

The focus of our study is to examine the role of product market competition on a firm's corporate social responsibility. Based on certain common characteristics for emerging markets, particularly for East Asian countries, this study can be extended further. For instance, future research may investigate this research topic by attributing corporate governance or agency factors such as manager ability, board structure, or ownership expropriation. This would be another interesting extension of study in this field. The effect of institutional settings, such as a political connection or legal framework for ethical business, would also be an interesting perspective.

NOTES

[1] FTSE4 Good is an index for ethical investment stock market. It is classified by FTSE Russel company as one of corporate social responsibility indices with the purpose of to reveal ethical listed firms

[2] KLD Database is a database from MSCI KLD firm which incorporates environmental, social, and governance information.

[3] Fernandez-Kranz and Santalo (2010) uses three measures: Hirschman-Herfindahl Index (market concentration), number of competitors, and import and tariff penetration. The second measure (number of competitiors) is hard to trace for the Malaysian context due to its pyramiding ownership and intersection with numerous industries (because of high diversification). The third measure cannot be applied here due to data unavailability for the Malaysian context.

[4] We tested quadratic equation for each independent variable resulting no significant relationship. This means there is no nonlinear relationship found in our estimation model.

[5] This is our reason that the latter using "Lagged-Variable of Regressor" approach as per suggested by Bellemare et al. (2017) is not suitable in tackling endogeneity for our full estimation model

[6] The scoring process of Corporate Social Responsibility included the validity and sensitivity test. The loading factor of each item is higher than 0.7 implying the items meet goodness of measure. Due to page limitation, we do not provide the result in the paper. We also do not provide the result of Likelihood Ratio, Breusch Pagan LM Test, Hausman Test, Wooldridge Test of our panel regression process for the same reason.

[7] The argument of reverse causality from CSR to competition is dealt with Panel GMM as suggested by Wintoki et al. (2012). Indeed, there is another way to deal with reverse causality such TSLS as explained in Antonakis et al. (2010), however, CSR is theoretically hard to affect market competition, especially, our CSR variable is quasi instrumented.

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APPENDIX A. Table of CSR SCORING

Community		
List of constructs		Scores
1.	Employee volunteerism	1
2.	Education	1
3.	Youth development	1
4.	Educating communities	1
5.	Aid to underprivileged	1
6.	Community engagement	1
7.	Community health	1
8.	Community – infrastructure	1
9.	Culture and leisure	1
10.	Awards related to community achievement	1
Environment		
List of constructs		Scores
1.	Climate change	1
2.	Energy	1
3.	Waste management	1
4.	Biodiversity	1
5.	Pollution management	1
6.	ISO 14001/14004	1
7.	Water resources	1
8.	Materials	1
9.	Commitment to sustainable development	1
10.	Awards related to environmental commitments	1
Workplace		
List of constructs		Scores
1.	Great place to work	1
2.	Remuneration	1
3.	Workplace diversity	1
4.	Employee health and safety	1
5.	OHSAS 18001	1
6.	Workplace relations	1
7.	Employee training and human capital development	1
8.	Employee reward and recognition	1
9.	Employee satisfaction surveys	1
10.	Awards in recognition of company's excellence in workplace	1
Marketplace		
List of constructs		Scores
1.	Product and service labelling	1
2.	Customer health and safety	1
3.	Green product	1
4.	Satisfaction survey	1
5.	Corporate governance	1
6.	External assurance report	1
7.	Educating stakeholders	1
8.	Friendly facilities to customers	1
9.	Stakeholder engagement	1
10.	Awards in relation to marketplace practices	1

Source: (Othman, Darus & Arshad 2011)

Jurnal Ekonomi Malaysia 54(1) 2020 181 - 192
http://dx.doi.org/10.17576/JEM-2020-5401-13

Revisiting Government Expenditure and Private Investment Nexus: An ARDL Approach

(Tinjauan Semula Neksus Perbelanjaan Kerajaan dan Pelaburan Swasta: Satu Pendekatan ARDL)

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ABSTRACT

This paper re-examines the nexus between government expenditure and private investment in Nigeria over the period of 1981-2016. The study is rooted on Jorgenson's theory of investment, the Samuelson's version of the flexible accelerator theory and Keynesian-classical crowding-in/crowding-out theory of investment. The resulting empirical models comprise three equations; one each for private investment (PI), private domestic investment (PDI) and foreign direct investment (FDI). The study employed Autoregressive Distributed Lag technique to estimate the models. From the study, government expenditure showed positive impact on private investment in Nigeria. Our specific findings showed that: Federal government's capital expenditure (CAEX) showed positive and significant impact on both PI and PDI in the long run: a ₦1.00 billion each increase in CAEX increases PI and PDI by ₦0.12 and ₦0.238billion respectively. CAEX showed negative but insignificant impact on FDI in both short and long run. State government's capital expenditure (SCEX) showed positive and significant impact on PI: A ₦1.00 billion increase in SCEX increases PI by ₦0.27 billion. Federal government's recurrent expenditure (REEX) showed positive and negative impact on FDI and PI respectively: A ₦1.00 billion increase in REEX increases FDI by ₦1.27 billion, and reduces PI by ₦0.28 billion. Our findings imply that, if the objective of government policy is to raise private investment or private domestic investment, then both the Federal Government and state governments should boost their capital expenditure.

Keywords: Government expenditure; Investment; Accelerator theory; crowd-in/out hypotheses; ARDL model

ABSTRAK

Kertas ini menguji semula neksus antara perbelanjaan kerajaan dan pelaburan swasta di Nigeria bagi tempoh 1981-2016. Kajian ini berasaskan Teori Pelaburan Jorgenson, Teori Pencepat Boleh Ubah Versi Samuelson dan Teori Pelaburan Kesan Himpitan Dalam/Kesan Himpitan Luar Keynas-Klasik. Hasil model empirical merangkumi tiga persamaan; setiap satunya adalah pelaburan swasta (PI), pelaburan swasta domestik (PDI) dan pelaburan langsung asing (FDI). Kajian menggunakan teknik Autoregresif Lat Teragih (ARDL) untuk menganggarkan model. Daripada kajian, perbelanjaan kerajaan menunjukkan impak yang positif dalam pelaburan swasta di Nigeria. Penemuan spesifik kami menunjukkan: Perbelanjaan modal kerajaan persekutuan (CAEX) menunjukkan impak positif dan impak yang signifikan bagi PI dan PDI dalam jangka panjang: ₦1.00 bilion setiap kenaikan CAEX meningkatkan PI dan PDI masing-masing sebanyak ₦0.12 dan ₦0.238 bilion. CAEX menunjukkan impak negatif tetapi tidak signifikan bagi FDI dalam jangka pendek dan panjang. Perbelanjaan modal kerajaan negeri (SCEX) menunjukkan impak positif dan signifikan pada PI: ₦1.00 bilion peningkatan dalam SCEX meningkatkan PI sebanyak ₦0.27 bilion. Perbelanjaan berulang kerajaan persekutuan (REEX) menunjukkan impak positif dan negatif bagi FDO dan PI. Peningkatan ₦1.00 billion REEX meningkatkan FDI sebanyak ₦1.27 bilion dan mengurangkan PI sebanyak ₦0.28 bilion. Kajian kami menunjukkan, jika objektif polisi kerajaan adalah untuk meningkatkan pelaburan swasta atau pelaburan domestik swasta, maka kedua-dua kerjaan persekutuan dan kerajaan negeri sepatutnya meningkatkan perbelanjaan modal mereka.

Kata kunci: Perbelanjaan kerajaan; pelaburan; teori pencepat; hipotesis himputan dalam/luar; model ARDL

INTRODUCTION

One of the indisputable stylized facts of economic development has been the wide disparity in the economic performance of countries across the world. Attempts to explain these divergent outcomes have generated a voluminous theoretical and empirical literature on the nexus between investment and government spending. The scenario in the emerging economies most significantly the Asian Tiger economies epitomize the place of investment in the transitional process from traditional to modern economy. It is established in the literature that investment stimulates growth within a market economy; as a result, private investment no doubt remains the engine of growth with the government expenditure providing the enabling environment (Petrović, Arsić, Nojković (2020); Lee, Won, and Jei (2019); Olayungbo and Olayemi, 2018; Onifade, Çevik, Erdoğan, Asongu and Bekun, 2018; Maingi, 2017). Keynesian theory (1936), Harrod Model (1936) and the neo-classical approach to investment founded by Jorgenson (1963) highlighted the importance of investment as necessary condition for economic growth. Thus, investment is both a result and cause of economic growth. It was on this that Nguyen and Trinh (2018) found growth rate of investment as key index for calibrating economic performance.

In macroeconomic literature many studies have provided valuable insights on nexus between government expenditure and private investment especially in the fiscal debate. Among the recent studies are Bouakez, Larocque, Denis & Michel. (2018), Bermperoglou, Pappa & Vella (2017), Jin, Shang and Xu (2018), Lee et al. (2019), Funashima and Ohtsuka (2019), Olayungbo et al. (2018). However, the direction of causal-effect between the two still remains highly controversial among different school of thoughts. Arguments along the Keynesian's IS-LM framework focus mainly on the ways the government chooses to finance its spending. The classical argued that, if increased government spending is mainly financed by borrowing, then the interest rate is likely to move up in the financial market due to more competition for limited loanable funds. Consequently, private investment will be reduced. This argument, commonly referred to as the crowding-out hypothesis, is strongly challenged by some counterviews.

The counterview by the accelerator principle opined that an increase in government spending will produce a higher level of income which, in turn, may crowd-in private investment. This rests on the premise and reality that private agents are induced to invest more at higher income level. Rational expectation hypothesis is another counterview. It opined that debt-financed government expenditure may not lead to a crowding-out effect, if private agents fully discount the current debt financed government expenditure by taking into account the expected increase in future taxes when making current investment decisions (Kindal 2010).

The implication of these counterviews is that government fiscal decisions are irrelevant to both private investment and output level. Another school emphasizes the possibility of coupling expansion fiscal and monetary policies by the government. This simultaneous rightward shift of both IS and LM curves will neutralize crowd-in effect on investment. The Neoclassical ignore neutrality hypothesis and focus on substitutability and complementarity relationships between government expenditure and private investment (Ighodaro & Okiakhi 2010).

The substitutability hypothesis believed that as productive government expenditure increases, the rate of capital accumulation increases beyond the optimal level. The available loanable funds for the private agent reduces, forcing the interest rate upward. Consequently, the private agents cut their investments in order to reestablish the optimal rate of capital accumulation in the economy. Thus, crowd-out private investment. In contrast, the complementarity hypothesis expect government spending on infrastructure and human capital to raise the marginal productivity of private capital. Therefore, induce more private investment (Konstantinouy & Partheniou 2019; Berperogiou et al. 2017).

Following the work of Miyamoto, Nguyen and Sergeyev (2017), Boehm (2018) and Fan, Liu and Coyte (2017), empirical investigations should not only address the effects of aggregated government spending; understanding the effects of disaggregated government expenditure on investment is of much important to policy makers. This of course allows application of fiscal policy through appropriate spending channels. This study investigates the nexus between disaggregated government expenditure and disaggregated private investment in Nigeria. The 36 federating states with federal capital territory spend 30 percent of Nigerian revenue, therefore, the impact of states governments' expenditure should not be ignored. This justifies the inclusion of states government expenditure to this study.

Therefore, in the light of the above discussion it is imperative to ask these questions: Does Federal Government capital expenditure have impact on private investment in Nigeria?; does Federal Government capital expenditure have impact on private domestic investment in Nigeria?; does Federal Government capital expenditure have impact on foreign direct investment in Nigeria?; and does States Government capital expenditure have impact on private investment in Nigeria? Answers to these questions are the focus of this study.

This paper is motivated by the fact that over the years, aggregate investment as percent of Nigeria GDP has fluctuated and many times dropped below the minimum requirement (20 percent) as stipulated by

International Monetary Fund for sustainable economic development. Fall in oil revenue in the last quarter of 2015 caused by crashed in world oil price, preceded exchange rate volatility and Nigerian economic recession. Thus, government capital expenditure on economic of service fell drastically while national debt has been rising significantly, as palliative to sustainability of recurrent spending. Consequently, the position of Nigerian infrastructure has witnessed unprecedented set back, hampering overall economic performance. Thus, aggregate investment has not been exempted. Therefore, the need to revisit nexus between disaggregated spending and private investment is timely by this study. This study covers the period of 36 years (1981 to 2016). The choice of this period is informed by data availability.

The remaining part of this paper is sectioned as followed: The next section contains the empirical and theoretical literature; section three presents the method and materials used; section four present the preliminary findings; section five presents the econometrics findings and policy implication deduced; and the last section presents the concluding remark.

LITERATURE

THEORETICAL FRAMEWORK

Classical and Keynesian investment theories have come under attacks over the decades, from both neo-classical and post-Keynesian. According to Keynes, fiscal expansion premised on less than full employment/output level, will generate more income for household, and boost aggregate demand and investment. This equally boost output via multiplier mechanism. The classical held contrary opinion premised on persistent constant full employment, and savings-investment-interest rest sensitivity (Sineviciene 2015).

To the Orthodox, expansionary fiscal policy would induce higher interest rates, reduce after-tax income and increase wages. Consequently, dampen firms' profitability and marginal propensity to invest. In another view, financing expanded government expenditure either through loan or taxes, decreases savings and aggregate demand. Consequently, drives up interest rate and makes loanable funds further expensive for private sector, and by implication crowd-out private sector investment. The submission of Ricardo on the subject matter stands neutral. According to Ricardo, consumers form expectation and steadily anticipate for change in government spending and tax policy. This action neutralizes the anticipated impact of fiscal policy on private investment. The general public tend to save its surplus money to pay more tax in the nearest future needed to service and pay off debt. In other words, expectations on rise in future tax compels consumers to save rather than spending the excess income earned from fiscal expansion (increased government spending/ decreased tax). Thus, the excess income-saving equivalent neutralizes expansionary fiscal policy.

Samuelson's accelerator theory viewed investment from the demand side of the conventional circular flow of income frame work. It was on this that Harrod (1936; 1948) adjured growth in investment to growth rate of output. The model assumes that the demand for machinery and factories is driven by the demand for goods. Thus, a new investment in plant and machinery will be required to meet new demand for goods. Hence, changes in output level have direct implications on the level of business investment.

REVIEWED STUDIES

An important implication of the substitutability and complementarities hypotheses as pioneered by Classical and Keynesian respectively, is the reality that different categories of government expenditure (capital and recurrent) may produce different effects on private investment. In response to these theoretical controversies, some recent empirical studies have produced mixed results. For example, studies by Nguyen and Trinh (2018), Fan et al. (2017), Funashima et al. (2019), Furceri and Sousa (2018), Boehm (2018), Bouakez et al. (2018), and Malizard (2015) provided evidence in support of substitutability hypothesis. Among the studies that aligned with complementarity hypothesis are Deleidi, Mazzucato and Semieniuk (2020), Deleidi (2019), Petrović et al (2020), Ambler, Bouakez and Cardia (2017), Konstantinouy et al. (2019), Bouakez, Guillard, and Roulleau-Pasdeloup (2016), Maingi (2017), Akinlo and Oyeleke (2018), Olayungbo et al. (2018), Jin et al. (2018) and Bouakez et al. (2018). However, Sinevičienė (2015) and Ouédraogo, Sawadogo and Sawadogo (2019) found variations among countries in the level of crowding-out and crowding-in effect respectively among Sub-Saharan Africa countries. The degree was much higher in countries with a strong private sector. In India, Bahal, Raissi and Tulin (2018) found evidence of time variance; they were evidence of crowding-out during the period 1950-2012, but the period 1980-2012 aligned with crowding-in hypothesis. The justification for the variation hinged on India policy reforms during the early 1980s.

On disaggregated level, Mohib, Irfan and Khalil, (2015) and Joseph, Tochi-Nze and Ekundayo (2016) produced mixed result. Mohib et al. (2015) found government's capital expenditure to have crowd-in private investment, while recurrent expenditure crowd-out private investment. Government expenditures on agriculture, health and transport and communication support crowding-in hypothesis, while community servicing and debt servicing expenditures support crowding out hypothesis. Likewise, findings by Joseph

et al. (2016) showed that recurrent expenditure and external debt crowd-out private investment, while capital expenditure showed crowding-in effect. In the case of Furceri et al. (2018), only capital goods crowd-out both private consumption and investment, but Jin et al. (2018) and Konstantinouy et al. (2019) found a crowd-in effect. Similar study in the United States by Bouakez et al. (2018) found crowd-in and crowd-out effect on private consumption and investment respectively. Konstantinouy et al. (2019) found three years lag between shock in government spending and the time it reflected on private investment. In France, Malizard (2015) found evidence of mixed findings; recurrent spending on military crowd-out private investment, while capital spending on military equipment produced a crowd-in effect.

On the account of private consumption and investment, as found by Boehm (2018), government consumption and investment crowd-out and crowd-in private consumption and investment respectively. Miyamoto et al. (2017) viewed government spending-private investment nexus from two different interest rate regimes in Japan. It found evidence of crowd-in effect on both private investment and consumption during zero-bond interest rate, but crowd-out when the interest rate was normalized. A very similar study by Mamedi (2016) found contrary results; under zero-based interest rate government aggregate spending crowd-out private investment, but crowd-in effect was found under normal interest rate regime. Bermperoglou et al. (2017) examined government expenditure from three different levels (federal, state and local governments). Spending by government at all levels complementarily crowd-in private consumption. However, crowd-out effect of Federal government appeared stronger than the state government because of the large size of the former. At the sectorial level, Deleidi et al. (2020) and Carneiro, Armand, Locatelli, Mihreteab, and Keating (2016) found government spending to have produced crowd-in effect on private investment in power and health sectors respectively.

Therefore, from the reviewed studies, the outcome of fiscal policy on private investment depends on channel of government expenditure under consideration. This present study is different from previous literature based on the following: First, it evaluates disaggregated government spending and its impact on private investment in Nigeria. Second, inclusion of state government expenditure makes it unique. Also, different econometric models have been used. Few of the studies in Nigeria have taken the stationarity of the variables into account. However, this study employs relevant econometric tools based on the behavior of the variables, thus void of problems of spurious results.

METHOD AND MATERIALS

This study is rooted on accelerator theory and Neo-classical theory. According to the accelerator theory, the level of investment depends on rate of changes in the level of output (Harrod 1936). Neo-classical theory believe that investment capital stock is a function of the user cost of capital, the level of output and the unit price of capital (Jorgenson 1967). Thus, the original Jorgenson's model was stated as:

$$K^* = \frac{P\alpha Y}{C} \tag{1}$$

Equation (1) is transformed to:

$$K_t^* = \varphi P_t Y_t C_t^{-\alpha} \tag{2}$$

$$\text{Thus, } \Delta K = \Delta (\varphi P_t Y_t C_t^{-\alpha}) \tag{3}$$

Where denotes optimal capital stock in a country, P is price of output proxy by inflation, Y is output, C is user cost of capital proxy by interest rate (Jorgenson 1967). φ and α represent the distribution parameter and constant elasticity of substitution between capital stock and labor. The available capital for investment when depreciation is zero, is stated as:

$$I_t = \Delta K_t^* \tag{4}$$

Substituting (3) into (4), investment model is derived as

$$I_t = \varphi_1 \Delta P_t + \varphi_2 \Delta Y_t + \varphi_3 \Delta C_t + \mu_t \tag{5}$$

This study factored in fiscal policy (government expenditure and indirect tax on output) into the model because it is the core explanatory variable.

$$PI_t = \alpha + \boldsymbol{\varphi}_i \Delta K_{ti}^* + {}_j\beta_j X_{tj} + {}_k\delta_k FP_{tk} + \mu_t \tag{6}$$

Where PI is the private investment, ΔK_{ti}^* is a vector of acelerator theory on function of Investment, FP_{tk} is a vector of fiscal policy variables, X_{tj} is a vector conditioning variable and ε is the stochastic error term.

After the empirical work of Aschauer (1989) several theoretical and empirical studies have contributed to literature on nexus between government spending and private investment. However, findings remains inconclusive. Post Aschauer studies introduced different macroeconomic variables, and their findings have equally become relevant to policy maker. Therefore, following Jorgenson (1967), Akinlo and Oyeleke (2018) and Chen, Yao and Malizard (2016), we proxy price (P) with inflation (INF), output (Y) with Real GDP per capita, and cost of capital (C) with interest

rate. The empirical findings by Ouedraogo et al. (2019) and Abel (2017) suggested the importance of credit to private sector (CPS) and indirect tax on output (NT) respectively, in investment model. The inclusion of state government capital expenditure is novelty because it spends 30 percent of Nigerian government revenue. Three models were estimated to attain the set objectives. Thus, the ARDL models are stated as:

$$\Delta PI_t = \delta_i + \sum_{i=0}^{p}\delta_{1i}\Delta PI_{t-i} + \sum_{i=0}^{q}\delta_{2i}\Delta GDPPC_{t-i} + \sum_{i=0}^{q}\delta_{3i}\Delta INR_{t-i} + \sum_{i=0}^{q}\delta_{4i}\Delta INF_{t-i} + \sum_{i=0}^{q}\delta_{5i}\Delta CPS_{t-i} + \sum_{i=0}^{q}\delta_{6i}\Delta REX_{t-i} + \sum_{i=0}^{q}\delta_{7i}\Delta CEX_{t-i} + \sum_{i=0}^{q}\delta_{8i}\Delta NT_{t-i} + \sum_{i=0}^{q}\delta_{9i}\Delta SCEX_{t-i} + \lambda ECT t-i+\Delta t \quad (7)$$

This study further disaggregated private investment to examine the nexus between explanatory variable and its components (private domestic investment and foreign direct investment).

$$\Delta FDI_t = \delta_i + \sum_{i=0}^{p}\delta_{1i}\Delta FDI_{t-i} + \sum_{i=0}^{q}\delta_{2i}\Delta GDPPC_{t-i} + \sum_{i=0}^{q}\delta_{3i}\Delta INR_{t-i} + \sum_{i=0}^{q}\delta_{4i}\Delta INF_{t-i} + \sum_{i=0}^{q}\delta_{5i}\Delta CPS_{t-i} + \sum_{i=0}^{q}\delta_{6i}\Delta REX_{t-i} + \sum_{i=0}^{q}\delta_{7i}\Delta CEX_{t-i} + \sum_{i=0}^{q}\delta_{8i}\Delta NT_{t-i} + \sum_{i=0}^{q}\delta_{9i}\Delta SCEX_{t-i} + \lambda ECT t-i+\Delta \quad (8)$$

$$\Delta FDI_t = \delta_i + \sum_{i=0}^{p}\delta_{1i}\Delta FDI_{t-i} + \sum_{i=0}^{q}\delta_{2i}\Delta GDPPC_{t-i} + \sum_{i=0}^{q}\delta_{3i}\Delta INR_{t-i} + \sum_{i=0}^{q}\delta_{4i}\Delta INF_{t-i} + \sum_{i=0}^{q}\delta_{5i}\Delta CPS_{t-i} + \sum_{i=0}^{q}\delta_{6i}\Delta REX_{t-i} + \sum_{i=0}^{q}\delta_{7i}\Delta CEX_{t-i} + \sum_{i=0}^{q}\delta_{8i}\Delta NT_{t-i} + \sum_{i=0}^{q}\delta_{9i}\Delta SCEX_{t-i} + \lambda ECT t-i+\Delta t \quad (9)$$

λ = $(1-\sum^{p}\sigma_1)$ Represents the speed of adjustment parameter- it must be negative, less than one and significant.

ECT = (PI_{t-1} or FDI_{t-1} or PDI – θX_t) Represents the error correction term in the three models.

Where: PI is private investment, PDI is private domestic investment and FDI is foreign direct investment (as dependent variables). INF is inflation rate, GDPPC is GDP per capita, INR is interest rate, CPS is credit to private sector, REX is recurrent expenditure (by the Federal government), CEX is capital expenditure (by the Federal government), NT is net indirect taxes on product, and SCEX is capital expenditure (by all the 36 state governments and Federal Capital Territory). We sourced Data from Central Bank of Nigeria and World Development Indicator, covering 1981 to 2016. Augmented Dickey Fuller test, ARDL Bound test and ARDL model were employed as estimating techniques. Pesaran, Shin and Smith (2001) suggested ARDL techniques as most suitable, when the variables in a model are combination of I(1) and I(0).

RESULTS AND DISCUSSION

PRELIMINARY ANALYSIS

Figure 1 shows that federal government capital expenditure was stationary during 1981-1994, fluctuated during 1994-2003, and assumed inverted U-shape during 2004-2016. Figure 2 shows that federal government recurrent expenditure was stationary during 1981-1998, but moved upwardly during 1999-2016.

Figure 3 shows that all-state-government capital expenditure was stationary during the period 1981-2000, but formed an inverted U-shape during 2001-2016. Figure 4, 5 and 6 depicts gross domestic product, private investment and private domestic investment respectively; they formed U-shape during the period of 1981-2016.

Figure 7 shows that foreign direct investment fluctuated during the period of 1981-2007 and assumed an inverted U-shape during the period of 2008-2016. Figure 8 depicts credit to private sector; it was stationary during the period 1981-2005, but moved upwardly during 2006-2016. Figure 9 and 10 depict inflation rate and interest rate respectively; both fluctuated during the period review. Figure 11 depicts net indirect tax on goods and service; it formed U-shape and inverted U-shape during the period 1981-2005 and 2006-2016 respectively.

Table 1 provides a glance understanding of the descriptive statistics of the variables in the models. Private investment is the summation of PDI and FDI. It has maximum and minimum value of ₦78.6 billion and ₦9.9 billion respectively, with an annual average value of ₦34 billion. Total private investment during the period reviewed skewed largely towards private domestic investment (PDI). The PDI recorded the maximum value of ₦74 billion as against ₦8.8 billion recorded by the FDI. PDI and FDI recorded an annual average value of ₦31 billion and ₦2.7 billion respectively during the period reviewed. Government capital expenditure recorded maximum, minimum and annual mean value of ₦1.152 trillion, ₦4.1 billion and ₦368 billion respectively, while Nigeria recorded recurrent expenditure of ₦4.178, 4.7 and ₦1.063 trillion respectively. It shows that government expenditure skewed towards recurrent during the period under reviewed.

The maximum, minimum and mean aggregate capital expenditure of all states in Nigeria during the period of reviewed stood at ₦1.9 trillion, ₦1billion and ₦473.9 billion respectively. Nigeria recorded ₦2.563 trillion and ₦1.6696 trillion as maximum and mean value of gross domestic product per capita respectively. The country recorded maximum and minimum inflation rate of 72.8% and 5.3% respectively, with maximum and minimum lending rate 36% and 21.4% respectively.

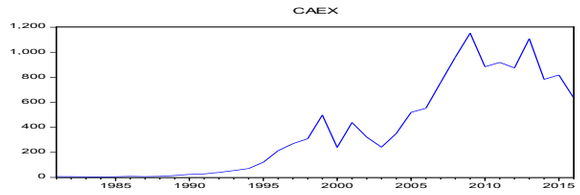

FIGURE 1.1. Federal Government capital expenditure

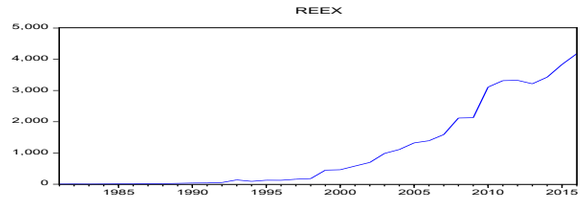

FIGURE 1.2. Federal Government recurrent expenditure

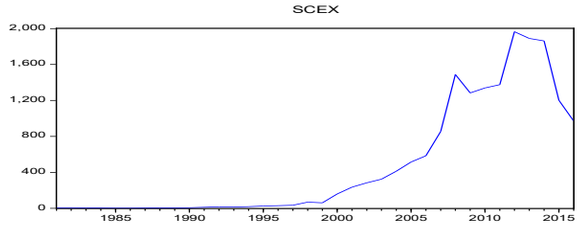

FIGURE1.3. State Governments capital expenditure

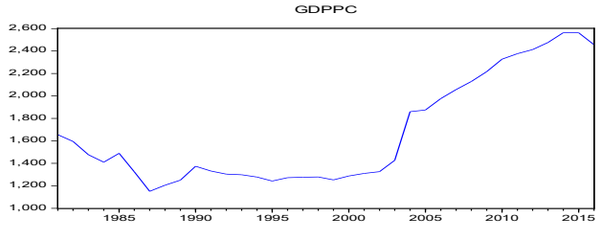

FIGURE 1.4. Gross domestic product per capita

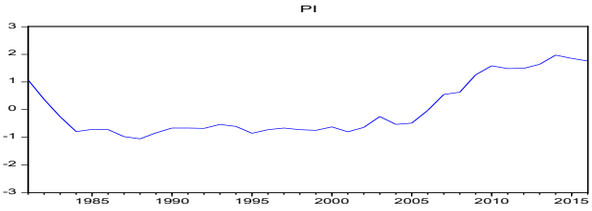

FIGURE 1.5. Private investment

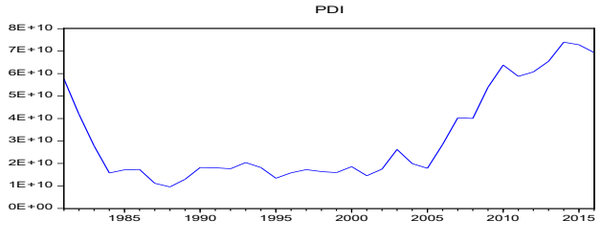

FIGURE 1.6. Private domestic investment

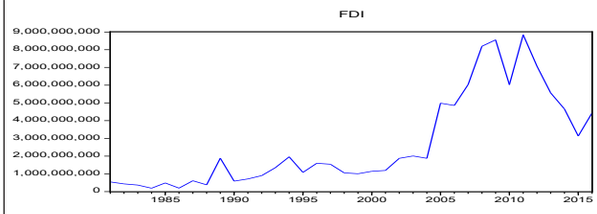

FIGURE 1.7. Foreign direct investment

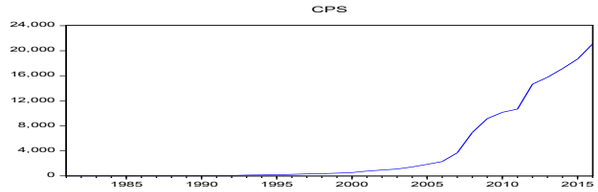

FIGURE 1.8. Credit to private sector

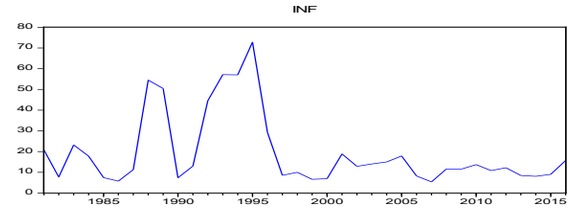

FIGURE1.9. Inflation rate

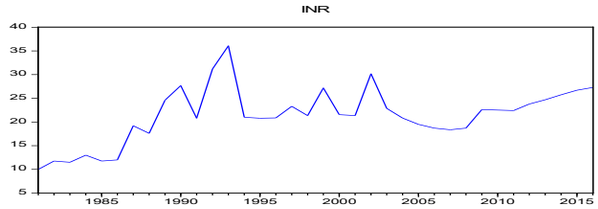

FIGURE 1.10. Interest rate

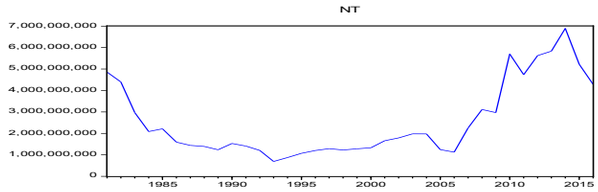

FIGURE 1.11. Net indirect tax

FIGURE 1. Trend of the variables

TABLE 1. Descriptive Statistics

Variables	Observation	Std. Dev.	Mean	Median	Maximum	Minimum
PI (₦Billion)	36	22.71	34.00	21.00	78.60	9.95
CEX (₦Billion)	36	372.32	368.14	255.67	1152.79	4.10
REX (₦Billion)	36	1352.55	1063.05	313.88	4178.59	4.75
SCEX (₦Billion)	36	1.03	473.97	64.53	1965.30	1.03
CPS (₦Billion)	36	6302.89	3856.11	391.56	21082.72	8.57
FDI (₦Billion)	36	2.64	2.70	1.57	8.84	0.189
PDI (₦Billion)	36	20.80	31.20	18.40	74.00	9.57
GDPPC (₦Billion)	36	478.14	1669.64	1418.79	2563.09	1151.12
INFL (Rate)	36	17.69	19.60	12.54	72.83	5.38
INR (Rate)	36	5.86	21.37	21.33	36.09	10.00
NT (₦Billion)	36	1.74	2.55	1.72	6.93	6.90

TABLE 2. Augmented Dickey Fuller and Phillip Peron Test

Variables	ADF Statistic	5% Critical Value	P-Value	Remark	PP Statistic	5% Critical Value	P-Value	Remark
D(LOGCEX)	-5.833536	-2.951125	0.0000	I(1)	-5.866305	-2.951125	0.0000	I(1)
D(LOGRER)	-4.812455	-2.951125	0.0004	I(1)	-7.872910	-2.951125	0.0000	I(1)
D(LOGSCEX)	-3.956220	2.951125	0.0045	I(1)	-3.867239	-2.951125	0.0056	I(1)
D(LOGPI)	-4.025735	-2.957110	0.0039	I(1)	-4.606064	-2.951125	0.0008	I(1)
D(LOGPDI)	-3.878828	-2.957110	0.0057	I(1)	-4.624328	-2.951125	0.0007	I(1)
D(LOGFDI	-11.15135	-2.951125	0.0000	I(1)	-11.15135	-2.951125	0.0000	I(1)
D(LOGGDPPC)	-4.344214	-2.951125	0.0016	I(1)	-4.331327	-2.951125	0.0017	I(1)
D(INF)	-5.416306	-2.951125	0.0001	I(1)	-2.906336	-2.951125	0.0000	I(1)
D(LOGNT)	-5.092719	-2.951125	0.0002	I(1)	-5.092717	-2.951125	0.0002	I(1)
D(INR)	-6.600579	-2.954021	0.0000	I(1)	-8.183291	-2.951125	0.0000	I(1)
D(LOGCPS	-4.252015	-2.951125	0.0020	I(1)	-4.135155	-2.951125	0.0028	I(1)

Note: Variables were screened at 5% level of significance

TABLE 3. ARDL Bound Test

	Model 1 Private investment	Model 2 Private domestic investment	Model 3 Foreign direct investment
F-statistic	8.53	10.43	3.17
K	8	8	8
5% I(0)	2.22	2.22	1.91
5% I(1)	3.39	3.39	3.11

Note: Variables were screened at 5% level of significance

TABLE 4. Residual diagnostic tests

	Breusch-Godfrey Serial Correlation LM Test	Breusch-Pagan-Godfrey Heteroskedasticity Test
Model	F-statistic (P-value)	
Private Investment	2.034 (0.2027)	1.085 (0.4509)
Private domestic investment	3.166 (0.0820)	1.310 (0.3134)
Foreign direct investment	4.817 (0.1112)	0.4297 (0.9565)

Note: P-value in parenthesis () at 5% significance level

UNIT ROOT TEST

The results from Augmented Dickey Fuller and Phillip Perron tests (in Table 2) show that all the series are stationary at first difference at 5 percent significant level. That is, they are all I(1) series.

COINTEGRATION TEST

The results of ARDL tests in Table 3 conform the existence of long run relationship in the three models. The value of F-statistic (8.53, 10.43 and 3.17) for model 1, 2 and 3 respectively is greater than upper bound value at 5% significance level. Therefore, the variables in the three models cointegrate.

RESULTS ARDL MODELS

The results of Breusch-Godfrey LM test for serial correlation and Breusch-Pagan-Godfrey test for heteroskedasticity, as shown in Table 4 implies that the P-value of F-Statistic across the three models is greater than 0.05 significant levels. Therefore, the results from the model are void of spurious regression.

ARDL ESTIMATES

The estimated adjusted R^2 in Table 5, 6 and 7 show that the models account for about 97%, 97.1% and 93.4% variation in aggregate private investment, private domestic investment and foreign direct investment respectively. The F-statistic 78.1, 56.92 and 23.97 are evidences that each of the three models adequately capture the relationship between the variables. The Error Correction Terms CointEq(-1) are all negative and significant, an evidence that convergence to long run are feasible in the models.

The results of the ARDL models in Table 5, 6 and 7 reveal that Federal government capital expenditure (CEX) has positive impact on private investment (PI) in both short and long run. It was not significant in foreign direct investment (FDI) model, but was found significant in the long run in the case of private domestic investment (PDI) model. Specifically, ₦1billion increase in CEX increases PI and PDI by ₦0.12billion and ₦0.24billion unit respectively in the long run. The magnitude of the coefficients show that CEX was more impactful on PDI (0.24) than on PI (0.12). This is not a surprise, since CEX had no impact on FDI. Federal government recurrent expenditure (REX) showed negative and positive impact on private investment and foreign direct investment respectively, but showed no impact on private domestic investment. As REX increases by ₦1billion, PI reduces by ₦0.28billion, while FDI increases by ₦1.27billion.

The magnitude of the coefficients showed that REX was more impactful on FDI (1.27) than on PI (-0.28), but remain insignificant under PDI model. These findings lend credence to Mohib et al. (2015) whose findings established positive relationship between government capital expenditure and private investment, while the recurrent expenditure showed negative sign. REX (-0.28) was more impactful on PI than CEX (0.12); in the FDI model, REX had 1.27 impact while CEX was not significant; in PDI model, CEX had 0.24 impact while REX was not significant. In private investment (PI) model, SCEX had more than CEX, but less than REX. GDPPC was the most impactful variable across the three models; with positive coefficient value of 1.5, 3.0 and 1.7 for PI, FDI and PDI respectively. The position of the GDPPC in the three models lend credence to Keynesian investment theory; rise in aggregate demand boosts investment. Gross domestic product per capita (GDPPC) shown positive impact on the three forms of investments, both in the short run and long run.

As shown in Table 5, 6 and 7, credit to private sector (CPS) was only found significant in FDI model and showed negative sign; as CPS increases by ₦1billion, FDI reduces by ₦0.837billion. Indirect tax rate on the output of private sector was found positively significant in PI and PDI model but not significant in FDI model. As indirect tax levied on output increases by 1 percent, PI and PDI increases by 28.9 percent and 41.5 percent respectively. State capital expenditure (SCEX) showed positive impact on private investment but showed no impact on FDI and PDI. ₦1billiont increased in SCEX increases PI ₦0.273billion.

Inflation rate and interest rate, proxy by consumer price index and maximum lending rate respectively, were found both significant in the three models. As inflation rate increases by 1 percent, PI, FDI and PDI increase by 0.65 percent, 3.38 percent and 0.35 percent respectively in the long run. Our findings went contrary to Deleidi et al. (2020) and Deleiidi (2018). This lends credence to Fleming and Mudelling exchange rate theory which states that at lower domestic interest rate capital tends to fly out in search for robust returns. Also, moderate rise in inflation might boost the marginal propensity to profit for domestic investor, being incentive to investment even when the cost of production rises, provided that elasticity demand for those product are fairly inelastic. These results lends credence to earlier studies, such as Petrović et al. (2020), Deleidi et al. (2020), Deleidi (2018), Berperogiou et al. (2017), Magableh and Ajlouni (2016) and Olayungbo and Olayeni (2018), Ouedraogo et al (2019), Maingi (20017), Akinlo et al. (2018), Bahal et al (2018), Miyamoto et al (2017) and Ambler et al (2017). While it contradicts the ealier findings of Funashima et al. (2019), Furceri et al (2018) and Nguyen and Trinh (2018).

TABLE 5. ARDL for Private Investment

Short run ARDL Model			Long run ARDL Model		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(LOGPI(-1))	0.615755	0.0012	LOGCEX	0.122460	0.0197
D(LOGCEX)	0.194307	0.0307	LOGCPS	-0.059068	0.4994
D(LOGCPS)	-0.093724	0.5036	LOGGDPPC	1.504216	0.0000
D(LOGGDPPC)	-0.557491	0.2310	LOGNT	0.289009	0.0004
D(LOGGDPPC(-1))	-1.423628	0.0164	LOGREX	-0.283460	0.0081
D(LOGNT)	0.270298	0.0147	LOGSCEX	0.273782	0.0000
D(LOGREX)	0.013159	0.9182	INF	0.006522	0.0016
D(LOGREX(-1))	0.436005	0.0050	INR	0.013520	0.0154
D(LOGSCEX)	0.155935	0.0880	C	6.401684	0.0044
D(LOGSCEX(-1))	-0.315683	0.0008			
D(INF)	0.005510	0.0234			
D(INF)	-0.003096	0.1758	Adjusted R^2	0.970	
D(INR)	0.011349	0.1060	F-statistic	78.1	
CointEq(-1)	-1.586701	0.0000	Prob(F-statistic)	0.0000	

Note: Variables were screened at 5% level of significance

TABLE 6. ARDL for Private Domestic Investment

Short run ARDL Model			Long run ARDL Model		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(LOGPDI(-1))	0.583138	0.0042	LOGCEX	0.238070	0.0032
D(LOGCEX)	0.162529	0.2041	LOGCPS	-0.182161	0.0621
D(LOGCPS)	0.025757	0.8994	LOGGDPPC	1.699314	0.0000
D(LOGGDPPC)	0.220032	0.6838	LOGNT	0.415044	0.0001
D(LOGGDPPC(-1))	-1.891901	0.0088	LOGREX	-0.126227	0.1468
D(LOGNT)	0.328177	0.0152	LOGSCEX	0.100150	0.1155
D(LOGREX)	-0.197534	0.1453	INF	0.003459	0.0537
D(LOGSCEX)	-0.047135	0.6650	INR	0.020234	0.0032
D(LOGSCEX(-1))	-0.222641	0.0517	C	2.253080	0.3590
D(INF)	0.004183	0.1182			
D(INF)	0.001426	0.4897	Adjusted R^2	0.971	
D(INR)	0.006448	0.3972	F-statistic	56.92	
CointEq(-1)	-1.564916	0.0000	Prob(F-statistic)	0.0000	

Note: Variables were screened at 5% level of significance

TABLE 7. ARDL for Foreign Direct Investment

Short run ARDL Model			Long run ARDL		
Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
D(LOGFDI(-1))	-0.379609	0.0630	LOGCEX	-0.009762	0.9686
D(LOGCEX)	0.118364	0.7238	LOGCPS	-0.836634	0.0431
D(LOGCEX(-1))	-0.474604	0.2513	LOGGDPPC	3.006602	0.0041
D(LOGCPS)	-1.153067	0.0624	LOGNT	-0.120194	0.6869
D(LOGCPS(-1))	2.145390	0.0017	LOGREX	1.269236	0.0476
D(LOGGDPPC)	1.263943	0.4054	LOGSCEX	0.032199	0.8671
D(LOGNT)	-0.113514	0.6742	INF	0.033791	0.0081
D(LOGREX)	1.198699	0.0023	INR	-0.065254	0.0599
D(LOGSCEX)	0.638130	0.0333			
D(LOGSCEX(-1))	-0.389580	0.1942			
D(INF)	0.009799	0.1890			
D(INF)	-0.014480	0.0635			
D(INR)	0.038692	0.1284	Adjusted R^2	0.934	
D(INR(-1))	0.046397	0.0512	F-statistic	23.97	
CointEq(-1)	-0.944426	0.0116	Prob(F-statistic)	0.0000	

Note: Variables were screened at 5% level of significance

POLICY IMPLICATIONS

Federal government capital expenditure is potent at stimulating private investment through private domestic investment, while recurrent expenditure is potent at stimulating foreign direct investment. All-state-government expenditure is potent at stimulating private investment. It points to the fact that in the build-up to stimulate investment, Nigerian government must be selective in its approach towards using any component of expenditure. The state government capital expenditure crowd-in private investment, an indication that collaboration between federal and states governments could yield more productive result than the conventional federal fiscal policy. For instance, the bail-out received by states governments from the federal government special fund, significantly, cushioned the effects and shorten the period of 2016 recession. This study agrees with previous studies that GDP and recurrent expenditure are important to growth trajectory of FDI in Nigeria. It is an indication that capital inflows thrives when the economy booms. Invariable, oil sector is the largest recipient of FDI in Nigeria while the nonoil remains unattractive. Nigerian government should boost FDI in nonoil sector especially agriculture and mining sector. However, for government policy to be efficacious, it is imperative to create conducive investment climate coupled with fiscal reform and selective fiscal implementation. For instance, Nigeria oil sector receives more than 80 percent of FDI, therefore, federal government in collaboration with the states governments should grant fiscal preferential treatment inform of tax concessions to foreign investors as incentive to drive non-oil sector. Also, Interest rate on loan remains the bane to small and medium private investors. Internal rate of returns (IRR) rarely breakeven the prevailing market interest rate. Nigerian government should cushion the impact of interest on indigenous domestic investment via preferential interest rate policy. Investors in nonoil sector should be given low or zero-based interest loan. Also, security of life and property remains the central focus of foreign investors. The trend of insurgency over the decade has ranked Nigeria among most difficult countries to do business. If government will attract inflow of FDI, insurgency must be dealt with.

FDI and private domestic investment hold huge prospect for Nigeria economy. The current dwindling in Nigerian government's revenue preceded by fall in crude oil price in the international market, will be resuscitated if both FDI and domestic investment are geared towards nonoil sector. It is expected to yield positive spillover effect on unemployment level, as well improve Nigeria balance of payment status.

SUMMARY AND CONCLUDING REMARKS

This study re-visits government expenditure and private investment nexus in Nigeria. While there is a plethoral of studies on this subject, this paper appears to be the first to take cogniziance the position of all-state government capital expenditure in the context of private investment. This becomes imperative because of its share in Nigeria fiscal budgetary plan. Research methodology adopted is another landmark this paper made. Following the behaviour of the variables in

the models, unlike the previous studies on the subject matter, this paper employed appriopriate research techniques. The Augmented Dickey Fuller and Phillip Perronn tests show that all the variables are stationary at first difference. Therefore, ARDL bound test becomes the most suitable cointegration test (Pesaran, Shin & Smith 2001).

For meaningful comparative analysis we came up with three models which captured private investment, private domestic investment and foreign direct investment. We equally disaggregated government spending into capital and recurrent expenditure. There are evidences of variation in our results on the impact of disaggregated components of government expenditure on gisaggregated investment. During the period under review (1981-2016), the impact of Federal government capital expenditure on aggregated private investment and private domestic investment support Keynesian crowding-in hypothesis. Federal government recurrent expenditure and private investment nexus supported classical-crowding-out hypothesis, while its nexus with foreign direct investment supported Keynesian-crowding-in hypotheses. The inclusion and result of all-state-government expenditure is novelty. All-state-government expenditure and private investment nexus supported Keynesian-crowding-in hypothesis. Our residual diagnostic results show that our models are void of spuriousness. Our study agrees with Deleidi et al. (2020); that expanding private investment is a function of right application of appropriate fiscal policy instruments. This is possible via effective governance as suggested by Su and Bui (2017). The study advocated for selective use of government expenditure in stimulating investment in Nigeria.

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Jurnal Ekonomi Malaysia 54(1) 2020 193 - 211
http://dx.doi.org/10.17576/JEM-2020-5401-14

Perubahan Makroekonomi, Persaingan Harga Barang Pengganti dan Eksport Sawit Malaysia

(Macroeconomic Changes, Competitiveness Price of Substitute Product and Malaysian Palm Oil Exports)

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ABSTRAK

Malaysia adalah antara negara yang mendominasi pengeluaran minyak kelapa sawit dunia. Kajian ini menganalisis kesan perubahan faktor makroekonomi terpilih dan persaingan harga terhadap eksport produk utama sawit Malaysia, iaitu minyak sawit mentah (CPO) dan minyak isirung sawit (PKO). Perubahan faktor makroekonomi mengambil kira pemboleh ubah harga tempatan sawit, harga dunia sawit, pengeluaran sawit dan kadar pertukaran efektif benar. Persaingan harga pula menggunakan pemboleh ubah harga produk barang pengganti bagi minyak kelapa sawit iaitu minyak kacang soya, minyak kanola, minyak bunga matahari dan minyak kelapa. Kajian merangkumi tempoh dari tahun 1985 hingga tahun 2016. Kajian ini menggunakan pendekatan model kaedah Auto Regresif Lat Tertabur (ARDL) iaitu kaedah penganggaran untuk melihat hubungan jangka panjang dan pendek. Hasil kajian empirikal mendapati, harga tempatan sawit, kadar tukaran dan harga barang pengganti, sangat mempengaruhi eksport sawit di Malaysia. Oleh itu, dalam usaha untuk meningkatkan eksport sawit Malaysia, kestabilan harga tempatan sawit, kadar pertukaran asing dan harga barang pengganti sawit perlulah diberikan perhatian untuk memastikan daya saing eksport sawit Malaysia terus meningkat. Di samping itu, memandangkan kajian ini mendapati bahawa krisis kewangan Asia 1997/98 dan krisis kewangan Eropah 2007/2008 memberi kesan negatif kepada eksport minyak sawit, maka Malaysia harus mengambil langkah berjaga-jaga terhadap petanda krisis di rantau Asia dan global.

Kata Kunci: Minyak sawit mentah; minyak isirung sawit; persaingan harga; model Auto Regresif Lat Tertabur(ARDL).

ABSTRACT

Malaysia is one of the world leaders in palm oil production. The study investigates the effects of selected macroeconomic variables and price competition on the major palm oil export products, which are the crude palm oil (CPO) and palm kernel oil (PKO). The macroeconomic variables include local and world palm oil prices, palm oil production and real effective exchange rates. Meanwhile, price competition includes the price of substitute products for palm oil such as soybean oil, canola oil, sunflower oil and coconut oil. Autoregressive distributed lag (ARDL) method is employed in examining the short and long run relationship among the variables for the sample spanning from year 1985 to 2016. The study provides empirical evidence that local palm oil prices, exchange rates, and prices of substitute products strongly influence Malaysian palm oil exports. Thus, initiatives toward increasing Malaysian palm oil exports should consider the stability of local palm oil prices, foreign exchange rates and prices of the substitute products to retain competitive advantage of Malaysian palm oil export. In addition, the evidence on the inverse impact of the Asian 1997/1998 and Eropean 2007/2008 crises on palm oil export suggests that Malaysia should be cautious of the Asian and global crisis signals.

Keywords: Crude palm oil; palm kernel oil; price competition; Autoregressive Distributed Lag (ARDL)

PENDAHULUAN

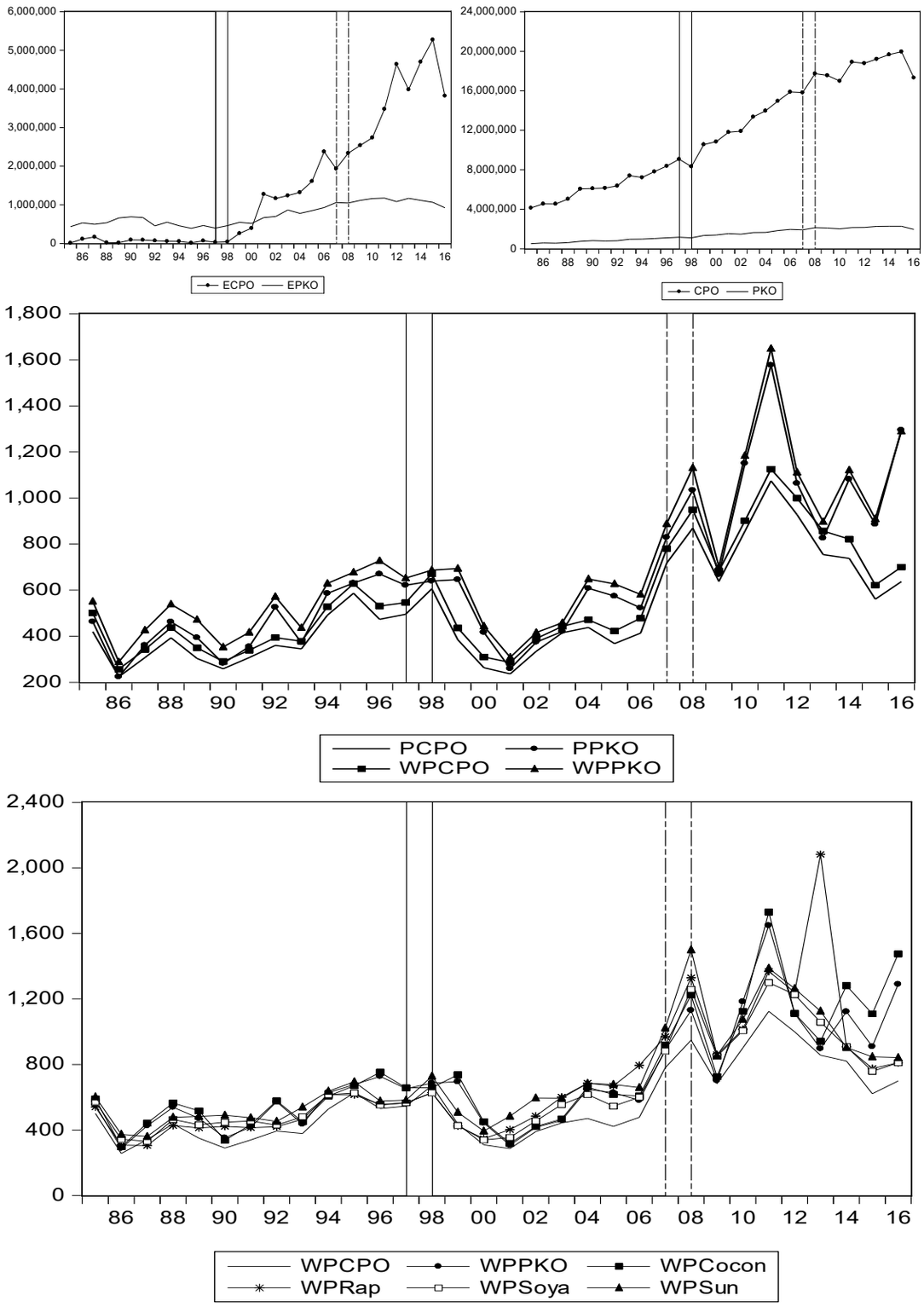
Sepanjang beberapa dekad yang lalu, industri minyak sawit menjadi peneraju minyak sayuran utama di dunia. Pada tahun 2014, bekalan minyak sayur-sayuran berjumlah 176 juta metrik tan dan minyak sawit telah menyumbang kira-kira 35%, diikuti oleh minyak kacang soya yang menyumbang kira-kira 28% (USDA 2015). Industri sawit adalah antara tonggak ekonomi Malaysia dan memainkan peranan penting dalam membekalkan sumber makanan dan tenaga kepada populasi global yang semakin meningkat. Malaysia berada di tempat pertama sehingga tahun 2005 dengan pengeluaran minyak sawit mentah sebanyak 45.24% daripada jumlah pengeluaran minyak sawit mentah (*crude palm oil* - CPO) dunia. Pertumbuhan pengeluaran dan eksport minyak sawit

digalakkan lagi oleh harga minyak sayuran lain seperti minyak kacang soya, minyak bunga matahari, minyak kanola, dan minyak kelapa yang lebih tinggi berbanding harga minyak sawit mentah. Pengeluaran minyak isirung sawit (palm kernel oil - PKO) Malaysia dijangka meningkat sepanjang tahun 2020 selaras dengan pemulihan pengeluaran CPO (Tinjauan Ekonomi 2020, Kementerian Kewangan Malaysia). Minyak isirung sawit yang berasal daripada kernel atau isi dalam buah kelapa sawit digunakan terutamanya dalam produk bukan makanan seperti untuk membuat sabun, kosmetik dan bahan pencuci. Pengimport utama PKO ialah Belanda, China, India, Turki dan Amerika Syarikat. Rajah 1 menunjukkan tren bagi pemboleh ubah yang dikaji. Bagi tren eksport CPO dan PKO, eksport PKO lebih banyak berbanding eksport CPO sehinggalah pada tahun 2000, di mana eksport CPO meningkat dengan lebih tinggi dan memintas eksport PKO. Tren bagi jumlah pengeluaran pula menunjukkan pengeluaran CPO semakin meningkat pada kadar yang lebih tinggi berbanding peningkatan dalam jumlah pengeluaran PKO yang meningkat pada kadar yang sedikit berbanding pengeluaran CPO. Keadaan ini menunjukkan bahawa walaupun pengeluaran CPO dan PKO Malaysia semakin meningkat saban tahun, tetapi permintaan dunia terhadap CPO dan PKO Malaysia meningkat pada kadar yang lebih rendah berbanding pengeluaran CPO dan PKO. Situasi ini menunjukkan bahawa eksport sawit bukan sahaja dipengaruhi oleh faktor pengeluaran minyak sawit sepenuhnya, tetapi terdapat juga faktor lain yang turut mempengaruhi eksport CPO dan PKO.

Bagi harga minyak sayuran pula, harga tempatan CPO mempunyai tren yang sama dengan harga dunia CPO, manakala tren harga tempatan PKO sama dengan tren harga dunia PKO (Rajah 1). Keadaan ini menunjukkan bahawa harga CPO dan PKO Malaysia menjadi penanda aras dalam perubahan harga dunia CPO dan PKO. Tren harga menunjukkan harga CPO dan PKO Malaysia menjadi penanda aras kepada harga minyak sayuran lain. Situasi ini menunjukkan bahawa antara strategi yang digunakan untuk membolehkan minyak sayuran lain bersaing dengan minyak kelapa sawit adalah melalui persaingan harga yang dapat menarik perhatian pengguna minyak sayuran. Persoalannya, adakah harga minyak sayuran lain turut memberi kesan terhadap eksport CPO dan PKO Malaysia berdasarkan tren harga minyak sayuran?

Berdasarkan situasi di atas, Malaysia merupakan negara yang mendominasi pengeluaran minyak kelapa sawit dunia. Kajian ini dilaksanakan untuk mengenal pasti dan menganalisis faktor makroekonomi dan persaingan harga yang memberi kesan terhadap eksport produk utama sawit Malaysia. Produk eksport utama sawit Malaysia yang dikaji ialah CPO dan PKO. Fakor makroekonomi dalam kajian ini mengambil kira pemboleh ubah harga tempatan sawit, harga dunia sawit, pengeluaran sawit dan kadar pertukaran efektif benar. Faktor-faktor makroekonomi ini penting untuk diambil kira memandangkan jumlah pengeluaran minyak kelapa sawit Malaysia semakin meningkat saban tahun pada kadar yang lebih tinggi berbanding dengan jumlah eksport minyak kelapa sawit yang meningkat pada kadar yang lebih rendah. Seharusnya, kadar peningkatan eksport minyak kelapa sawit harus selari dengan kadar peningkatan pengeluaran minyak kelapa sawit. Adakah pengeluaran minyak kelapa sawit tidak memberi kesan terhadap eksport minyak kelapa sawit? Atau, pengeluaran minyak kelapa sawit hanya memberi sedikit kesan sahaja terhadap eksport minyak kelapa sawit? Keadaan ini perlu diperhalusi agar pihak yang berkaitan dapat melihat sejauh mana kesan pengeluaran terhadap eksport minyak kelapa sawit. Sekiranya pengeluaran tidak memberi kesan terhadap eksport minyak kelapa sawit, maka pihak yang berkaitan perlu merangka strategi untuk meningkatkan eksport minyak kelapa sawit dengan tidak hanya memberi fokus terhadap faktor pengeluaran minyak kelapa sawit. Bagi faktor kadar pertukaran pula, berlaku keadaan turun naik yang tinggi. Keadaan ini dapat dilihat dalam tempoh dua dekad ini apabila berlaku krisis kewangan Asia dan krisis kewangan global yang memberi kesan terhadap sesebuah industri. Turun naik yang tinggi dalam kadar pertukaran berlaku dalam konteks peningkatan atau pengurangan dalam transaksi perdagangan. Keadaan turun naik dalam kadar pertukaran memberi kesan terhadap pasaran mata wang dan seterusnya dapat memberi kesan terhadap eksport minyak kelapa sawit. Berdasarkan situasi ini, adakah kadar pertukaran memberi kesan ke atas eksport minyak kelapa sawit Malaysia? Selain itu, adakah harga dunia minyak kelapa sawit memberi kesan terhadap eksport minyak kelapa sawit Malaysia?

Persaingan harga pula mengambil kira harga produk barang pengganti bagi minyak kelapa sawit iaitu minyak sayuran lain yang meliputi harga minyak kacang harga soya, harga minyak kanola, harga minyak bunga matahari dan harga minyak kelapa. Berdasarkan kepada tren harga minyak sayuran lain, harga minyak kelapa sawit Malaysia telah dijadikan sebagai penanda aras dalam penetapan harga minyak sayuran. Ini menunjukkan bahawa minyak sayuran lain bersaing dalam pengeluaran minyak sayuran dunia melalui mekanisma harga. Persoalan yang timbul adalah, jika minyak sayuran lain bersaing dengan minyak kelapa sawit melalui mekanisma harga, sejauh manakah harga minyak sayuran lain dapat memberi kesan ke atas eksport CPO dan PKO Malaysia? Hal ini penting kerana secara lumrahnya harga memainkan peranan yang tinggi terhadap permintaan sesuatu barang. Berdasarkan teori asas permintaan, semakin rendah harga sesuatu barang, maka semakin tinggi permintaan terhadap barang tersebut. Dalam situasi ini, jika harga minyak kelapa sawit lebih rendah berbanding minyak



Sumber: Malaysian Palm Oil Board (MPOB)
* Garis menegak bersambung menunjukkan tempoh berlakunya krisis kewangan Asia
* Garis menegak putus-putus menunjukkan tempoh berlakunya krisis kewangan global.

RAJAH 1. Tren Pemboleh Ubah Kajian

sayuran lain, maka seharusnya minyak sayuran lain tidak dapat bersaing dengan minyak kelapa sawit kerana harga minyak sayuran lain lebih tinggi berbanding harga minyak kelapa sawit (Rajah 1). Justeru itu, kajian ini penting dilaksanakan untuk melihat adakah harga minyak sayuran lain memberi kesan terhadap eksport minyak kelapa sawit Malaysia? Jika minyak sayuran tersebut memberi kesan terhadap eksport minyak kelapa sawit Malaysia, adakah ianya akan mempengaruhi prestasi eksport minyak kelapa sawit Malaysia? Hal ini penting kerana jika harga minyak sayuran lain memberi kesan terhadap eksport minyak kelapa sawit Malaysia, maka pihak yang berkaitan dapat memberi penekanan terhadap harga minyak sayuran tersebut melalui pemantauan harga minyak sayuran tersebut secara berkala dan seterusnya merangka strategi untuk bersaing dalam penetapan harga eksport minyak kelapa sawit Malaysia.

KAJIAN LEPAS

Minyak kelapa sawit merupakan salah satu minyak sayuran yang stabil dan mempunyai pelbagai kegunaan sama ada untuk industri makanan mahupun industri bukan makanan. Secara umumnya minyak kelapa sawit digunakan untuk makanan (Khushairi et al. 2018). Walau bagaimanapun minyak kelapa sawit juga mempunyai permintaan tinggi daripada industri minyak biodiesel sawit (sebanyak 20%). Disebabkan minyak kelapa sawit merupakan minyak sayuran utama di pasaran dunia, banyak kajian telah dilakukan untuk mengkaji permintaan minyak kelapa sawit secara global. Secara keseluruhannya, Malaysia dan Indonesia menghasilkan sekitar 85% pengeluaran minyak kelapa sawit global, yang menunjukkan bahawa kedua-dua negara tersebut merupakan pengeluar utama minyak kelapa sawit di dunia (Zulkifli et al. 2017). Malaysia mengeksport lebih daripada 642,000 tan biodiesel sawit, terutamanya ke Eropah dan Amerika Syarikat serta berpotensi untuk menerajui pasaran sawit dunia menjelang tahun 2035 (Yean dan Dong 2014). Pada masa kini, Malaysia mengeksport ke lebih daripada 200 pasaran di seluruh dunia (Balu et al. 2018).

Zakaria et al. (2018) mengkaji permintaan jangka panjang minyak sawit di Turki dalam tempoh tahun 1980 hingga 2015, dengan menggunakan kaedah Autoregressive Distributed Lag (ARDL). Hasil kajian mereka mendapati bahawa daya saing harga merupakan faktor utama peningkatan permintaan minyak kelapa sawit di Turki. Selain itu, faktor pendapatan negara dan harga minyak sayuran pengganti juga mempengaruhi permintaan minyak sawit. Kajian Radifah (2014) berkaitan faktor-faktor yang mempengaruhi eksport CPO Indonesia pula mendapati bahawa faktor pengeluaran, kadar pertukaran asing dan harga CPO berhubungan positif dengan eksport CPO Indonesia di pasaran antarabangsa dalam jangka masa panjang. Seterusnya, Azizah (2017) menganalis eksport CPO Indonesia di negara Eropah dengan menggunakan data panel yang melibatkan enam buah negara Eropah iaitu Jerman, Itali, Belanda, Rusia, Sepanyol dan Ukrain dari tahun 2000 hingga 20011. Kajian tersebut mendapati bahawa faktor pengeluaran dan keluaran dalam negara kasar negara pengimport mempunyai hubungan yang positif dengan jumlah eksport CPO Indonesia di pasaran Eropah. Huda dan Widodo (2017) pula mendapati harga dunia CPO memberi kesan negatif terhadap jumlah eksport CPO, manakala pengeluaran CPO dan kadar tukaran asing memberi kesan positif terhadap jumlah eksport CPO. Seterusnya Lee dan Mansur (2018) mengkaji hubungan di antara kadar tukaran asing dan eksport minyak kelapa sawit dengan menggunakan kaedah ARDL dan nonlinear autoregressive distributed lag (NARDL). Kajian mereka mendapati bahawa kadar pertukaran adalah pemboleh ubah eksogen, manakala eksport minyak sawit adalah pemboleh ubah endogen dan wujud hubungan asimetri jangka panjang antara kadar tukaran dan eksport minyak kelapa sawit.

Harga minyak sayuran lain menjejaskan harga minyak sawit mentah (Applanaidu et al. 2011; Talib & Darawi 2002; Abdullah et al. 2007; Rahman et al. 2007). Harga minyak kacang soya mempunyai pengaruh ke atas harga minyak sawit kerana minyak kacang soya adalah salah satu pengganti kepada CPO dalam banyak kegunaan sehingga harganya sangat berkorelasi. Applanaidu et al. (2011) dan Talib dan Darawi (2002) menyatakan bahawa minyak soya adalah pesaing minyak sawit dan mempunyai hubungan positif dengan keanjalan harga silang. Berdasarkan Abdullah et al. (2007) dan Rahman et al. (2007), permintaan minyak kacang soya dan minyak kelapa sawit adalah serupa dengan komoditi pertanian yang mempunyai ciri-ciri yang sama sejak diguna pakai dalam industri makanan. Minyak kelapa sawit adalah minyak utama dan juga penanda aras harga untuk perdagangan minyak sayuran (Carrere 2010). Walau bagaimanapun, kenaikan harga minyak sayuran pengganti seperti minyak kacang soya juga telah menyebabkan kenaikan harga minyak sawit mentah. Kajian oleh Alias dan Othaman (1998) mendapati wujud hubungan kointegrasi antara minyak kelapa sawit dengan minyak kacang soya. Berdasarkan teknik kointegrasi, wujud hubungan antara minyak kelapa sawit dengan minyak soya dalam jangka panjang, menggambarkan bahawa minyak kacang soya merupakan barang pengganti minyak kelapa sawit. Kajian tersebut melaksanakan ujian 'Granger Test' untuk melihat kesan sebab akibat antara hubungan kedua-dua minyak tadi. Sebarang perubahan terhadap harga minyak kacang soya akan memberi kesan ke atas pasaran dalam permintaan dan penawaran minyak kelapa sawit, di mana peningkatan harga kelapa sawit memberi kesan negatif kepada harga minyak kacang soya. Di Malaysia, kelapa merupakan tanaman perindustrian keempat

penting selepas kelapa sawit, getah dan padi dari segi kawasan yang ditanam. Tambahan pula, minyak kelapa juga dalam kumpulan minyak sayuran seperti minyak kacang soya, minyak kelapa yang menghasilkan ciri-ciri minyak yang sama seperti minyak sayuran. Minyak sawit mentah Malaysia lebih banyak diimport kerana ia lebih murah daripada minyak kelapa.

Menurut Sulistyanto et al. (2011) dan Palm Oil News (2012), persaingan utama kepada minyak sawit Malaysia ialah minyak kacang soya, minyak jagung, minyak bunga matahari, minyak biji kapas, minyak kanola dan minyak kelapa. Susila (2004) menyatakan bahawa CPO boleh dijelaskan oleh harga dalam negeri, harga pengeluaran barang penggantinya iaitu minyak kelapa, keluaran dalam negara kasar (KDNK) dan juga jumlah populasi penduduk. Maka, semakin tinggi KDNK, jumlah populasi penduduk dan harga minyak kelapa (barang pengganti kepada minyak sawit), semakin tinggi harga CPO. Tambahan pula, menurut Sulistyanto et al. (2011), pertumbuhan pengeluaran dan eksport CPO digalakkan oleh permintaan dan harga yang bersaing dengan minyak sayuran lain seperti minyak kelapa. Amiruddin et al. (2005) yang mengkaji potensi pasaran dan cabaran industri minyak sawit Malaysia dalam menghadapi persaingan minyak sayuran lain seperti minyak kanola dan minyak bunga matahari, mendapati wujud tahap penggantian tinggi antara minyak sayuran di pasaran antarabangsa. Kesannya, harga minyak sayuran saling berkait dalam jangka panjang dan juga dalam jangka masa pendek. Sekiranya pengeluaran kacang soya dan minyak sawit bertambah, peningkatan dalam permintaan minyak sayur dunia yang lain akan menurun dan seterusnya menggalakkan eksport minyak kelapa sawit di pasaran global. Kajian Balqis Navilla (2013) pula mendapati harga minyak kacang soya, harga minyak kelapa, harga minyak bunga matahari dan harga minyak zaitun mempunyai hubungan positif yang signifikan dengan harga minyak sawit mentah. Kajian tersebut juga mendapati harga minyak kacang soya dan harga minyak kelapa adalah berhubungan positif dengan harga minyak sawit mentah. Hasil regresi turut juga menunjukkan bahawa harga minyak bunga matahari dan harga minyak zaitun adalah berhubungan negatif dengan harga minyak sawit. Prestasi minyak sawit mentah sangat dipengaruhi oleh harga penggantinya iaitu harga minyak kacang soya, harga minyak kelapa, harga minyak bunga matahari dan harga minyak zaitun.

Kepentingan kajian ini adalah untuk mengenal pasti faktor makroekonomi dan harga minyak sayuran yang manakah yang mempengaruhi eksport minyak sawit Malaysia, memandangkan kajian terdahulu hanya melihat kesan harga minyak sayuran secara berasingan (Talib & Darawi 2002; Hassan & Balu 2016; Zakaria et al. 2018 & 2019; Ismail et al. 2019). Kajian ini juga melihat kesan harga minyak sayuran lain secara serentak iaitu melihat kesan harga minyak kacang soya, minyak bunga matahari, minyak kanola dan minyak kelapa terhadap eksport CPO dan eksport PKO Malaysia. Selain itu, kajian sebelum ini hanya melihat kesan harga minyak sayuran lain terhadap eksport CPO (Talib & Darawi 2002; Hassan & Balu 2016; Zakaria et al. 2018 & 2019; Ismail et al. 2019). Kajian ini melihat kesan harga minyak sayuran lain terhadap eksport PKO yang mana secara puratanya harga PKO lebih rendah berbanding minyak kacang soya dan minyak kelapa. Kajian ini dilaksanakan agar dapat membantu pihak kerajaan khususnya Kementerian Industri Utama (MPI), Kementerian Pertanian dan Industri Asas Tani (MOA) dan Lembaga Minyak Sawit Malaysia (MPOB) dan syarikat-syarikat swasta[1] agar mereka dapat memberikan perhatian terhadap faktor tersebut secara serentak bagi memastikan daya saing eksport minyak kelapa sawit Malaysia terus meningkat. Selain itu, perbezaan kajian ini dengan kajian sebelum ini adalah, kajian ini mengambil kira krisis ekonomi yang memberi kesan terhadap eksport minyak kelapa sawit Malaysia. Kajian sebelum ini hanya melihat kesan kejadian alam iaitu apabila berlaku la-nina dan el-nino (Kamil dan Omar 2017) terhadap industri minyak sawit Malaysia. Kajian ini membuat penambahan dari aspek peristiwa krisis ekonomi yang memberi kesan terhadap eksport minyak kelapa sawit Malaysia, iaitu sama ada wujud kesan krisis ekonomi Asia dan global terhadap jumlah eksport CPO dan PKO, sebagai petunjuk kepada kebarangkalian kesan yang akan berlaku terhadap eksport CPO dan PKO, sekiranya berlaku krisis ekonomi pada masa akan datang.

Kajian ini mengadaptasi model daripada Lee dan Masih (2018), Zakaria et al. (2019) dan Ismail et al. (2019), dengan membuat beberapa penambahan seperti (1) penentu kepada eksport produk sawit CPO dan PKO (kajian sebelum ini hanya melihat penentu kepada eksport CPO sahaja), (2) melihat lebih banyak alternatif barang pengganti (kajian sebelum ini hanya melihat kesan minyak soya dan minyak bunga matahari sahaja), dan (3) melihat kesan krisis ekonomi terhadap eksport minyak sawit dalam mencapai mencapai objektif kajian.

METODOLOGI KAJIAN

DATA DAN SPESIFIKASI MODEL

Bagi menjalankan kajian ini, data yang digunakan adalah data tahunan bermula dari tahun 1985 sehingga tahun 2016. Semua data diperolehi daripada Malaysia Palm Oil Board (MPOB), Jabatan Perangkaan Malaysia, *Datastream*, *World Bank Indicator* dan *Direktorat Jenderal Pekebunan, Departemen Pertanian*, Indonesia.

Terdapat beberapa kajian yang memodelkan pasaran minyak sawit. Antara kajian yang memodelkan pasaran minyak sawit ialah Yusoff (1988), A. Talib dan Darawi (2002), dan A. Talib et al. (2007). Kajian-kajian tersebut melihat faktor-faktor yang mempengaruhi

pasaran minyak sawit, menggunakan persamaan serentak. Fungsi permintaan eksport terbahagi kepada dua produk utama, iaitu jumlah eksport CPO dan jumlah eksport PKO. Persamaan asal model di bawah telah diolah semuanya dalam bentuk logarithma kecuali pemboleh ubah patung dan seterusnya digunakan untuk tujuan penganggaran kajian:

$$EPS_t = \alpha_0 + \alpha_1 PPS_t + \alpha_2 PS_t + \alpha_3 WPPS_t + \alpha_4 REER_t + \alpha_5 SUB + \alpha_6 DAK_t + \alpha_7 DGK_t + u_t \quad (1)$$

Daripada persamaan 1, model kajian ini membahagikan fungsi permintaan eksport kepada dua produk sawit (EPS), iaitu jumlah eksport CPO dan jumlah eksport PKO yang dianalisis secara berasingan. Hal ini berbeza dengan kajian terdahulu yang hanya mengkaji eksport CPO sahaja. Ini bertujuan agar pihak penggubal dasar di Malaysia seperti Kementerian Industri Utama (MPI), Kementerian Pertanian dan Industri Asas Tani (MOA) dan Lembaga Minyak Sawit Malaysia (MPOB) dapat memberi penekanan terhadap faktor penentu eksport bagi dua produk minyak sawit tersebut. Daripada setiap fungsi yang dibangunkan, kajian ini melihat impak secara berasingan terlebih dahulu bagi kesan pemboleh ubah harga barang pengganti (SUB), iaitu harga minyak kelapa (WPCOCON), harga minyak kanola (WPREP), harga minyak kacang soya (WPSOY) dan harga minyak bunga matahari (WPSUN) kepada jumlah eksport sawit (EPS). Analisis seterusnya mengenal pasti kesan harga barang-barang pengganti secara serentak terhadap jumlah eksport minyak sawit. Analisis ini adalah penambahbaikan daripada kajian-kajian sebelum ini yang hanya melihat faktor kesan harga barang-barang pengganti secara berasingan. Setiap fungsi dimasukkan pemboleh ubah pepatung krisis kewangan Asia (DAK) dan krisis kewangan global (DGK) untuk melihat kesan tersebut terhadap eksport minyak sawit. Spesifikasi pemboleh ubah yang terlibat dalam kajian ini seperti Jadual 1.

PROSEDUR PENGANGGARAN

Kajian ini telah menganggarkan persamaan 1 dengan menggunakan model ARDL, seperti yang dicadangkan oleh Pesaran et al. (2001), untuk mengenal pasti hubungan jangka panjang antara harga produk minyak kelapa sawit, pengeluaran produk minyak kelapa sawit, harga dunia minyak kelapa sawit, kadar tukaran, harga barang pengganti dan krisis ekonomi terhadap eksport minyak kelapa sawit Malaysia. Pada asasnya, pendekatan ARDL tidak memerlukan ujian kepegunan pemboleh ubah dilakukan terlebih dahulu. Ini bererti ujian kointegrasi berasaskan pendekatan ARDL boleh terus diaplikasi tanpa mengambil kira sama ada semua pemboleh ubah dalam bentuk I(0), I(1) atau campuran I(0) dan I(1). Namun, kajian ini tetap menjalankan ujian kepegunan bagi memastikan kepegunan setiap pemboleh ubah tidak berada pada tahap I(2). Secara spesifik, ujian kointegrasi ARDL yang dijalankan mempunyai tiga langkah dalam penganggaran. Pertama, ujian kointegrasi dilakukan dengan menggunakan ujian had sempadan (bound test) bagi mengenal pasti panjang lat yang optimum. Kedua, membuat penganggaran model jangka panjang. Ketiga, membuat penganggaran model jangka pendek dengan mengambil kira terma pembetulan ralat (ECT). Kajian ini juga turut menjalankan ujian diagnostik yang merangkumi CUSUM, ujian normaliti, autokorelasi, heterokredastisiti dan ujian Ramsey bagi memastikan penganggaran yang dijalankan adalah tepat dan tidak bias.

UJIAN KEPEGUNAN

Kajian ini menjalankan ujian kepegunan iaitu Augmented Dickey-Fuller (ADF) (Dickey & Fuller 1981) dan Phillips-Perron (PP) (Phillips & Perron 1988) bagi menentukan tahap integrasi data. Oleh kerana data yang digunakan dalam kajian ini adalah berbentuk siri masa, maka ujian kepegunan adalah perlu. Ia bertujuan untuk mengelakkan daripada mendapat regresi palsu, iaitu penganggaran yang tidak menunjukkan hubungan yang sebenar, walaupun penganggaran regresinya kelihatan amat memuaskan. Sesuatu pemboleh ubah berkemungkinan berada dalam keadaan pegun dalam bentuk paras pembezaan pertama mahupun pada tingkat pembezaan kedua. Jika pemboleh ubah berada pada kedudukan pegun setelah dibezakan sekali, maka pemboleh ubah tersebut mempunyai integrasi satu atau I(1). Manakala, jika pemboleh ubah tersebut dibezakan sebanyak `n' kali untuk menjadi pegun, maka pemboleh ubah tersebut dikatakan mempunyai ciri integrasi ke-n atau I(n). Model berikut menunjukkan proses AR (1) yang diterbitkan:

$$y_t = \rho y_{t-1} + x_t' \delta + \epsilon_t \quad (2)$$

Dengan x_t merupakan pemboleh ubah bebas yang mungkin mempunyai persilang atau mempunyai persilangan dan tren, ρ dan δ adalah pekali yang ingin dianggarkan dan ϵ_t adalah terma ralat. Jika $|\rho| \geq 1$, y adalah siri yang tidak pegun dan varians bagi y meningkat dengan masa dan menghampiri infiniti. Jika $|\rho| < 1$, y adalah siri yang pegun. Oleh itu hipotesis bagi menguji kepegunan ini dapat dijalankan dengan melihat jika ρ adalah kurang daripada satu. Hal ini dapat membentuk hipotesis sifar iaitu H_0: $\rho = 1$ dan hipotesi alternatif iaitu H_1: $\rho < 1$. Walaupun terdapat pelbagai ujian dalam mengenal pasti punca unit dalam data siri masa, namun Ujian Augmented Dickey Fuller dan Ujian Philip-Perron adalah dua bentuk ujian kepegunan yang kerap digunakan.

JADUAL 1. Spesifikasi Pemboleh ubah

Variable	Notasi	Spesifikasi Pengukuran
Export Produk Sawit (EPS):		
ECPO	Eksport minyak sawit mentah	Jumlah Eksport CPO (Tan)
EPKO	Eksport minyak isirung sawit	Jumah Eksport PKO (Tan)
Harga Produk Sawit (PPS):		
PCPO	Harga tempatan minyak sawit mentah	Harga CPO Tempatan (USD/Tan)
PPKO	Harga tempatan minyak isirung sawit	Harga PKO Tempatan (USD/Tan)
Pengeluaran Produk (PS):		
CPO	Pengeluaran minyak sawit mentah	Jumlah Pengeluaran CPO (Tan)
PKO	Pengeluaran minyak isirung sawit	Jumlah Pengeluaran PKO (Tan)
Harga Dunia Produk Sawit (WPPS):		
WPCPO	Harga dunia minyak sawit mentah	Harga Dunia CPO (USD/Tan)
WPPKO	Harga dunia minyak isirung sawit	Harga Dunia PKO (USD/Tan)
Kadar tukaran REER	Kadar pertukaran efektif benar	RM/USD
Harga barang pengganti (SUB):		
WPSOY	Harga Dunia Minyak Kacang Soya	Harga Dunia Minyak Kacang Soya (USD/Tan)
WPREP	Harga Dunia Minyak Kanola	Harga Dunia Minyak Kanola (USD/Tan)
WPSUN	Harga Dunia Minyak Bunga Matahari	Harga Dunia Minyak Bunga Matahari (USD/Tan)
WPCOCON	Harga Dunia Minyak Kelapa	Harga Dunia Minyak Kelapa (USD/Tan)
Krisis Ekonomi:		
DAK	Pepatung Krisis Kewangan Asia	1 bagi tahun 1997 - 1998; 0 bagi tahun selainnya
DGK	Pepatung Krisis Kewangan Global	1 bagi tahun 2007 - 2009; 0 bagi tahun selainnya

UJIAN AUGMENTED DICKEY-FULLER (ADF)

Ujian punca unit ADF mengandaikan bahawa faktor gangguan adalah tidak berkorelasi dan mempunyai varian yang malar. Dalam kajian ini, ujian Augmented Dickey-Fuller telah digunakan untuk mengukur kepegunan pemboleh ubah dan model bagi pengujian ini terbentuk dengan menolak setiap sisi dengan y_{t-1} seperti berikut:

$$\Delta y_t = \alpha y_{t-1} + x_t{}' \delta + \epsilon_t \quad (3)$$

Di mana α merupakan $\rho - 1$ dan hipotesis baru yang dibentuk adalah seperti berikut:

H_0: $\alpha = 0$
H_1: $\alpha < 0$

Dickey dan Fuller (1979) menunjukkan bahawa di bawah hipotesis sifar bagi ujian kepegunan, statistik ini tidak mengikut taburan-t yang biasa digunakan, dan mereka telah memperoleh keputusan asimptot dan menjana nilai kritikal bagi pelbagai ujian dengan mengunakan pelbagai saiz sampel. MacKinnon (1991, 1996) telah menjalankan simulasi dengan menggunakan set lebih besar daripada yang dihasilkan oleh Dickey dan Fuller. Tambahan pula, MacKinnon menganggarkan tindak balas yang wujud daripada hasil simulasi dan ini memberi ruang dalam memperoleh nilai kritikal Dickey-Fuller dan nilai-p bagi saiz sampel yang arbitrari.

Ujian kepegunan Dickey-Fuller ini hanya sah jika siri tersebut mempunyai proses AR(1). Jika siri mempunyai darjah korelasi pada lat yang lebih tinggi, andaian dalam kewujudan white noise, ϵ_t telah dilanggar. Oleh yang demikian, ujian Augmented Dickey-Fuller (ADF) merangka pembetulan parametrik bagi darjah korelasi yang lebih tinggi dengan mengandaikan siri y mengikut proses AR (p), dengan menambah p lat pembezaan terma bagi pemboleh ubah bersandar y pada sebelah kanan persamaan bagi ujian regrasi tersebut:

$$\Delta y_t = \alpha y_{t-1} + x_t{}' \delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-1} + \cdots + \beta_p \Delta y_{t-p} + \epsilon_t \quad (4)$$

Salah satu kepentingan hasil yang diperoleh daripada Dickey dan Fuller ini iaitu taburan asimptot

bagi nisbah-t bagi α adalah tidak bergantung kepada bilangan lat bagi pembezaan pertama dalam regresi ADF. Selain itu, walaupun terdapat andaian bahawa y mesti mengikut proses AR ini agak ketat, namun Said dan Dickey (1984) telah menunjukkan bahawa ujian ADF ini sah dalam kewujudan komponen purata bergerak (*moving average*) dan dengan syarat terdapat terma lat pembezaan yang mencukupi yang telah dimasukkan dalam menguji regresi.

UJIAN PHILLIPS-PERRON (PP)

Phillips dan Perron (1988) mencadangkan kaedah alternatif dalam mengawal siri korelasi dalam menguji kepegunan yang dikenali sebagai Ujian Phillips-Perron (PP). Kaedah PP ini menganggarkan ujian DF yang tidak augmented dan mengubah suai nisbah-t bagi koefisien α supaya korelasi bersiri ini tidak mempengaruhi taburan asimptot bagi ujian statistik ini dan nisbah-t PP adalah seperti berikut:

$$t_\alpha = t_\alpha \left(\frac{\gamma_0}{f_0}\right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s} \quad (5)$$

Di mana $\hat{a}$ adalah penganggar, dan t_α merupakan nisbah-t bagi $\hat{a}$, ($\hat{a}$) merupakan pekali sisihan piawai dan s merupakan sisihan piawai bagi ujian regresi. Selain itu, γ_0 merupakan penganggar konsisten bagi ralat varians dan f_0 adalah penganggar bagi residual spektrum di frekuensi sifar.

Kaedah PP turut menggunakan nilai kritikal yang dihasilkan oleh MacKinnon. Ujian punca unit kaedah PP mengambil kira masalah-masalah yang berkemungkinan dihadapi dalam faktor gangguan, sekiranya varians dalam faktor gangguan adalah bersifat tidak malar.

PENDEKATAN *AUTOREGRESSIVE DISTRIBUTED LAG* (ARDL)

Langkah pertama dalam menganggar model adalah menganggar hubungan jangka panjang (kointegrasi) dalam kalangan pemboleh ubah siri masa. Penganggaran untuk model ARDL adalah seperti berikut:

Model ARDL CPO:

$$\begin{aligned}\Delta \mathrm{LECPO}_t = {} & \alpha_0 + \sum_{i=1}^{j} \alpha_1 \Delta \mathrm{LECPO}_{t-i} + \sum_{i=0}^{k} \alpha_2 \Delta \mathrm{LPCPO}_{t-i} + \sum_{i=0}^{l} \alpha_3 \Delta \mathrm{LCPO}_{t-i} + \sum_{i=0}^{m} \alpha_4 \Delta \mathrm{LWPCPO}_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta \mathrm{LREER}_{t-i} \\ & + \sum_{i=0}^{o} \alpha_6 \Delta \mathrm{LSUB}_{t-i} + \beta_1 \mathrm{LECPO}_{t-1} + \beta_2 \mathrm{LPCPO}_{t-1} + \beta_3 \mathrm{LCPO}_{t-1} + \beta_4 \mathrm{LWPCPO}_{t-1} + \beta_5 \mathrm{LREER}_{t-1} \\ & + \beta_6 \mathrm{LSUB}_{t-1} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + u_t \end{aligned} \quad (6a)$$

Model ARDL PKO:

$$\begin{aligned}\Delta \mathrm{LEPKO}_t = {} & \alpha_0 + \sum_{i=1}^{j} \alpha_1 \Delta \mathrm{LEPKO}_{t-i} + \sum_{i=0}^{k} \alpha_2 \Delta \mathrm{LPPKO}_{t-i} + \sum_{i=0}^{l} \alpha_3 \Delta \mathrm{LPKO}_{t-i} + \sum_{i=0}^{m} \alpha_4 \Delta \mathrm{LWPPKO}_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta \mathrm{LREER}_{t-i} \\ & + \sum_{i=0}^{o} \alpha_6 \Delta \mathrm{LSUB}_{t-i} + \beta_1 \mathrm{LEPKO}_{t-1} + \beta_2 \mathrm{LPPKO}_{t-1} + \beta_3 \mathrm{LPKO}_{t-1} + \beta_4 \mathrm{LWPPKO}_{t-1} + \beta_5 \mathrm{LREER}_{t-1} \\ & + \beta_6 \mathrm{LSUB}_{t-1} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + u_t \end{aligned} \quad (6b)$$

Di mana β_n adalah pekali bagi jangka panjang, α_0 adalah pintasan, Δ adalah pembezaan pertama untuk setiap pemboleh ubah dan j, k, l, m, n dan o adalah nilai optimum bagi lat dan u_t adalah ralat gangguan putih *(white noise)* dengan notasi bagi setiap pemboleh ubah dinyatakan dalam Jadual 1. Bagi mengenal pasti kewujudan hubungan jangka panjang antara pemboleh ubah dalam persamaan (6a dan 6b), maka hipotesis nol dan hipotesis alternatif diuji dengan menggunakan ujian statistik-F seperti berikut:

H_0: tiada kointegrasi: ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6$)
H_0: ada kointegrasi: ($\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6$)

Dengan merujuk kepada Pesaran (2001), nilai kritikal had bawah (*lower bound*) mengandaikan pemboleh ubah penerang berintegrasi pada aras I(0) dan nilai kritikal had atas (*upper bound*) mengandaikan pemboleh ubah penerang berintegrasi pada aras I(1). Sekiranya nilai statistik-F yang diperolehi lebih besar daripada nilai atas (*upper bound*) had kritikal, ini menunjukkan hipotesis nol akan ditolak dan wujud hubungan jangka panjang di kalangan pemboleh ubah siri masa tersebut. Sebaliknya, jika nilai statistik F yang diperolehi berada di bawah batas kritikal, ini menunjukkan hipotesis nol tidak dapat ditolak. Selain itu juga, jika nilai statistik-F terletak antara nilai batas kritikal bawah dan batas kritikal atas, maka tidak dapat dikenal pasti sama ada wujud kointegrasi ataupun tidak, kerana darjah integrasi pemboleh ubah bebas tidak diketahui dengan jelas. Tingkat lat optimum yang dipilih dalam kajian ini adalah dengan melihat nilai F-statistik yang tertinggi.

Langkah selanjutnya diteruskan untuk menganggar model jangka panjang. Kajian jangka panjang dilaksanakan dengan melihat kehadiran hubungan jangka panjang menggunakan ujian-F untuk mengenal pasti sejauh mana tahap signifikan terhadap lag pemboleh ubah yang terlibat. Pesaran et al. (2001) memberikan dua andaian set nilai kritikal untuk ujian-F. Andaian pertama, semua pemboleh ubah *I(0)* dan andaian yang kedua

semua pemboleh ubah *I(1)*. Hubungan jangka panjang terhasil apabila wujud hubungan antara pemboleh ubah tanpa halangan jangka pendek atau sekalipun terdapat lencongan jangka pendek, ia akan kembali semula kepada hubungan jangka panjang tersebut. Narayan (2004) juga menggunakan model ini untuk memeriksa hubungan jangka panjang dan jangka pendek antara pemboleh ubah yang dipilih. Hubungan jangka panjang adalah penting untuk pembentukkan teori ekonomi serta dan menjadi panduan kepada penggubal dasar dalam merangka strategi yang seharusnya memfokuskan kepada sasaran jangka panjang, di samping menangani cabaran jangka pendek (jika ada). Hubungan jangka panjang dianalisis dengan melakukan penganggaran pekali untuk model jangka panjang seperti dalam persamaan (7a) dan (7b).

Dalam masa yang sama, penganggaran hubungan dinamik jangka pendek juga dianalisis. Hubungan jangka pendek bertujuan untuk melihat sama ada terdapat sisihan (*deviation*) daripada hubungan jangka panjang agar penggubal dasar bersedia merangka strategi bagi menangani perubahan jangka pendek. Hubungan jangka pendek diuji dengan menerbitkan vektor pembetulan ralat (EC) seperti yang ditunjukkan dalam persamaan (8a) dan (8b).

Di mana α_1, α_2, α_3, α_4, α_5, dan α_6 adalah parameter pekali dinamik jangka pendek, β_7 dan β_8 adalah parameter pekali pepatung jangka pendek, dan ψ adalah pekali bagi pembetulan ralat (ECT). Pekali ECT boleh menerangkan dua perkara iaitu pertama, ia menerangkan arah sebab-penyebab jangka panjang di antara pemboleh ubah penerang terhadap pemboleh ubah bersandar. Kedua, ECT boleh mengukur kelajuan pelarasan (speed of adjustment) kepada keseimbangan jangka panjang, iaitu masa yang diambil oleh pemboleh ubah penerang untuk kembali kepada keseimbangn jangka panjang jika berlaku sebarang kejutan dalam ekonomi. Kaedah untuk mengira kelajuan pelarasan ialah (1/ECT). Nilai pekali ψ mesti signifikan pada aras keertian yang ditentukan dan mempunyai nilai negatif untuk mengesahkan kewujudan hubungan jangka panjang (Saad & Suryati 2014) antara semua pemboleh ubah yang digunakan. Nilai ψ adalah antara 0 hingga 1 yang menunjukkan semakin tinggi nilai, semakin cepat pelarasan kepada keseimbangan (1/ECT). Kriteria maklumat Schwartz-Bayesian (SBC) digunakan untuk menentukan lat masa optimum (optimum lag), bagi ketiga-tiga langkah ARDL sebagaimana j, k, l, m, n, dan o di atas setiap persamaan.

UJIAN DIAGNOSTIK ARDL

Ujian ini penting dalam pendekatan ARDL untuk menunjukkan bahawa tiada masalah dalam model yang digunakan. Berikut merupakan beberapa ujian diagnostik yang telah dilakukan.

$$\mathrm{LECPO}_t = \alpha_0 + \sum_{i=1}^{j} \alpha_1 \mathrm{LECPO}_{t-i} + \sum_{i=0}^{k} \alpha_2 \mathrm{LPCPO}_{t-i} + \sum_{i=0}^{l} \alpha_3 \mathrm{LCPO}_{t-i} + \sum_{i=0}^{m} \alpha_4 \mathrm{LWPCPO}_{t-i} + \sum_{i=0}^{n} \alpha_5 \mathrm{LREER}_{t-i} + \sum_{i=0}^{o} \alpha_6 \mathrm{LSUB}_{t-i} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + u_t \quad (7a)$$

$$\mathrm{LEPKO}_t = \alpha_0 + \sum_{i=1}^{j} \alpha_1 \mathrm{LEPKO}_{t-i} + \sum_{i=0}^{k} \alpha_2 \mathrm{LPPKO}_{t-i} + \sum_{i=0}^{l} \alpha_3 \mathrm{LPKO}_{t-i} + \sum_{i=0}^{m} \alpha_4 \mathrm{LWPPKO}_{t-i} + \sum_{i=0}^{n} \alpha_5 \mathrm{LREER}_{t-i} + \sum_{i=0}^{o} \alpha_6 \mathrm{LSUB}_{t-i} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + u_t \quad (7b)$$

$$\Delta\mathrm{LECPO}_t = \alpha_0 + \sum_{i=1}^{j-1} \alpha_1 \Delta\mathrm{LECPO}_{t-i} + \sum_{i=0}^{k-1} \alpha_2 \Delta\mathrm{LPCPO}_{t-i} + \sum_{i=0}^{l-1} \alpha_3 \Delta\mathrm{LCPO}_{t-i} + \sum_{i=0}^{m-1} \alpha_4 \Delta\mathrm{LWPCPO}_{t-i} + \sum_{i=0}^{n-1} \alpha_5 \Delta\mathrm{LREER}_{t-i} + \sum_{i=0}^{o-1} \alpha_6 \mathrm{LSUB}_{t-i} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + \psi EC_{t-1} + u_t \quad (8a)$$

$$\Delta\mathrm{LEPKO}_t = \alpha_0 + \sum_{i=1}^{j-1} \alpha_1 \Delta\mathrm{LEPKO}_{t-i} + \sum_{i=0}^{k-1} \alpha_2 \Delta\mathrm{LPPKO}_{t-i} + \sum_{i=0}^{l-1} \alpha_3 \Delta\mathrm{LPKO}_{t-i} + \sum_{i=0}^{m-1} \alpha_4 \Delta\mathrm{LWPPKO}_{t-i} + \sum_{i=0}^{n-1} \alpha_5 \Delta\mathrm{LREER}_{t-i} + \sum_{i=0}^{o-1} \alpha_6 \mathrm{LSUB}_{t-i} + \beta_7 \mathrm{DAK} + \beta_8 \mathrm{DGK} + \psi EC_{t-1} + u_t \quad (8b)$$

1. Ujian *Breusch-Godfrey Serial Correlation LM* untuk melihat kehadiran masalah autokorelasi.
2. Ujian Heteroskedastisiti untuk melihat sama ada wujud kehadiran masalah heteroskedastisiti dalam residual persamaan.
3. Ujian Normaliti untuk melihat sama ada data bertaburan normal atau sebaliknya.
4. Ujian *Ramsey Regression Specification Error Test (RESET)* untuk melihat ralat dalam pembentukan spesifikasi model.
5. Ujian *Cummulative Sum of Residual (CUSUM)* untuk melihat kestabilan struktur model.

HASIL KAJIAN

Penerangan hasil kajian ini terbahagi kepada dua jenis produk utama iaitu CPO dan PKO. Daripada setiap produk yang dikaji, kajian ini melihat impak secara berasingan terlebih dahulu melalui model 1 hingga model 4, iaitu kesan terhadap harga minyak kelapa (M1), harga minyak kanola (M2), harga minyak kacang soya (M3) dan harga minyak bunga matahari (M4), kepada jumlah eksport sawit. Seterusnya kajian diteruskan dengan mengenal pasti kesan harga barang-barang pengganti secara serentak terhadap jumlah eksport minyak sawit melalui model 5 (M5). Setiap fungsi dimasukkan pemboleh ubah pepatung krisis kewangan Asia dan krisis kewangan global untuk melihat kesan tersebut terhadap eksport minyak sawit.

UJIAN PUNCA UNIT

Jadual 2 menunjukkan keputusan ujian kepegunan dengan menggunakan ujian kepegunan ADF dan PP untuk mengenal pasti tingkat integrasi bagi pemboleh ubah dalam kajian. Ujian statistik yang dihasilkan telah dibandingkan dengan nilai kritikal berdasarkan MacKinnon (1996). Bagi pemboleh ubah pada tingkat, nilai kritikal pada aras keertian 10%, 5% dan 1% adalah -3.1731, -3.4892 dan -4.1243, manakala bagi pemboleh ubah pada pembezaan pertama, nilai kritikal bagi aras keertian 10%, 5% dan 1% adalah -2.5940, -2.9126 dan -3.5482. Kedua-dua ujian ini jelas menunjukkan bahawa semua pemboleh ubah adalah pegun pada peringkat paras dan pembezaan pertama, dan ini turut menunjukkan bahawa kesemua pemboleh ubah bercampur antara I(0) dan I(1) di kedua-dua buah negara dan harga dunia bagi barang pesaing.

UJIAN SEMPADAN BAGI KOINTEGRASI

Jadual 3 menunjukkan ringkasan keputusan ujian sempadan. Nilai kritikal bagi ujian sempadan ini diperoleh daripada jadual Narayan (2004) dan k adalah bilangan pemboleh ubah tidak bersandar. Berdasarkan ujian sempadan ini, bagi poduk CPO nilai statistik-F pada semua model mempunyai nilai yang signifikan. Manakala, bagi produk PKO, nilai statistik-F pada model tiga hingga lima mempunyai nilai yang signifikan, sementara model satu hasil ujian tidak signifikan dan pada model dua hasil ujian tidak dapat dikenal pasti (inconclusive). Tingkat lat optimum dipilih kerana ia mempunyai nilai F-statistik yang tertinggi. Hasil ujian sempadan ini menunjukkan terdapat keseimbangan jangka masa panjang di mana pemboleh ubah akan bergerak bersama dalam jangka masa panjang bagi semua model CPO dan KPO. Hal ini membolehkan kajian diteruskan dengan menjalankan ujian kointegrasi Autoregressive Distributed Lag (ARDL) yang dicadangkan oleh Pesaran dan Shin (1996).

ANGGARAN PEKALI JANGKA PANJANG MODEL ARDL

Setelah mengenal pasti bahawa wujud hubungan jangka panjang, langkah seterusnya adalah melakukan penggangaran pekali jangka panjang dengan aras lat pemboleh ubah yang sama berdasarkan Jadual 4. Tujuan kajian ini dijalankan adalah untuk melihat pengaruh faktor makroekonomi dan persaingan harga terhadap eksport produk utama sawit dalam jangka panjang. Produk eksport utama sawit yang dikaji ialah CPO dan PKO. Faktor makroekonomi dalam kajian ini mengambil kira pemboleh ubah harga tempatan sawit, harga dunia sawit, jumlah pengeluaran sawit dan kadar tukaran benar efektif. Persaingan harga pula mengambil kira harga produk barang pengganti bagi minyak kelapa sawit iaitu minyak kacang soya, minyak kanola, minyak bunga matahari dan minyak kelapa. Kajian ini juga melihat sama ada wujud kesan krisis ekonomi Asia dan global terhadap jumlah eksport CPO dan PKO.

Jadual 4 meringkaskan keputusan penganggaran model jangka panjang bagi produk CPO. Dapatan kajian bagi semua model mendapati bahawa jumlah pengeluaran (LCPO) dan harga dunia CPO (LWPCPO) berhubungan positif dengan eksport CPO Malaysia. Ini menunjukkan peningkatan jumlah pengeluaran dan peningkatan dalam harga CPO dunia telah meningkatkan eksport CPO Malaysia. Manakala, harga tempatan CPO (LPCPO) berhubungan negatif dengan jumlah eksport CPO Malaysia yang menunjukkan peningkatan dalam harga tempatan CPO mengurangkan jumlah eksport CPO. Kadar tukaran berkesan benar tidak memberi kesan yang signifikan terhadap jumlah eksport CPO. Bagi kesan harga barang penganti pula, hasil kajian mendapati bahawa pada model tiga, harga dunia minyak kacang soya berhubungan negatif dengan jumlah eksport CPO Malaysia. Keadaan ini menunjukkan bahawa, jika harga minyak kacang soya jatuh maka jumlah eksport CPO Malaysia akan berkurangan. Hubungan negatif antara harga soya dan jumlah eksport menunjukkan bahawa minyak soya adalah barang pengganti kepada CPO. Kajian juga mendapati bahawa terdapat kesan negatif antara krisis ekonomi Asia dengan jumlah

JADUAL 2. Keputusan Ujian Kepegunan Data *Augmented Dickey-Fuller* dan *Philips- Perron*

Pemboleh ubah	ADF		PP	
	Aras	Pembezaan Pertama	Aras	Pembezaan Pertama
LECPO	-2.709	-6.331***	-2.815	-6.331***
LEPKO	-2.187	-1.855	-1.890	-6.599***
LPCPO	-2.897	-5.739***	-2.897	-6.526***
LPPKO	-3.621**	-6.986***	-3.692**	-7.845***
LCPO	1.013	-7.787***	0.117	-8.615***
LPKO	0.262	-7.023***	0.436	-12.32***
LREER	-3.591**	-4.999***	-4.975**	-9.384***
LWPCPO	-3.086	-5.625***	-4.739***	-17.143***
LWPPKO	-3.544*	-6.874***	-3.569**	-7.401***
LWPPO	-2.604	-5.461***	-3.003	-5.810***
LPSOYA	-3.858	-6.892***	-3.658**	-7.709***
LPCOCON	-2.729	-5.480***	-3.382*	-7.061***
LPREP	-3.128	-6.489***	-3.479*	-6.497
LPSUN	-3.086	-5.625***	-4.739***	-17.14***

Nota: ***, ** dan * menunjukkan aras keertian pada 1%, 5% dan 10%

JADUAL 3. Keputusan Ujian Sempadan

Nilai kritikal ujian sempadan bagi nilai statistik - F: persilangan dan tiada tren						
k	Aras 90%		Aras 95%		Aras 99%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
5	2.384	3.469	2.846	4.091	4.057	5.636
8	1.950	3.060	2.220	3.390	2.790	4.100

Model	CPO	PKO
1) F_E(E|P,Pr,Er,WP,WPcocon)	4.219***	1.539
2) F_E(E|P,Pr,Er,WP,WPrap)	6.527***	2.904
3) F_E(E|P,Pr,Er,WP,WPsoya)	3.871**	6.865***
4) F_E(E|P,Pr,Er,WP,WPsun)	6.092***	18.136***
5) F_E(E|P,Pr,Er,WP,WPcocon,WPrap,WPsoya,WPsun)	13.08***	26.558***

Nota: Nilai sempadan kritikal diperoleh daripada Narayan (2004). k adalah bilangan pemboleh ubah tidak bersandar.
*, ** dan *** menunjukkan nilai F-statistik berada di atas sempadan atas pada aras keyakinan 90%, 95% dan 99%.

JADUAL 4. Hasil Penganggaran Jangka Panjang CPO

Pemboleh ubah	Model 1	Model 2	Model 3	Model 4	Model 5
C	-81.215747**	-65.246001**	-69.457731**	-63.233030**	-56.825729*
LCPO	5.560876***	4.971306***	5.117477***	4.631464***	4.059864***
LPCPO	-2.648581**	-2.625424**	-3.622478***	-3.602227***	-6.036911**
LREER	2.664901	1.178604	1.276857	0.922282	0.357228
LWPCPO	0.971602***	0.909360**	1.017159**	1.035165**	1.190139**
LWPCOCN	0.252477				0.607018
LWPRAP		1.079972			-0.366448
LWPSOYA			2.227115*		0.943455
LWPSUN				2.539186	3.731982
DAK	-2.115345***	-1.753318**	-1.493934***	-1.562168**	-1.386355*
DGK	0.326682	0.336978	0.018074	0.201590	0.175301

Nota: ***, ** dan * menunjukkan aras keertian pada 1%, 5% dan 10%
Model 1-4 adalah model bagi harga barang pengganti yang dianalisa secara berasingan, manakala model 5 merangkumi semua harga barang pengganti yang dianalisa sekaligus

eksport CPO Malaysia. Hasil kajian menunjukkan apabila berlaku krisis ekonomi Asia, jumlah eksport CPO akan berkurang.

Seterusnya, Jadual 5 meringkaskan keputusan penganggaran jangka panjang bagi produk PKO. Pengaruh faktor makroekonomi iaitu harga minyak isirung sawit (LPKO) dan harga dunia minyak isirung sawit (LWPPKO) menunjukkan hubungan yang positif dan signifikan. Ini menunjukkan bahawa semakin tinggi harga tempatan dan harga dunia minyak isirung sawit, maka semakin tinggi jumlah eksport minyak isirung sawit Malaysia. Manakala, harga tempatan PKO (LPPKO) dan kadar tukaran benar efektif (LREER) berhubungan negatif dengan jumlah eksport PKO Malaysia yang mana peningkatan dalam harga tempatan PKO dan kadar tukaran benar efektif telah mengurangkan jumlah eksport PKO. Bagi kesan harga barang pengganti pula, hasil kajian mendapati bahawa apabila model harga barang pengganti diuji secara berasingan, iaitu pada model dua dan tiga, harga dunia minyak kanola (LWPRAP) dan minyak kacang soya (LWPSOYA) berhubungan negatif dengan jumlah

JADUAL 5. Hasil Penganggaran Jangka Panjang PKO

Pemboleh ubah	Model 1	Model 2	Model 3	Model 4	Model 5
C	-1.174226	-23.516315*	-52.558113	31.416905	-13.457744***
LPKO	0.998319***	2.216457**	3.003744*	-0.234725	1.743325***
LPPKO	-6.656477***	-14.007031***	-14.505739**	-9.160652**	-10.926654**
LREER	-0.418886	0.153888	3.959672	-4.941862	-0.244156**
LWPPKO	6.612427***	15.558012***	17.179627**	9.148590**	11.062395**
LWPCOCN	0.341716				0.552428**
LWPRAP		-1.021713*			-1.119319**
LWPSOYA			-2.170650*		1.895248**
LWPSUN				1.183871	-1.085943**
DAK	-0.345232*	0.034875	-0.391685*	0.598670	-0.027087*
DGK	0.018487	-0.138547	-0.214743	-0.331633*	-0.127985**

Nota: ***, ** dan * menunjukkan aras keertian pada 1%, 5% dan 10%
Model 1-4 adalah model bagi harga barang pengganti yang dianalisa secara berasingan, manakala model 5 merangkumi semua harga barang pengganti yang dianalisa sekaligus.

JADUAL 6. Hasil Penganggaran Jangka Pendek dan Ujian Diagnostik CPO

Pemboleh ubah	Model 1	Model 2	Model 3	Model 4	Model 5
D(LCPO)	2.397113	2.784066***	3.668980***	2.780820***	3.078752**
D(LPCPO)	-2.158251*	-0.655528	-3.648596***	-2.668638***	-3.526937**
D(LREER)	-3.866557	-1.922750	-4.802678**	-3.017245**	-4.393257*
D(LWPCPO)	0.791729**	-0.179662	1.049193***	1.103788***	0.902528**
D(LWPCOCN)	0.205736				0.460325
D(LWPRAP)		0.276701			-0.277892
D(LWPSOYA)			1.990842		0.715458
D(LWPSUN)				1.744784*	1.012022
D(DAK)	-1.723732**	-1.023424**	-1.343555**	-0.969831**	-1.051326*
D(DGK)	0.266204	0.192993	0.123023	-0.023955	0.132937
ECTt-1	-0.814870***	-0.720231***	-0.795000***	-0.961656***	-0.758339***
Ujian Diagnostik					
Auto	0.011949	1.100378	0.010350	0.172897	0.025382
Norm	0.977542	79.24984***	0.503418	27.22374***	0.084261
White	0.397842	0.160673	0.524559	0.228719	0.654092
RESET	1.362773	1.871210	2.359938	1.442990	2.199110

Nota: ***, ** dan * menunjukkan aras keertian pada 1%, 5% dan 10%
Model 1-4 adalah model bagi harga barang pengganti yang dianalisa secara berasingan, manakala model 5 merangkumi semua harga barang pengganti yang dianalisa sekaligus

eksport PKO. Namun bergitu, dapatan kajian berubah apabila kesemua harga barang pengganti diuji serentak, seperti dalam model 5, yang mana harga dunia minyak kelapa (LWPCOCN) dan minyak soya (LWPSOYA) berhubungan positif dengan jumlah eksport PKO. Keadaan ini menunjukkan bahawa jika harga minyak kelapa dan soya meningkat, maka jumlah eksport PKO Malaysia meningkat, tetapi sebaliknya berlaku pada harga dunia minyak bunga matahari (LWPSUN) dan minyak kanola (LWPRAP) berhubungan negatif dengan jumlah eksport PKO. Hubungan negatif antara harga dunia bunga matahari dan minyak kanola dengan jumlah eksport menunjukkan bahawa minyak bunga matahari dan minyak soya adalah barang pengganti kepada PKO. Kajian juga mendapati bahawa terdapat kesan negatif bagi krisis ekonomi Asia (DAK) dan krisis ekonomi global (DGK) dengan jumlah eksport PKO Malaysia. Penemuan ini menunjukkan bahawa apabila berlaku krisis ekonomi Asia krisis ekonomi global, maka jumlah eksport PKO akan berkurang.

ANGGARAN PEKALI JANGKA PENDEK MODEL ARDL DAN UJIAN DIAGNOSTIK MODEL ARDL

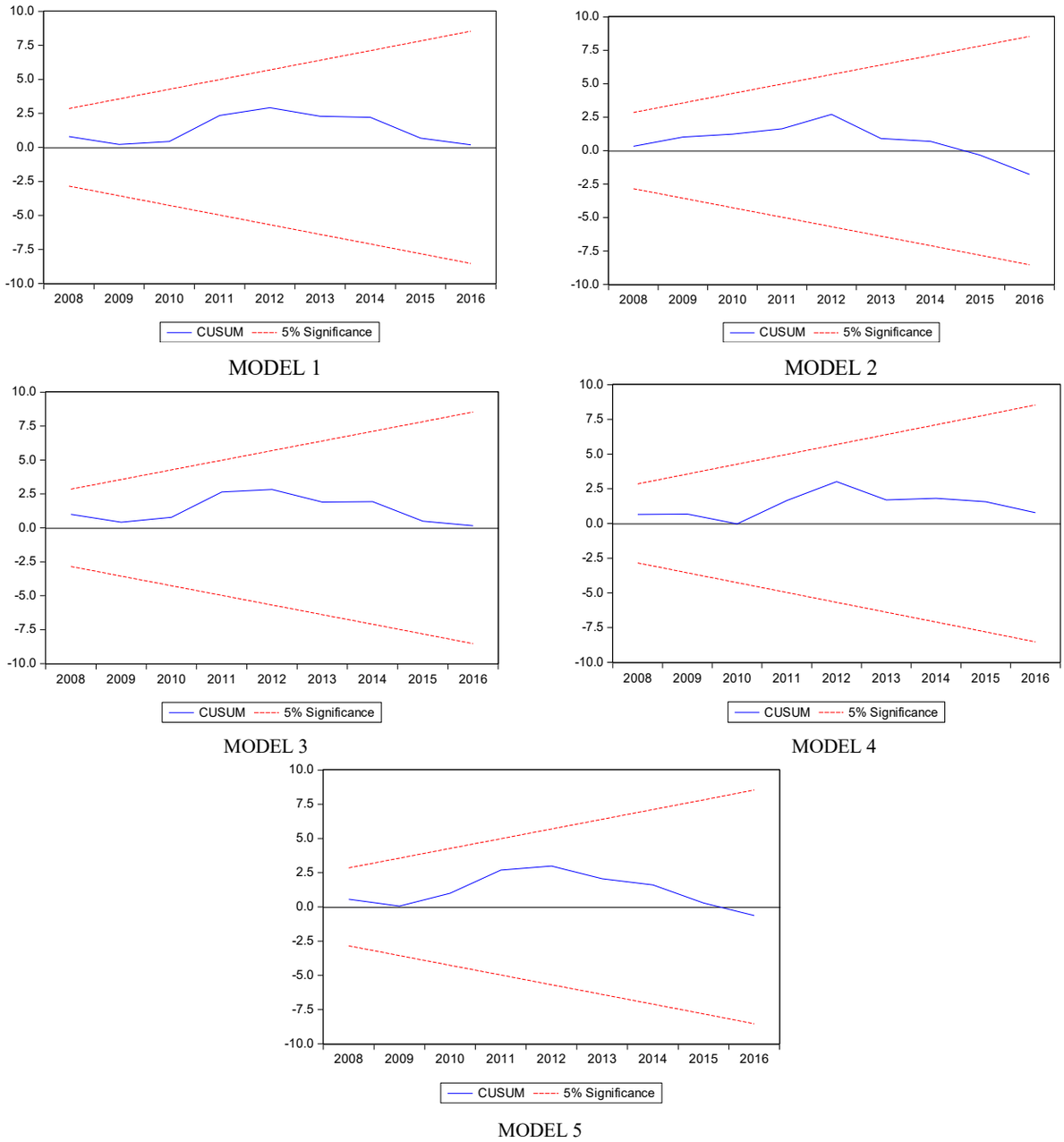
Jadual 6 menunjukkan keputusan untuk pekali dinamik jangka pendek berserta terma pembetulan ralat jangka panjang bagi produk CPO. Nilai pekali bagi terma pembetulan ralat (ECT_{t-1}) menunjukkan nilai negatif dan signifikan pada aras keertian 1% pada semua model. Ini membuktikan wujud pelarasan kejutan dalam jangka pendek untuk menuju ke keseimbangan jangka panjang untuk semua model. Nilai pekali ECTt-1 bagi model 1 adalah -0.814870, -0.720231, -0.795000, -0.961656, dan -0.758339 untuk model 1, model 2, model 3, model 4 dan model 5. Keadaan ini menunjukkan bahawa tempoh masa untuk kembali kepada keseimbangan asal dalam jangka masa panjang apabila berlakunya kejutan dalam jangka masa pendek adalah 1.2 tahun, 1.4 tahun, 1.3 tahun, 1 tahun dan 1.3 tahun bagi model 1, model 2, model 3, model 4 dan model 5 .

Bagi tujuan hubungan jangka pendek, bagi model tiga hingga lima, nilai pekali untuk jumlah pengeluaran CPO (LCPO) dan harga dunia CPO (LWPCPO) menunjukkan nilai yang positif dan signifikan pada aras pada aras keertian 1% dan 5%. Manakala, nilai pekali untuk harga tempatan CPO (LPCPO) dan kadar pertukaran efektif benar (REER) menunjukkan nilai negatif dan signifikan pada aras keertian 1% dan 10%. Bagi kesan harga barang pengganti dalam jangka pendek, hasil kajian mendapati bahawa pada model empat, harga dunia minyak bunga matahari (LWPSUN) berhubungan positif dengan jumlah eksport CPO (LECPO) Malaysia. Keadaan ini menunjukkan bahawa, kenaikan harga minyak bunga matahari(LWPSUN) telah meningkatkan jumlah eksport CPO (LECPO) Malaysia. Kajian juga mendapati bahawa pada semua model, terdapat kesan negatif antara krisis ekonomi Asia (DAK) dengan jumlah eksport CPO (LECPO) Malaysia. Hasil kajian menunjukkan bahawa apabila berlaku krisis ekonomi Asia (DAK), berlaku pengurangan jumlah eksport CPO (LECPO) dalam jangka masa pendek.

JADUAL 7. Hasil Penganggaran Jangka Pendek dan Ujian Diagnostik PKO

Pemboleh ubah	Model 1	Model 2	Model 3	Model 4	Model 5
D(LPKO)	0.438401***	2.686151**	2.458151**	1.040277**	5.292740**
D(LPPKO)	-2.923121***	-2.943720**	-1.512075	-3.946354***	-7.461357**
D(LREER)	-1.004293**	-0.893950	-0.195972	0.172382	-0.893663**
D(LWPPKO)	2.903777***	3.668251**	2.205635	4.641027***	7.615520**
D(LWPCOCN)	0.150061				1.338508**
D(LWPRAP)		-0.256840*			-0.436609**
D(LWPSOYA)			-0.253785		0.729837**
D(LWPSUN)				-1.098767***	-0.381366**
D(DAK)	-0.151605	0.029075	-0.199301*	-0.612413**	0.082495*
D(DGK)	0.008118	-0.115507	-0.109268	0.339246	-0.389789*
ECTt-1	-0.439139***	-0.833705**	-0.508831**	1.022956	-3.045583**
Ujian Diagnostik					
Auto	0.731647	1.470380	1.483459	2.262507	2.398170
Norm	1.437373	0.181893	0.516938	0.513276	0.168008
White	3.990298**	0.856686	3.832755*	0.561443	0.324009
RESET	0.709258	0.068158	0.870852	2.065480	0.406781

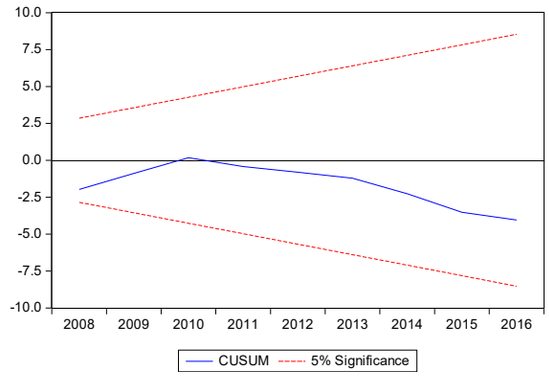
Nota: ***, ** dan * menunjukkan aras keertian pada 1%, 5% dan 10%
Model 1-4 adalah model bagi harga barang pengganti yang dianalisa secara berasingan, manakala model 5 merangkumi semua harga barang pengganti yang dianalisa sekaligus



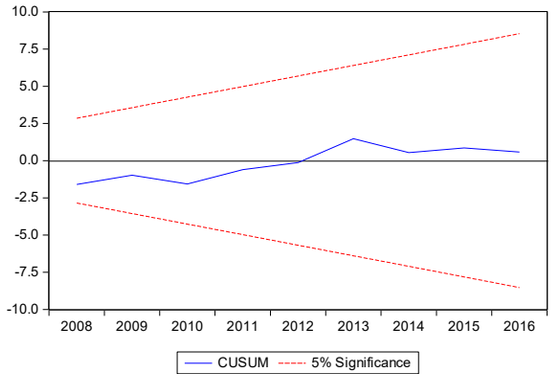
RAJAH 2. Jumlah kumulatif rekursif residual (CUSUM) CPO

Ujian diagnostik dijalankan untuk melihat kehadiran masalah dalam model ekonometrik yang digunakan. Ujian diagnostik yang dijalankan adalah ujian *Breush-Godfrey Serial Correlation LM* untuk melihat masalah autokorelasi, ujian heterokedastisiti *White*, ujian normaliti *Jarque-Bera* (JB) ujian spesifikasi model Ramsey RESET. Berdasarkan Jadual 8 bagi produk CPO, hasil ujian diagnostik yang dijalankan menunjukkan model 1, model 3 dan model 5 tidak wujud masalah autokorelasi, heterokedastisiti, normaliti dan spesifikasi. Bagi model 2 dan model 4 hanya terdapat masalah normaliti pada aras keertian 1% .

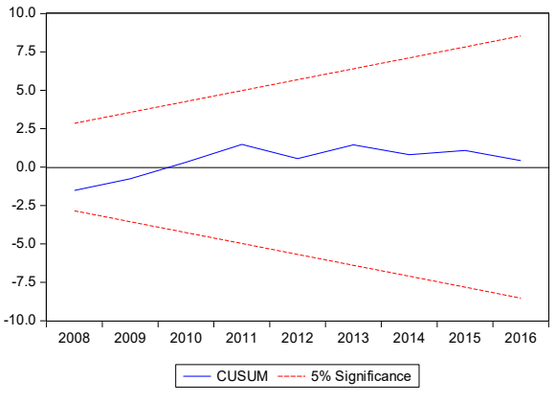
Jadual 7 pula menunjukkan keputusan untuk pekali dinamik jangka pendek berserta terma pembetulan ralat ke jangka panjang produk PKO. Nilai pekali bagi terma pembetulan ralat (ECT_{t-1}) didapati negatif dan signifikan pada aras keertian 1% pada semua model kecuali model empat. Ini membuktikan wujud pelarasan kejutan dalam jangka pendek untuk menuju ke keseimbangan jangka panjang untuk semua model kecuali model empat. Nilai pekali ECT_{t-1} iaitu -0.439139, -0.833705, -0.508831, dan -3.045583 model 1, model 2, model 3 dan model 5. Keadaan ini menunjukkan bahawa tempoh masa untuk kembali kepada keseimbangan asal (1/ECT) dalam



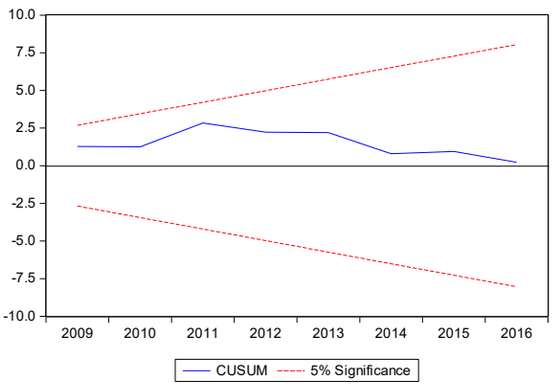
MODEL 1



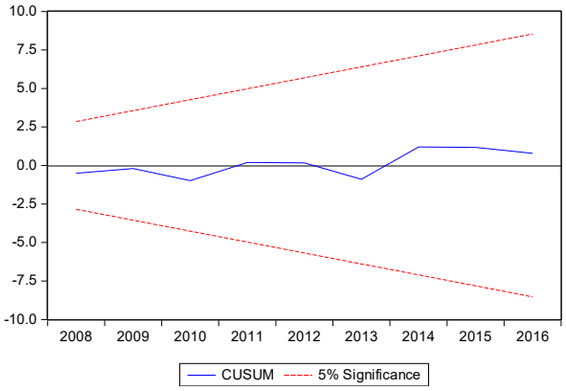
MODEL 2



MODEL 3



MODEL 4



MODEL 5

RAJAH 3. Jumlah kumulatif rekursif residual (CUSUM) PKO

jangka masa panjang, apabila berlaku kejutan dalam jangka masa pendek adalah 2.3 tahun, 1.4 tahun, 1.2 tahun, 2 tahun dan 0.3 tahun bagi model 1, model 2, model 3, dan model 5. Nilai ECT_{t-1} bagi model 5 lebih daripada -1. Keadaan ini boleh berlaku di mana apabila berlaku kejutan, masa yang diambil untuk kembali kepada keseimbangan asal bertindak balas dengan sangat pantas terhadap kejutan tersebut. Hasil kajian yang dilaksanakan oleh Dennis Nchor at al. (2015) juga turut mendapati hasil ujian ECT melebihi nilai -1.

Hasil ujian jangka pendek pula mendapati, bagi semua model kecuali model 3, nilai pekali untuk jumlah pengeluaran PKO (LPKO) dan harga dunia PKO (LWPPKO) menunjukkan nilai yang positif dan signifikan pada aras kertian 1% dan 5%. Manakala, nilai pekali untuk harga tempatan PKO (LPPKO) dan kadar pertukaran efektif benar (REER) menunjukkan nilai negatif dan signifikan pada aras kertian 1% dan 5%. Bagi kesan harga barang pengganti pula, hasil kajian mendapati bahawa pada model empat, harga

dunia minyak bunga matahari (LWPSUN) berhubungan negatif dengan jumlah eksport PKO (LEPKO). Keadaan ini menunjukkan bahawa, jika eksport PKO (LEPKO) meningkat maka harga dunia minyak bunga matahari (LWPSUN) akan berkurangan. Bagi model lima pula, harga dunia minyak kelapa (LWPOCN) dan soya (LWPSOY) berhubungan positif dengan jumlah eksport PKO (LEPKO). Keadaan ini menunjukkan bahawa, jika harga dunia minyak kelapa (LWPOCN) dan soya (LWPSOY) jatuh, maka jumlah eksport PKO(LEPKO) Malaysia akan meningkat, sebaliknya berlaku, harga dunia minyak bunga matahari (WPSUN) dan kanola (LWPRAP) berhubungan negatif dengan jumlah eksport PKO (LEPKO). Keadaan ini menunjukkan bahawa, jika harga minyak bunga matahari (WPSUN) dan kanola (LWPRAP) jatuh maka jumlah eksport PKO (LEPKO) Malaysia akan berkurangan. Kajian juga mendapati bahawa terdapat kesan negatif antara krisis ekonomi Asia (DAK) dan krisis ekonomi global (DAG) dengan jumlah eksport PKO (LEPKO) Malaysia pada model lima dalam jangka masa pendek. Hasil kajian menunjukkan bahawa apabila berlaku krisis ekonomi Asia (DAK) dan krisis ekonomi global (DAG), jumlah eksport PKO (LEPKO) akan berkurang.

Jadual 7 juga menunjukkan beberapa hasil ujian diagnostik yang dijalankan bagi produk PKO untuk melihat kehadiran masalah dalam model ekonometrik yang digunakan. Ujian diagnostik yang dijalankan adalah ujian *Breush-Godfrey Serial Correlation LM* untuk melihat masalah autokorelasi, ujian heterokedastisiti *White*, ujian normaliti *Jarque-Bera* (JB) ujian spesifikasi model Ramsey RESET. Hasil ujian diagnostik yang dijalankan menunjukkan model 2, model 4 dan model 5 tidak wujud masalah autokorelasi, heterokedastisiti, normaliti dan spesifikasi. Bagi model 1 dan model 2 hanya terdapat masalah heterokedastisit pada aras keertian 5% dan 10%.

Kestabilan model ARDL diuji berdasarkan model pembetulan ralat (error correction) dengan menggunakan teknik ujian kestabilan jumlah kumulatif rekursif residual (cumulative sum of recursive residual (CUSUM)). Berdasarkan Rajah 2, plot graf bagi model 1, model 2, model 3, model 4 dan model 5 adalah stabil kerana plot statistik CUSUM bagi semua model berada dalam sekitar sifar dan tidak melebihi garis 5% aras keertian. Plot CUSUM PKO yang ditunjukkan pada Rajah 3 jelas menunjukkan bahawa plot graf bagi model 1, model 2, model 3, model 4 dan model 5 adalah stabil kerana plot statistik CUSUM bagi semua model berada dalam sekitar sifar dan tidak melebihi garis 5% aras keertian. Oleh itu, dapat disimpulkan secara ringkas bahawa penganggaran bagi semua model adalah stabil. Kesimpulannya, kajian ini tidak mengalami masalah diagnostik dan menepati syarat asas model ekonometrik secara keseluruhan.

RUMUSAN DAN RINGKASAN KAJIAN

Kajian ini dilaksanakan untuk mengenal pasti dan menganalisis perubahan makroekonomi dan persaingan harga yang memberi kesan terhadap eksport produk utama sawit (CPO dan PKO) Malaysia dari tahun 1985 hingga 2016, dengan menggunakan kaedah ARDL. Faktor-faktor makroekonomi dalam kajian ini mengambil kira pemboleh ubah harga tempatan sawit, harga dunia sawit, pengeluaran sawit, dan kadar pertukaran efektif benar. Persaingan harga pula mengambil kira harga produk barang pengganti bagi minyak kelapa sawit iaitu minyak kacang soya, minyak kanola, minyak bunga matahari dan minyak kelapa. Kajian ini juga melihat peristiwa kejutan yang berlaku di Malaysia iaitu sama ada wujud kesan krisis ekonomi Asia dan global terhadap jumlah eksport CPO dan jumlah eksport PKO.

Penemuan kajian mendapati bahawa bagi kesan harga barang pengganti, harga dunia minyak kacang soya yang berhubungan negatif dengan jumlah eksport CPO Malaysia, menunjukkan bahawa minyak soya adalah barang pengganti kepada CPO. Kajian juga mendapati bahawa terdapat kesan negatif antara krisis ekonomi Asia dengan jumlah eksport CPO Malaysia. Hasil kajian menunjukkan bahawa apabila berlakunya krisis ekonomi Asia, jumlah eksport CPO telah berkurang. Bagi produk PKO pula, hasil kajian mendapati bahawa harga dunia minyak kanola dan harga dunia minyak kacang soya berhubungan negatif dengan jumlah eksport PKO. Namun begitu, dapatan kajian berubah apabila kesemua harga barang pengganti diuji serentak, didapati harga dunia minyak kelapa dan harga minyak soya berhubungan positif dengan jumlah eksport PKO. Keadaan ini menunjukkan bahawa jika harga minyak kelapa dan soya meningkat, maka jumlah eksport PKO Malaysia juga turut meningkat. Hal yang sebaliknya berlaku pada harga dunia minyak bunga matahari dan harga dunia minyak kanola yang berhubungan negatif dengan jumlah eksport PKO.

Keadaan ini menunjukkan bahawa peningkatan harga dunia minyak bunga matahari dan harga dunia minyak kanola menurunkan jumlah eksport PKO Malaysia, dan sekaligus menggambarkan bahawa minyak bunga matahari dan minyak kacang soya adalah barang pengganti kepada PKO. Kajian ini juga mendapati bahawa terdapat kesan negatif berkaitan krisis ekonomi Asia dan Eropah dengan jumlah eksport PKO Malaysia. Justeru, penemuan ini menunjukkan bahawa apabila berlakunya krisis ekonomi Asia krisis ekonomi global, maka jumlah eksport PKO akan berkurang.

Kepentingan kajian ini adalah agar pihak kerajaan khususnya Kementerian Industri Utama (MPI), Kementerian Pertanian dan Industri Asas Tani (MOA) dan Lembaga Minyak Sawit Malaysia (MPOB) serta

syarikat-syarikat swasta dapat memberikan perhatian terhadap faktor-faktor yang mempengaruhi eksport CPO dan PKO. Hasil kajian mendapati bahawa harga dunia minyak kacang soya berhubungan negatif dengan jumlah eksport CPO Malaysia dan ini menunjukkan bahawa minyak soya adalah barang pengganti kepada CPO.

Selain itu, hasil kajian ini juga mendapati bahawa harga dunia minyak kanola dan harga dunia minyak kacang soya berhubungan negatif dengan jumlah eksport PKO. Malaysia perlu mengekalkan kelebihan harga yang berdaya saing berbanding pesaing utama seperti Indonesia, untuk menarik lebih banyak pengimport. Justeru, dalam usaha untuk meningkatkan eksport sawit di Malaysia, kestabilan harga tempatan sawit, kadar pertukaran asing dan harga barang pengganti sawit perlulah diberi perhatian untuk meningkatkan daya saing negara dalam meningkatkan eksport sawit negara. Di samping itu, Malaysia juga perlu meningkatkan lagi hubungan kerjasama dengan negara pengimport utama sawit bagi meningkatkan eksport sawit. Kejutan yang berlaku ke atas negara juga perlu diambil perhatian kerana ia dapat memberi kesan terhadap eksport minyak sawit Malaysia. Hasil kajian ini dijangka dapat membantu mengukuhkan ekonomi negara iaitu membantu pihak penggubal dasar negara merangka strategi yang bersesuaian, berkaitan dengan faktor perubahan makroekonomi dan persaingan harga, dan seterusnya mengukuhkan ekonomi pengusaha sawit Malaysia, terutamanya dalam merancang strategi pemasaran dan pengeluaran.

Dari segi batasan kajian, kajian ini dilaksanakan ke atas jumlah keseluruhan eksport Malaysia kepada dunia. Justeru, kajian yang seterusnya disarankan menumpukan kajian secara bilateral yang mampu mendapatkan hasil keputusan yang lebih tepat, kerana berkemungkinan faktor penentu kepada permintaan minyak sawit juga bergantung kepada keadaan sesebuah negara pengimport.

NOTA

[1] Syarikat swasta terutamanya industri kecil dan sederhana perlu memperbaiki sistem dalaman firma seperti komitmen pengurusan terhadap inovasi dan kreativiti inovasi, di samping mengambil kira faktor makroekonomi dalam meningkatkan eksport mereka (Ismail et al. 2018).

PENGHARGAAN

Kami berterima kasih kepada Lembaga Minyak Sawit Malaysia (Malaysian Palm Oil Board - MPOB) yang membiayai penyelidikan ini melalui geran EP-2016-027 dan EP-2018-019.

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Jurnal Ekonomi Malaysia 54(1) 2020 213 - 227
http://dx.doi.org/10.17576/JEM-2020-5401-15

Kesan Asimetrik Kadar Pertukaran Terhadap Imbangan Dagangan: Malaysia dan China

(Asymmetric Effects of Exchange Rate on Trade Balance: Malaysia and China)

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ABSTRAK

Kemeruapan kadar pertukaran yang tinggi mewujudkan ketakpastian dan mempengaruhi ekonomi sesebuah negara. Ini dapat dilihat apabila kenaikan atau penyusutan nilai mata wang menjejaskan aliran perdagangan antara negara. Kertas ini mengkaji kewujudan fenomena keluk-J melalui kesan perubahan kadar pertukaran ke atas imbangan dagangan dua hala antara Malaysia dengan China bagi 17 industri perdagangan utama. Selain itu, kajian juga menilai kesan perubahan kadar pertukaran ke atas imbangan dagangan sama ada berlaku secara simetrik atau bukan simetrik (asimetrik). Kajian menggunakan data bulanan bermula Januari 2013 sehingga April 2018. Hasil kajian membuktikan kewujudan keluk-J bagi 5 daripada 17 industri perdagangan utama. Selain itu, hasil kajian juga menunjukkan bahawa penggunaan model ARDL tidak linear dapat membuktikan kesan asimetrik perubahan kadar pertukaran ke atas imbangan dagangan. Keputusan kajian memberi panduan kepada pembuat dasar mengenai kesan perubahan positif dan negatif kadar pertukaran terhadap eksport dan import industri utama negara ke China. Sekali gus, perkara ini dapat digunakan bagi mengesan dan mengatasi masalah inflasi diimport.

Kata Kunci: Imbangan dagangan; kadar pertukaran; keluk-J; industri; asimetrik

ABSTRACT

High volatility of exchange rates creates uncertainty and in turn affects the economic condition of a country. This can be seen when sudden currency appreciation or depreciation affects the trade flow between countries. This paper examines the existence of the J-curve phenomenon from the effect of exchange rate changes on the bilateral trade balance between Malaysia and China for 17 major trade industries. Besides, the study also evaluates whether the effect of exchange rate fluctuations on the trade balance is symmetric or asymmetric. This study uses monthly data from January 2013 to April 2018. The findings confirm the existence of J-curves for 5 out of the 17 major trade industries. Besides, the results show that the use of non-linear ARDL models is capable to prove the asymmetric effect of exchange rate changes on the trade balance. The results of this study provide insights for policymakers concerning the impact of positive and negative exchange rate changes on the country's major exports to and imports from China. Accordingly, this can be used to detect and mitigate issues of imported inflation.

Keywords: Trade balance; exchange rate; J-curve; industry; asymmetric

PENGENALAN

Penyelarasan kadar pertukaran merupakan alat dasar penting yang digunakan oleh Tabung Kewangan Antarabangsa (*International Monetary Fund* IMF) sebagai sebahagian rancangan penstabilan dan ia telah diimplementasikan oleh kebanyakan negara antaranya Israel, Britain, India, Pakistan dan China (Edwards 1986). Kegunaan alat dasar ini adalah untuk memperbaiki kebersaingan, menggalakkan eksport dan meningkatkan imbangan dagangan negara dengan melakukan penyusutan nilai mata wang domestik (Nusair 2016). Justeru, pembuat dasar perlu mengenal pasti hubungan antara kadar pertukaran dengan imbangan dagangan. Ini adalah kerana, pertama, ia memberikan panduan kepada negara yang ingin melaksanakan penyusutan nilai mata wang domestik bagi memacu eksport dan menggalakkan pertumbuhan ekonomi. Kedua, ia mengukuhkan hubungan jangka masa panjang yang stabil antara kadar pertukaran dan imbangan dagangan. Ketiga, ia memberikan pemahaman berkaitan kesan jangka masa pendek dan jangka masa panjang penyusutan mata wang domestik terhadap imbangan dagangan.

Meskipun wujud ketidakpastian dalam kesan jangka masa pendek akibat penyusutan mata wang domestik, pembuat dasar lebih menumpukan kepada kesan jangka masa panjang. Dalam jangka masa pendek, terdapat lat penyesuaian dan tindak balas harga terhadap kadar pertukaran yang perlahan, menyebabkan terhasilnya kesan negatif penyusutan nilai mata wang domestik terhadap imbangan dagangan. Namun, imbangan dagangan akan kembali meningkat dalam jangka masa panjang. Hal ini menunjukkan kewujudan fenomena keluk-J.

Pada tahun 2015, Malaysia ditimpa musibah kejatuhan nilai Ringgit yang terendah sejak krisis kewangan Asia 1997 hingga 1998. Pada penghujung September, kadar pertukaran Ringgit Malaysia (RM) telah meningkat sehingga RM4.48 berbanding dolar Amerika Syarikat. Dengan perkataan lain, RM telah menyusut nilai sebanyak hampir 40 peratus berbanding dengan kadar pada tahun sebelumnya. Terdapat industri yang terpaksa menanggung impak negatif daripada penyusutan nilai ringgit ini iaitu industri yang memerlukan input perantaraan yang diimport, seperti industri elektrik dan elektronik. Impak penyusutan nilai ringgit ini lebih dipengaruhi oleh perkembangan ekonomi global terutamanya prestasi ekonomi China yang perlahan (Hariz 2015).

China adalah rakan dagangan terbesar Malaysia bagi lapan tahun berturut-turut dan Malaysia merupakan rakan dagangan terbesar dalam kalangan negara ASEAN bagi China. Nilai eksport dan import Malaysia dengan China telah menyusut dengan ketara dari AS$64.5 bilion pada tahun 2013 kepada AS$58.1 bilion pada tahun 2016 dan meningkat kembali kepada AS$67.2 bilion pada tahun 2017. Perubahan dalam kadar pertukaran sudah pasti akan menjejaskan imbangan dagangan antara Malaysia dengan China. Oleh yang demikian, kajian impak akibat perubahan kadar pertukaran adalah penting kerana sebarang perubahan dalam nilai Ringgit akan menyebabkan import dan eksport antara Malaysia dengan China berubah (Dizioli et al. 2016).

Justeru, objektif kajian ini adalah untuk menilai kesan perubahan kadar pertukaran ke atas imbangan dagangan bagi 17 industri perdagangan utama yang mewakili 86 peratus syer perdagangan antara Malaysia dengan China. Kajian ini dijalankan untuk menguji kewujudan keluk-J dan mengenal pasti sama ada kadar pertukaran mempunyai kesan simetrik atau asimetrik terhadap imbangan dagangan antara Malaysia dengan China. Untuk itu, kajian mengaplikasikan kaedah ARDL linear dan tidak linear. Pendekatan tidak linear diaplikasikan kerana kajian lepas terutamanya kajian Bahmani-Oskooee dan Fariditavana (2016) telah menemui lebih banyak bukti kewujudan keluk J melalui pendekatan ini. Kajian terkini telah membuktikan bahawa kadar pertukaran mempunyai kesan simetrik dan asimetrik terhadap imbangan dagangan (Bussiere 2013; Bahmani-Oskooee & Fariditavana 2016; Arize et al. 2017). Namun demikian, hanya Bahmani-Oskooee dan Aftab (2018) yang melihat kesan simetrik dan asimetrik kadar pertukaran terhadap imbangan dagangan bagi perdagangan dua hala Malaysia dan China mengikut industri, tetapi mereka tidak menumpukan kepada industri utama.

Maklumat daripada hasil kajian penting bagi pembuat dasar dalam mengenal pasti industri utama yang akan terjejas akibat perubahan positif dan negatif kadar pertukaran Ringgit Malaysia. Maklumat ini dapat digunakan bagi mengesan dan mengatasi masalah inflasi diimport sekiranya lebih banyak industri yang terjejas daripada penyusutan nilai Ringgit. Di samping itu, pengamatan kajian lepas mendapati bahawa kurang pengkaji yang memfokuskan kepada industri utama dan menggunakan data bulanan terkini terutamanya bagi perdagangan dua hala Malaysia dan China. Perkara ini membuka ruang untuk dipenuhi kajian ini bagi memberikan hasil yang lebih terperinci. Kajian ini menggunakan data bulanan bermula Januari 2013 sehingga April 2018 mengikut industri bagi mengenal pasti industri mana yang lebih sensitif terhadap perubahan kadar pertukaran. Fokus kajian tertumpu kepada 17 industri yang mempunyai syer perdagangan terbesar bagi perdagangan dua hala Malaysia dan China. Industri yang paling penting dalam perdagangan dua hala Malaysia dan China adalah industri jentera dan peralatan elektrik. Industri ini merupakan antara industri yang memainkan peranan penting dalam pertumbuhan sektor perindustrian pembuatan di Malaysia (Yusoff 2007). Majlis Eksport Negara telah menetapkan sektor elektrik dan elektronik sebagai sektor utama dalam mempromosikan syarikat Malaysia di rantaian pemasaran global (Kementerian Perdagangan Antarabangsa dan Industri Malaysia 2018).

TEORI DAN SOROTAN KAJIAN LEPAS

Konsep keluk-J telah diperkenalkan oleh Magee (1973) dalam membincangkan kesan perubahan kadar pertukaran ke atas imbangan dagangan sesebuah negara. Bahmani-Oskooee (1985) pula telah membina model ekonometrik untuk menguji kewujudan keluk-J secara empirikal. Rentetan daripada itu, banyak kajian telah dilakukan dalam menguji kewujudan teori keluk-J sama ada di negara membangun mahu pun di negara maju. Antara lain kajian Arora et al. (2003) telah melihat fenomena keluk J bagi negara India, Akbostanci (2004) bagi Turki, Sahlan et al. (2008) dan Nizamani et al. (2017) bagi Malaysia, Bahmani-Oskooee dan Fariditavana (2015) bagi Amerika Syarikat dan Gurtler (2019) bagi Republik Czech.

Kajian Hacker dan Hatemi-J. (2003), Hsing (2008), Sahlan et al. (2008), Akbostanci (2004), Duasa (2007) dan Baharumshah (2001) menggunakan data perdagangan agregat dalam melihat kewujudan keluk

J. Namun demikian, kajian-kajian ini menghadapi masalah bias agregat kerana setiap negara mempunyai kadar pertukaran dan jumlah perdagangan yang berbeza. Oleh sebab itu, banyak pengkaji telah beralih kepada penggunaan data perdagangan dua hala kerana untuk mengatasi masalah bias agregat dan memperoleh hasil kajian yang lebih signifikan (Arora et al. 2003).

Kajian Bahmani-Oskooee dan Hegerty (2010) berjaya menunjukkan lebih banyak bukti kewujudan keluk-J diperoleh jika perdagangan dua hala dipecahkan lagi mengikut industri. Terdapat beberapa kajian yang telah menggunakan data industri bagi melihat hubungan kadar pertukaran ke atas imbangan dagangan dengan lebih terperinci antaranya Bahmani-Oskooee dan Harvey (2018), Bahmani-Oskooee et al. (2016), Bahmani-Oskooee dan Aftab (2017) dan Bahmani-Oskooee dan Saha (2017).

Selain itu, satu ciri utama dalam kajian-kajian sebelum ini adalah mereka mengandaikan bahawa kesan perubahan kadar pertukaran ke atas imbangan dagangan adalah simetrik, sebagai contoh, jika penyusutan nilai meningkatkan imbangan dagangan maka peningkatan nilai akan mengurangkan imbangan dagangan. Namun, dalam ekonomi sebenar, hal ini tidak selalunya tepat. Bahmani-Oskooee dan Fariditavana (2015) telah menjalankan kajian bagi menguji andaian ini dan menentukan sama ada perubahan kadar pertukaran mempunyai kesan simetrik atau asimetrik terhadap imbangan dagangan bagi Kanada, China, Jepun dan Amerika Syarikat bagi mendapatkan lebih banyak bukti bagi menyokong kewujudan keluk-J. Hasil kajian mereka mendapati bahawa apabila konsep tidak linear diperkenalkan, terdapat lebih banyak bukti yang menyokong kewujudan keluk-J.

Dapatan kajian Bahmani-Oskooee dan Fariditavana (2015) telah disokong banyak pengkaji selepasnya seperti Baek dan Choi (2020), Bahmani-Oskooee dan Baek (2019), Bahmani-Oskooee dan Harvey (2017) dan Bahmani-Oskooee dan Saha (2017). Bagi mengkaji kewujudan keluk-J di Malaysia, beberapa kajian telah dijalankan antaranya Sahlan et al., (2008), Yusoff (2009), Tsen (2011), Chan dan Hooy (2012), Rahim dan Shahwahid (2014) dan Ali et al. (2014). Namun demikian, kajian-kajian ini lebih menumpukan kepada perdagangan agregat dan kesan simetrik.

Kajian Bahmani-Oskooee et al. (2016) merupakan antara kajian terawal yang menguji kesan asimetik bagi Malaysia dengan menggunakan data perdagangan di peringkat komoditi. Kajian mereka menumpukan kepada perdagangan dua hala Malaysia dan Singapura dan mendapati bahawa terdapat kesan asimetrik pada jangka masa pendek 31 industri daripada 65 industri. Kajian mereka juga membuktikan bahawa industri petroleum dan jentera elektrik yang memiliki 40% syer perdagangan memperoleh manfaat daripada penyusutan ringgit dan tidak terjejas dengan kenaikan ringgit. Namun demikian, hasil kajian mereka bercanggah dengan hasil kajian Bahmani-Oskooee dan Harvey (2018) yang mendapati bahawa hanya 19 industri kecil sahaja yang memperoleh manfaat dalam jangka masa panjang

Selain itu, kajian Bahmani-Oskooee dan Aftab (2017) pula menumpukan kepada perdagangan dua hala antara Malaysia dengan Kesatuan Eropah dan hasil kajian mereka mendapati penggunaan model asimetrik menunjukkan lebih banyak bukti kewujudan keluk-J. Hasil ini selari dengan dapatan kajian Bahmani-Oskooee dan Aftab (2019) yang melihat kepada perdagangan komoditi antara Malaysia dan Jepun. Hasil kajian mereka membuktikan bahawa terdapat kesan perubahan asimetrik bagi 50 industri daripada 60 industri dalam jangka masa pendek.

Berdasarkan Laporan Kementerian Perdagangan Antarabangsa dan Industri Malaysia (2018) China merupakan rakan dagangan terbesar bagi Malaysia. Namun sehingga kini, masih kurang kajian yang mengkaji kesan simetrik dan asimetrik kadar pertukaran ke atas imbangan dagangan dua hala Malaysia dan China mengikut industri. Kajian Bahmani-Oskooee dan Aftab (2018) merupakan satu-satunya kajian yang melihat kepada kesan perubahan kadar pertukaran yang asimetrik ke atas perdagangan komoditi antara Malaysia dan China. Hasil kajian mereka mendapati bahawa 15 industri yang mewakili 40% syer perdagangan memperoleh manfaat daripada kejatuhan nilai ringgit. Kajian Zaidi et al. (2018) pula melihat kesan kejutan dasar monetari, pendapatan dan inflasi di negara China dan beberapa negara rakan dagang utama Malaysia terhadap pemboleh ubah makro Malaysia iaitu inflasi, pendapatan dan kadar pertukaran. Hasil kajian mendapati kesan kejutan pendapatan di China berbanding kesan kejutan pendapatan di negara rakan dagang lain memberi pengaruh lebih dominan ke atas pendapatan dan kadar pertukaran Malaysia.

Kekurangan kajian lepas dalam menumpukan kepada industri utama dan menggunakan data terkini membuka ruang untuk dipenuhi kajian ini. Selain itu, kajian ini akan menggunakan data bulanan yang dijangka akan memberikan hasil yang lebih terperinci. Kebanyakan kajian sebelum ini hanya menggunakan data suku tahunan (Ivanovski et al. 2020; Ari et al. 2019; Bahmani-Oskooee & Kanitpong 2018).

METODOLOGI KAJIAN

Kajian ini mengguna pakai data bersifat sekunder, iaitu berbentuk siri masa bulanan iaitu bermula dari Januari 2013 sehingga April 2018, iaitu selama 64 bulan. Kajian ini memfokuskan kepada 17 industri perdagangan utama antara Malaysia dan China berdasarkan klasifikasi Sistem Harmoni (HS) 2-digit. Industri yang dipilih merupakan industri yang mempunyai syer perdagangan terbesar, iaitu hampir 86 peratus perdagangan dua hala

antara Malaysia dan China pada tahun 2017. Jadual 1 menunjukkan industri yang ditumpukan dalam kajian.

Pemboleh ubah yang digunakan dalam kajian ini adalah imbangan dagangan, pendapatan Malaysia, pendapatan China dan kadar pertukaran benar. Data imbangan dagangan yang digunakan dalam kajian ini dihasilkan dengan membahagikan eksport Malaysia kepada import Malaysia bagi setiap industri perdagangan utama antara Malaysia dan China. Sumber data ini adalah daripada Perangkaan Perdagangan Luar Negeri Malaysia (2018). Manakala, data pendapatan negara bagi Malaysia dan China yang digunakan dalam kajian ini adalah data indeks pengeluaran industri. Sumber bagi data ini adalah daripada *World Bank* (2018).

Selain itu, data bagi kadar pertukaran benar yang digunakan dalam kajian ini diperoleh dengan rumus berikut, $RER = \left(\frac{P_{MAS}}{P_{CHN}} X \frac{YUAN}{RM} \right)$, yang mana $\frac{YUAN}{RM}$ adalah kadar pertukaran nominal, iaitu jumlah mata wang yuan China bagi setiap ringgit, P_{MAS} adalah indeks harga pengguna bagi Malaysia, manakala P_{CHN} adalah indeks harga pengguna bagi China. Oleh itu, pengurangan dalam RER ini menunjukkan penyusutan nilai ringgit benar. Sumber bagi data ini juga diperoleh daripada *International Monetary Fund* (2018).

Berdasarkan kajian Bahmani-Oskooee dan Hegerty (2011) dan Bahmani-Oskooee dan Fariditavana (2016), model bagi imbangan perdagangan dua hala Malaysia yang berfungsi kepada pendapatan Malaysia, pendapatan China dan kadar pertukaran benar telah dibentuk seperti berikut:

$$lnTB_t^i = \beta_0 + \beta_1 lnY_t + \beta_2 lnY_t^* + \beta_3 lnRER_t + \mu_t \quad (1)$$

yang mana;

TB	Imbangan dagangan mengikut industri (i)
Y	Pendapatan Malaysia
Y^*	Pendapatan China
RER	Kadar pertukaran dua hala benar
i	Kod HS 2-digit industri
t	Siri masa

Kajian ini menjangkakan nilai β_1 yang negatif dan nilai β_2 yang positif kerana peningkatan pendapatan negara akan meningkatkan import dan menyebabkan penurunan imbangan dagangan, manakala peningkatan pendapatan China akan meningkatkan eksport dan seterusnya meningkatkan imbangan dagangan. Pekali bagi kadar pertukaran benar, β_3 dijangkakan mempunyai hubungan sonsang terhadap imbangan dagangan yang mana penyusutan mata wang domestik akan meningkatkan imbangan dagangan. Namun demikian, berdasarkan hipotesis keluk-J, kesan ini hanya akan berlaku dalam jangka masa panjang, sebaliknya dalam jangka masa pendek penyusutan nilai ringgit akan memburukkan imbangan dagangan.

Oleh kerana data yang digunakan dalam kajian ini adalah berbentuk siri masa, maka ujian kepegunan adalah perlu. Ia bertujuan untuk mengelakkan daripada

JADUAL 1. Industri Perdagangan Utama Malaysia dan China

Kod HS	Huraian Industri	Syer Perdagangan	Pemboleh Ubah
15	Minyak dan Lemak Binatang atau Sayuran	2%	TB15
26	Bijih, Sanga dan Abu	2%	TB26
27	Bahan Api Galian, Minyak Galian dan Produk Penapisan	10%	TB27
28	Bahan Kimia Bukan Organik	1%	TB28
29	Bahan Kimia Organik	2%	TB29
38	Pelbagai Produk Kimia	2%	TB38
39	Plastik dan Barangan Berkaitan	4%	TB39
40	Getah dan Barangan Berkaitan	3%	TB40
72	Besi dan Keluli	2%	TB72
73	Barangan Berkaitan Besi dan Keluli	2%	TB73
74	Tembaga dan Barangan Berkaitan	1%	TB74
76	Aluminium dan Barangan Berkaitan	1%	TB76
84	Reaktor Nuklear, Dandang, Jentera dan Peralatan Mekanikal	13%	TB84
85	Jentera dan Peralatan Elektrik	34%	TB85
87	Kenderaan Selain Kereta Api, Bahagian dan Aksesori	1%	TB87
90	Optik, Fotografi, Sinematografi, Pengukuran, Pemeriksaan, Ketepatan, Instrumen Perubatan dan Pembedahan dan Radas, Bahagian dan Aksesori	3%	TB90
94	Perabot	1%	TB94
	Jumlah Keseluruhan	86%	

Sumber: Perangkaan Perdagangan Luar Negeri Malaysia (2018)

mendapat pengujian palsu, iaitu penganggaran yang tidak menunjukkan hubungan yang sebenar, walaupun penganggaran regresinya kelihatan amat memuaskan. Jikalau, pemboleh ubah berada pada kedudukan pegun setelah dibezakan sekali, maka pemboleh ubah tersebut mempunyai integrasi satu atau *I(1)*. Manakala, jika pemboleh ubah tersebut dibezakan sebanyak `n' kali untuk menjadi pegun, maka pemboleh ubah tersebut dikatakan mempunyai ciri integrasi ke-n atau *I(n)*. Ujian Augmented Dickey Fuller dan Ujian Philip-Perron adalah merupakan dua bentuk ujian kepegunan yang kerap digunakan. Kajian ini menambah ujian Kwiatkowski–Phillips–Schmidt–Shin (KPSS) bagi mengukuhkan hasil kajian.

Dalam kajian ini, kaedah ujian kointegrasi *Autoregressive Distributed Lag* (ARDL) yang dicadangkan oleh Pesaran dan Shin (1996) dan Pesaran et al. (2001) telah diaplikasikan untuk membentuk fungsi imbangan dagangan dua hala pada jangka masa panjang di Malaysia. Kaedah ARDL telah digunakan secara meluas dalam mengkaji kewujudan keluk-J. Antaranya adalah Wilson (2001), Bahmani-Oskooee dan Goswami (2003), Narayan (2006), Duasa (2007), Halicioglu (2007) dan Panda dan Reddy (2016).

Model persamaan ARDL yang dibentuk telah memasukkan pemboleh ubah jangka masa pendek dan jangka masa panjang dalam persamaan berikut:

$$\begin{aligned}\Delta lnTB_t^i = {} & \alpha + \sum_{j=1}^{n1}\beta_j \Delta lnTB_{t-j}^i \qquad lnY \qquad lnY \qquad lnRER \\ & + \sum_{j=0}^{n2}\gamma_j \Delta lnY_{t-j} \sum_{j=0}^{n3}\delta_j \Delta lnY_{t-j}^* \sum_{j=0}^{n4}\pi_j \Delta lnRER_{t-j} \\ & + \theta_1 lnTB_{t-1}^i + \theta_2 lnY_{t-1} + \theta_3 lnY_{t-1}^* + \theta_4 lnRER_{t-1} + \varepsilon_t\end{aligned} \tag{2}$$

Persamaan (2) yang dibentuk mempunyai persamaan dengan sama dengan model pembetulan ralat kecuali setiap pemboleh ubah pada paras tingkat dimasukkan secara berasingan, tidak sebagai satu nilai. Hasil koefisien boleh diselaraskan kepada vektor kointegrasi yang kemudiannya digunakan bagi menganalisis hubungan setiap pemboleh ubah dalam jangka masa panjang. Jika pemboleh ubah mempunyai kesignifikanan bergabung, pemboleh ubah jangka masa panjang menunjukkan kewujudan hubungan dalam jangka masa panjang melalui ujian-F yang dilakukan dengan menggunakan jadual nilai kritikal berdasarkan Pesaran et al. (2001).

Dalam kajian ini, teori keluk-J wujud jika penganggar jangka masa pendek, π_j adalah positif manakala penganggar jangka masa panjang, θ_4 adalah negatif. Bagi mengkaji isu ini dengan lebih lanjut, kajian ini membentuk perubahan dalam kadar pertukaran benar sebagai $\Delta lnRER$ termasuk perubahan positif dan perubahan negatif, berdasarkan kajian Bahmani-Oskooee dan Fariditavana (2016). Kajian seterusnya membentuk dua siri yang baru, iaitu $lnRER_t^{POS}$ bagi mewakili peningkatan nilai ringgit dan $lnRER_t^{NEG}$ bagi mewakili penyusutan nilai ringgit. $lnRER_t^{POS}$ didefinisikan sebagai jumlah separuh bagi perubahan positif, manakala $lnRER_t^{NEG}$ adalah jumlah separuh bagi perubahan negatif seperti berikut:

$$lnRER_t^{POS} = \sum_{j=1}^{t}\Delta lnRER_j^{+} = \sum_{j=1}^{t}\max\left(\Delta lnRER_j, 0\right) \tag{3}$$

$$lnRER_t^{NEG} = \sum_{j=1}^{t}\Delta lnRER_j^{-} = \sum_{j=1}^{t}\min\left(\Delta lnRER_j, 0\right) \tag{4}$$

Seterusnya, dengan berpandukan Shin et al. (2014), kajian ini mengganti $lnRER$ dalam persamaan (2) dengan jumlah separuh $lnRER_t^{POS}$ dan $lnRER_t^{NEG}$ yang dihasilkan dalam persamaan (3) dan (4). Model yang dihasilkan dengan memasukkan $lnRER_t^{POS}$ dan $lnRER_t^{NEG}$ ini dikenali sebagai model ARDL tidak linear berdasarkan Shin et al. (2014), yang menunjukkan bahawa ianya boleh dianggarkan seperti persamaan (2) dengan ujian sempadan yang masih relevan bagi menguji kointegrasi. Persamaan baharu yang terbentuk adalah seperti berikut:

$$\begin{aligned}\Delta lnTB_t^i = {} & \alpha + \sum_{j=1}^{n1}\beta_j \Delta lnTB_{t-j}^i \qquad lnY \qquad lnY \qquad lnRER \\ & + \sum_{j=0}^{n2}\gamma_j \Delta lnY_{t-j} \sum_{j=0}^{n3}\delta_j \Delta lnY_{t-j}^* \sum_{j=0}^{n4}\pi_j^{+} \Delta lnRER_{t-j}^{POS} \\ & + \sum_{j=0}^{n5}\pi_j^{-} \Delta lnRER_{t-j}^{NEG} + \theta_1 lnTB_{t-1}^i + \theta_2 lnY_{t-1} \\ & + \theta_3 lnY_{t-1}^* + \theta_4^{+} lnRER_{t-1}^{POS} + \theta_4^{-} lnRER_{t-1}^{NEG} + \varepsilon_t\end{aligned} \tag{5}$$

Berdasarkan persamaan (5), kajian dapat melihat kesan asimetrik dalam perubahan kadar pertukaran. Di sini, kita definisikan perubahan simetrik apabila $lnRER_t^{POS}$ dan $lnRER_t^{NEG}$ mempunyai pekali yang sama nilai dan tanda. Kajian menjangkakan nilai θ_2 yang negatif, kerana peningkatan pendapatan Malaysia akan meningkatkan import Malaysia dari China dan ini menyebabkan imbangan dagangan semakin berkurangan. Kajian menjangkakan nilai θ_3 yang positif, kerana peningkatan pendapatan China akan meningkatkan eksport Malaysia ke China dan ini meningkatkan imbangan dagangan. Kajian menjangkakan nilai θ_4^{+} yang negatif, kerana peningkatan ringgit akan meningkatkan import Malaysia dari China dan ini menyebabkan imbangan dagangan semakin menyusut. Kajian menjangkakan nilai θ_4^{-} yang negatif, kerana penyusutan ringgit akan meningkatkan eksport Malaysia ke China dan ini meningkatkan imbangan dagangan.

KEPUTUSAN KAJIAN EMPIRIKAL

Sebelum membincangkan hasil ujian kepegunan merangkumi ujian ADF, PP dan KPSS yang telah dijalankan sebagai prasyarat sebelum meneruskan

kepada ujian kointegrasi, kajian ini mengemukakan analisis statistik deskriptif bagi mengenal pasti keadaan dan taburan data bagi setiap pemboleh ubah yang digunakan dalam kajian. Jadual 2 menunjukkan hasil keputusan ringkasan statistik yang diperoleh dan dapat dilihat bahawa nilai sisihan piawai bagi semua pemboleh ubah adalah rendah dan ini bermakna terdapat variasi yang rendah dalam set data. Di samping itu, kajian mendapati semua pemboleh ubah mempunyai nilai kurtosis yang kurang daripada tiga kecuali pemboleh ubah $lnTB_{15}$, $lnTB_{27}$, $lnTB_{40}$, $lnTB_{72}$, $lnTB_{73}$, $lnTB_{76}$, $lnTB_{84}$, $lnTB_{85}$, dan $lnTB_{94}$.

Bagi menjalankan ujian kepegunan, kajian telah memasukkan terma tren dan persilangan bagi pemboleh ubah pada aras dan hanya terma persilangan (tanpa tren) bagi pemboleh ubah pada pembezaan pertama. Susunan auto regresif bagi persamaan ujian ADF adalah berdasarkan kriteria informasi Akaike (*Akaike information criterion*, AIC) dan nilai ujian statistik yang diperoleh kemudiannya dibandingkan dengan nilai kritikal yang diberikan oleh MacKinnon (1996).

Jadual 3 menunjukkan hasil ujian kepegunan berdasarkan ujian ADF, PP dan KPSS. Hasil ujian ini dapat disimpulkan bahawa semua pemboleh ubah pegun pada pembezaan pertama dan terdapat beberapa pemboleh ubah yang turut pegun pada aras. Dalam erti kata lain, pemboleh ubah yang digunakan tergolong dalam kategori I(0) dan I(1). Maka, kajian boleh diteruskan kepada pengujian kointegrasi. Kajian diteruskan dengan melihat panjang lat optimum berdasarkan model VAR bagi menentukan maksimum lat yang akan diuji dalam ujian sempadan ARDL dan ia ditunjukkan dalam Jadual 4. Panjang lat optimum bagi setiap model adalah 8.

Kajian diteruskan dengan menjalankan ujian sempadan ARDL bagi menentukan kewujudan hubungan jangka masa panjang antara pemboleh ubah bebas dengan pemboleh ubah bersandar bagi perdagangan dua hala mengikut industri antara Malaysia dan China. Seterusnya untuk melihat hubungan dinamik jangka masa panjang dan hubungan jangka masa pendek, kajian telah melakukan ujian ARDL linear dan ARDL tidak linear bagi menguji tindak balas simetrik dan asimetrik. Bagi memastikan kestabilan model yang digunakan, kajian turut melakukan beberapa ujian diagnostik ke atas model. Kajian ini membincangkan mengikut industri perdagangan utama bagi memudahkan pemahaman berkaitan hasil kajian. Hasil penganggaran berdasarkan model ARDL linear dapat dilihat dalam Jadual 5 dan Jadual 6.

Berdasarkan Jadual 5, kadar pertukaran benar mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan dalam jangka masa pendek bagi 8 industri iaitu kod industri 26, 27, 28, 39, 40, 76, 87,

JADUAL 2. Ringkasan Statistik

Pemboleh Ubah	Min	Median	Maksimum	Minimum	Sisihan Piawai	Kepencongan	Kurtosis
lnY	4.79	4.79	4.91	4.59	0.07	-0.31	2.73
*lnY**	5.07	5.07	5.37	4.87	0.12	0.27	2.54
lnRER	0.52	0.48	0.68	0.34	0.09	0.33	1.89
$lnTB^{15}$	4.77	4.98	6.04	2.40	0.85	-0.99	3.64
$lnTB^{26}$	3.84	3.71	6.70	1.98	1.17	0.28	2.08
$lnTB^{27}$	1.41	1.28	4.80	0.11	0.99	1.13	4.32
$lnTB^{28}$	-1.17	-0.93	0.11	-3.35	0.85	-0.68	2.60
$lnTB^{29}$	0.56	0.53	1.62	-0.09	0.31	0.53	3.95
$lnTB^{38}$	0.07	0.11	1.33	-0.92	0.50	0.40	2.95
$lnTB^{39}$	0.03	0.05	0.49	-0.42	0.22	-0.05	2.58
$lnTB^{40}$	2.18	2.15	3.33	1.45	0.43	0.67	3.29
$lnTB^{72}$	-3.64	-3.80	-1.57	-5.13	0.70	0.64	3.34
$lnTB^{73}$	-3.05	-3.05	-1.51	-3.70	0.39	1.15	6.63
$lnTB^{74}$	0.05	0.15	2.38	-3.12	1.24	-0.25	2.74
$lnTB^{76}$	-2.26	-2.36	-0.03	-3.71	0.68	0.63	4.00
$lnTB^{84}$	-0.87	-0.87	-0.45	-1.29	0.16	-0.34	3.53
$lnTB^{85}$	-0.16	-0.18	0.17	-0.62	0.16	-0.08	3.01
$lnTB^{87}$	-1.40	-1.39	-0.70	-2.19	0.33	-0.22	2.85
$lnTB^{90}$	-0.41	-0.40	0.73	-1.35	0.42	-0.11	2.87
$lnTB^{94}$	-2.12	-2.20	0.36	-3.27	0.56	1.74	8.63
$lnTB^{ALL}$	-0.24	-0.23	0.11	-0.58	0.15	-0.12	2.77

JADUAL 3. Keputusan Ujian Kepegunan

Pemboleh Ubah	ADF		PP		KPSS	
	Aras	Pembezaan Pertama	Aras	Pembezaan Pertama	Aras	Pembezaan Pertama
lnY	-9.09***	-9.07***	-9.09***	-25.13***	0.05	0.03
*lnY**	-8.95***	-52.32***	-5.39***	-11.67***	0.03	0.03
lnRER	-1.59	-7.72***	-1.69	-7.72***	0.18**	0.16
$lnTB^{15}$	-5.77***	-12.29***	-5.82***	-34.07***	0.11	0.50**
$lnTB^{26}$	-5.13***	-10.86***	-5.16***	-19.83***	0.09	0.41*
$lnTB^{27}$	-6.64***	-14.23***	-6.61***	-41.40***	0.16**	0.39*
$lnTB^{28}$	-5.93***	-11.97***	-5.91***	-33.24***	0.14*	0.20
$lnTB^{29}$	-5.04***	-7.41***	-4.97***	-15.60***	0.21**	0.35*
$lnTB^{38}$	-7.80***	-15.28***	-7.81***	-21.84***	0.04	0.30
$lnTB^{39}$	-5.13***	-12.92***	-5.05***	-17.55***	0.12	0.23
$lnTB^{40}$	-3.96**	-8.92***	-3.87**	-11.45***	0.20**	0.18
$lnTB^{72}$	-4.21***	-8.80***	-4.05**	-22.26***	0.25***	0.25
$lnTB^{73}$	-5.46***	-9.62***	-5.46***	-15.96***	0.08	0.25
$lnTB^{74}$	-3.98**	-7.81***	-3.86**	-11.29***	0.07	0.06
$lnTB^{76}$	-3.96**	-7.89***	-4.01**	-15.64***	0.09	0.23
$lnTB^{84}$	-6.89***	-6.69***	-6.89***	-34.08***	0.14*	0.34
$lnTB^{85}$	-6.50***	-8.96***	-6.49***	-19.39***	0.07	0.16
$lnTB^{87}$	-5.37***	-12.21***	-5.49***	-15.62***	0.20**	0.22
$lnTB^{90}$	-4.43***	-11.01***	-4.18***	-15.75***	0.09	0.46*
$lnTB^{94}$	-3.85**	-6.49***	-3.89**	-13.10***	0.22***	0.23
$lnTB^{ALL}$	-4.88***	-8.66***	-4.86***	-17.58***	0.13*	0.19

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

JADUAL 4. Panjang Lat Optimum Berdasarkan Model VAR

Pemboleh Ubah Bersandar	LR	FPE	AIC	SC	HQ
$lnTB^{15}$	62.38 [6]	3.23e-10 [8]	-11.20 [8]	-7.38 [1]	-9.35 [8]
$lnTB^{26}$	27.46 [8]	1.00e-09 [8]	-10.07 [8]	-6.63 [1]	-8.22 [8]
$lnTB^{27}$	26.60 [8]	3.84e-10 [8]	-11.03 [8]	-7.12 [1]	-9.18 [8]
$lnTB^{28}$	45.90 [6]	8.64e-11 [8]	-12.52 [8]	-8.86 [1]	-10.67 [8]
$lnTB^{29}$	32.07 [8]	2.17e-11 [8]	-13.90 [8]	-9.51 [1]	-12.05 [8]
$lnTB^{38}$	53.05 [6]	3.73e-11 [8]	-13.36 [8]	-9.83 [1]	-11.51 [8]
$lnTB^{39}$	28.43 [7]	5.01e-12 [8]	-15.37 [8]	-10.95 [6]	-13.51 [8]
$lnTB^{40}$	32.15 [8]	2.08e-11 [8]	-13.94 [8]	-9.21 [6]	-12.09 [8]
$lnTB^{72}$	29.37 [7]	1.31e-10 [8]	-12.10 [8]	-8.07 [2]	-10.25 [8]
$lnTB^{73}$	48.74 [8]	2.11e-11 [8]	-13.93 [8]	-9.74 [1]	-12.08 [8]
$lnTB^{74}$	33.56 [8]	2.77e-10 [8]	-11.35 [8]	-7.18 [1]	-9.50 [8]
$lnTB^{76}$	29.32 [8]	2.25e-10 [8]	-11.56 [8]	-7.86 [1]	-9.71 [8]
$lnTB^{84}$	46.78 [8]	4.27e-12 [8]	-15.53 [8]	-10.87 [1]	-13.67 [8]
$lnTB^{85}$	29.10 [8]	1.28e-11 [8]	-14.43 [8]	-10.54 [1]	-12.58 [8]
$lnTB^{87}$	29.56 [8]	3.29e-11 [8]	-13.48 [8]	-9.62 [1]	-11.63 [8]
$lnTB^{90}$	60.89 [6]	1.97e-11 [8]	-14.00 [8]	-10.02 [2]	-12.14 [8]
$lnTB^{94}$	48.95 [6]	4.70e-11 [8]	-13.13 [8]	-8.96 [1]	-11.28 [8]
$lnTB^{ALL}$	51.24 [8]	1.30e-12 [8]	-16.71 [8]	-11.94 [8]	-14.86 [8]

Nota: Nilai dalam kurungan adalah panjang lat optimum.

JADUAL 5. Penganggaran Jangka Pendek Berdasarkan Model ARDL Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas							
	$\Delta lnRER_t$	$\Delta lnRER_{t-1}$	$\Delta lnRER_{t-2}$	$\Delta lnRER_{t-3}$	$\Delta lnRER_{t-4}$	$\Delta lnRER_{t-5}$	$\Delta lnRER_{t-6}$	$\Delta lnRER_{t-7}$
$lnTB^{15}$	0.51							
$lnTB^{26}$	3.2	12.83	-8.51	-5.13	17.07**	3.17	-26.00***	16.55***
$lnTB^{27}$	-13.54	-1.63	0.79	0.54	11.69*	-14.04***		
$lnTB^{28}$	-2.42***	-1.96	1.4	-5.14*	0.83	6.34***		
$lnTB^{29}$	0.3							
$lnTB^{38}$	-1.5	-1.51	-0.65	-1.66				
$lnTB^{39}$	-1.94**	-2.16**						
$lnTB^{40}$	2.27	3.73*	-3.22**					
$lnTB^{72}$	2.23							
$lnTB^{73}$	-0.4							
$lnTB^{74}$	-0.75							
$lnTB^{76}$	-2.12	-6.33*						
$lnTB^{84}$	-0.08							
$lnTB^{85}$	-0.61							
$lnTB^{87}$	-1.13**							
$lnTB^{90}$	-0.7							
$lnTB^{94}$	2.25	0.06	0.07	-6.17**	4.99***			
$lnTB^{ALL}$	2.32**	0.61	-0.1	-2.60***	3.91***	-0.22	-2.31***	

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

JADUAL 6. Penganggaran Jangka Panjang Berdasarkan Model ARDL Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas				
	Syer Perdagangan	Pemalar	*lnY*	*lnY**	*lnRER*
$lnTB^{15}$	2%	35.29**	-4.64	-1.71	0.66
$lnTB^{26}$	2%	17.18	-2.3	0.25	-7.28**
$lnTB^{27}$	10%	32.11*	-7.52*	1.04	-0.23
$lnTB^{28}$	1%	-41.20***	10.21***	-1.28	-4.42***
$lnTB^{29}$	2%	-0.19	0.03	0.06	0.52
$lnTB^{38}$	2%	28.90***	-4.43***	-1.53***	0.25
$lnTB^{39}$	4%	-35.43	8.65	-1.64	4.47
$lnTB^{40}$	3%	0.47	2.1	-1.87	2.13
$lnTB^{72}$	2%	-17.01	0.35	1.9	3.95*
$lnTB^{73}$	2%	20.23***	-4.30***	-0.46	-0.65
$lnTB^{74}$	1%	40.06	-10.33	2.13	-1.9
$lnTB^{76}$	1%	-31.30**	0.96	4.48	3.16
$lnTB^{84}$	13%	8.80***	-2.66**	0.62	-0.09
$lnTB^{85}$	34%	0.4	-1.66*	1.40**	0.63
$lnTB^{87}$	1%	12.35**	-5.88***	3.01***	-1.58**
$lnTB^{90}$	3%	-27.09***	5.46***	0.19	-0.91
$lnTB^{94}$	1%	-3.19	-1.02	0.93	2.20*
$lnTB^{ALL}$		8.40*	-7.88**	5.54**	2.26***

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

94 dan perdagangan agregat ($lnTB_{ALL}$). Hasil ini selari dengan teori di mana penyusutan nilai ringgit akan meningkatkan imbangan dagangan melalui pengurangan import dan peningkatan eksport.

Jadual 6 menunjukkan hasil penganggaran jangka masa panjang bagi model ARDL linear dan hasil kajian menunjukkan pendapatan Malaysia mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan bagi kod industri 27, 38, 73, 84, 87 dan perdagangan agregat. Manakala, pendapatan China mempunyai hubungan positif yang signifikan terhadap imbangan dagangan bagi kod industri 87, 90 dan perdagangan agregat. Perkara ini selari dengan teori di mana pendapatan Malaysia akan meningkatkan eksport dan pendapatan China akan meningkatkan import.

Di samping itu, kadar pertukaran mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan bagi kod industri 26, 28 dan 87, manakala hubungan positif yang signifikan bagi imbangan dagangan bagi kod industri 72 dan 94. Imbangan dagangan agregat juga menunjukkan hubungan positif yang signifikan terhadap kadar pertukaran dan ini bermakna apabila ringgit menyusut, dalam jangka masa panjang perdagangan agregat dua hala Malaysia dan China akan menyusut.

Jadual 7 menunjukkan hasil ujian diagnostik yang telah dijalankan bagi model ARDL linear dan hasil ujian sempadan menunjukkan terdapat kointegrasi atau hubungan jangka masa panjang bagi semua model. Nilai terma pembetulan ralat (ECT) bagi model ARDL linear adalah dalam julat antara 0.21 dan 1.99 yang menunjukkan apabila berlaku sebarang kejutan dalam ekonomi, imbangan dagangan yang terpilih mengambil masa setengah bulan hingga 5 bulan untuk kembali kepada keseimbangan. Secara keseluruhannya, model yang digunakan dalam kajian ini tidak mempunyai masalah korelasi bersiri, heteroskidastisiti dan spesifikasi model yang ditunjukkan melalui ujian LM, ARCH dan RESET. Di samping itu, hasil ujian CUSUM dan CUSUM kuasa dua menunjukkan semua penganggar yang diperoleh dalam model ARDL linear adalah stabil.

Berdasarkan definisi yang diberikan oleh Bahmani-Oskooee (1985) iaitu koefisien positif jangka masa pendek diikuti koefisien negatif, kajian berjaya memperoleh bukti kewujudan keluk-J bagi kod industri 26, 28 dan 94. Selain itu, berdasarkan definisi yang dikembangkan mengikut Rose dan Yellen (1989) iaitu perubahan jangka masa pendek atau penganggaran yang tidak signifikan digabungkan dengan kesan negatif jangka masa panjang yang signifikan, kajian memperoleh bukti kewujudan keluk-J bagi kod industri 26, 28 dan 87. Kajian diteruskan dengan melihat kesan peningkatan ringgit dan penyusutan ringgit berdasarkan model ARDL tidak linear. Bagi memudahkan penyampaian hasil penganggaran, kajian menggunakan pendekatan Bahmani-Oskooee dan Nasir (2020) dengan mengasingkan antara peningkatan ringgit dan

JADUAL 7. Keputusan Ujian Diagnostik Bagi Model ARDL Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas						
	F Statistik	ECT	LM	ARCH	RESET	CUSUM	CUSUM^2
$lnTB^{15}$	7.78***	-0.78***	0.57	1.44	0.01	S	S
$lnTB^{26}$	7.20***	-0.98***	1.72	1.08	1.7	S	S
$lnTB^{27}$	10.45***	-0.83***	0.51	1.94*	3.14*	S	S
$lnTB^{28}$	8.07***	-1.99***	1.34	1.21	1.68	S	S
$lnTB^{29}$	5.72***	-0.57***	0.64	1.36	2.19	S	S
$lnTB^{38}$	16.76***	-1.25***	0.06	1.47	3.19*	S	S
$lnTB^{39}$	5.07**	-0.21	1.39	1.00	0.01	S	S
$lnTB^{40}$	5.81***	-0.47***	0.02	0.63	0.37	S	S
$lnTB^{72}$	5.11**	-0.56***	1.25	0.43	0.52	S	S
$lnTB^{73}$	7.93***	-0.62***	0.08	2.17*	2.6	S	S
$lnTB^{74}$	4.87**	-0.39***	0.4	1.69	1.38	S	S
$lnTB^{76}$	4.55**	-0.69***	0.45	0.71	1.27	S	S
$lnTB^{84}$	9.63***	-0.81***	0.9	1.18	1.94	S	S
$lnTB^{85}$	14.84***	-0.92***	1.14	0.66	0.8	S	S
$lnTB^{87}$	12.49***	-0.72***	0.55	1.04	0.52	S	S
$lnTB^{90}$	11.99***	-0.77***	3.03*	1.51	0.07	S	S
$lnTB^{94}$	7.64***	-0.72***	0.78	0.6	2.72	S	S
$lnTB^{ALL}$	8.92***	-1.01***	0.05	0.68	0.35	S	S

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%. Bagi ujian CUSUM, S adalah stabil dan TS adalah tidak stabil.

JADUAL 8. Penganggaran Jangka Pendek Bagi Peningkatan Ringgit Berdasarkan Model ARDL Tidak Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas					
	$\Delta lnRER_t^{POS}$	$\Delta lnRER_{t-1}^{POS}$	$\Delta lnRER_{t-2}^{POS}$	$\Delta lnRER_{t-3}^{POS}$	$\Delta lnRER_{t-4}^{POS}$	$\Delta lnRER_{t-5}^{POS}$
$lnTB^{15}$	7.88	17.21	-20.24			
$lnTB^{26}$	-20.20					
$lnTB^{27}$	-10.39***					
$lnTB^{28}$	-1.87					
$lnTB^{29}$	-0.24	1.33	-4.35*			
$lnTB^{38}$	-0.94	2.60	-2.54	4.29	2.06	-8.24**
$lnTB^{39}$	0.16					
$lnTB^{40}$	3.43	9.63***	-4.03	-5.48**		
$lnTB^{72}$	5.80***					
$lnTB^{73}$	-0.36					
$lnTB^{74}$	0.98					
$lnTB^{76}$	-10.01*	-23.58***				
$lnTB^{84}$	3.78*	1.77	1.20	-3.30**		
$lnTB^{85}$	-0.22					
$lnTB^{87}$	-1.46	-4.14	7.71***			
$lnTB^{90}$	1.21	1.29	0.78	3.00		
$lnTB^{94}$	1.66	1.72	-5.53	-7.93*	8.74**	
$lnTB^{ALL}$	1.47	-0.01	1.68	-4.23***		

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

JADUAL 9. Penganggaran Jangka Pendek Bagi Penyusutan Ringgit Berdasarkan Model ARDL Tidak Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas				
	$\Delta lnRER_t^{NEG}$	$\Delta lnRER_{t-1}^{NEG}$	$\Delta lnRER_{t-2}^{NEG}$	$\Delta lnRER_{t-3}^{NEG}$	$\Delta lnRER_{t-4}^{NEG}$
$lnTB^{15}$	-0.58				
$lnTB^{26}$	19.52*				
$lnTB^{27}$	-12.60*				
$lnTB^{28}$	-3.09***				
$lnTB^{29}$	0.31				
$lnTB^{38}$	-2.04	-6.90	7.59*	-9.48**	5.55**
$lnTB^{39}$	-3.35**	-2.44			
$lnTB^{40}$	0.82				
$lnTB^{72}$	1.95				
$lnTB^{73}$	-0.40				
$lnTB^{74}$	-1.69				
$lnTB^{76}$	-0.36				
$lnTB^{84}$	-1.88				
$lnTB^{85}$	0.56				
$lnTB^{87}$	-0.73				
$lnTB^{90}$	-0.47				
$lnTB^{94}$	1.45*				
$lnTB^{ALL}$	-0.72	2.25*			

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

penyusutan ringgit seperti yang dapat dilihat dalam Jadual 8 dan Jadual 9.

Jadual 8 menunjukkan penganggaran jangka masa pendek bagi peningkatan ringgit dan hasil kajian menunjukkan apabila nilai ringgit naik, imbangan dagangan telah meningkat bagi kod industri 40, 72, 84, 87 dan 94, manakala imbangan dagangan akan menyusut bagi kod industri 27, 29, 38, 40, 76, 84 dan 94. Di samping itu, secara agregat kenaikan ringgit telah menyusutkan imbangan dagangan dalam jangka masa pendek. Kajian seterusnya melihat kepada hasil penganggaran jangka masa pendek bagi penyusutan ringgit yang ditunjukkan di dalam Jadual 9 dan hasil kajian menunjukkan apabila nilai ringgit menyusut, imbangan dagangan telah meningkat bagi kod industri 26, 38 dan 94, manakala imbangan dagangan telah menyusut bagi kod industri 28, 38, 40, dan 39. Imbangan dagangan agregat juga telah menyusut dalam jangka masa pendek. Imbangan dagangan agregat juga telah meningkat dalam jangka masa pendek apabila nilai ringgit menyusut. Secara teori, penyusutan nilai ringgit seharusnya meningkatkan imbangan dagangan melalui pengurangan import dan peningkatan eksport, manakala peningkatan nilai ringgit telah mengurangkan imbangan dagangan.

Jadual 10 menunjukkan hasil penganggaran jangka masa panjang bagi model ARDL tidak linear dan hasil kajian menunjukkan pendapatan Malaysia mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan bagi kod industri 15, 26, 29, 38, 40, 72, 76 dan 84. Manakala, pendapatan China mempunyai hubungan positif yang signifikan terhadap imbangan dagangan bagi kod industri 27, 85 dan 87. Perkara ini selari dengan teori yang mana peningkatan pendapatan Malaysia akan meningkatkan import negara, sebaliknya peningkatan pendapatan di China telah meningkatkan eksport negara. Di samping itu, peningkatan kadar pertukaran mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan bagi kod industri 27 dan 87, manakala hubungan positif yang signifikan bagi imbangan dagangan kod industri 15, 29, 40, 72 dan 76. Selain itu, penyusutan kadar pertukaran mempunyai hubungan negatif yang signifikan terhadap imbangan dagangan kod industri 26 dan 28, manakala hubungan positif yang signifikan bagi imbangan dagangan kod industri 94.

Berdasarkan definisi yang diberikan oleh Bahmani-Oskooee dan Fariditavana (2016), iaitu pemboleh ubah $lnRER^{POS}$ atau $lnRER^{NEG}$ mempunyai koefisien negatif yang signifikan dalam jangka masa panjang, kajian memperoleh bukti kewujudan keluk J bagi 4 industri daripada 17 industri perdagangan utama dua hala Malaysia dan China yang dikaji iaitu kod industri 26, 27, 28 dan 87. Definisi ini adalah selari dengan teori keluk-J yang mana jika terdapat peningkatan nilai ringgit, imbangan dagangan akan menyusut pada jangka

JADUAL 10. Penganggaran Jangka Panjang Berdasarkan Model ARDL Tidak Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas					
	Syer Perdagangan	Pemalar	lnY	lnY^{*}	$lnRER^{POS}$	$lnRER^{NEG}$
$lnTB^{15}$	2%	130.78***	-22.99***	-3.50*	6.30*	-0.70
$lnTB^{26}$	2%	112.28***	-19.53***	-3.41*	1.95	-5.52**
$lnTB^{27}$	10%	-69.04**	11.34**	3.58**	-10.24***	-1.27
$lnTB^{28}$	1%	-14.11	1.24	1.20	-2.28	-3.76***
$lnTB^{29}$	2%	45.58***	-7.07***	-2.37**	4.23***	0.42
$lnTB^{38}$	2%	45.13***	-11.11***	1.63	0.07	-0.15
$lnTB^{39}$	4%	-31.87*	6.10*	0.66	0.28	2.16
$lnTB^{40}$	3%	58.29***	-8.00**	-3.65**	5.66***	1.44
$lnTB^{72}$	2%	69.81*	-13.60*	-1.89	10.40***	3.50
$lnTB^{73}$	2%	20.62	-4.44	-0.50	-0.58	-0.65
$lnTB^{74}$	1%	103.84*	-14.7	-7.03	2.46	-4.26
$lnTB^{76}$	1%	76.13**	-14.26**	-2.31	6.58**	-0.48
$lnTB^{84}$	13%	19.53*	-4.67**	0.33	1.09	0.12
$lnTB^{85}$	34%	-7.95	-0.69	2.26**	-0.23	0.59
$lnTB^{87}$	1%	-37.20*	2.88	4.46***	-4.57***	-1.10
$lnTB^{90}$	3%	-41.65***	7.55***	1.01	-1.59	-0.56
$lnTB^{94}$	1%	-1.74	2.24	-2.20	2.53	1.97*
$lnTB^{ALL}$		27.23**	-5.12**	-0.64	1.66	-0.02

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%.

JADUAL 11. Keputusan Ujian Diagnostik Bagi Model ARDL Tidak Linear

Pemboleh Ubah Bersandar	Pemboleh Ubah Bebas						
	F Statistik	ECT	LM	ARCH	RESET	CUSUM	CUSUM^2
$lnTB^{15}$	6.29***	-0.83***	0.39	1.76	0.02	S	S
$lnTB^{26}$	5.05***	-1.16***	0.73	2.10	0.30	S	S
$lnTB^{27}$	14.19***	-1.01***	0.19	1.21	4.88**	S	S
$lnTB^{28}$	8.46***	-0.82***	0.87	0.17	0.34	S	S
$lnTB^{29}$	9.09***	-0.73***	0.92	0.40	0.73	S	S
$lnTB^{38}$	7.28***	-1.50***	0.77	0.10	7.08**	S	S
$lnTB^{39}$	5.25***	-0.57***	1.03	3.99*	0.17	S	S
$lnTB^{40}$	7.67***	-0.57***	0.01	1.83	2.49	S	S
$lnTB^{72}$	5.98***	-0.56***	1.17	0.12	0.01	S	S
$lnTB^{73}$	6.11***	-0.62***	0.10	0.14	2.62	S	S
$lnTB^{74}$	4.61***	-0.40***	0.79	1.06	2.00	S	S
$lnTB^{76}$	5.57***	-0.77***	0.69	1.94	0.61	S	S
$lnTB^{84}$	6.50***	-0.71***	1.01	1.94	1.11	S	S
$lnTB^{85}$	12.20***	-0.94***	0.57	0.10	1.82	S	S
$lnTB^{87}$	4.96***	-0.66***	0.95	0.57	0.58	S	S
$lnTB^{90}$	13.22***	-0.84***	1.29	0.08	1.68	S	S
$lnTB^{94}$	5.96***	-0.74***	0.52	3.18*	0.94	S	S
$lnTB^{ALL}$	5.12***	-0.58***	2.95*	0.02	0.47	S	S

Nota: *, ** dan *** adalah signifikan pada paras keertian 10%, 5%, 1%. Bagi ujian CUSUM, S adalah stabil dan TS adalah tidak stabil.

masa panjang. Sebaliknya, jika terdapat penyusutan nilai ringgit, imbangan dagangan akan meningkat pada jangka masa panjang.

Hasil ujian diagnostik yang telah dijalankan bagi model ARDL tidak linear dapat dilihat di dalam Jadual 11 dan hasil ujian sempadan menunjukkan terdapat kointegrasi pada jangka masa panjang bagi semua model. Nilai terma pembetulan ralat (ECT) bagi model ARDL tidak linear adalah dalam julat antara 0.40 dan 1.16 yang menunjukkan apabila berlaku sebarang kejutan dalam ekonomi, imbangan dagangan yang terpilih mengambil hampir 1 bulan hingga 2 setengah bulan untuk kembali kepada keseimbangan. Secara keseluruhannya, model yang digunakan dalam kajian ini tidak mempunyai masalah korelasi bersiri, heteroskidastisiti dan spesifikasi model yang ditunjukkan melalui ujian LM, ARCH dan RESET. Di samping itu, hasil ujian CUSUM dan CUSUM kuasa dua menunjukkan semua penganggar yang diperoleh dalam model ARDL linear adalah stabil.

RUMUSAN DAN IMPLIKASI DASAR

Secara kesimpulan, kajian ini berjaya memperoleh bukti kewujudan keluk-J bagi 5 industri daripada 17 industri perdagangan utama antara Malaysia dengan China. Berdasarkan definisi yang diberikan oleh Bahmani-Oskooee (1985) iaitu koefisien positif jangka masa pendek diikuti koefisien negatif, kajian berjaya memperoleh bukti kewujudan keluk-J bagi kod industri 26, 28 dan 94. Selain itu, berdasarkan definisi yang dikembangkan mengikut Rose dan Yellen (1989) iaitu perubahan jangka masa pendek atau penganggaran yang tidak signifikan digabungkan dengan kesan negatif jangka masa panjang yang signifikan, kajian memperoleh bukti kewujudan keluk-J bagi kod industri 26, 28 dan 87. Di samping itu, kajian turut menjalankan model ARDL tidak linear yang diperkenalkan oleh Shin et al. (2014) dan berjaya mengukuhkan bukti kewujudan keluk-J bagi kod industri 26, 27, 28 dan 87 dengan menggunakan definisi yang diberikan oleh Bahmani-Oskooee dan Fariditavana (2016) iaitu pemboleh ubah $lnRER^{POS}$ atau $lnRER^{NEG}$ mempunyai koefisien negatif yang signifikan dalam jangka masa panjang.

Jika kerajaan memilih untuk menjalankan dasar penyusutan nilai mata wang bagi menggalakkan perdagangan, hasil kajian ini boleh memberikan gambaran awal hasil yang dijangka pada jangka masa panjang. Industri bijih, sanga dan abu, industri bahan api galian, minyak galian dan produk penapisan, industri bahan kimia bukan organik dan industri kenderaan dijangka akan memperoleh manfaat. Keempat-empat industri ini mewakili hampir 14 peratus syer perdagangan antara Malaysia dan China.

Namun sedemikian, hasil kajian ini menunjukkan penyusutan nilai mata wang bukan merupakan suatu pilihan dasar yang baik bagi Malaysia kerana 6 industri menunjukkan kesan yang negatif. Hal ini bererti

dalam jangka masa panjang, penyusutan nilai ringgit akan menyebabkan imbangan dagangan 6 daripada 17 industri perdagangan utama antara Malaysia dan China semakin merosot. Industri yang akan terjejas ini adalah industri minyak dan lemak binatang sayuran (antaranya adalah industri minyak sawit), industri bahan kimia organik, industri getah, industri besi dan keluli, industri aluminium dan industri perabot. Industri yang terjejas ini mewakili 11 peratus syer perdagangan antara Malaysia dan China. Industri yang terbesar bagi perdagangan dua hala antara Malaysia dan China iaitu industri jentera dan peralatan elektrik didapati tidak dipengaruhi dengan perubahan nilai Ringgit.

Perkara ini merupakan penemuan baharu dalam bidang keluk-J yang mana walaupun secara agregat penyusutan kadar pertukaran akan meningkatkan imbangan dagangan dua hala antara Malaysia dan China seperti yang ditemui Bahmani-Oskooee dan Harvey (2017), namun, apabila kajian difokuskan kepada industri perdagangan utama, keputusan yang diperoleh adalah bercanggah. Selain itu, hasil penganggaran dengan menggunakan model ARDL tidak linear ini menunjukkan bahawa perubahan kadar pertukaran mempunyai kesan asimetrik ke atas imbangan dagangan di Malaysia dalam jangka masa panjang. Hasil kajian menunjukkan penyusutan Ringgit telah meningkatkan imbangan dagangan bagi industri bijih, sanga dan abu dan industri bahan kimia bukan organik. Manakala, kenaikan Ringgit pula telah menyusutkan imbangan dagangan bagi industri bahan api galian dan industri kenderaan.

Dapatan kajian ini sangat berguna bagi pembuat dasar dan penyelidik. Bagi pembuat dasar, mereka dapat melihat secara terperinci impak kejatuhan mata wang terhadap industri perdagangan utama antara Malaysia dengan China. Perkara ini membuka ruang dasar, yang mana kerajaan mungkin boleh memberikan bantuan seperti subsidi bagi memastikan industri dan produk tempatan dapat terus bersaing di pasaran antarabangsa selepas kejatuhan nilai Ringgit. Hasil kajian ini dapat memberikan maklumat kepada pembuat dasar mengenai kesan perubahan positif dan negatif kadar pertukaran terhadap eksport dan import negara. Perkara ini dapat digunakan bagi mengesan dan mengatasi masalah inflasi diimport. Di samping itu juga, hasil kajian ini menunjukkan wujud kesan asimetrik daripada perubahan nilai Ringgit ini. Maka, dengan memperoleh maklumat mengenai kesan asimetrik ini, kerajaan dapat mengambil langkah yang lebih proaktif dalam mempertingkatkan ekonomi negara ini. Manakala, bagi penyelidik pula, hasil dapatan kajian ini dapat dijadikan sebagai rujukan untuk kajian akan datang dalam melihat kewujudan fenomena keluk-J ini.

Kajian ini hanya menganalisis kewujudan keluk-J bagi 17 industri perdagangan utama antara Malaysia dan China. Dengan itu, pengkaji yang berminat dalam menganalisis kewujudan keluk-J boleh melanjutkan kajian ini terhadap lebih ramai rakan dagangan secara berasingan mengikut produk. Hal ini supaya dapat memberikan gambaran yang lebih tepat berkaitan impak penyusutan nilai ringgit ke atas setiap produk. Perkara ini masih belum dapat dijawab secara meluas berdasarkan pengamatan kajian lepas.

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