Journal of Business and Economics Review

Journal homepage: www.gatrenterprise.com/GATRJournals/index.html

J. Bus. Econ. Review 4 (1) 58 - 67 (2019)

Dynamic Perspective of Trade Balance: Evidence from Southeast Asia before the Global Financial Crisis of 2008

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ABSTRACT

Objective – This paper studies the influence of some determinants of trade balance for Southeast Asia countries in dynamics perspective before the global financial crisis of 2008.
Methodology/Technique – Based on quarterly data (1980q1 to 2007q3), the investigation is carried out using VECM.
Findings – The results show that in the long run: (i) income effect is found to be dominant in determining the change in trade balance; (ii) the cash balance effect does influence bilateral trade; (iii) bilateral trade is affected by exchange rate movements. Further, the effect of small economies are suspected to be present in Southeast Asia region. Meanwhile, in the short run: (i) the cash balance effect plays a major role in influencing trade balance improvement; (ii) compared to the cash balance effect, the income effect is present with slightly less contribution; (iii) the exchange rate effect is observed in the analysis, while a J-curve phenomenon exists in minor cases.
Novelty – This paper concludes that in the long term, income effect is found to be dominant in determining the change in trade balance.
Type of Paper: Empirical.
JEL Classification: C33, F14, O14.

Keywords: Export; Trade Balance; VECM; J-curve; Income Effect.

1. Introduction

In the era of open economic policy, trade has been widely considered as a determinant of the success of the industrialization process and economic growth of a country (Naito, 2017; Li, 2018). Many factors may cause the trade balance to fluctuate, including changes in the relative prices of foreign and domestic goods, exchange rates, country income, logistic factors, interest rates, free trade arrangements, tariff or non-tariff barriers, and transportation costs (Caporale et. al., 2017; Senadza & Diaba, 2017; Sasaki & Yoshida, 2018; Soderbery, 2018). After the financial crisis struck the Southeast Asian region in 1997, ASEAN started to maintain two fundamental internal actions in order to accelerate the recovery process and get out of the downturn period.

* Paper Info: Revised: December 16, 2018
Accepted: March 19, 2019

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First, intensifying trade cooperation among member states and with other major trading partners (e.g. US, Japan, and EU) and second, expanding financial cooperation among the member states itself, including China, Japan and Korea (Severino, 2002). On the first point, there is an emphasis on trade arrangements since ASEAN has been recognized as an open organization that should liberalize its intra-inter regional trade and a regional bloc whose economy is highly dependent on trade. With respect to the latter, Huang et. al. (2004) states that prior to the financial crisis in 1996, ASEAN's ratio of exports to GDP was at about 46% while the ratio of imports to GDP was around 49%. After the crisis in 2000, the decline of its GDP was accompanied by the growth of exports which resulted in the ratio of exports to GDP increasing by 71% while the ratio of imports to GDP rose to 62%. It therefore seems that ASEAN has become more trade-dependent, even following the crisis period.

The economic performance, including the ASEAN trade balance, was again shaken when the global financial crisis hit in 2008. As a result, economic growth in the Southeast Asia region declined, from around 6.4% in 2007, to around 4.3% in 2008 (ADB, 2009). Still, based on ADB records (2009), Southeast Asian export activities are reported to have reached 30% in this period. In an effort to minimize bias in the calculation of indirect impact (because of the wide impact of the crisis on various sectors), this paper limits the dynamic analysis of trade balance to the period prior to the global financial crisis (i.e. late 2007).

The objective of this paper is to analyze the role of real exchange rates, real income and real cash balance on the bilateral trade balance before the global financial crisis of 2008 among selected ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand) and between those ASEAN countries and the US and Japan, due to their position as major ASEAN's trading partners and two of the biggest economies in the world. Tongzon and Felmingham's (1998) study of bilateral trade provides a deeper insight into particular issues related to trade activity between countries, which are usually not addressed in studies of aggregate trade. Bilateral trade flows tend to respond differently to various factors (e.g. real exchange rate, income, and other monetary instruments) which determine aggregate trade flows, i.e. those variables may have a different impact on certain countries where the impact depends highly on the characteristics of the country itself or its trading partners.

To address the paper's objective, a vector error correction model (VECM) is estimated. In this case, the VECM treats all variables in the model as potentially endogenous. The model will analyze the impact of all of the variables on bilateral trade flows, both in the short and long term. Additionally, the impulse response function is also used to support the results of the VECM. The paper finds that in the long-tern, rather than cash balance effect and exchange rate effect, income effect appears to be more dominant in determining the change in trade balance. Further, in the short-tern, the cash balance effect plays a major role in influencing the improvement of trade balance, however with slightly less difference in contribution, the income effect also appears. With respect to the exchange rate effect, the findings are supportive for the J-curve phenomenon in minor cases. The paper will be structured as follows. Section 2 discusses some principal facts around ASEAN trade. Section 3 provides a literature review. Section 4 explains the empirical methodology. Section 5 presents the result and discussion, followed by section 6 which concludes the paper.

2. The Facts of ASEAN Trade

Two common indicators can be used to describe the importance of trade in the economy: the ratio of trade in goods to GDP and the ratio of trade in services to GDP. Trade in goods consist of all merchandise which is exported and imported by a country, while trade in services has a same meaning but involves different sectors, such as transport, travel, finance, insurance, royalties, construction, communication and cultural services (World Bank, 2006).

As seen in Table 1, the importance of trade in the economies of the region (as indicated by the ratio of trade in goods and trade in services to GDP) varies for all considered periods. Singapore, one of the most open economies in the world, is expected to be superior to other economies in the region. This is verified by

its ratio of trade in goods to GDP which has reached over 200%, ranging from about 277% to 368%, and its ratio of trade in services to GDP which has achieved more than 50%, ranging between 58% and 90%. The trades in goods/GDP ratios of other ASEAN countries move far lower than that of Singapore. This seems to be the same for the ratio of trade in services to GDP.

As a group (see Figure 1 and 2), the distributions of ASEAN trade is relatively concentrated in its own area. On average, between 1996 and 2005, intra-ASEAN trade accounted for more than 23% of exports and 22% of imports. The data shows that intra-ASEAN trade is of growing importance, particularly for imports.

Table 1. The Importance of Trade in ASEAN Economies

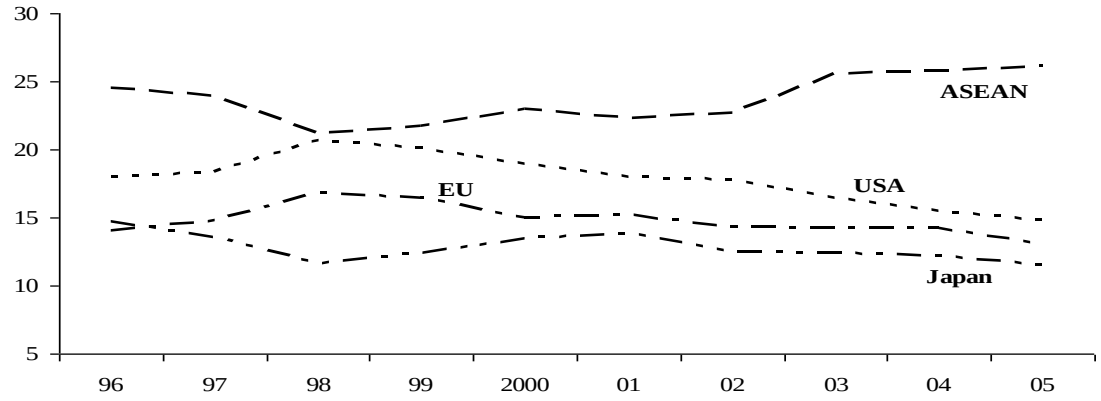
Countries	Trade in goods as a share of GDP (%)					Trade in services as a share of GDP (%)		
	1990	2001	2003	2004	2005	1990	2004	2005
Cambodia	22.4	91.7	80.5	122.2	109.9	5.7	25.3	28.1
Indonesia	41.5	60.1	44.9	49.4	54.2	7.5	17.9	12.8
Lao PDR	30.5	50.4	42.5	35.4	43.6	5.8	N/A	N/A
Malaysia	133.4	184.0	174.8	195.9	196.1	21.2	29.9	31.9
Philippines	47.7	88.9	94.3	97.0	89.5	11.3	11.2	10.4
Singapore	309.5	277.6	297.8	321.5	368.0	58.1	76.6	90.4
Thailand	65.7	110.9	109.4	119.2	129.3	14.9	26.1	27.3
Vietnam	79.7	93.6	115.0	125.4	129.9	N/A	19.0	18.0

Source: World Development Indicators, 2003; 2005; 2006 and 2007, World Bank.

Notes: N/A means “not available”.

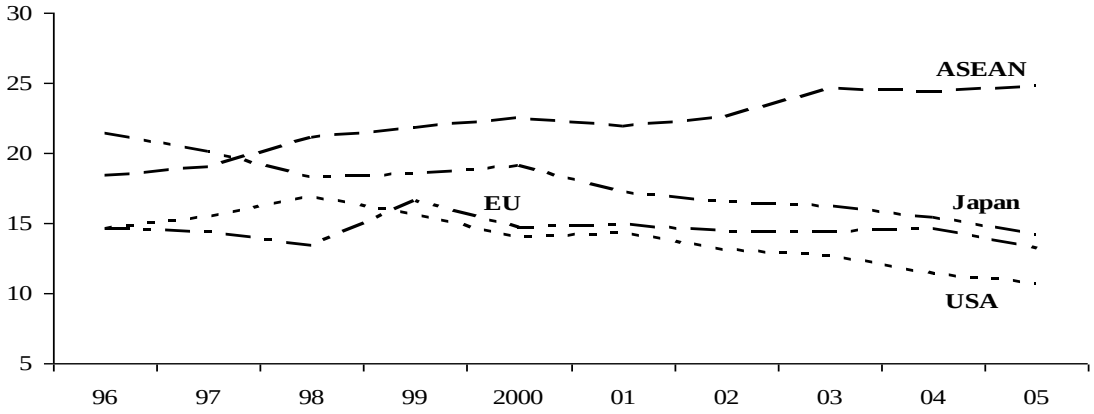
Intra-ASEAN imports showed a gradual increase between 1996 and 2005, with the exception of 2001, where the figure dropped slightly to 21.9%. Generally, intra-ASEAN imports have grown from 18.4% in 1996 to 24.8% in 2005. In terms of exports, intra-ASEAN exports have always increased since 2001, though prior to that period, the distribution would typically fluctuate. After ASEAN itself, developed countries are the next most significant trade partners of ASEAN. Three of them, namely the US, Japan and EU are noted as the countries whose contributions always dominate ASEAN’s export and import activities. Their contributions during 1996-2005 reach more than 11% each for both trade activities. The most dominant market for ASEAN merchandises is the US, which accounts for around 18% of total trade in 1996 and around 15% of total trade in 2005.

Figure 1. Distribution of ASEAN exports by major destination (%), 1996-2005



Source: Direction of Trade Statistics Yearbook, 2003 and 2006, IMF.

Figure 2. Distribution of ASEAN imports by major partners (%), 1996-2005



Source: Direction of Trade Statistics Yearbook, 2003 and 2006, IMF.

3. Literature Review

In the context of international economic theory, many factors can cause trade balance values to change. One factor that is often referred to is exchange rates. Through fulfilling the Marshall-Lerner Condition (MLC) terminology, real depreciation is believed to have a positive effect on trade balance (Krugman & Obsfeldt, 2003). The MLC guarantees that the real depreciation of the domestic currency will cause a decline in export prices, and vice versa. Furthermore, MLC will also be related to a decrease in export quantity and an increase in import quantity from country partners.

A real depreciation makes domestic products relatively cheaper than foreign products since the prices of export products are in the sellers' currency. When the domestic relative price of exported goods (px) and foreign relative export price (p*x) are assumed to be fixed, and there is only a small immediate impact on the quantity of export (M*) and import (M), then the value of exports (pxM*) increases only by a small amount, while the value of imports (qp*xM) increases significantly. This situation results in a deterioration of trade balance in the short term. However, as time goes by, the increased price of imports brings the quantity of domestic import demand down and due to the price elasticity of domestic exports is larger in the long run than in the short run, the volume and value of domestic exports rises sufficiently to improve the trade balance

so that the effect of the depreciation is cumulatively positive (Rose & Yellen, 1989; Tongzon & Felmingham, 1998; Wilson & Tat, 2001).

The above condition considers the role of time path in the relationship between the real exchange rate and trade balance. It distinguishes the time path into short and long term. Hence, after a real depreciation occurs, an initial deterioration in TB occurs before an improvement is realized. This well-known phenomenon is called the J-curve effect. The J-curve effect is a condition whereby a country's trade balance worsens suddenly after a real depreciation and improves only after a certain period of time. This effect is attributed to a lagged adjustment of quantities to changes in relative prices (Junz & Rhomberg, 1973; Pikoulakis, 1995).

The effect of domestic real income on the trade balance is known to be ambiguous because, besides being able to have a positive effect (increasing domestic import demand), an increase in domestic real income occurs due to an increase in production of import-substitute goods which results in fewer importing countries, which can affect improvement in the trade balance (Bahmani-Oskooee & Ratha, 2004; Onofowora, 2003).

4. Methodology

4.1 Model Specification

This paper adopts a trade balance model that relies on a standard two-country model as applied by Rose and Yellen (1989), and Rose (1991). Significantly, this paper also follows the work of Tongzon and Felmingham (1998) which incorporates a real cash balance variable in determining bilateral trade flows. The following specification will clarify these points.

$$TB = TB\left(q, y, y^*, h, h^*\right) \qquad (1)$$

Where, trade balance (TB) is expressed as a function of real exchange rate (q), the domestic (foreign) country's real income (y, y*) and the domestic (foreign) country's real cash balance (h, h*).

According to Equation (1), TB will improve if y* and h* increase or if y and h decrease. For q, this paper specifies q as the domestic currency price of the foreign currency. This indicates that a positive change in q implies a real depreciation of the domestic currency. If this variable has a positive impact on TB, then one can says that the exchange rate effect is present. The Marshall-Lerner condition will be satisfied if the effect persists in the long term. The paper will also investigate the J-curve effect. The J-curve will be verified by the paper, if initially, the real exchange rate (q) has a negative impact on TB followed by positive impact after a particular period.

With respect to the model used, this paper starts by forming Equation (1) into a log-linear standard model and then modifies a VECM specification for TB conditional on q, y, y*, h, and h*. The model will be estimated in order to identify the dynamic bilateral trade relationship among selected ASEAN countries (Indonesia, Malaysia, Singapore, Thailand, and the Philippines) and between ASEAN countries with the US and Japan.

4.2 Data Source

To carry out the empirical work, quarterly data for the first quarter of 1980 to the third quarter of 2007 (1980q1-2007q3) is used. The data is collected from the Direction of Trade Statistics (DOTS) of IMF and International Financial Statistics (IFS) of IMF. The real bilateral trade balance (TB) is measured as a ratio of merchandise f.o.b. exports to merchandise c.i.f. imports multiplied by 100. Since DOTS-IMF only covers 2003q1-2007q3 Singapore's export-import data to and from Indonesia, the paper will only use that series in the analysis.

Due to the absence of quarterly GDP data in most countries during the research periods (1980q1-2007q3), in following Wilson and Tat (2001), Bahmani-Oskooee and Goswami (2003) and Bahmani-Oskooee and Ratha (2004), this paper uses the industrial production index (for Malaysia, Japan and the US) and the manufacturing production index (for Indonesia, Philippines, and Singapore) as a proxy for the real domestic (foreign) income all with index numbers (2000=100). It is noteworthy that, since those two indexes are not available in Thailand, this paper uses the quarterly data of nominal GDP for that country but with a shorter research period (1993q1-2007q3). Thailand's quarterly nominal GDP series was deflated by its CPI (2000=100) to express it in real terms.

A home country's real cash balance (h), in following Bahmani-Oskooee (1985) and Tongzon and Felmingham (1998), is obtained by adding the currency outside of the banks (IFS, 14a) and commercial banks reserves (IFS, 20), deflated by the country's CPI (IFS, 64). An equivalent procedure (as shown by h) is used to generate the foreign country's real cash balance (h*) based on their respective data. The bilateral real exchange rate (q) is computed by multiplying the spot or market exchange rate –e (IFS, rf) by the ratio of foreign price to the domestic price level multiplied by 100. CPI will represent the price level (IFS, 64). It is noteworthy that, since the IMF provides all exchange rates in relation to the US dollar, a conversion adjustment in relation to other currencies outside of the US is needed. All variables are in a natural logarithm form.

5. Results and Discussion

After determining the lag length of each bilateral case using AIC, the ADF test is conducted. The ADF test finds two individual time series are stationary in level [I(0)], namely (i) the trade balance (TB) between Indonesia and Malaysia, and (ii) the trade balance between Malaysia and Indonesia. For the majority of the remaining series, the ADF tests provides a strong indication of unit roots, in which they are [I(1)]. However, there are exceptions for 10 series which are stationary in second differences [I(2)], namely the variable of y for Thailand and the US (in Thailand-US case), h for Indonesia, Malaysia and Philippines (when they do trade with Thailand), q for Malaysia-Thailand, Singapore-Indonesia, Thailand-Malaysia, Thailand-the US, and TB for Singapore-Thailand. All bilateral cases which possess variables that are stationary in the second differences [I(2)] are excluded from the co-integration test.

This paper uses the Johansen co-integration test to determine the possibility of a long tern relationship among the variables in each case. This study rejects the null hypothesis of no co-integration (r=0) in 9 out of 17 cases. Those 9 cases are: (i) Indonesia-Singapore; (ii) Indonesia-Japan; (iii) Indonesia-the US; (iv) Malaysia-Philippines; (v) Malaysia-Japan; (vi) Malaysia-the US; (vii) Philippines-Japan; (viii) Singapore-Japan; and (ix) Singapore-the US.

5.1 The Long Term Relationship

Since the results of the Johansen co-integration test show that various numbers of co-integrating vectors in the bilateral cases reject the null hypothesis, this suggests that the long tern relationship is not unique. With respect to that, in following Singh (2002), we decided to use the first co-integrating vector as the most likely vector in our not unique long term analysis as it provides the maximum eigenvalue statistics in the test. Hence, hereafter, we consistently hold that idea when applying the Johansen co-integration test.

In Table 2, the estimated coefficients of the first co-integrating vector are normalized with respect to the coefficient of the Ln TB. Among all bilateral cases that are reported, only Indonesia-Singapore and Indonesia-Japan indicate an expected positive long term relationship between the real exchange rate (q) and the real bilateral trade balance (TB). With a long run elasticity of 1.81 and 4.44, respectively, they provide strong empirical support to the theory that predicted real depreciation improves the trade balance in the long term. The Marshall-Lerner condition holds in those bilateral cases. Contrary to this, for other bilateral cases,

this paper fails to identify such a relationship. However, the case of Singapore-US still shows an expected positive sign although it is statistically insignificant.

Through those 9 cases, we discover some issues related to the long term analysis. First, we find that the income effect seems more dominant and consistent than the import-substitution effect. Second, the income effects play a major role in determining the trade balance since their coefficients are relatively greater than other variables' coefficients and they appear in relatively more bilateral cases. Third, the cash balance effect plays a minor role in influencing the trade balance since their coefficients shows the smallest figure in relative meaning. Fourth, the results provide evidence for the exchange rate effect in bilateral cases. This suggests that a real depreciation improves trade balance over time. However, in several cases, the coefficients of q are wrongly signed.

Table 2. Long Term Relationship of the Variables: Estimation of VECM

Cases	Variables				
	yt	yt*	ht	ht*	qt
Indonesia-Sing.	0.889***	-0.766	-0.121	-1.249***	1.807**
Indonesia-Japan	-4.997**	-13.473***	5.999**	-14.752**	4.440*
Indonesia-the US	-0.935**	10.483**	-0.073	-4.030*	-1.382**
Malaysia-Philip.	-36.649	-20.503	18.008**	-12.310	-81.920**
Malaysia-Japan	-22.443	45.348***	3.395	-10.058	-57.924**
Malaysia-the US	-0.502***	-0.983	-0.234	1.960**	-1.993**
Philip.-Japan	-0.169	12.173**	-2.050	2.957**	-8.299**
Sing.-Japan	-0.513	2.235**	-1.425**	0.875**	-0.744**
Sing.-the US	3.461**	1.756***	3.842**	0.551	0.028

Notes: *, ** and *** denote rejection of null hypothesis at 5%, 1% and 10%, respectively.

5.2 The Short Term Relationship and the Speed of Adjustment

The results of the VECM estimation for short term relationships show that changes in the value of Indonesia's bilateral trade balance with Singapore are affected by the lagged four period value of the domestic real income. Domestic real income (y) seems to have a significant positive impact on the Indonesia-Singapore real trade balance in both the long term and the short term. This strengthens the possibility that the import-substitution effect exists. However, another possibility also arises, i.e. the reporting country's exports are not driven by the demand factor but determined by the supply factor. Onafowora (2003) notes that supply can also be a main determinant factor of exports when higher exports are originated from the utilization of domestic surplus that are carried by a condition where an increase in domestic output surpasses an increase in domestic consumption.

The import-substitution effects are found in the bilateral trade for Indonesia, Malaysia, and Singapore with respect to the US. In addition, the effects also appear in the case of Malaysia-Japan and Philippines-Japan. Meanwhile, the income effect can be seen in Malaysia-Philippines. In this case, the Philippines income carries the expected positive sign and it is statistically significant at 10%, indicating that Malaysian exports to the Philippines have increased in the short term due to the Philippines income effect. However, we also note that both income and import-substitution effect exist simultaneously in the case of Philippines-Japan and Singapore-US.

These findings indicate that in the short term relationship, the import-substitution effect seems more dominant than the income effect. The situation is quite different when the analysis is performed for the long term relationship. In the long term analysis, the income effect is found to be the most influential effect that determines the trade balance. In the short term, the income effect plays a less influential role than the cash balance effect in determining the trade balance since the income effect appears in relatively less bilateral cases and the cash balance effect displays a more consistent effect on the variables. However, the magnitude of the variables which are related to those two effects are not so significantly different in figure. In the short term relationship, the exchange rate effect appears in most bilateral cases and it was found that the effects are more frequently observed than in the long term relationship.

Looking at the speed of adjustment coefficients, their size implies particular adjustment information to a deviation from the long term equilibrium. Four out of nine coefficients of the speed of adjustment are statistically insignificant, while the remaining five coefficients of carry theoretically predict negative signs and are statistically significant. In the case of Indonesia-Singapore, the coefficient suggests a rapid speed of adjustment, where nearly 65% of the disequilibrium is eliminated in each quarter. For Indonesia-US, about 25% of disequilibrium is corrected in each quarter by changes in the trade balance. In other bilateral cases, i.e. Malaysia-Philippines, Malaysia-Japan and Philippines-Japan, those coefficients are fairly small in size. This implies that they characterize a slow adjustment to the disequilibrium. Those coefficients suggest about 1.2%, 0.7% and 7.4% of disequilibrium is eliminated in one quarter for each case respectively. This paper also executes the diagnostic tests for the model. As a result, the null hypothesis is accepted. The coefficients of determination (R2) in 9 bilateral cases vary in value from 0.453 to 0.637.

5.3 The Impulse Response Function

For Indonesian IRF, we find that Indonesia's trade balance with respect to Singapore reacts positively to real depreciation. This pattern reinforces evidence of a Marshall-Lerner condition. The import-substitution effect appears in this case. The effect seems to consistently influence trade balances, particularly through real domestic income (y), where Indonesia income increases, imports from Singapore decline due to an increase in the production of import-substituted goods. For Indonesia-Japan, the presence of a negative short term effect of real depreciation is supportive of the J-curve phenomenon. These findings also observe the presence of a Marshall-Lerner condition. The figure clarifies the existence of an import-substitution effect in this bilateral case. For some initial extents, the cash balance effect seems to exist in this case. Our findings suggest that a J-curve effect does not exist in the case of Indonesia-US, since the impulse response function reveals that rising real exchange rates (q) eventually correspond to a decline in their bilateral trade balance.

The impulse response functions for Malaysia reveal that increases in real exchange rates (q) will eventually lead to reductions in the bilateral trade balance for all three of Malaysia's bilateral cases (Malaysia-Philippines, Malaysia-Japan and Malaysia-US). The negative long term effect of a real depreciation on bilateral trade balance in respective case is not supportive of the J-curve hypothesis. Hence, these results strengthen our findings. It is also observed that increases in Malaysia's real income (y) lead to increases in the bilateral trade balance in all cases. This is not a surprising result since we have observed the same finding about the presence of import-substitution effect for these 3 cases in our previous analysis. Meanwhile, only the Malaysia-Japan relationship indicates that the income effect is present. In the case of Malaysia-Philippines and Malaysia-US, trade balance reacts positively to foreign real cash balance (h*), i.e. a

rising foreign real cash balance will eventually correspond to rising bilateral trade balance. This suggests that the cash balance effect is consistently present in trade between Malaysia and the US.

From the Philippine's IRF, we found the absence of J-curve phenomenon in Philippine-Japan bilateral case. Through the findings which related to variables y* and h*, we confirm the existence of income and cash balance effect in this case. As shown before in the VECM analysis, these two effects are clearly present in the short term and long term. The effects have been observed since the VECM provide evidence for the positive influence of Japan's income and cash balance on the improvement of trade balance. Looking at Singapore's IRF (Singapore-Japan and Singapore-US), this paper fails to identify a J-curve effect. Meanwhile, in the case of Singapore-Japan, Singapore's trade balance reacts negatively to Singapore's real cash balance (h) and responds positively to a positive shock in foreign real cash balance (h*), indicating that the cash balance effect appears in the case.

6. Conclusion

The objective of this paper is to analyze the dynamics of bilateral trade balance in the ASEAN region before the global financial crisis of 2008. In order to realize that objective, we investigate the role of exchange rates, income and cash balance on the change in trade balance. Our analysis includes the bilateral trade cases among selected ASEAN countries (Indonesia, Malaysia, Singapore, Thailand, and Philippines) and between those ASEAN countries and their major trading partners, i.e. the US and Japan. In the investigation of the effect of all considered variables on the bilateral trade balance, a vector error correction model (VECM) is specified. In addition, the impulse response function (IRF) is employed to complement the dynamic perspective of the VECM.

Based on the results obtained, this paper concludes that in the long term, income effect is found to be dominant in determining the change in trade balance. Cash balance and exchange rates affect bilateral trade, although their roles are relatively lower than the income effect. This condition may be attributed to the small economy effect, whereby a small economy tends to use foreign currency in trading to avoid the uncertainty of the fluctuation in their domestic currency. As a group of small open economies, most foreign trade (exports and imports) of ASEAN countries are invoiced in foreign currency. Consequently, the effect of real depreciation is hedged and the trade balance remains unaffected.

In the short term, the cash balance effect plays a major role in influencing the improvement of trade balance. Income effect plays a less influential role, even when it is compared to the import-substitution effect. The exchange rate effect is observed, where the J-curve phenomenon is verified in minor cases. The results of the IRF reinforce the findings of the VECM long term and short term results. Using variance decomposition analysis and considering only the explanatory variables, this paper concludes that the most meaningful innovation that affects the variation of trade balance is the innovation of exchange rates (q). However, the results show that the effect of real income and real cash balance are relatively smaller, but are still important to explain the performance of trade balance.

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