An Analysis of Price Disparity: Peninsular Malaysia and Sabah

(Analisis Jurang Perbezaan Harga: Semenanjung Malaysia dan Sabah)

Siti Marsila Mhd Ruslan
Universiti Malaysia Terengganu

Kasypi Mokhtar
Universiti Malaysia Terengganu

ABSTRACT

This study examines the price differences between Peninsular Malaysia and Sabah from 2004 using quantitative and qualitative methods. For quantitative research, we employ disaggregate monthly consumer price indices for nine types of goods and services. Based on the Johansen co-integration test, the results reveal that the long-run relationship only exists for transport group. The findings using Granger pair-wise causality test indicated that the prices in Peninsular Malaysia do not determined the price in Sabah. Qualitative research was further conducted via interviews with stakeholders of shipping providers, port authority, government and special interest group show that the price disparity between Peninsular Malaysia and Sabah occurred due to trade imbalance, sluggish economic activities, poor accessibility between port and retailers, insufficient infrastructure and technical facilities and political sentiment.

Keywords: Price disparity; consumer price index; Johansen test; Granger test; Malaysia

ABSTRAK

Kajian ini menyingkap perbezaan harga antara Semenanjung Malaysia dan Sabah dari tahun 2004 menggunakan kaedah kuantitatif dan kualitatif. Bagi kajian kuantitatif, kami menggunakan Indeks Harga Pengguna bulanan bagi sembilan jenis barangan dan perkhidmatan. Ujian ko-integrasi Johansen menunjukkan bahawa hubungan jangka panjang hanya wujud bagi kumpulan pengangkutan. Dapatan menggunakan ujian kausaliti berpasangan Granger menunjukkan harga di Semenanjung Malaysia tidak menentukan harga di Sabah. Kajian kualitatif telah dijalankan secara lebih mendalam menerusi wawancara dengan beberapa pihak berkepentingan iaitu pembekal perkapalan, pihak berkuasa pelabuhan, kerajaan dan kumpulan berkepentingan khas menunjukkan perbezaan harga di Semenanjung Malaysia dan Sabah berlaku kerana ketidakseimbangan perdagangan, aktiviti ekonomi yang lembap, akses yang kurang baik antara pelabuhan dan peruncit, infrastruktur dan kemudahan teknikal yang tidak mencukupi dan sentimen politik.

Kata kunci: Perbezaan harga; indeks harga pengguna; ujian Johansen; ujian Granger; Malaysia

INTRODUCTION

Price disparity between Peninsular Malaysia and Sabah has been a long-debated issue. Over the years, industry players, political parties and non-governmental organisations have argued about the reasons of the price differences between Peninsular Malaysia and Sabah. Therefore, it is a question whether certain factors affect the price including taxes and subsidies or price control measures implemented by the government for the basic necessities such as oil, sugar, flour and other goods across the country[1]. Other potential factors contributing to the high prices within Sabah could also include the cost of inland shipping, the lack of competition, and inefficient distribution channels to reach consumers which affect the distribution of each component in the supply chain[2].

On the other hand, shipping companies have denied the existence of price-fixing cartels or monopolistic behaviour in the presence of protective or special rights granted by the policy for them. They emphasised that the imposition of carriage charge is influenced by the quality of port infrastructure in Sabah. Before Port Sepanggar was refurbished, most large ships had to dock far away from the port, hence making goods to be costly and time-consuming to be transported from ship to shore[3]. Second, shipping companies also incur higher insurance costs due to the instability of maritime security in general and particularly in the Eastern waters of Sabah. The third factor is a small-scale trading from within and outside the state. Even though the policy was liberalised in 2009, most international shipping companies prefer to continue to Port Klang as the demand and population in the Peninsular are more than Sabah[4]. This saves much

of their logistics cost. The fourth factor is because of the trade imbalance from within and outside the state. The current issues is related to the freight rate which occurs due to imbalanced trade pattern between East and West Malaysia. As anecdotal on news report for now, and it has been so ever since, there is less backhaul cargo from East Malaysia to West Malaysia[5]. Nevertheless, such imbalance and the subsequent freight rate level are perceived as normal which also happen in ports in Europe and the Far East countries.

As most container ships that pass-through Sabah while heading to Peninsular Malaysia are returned empty, it forces shipping companies to double their charges to cover the cost of the return shipping. At 2014, the total imports and exports were estimated at 80% and 20% respectively, therefore domestic shipping operations are limited to sending cargo to Port Klang compared to Sabah or Sarawak. This means shipping companies have to compete against each other to get a reasonable cargo density and low carriage charge[6].

An article written by Serna and Beti (n.d)[7] mentioned that there is indispensably high demand for imported goods in Sabah. In this case, demands from the public still must be catered despite the cost is higher. Nonetheless, the issue engulfing the situation is that there is less competition in Sabah's local industry that allows producers to influence the market. Similarly, since there is a devoid of commitment from the producers to fulfil the local demand, a more contagious effect is created which leads for more imported goods. Additionally, the high maintenance cost has further exacerbated the issue by casting away the producers from expanding in Sabah. A policy called "cabotage policy"[8], as mentioned by Serna and Beti (n.d), inhibits international business industry from flourishing in Sabah. At the same time, poor basic infrastructure could also be the reason of extortionate commodities prices. With this pitfall, Sabah ports could not reach the required standard and stand in line with other ports around Malaysia. Consequently, the foreign shipping lines are not allowed to unload their cargoes directly in Sabah ports.

On different connotation, Serna and Beti (n.d) mentioned that many firms do not plan to settle down in Sabah due to poor facilities and infrastructure like poor road condition. Other factor includes the number of populations in Sabah alone is insufficient to support the demand from firms. It is undeniable that there is a high demand for imported commodities, but the demand alone does not meet the firm's standard insufficient to attract them to enter Sabah and conduct business there. As a result, it creates a sluggish industry and when coupled with immoral producers, it has inevitably doubled the impacts by suppressing the people with price increase even more. At the same time, it is also unfair to underline the shortcoming without acknowledging several reforms that have taken place including trade policy, industry policy and labour policy. From year

2009 until 2015, some of the changes that equally took part included:

1. Goods market: allotment of consumer and producer subsidies, opening of *"Kedai Rakyat 1Malaysia (prior 2018)"*, import licensing and tariffs, and introduction of light-handed regulation;
2. Monetary policy: introduction of primary objective of monetary policy to have price stability and the enforcement of Price Control and Anti-Profiteering Act 2011;
3. Taxation reforms: tax exemption for Malaysian crews on board Malaysian vessels;
4. Industry reform: road transport development in Sabah and Sarawak (e.g. Pan-Borneo Highway Project) and the expansion of Sepanggar Port in Sabah; and
5. Labour policy: regulations on labour requirement for unconditional license for vessels operating in Malaysia with the participation of 30% indigenous and 75% Malaysians on board.

In separate cases, moving through the supply chain that requires a modern and efficient supply chain, a better solution-focus on production must take into consideration the speed, care and competitive prices. Several important factors in transporting goods to the market include high-quality competitive shipping services and service frequency. For charterers (i.e. manufacturers), the tendency towards choosing shipping providers is based on the following criteria:

1. Service frequency
2. Transit time
3. Service quality e.g. minimal damage
4. Price
5. Added value services e.g. door-to-door and advancement in technology

The imbalance of trade between Peninsular Malaysia and Sabah occurred because many producers and manufacturers are reluctant to ship goods to the East side. This situation has worsened off when several shipping companies took advantage of the empty shipping space in Sabah ports, hence putting competitive pressure on shipping freight rate that leaves exporters with no choice but to increase the price; a domino effect from suppliers down to the consumers.

Even so, in July 2009, taking an excerpt by the former Minister of Transport Datuk Seri Ong Tee Keat, the high prices of goods in Sabah should not be blamed solely on the shipping costs. Other factors should also be considered i.e. high handling charges, weak distribution channels, and inefficient inland transportation (Khalid, Ang, & Hasan, 2010). At the same time, there are values in the disputes presented by several parties, and they should legitimately take into

consideration in analysing the condition and in coming up with proposition to address this issue. Nonetheless, the short-term interests of certain parties also need to be addressed so that a better involvement of the nation will remain absolute over vested (MIMA Bulletin 2012). Hence, any suggestions must be apprehensive of the notion that the shipping cost is not the only culprit causing the distasteful position of inadequate shipping services, high prices of goods and services, high freight rates, and non-competitiveness of exports from Sabah and Sarawak (MIMA Bulletin 2012).

At the same time, other factors that lead to the price differences between Peninsular Malaysia and Sabah also must be investigated e.g. the existence of market power which gives certain group of enterprises acting collectively (Aguiar & Santana 2002; Meyer & Cramon-Taubadel 2004; Xiao & Yu 2006), competitiveness among players (from suppliers to retailers) (El Ouardighi & Kim 2010; von Cramon-Taubadel 1998; Yao, Leung & Lai 2008), government intervention through policies that might lead to series of gradual marketing reforms (Badiane & Shively 1998; Kinnucan & Forker 1987; Liu, Keyzer, van den Boom & Zikhali 2012) and product characteristics i.e. durable, non-durable, perishable, and services (Holloway 1991; Méndez, Oubiña & Rubio 2008; Wagner, Grosse-Ruyken & Erhun 2012).

On the other hand, this study could provide a link on the co-integration relationships among economic variables in time-series modelling techniques (Ardeni 1989; Fackler & Goodwin 2001; Serra & Goodwin 2003). Most analyses of co-integration utilised the bivariate tests of Engle and Granger (1987). Nevertheless, Engle and Granger (1987)'s bivariate tests were recently scrutinised to have a number of serious limitations. In contrary, this study described and applied different technique i.e. Johansen and Juselius test for evaluating the co-integration and long-run relationships among various groups of variables.

As noted by Ardeni (1989), time-series properties of individual price data series could be at flaw since the conventional regression tests of the Law of One Price (LOP) may have misrepresented or ignored the time-series properties. Such properties may have important implications for statistical tests of the LOP. In particular, several inferential biases and inconsistencies could happen if serial correlation is ignored in an empirical test of the LOP.

Furthermore, even though the differencing transformations and filters are ad-hoc in nature for price differentials, it may suffer empirical tests and may be inappropriate for a given price series. As an alternative, a bivariate two-step co-integration testing technique of Engle and Granger could be utilised as suggested by Ardeni (1989). Nonetheless, the application for co-integration test of Engle and Granger is limited because of two reasons, first due to the fact that co-integration considerations are confined to pair-wise comparisons,

and second because such tests require one of the two prices to be designated as exogenous.

Additionally, the potential for small-sample biases in parameter estimation attained from the two-step procedures has been discussed (Banerjee, Mizen & Russell 2007). Finally, it is also interesting to find that Engle and Granger (1987)'s testing procedure does not offer straightforward testing procedures as its testing procedures do not have well-defined limiting distributions.

The Johansen and Juselius (1988) co-integration test, on the other hand, suggests a maximum likelihood estimation procedure that provides estimation of all co-integrating vectors existing among a group of variables. For Johansen's test, test statistics that have an exact limiting distribution which functions as a single parameter is being utilised. With this, it could be seen that Johansen's (1988) co-integration testing procedures may offer significant advantages over the bivariate two-step approach of Engle and Granger.

In sum, this study intends to bring out the issue of price disparity and the existence of price connection (co-movement) between Peninsular Malaysia and Sabah occurred between 2004 and 2015 by extracting the factors that lead to the causes. Since the issue of the market price needs to be studied thoroughly, qualitative findings i.e. interviews with selected stakeholders are therefore utilized to support quantitative findings for a better representation of the cause and effect.

The rest of the paper is organised as follows. The literature review is the second section of this paper while the third section discusses the data description and model. Subsequently, the fourth section discusses the methodology. Next, the fifth section explains the quantitative and qualitative findings of the study, and finally the sixth section is the conclusion of this study.

LITERATURE REVIEW

The issue often associated with cabotage policy in East Malaysia, especially in Sabah, is high producer and consumer prices alleged by the high cost of sea transport. The determinants of transport cost have been a subject of investigation for several studies which focused on different issues such as the quality of transport and communication infrastructure (Adriani & Deidda 2011; Schaefer & Barale 2011), economies of scale (Lindstad et al. 2012), port efficiency (Cho 2014; Moon & Woo, 2014; Wu & Goh 2010) and the country's connection with international liner-shipping networks (Nair 2012; Li, Otsuka, Brigham 2020). At the heart of the debate, the competition level in the sector of freight rates is one of the determinants of transport costs. Liner-shipping companies are allowed to make deal on prices, capacity and schedules on some maritime routes (Huang, Laserre, Pic & Chiu 2020). The standard practice is to include

substitution for restriction policy (Qu, Zhou, Zhang, Wahab, Zhang & Ye 2019) because the evolution of the main feature of this industry leads to the increased concentration, where recent studies focused more on the competition strength on specific trade routes (Msakni, Fagerholt, Meisel & Lindstad 2020). However, several questions remained, specifically on how market power is reflected in the components of freight rate (Gu, Dong & Chen 2020).

In order to estimate the determinants of the transport costs, Fink et al. (2002) used a reduced form of the price function which considers the technological effects of containerisation, the distance between countries, the public trade policies, the existence of economies of scale and private anti-competitive practices followed in various countries. These two elements (public trade policies and private anti-competitive practices) are crucial in their analysis since they highlight the impact of competition rules in the liner-shipping sector.

Several studies point out some important aspects of service quality that may affect freight rates such as the frequency of services (Puckett et al. 2011), the number of scales (Dinwoodie, Tuck & Rigot-Müller 2013; Lindsey, Mahmassani, Mullarkey, Nash & Rothberg 2014; Medda & Trujillo 2010) and the transhipment services (Meng, Wang & Wang, 2012; (Meng, Wang, & Wang, 2012; Wang et al., 2013 Wang et al. 2013). The last one is a key issue, since the emergence of a two-tier maritime network shows that the connectivity to shipping routes can sensibly vary from a direct to indirect link through hubs or transhipment ports (Sun, Rangarajan, Karwan & Pinto 2015; Cheung, Bell, Pan & Perera 2020). Tierney, Áskelsdóttir, Jensen, and Pisinger (2014) emphasised that reserve and distant location to the main international liner-shipping networks has a higher effect on maritime transport cost than the geographical distance. Wilmsmeier and Notteboom (2011) showed that these factors explain nearly three-fifth of the freight rate variance by introducing variables related to port infrastructure, service quality and connectivity to the liner-shipping networks. Among the significant variables is the number of carriers which provide a regular service on a route. This is the determinant role of the freight rates (Ma, Chang, Wang & Tang 2019; Trapp, Harris, Rodrigues & Sarkisa 2020). As competition is more intense and more services are offered, Sun et al. (2015) showed that shipping lines are also able to reduce their margins on these routes and decrease transportation costs.

For example, there are various types of services in the transportation of goods, namely the trucking costs, carriage costs (forwarding), cost of terminal handling services, oil price volatility and storage costs (Donga, Christiansena, Fagerholta & Bektaş 2020; Duy & Minh 2020; Maitra, Chandra & Dash 2020; Tan, Duru & Thepsithar 2020). In addition, the government regulates the prices for vessel to port operators while the carriage

cost is paid to the company. The cost of carriage is subject to the current market price, an option given to licensed shipping company. This thoroughly reflects the existence of power in shipping lines which ultimately determines the overall transport costs (Tinoco, Creemers & Boute 2017; Lee 2019; Wang & Bae 2020).

IMBALANCE OF TRADE

Empty intermodal container management is another issue related to the shipping industry. However, this is one of the most complicated issues faced by the global logistics industry. The industry has seen a general reduction in cost and service time, the increase in safety, efficiency, and productivity since the beginning of containerisation (Theofanis & Boile 2009). Regardless of this accomplished efficiency, intermodal container transport has endured from the deficient trade imbalance which creates a necessity for empty container logistics management, along with adjusting the position at different geographical levels as well as handling their storage and accumulation in major importing regions (Raza 2020).

Part of an aftermath of the trade imbalance, along the main trade lane, is the imbalances in the empty container of demand and supply which causes to structural and endemic problem of the trade. An elemental component of a comprehensive international transportation system is empty container repositioning (Li & DaCosta 2013). Empty container repositioning is needed to balance the demand and supply although it is a non-revenue generating, expensive and unsatisfactory practice between major exporting and importing regions (Sheng 2014).

In Malaysia, the trade imbalance is particularly related to the trade coming from within and outside the East part. Most container ships arrived from Sabah and Sarawak to Peninsular are empty, thus forcing shipping companies to double charge their customers as a form of compensation to cover the costs of returned shipping. It is estimated that there are 80% of imports and 20% of exports are coming from Sabah and Sarawak compared to Peninsular[9]. Since the volume of cargo is very limited, the domestic shipping operations are therefore scarce in sending cargo to Sabah or Sarawak. This is because the output of export is not convincing enough to bare the profit loss. Shipping companies therefore have to compete against each other to get reasonable cargo density and pay out fairly good amount of carriage charge (Khalid 2011).

Theofanis and Boile (2009) mentioned that tariff imbalance and the relevant costs of repositioning empty containers from surplus to deficit areas, marginal and volatile profitability of the leasing industry, cost of inland transportation, cost of manufacturing and purchasing new containers in relation to the cost of

leasing containers, cost of inspection and maintenance of aged containers, leasing contract terms and cost of disposal as other additional causes leading to the trade imbalance.

It is essentially important to note that leasing companies and ocean carriers have essentially different and conflicting goals in this case. As transportation equipment and equipment management decision-making is concentrated towards assisting cargo move and minimising transportation and handling costs, carriers are mainly made to handle containers (Wang, Meng & Jia 2019). Meanwhile, seeking protection over deflation and creating feasible profit out of the leasing companies scrutinise the containers which are the companies' core assets.

The synergy between these two main players are exceptionally complicated and cannot be freely conceptually defined. Generally, ocean carriers utilise the flexibility of leasing arrangement and extensively use leased equipment; on employing them in high demand areas and off hiring containers in surplus areas. Following the growing integration preferences and the use of strict management approaches, over the several years ocean carriers have improved their ownership of container equipment like revenue management in their administration and operation (Alexandridis, Antypas, Gulnur & Visvikis 2020).

At times, empty containers can be inter-regionally repositioned through a depot or an intermodal terminal. Through intermodal transportation and last mile drayage, empty containers can also reach consignors' premises. A container is normally drayed to an intermodal terminal or a marine terminal for export once filled at the consignor's premises. Once it is off hired by an ocean carrier, empty containers can also attain storage depots and can temporarily be stored before overseas repositioning takes place (Ko 2013).

From the storage depots, aged containers, which specifically refer to those stored over a long period, may be sold out of the transportation network to the secondary market. Empty containers may move between different storage depots for balancing purpose or between marine terminals and storage depots (Kavussanos & Alizadeh 2001). Several terminals operate satellite empty container depots to avoid congestion at the gates, gain additional storage capacity, and provide dedicated service to ocean carriers. Moreover, marine terminal satellite empty depots are often linked with chassis pools where chassis are owned by ocean carriers in the US (Koekebakker, Adland & Sødal 2007).

The dynamics and linkages among stakeholders at the local and regional level, with influence from the interregional level, are all interconnected. This whole process involves many different parties from the ocean carriers to consignors, consignees, depot operators, marine terminal operators, drayage operators, depot operators, and possibly the transport intermediaries (Wang, Liu & Zhang 2020). A full container can reach a consignee's premises by truck either inter-modally or directly through a marine container terminal (Márquez-Ramos, Martínez-Zarzoso, Pérez-García & Wilmsmeier 2011). The empty container can be either returned to the marine terminal or a storage depot once stripped, or directly street-turned to a consignor's premises to be filled with backhauling load or an export (Russo & Musolino 2013).

The accumulation of empty containers in storage facilities at major importing regions with substantial import-export imbalances under certain circumstances may become a crucial problem under certain circumstances. The process of empty container aggregation follows the dynamics of container shipping and is highly dynamic (Veenstra 2005). Other than the integral global trade imbalance, other origin causes comprise the relevant cost of repositioning empty containers from surplus to deficit areas, container rate imbalances, cost of inland transportation, imbalances in the type of containers available and demanded, cost of manufacturing and purchasing new boxes in relation to the cost of leasing containers, marginal and volatile profitability of the leasing industry, cost of inspection and maintenance for aged containers, as well as the cost of disposal and terms of leasing contracts between leasing companies and ocean carriers (Wang, Gao, Tan & Yang 2019).

DATA DESCRIPTION AND MODEL

As the study of co-movement is highly related with the market integration, the model derived from the Law of One Price (LOP) is therefore incorporated. It involves the regression of the current price change in one market on a constant and the price changes in another market. In this case, the independent variable is the change of CPI of Peninsular while the dependent variable is the change of CPI of Sabah. If, and denote prices for a homogenous commodity in markets and in period , the following equation is estimated:

$$\Delta P_t^i = \alpha + \beta \Delta P_t^j + \varepsilon_t \qquad (1)$$

The null hypothesis that $\alpha = 0$ and $\beta = 1$ was then tested using a standard F- test, in which if the null hypothesis can be rejected, then so is the LOP.

All the data used were based on monthly observations with the estimation period from 2004 until 2015. The main data source for this study was retrieved from the Department of Statistics Malaysia and National Archive of Malaysia. Disaggregate data for consumer price index (CPI), not the actual retail price for various goods and services in Peninsular Malaysia and Sabah was used to represent both East and West Malaysia). Due to data constraint relating to the CPI covering each state, nine main groups were analysed:

1. Food and non-alcoholic beverages;
2. Alcoholic beverages and tobacco;
3. Clothing and footwear;
4. Housing, water, electricity, gas and other fuels;
5. Furnishings, household equipment and routine household maintenance;
6. Health;
7. Transport;
8. Recreation services and culture; and
9. Miscellaneous goods and services.

METHODOLOGY

Since co-integration suggests the co-movement of the integrated series, the stochastic properties of each variable needs to be established first. Accordingly, prior to the test, the standard augmented Dickey-Fuller (ADF), Philips Perron (PP) and Kwiatkowski-Philips-Schmidt-Shin (KPSS) unit root tests were conducted to determine the variables' orders of integration.

As for finding the co-movement of prices, the co-integration approach was conducted to measure whether two markets were integrated in the long term by assessing whether their prices wander within a fixed band. The usual two-step residual-based test, according to Engle and Granger (1987), involves the estimation of the following co-integrating regression:

$$P_t^i = a + bP_t^j + \varepsilon_t \qquad (2)$$

The traditional Engle and Granger (1987) two-step methodology can be used to explore the possibility of a single co-integration relationship. This test however has its own setbacks as the regression of non-stationary data series gives way to both and inconsistent regression and spurious problems. In a bivariate context, there might be a linear combination of integrated variables that is stationary. In that case, such variables are deemed as co-integrated which means they share a common unit root and the sequence of stochastic shocks is common to both. If two non-stationary series are co-integrated, by definition this means the extent by which they diverge from each other will have stationary characteristics and will reflect only the disequilibrium. Nevertheless, previous studies used this method as a multivariate framework to investigate the co-movement between variables, for example the energy-output relationship of multiple co-integration relationships (Ghali & El-Sakka 2004; Stern 2000; Warr & Ayres 2010).

In order to compensate the shortcoming in Engle and Granger test, the Johansen co-integration test embodies a better concept that allows capturing the equilibrium relationship even between non-stationary series in the model. Co-integration implies that prices move closely together in the long run, although in the short run they may drift apart. In other words, Johansen test is concerned with estimating long-run economic relationships among non-stationary, integrated variables.

In the presence of co-integration, this study formulated a vector error correction model (VECM) that captures both the long-run relationship and the short-run dynamics of the variables. The comparative advantage of Johansen's procedure is that it can provide independent estimates of the multiple co-integration vectors. In this procedure, the maximum likelihood method was applied to test for the co-integration rank. The co-integration rank was found using the trace (λ trace) and maximum eigenvalue (λ max) test statistics (Johansen 1988; Stock & Watson 1988). In other words, Johansen co-integration test suggests co-movement of the integrated series (Shahiduzzaman & Alam 2012).

In general, if the variables in the model are not co-integrated, a VAR can be used in the first difference to test for Granger causality. This study omitted the the long-run components from the model, thus whether or not the variables of interest are co-integrated, this still has implications for the form of the model used to conduct the causality test.

QUANTITATIVE FINDINGS

1. Unit Root Tests

The results of the ADF, PP and KPSS unit root tests are presented in Table 1. The estimation results of the ADF, PP and KPSS tests generally support non-stationarity of the variables in level and stationarity in the first difference. Based on the result, it is shown that the variables are

Table 1 reports the results of unit root tests and suggest that the series in levels behave like unit root processes, while for the first difference, the unit root is strongly rejected, mostly at the 1% level of significance, particularly for PP test. The null hypothesis of non-stationarity of the series in the KPSS test, however, is not rejected. Therefore, based on the KPSS results too, it is posited that a non-stationarity exists among the variables.

2. Johansen Co-integration Test

The Johansen co-integration test approach entails the selection of an optimal lag length at the first stage. Given that economic theory is not explicit about lag lengths, purely statistical techniques are commonly used in the literature. Based on the test derived, and using the sequential modified likelihood ratio (LR), the Aikaike information criterion (AIC) is selected to determine the optimal lag for the VAR. The results are presented in Appendix B for the model of all groups. Estimates of the autoregressive parameters with minimum AIC

TABLE 1. Unit Root Tests

Variable	ADF		PP		KPSS	
	Levels	First Differences	Levels	First Differences	Levels	First Differences
All items Sabah	-1.991	-9.312***	-1.991	-11.016***	0.174**	0.057
All items Peninsular	-1.465	-10.205***	-1.273	-10.101***	0.256***	0.108
Food and non-alcoholic beverages Sabah	-1.088	-13.183***	-1.029	-13.183***	0.336***	0.068
Food and non-alcoholic beverages Peninsular	-1.737	-3.087	-1.909	-13.429***	0.341***	0.059
Alcoholic beverages and tobacco Sabah	-2.962	-12.110***	-3.085	-12.112***	0.129***	0.037
Alcoholic beverages and tobacco Peninsular	-2.962	-12.110***	-3.085	-12.112***	0.149***	0.043
Clothing and footwear Sabah	-1.421	-2.040	-1.275	-15.908***	0.299***	0.113
Clothing and footwear Peninsular	-1.667	-1.910	-2.587	-19.053***	0.201***	0.118
Housing, water, electricity, gas and other fuels Sabah	-0.215	-2.590	-1.325	-13.081***	0.304***	0.063
Housing, water, electricity, gas and other fuels Peninsular	-1.336	-1.904	-2.181	-13.291***	0.220***	0.064
Furnishings, household equipment and routine household maintenance Sabah	0.047	-2.833	-1.120	-13.750***	0.353***	0.054
Furnishings, household equipment and routine household maintenance Peninsular	1.446	-0.910	-0.443	-13.494***	0.336***	0.084
Health Sabah	-1.549	-2.086	-2.273	-13.483***	0.285***	0.054
Health Peninsular	-2.297	-1.966	-2.959	-13.500***	0.151**	0.079
Transport Sabah	-2.586	-9.935***	-2.309	-9.767***	0.182**	0.095
Transport Peninsular	-3.241*	-4.919***	-2.695	-11.203***	0.173**	0.103
Recreation services and culture Sabah	0.230	-2.997	-1.210	-12.932***	0.366***	0.044
Recreation services and culture Peninsular	-2.856	-2.478	-3.028	-13.069***	0.145*	0.138*
Miscellaneous goods and services Sabah	-3.723**	-11.831***	-2.360	-11.833***	0.198**	0.0441
Miscellaneous goods and services Peninsular	-2.947	-3.268*	-2.830	-13.428***	0.231***	0.051

Notes: The values are based on the AIC information criterion estimation. *, ** and *** are referred to 10%, 5% and 1% significance)

are calculated, suggesting a lag length order for every model. To detect the existence of a co-integrating relation, the Johansen maximum likelihood method provides both trace and maximum eigenvalue statistics to detect the existence of co-integrating vector (Risso, Punzo & Carrera, 2013)now, there are rich databases for carry on panel-data type of analyses. However, time series studies for specific countries may be more attractive and yield revealing results. For this reason, we study hereafter the long-run relationship between economic growth and income inequality in the case of Mexico. To this end, a time series of data for the Gini coefficients from Solt (2011.

Table 2 reports the results of the Johansen (1988) Maximum Likelihood (ML) tests for λ_{max} and the Trace test statistics. These estimated test statistics were adjusted by the Reinsel and Ahn (1992) scaling factor discussed by Cheung and Lai (1993). In this study, various lag lengths were attempted and the lag structures were chosen by the AIC. According to Cheung and Lai (1993), the trace test shows more robustness to both skewness and excess kurtosis in the residual than the

λ_{max} test. Majority of trace statistic for every model suggests that there is no co-integrating vector among all CPI groups except for "transport".

The evidence of co-integration leads to several important implications which carry the existence of a long-run relationship between two or more non-stationary time series. In other words, the co-movement is tested by examining the stability of deviations from the relationship (Yavuz 2014). If two time series were found to be co-integrated, the result would be consistent with the hypothesis that the time series possess a long-run relationship and that the disequilibrium error around that relationship partly accounts for subsequent movements in the two series (Bahmani-Oskooee, Chang & Lee 2016; Burgman & Geppert 1993). In this study, it is shown that all groups except for "transport" are not co-integrated; which define that factor of consumer prices possess a disequilibrium relationship. As for "transport", one co-integrating vector exists and can be interpreted as a long-run co-integrating relationship that exists between variables in Sabah and Peninsular Malaysia.

TABLE 2. Johansen Co-integration Test

Model	λ_{max}				Trace				Co-integrating vector
	$r = 0$	C.V at 5%	$r = 1$	C.V at 5%	$r = 0$	C.V at 5%	$r = 1$	C.V at 5%	
All items	8.878	19.387	4.009	12.518	12.887	25.872	4.009	12.518	No
Food and non-alcoholic beverages	7.952	14.264	3.249	3.8415	11.201	15.494	3.249	3.8415	No
Alcoholic beverages and tobacco	11.511	19.387	8.878	12.518	20.389	25.872	8.878	12.518	No
Clothing and footwear	10.755	19.387	4.077	12.518	14.831	25.872	4.077	12.518	No
Housing, water, electricity, gas and other fuels	10.347	19.387	1.999	12.518	12.346	25.872	1.999	12.518	No
Furnishings, household equipment and routine household maintenance	12.262	19.387	7.923	12.518	20.185	25.872	7.923	12.518	No
Health	11.478	19.387	5.428	12.518	16.907	25.872	5.429	12.518	No
Transport	45.570	19.387	6.775	12.518	52.345	25.872	6.775	12.518	1
Recreation services and culture	12.138	19.387	3.978	12.518	16.117	25.872	3.978	12.518	No
Miscellaneous goods and services	14.309	19.387	6.304	12.518	20.613	25.872	6.304	12.518	No

TABLE 3. Granger Pair-Wise Causality Test

Variable	Peninsular on Sabah (F-stat)	Sabah on Peninsular (F-stat)	Result
Food and non-alcoholic beverages	0.03772	2.34540	Both Peninsular and Sabah do not Granger Caused each other
Alcoholic beverages and tobacco	1.73835	3.45394	Both Peninsular and Sabah do not Granger Caused each other
Clothing and footwear	1.22369	0.73460	Both Peninsular and Sabah do not Granger Caused each other
Housing, water, electricity, gas and other fuels	1.40338	2.54583	Both Peninsular and Sabah do not Granger Caused each other
Furnishings, household equipment and routine household maintenance	1.50137	1.59461	Both Peninsular and Sabah do not Granger Caused each other
Health			Both Peninsular and Sabah do not Granger Caused each other
Recreation services and culture	1.11314	0.15877	Both Peninsular and Sabah do not Granger Caused each other
Miscellaneous goods and services	1.08667	3.20714	Both Peninsular and Sabah do not Granger Caused each other

Notes: The values are based on the AIC information criterion estimation. *, ** and *** are referred to 10%, 5% and 1% significance

3.   Granger Causality

The Granger causality approach employs an error correction mechanism to assess the extent to which current and past prices changes in one market explain price changes in another. Nevertheless, the analysis of co-integration does not explain something about causality. If two series are co-integrated, then Engle and Granger (1987) showed that they can be represented as an Error Correction Mechanism (ECM), as follows:

$$\Delta p_{i,t} = \gamma_0^i + \gamma_1^i p_{i.t-1} + \gamma_2^i p_{i.t-1} + \sum_{k=1}^{k=m_i} \delta_k^i \Delta p_{i,t-k} + \sum_{h=0}^{k=n_i} \emptyset_h^i \Delta p_{j,t-h} \qquad (3)$$

where Δ is the difference operator; m_i and n_i are the number of lags; and the γ, δ, and $\emptyset$ are parameters to be estimated. Causality from market j market i can then be tested as follows:

$$H_0: \gamma_2^i \neq 0; \emptyset_h^i = 0; h = 1,2,3\ldots n_i$$

Table 3 reports the results of the Granger pair-wise causality test consisting all other groups except for "transport" as it is the only group reported co-integrated in previous test.

Causality tests further reveal that Sabah price does not Granger-caused by the prices in Peninsular for all items, vice versa in the sense that their past values of prices are not important to predict what happens in the remaining markets. This indicates both prices in the Peninsular and Sabah are independently related and not affecting one and another.

QUALITATIVE FINDINGS

The quantitative findings of this research posited a lack of price co-movement between Peninsular Malaysia and Sabah for majority of the groups. The prices in both regions are also independent from one and another. However, the findings did not specifically single out the main factor that leads to the price differences between Peninsular Malaysia and Sabah. Therefore, this section specifically addresses the factors affecting the price disparity between Peninsular Malaysia and Sabah. The introduction of this paper has explained that the findings of this paper were discovered through interviews involving four stakeholders i.e. shipping provider/agency, port authority, government sector and special interest groups located in Peninsular Malaysia and Sabah. Table 4 presents the classification of stakeholders.

Price disparity has led to many other related issues such as political sentiments, conditions of port, trade imbalance, sluggish economic activities, as well as lack of accessibility from port to retailers, infrastructure and technical facilities. This is why many shippers are reluctant to berth at Sabah ports due to inefficiency and lack of standards in handling cargoes. However, the Sabah government and port operator dismiss this argument by defending that the issue of comparing the technicalities is not relevant due to the reason of development disparity in land infrastructure compared to Peninsular Malaysia thereby causing distribution problems for the goods landed at the port; most of the roads in Sabah are not well paved, which in turn causing other land transports to adapt to such state of condition.

Nevertheless, the issue of trade imbalance has been well agreed by all stakeholders due to the fact that only 30% of outputs are coming out from Sabah, thus leading to cost-inefficiency as higher cost needs to be covered by the shippers if there is nothing to be brought back to Peninsular Malaysia. In this case, majority of Sabah stakeholders believe that the sole cause of this problem is the lack of manufacturing and industrial activities. By stating a few examples, they are convinced that the lack of industrial activities should not have happened in the first place because the state is endowed with plenty of natural resources and geographically located at a strategic location that can support large economic activities in comparison to Peninsular Malaysia. This issue occurred mainly due to political reasons. Most of the stakeholders believe the reason is because most public policy decision makers are located in the Peninsular Malaysia, thus leading to biased perspectives.

TABLE 4. Classification of stakeholders

Stakeholders	Participated agencies
Shipping provider/agency	1. Malaysian Ship-owners Association (MASA) 2. Malaysian Institute of Maritime (MIMA) 3. Association of Marine Industries of Malaysia (AMIM)
Port authority	Port and Harbour Department, Sabah
Government sectors	1. Ministry of Transport (MOT) 2. Ministry of Development and Infrastructure, Sabah
Special interest group	Consumers Front of Sabah (CFOS)

When discussing about the effectiveness of the government's role in addressing the current challenge of maritime industry, the federal government concurred that there are still many things lacking in the country's policy and regulations compared to other developed nations. There are indeed some loopholes that to be fixed and streamlined if the vision to become a successful and thriving maritime nation is to be realised. In the support of such a phenomena, the shipping providers mentioned a few shipping companies that have already succumbed due to the tough environment and intense competition especially from international providers. This in turn questions the intended objective of the cabotage policy to protect the domestic shipping industry. The price disparity problem has tried to be addressed by the government for a few years now through several initiatives like *Kedai Rakyat 1Malaysia, Coop1Malaysia, Agrobazar Kedai Rakyat*, and *FAMA* stores. These at least help to ease the burden of many people, if not all, in the East part of Malaysia.

Through the interviews, the special interest group did not elaborate much on the issue such as cabotage policy and how it affected price hikes but instead the group indicated that the cabotage policy should be abolished as it promotes monopoly among domestic shipping providers. Although the port authority supports such claim, shipping providers and federal government suggests otherwise, citing various anti-profiteering measures that have been successful at curbing monopolistic behaviours. The group subsequently suggested that the price in Sabah should be standardised first before deliberately trying to regulate it nationwide.

Overall, this analysis indicates that the lack of appropriate regulation and execution measures causing the disarrangement in the industry needs to be addressed. On the other hand, other factors that directly affects price also needs to be addressed, in particular infrastructure development by bringing more industrial activities to Sabah so that they will not have to rely much on the outputs coming from the Peninsular Malaysia. This will further improve the trade imbalance. Other measures include improving transportation facilities, especially for land transport, to ensure seamless connectivity across towns, cities and different areas.

In summary, in addition to the issue of price disparity between Peninsular Malaysia and Sabah is related to numerous factors, there is a strong proof that the declining total fleet will result in the declining turnover and profit in the overall shipping industry. As such, in order to weather the foreign vessels off from the coast, it is equally imperative to provide an efficient regulation to accommodate the industry to ensure a sustainable number of fleets are available to support the domestic trading activities. Thus, less cargoes have to be carried by vessels from other countries, keeping the balance of payment intact for the future benefit of Sabah's economy.

Overall, the stakeholders' opinions on price disparity in Sabah mostly revolved around the cabotage policy and this can be summarised with the following quote from Interviewee A of MIMA about the trading process.

"...Not to mention that trade inequality because you know, if you were to assume that Peninsular Malaysia and Sabah and Sarawak as two different countries, there is trade imbalance in favour of Semenanjung Malaysia because Sabah and Sarawak need more. And also the nature of shipping itself such that most of our imports go to Port Klang and major port in Peninsular Malaysia before they are being fed to the smaller ports because the kind of container ships, the big ships cannot call that in port in Sabah and Sarawak. There are no direct service for the country for example like in Far East and also in Europe straight to Sabah and Sarawak ports because the facilities at the port are not capable to handle the big ships and also the trade..there is no enough cargo to generated for the ships to haul back. So, fortunately this is almost like the cast in stone and it is partly contributes to in addition of cabotage. Yes, I agree that cabotage needs to be addressed, maybe the imposition in cabotage shouldn't be too liberal in Malaysia, whereby the Ministry of Transport through Domestic Shipping Licensing board is always very..I would say very liberal in the interpretation of cabotage but at the same time we have to acknowledge that the local shipping companies do not have the adequate shipping capacity to carry most of our own trade."

As mentioned above, it is evident that the factors towards resistance in changes to price disparity are lack of manufacturing activities, lower rates offered by international freights and less financial support offered for shipping industry. Much discomfort were raised about the imbalance of industrial distribution centres between Peninsular Malaysia and Sabah as this issue further leads to the trade imbalance in Sabah. This accounts for 20% of the exports. An excerpt of the conversation with Interviewee X of Port and Harbour Department, Sabah is a proof of this matter.

"Yeah… because as far as you are not having the backload you will not achieve anything. You can have a high vision, but you don't have the backload. As long as there is no intention from the Federal Government to move all industries located in Shah Alam coming here (Sabah), then we shall bid good bye lah. You can have a big port but without backload. And you will have a problem with direct ship calls for the next 100 years! Until all these government are changed! Or these visions are changed! Why all must be in Shah Alam, is there no more remaining land here?! We have so much land left, you must remember, Selangor is only as big

as Kinabatangan! (As for) Kinabatangan, only one guy holds the whole constituent! So why there is this mentality, why not the government gives fairly between Peninsular and Sabah and Sarawak when we are actually equal partners. So this kind of attitude is not being practice now. That's the problem. That's why we are losing on our contract of oil and gas."

As for freight rate offered, certain stakeholders do not believe this to be the case so long as it can benefit both charterers and shippers. However, certain quarters are confident that this issue is the factor that spawned the formation of cartel, for example another opinion given by Interviewee Y of MOT reiterated this issue as non-evident.

"...under Malaysia Competition Commission, we have My Competition Act 2010...but in Europe there is a competition act as well. Who did the cartel, will get whipped! So, that thing is not an issue. The cartel issue is not there in the first place. Even in Malaysia, they will not survived. Who colludes to raise the price, if found guilty, will definitely put under charge."

However, countering the above statement, again the Interviewee Y of Port and Harbour Department, Sabah pointed out the reality of this issue.

"I take one example lah... Like us in Sabah we have XX and they have shipping and forwarding agent. They still survived until now. And then what they are doing? If you step in, they will reduce (the price), they will play.. until you already.. when they reduce, everyone goes to his place. .until you cannot survive, you close shop, they will raise the price back.. but, who make them?...... The existence is nothing to me but who made them?...... From the government lah. From domestic shipping license, shipping and forwarding agent.. who issue this is the one who creating the cartel. It should be shipping is one part.. forwarding is one part.. but if you give the shipping and forwarding agent.. they can have a ship.. they can have all, hence they control lah.."

Despite all of these issues, several initiatives have been taken to address the connectivity in Sabah and this includes the road network on Borneo Island connecting East Malaysia (i.e. Sabah and Sarawak) with Brunei known as Trans Borneo Highway which is a part of the Pan Borneo Highway development. The Malaysia's side of the project includes the length of the entire highway to be about 2,083 kilometres (1,294 miles). About 95.2% (997.18 kilometres or 619.62 miles) of the highway was completed in 2002 with the newest segment of the highway[10] is the Tenom–Sipitang section which was completed in 2006. According to plan, the entire Pan Borneo Highway is expected to be fully completed within the 9th Malaysia Plan period as the construction

of the final section from Kalabakan to Sepulut had already begun in 2008. However, as the construction of 786 km (for Sarawak) is targeted for completion by the end of 2021, as well as another 95 km currently in the planning stage[11], it seems that the highway project is still an on-going process.

In addition to that, one of the key focuses for the development of Sabah under the 11th Malaysia Plan 2016-2020 (11MP) is improving connectivity through infrastructure development. For that reason, other than the completion of Pan Borneo Highway, other projects were devised including the KK Bus Rapid Transit (BRT), long-term development of the Sabah Development Corridor (SDC), Light Rail Transit (LRT) system in Kota Kinabalu, and building a new railway line to connect north and east coasts of Sabah[12]; all to ensure a seamless and efficient inter-connection between every district and city in the future. Consequently, these projects are expected to give benefits not only to the public but also to precast potential product manufacturers to come and invest to Sabah.

Policy Implications

This study has examined the co-movement of price between Peninsular Malaysia and Sabah and determined the factors relevant to the higher price in East Malaysia (Sabah as the case sample), leading to the issue of price disparity between both regions. These expected factors help charterers to reconsider their choice in deciding and identifying their potential shippers so that more local shippers are given the opportunity to carry domestic exports instead of the foreign ones. Similarly, shipping companies should be better equipped with cutting-edge technologies and more vessels, and at the same time evaluating the freight rate offered to the exporters. The findings of this study also serve as a guideline for port authorities in improving the services offered and infrastructure, especially in East Malaysia. On the other hand, the government could also consider setting up insurance schemes to the shippers and employees working at the port, as well as providing better financial plans to attract more locals to work in this industry without the need of finding external assistance as currently practiced.

In short, the findings are expected to strengthen suppliers' ability to find solutions to meet consumer demand for goods in East Malaysia more effectively. This will assist for a better supply chain system employed by suppliers and provide better risk management associated with moral hazard, fraud, and abuses. In addition, the qualitative analysis used in this study could aid as a guidance for key players to help in composing schemes to better furnish the domestic trade in Malaysia.

CONCLUSION

This study is driven by the motivation to examine the price disparity between Peninsular Malaysia and Sabah by examining both quantitative and qualitative measures of research analysis. In order to provide further understanding on the co-movement of price between Peninsular Malaysia and Sabah, several tests were conducted involving nine groups of CPIs in the span of 11 years on a monthly basis, starting from 2004 until 2015. Overall, it was found that there is a lack of co-movement recorded among all groups except for transport. Similarly, the Granger pair-wise causality test showed that both Peninsular and Sabah do not Granger-caused each other, hence indicating that all prices in both regions are independent on one over the other.

As a consequence, the qualitative part is incorporated to address the main factor which leads to the price differential between Peninsular Malaysia and Sabah. With that, several stakeholders were interviewed and based on their feedback, the root cause of the issue is narrowed down. Generally, the issue of price disparity between Peninsular Malaysia and Sabah can be linked with various factors including the condition of ports, the existence of trade imbalance, sluggish economic activities, lack of accessibility from port to retailers, poor infrastructure and technical facilities and political sentiments; notwithstanding the issue of cabotage policy.

Nonetheless, the issue on price determination could not be solely referred to the trade, industry or labour policies alone as the consumer's market price itself constitutes many contributing factors including the current economic situation, policy enforcement, subsidy rationalisation or socio-economic issues. Therefore, the dispute over the price stipulation between Peninsular Malaysia and Sabah must be studied in many other different angles to discover the real factors causing towards this issue while taking care of the public sentiment and their welfare.

NOTES

1. The Malay Mail, 21st Jan 2017: "Ministry: Government cannot control prices of all goods"
2. Daily Express, 27th March 2016: "Sabah's costly living and economic future"
3. The Star, 15th April 2015: "Plans for Sepanggar Port to be Transshipment Hub"
4. The Star, 8th March 2009: "Shipping rates not the only factor in high price of goods in Sabah and Sarawak"
5. The Star, 5th April 2014: "Leveraging on Logistics Strength"
6. Free Malaysia Today, 4th July 2014: "Free Sabah and Sarawak from Cabotage Policy"
7. https://www.academia.edu/3822380/Cabotage_Policy_a_Flash_in_the_Pan? (retrieved on 20th March 2018)
8. The cabotage policy sets out to restrict the operation of sea, air, or other transport services, within or into a particular country to that country's own transport services. Cabotage sea regulation aims to limit foreign trade cargo ship into domestic waters. Such protection policy determines that only Malaysian-owned shipping companies with vessels flying the Malaysian flag can conduct trade between ports in the country. It was abolished on 1st June 2017.
9. The Star, 10th July 2009: Move to address trade imbalance.
10. Borneo Post, 12th Dec 2016: Pan Borneo Highway a game changer for Sabah
11. http://www.panborneo.com.my/, retrieved on 24th May 2017
12. The Star, 19th Dec 2016: RM16bil Pan Borneo Highway jobs awarded

REFERENCES

Adriani, F., & Deidda, L. G. 2011. Competition and the signaling role of prices. *International Journal of Industrial Organization* 29(4): 412–425.

Aguiar, D., & Santana, J. 2002. Asymmetry in farm to retail price transmission: evidence from Brazil. *Agribusiness* 18(1): 37–48.

Alexandridis, G., Antypas, N., Gulnur, A., Visvikis, I. 2020. Corporate financial leverage and M&As choices: Evidence from the shipping industry. *Transportation Research Part E* 133: 1-19.

Badiane, O., & Shively, G. E. 1998. Spatial integration, transport costs, and the response of local prices to policy changes in Ghana. *Journal of Development Economics* 56(2): 411–431.

Bahmani-Oskooee, M., Chang, T., & Lee, K.-C. 2016. Purchasing power parity in emerging markets: A panel stationary test with both sharp and smooth breaks. *Economic Systems* 40(3): 453–460.

Burgman, T. a., & Geppert, J. M. 1993. Factor price equalization: a cointegration approach. *Weltwirtschaftliches Archiv* 129(3): 472–487.

Cheung, Y. W., & Lai, K.S. 1993. Long run purchasing power parity during the recent float. *Journal of International Economics* 34: 181–192.

Cheung, K-F., Bell, M. G. H., Pan, J. J., Perera, S. 2020. An eigenvector centrality analysis of world container shipping network connectivity. *Transportation Research Part E* 140: 1-21.

Cho, H. 2014. Determinants and Effects of Logistics Costs in Container Ports : The Transaction Cost Economics Perspective G. *The Asian Journal of Shipping and Logistics* 30(2): 193–215.

Dinwoodie, J., Tuck, S., & Rigot-Müller, P. 2013. Maritime oil freight flows to 2050: Delphi perceptions of maritime specialists. *Energy Policy* 63: 553–561.

Dong, B., Christiansen, M., Fagerholt, K., & Bektaş, T. 2020. Combined maritime fleet deployment and inventory

management with port visit flexibility in roll-on roll-off shipping. *Transportation Research Part E* 140: 1-14.

Duy, L. B., & Minh, N. V. T. 2020. Utilization of a deep learning-based fuel consumption model in choosing a liner shipping route for container ships in Asia. *The Asian Journal of Shipping and Logistic*s: 1-11.

El Ouardighi, F., & Kim, B. 2010. Supply quality management with wholesale price and revenue-sharing contracts under horizontal competition. *European Journal of Operational Research* 206(2): 329–340.

Engle, R. F. & Granger, C. W. J. 1987. Co-integration and Error-Correction: Representation, Estimation and Testing. *Econometrica* 55(1): 251-276.

Ghali, K., & El-Sakka, M. 2004. Energy use and output growth in Canada: a multivariate cointegration analysis. *Energy Econ* 26 (2): 225–238.

Gu, Y., Dong, X., & Che, Z. 2020. The relation between the international and China shipping markets. *Research in Transportation Business & Management* 34: 1-5.

Holloway, G. 1991. The Farm-Retail Price Spread in an Imperfectly Competitive Food Industry. *Amer. J. Agr. Econ* 1975(4): 399-409.

Huang, L., Lasserre, F., Pic, P., & Chiu, Y. Y. 2020. Opening up the Chinese shipping market 1988–2018: The perspective ofChinese shipping companies facing foreign competition. *Asian Transport Studies* 6: 1-11.

Johansen, S. 1988. Statistical analysis of cointegration vectors'. *Journal of Economic Dynamics and Control* 12: 231-54.

Khalid, N., Ang, M., & Hasan, E. C. A. 2010. Incentives for the development of Malaysia's merchant shipping and port sectors: 1-9.

Kavussanos, M. G., & Alizadeh-M, A. H. 2001. Seasonality patterns in dry bulk shipping spot and time charter freight rates. *Transportation Research Part E: Logistics and Transportation Review* 37(6): 443–467.

Khalid, N. 2011. The cabotage conundrum. *SEA VIEWS* 7(2012): 1-5.

Kinnucan, H. W., & Forker, O. D. 1987. Asymmetry in Farm-Retail Price Transmission for Major Dairy Products. *American Journal of Agricultural Economics* 69(2): 285.

Ko, B. W. 2013. Analysis of term structure in dry bulk freight market. *Asian Journal of Shipping and Logistics* 29(1): 1–22.

Koekebakker, S., Adland, R., & Sødal, S. 2007. Pricing freight rate options. *Transportation Research Part E: Logistics and Transportation Review* 43(5): 535–548.

Lee, E. S. 2019. Improving a Firm's Performance within a Strategic Shipping Alliance. *The Asian Journal of Shipping and Logistics* 35(4): 213-219.

Li, Y., & DaCosta, M. N. 2013. Transportation and income inequality in China: 1978-2007. *Transportation Research Part A: Policy and Practice* 55(1): 56–71.

Li, X., Otsuka, N., Brigham, L. W. 2020. Spatial and temporal variations of recent shipping along the Northern Sea Route. *Polar Science:* 1-15.

Lindsey, C., Mahmassani, H. S., Mullarkey, M., Nash, T., & Rothberg, S. 2014. Regional logistics hubs, freight activity and industrial space demand: Econometric analysis. *Research in Transportation Business and Management* 11: 98–104.

Lindstad, H., Asbjørnslett, B. E., & Strømman, A. H. 2012. The importance of economies of scale for reductions in greenhouse gas emissions from shipping. *Energy Policy* 46: 386–398.

Liu, B., Keyzer, M., van den Boom, B., & Zikhali, P. 2012. How connected are Chinese farmers to retail markets? New evidence of price transmission. *China Economic Review* 23(1): 34–46.

Ma, Y., Chang, D., Wang, H., & Tang, M. 2019. Optimal Shipping Path Algorithm Design for Coastal Port. *Procedia Computer Science* 162: 375-382.

Maitra, D., Chandra, S. & Dash, S. R. 2020. Liner shipping industry and oil price volatility: Dynamic connectedness and portfolio diversification. *Transportation Research Part E* 138: 1-33.

Márquez-Ramos, L., Martínez-Zarzoso, I., Pérez-García, E., & Wilmsmeier, G. 2011. Special Issue on Latin-American Research Maritime Networks, Services Structure and Maritime Trade. *Networks and Spatial Economics* 11(3): 555–576.

Méndez, J. L., Oubiña, J., & Rubio, N. 2008. Expert quality evaluation and price of store vs. manufacturer brands: An analysis of the Spanish mass market. *Journal of Retailing and Consumer Services* 15(3): 144–155.

Meng, Q., Wang, T., & Wang, S. 2012. Short-term liner ship fleet planning with container transshipment and uncertain container shipment demand. *European Journal of Operational Research* 223(1): 96–105.

Meyer, J. & Cramon-Taubadel, S. 2004. Asymmetric price transmission: A survey. *Journal of Agricultural Economics* 55(3): 581–611.

Moon, D. S.-H., & Woo, J. K. 2014. The impact of port operations on efficient ship operation from both economic and environmental perspectives. *Maritime Policy & Management* 41(5): 444–461.

Msakni, M. K., Fagerholt, K., Meisel, F., Lindstad, E. 2020. Analyzing different designs of liner shipping feeder networks: A case study. *Transportation Research Part E, 134*, 1-17.

MIMA Bulletin. 2012. Alternatives to the Straits of Malacca and Singapore: Routes Through the Indonesian Archipelago 19(2): 37-43.

Nair, R. 2012. External constraint on scheduled container liner shipping operations : A view from economic regulation in european union. *Asian Journal of Shipping and Logistics* 28(3): 279–300.

Puckett, S. M., Hensher, D. a., Brooks, M. R., & Trifts, V. 2011. Preferences for alternative short sea shipping opportunities. *Transportation Research Part E: Logistics and Transportation Review* 47(2): 182–189.

Qua, S., Zhou Y., Zhang, Y., Wahab, M. I. M., Zhang, G., Ye Y. 2019. Optimal strategy for a green supply chain considering shipping policy and default risk. *Computers & Industrial Engineering* 131: 172-186.

Raza, Z. 2020. Effects of regulation-driven green innovations on short sea shippinǵs environmental and economic performance. *Transportation Research Part D* 84: 1-12.

Risso, W. A., Punzo, L. F., & Carrera, E. J. S. 2013. Economic growth and income distribution in Mexico: A cointegration exercise. *Economic Modelling* 35: 708–714.

Russo, F., & Musolino, G. 2013. Estimating demand variables of maritime container transport: An aggregate procedure

for the Mediterranean area. *Research in Transportation Economics* 42(1): 38–49.

Schaefer, N., & Barale, V. 2011. Maritime spatial planning: Opportunities & challenges in the framework of the EU integrated maritime policy. *Journal of Coastal Conservation* 15: 237–245.

Shahiduzzaman, M., & Alam, K. 2012. Cointegration and causal relationships between energy consumption and output: Assessing the evidence from Australia. *Energy Economics* 34(6): 2182–2188.

Sheng, L. 2014. Theorizing income inequality in the face of financial globalization. *Social Science Journal* 2014(1): 1-10.

Stern, D.I. 2000. A multivariate cointegration analysis of the role of energy in the US macroeconomy. Energy *Econ.* 22: 267–283.

Stock, J. H., & Watson, M.W. 1988. Testing for common trend. *Journal of the American Statistical Association,* 83: 1097–1107.

Sun, L., Rangarajan, A., Karwan, M. H., & Pinto, J. M. 2015. Transportation cost allocation on a fixed route. *Computers & Industrial Engineering* 83(February): 61–73.

Tan, R., Duru, O., & Thepsithar, P. 2020. Assessment of relative fuel cost for dual fuel marine engines along major Asian container shipping routes. *Transportation Research Part E* 140: 1-15.

Theofanis, S., & Boile, M. 2009. Empty marine container logistics: Facts, issues and management strategies. *GeoJournal* 74(1): 51–65.

Tierney, K., Áskelsdóttir, B., Jensen, R. M. & Pisinger, D. 2014. Solving the Liner Shipping Fleet Repositioning Problem with Cargo Flows. *Transportation Science* 7555(1)*:* 1-16.

Tinoco, S. V. P., Creemers, S., & Boute, R. N. 2017. Collaborative shipping under different cost-sharing agreements. *European Journal of Operational Research* 263(3): 827-837.

Trapp, A. C., Harris, I., Rodrigues, V. S., & Sarkis, J. 2020. Maritime container shipping: Does coopetition improve cost and environmental efficiencies? *Transportation Research Part D: Transport and Environment* 87: 1-15.

Veenstra, A. W. 2005. Empty container reposition: The port of Rotterdam case. *Managing Closed-Loop Supply Chains*: 65–76.

von Cramon-Taubadel, S. 1998. Estimating asymmetric price transmission with the error correction representation: An application to the German pork market. *European Review of Agricultural Economics*, 25(1998): 1–18.

Wagner, S. M., Grosse-Ruyken, P. T., & Erhun, F. 2012. The link between supply chain fit and financial performance of the firm. *Journal of Operations Management* 30(4): 340–353.

Wang, S., Gao, S., Tan, T., & Yang W. 2019. Bunker fuel cost and freight revenue optimization for a single liner shipping service. *Computers and Operations Research* 111: 67–83.

Wang, J., Ge, C., Yang, Z., Hyer, E. J., Reid, J. S., Chew, B.-N., Mahmud, M., Zhang, Y., & Zhang, M. 2013. Mesoscale modeling of smoke transport over the Southeast Asian Maritime Continent: Interplay of sea breeze, trade wind, typhoon, and topography. *Atmospheric Research* 122: 486–503.

Wang, L., & Bae, S. M. 2020. How to avoid the free shipping pitfall? Changing consumer attitudes from the perspective of information interaction. *Electronic Commerce Research and Applications* 42: 1-38.

Wang, J., Liu, J., & Zhang, X. 2020. Service purchasing and market-entry problems in a shipping supply chain. *Transportation Research Part E: Logistics and Transportation Review* 135: 1-24.

Wang, Y., Meng, Q., Jia, P. 2019. Optimal port call adjustment for liner container shipping routes. *Transportation Research Part B* 128: 107–128.

Warr, B., & Ayres, R.U. 2009. *The Economic Growth Engine: How Energy and Work Drive Material Prosperity*. Edward Elgar Publishing, Cheltenham, Northampton.

Wilmsmeier, G., & Notteboom, T. 2011. Determinants of liner shippping network configuration: A two-region comparison. *GeoJournal* 76(3): 213–228.

Wu, Y.-C. J., & Goh, M. 2010. Container port efficiency in emerging and more advanced markets. *Transportation Research Part E: Logistics and Transportation Review* 46(6): 1030–1042.

Xiao, T., & Yu, G. 2006. Supply chain disruption management and evolutionarily stable strategies of retailers in the quantity-setting duopoly situation with homogeneous goods. *European Journal of Operational Research* 173(2): 648–668.

Yao, Z., Leung, S. C. H., & Lai, K. K. 2008. Manufacturer's revenue-sharing contract and retail competition. *European Journal of Operational Research* 186(2): 637–651.

Yavuz, N. Ç. 2014. CO_2 Emission, Energy Consumption, and Economic Growth for Turkey: Evidence from a Cointegration Test With a Structural Break. *Energy Sources, Part B: Economics, Planning, and Policy*, 9(3): 229–235.

Siti Marsila Mhd Ruslan
Faculty of Maritime Studies
Universiti Malaysia Terengganu
21030 Kuala Nerus
MALAYSIA
E-mail: sitimarsila@gmail.com; s.marsila@umt.edu.my

Kasypi Mokhtar*
Faculty of Maritime Studies
Universiti Malaysia Terengganu
21030 Kuala Nerus
MALAYSIA
E-mail: kasypi@umt.edu.my

*Corresponding author