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## **Is There Any Regional Price Disparity in Peninsular Malaysia?**

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## IS THERE ANY REGIONAL PRICE DISPARITY IN PENINSULAR MALAYSIA?

LEE CHIN<sup>1</sup>

**ABSTRACT** – This study examines whether there are significant differences in prices across four regions in Peninsular Malaysia, namely Northern, Central, Southern, and Eastern Peninsular Malaysia. Disaggregate monthly consumer price indices for twelve types of goods and services from July 2010 to February 2013 were analyzed. Based on the Levin and Lin (1993) panel unit root test, this study found statistical evidence of price convergence among the four zones for two-thirds of the price groups. Most importantly, price convergence exists for three major consumers' expenditures items: Food and Non-Alcoholic Beverages; Housing, Water, Electricity, Gas and Other Fuels; and Transport. Indeed, these eight price groups that converged comprised 83.6% of total consumer expenditures. Evidence of price convergence among these price groups suggests that Peninsular Malaysia markets are highly integrated. In addition, this study found that the half-life for the tradable goods is roughly 2-3 months and for nontradable goods about 5-10 months. These findings indicate that tradable goods prices adjust more rapidly than nontradable goods do.

**Keywords:** regional price disparity, price convergence, half-life, speed of adjustment, panel unit root test

### INTRODUCTION

Malaysia is a country located in Southeast Asia. It has a total landmass of 329,847 km<sup>2</sup> separated by the South China Sea into two regions, Peninsular Malaysia and East Malaysia<sup>2</sup> (Figure 1). Peninsular Malaysia contains roughly 40 percent of its land area and East Malaysia 60 percent. According to World Development Indicators<sup>3</sup>, in 2012 the population of Malaysia was about 29.2 million, with 23.5 million (roughly 80%) living in Peninsular Malaysia. Peninsular Malaysia is generally more economically developed and home for the majority of Malaysia's population. Within Peninsular Malaysia, the West Coast is more developed, urbanized, and separated from the more rural East Coast by a mountain range - the Titiwangsa. Peninsular Malaysia can be divided into four regions, namely Northern Region, Central Region and Southern Region on the West Coast and Eastern Region on the East Coast of Peninsular Malaysia<sup>4</sup>.

The capital city Kuala Lumpur and the federal administrative centre Putrajaya are located in the Central Region of Peninsular Malaysia. The Central Region is the fastest growing region with a gross domestic product (GDP) of RM 290 billion (roughly USD 92 billion) in 2012 making up 39% of

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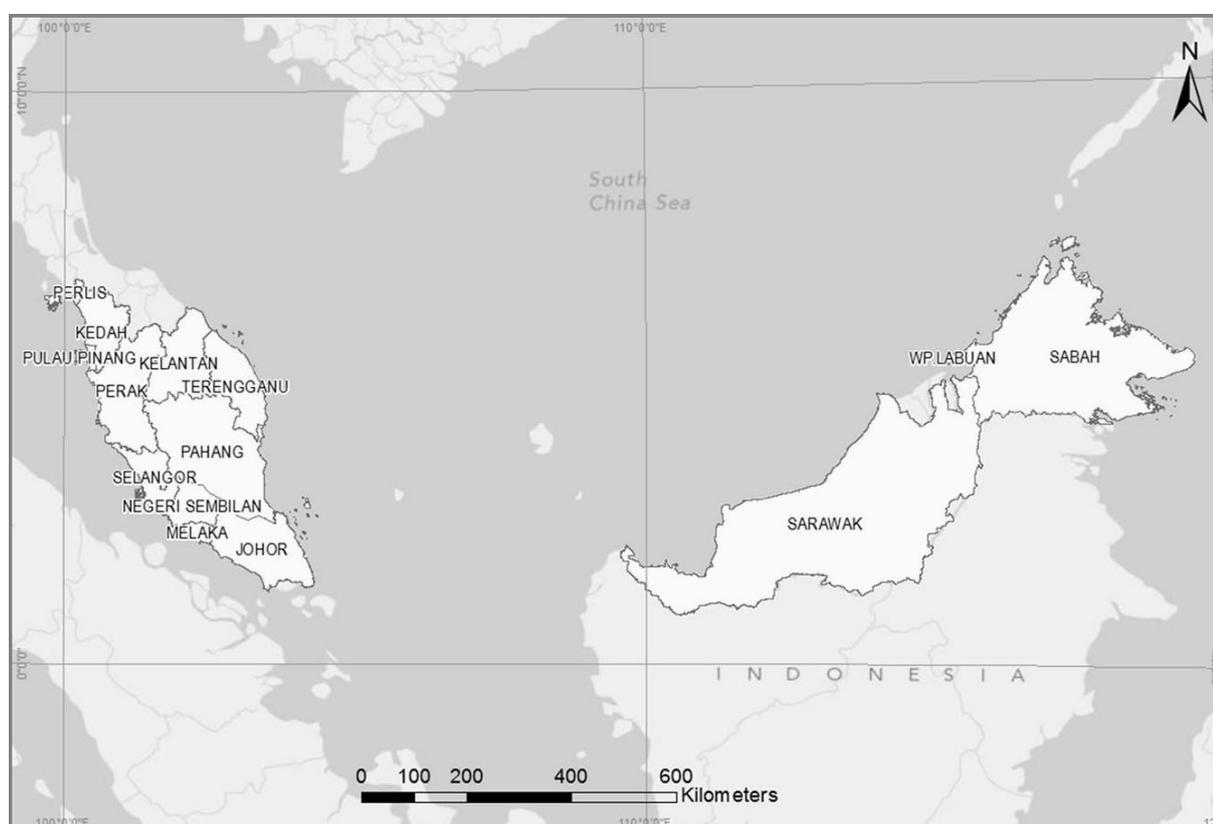
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<sup>2</sup> Peninsular Malaysia consists of the following 11 states and two federal territories: Perlis, Kedah, Pulau Pinang, Perak, Selangor, Melaka, Negeri Sembilan, Johor, Pahang, Kelantan, Terengganu, the Federal Territory of Kuala Lumpur and the Federal Territory of Putrajaya. East Malaysia consists of the states of Sabah and Sarawak, and the Federal Territory of Labuan.

<sup>3</sup> The World Bank. Retrieved 23 June 2014.

<sup>4</sup> The Northern Region of Peninsular Malaysia covers the states of Perlis, Kedah, Pulau Pinang, and Perak; the Central Region covers the state of Selangor, the Federal Territory of Kuala Lumpur and the Federal Territory of Putrajaya; the Southern Region covers the states of Melaka, Negeri Sembilan, and Johor; and the Eastern Region covers the states of Pahang, Kelantan, and Terengganu.

the total GDP of Malaysia<sup>5</sup>. This region also has the highest population density and the most developed infrastructure. It contains Malaysia's biggest airport - the Kuala Lumpur International Airport (KLIA) and the largest seaport in the country - Port Klang. Due to its strategic location and the government's policy to developed Port Klang into the National Load Centre, almost half of Malaysia's container trade is handled by this seaport, which is located 38 km away from Kuala Lumpur (Khalid, 2006; Suffian et al., 2013). Since most of the goods enter the country through KLIA and Port Klang, it is generally believed that the price of goods in East Coast and East Malaysia is more expensive than in West Coast (Suffian et al., 2013; Babar et al., 2005). However, we cannot simply make judgement without considering other factors. The advantages of lower cost of transportation in Central Region may be offset by higher cost of doing business here. Generally, the rentals and wages in Central Region are relatively higher than other parts of Malaysia<sup>6</sup>. Furthermore, Central Region is linked to the rest of Malaysia by comprehensive air, road and rail connections. Therefore, distributions of goods to other parts of Malaysia can be done relatively fast and easy. Hence, goods in other parts of Malaysia are not necessary more expensive.



**Figure 1.** *Peninsular Malaysia and East Malaysia*

Source: Hazrin et al., 2013, p. 2015

The issue of regional price disparity shall be examined empirically. Price disparity between Peninsular Malaysia and East Malaysia is well documented by Lee and Habibullah (2008). They found evidence of price convergence for 5 price groups and evidence of price divergence for 4 types of goods and services. However, there has been no study to date that compares the consumer prices

<sup>5</sup> Gross Domestic Product (GDP) by State in 2012. Department of Statistics, Malaysia. Retrieved 30 June 2014.

<sup>6</sup> Mean and median monthly salaries and wages by state and sex, Malaysia, 2012. Department of Statistics, Malaysia. Retrieved 3 July 2014.

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between the various regions within Peninsular Malaysia. It is uncertain whether regional price disparity exists across regions within Peninsular Malaysia.

To document these potential differences systematically, this study examines in detail whether there are significant differences in price level across specific regions in Peninsular Malaysia by testing the consumer price indices convergence for typical types of goods and services. Specifically, the study seeks to identify whether relative price indices in Peninsular Malaysia share a common trend and basis, and if so, how quickly do these prices revert to that trend following a local price shock?

The current paper differs from Lee and Habibullah's study (2008), focused on intranational price convergence in Malaysia, in several respects:

First, this study employs the latest consumer price index (CPI) classification where items are classified based on the Classification of Individual Consumption According to Purpose (COICOP). Lee and Habibullah (2008) used data prior to 2006 when items in the CPI basket of Malaysia were classified according to the Classification of Household Goods & Services (CHGS).<sup>7</sup>

Secondly, this study examines the disaggregate price data of Peninsular Malaysia by regions namely Northern, Central, Southern, and Eastern Peninsular Malaysia. This is the first study that has examined price convergence across these 4 regions in Peninsular Malaysia. Lee and Habibullah (2008) analyzed price convergence across Peninsular Malaysia, Sabah and Sarawak only.

Finally, this study utilizes the latest data available for 4 regions in Peninsular Malaysia spanning July 2010 to February 2013. Lee and Habibullah (2008) employed data only until 2005.

The outline of the paper is as follows. Section 2 discusses the Consumer Price Index (CPI) measurement in Malaysia. Section 3 briefly presents the theory on the evidence of price convergence. Section 4 introduces the research method and describes the data. Section 5 reports the results of econometric analysis and discusses the findings. Finally, Section 6 concludes with a discussion of limitations and suggestions for future research.

### **THE MALAYSIAN CONSUMER PRICE INDEX (CPI)**

The Consumer Price Index (CPI) measures the percentage change over time for the cost of purchasing a constant basket of goods and services that represent the average pattern of purchases made by a particular population group during a specified period. CPI Malaysia is calculated based on the international standard and procedures known as the Laspeyres formula. Table 1 presents the basket of goods and services included in the CPI, together with their weights for the calculation of CPI Malaysia. Prior to 2006, the items in this basket of goods and services were classified using the Classification of Household Goods & Services (CHGS) and the 9 main product groups were: Food; Beverages and Tobacco; Clothing and Footwear; Gross Rent, Fuel & Power; Furniture, Furnishing & Household; Equipment and Operation; Medical Care and Health Expenses; Transport and Communication; Recreation, Entertainment, Education and Cultural Services; and Miscellaneous Goods and Services.

Commencing January 2006, these items were classified based on the Classification of Individual Consumption According to Purpose (COICOP) in the following 12 main groups: Food and Non-Alcoholic Beverages; Alcoholic Beverages and Tobacco; Clothing and Footwear; Housing, Water, Electricity, Gas and Other Fuels; Furnishing, Household Equipment and Routine Household Maintenance; Health; Transport; Communication; Recreation Services and Culture; Education; Restaurants and Hotels; and Miscellaneous Goods and Services (Department of Statistics Malaysia, n.d.).

In summary, three major changes occurred. First, the item of Transport and Communication in CHGS is separated to two different items: Transport; and Communication in COICOP. Second, Recreation, Entertainment, Education and Cultural Services is separated to Recreation Services and Culture; and Education. Third, a new category, namely, Restaurants and Hotels was created.

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<sup>7</sup> There are only 9 price groups in CHGS, but 12 price groups in the COICOP. The COICOP classification is thus more detailed. For example, Education is separated from Recreation Services and Culture, which provides more useful segregated information on consumer expenditures.

The expenditure for each item in the basket of goods and services compared to the total expenditure is designated the relative importance of each item. This relative importance reflects the weight of each particular item in the CPI basket. The effect on price changes for a particular item depends on the weighting of that item for the total expenditure of consumers. According to CHGS, Food; Gross Rent, Fuel & Power; and Transport & Communication are the three major consumer expenditures and comprise 75% of total expenditure (Table 1).

**Table 1. Weights in Consumer Price Index for Malaysia**

<b>Classification of Household Goods &amp; Services (CHGS)</b>	<b>Weights (%)</b>	<b>Classification of Individual Consumption According to Purpose (COICOP)</b>	<b>Weights (%)</b>
Food	33.8	Food & Non-Alcoholic Beverages	30.3
Beverages & Tobacco	3.1	Alcoholic Beverages & Tobacco	2.2
Clothing & Footwear	3.4	Clothing & Footwear	3.4
Gross Rent, Fuel & Power	22.4	Housing, Water, Electricity, Gas & Other Fuels	22.6
Furniture, Furnishings & Household Equipment	5.3	Furnishings, Household Equipment & Routine Household Maintenance	4.1
Medical Care & Health Expenses	1.8	Health	1.3
Transport & Communications	18.8	Transport	14.9
		Communication	5.7
Recreation, Entertainment, Education & Culture Service	5.9	Recreation Services & Culture	4.6
		Education	1.4
		Restaurants & Hotels	3.2
Miscellaneous Goods & Services	5.5	Miscellaneous Goods & Services	6.3
<b>Total (All Items)</b>	<b>100.0</b>	<b>Total (All Items)</b>	<b>100.0</b>

Source: Ministry of Finance (n.d. a and b)

Further, these three groups, Food and Non-Alcoholic Beverages; Housing, Water, Electricity, Gas and Other Fuels; and Transport remained as the three major consumer' expenditures in the COICOP, which comprise 68% of total expenditures. The main group Food and Non-Alcoholic Beverages carried the highest weighting at 30.3%, followed by Housing, Water, Electricity, Gas and Other Fuels at 22.6% and Transport at 14.9%, respectively.

### **PRICE CONVERGENCE: THE THEORY AND THE EVIDENCE**

The studies of price convergence are closely related to studies on the law of one price (LOP) and purchasing power parity (PPP). The law of one price establishes that the price of goods should equalize between different economic areas. For the good  $j$  this law implies that the ratio of relative prices  $P_{RELj}$  is equal to 1:

$$P_{RELj} = P_1^j / P_2^j = 1 \quad (1)$$

where the subscripts 1 and 2 refer to countries or regions<sup>8</sup>. For further convenience in this current analysis, it is preferable to specify the PPP in logarithmic terms as follows:

$$PPP: \ln(P_{RELj}) = \ln P_1^j - \ln P_2^j = 0 \quad (2)$$

<sup>8</sup> The law of one price is typically defined for economic areas with different currencies. In this case, the price level for country 2, the 'foreign' country is specified in terms of the domestic currency  $P_2 = EP_1$ , where  $E$  is the nominal exchange rate.

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The law of one price usually fails to hold, as documented by Isard (1977) and Giovannini (1988). The existence of tariffs, nominal exchange rates (between countries) or transportation costs sets a wedge between the prices of the same products in different countries. However, more recent evidence studied the law of one price within countries (i.e. within a monetary union), thus eliminating the effects of tariffs and nominal exchange rates (Engel, Rogers, 1996; Parsley, Wei, 1996), and thus, deviations from the law of one price should not persist.

In fact, there is a wide consensus that the PPP hypothesis should be more easily satisfied at the intranational level than when it is analyzed at an international level. Among the reasons for PPP to hold at intranational level are higher markets integration, the absence of trade barriers like tariffs and quotas, and the absence of an exchange rate volatility within a country. In addition, price indices within a country are expected to be more homogeneous than price indices between countries since those price indices within a country are collected by the same statistical institution and the basket of goods is thus more homogeneous.

In recent years, there has been an increasing amount of literature on the issue of price convergence across internal regions within a single economy. However, most of the empirical evidence on intranational price convergence has focused on cities in North America, such as those in the United States, Canada, and Mexico. For example, Tootell (1992), Parsley and Wei (1996), Engel and Rogers (2001), Chen and Devereux (2003), Cecchetti et al. (2005), Sonora (2008), Chmelarova and Nath (2009) and Rangkakulnuwat et al. (2011) focused on cities in the United States. Ceglowski (2003) and Li and Huang (2006) looked at Canadian cities; Sonora (2005) studied Mexico cities, while Engel and Rogers (1996) and Jenkins (1997) examined both the United States and Canadian cities.

There is fewer empirical studies that address intranational price convergence on other geographical areas. Several studies were devoted to intranational price convergence in the Asian region. Esaka (2003), Nagayasu and Inakura (2009) examined whether consumer price indices convergence exist between major Japanese cities. Esaka (2003) looked at 13 prices for 7 Japanese cities while Nagayasu and Inakura (2009) used aggregate CPI for 47 Japan cities. Further, Morshed et al. (2006) analyzed the aggregate CPI convergence for 25 Indian cities; Oh and Han (2009) studied the price convergence for 13 prices in 6 Korea cities; Lee and Habibullah (2008) examined 9 disaggregate price convergences among 3 regions in Malaysia; and Woo and Lee (2009) investigated the aggregate CPI convergence for 29 regions in China. Similar published work on other geographical areas includes Carrion et al. (2004) for aggregate CPI for 50 Spanish cities, and Chaudhuri and Sheen (2004) for 8 goods or services across 7 major Australian cities.

There is only one study on intranational price convergence in Malaysia, namely that of Lee and Habibullah (2008). The authors analyzed the price convergence for Peninsular Malaysia, Sabah, and Sarawak for 9 types of price groups for the period 1990-2005. By employing a panel unit root test, they found evidence of price convergence for 5 groups and price divergence for 4 goods and services. Although Peninsular Malaysia, Sabah and Sarawak are in one country, as claimed by Lee and Habibullah (2008), the South China Sea that separates Sabah and Sarawak from Peninsular Malaysia does matter for the price disparity. Therefore, this study assesses whether there is price disparity within Peninsular Malaysia, namely between Northern, Central, Southern, and Eastern regions.

### METHODOLOGY AND DATA

The analysis of this study proceeded as follows. First, we are interested in whether relative prices between the regions studied are unit-root processes. That is to say, we ask whether the relative prices between regions contain a unit root, under which they will then diverge from one another. The alternative hypothesis in our statistical tests asks whether the level of relative prices in various regions converges into a steady-state value over the long run. For this purpose, we conducted a Levin and Lin (LL) panel unit root test on the relative prices or real exchange rates,  $q_{i,t}$

$$q_{i,t} = \ln(P_{i,t}/P_{0,t}) \quad (3)$$

where  $P_{i,t}$  is the consumer price index (CPI) for zone  $i$  and  $P_{0,t}$  is the CPI for the numerarie region.<sup>9</sup> If the unit root hypothesis cannot be rejected, we will conclude that intranational price convergence is rejected by the data. In this event, the price level of different regions will tend to diverge over time. Hence, regional price disparity exists. To the contrary, if the relative price is a mean reverting process, a tendency exists for the price level to return to its equilibrium parity path. We will then conclude that the relative prices converge to a steady-state value over the long run. Hence, regional price disparity does not exist.

Second, having obtained evidence that relative prices converge across regions, we are then interested in the speed of converge based on the persistence parameters: the  $\rho_i$ . Following Cecchetti et al. (2002), the approximate half-life of a shock to  $q_{i,t}$  is computed as:

$$\text{half-life} = -\ln(2)/\ln(\rho_i) \quad (4)$$

Our data source is the Department of Statistics Malaysia. Monthly disaggregate CPI for the twelve main groups spanning July 2010 to February 2013 for 4 regions of Peninsular Malaysia, namely Northern, Central, Southern, and Eastern Peninsular Malaysia were used in this analysis.

### THE ECONOMETRIC ANALYSIS AND DISCUSSION

In order to determine whether there is any significant difference in price levels across 4 regions in Peninsular Malaysia, the Levin-Lin (LL) panel unit root test was used to test whether or not relative prices between these regions are unit-root processes. If the relative prices between regions contain a unit root, this finding will indicate that they are diverged from one another. Hence, there would be a significant difference in price levels across 4 regions in Peninsular Malaysia. Table 2 reports the results obtained from the Levin-Lin (LL) panel unit root test for 12 relative prices.

**Table 2.** Results from Levin-Lin Panel Unit Root Test

Goods	statistic	adj $\rho$	half-life
Food & Non-Alcoholic Beverages	-2.20 <sup>b</sup>	0.74	2.34
Alcoholic Beverages & Tobacco	-3.43 <sup>a</sup>	0.77	2.66
Clothing & Footwear	-3.56 <sup>a</sup>	0.76	2.57
Housing, Water, Electricity, Gas & Other Fuels	-1.84 <sup>b</sup>	0.76	2.54
Furnishings, Household Equipment & Routine Household Maintenance	-0.55	-	-
Health	-1.99 <sup>b</sup>	0.78	2.84
Transport	-1.81 <sup>b</sup>	0.87	5.14
Communication	-5.97 <sup>a</sup>	0.36	0.68
Recreation Services & Culture	-0.72	-	-
Education	1.81	-	-
Restaurants & Hotels	-2.14 <sup>b</sup>	0.93	9.70
Miscellaneous Goods & Services	-0.78	-	-

Note: a and b denote significance at 1% and 5% level, respectively

The results do show that we can reject the null hypothesis for a unit root in 8 out of 12 cases at the 5% significance level. The unit root null was rejected by the LL test for Food and Non-Alcoholic Beverages; Alcoholic Beverages and Tobacco; Clothing and Footwear; Housing, Water, Electricity, Gas and Other Fuels; Health; Transport; Communication; and Restaurants and Hotels. These 8 groups carried a weighting of 83.6% of total consumer expenditures. Evidence of stationary among these price groups (relative to a common numeraire) implied that shocks to Peninsular Malaysia region relative prices do not drive the prices away from the average Peninsular Malaysia price. Hence, there

<sup>9</sup> For this study, the respective CPI for Peninsular Malaysia was used as the numerarie.

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is strong support for price convergence for these groups of goods across 4 regions in Peninsular Malaysia. As expected, price convergence was found for tradable goods like Food and Non-Alcoholic Beverages; Alcoholic Beverages and Tobacco; and Clothing and Footwear. Interestingly, price convergence held for Housing, Water, Electricity, Gas and Other Fuels; Health; Transport; Communication; and Restaurants and Hotels, perhaps these may be nationally regulated prices. The LL test was unable to reject the null hypothesis for Furnishing, Household Equipment and Routine Household Maintenance; Recreation Services and Culture; Education; and Miscellaneous Goods and Services. Hence, there exists divergence between the prices of these goods in different regions in Peninsular Malaysia. These goods are also probably the most non-tradable of the examined goods.

Next, we calculated the estimated half-life for those relative prices that did converge. Among the different commodity groups, Communication had the lowest half-life (0.68 months), followed by Food and Non-Alcoholic Beverages (2.34 months), Housing, Water, Electricity, Gas and Other Fuels (2.54 months), Clothing and Footwear (2.57 months), Alcoholic Beverages and Tobacco (2.66 months), Health (2.84 months), Transport (5.14 months), and Restaurants and Hotels (9.70 months). Generally, the convergence rate for tradable category was much faster than the nontradable category. The half-life of the price gap for tradable goods such as Food and Non-Alcoholic Beverages; Alcoholic Beverages and Tobacco; and Clothing and Footwear was roughly 2-3 months, but it was 5-10 months for nontradable goods like Transport; and Restaurants and Hotels.

Our results are quite consistent with the findings of Lee and Habibullah (2008). They also found price convergence for Clothing and Footwear as well as for the three main items of CPI, i.e. Food; Gross Rent, Fuel & Power; and Transport and Communication. For half-life, our estimated half-lives were shorter than Lee and Habibullah's (2008) estimations. Our results estimated a half-life of 2 - 3 months for tradable goods and 5-10 months for nontradable goods; their results estimated a half-life of 1-2 years for tradable goods and 10 years for nontradable goods. This variance can be explained by the fact that this study examined the price convergence among 4 regions that are located on the same peninsula and well connected by road, air, sea, and rail, thus making the movement of goods from one region to another region easier and with lower costs. However, Lee and Habibullah (2008) analyzed the price convergence for Peninsular Malaysia and East Malaysia that are separated by the South China Sea and where the movement of goods is only possible using sea and air. This difference in the type of transportation will naturally increase both transportation time and costs. Even though Peninsular Malaysia and East Malaysia are in the same country, there were still a few minor customs legislations in these regions that operated separately. These would affect the movement of goods from one region to the other, thus creating a bumpy journey through different bureaucracies. Hence, the longer estimated half-life obtained by Lee and Habibullah (2008).

### CONCLUSION

This study investigated whether there are significant differences in price levels across 4 regions in Peninsular Malaysia by testing their consumer price indices convergence for various types of goods and services from July 2010 – February 2013. Based on panel unit root tests, we found statistical evidence of price convergence between the 4 regions for the majority of price groups in Malaysia. Most importantly, price convergence existed for the three major consumer expenditures items, namely Food and Non-Alcoholic Beverages; Housing, Water, Electricity, Gas and Other Fuels; and Transport. Evidence of a mean reversion among these price groups suggests that the prices of these goods and services tend to converge over time. The results also revealed that there are significant differences in price levels across the 4 regions under analysis for a few goods and services. Price groups for most of the nontradable goods like Furnishings, Household Equipment & Routine Household Maintenance; Recreation Services and Culture; Education; and Miscellaneous Goods & Services show little evidence of convergence. These markets were characterized by substantial price disparities. To sum up, evidence of stationary among the price groups of Food and Non-Alcoholic Beverages; Housing, Water, Electricity, Gas and Other Fuels; and Transport strongly supports price convergence within Peninsular Malaysia since the expenditures of these three items comprise 68% of total consumers' expenditures in Malaysia. Indeed, all the 8 price groups that converged comprise

83.6% of total consumers' expenditures. Hence, we conclude that there is no regional price disparity in Peninsular Malaysia.

In term of the speed of convergence, our empirical estimates showed the half-life for the tradable goods to be roughly 2-3 months and for nontradable goods about 5-10 months. Tradable goods prices adjusted more rapidly than nontradable goods. In conclusion, the greater the good toward the nontraded end, the less likely it will be for PPP to hold or prices to converge, and the longer will be the expected half-life of the adjustment process.

The evidence of price convergence across the 4 regions implies that markets are highly integrated in Peninsular Malaysia and any deviation of price will quickly disappear. The short half-life further supports this viewpoint. Indeed, the 4 regions are situated on the same peninsula and well connected by roads, highways and railways. It is thus quite easy to move goods from one zone to another zone. The shorter half-life for tradable goods than nontradable goods also implies that interstate transportation system plays an important role in price convergence. Thus, in order to reduce the price gap across states, government should construct more interstate highways or improve the railway system.

Despite the fact that the pricing situation in Malaysia has always been of great concern for individuals as well as for the Malaysian government, studies on disaggregate prices in Malaysia are scant. The primary purpose of this paper is to establish whether prices behave in a similar manner across the 4 regions under analysis. The answer is quite conclusive and it is 'yes'. The findings of this study can be used by government institutions and policy-makers to formulate new or better policy options. Our focus on the behaviour of disaggregate price indices, which contain broad coverage of goods and services sold in various regions in Malaysia can allow policy-makers to better understand the behaviour of the price of individual goods and services, as well as the price differences among regions in Malaysia. Hence, appropriate and prudent policy actions can be taken according to the type of goods or services. Furthermore, necessary adjustment and proper policy implementation can be made consistent with the domestic economic situation of various regions, a positive step to reduce price or cost of living differences across regions in Malaysia.

Lastly, the sample periods used by Lee and Habibullah (2008) and this study are different. Therefore, a direct comparison cannot be made and we do not know whether the speed of adjustment has been faster over the past decade. Hence, it is recommended that future studies further explore this issue using data from the same sample periods to produce a sounder and more concrete formal comparison between the half-life of regions in Peninsular Malaysia and East Malaysia.

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