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Cost of Living and Standard of Living Nexus: The Determinants of Cost of Living

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ABSTRACT

Cost of living and standard of living are two elements that have strong causal relationship. Determining which one causes the other would give some ideas to policy makers about mitigating the adverse impact of the rising cost of living. This study investigates whether the standard of living causes the cost of living. It further identifies the factors influencing the cost of living. Based on Malaysian data over 1980-2014, we use Toda Yamamoto causality model, to identify whether the cost of living Granger causes the standard of living or vice-versa. In identifying the factors that influence the cost of living, we use, the Autoregresive Distributed Lag (ARDL) Bounds test. The result indicates that there is evidence of unidirectional Granger causality between the cost of living and the standard of living. It addition, we found that the cost of living can be used to better predict the standard of living by considering the lagged values of the cost of living rather than the lagged values of the standard of living. The results further show that there is a long-run relationship between the cost of living and the factors of gross domestic product per capita, population growth, unemployment rate and degree of openness.

Keywords: ARDL; cost of living; Granger causality; prices; standard of living

ABSTRAK

Kos sara hidup dan taraf hidup mempunyai hubungan penyebab yang kuat. Pengetahuan tentang arah penyebab antara keduanya boleh membantu pembuat dasar dalam mengurangkan kesan buruk peningkatan kos sara hidup. Kajian ini menyiasat sama ada taraf hidup menjadi penyebab kepada kos sara hidup dan selanjutnya mengenal pasti faktor utama yang mempengaruhi kos sara hidup di Malaysia. Berdasarkan data Malaysia sepanjang tahun 1980-2014, kajian ini menggunakan model arah penyebab Toda Yamamoto untuk mengenalpasti sama ada kos sara hidup Granger mempengaruhi taraf hidup atau sebaliknya. Ujian Bound Autoregresive Distributed Lag (ARDL) digunakan untuk mengenalpasti faktor-faktor yang mempengaruhi taaraf hidup. Hasil kajian menunjukkan bahawa terdapat bukti penyebab Granger searah antara kos sara hidup dan taraf hidup. Kami juga mendapati bahawa penggunaan kos sara hidup adalah lebih baik untuk meramal taraf hidup dengan mempertimbangkan nilai-nilai lag kos sara hidup berbanding nilai-nilai lag taraf hidup. Keputusan selanjutnya menunjukkan bahawa terdapat hubungan jangka panjang antara kos sara hidup dan faktor-faktor keluaran dalam negara kasar per kapita, pertumbuhan penduduk, kadar pengangguran dan darjah keterbukaan.

Kata kunci: ARDL; kos sara hidup; Granger causality; harga; taraf hidup

INTRODUCTION

Malaysia enjoyed an excellent economic growth in the first half of the 1990s but no issues regarding the high cost of living have been discussed. The high Malaysia Quality of Life Index (MQLI) as well as the low unemployment rate implies a rise in the standard of living of the Malaysian people. A good MQLI means that the country has sustainable economic growth and higher per capita income (Economic Planning Unit, 2012). In the first 14 years of the 21st century, Malaysia's economic growth continues to escalate without being accompanied by a raise in the standard of living and wage rates. With a positive trend of GDP growth and other macro indicators, the cost of living in Malaysia continues to rise and this has worsened the standard of living. As a small open economy, Malaysia also depends on the stability of the world economy and the US dollar to remain competitive. Any changes in macroeconomic indicators such as the foreign exchange rates and

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the degree of economic openness will directly affect the Malaysian economic growth and the standard of living. The economic recession in the 1980s, the Asian financial crisis in 1997 to 1998 and the slowdown of the world economy in 2008 has proved the dependency of the Malaysian economy on the stability of the world economy.

In general, the cost of living and the standard of living are two elements that have a strong and causal relationship but in order to minimise the impact of a rise in the cost of living in Malaysia, it is important to know whichever comes first, either the cost of living caused the standard of living to change, or vice versa. The standard of living measures the quality of life or the level of material prosperity enjoyed by individuals (Bank Negara Malaysia 2015). The quality of life is defined as encompassing personal advancements, a healthy lifestyle, access and freedom to pursue knowledge and attaining a standard of living which surpasses the fulfilment of the basic and psychological needs of an individual, to achieve a level of social well-being compatible with the aspirations of the nation (Economic Planning Unit 2012).

The cost of living, on the other hand, is the cost required to maintain some minimum basic standard of living at a point in time. It is also known as the cost of buying sufficient quantities of various items to maintain some minimum standard of living (ONS 2014). According to the Office for National Statistics (ONS) in the United Kingdom, the economic definition of the cost of living is "what is the minimum cost at this month's prices to achieve the actual level of utility attained in the base period". According to Boskin (2008), the concept of the cost of living is "how much more income would consumers need to be just as well-off with a new set of prices as the old". Bank Negara Malaysia (2015) defines the cost of living as the amount of expenditure on goods and services incurred by households including their financial obligations, to maintain a certain standard of living.

Since Malaysia does not have an official cost of living index, the Consumer Price Index (CPI) is the best proxy following other research work such as Gillingham and Greenlees (1987), Blanciforti and Kranner (1997), Renwick (1998), and Pang, Jui and Chih (2009). According to Gillingham and Greenlees (1987), the CPI is the best measure interpreted within the conditional cost of living index framework. Therefore, the aim of this study is to examine whether the standard of living causes the cost of living. In addition, the study identifies main factors influencing the cost of living in Malaysia. Thus, it is important to know the factors influencing the cost of living and by performing this research, a good policy with a good solution will be suggested.

The rest of this paper is structured as follows. Section two discusses the previous literature that relate to the cost of living. In section three, some methods to estimate the parameters are presented. The procedures to run the data analyses are showed in this section. Section four discusses the findings and reports the results. Finally, we draw some concluding remarks in section five.

LITERATURE REVIEW

This section has two sub-sections. First sub-section describes theoretical underpinning of the subject matter while the second sub-section reviews some of the important and relevant studies related to the topic.

THEORETICAL FRAMEWORK

The theory of cost of living can be explained through the utility function subject to a budget constraint. The utility function () is the utility level or standard of living that can be attained if the individual consumes a given quantity of set of goods, x. The consumer attempts to minimize the cost of achieving a given utility level (Diewert 1983) that defines the consumer's cost function. The cost function stems may be used to define the Konüs cost of living index, P_K. The P_K is the minimum cost of achieving the standard of living indexed relative to the minimum cost of achieving the same standard of living at base period. The Konüs index assumes that the cost function holds across the time where people get the same amount of utility or maintain the same standard of living as the previous year and that leads to a true cost of living index. But the Konüs index only serves as a theoretical idea and is not a practical price index compared to the Laspeyres price index.

The theory of the cost of living index originated in the 1920s with Konüs and showed that the Laspeyres index is in common use to measure the cost of living (Triplett 2001). According to Konüs (1939), Boonkitticharoen (1970) and Triplett (2001), a true cost of living index is where the satisfaction of the family or the standard of living of that family remains constant. Konüs (1939) indicates that between the standard of living of consumers in the base period and given period there always exists some standard, for which the true index of the cost of living falls in between the budgetary indexes. One of the common methods of obtaining the cost of living index is based on the Laspeyres price index. Boonkitticharoen (1970), Banerjee (1975), Gillingham and Greenlees (1987), and Primont (2000) indicated that the true cost of living lies within the limits of the Laspeyres index and Paasche index, $L > I > P$.

The Laspeyres index constitutes or establishes an upper limit of the true cost of living. Meanwhile, the Paasche index constitutes or establishes the lower limit of the true cost of living. In conclusion, the true cost of living lies within the limits of the Laspeyres index and Paasche index (Boonkitticharoen 1970; Banerjee 1975;

Gillingham & Greenlees 1987; Primont 2000). The true cost of living can be derived from the indifference curve given the level of satisfaction enjoyed.

The theory of consumer choice also can explain the cost of living, with given a fixed amount of income to spend that fits his or her total income or budget constraint. If the purchasing power for a person rises because of an increase in the person's income or wage, the quantity of each normal good purchased will also increase. Thus, the budget lines will move forward and parallel to each other, where the quantity of goods demanded increases. This reflects an increase in the standard of living.

If the prices change, the intercept and slope of the budget constraint will change. The substitution effect involves a movement along the curve. The income effect is a movement of the curves that representing a higher level of utility because the real income has increased. The budget constraint also moves upward because of the price fall. And this reflects that the standard of living of consumers increase because they have high purchasing power and maximize their utility, where we can derive a demand curve.

The demand curve might shift to a new position if income, the price of other goods and the preferences change. The changes are reflections of the standard of living when there are changes in prices. Therefore, to maintain the same cost of living or standard of living as previously either depends on the factors that determine the demand function such as prices of related goods, income distribution, tastes and preferences, the number of buyers and future expectations regarding the prices of goods and services (Keat & Young 2009). The government's policy through the rolling out of taxes and subsidies will affect directly the prices of goods and services, tastes and future prices. Meanwhile, a higher population and population density are the reflections of a high number of buyers in the market.

EMPIRICAL LITERATURE REVIEW

The ordinary least square (OLS) regression analysis method has been commonly used by most researchers in their investigation of the cost of living. Studies by Haworth and Rasmussen in 1973 stated that more econometric research was needed on the variation in the cost of living although the findings showed that more than 65 percent of the variation could be explained. In the 21st century, Cebula and Todd (2004) used the heteroscedasticity-corrected ordinary least squares for 67 counties for the year 2003 by focusing on a single state, metropolitan areas as well as rural and urban areas in the United States of America. The use of the OLS method was appropriate because it involved large and extensive research samples. For small-sized samples or more specifically, the use of the Autoregressive Distributed Lag (ARDL) method has begun to receive the attention of researchers today and is highly recommended. The developments of quantitative research and econometric methods that are more complex and more efficient have enabled the study of the variations in the cost of living in cities to be made. It also proves that the empirical results obtained by previous researchers can be validated through the latest econometric methods.

Before the 1990s, the cost of living data was not yet readily available. Haworth and Rassmusen (1973) in their study stated that the costs of rent and transportation were not available. Therefore, when some of the most useful information was not collected, developing a good policy was not possible. An improvement on CPI data by using the Laspeyres calculation method made the CPI the best option for a cost of living index as a proxy (Gillingham & Greenlees 1987). The cost of living can be any proxy as long as it is able to measure any changes in the cost of attaining some base level of utility between a base area and a comparison area. According to Alazzawi (2017), the rising prices as measured by the CPI do not accurately measure changes in the cost of living because a rational individual resort to substitution to hedge them against a declining standard of living when inflation is high. Thus, the researcher propose to use the true cost of living index and found that the cost of living increases have been higher in rural regions and there are larger regional disparities in cost of living increases over time. Other than that, using time series data or secondary data and new econometric methods in order to run the analysis is highly recommended.

The empirical results show that per capita income is significant that helps to improve the cost of living because increased demand for goods and services will increase the overall level of prices (Cebula 1980; Gillingham & Greenlees 1987; Nelson 1991; Blanciforti & Kranner 1997; Kurre 2000; Pasha & Pasha 2002; Cebula & Todd 2004; Cebula & Toma 2007; Chien & Mistry 2013). Further, Cebula (1980) also found that the coefficient for income fails to be significant at an acceptable level when the cost of living is not included in the model. Meanwhile, Hogan (1984) found that per capita income is not a significant variable in determining the cost of living and the sign is ambiguous. It is likely that Hogan's (1984) research was undertaken on 12 different expenditure groups with 12 different equations that gave different results due to the different tastes and preferences and income groups that existed in the household expenditure theory. However, Haworth and Rasmussen (1973) indicated that using real income is a better measure of economic welfare for regional differences in the cost of living. The data used will be deflated by current prices in order to evaluate the actual effect on the cost of living in certain areas. Cebula and Toma (2007) further stated that the cost of living is an increasing function of per capita income. The findings are in line with the theory of consumer choice but in the capacity of the law of demand, the price of the goods also depends on the types of goods, such as normal goods, essential goods, luxury goods and so on. The proportion of income spent varies by the type of goods and the amount of income enjoyed by individuals. Therefore, the income per capita is only valid and able to capture the changes in the cost of living at the household level study. Moreover, most of the studies have been completed without distinguishing income groups and the per capita income data derived from the household expenditure survey. Therefore, the findings of the study did not reflect the real situation regarding the cost of living at the national level.

Haworth and Rasmussen (1973), Roback (1982), Hogan (1984) and Blanciforti and Kranner (1997) found strong evidence that the greater the population, the higher the cost of living because of higher demand for goods and services. Haworth and Rassmusen (1973) also indicated that population size affects the cost of living by compensating for externalities such as air pollution, traffic congestion and the cost of land (Kurre 2000). As a consequence, an area with environmental issues suffers from a higher cost of living particularly in the capital cities such as found in the study conducted by Roback (1982). For example, a rapid urbanisation process, an increasing number of vehicles on the road, rental costs and housing becoming increasingly expensive show the existence of the rising cost of living in Malaysia.

In addition, Haworth and Rasmussen (1973), Roback (1982), Blanciforti and Kranner (1997) and Kurre (2000) found that population growth has a positive and significant relationship with the cost of living. However, there is an issue regarding the significance of population growth in terms of absolute and relative value before the 1990s. After the 1990s, the population growth increased at a relatively decreasing rate. A small magnitude percentage change in population growth can affect the results indirectly. For example, a study by Nelson (1991) found that population growth is not significant and has an ambiguous sign. As indicated by Nakamura et al. (2020), the cost of living is a key determinant for the productivity and population size of cities.

In the 1990s, Blanciforti and Kranner's (1997) study found that an increase in housing values caused an increase in the cost of living index in urban areas. The GDP of Alaska declined for a fourth straight year in 2016 after peaking in 2012 due to the continuing decline in energy costs (Fried 2017a). The energy prices play a role in housing costs where consumers spend the largest percentage of their income, so it has a big influence on the overall inflation rate. Its shows that the fuel prices in 2016 commensurate with the overall drop in energy costs. The volatility of oil prices and oil's massive role has swung the state's total GDP value like no other (Fried 2017b). As mentioned above, housing is the largest component in the cost of living index, and the coefficient for housing is positive and highly significant (Soberon-Ferrer & Dardis 1991; Nelson 1991; Blanciforti & Kranner 1997; Khandker & Mitchell 1998). More conclusively, the demand for and supply of housing which are not perfectly elastic is largely determined by the individual's income and population change (Nelson 1991). Living in urban areas tends to be more expensive than the rural areas, where housing costs are a key component of the overall cost of living (Blanciforti & Kranner 1997). Interestingly, a study by Südekum (2009) indicated that an increase in housing prices is also driven by migration.

Moreover, regions also play an important role in determining the cost of living (Gillingham & Greenlees 1987; Soberon-Ferrer & Dardis 1991; Blanciforti & Kranner 1997; Khandker & Mitchell 1998). Regional development contributed by the economic sector helps the rapid urbanisation process and increases land prices in the area. Chien and Mistry (2013) also found that living in a high cost of living area will put more stress on a family even if two families have the same income but live in different areas. However, this situation is only relevant to countries with large areas such as the United States as compared to Malaysia. Further, the researchers also found that the unemployment rate is not a significant variable (Roback 1982; Blanciforti & Kranner 1997; Cebula & Todd 2004; Cebula & Toma 2007). In contrast, Cebula (1980), Khandker and Mitchell (1998) and Kurre (2000) found that the unemployment rate is significant but the direction of the relationship is ambiguous. Normally for published data, such as data on the unemployment rate, the data consists of cyclical, structural and frictional unemployment. From a different perspective, these three types of unemployment have different impacts on the cost of living.

Additionally, a small country such as Malaysia has a stronger incentive to remain open to the international economy. Squalli and Wilson (2006) indicated that Malaysia is among the top five most open economies according to the trade openness measure. An open economy is often linked with export and import activities with all its trading partner countries. Rodriguez (2000) and Squalli and Wilson (2006) found that there is a positive correlation between the degree of openness and economic growth. At this point, there is tendency for the degree of openness of small countries to influence the standard of living through the cost of living. According to Abdul Wahab et al. (2018), the standard of living are the dominant factor that contributes to the problems of increasing cost of living, but this statement does not explain the causal relationship between the standard of living and the cost of living. The model developed only considers three top priorities of household expenditure.

Other than that, for a small and open economy such as Malaysia, any shift in the terms of trade will generally affect both the exchange rate and the standard of living. A study by Lafrance and Schembri (2000) found that the standard of living is related to the exchange rate and concluded that both are intimately related and have a causal relationship. For example, a decline in the world price of exports that worsens the terms of trade will cause the Ringgit Malaysia to depreciate and thus, the equilibrium real exchange rate must depreciate in order to restore demand. This can cause the cost of living to rise and affect the standard of living, causing it to fall as the prices of imported goods and import substitutes rise. Besimi (2004) also indicated that the exchange rate plays a significant role in the economy, especially for a small and open economy. Also, the price level index that is derived by dividing purchasing power parity's by nominal exchange rates are officially reported only at the country level when measuring the influence of cost of living (Nakamura et al. 2020).

Lastly, subsidies may improve the productivity and living standards of a society if there are external benefits. One of the most frequent justifications for fuel subsidies is that subsidies improve the welfare of the poor by making fuel more affordable and thus enable a higher standard of living (IISD 2013). Some subsidies are for the purpose of reducing inequalities in the standard of living and stimulating production (Jones 1948), although the inherent inefficiency of subsidies can increase the overall cost burden on society. As indicated by Abdul Hamid and Abdul Rashid (2012), the removal of the energy subsidy can affect the economy as access to energy will be restricted due to the price increase and households will have to spend more, which will decrease the welfare of households (Saari, Shuja & Abdul Rahman 2013).

METHODOLOGY

This section describes two approaches in achieving the objectives. First, the Granger causality tests are employed to identify whether the cost of living Granger causes the standard of living or vice-versa. This is done by adopting the Toda and Tamamoto (1995) procedure. Second, the ARDL Bounds tests proposed by Pesaran et al. (2001) are utilized to examine long-run relationship between the variables as well as to identify factors that influence the cost of living in Malaysia.

THE GRANGER CAUSALITY: TODA YAMAMOTO PROCEDURE

The Malaysia Quality of Life Index (MQLI) or known as the Malaysia Well-Being Index (MWBI) today is used as a proxy for the standard of living. A good MQLI means that the country has sustainable economic growth and higher per capita income. As a rational people, we would prefer that our standard of living improves or at least remains constant over time. This is in accordance with the Relative Income Hypothesis (RIH), which states that the aggregate ratio of consumption to income is assumed to depend on the level of present income relative to past income and it is difficult to reduce the level of consumption once attained (Duesenberry 1949). Hence, a rise in the MQLI indicates a significant increase in the standard of living in Malaysia and the increase in the standard of living has put pressure on the rising cost of living. Meanwhile, since Malaysia does not have an official cost of living index, the used of CPI as a proxy is acceptable such as research done by Gillingham and Greenlees (1987), Blanciforti and Kranner (1997), Renwick (1998), and Pang, Jui and Chih (2009). According to Gillingham and Greenlees (1987), the CPI is the best measure interpreted within the conditional cost of living index framework.

To test for Granger causality between the cost of living (COL) and the standard of living (SOL) in Malaysia, the Granger causality test was applied based on the Toda and Yamamoto (1995) procedure. Toda and Yamamoto (1995) indicated that the Granger causality tests are not valid if the economic series have a mixed order of integration. Based on Toda and Yamamoto (1995), the model of the Granger causality test is based on the following equations:

$$Y_t = \alpha + \sum_{i=1}^{h+d} \beta_i Y_{t-i} + \sum_{j=1}^{k+d} \gamma_j X_{t-j} + u_{yt} \quad (1)$$

$$X_t = \alpha + \sum_{i=1}^{h+d} \theta_i X_{t-i} + \sum_{j=1}^{k+d} \delta_j Y_{t-j} + u_{xt} \quad (2)$$

where:

d = the maximal order of integration
h, k = the optimal lag length of Y_t and X_t

To run the Toda and Yamamoto (1995) test, each of the time-series is tested in order to determine their order of integration by using the ADF test. Let the maximum order of integration for the group of time series be m, and set up a Vector Autoregressive (VAR) model by not differencing the data. Based on the AIC and SIC, the appropriate maximum lag length for the variables in the VAR, say p, suggest that there should be a maximum length for each variable.

Other than that, the residuals must be free from serial correlation and if serial correlation is present in the residuals, there is a need to increase the lag length, p, until the autocorrelation issue is resolved. To ensure that there is no serial correlation in the residuals, the Breusch-Godfrey LM test was run. The estimated model also must be dynamically stable. If the time series has the same order of integration, the Johansen co-integration methodology is preferred for reliable results to cross-check the validity of the results at the very end of the analysis.

For the preferred VAR model, the additional lags, m, must be added for each of the variables into each of the equations based on the maximum lag and to be free from serial correlation problems. The VAR model must be re-estimated at level VAR with one extra lag of each variable. The coefficients of these extra lags will then *not* be included when the subsequent Wald tests are conducted. To undertake Toda and Yamamoto's (1995) Granger non-causality test, the cost of living model in the following VAR system is as follows:

$$COL_t = \alpha_0 + \sum_{i=1}^{k}\alpha_{1i}COL_{t-i} + \sum_{j=k+1}^{d_{max}}\alpha_{2j}COL_{t-j} + \sum_{i=1}^{k}\beta_{1i}SOL_{t-i} + \sum_{j=k+1}^{d_{max}}\beta_{2j}SOL_{t-j} + \lambda_{1t} \quad (3)$$

$$SOL_t = \delta_0 + \sum_{i=1}^{k}\delta_{1i}SOL_{t-i} + \sum_{j=k+1}^{d_{max}}\delta_{2j}SOL_{t-j} + \sum_{i=1}^{k}\gamma_{1i}COL_{t-i} + \sum_{j=k+1}^{d_{max}}\gamma_{2j}COL_{t-j} + \lambda_{2t} \quad (4)$$

or,

$$COL_t = \alpha_0 + \alpha_1 COL_{t-1} + \ldots + \alpha_p COL_{t-p} + \beta_1 SOL_{t-1} + \ldots + \beta_p SOL_{t-p} + \lambda_{1t} \quad (5)$$

$$SOL_t = \delta_0 + \delta_1 SOL_{t-1} + \ldots + \delta_p SOL_{t-p} + \gamma_1 COL_{t-1} + \ldots + \gamma_p COL_{t-p} + \lambda_{2t} \quad (6)$$

The null and alternative hypothesis are as follows:

$H_0 : \beta_1 = \beta_2 = \ldots\ldots = \beta_p = 0$	Standard of living does not Granger causes COL
$H_1 : \beta_1 \neq \beta_2 \neq \ldots\ldots \neq \beta_p \neq 0$	Standard of living Granger causes COL
$H_0 : \gamma_1 = \gamma_2 = \ldots\ldots = \gamma_p = 0$	COL does not Granger cause standard of living
$H_1 : \gamma_1 \neq \gamma_2 \neq \ldots\ldots \neq \gamma_p \neq 0$	COL Granger causes standard of living

Rejection of the null implies a rejection of Granger non-causality. That is, a rejection of the null hypothesis supports the presence of Granger causality.

THE AUTO REGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

The cost of living can be explained through the utility maximisation and demand theory or the theory of consumer choice, where this theory assumes that the consumer maximises his or her utility function subject to a budget constraint. An indifference curve is used to represent the utility function to examine the transactions between individuals. From the indifference curve, it is possible to derive a demand curve that shows the relationship between the price of a good and the quantity of that good purchased, ceteris paribus. Changes in the quantity of demand in the demand curve are reflections of the standard of living when there are changes in prices. Therefore, to maintain the same cost of living or standard of living as enjoyed previously, this depends on the factors that determine the demand function such as prices of related goods, income distribution, tastes and preferences, number of buyers and future expectations regarding the prices of goods and services (Keat & Young 2009). The government policy through rolling out taxes and subsidies will directly affect the prices of goods and services, tastes and future prices. Meanwhile, a higher population is a reflection of a high number of buyers in the market. Therefore, the model for the cost of living is designed based on the theory and the empirical model developed by Cebula (1980), Nelson (1991), Kurre (2000), Pasha and Pasha (2002), Cebula and Todd (2004), and Cebula and Toma (2007).

For this study, the GDP per capita as a log number is used to represent the per capita income. Given the Malaysian economy and its demographic characteristics, this study includes a number of variables that influence the cost of living in Malaysia such as the degree of openness, the real exchange rate and the level of government subsidies. However, in order to avoid the collinearity problem and to maintain the stability of the model, two separate models are run to examine the degree of significance of the real exchange rate and degree of openness since these two variables are expected to have a high correlation. Therefore, the new imposed models for the cost of living in Malaysia are formulated as follows:

$$COL_t = \beta_0 + \beta_1 ln\,GDPC_t + \beta_2 PG_t + \beta_3 UR_t + \beta_4 DO_t + \beta_6 GS_t + \varepsilon_t \quad (7)$$

$$COL_t = \beta_0 + \beta_1 ln\,GDPC_t + \beta_2 PG_t + \beta_3 UR_t + \beta_5 REXRI_t + \beta_6 GS_t + \varepsilon_t \quad (8)$$

where:

COL = cost of living index (2010 = 100)
GDPC = gross domestic product per capita (RM)
PG = population growth ('000)
UR = unemployment rate (%)
DO = degree of openness (%)
REXRI = real exchange rates index (USD/RM, 2010 = 100)
GS = government subsidy (%)

The population growth is the increase in the number of persons in a population in a given time of period. The growth of the population is about how the number of people in a particular place is changing over time (Weeks 2008). The increase in the number of population is used because of the trend of population growth rate in Malaysia is increasing at a decreasing rate. Therefore, the marginal effect is too small (no changes for several years if using the growth rate) or cannot be significantly captured when running the econometrics analysis. Moreover, based on Rodriguez (2000), Squalli and Wilson (2006) and Jihene (2010), we define the degree of openness as the percentage of exports and imports to the GDP. The higher the degree of openness, the more sensitive the economy is to imports and exports, and the more open the economy is to trade, the more benefits it can be derived from international trade. Other than that, the real exchange rate is expected to exert a significant

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influence on the cost of living and standard of living. The real exchange rate measures the prices of one country's goods and services relative to those of another country or group of countries. The real exchange rate between two countries is calculated as the product of the nominal exchange rate and the relative price levels in each country (Ellis 2001). Thus, the real exchange rate index between the US Dollar (USD) and Ringgit Malaysia (MYR) with the year 2010 as the base year are suggested.

Since the annual time series data from 1980 to 2014 are used in the cost of living study, and the characteristics of economic data are trending and directly affected by the economic crisis of that time and structural breaks, two dummy variables are included in the cost of living model. This dummy variable will capture the effects of the Asian financial crisis in 1997 to 1998 and the global economic crisis in 2008 (*B*1), and the effects of unpegging Malaysian Ringgit against the US dollar in 2005 (*B*2) by placing a value of '1' for selected years which is year 1997, 1998, 2005 as well as 2008 and a value of '0' for non-selected years. In year 2005, the world economy slowed down because of the further spike in oil prices. The oil prices remained high because of high demand, especially from China and the United States as well as shortages in oil supply in the world market (USC, 2006). Malaysia as an oil producer and exporter was also affected by this global economic slowdown. Besides, the housing bubble that peaked in the United States in 2004 has caused harmful effects on financial institutions worldwide and, indirectly, the unpegging of the Malaysian Ringgit in 2005 has had a significant impact. Thus, the first cost of living model (later known as Model I) can be written as follows:

$$COL_t = \beta_0 + \beta_1 ln\,GDPC_t + \beta_2 PG_t + \beta_3 UR_t + \beta_4 DO_t + \beta_6 GS_t + \alpha_1 B1_t + \alpha_2 B2_t + \varepsilon_t \quad (9)$$

For the second cost of living model (later known as Model II), only the *B*2 dummy variable is included. We excluded *B1* because it makes the Model II unstable through the Cusum Square test results. This might be due to the existence of structural breaks at two different time periods on one model. Therefore, the Model II can be written as follows:

$$COL_t = \beta_0 + \beta_1 ln\,GDPC_t + \beta_2 PG_t + \beta_3 UR_t + \beta_5 REXRI_t + \beta_7 GS_t + \alpha_2 B2_t + \varepsilon_t \quad (10)$$

Next, the ARDL for Model I can be written as follows:

$$COL_t = \alpha + \sum_{i=1}^{p}\gamma_1 COL_{t-i} + \sum_{i=0}^{q}\gamma_2 \ln GDPC_{t-i} + \sum_{i=0}^{q}\gamma_3 PG_{t-i} + \sum_{i=0}^{q}\gamma_4 UR_{t-i} + \sum_{i=0}^{q}\gamma_5 DO_{t-i} + \sum_{i=0}^{q}\gamma_7 GS_{t-i} + \sum_{j=1}^{k}\gamma_8 B1_j + \sum_{j=1}^{k}\gamma_9 B2_j + \varepsilon_{t1} \quad (11)$$

The ARDL for Model II can be written as follows:

$$COL_t = \alpha + \sum_{i=1}^{p}\gamma_1 COL_{t-i} + \sum_{i=0}^{q}\gamma_2 \ln GDPC_{t-i} + \sum_{i=0}^{q}\gamma_3 PG_{t-i} + \sum_{i=0}^{q}\gamma_4 UR_{t-i} + \sum_{i=0}^{q}\gamma_6 REXRI_{t-i} + \sum_{i=0}^{q}\gamma_7 GS_{t-i} + \sum_{j=1}^{k}\gamma_9 B2_j + \varepsilon_{t2} \quad (12)$$

The co-integrating regression form of an ARDL model is obtained by transforming the ARDL model into first differences and substituting the long-run coefficients. To determine if any long-run relationship exists among the group of time series variables in both models, then the Bounds tests is used. The Bounds test for Model I can be written as follows:

$$\Delta COL_t = \alpha + \beta_1 COL_{t-i} + \beta_2 \ln GDPC_{t-j} + \beta_3 PG_{t-j} + \beta_4 UR_{t-j} + \beta_5 DO_{t-j} + \beta_7 GS_{t-j} + \sum_{i=1}^{p}\delta_{1i}\Delta COL_{t-i} + \sum_{j=0}^{p}\delta_{2i}\Delta ln\,GDPC_{t-j} + \sum_{j=0}^{p}\delta_{3i}\Delta PG_{t-i} + \sum_{j=0}^{p}\delta_{4i}\Delta UR_{t-i} + \sum_{j=0}^{p}\delta_{5i}\Delta DO_{t-i} + \sum_{j=0}^{p}\delta_{7i}\Delta GS_{t-i} + \sum_{j=0}^{k}\delta_{8i} B1_j + \sum_{j=0}^{k}\delta_{9i} B2_j + \varepsilon_{t1} \quad (13)$$

The Bounds test for Model II can be written as follows:

$$\Delta COL_t = \alpha + \beta_1 COL_{t-i} + \beta_2 \ln GDPC_{t-j} + \beta_3 PG_{t-j} + \beta_4 UR_{t-j} + \beta_6 REXRI_{t-j} + \beta_7 GS_{t-j} + \sum_{i=1}^{p}\delta_{1i}\Delta COL_{t-i} + \sum_{j=0}^{p}\delta_{2i}\Delta ln\,GDPC_{t-i} + \sum_{j=0}^{p}\delta_{3i}\Delta PG_{t-i} + \sum_{j=0}^{p}\delta_{4i}\Delta UR_{t-i} + \sum_{j=0}^{p}\delta_{6i}\Delta REXRI_{t-i} + \sum_{j=0}^{p}\delta_{7i}\Delta GS_{t-i} + \sum_{j=0}^{k}\delta_{9i} B2_j + \varepsilon_{t2} \quad (14)$$

In ARDL model, the regressand and regressors enter the models with lags or lagged differences, and they correct for potential endogeneity through appropriate augmentation (Pesaran & Shin 1999). Both lagged are predetermined and can serve as their own instruments, if the errors are not autocorrelated. Thus, the endogeneity problem is unlikely to arise. Modelling the ARDL with the appropriate lags will correct for both serial correlation and endogeneity problems. Also, the endogeneity is less of a problem if the estimated ARDL model is free of serial correlation (Jalil et al. 2008). Using the ARDL model approach is more robust and performs better for small sample sizes than other cointegration techniques. We also assumed all variables are endogenous in the model.

This study used annual data from 1980 to 2014, with a total of 35 observations for the cost of living model study. The splicing method is used to transform the data so that year 2010 is the base year. For the Granger causality test, annual data is run from 1990 to 2012. The secondary data for the cost of living and

Granger causality test study is derived primarily from monthly and annual reports of the Statistics Department, Bank Negara Malaysia and the Malaysian Ministry of Finance. Some of the data is obtained from monthly and annual reports published by the state governments and other institutions such as the Economic Planning Unit (2012), Asian Development Bank (2010), World Bank and others.

RESULTS AND DISCUSSION

There are four sections to analyze the results of the study starting with the Granger causality test. The results of ARDL, long- and short-run models are described in the following sections.

TODA-YAMAMOTO GRANGER CAUSALITY

The unit root test results indicate that the cost of living (COL) and standard of living (SOL) are both integrated of order 1 and therefore, the maximum order of integration for the group of time series is $m = 1$. The correlation between COL and SOL is very high, which is 0.907 and positive.

TABLE 1. ADF τ-Statistic: Unit Root for Stationarity COL vs SOL

Variables	At Level		At First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
COL	-1.5208	-1.9608	-4.5752***	-4.6046***
SOL	0.9668	-2.8334	-3.8810***	-3.7566**

Note: *** denotes rejection of the null hypothesis at the 0.05 level of significance.

According to the Toda Yamamoto (1995) procedure, the Vector Autoregressive (VAR) model will be set up by not differencing the data. Based on the AIC and SIC, the appropriate maximum lag length, p, for the variables in the VAR is 6 for each variable. To ensure that there is no serial correlation in the residuals, the LM test results show that the serial correlation is removed at least at the 5 per cent significant level if the lag increases to the maximum lag number, which is 5, and the estimated model is also found to be dynamically stable by running the roots of the characteristic polynomial test. Since these two times series have the same order of integration, the Johansen cointegration methodology is preferred. Johansen's Trace Test and the Maximum Eigenvalue Test both indicate the presence of cointegration between the two series, at the 5 per cent significance level (see Table 2).

For the preferred VAR model, the VAR is re-estimated at levels with one extra lag to be an "exogenous" variable and run the VAR Granger causality tests. As $m = 1$, which is the maximum order of integration for the group of time series, the VAR at levels will be re-estimated with 1 extra lag for each variable and each variable to be an "exogenous" variable. Table 3 shows the VAR Granger causality test results. The results clearly indicate that *the null hypothesis can be rejected due to the lack of causality from* the *cost of living to* the *standard of living* at the 1 per cent significance level, and concluded that the cost of living by applying the Granger test has an effect on the standard of living. On the other hand, it is not appropriate to *reject the null hypothesis of no causality* from the standard of living to the cost of living. Thus, it is possible that the standard of living, by applying the Granger test does not affect the cost of living.

TABLE 2. Johansen cointegration: Trace and maximum Eigenvalue test

Tests	None	At most 1
Trace Test	58.096*** (0.0000)	15.027** (0.0186)
Max. Eigenvalue Test	43.069*** (0.0000)	15.027** (0.0186)

Note: *** denotes rejection of the null hypothesis at the 0.05 level of significance.

TABLE 3. VAR Granger Causality test results between SOL and COL

Dependent Variable	Chi-Square	p-value	Decisions H_0
COL	1.2578	0.9392	Do Not Reject
SOL	42.829***	0.0000	Reject

Note: ***, ** and * indicate significance at 1%, 5% and 10%, respectively.

Therefore, there is evidence of unidirectional Granger causality from the cost of living to the standard of living but not vice-versa in Malaysia. In other words, changes in the cost of living may cause some changes in the Malaysian standard of living. The rising cost of living can cause the standard of living of the people either to increase, be maintained or be worsened. If the rising cost of living is accompanied by factors that influence it such as a positive GDP per capita growth or a commensurate increase in household income, the standard of living will be better-off, and vice-versa.

THE ARDL RESULTS

From the unit root test results (see Table 4), the variables are found to be of different orders of integration that are a mixture of $I(0)$ and $I(1)$. With such results, the ARDL

Bounds test is appropriate and this is run as a stability test to ensure the model is stable and valid.

The optimal lag for Model I and Model II is up to 1 lag as suggested by the SIC (see Table 5). The roots of the characteristic polynomial test indicate that there is no root lying outside the unit circle and the VAR satisfies the stability condition for Model I and Model II.

The ARDL model is run by using the general to specific approach to select the optimal lag with dummy variables as fixed regressors. The selection for the ARDL model for Model I is ARDL (1, 0, 0, 0, 0, 0) and (3, 3, 2, 3, 3, 1) for Model II. There is no auto correlation and partial auto correlation in the data analysis for Model I and Model II up to 16 lags based on the Q-statistics. The cumulative sum control chart or CUSUM test and CUSUM of square tests, the equation parameters are considered to be stable where the whole sum of recursive errors lies between the two critical lines at the 5 per cent level of significance for Model I and Model II.

The Breusch-Godfrey serial correlation LM test and the Breusch-Pagan-Godfrey test for heteroscedasticity (see Table 6) indicate that there are no serial correlation and heteroscedasticity problems at the 5 per cent level of significance in the ARDL model for Model I and Model II. After having passed all the diagnostic and stability tests for the ARDL model, the ARDL bounds test is run.

TABLE 4. The unit roots results

Variables	At Levels		At First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
COL	-0.7774	-1.9985	-5.6112***	-5.4911***
lnGDPC	-0.0527	-2.5132	-5.5147***	-5.4281***
PG	-2.3879	-1.8440	-7.0309***	-7.4739***
PD	-6.5204***	-7.5284***	-	-
UR	-2.0560	-3.1717	-3.6556**	-3.8058**
DO	-1.8550	-1.7710	-6.7394***	-5.5584***
REXRI	-1.6937	-2.1148	-6.9177***	-6.9680***
GS	-6.3153***	-6.4701***	-	-

Note: ***, ** and * indicate significance at 1 %, 5 % and 10 %, respectively.

TABLE 5. LM test and Lag length criteria

Lag	Model I				Model II			
	LM-S	Prob.	AIC	SIC	LM-S	Prob.	AIC	SIC
1	33.91	0.5680	34.328*	35.977*	36.113	0.4633	32.8949	34.544*
2	41.57	0.2410	35.033	38.331	29.404	0.7736	33.4964	36.794
3	38.19	0.3700	34.670	39.617	47.566	0.0940	32.369*	37.315

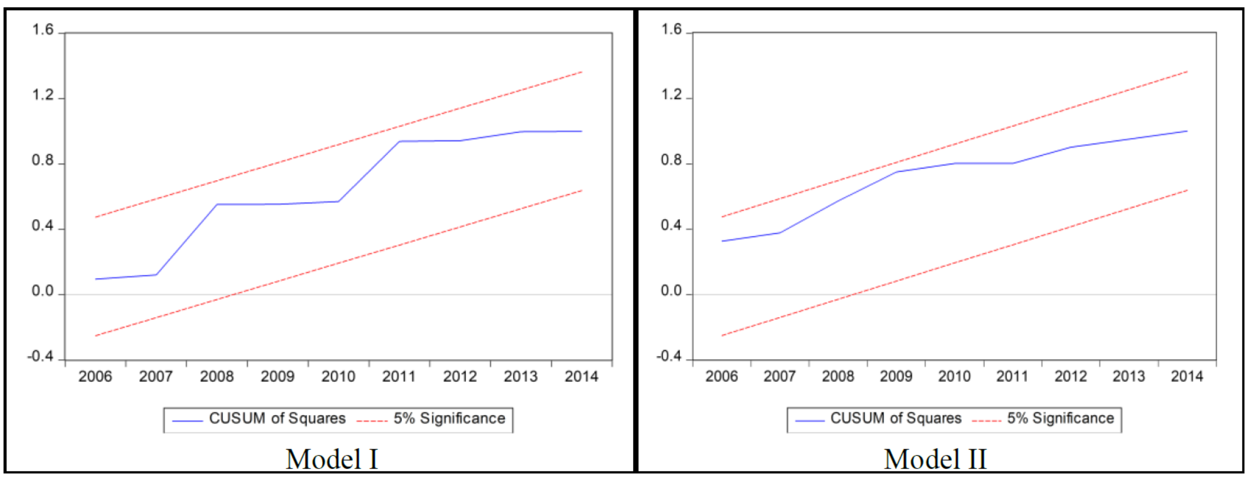

FIGURE 1. The CUSUM Square Test for ARDL Model I and Model II

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TABLE 6. The Residual Diagnostic Tests and ARDL Bounds Test for Model I and Model II

Tests	ARDL Model I (1, 0, 0, 0, 0, 0)		ARDL Model II (3, 3, 2, 3, 3, 1)	
	Obs*R^2	Prob. ÷^{2}	Obs*R^2	Prob. ÷^{2}
Serial Correlation LM	5.6787	0.0585	4.4830	0.1063
Heteroscedasticity	7.9512	0.4382	25.984	0.2071
F-statistic	23.495***		4.8182***	

Note: ***, ** and * indicate significance at 1 %, 5 % and 10 %, respectively.
The numbers in the ( ) show the best model with optimal lag.

TABLE 7. Johansen first information maximum likelihood test for cointegration

Hypothesis	Model I				Model II			
	Likelihood ratio	5% Critical Value	Maxi. Eigen Values	5% Critical Value	Likelihood ratio	5% Critical Value	Maxi. Eigen Values	5% Critical Value
r = 0	128.62	95.75*	66.281	40.08*	146.04	95.75*	70.382	40.08*
r = 1	62.336	69.82	26.266	33.88	75.669	69.82*	33.218	33.88
r = 2	36.072	47.86	18.067	27.58	42.441	47.86	18.541	27.58

Note: * indicate significance at 5 %.

From the ARDL bounds test for Model I, the value of the *F*-statistic is 23.495 and 4.8182 for Model II (see Table 6), which is greater than the upper bound critical value of 4.15 at the 1 per cent level of significance. Thus, it can be concluded that the variables are cointegrated and there exists a long-run equilibrium relationship between the variables.

The robustness of the ARDL bounds test cointegration was confirmed by the same evidence of strong long-run relationship between the variables, provided by the J-J test (see Table 7).

THE LONG RUN MODEL

The long-run relationship for the Model I and Model II is shown in Table 8. The results indicate that the GDP per capita (Cebula 1980; Hogan 1984; Gillingham & Greenlees 1987; Nelson 1991; Blanciforti & Kranner 1997; Kurre 2000; Pasha & Pasha 2002; Cebula & Todd 2004; Cebula & Toma 2007; Chien & Mistry 2013) and DO (Rodriguez 2000; Squalli & Wilson 2006) are positively related with the COL model at the 5 per cent level of significance. Malaysia's economic growth since the 1960s and changes in the structure of the Malaysian economy to an industrial-based economy have contributed to the increase in the cost of living. Further, with the emergence of international trade opportunities, this will promote Malaysian export products and remain competitive in the world market. This will stimulate Malaysian economic growth, which will encourage more job creation and opportunities for doing business in wider markets.

In addition, the significance of PG in Model I is consistent with the demand theory. With a greater population, this could increase the demand for goods and services. By operating under the economy of scale, the production of goods and services should reduce production costs and lead to lower prices. This result is consistent with the findings of Nelson (1991) and Blanciforti and Kranner (1997), an increase of thousand persons in PG will decrease the COL by 0.07 points a year. The results also revealed that UR is significant and negatively related with the COL (Cebula 1980; Kurre 2000; Cebula & Todd 2004; Cebula & Toma 2007) at the 5 per cent level in Model I. The unemployment rate in Malaysia is consistent and considered to be stable in order to keep inflation from accelerating as well as the cost of living. However, when there is cyclical unemployment, this may positively affect the cost of living. The cyclical unemployment pattern means people are faced with the problem of trying to find a job over a long period and causes social problems such as increasing crime rates due to the rising cost of living or they cannot afford their lives. This finding was supported by Latimaha et al. (2019) that the cost of living is positively related with all types of street crime rates except for snatch and theft estimation models in Malaysia.

Nonetheless, GS is significant at the 5 per cent level but with the wrong sign in Model I and it is insignificant in Model II. The inefficient allocation of subsidies and market distortions, as well as the subsidies provided by the government that do not reach targeted groups may contribute to the insignificance of GS in both models. Other than that, the value of the subsidies varies for different years that depend on the financial ability of the government are also among the reasons of the insignificancy of GS in this study. According to Bridel and Lontoh (2014), Malaysia's subsidy system is skewed in favor of high-income groups only (IMF,

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2015) and the price setting is associated with political decision-making. The International Monetary Fund or IMF (2015) also revealed that fuel price subsidies in Malaysia are an inefficient and ineffective way to meet fiscal policy's efficiency, growth and equity goals. Similarly, the REXRI is also found to be not significant and it can be concluded that REXRI is not related to the COL. At the beginning of the Asian financial crisis effect, the Ringgit Malaysia (RM) was not tradable outside Malaysia, and only after 8 years, the RM appeared back on the foreign exchange rate market. Other than that, the exchange rate between RM, US dollar and other major world currencies has been weak for several years. This is because the exchange rate represents the relative price of domestic and imported goods for a small country like Malaysia. For the next three consecutive years since 2012, the RM continue to depreciate against US dollar and in 2015, the exchange rate of US$1 = RM5.9524 (Ministry of Finance, 2016). Therefore, the REXRI is unable to absorb the impact of the exchange rate weakness and the pegging of the RM against the US dollar.

TABLE 8. The long-run relationship for Model I and Model II

Variables	Coefficient	Model I [1, 0, 0, 0, 0, 0]	Model II [3, 3, 2, 3, 3, 1]
C	$\hat{\beta}_0$	-34.311 (-0.8623)	-139.69*** (-3.3557)
lnGDPC	$\hat{\beta}_1$	16.849*** (6.2216)	23.213*** (5.7356)
PG	$\hat{\beta}_2$	-0.0661** (-2.707)	0.0248 (1.3036)
UR	$\hat{\beta}_4$	-3.5016** (-2.4152)	-0.8591 (-0.7013)
DO	$\hat{\beta}_5$	0.1260** (2.5393)	-
REXRI	$\hat{\beta}_6$	-	0.0316 (0.2530)
GS	$\hat{\beta}_7$	0.0363** (2.0027)	0.0004 (0.1909)
*B*1	$\hat{\alpha}_1$	9.0370** (2.2807)	-
*B*2	$\hat{\alpha}_2$	-95.471*** (-3.7455)	-50.692*** (-3.3557)

Note: ***, ** and * indicate significance at 1 %, 5 % and 10 %, respectively.
The number in the ( ) show the *t*-statistic.
The number in the [ ] show the best model with optimal lag.
All models pass the statistical diagnostic and dynamic stability test.

In summary, Model I is the best fit to explain the variations in the cost of living in Malaysia. Thus, the results indicate that the GDP per capita, PG, UR and DO have a relationship with COL, correctly signed and statistically significant. Meanwhile, GS in Model I is statistically significant but with the wrong sign in this study. Therefore, it can be concluded that the GDP per capita, PG, UR and DO are factors influencing the cost of living in Malaysia in the long-run. Furthermore, the estimated coefficient of dummy variables, *B*1 and *B*2 in Model I and Model II are statistically significant. Thus, it is appropriate to conclude that the Asian financial crisis in 1997 to 1998 and the global financial crisis in 2008 as well as the unpegging of the Ringgit Malaysia in 2005 had an effect on the cost of living.

THE SHORT RUN DYNAMIC MODEL

The estimated short-run dynamic model for Model I is as follows:

$$\Delta COL_t = 2.15\Delta ln\,GDPC_t - 0.008\Delta PG_t - 0.36\Delta UR_t + 0.02\Delta DO_t + 0.005\Delta GS_t + .96\Delta B1_t - 1.9\Delta B2_t - 0.12ect_{t-1} \quad (15)$$

For Model II, the short-run dynamic model is as follows:

$$\Delta COL_t = -0.02\Delta COL_{t-1} - 0.11\Delta COL_{t-2} + 3.79\Delta \ln GDPC_t - 5.34\Delta \ln GDPC_{t-1} + 2.01\Delta \ln GDPC_{t-2} - 0.006\Delta PG_t - 0.008\Delta PG_{t-1} + 0.25\Delta UR_t - 0.06\Delta UR_{t-1} - 1.12\Delta UR_{t-2} + 0.0005\Delta REXRI_t + 0.06\Delta REXRI_{t-1} + 0.06\Delta REXRI_{t-2} + 0.006\Delta GS_t - 11.05\Delta B2_t - 0.23ect_{t-1} \quad (16)$$

The coefficient of the lagged error correction term (ect(-1)) is -0.1241 for Model I and -0.2344 for Model II. Both coefficients are statistically significant at the 1 per cent level of significance and they have a negative sign. The magnitude of this coefficient indicates the speed of adjustment per period back to long-run equilibrium after a short-run shock, i.e. 12.4 per cent for Model I and 23.44 per cent for Model II of short-run disequilibrium in the cost of living when all the independent variables change, which are GDP per capita, PG, UR, GS, DO (for Model I) and REXRI (for Model II). Therefore, any short-run deviation will take about 8.06 years for Model I and 4.27 years for Model II to adjust or correct to the long-run equilibrium.

CONCLUSION

In conclusion, the Granger causality test results indicate that there is evidence of unidirectional Granger causality from the cost of living to the standard of living but not vice-versa in Malaysia. It suggests that the cost of living can be used to better predict the standard of living by considering the lagged values of the cost of living rather than the lagged values of the standard of living. Any policy changes particularly to minimise or overcome the rising cost of living in Malaysia should consider the role of the standard of living and the cost of living. To increase the standard of living of the Malaysian people, the cost of living should be minimised to be affordable at a minimum price. It should be noted that an increase in the cost of living without control and commensurate with increases in real wages, will worsen the standard of living of society or individuals.

Apart from that, the ARDL Bounds test results show that there is a long-run relationship among the variables for Model I and Model II. It can be concluded that Model I is the best fit model that can explain the variation in the cost of living in Malaysia. The main factors influencing the cost of living in Malaysia are the GDP per capita, population growth, unemployment rate and the degree of openness in the long-run. As a small and open economy, an increase in the cost of living is inevitable. This is because exports and imports play a bigger role in small economies. By stimulating domestic production and promoting exports, this will generate a positive economic growth. At the same time, the exchange rate of the RM against major currencies should be at a competitive rate to ensure the exports remain competitive and sustainable. For a small country like Malaysia, the exchange rate is an important variable in economic decisions because it represents the relative price of domestic and imported goods. Therefore, Malaysia needs to tighten the outflow of RM as a precaution to protect the Malaysian economy.

However, the real exchange rate does not affect the cost of living and is statistically insignificant but as a recommendation and a strong argument, the real exchange rate variable is still relevant and influences the cost of living. The exchange rate represents the relative price of domestic and imported goods for a small country like Malaysia. For example, the deterioration of purchasing power of the ringgit and higher cost of living in Johor Bahru City is caused by the depreciation of the RM against the Singapore dollar. The higher purchasing power of the Singaporean dollar effects and puts pressure on the rising cost of living in Johor Bahru. The prices keep increasing and make the cost of living in Johor Bahru more expensive (Latimaha et al. 2018) due to the high purchasing power of the Singaporean residents that enter Malaysia and spend their money. In other words, the Singaporean residents can buy more units of RM. Also, the depreciation of the ringgit against the US dollar raises the prices of imported food and indirectly increases the cost of living in Malaysia.

Furthermore, the insignificance of government subsidies is due to the delivery system that should be streamlined by identifying the appropriate target groups. The target groups need to be expanded and include middle-income groups because this group is the largest income group in Malaysia. The inefficient allocation of subsidies and market distortions mean that the subsidies provided by the government do not reach the targeted groups. The Malaysian subsidy system is skewed in favour of the high-income groups only and the price setting is associated with political decision making. Therefore, the subsidy delivery system, especially for petrol and consumer goods, needs to be upgraded to reach the targeted groups.

Lastly, the authors recommend the government to make adjustments to the CPI weights, by increasing the weight for the education group and to establish a child care component in the CPI group. To measure or calculate the cost of living index is very difficult because there are too many indicators especially regarding consumer behaviour, but to understand the pattern of household spending is very important and the CPI can be very helpful to explain any changes in the cost of living. Creating data concerning the cost of living is highly recommended.

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