EXCHANGE RATE AND TRADE BALANCE RELATIONSHIP: THE EXPERIENCE OF ASEAN COUNTRIES

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Abstract

This study addresses the question of whether exchange rate changes have any significant and direct impact on trade balance. By examining the trade balances between ASEAN-5 countries and Japan for the sample period from 1986 to 1999, this study found that the role of exchange rate changes in initiating changes in the trade balances has been exaggerated. As such, an alternative explanation to the observed behaviour of ASEAN-5 trade balances in the selected sample period has been postulated. In particular, we propose that trade balance is affected by real money, rather than nominal exchange rate. A mathematical framework that provides theoretical background to our proposition is presented. Our empirical data analysis suggests that the real money effect proposition could consistently explain the observed trade balances in Malaysia, Singapore, Thailand and the Philippines during the period of study, with respect to Japan. Thus, in order to cope with trade deficits, the governments of these ASEAN countries might resort to policy measures focusing on the variable of real money.

Keywords: Exchange rate; Trade balance; Real money; Purchasing power parity; ASEAN-5 Economies.

I. INTRODUCTION

Exchange rate is one of the important prices in an open economy since it affects so many business, investment and policy decisions. Thus, it is not surprising to learn that the study of exchange rate has been one of the most important areas of economic research over the past few decades. This body of research has experienced tremendous growth, especially in the post-Bretton Woods era in which foreign exchange rate has been highly volatile after the inception of the floating exchange rate regime in 1973.

One of the areas of research that has drawn the attention of researchers is the exchange rate-trade balance relationship. The elasticity model of the balance of trade (Krueger, 1983) has shown the existence of a theoretical relationship between exchange rate and the trade balance. Empirically, various studies have been conducted to assess the influence of exchange rate on trade balance, with the objective of providing valuable inputs to policy makers on the effectiveness of exchange rate policy such as devaluation-based adjustment policies (effected through nominal exchange rate) to balance a country's foreign trade (see, for example, Greenwood, 1984; Himarios, 1989; Rose and Yellen, 1989; Bahmani-Oskooee, 1991; Mahdavi and Sohrabian, 1993; Arize, 1994; Buluswar *et al.*, 1996; Rahman and Mustafa, 1996; Rahman *et al.*, 1997; Wei, 1999; Baharumshah, 2001; Bahmani-Oskooee, 2001; Lal and Lowinger, 2002; Singh, 2002). In theory, nominal depreciation (appreciation) of

exchange rate is assumed to change the real exchange rate (see, for instance, Himarios, 1989; Bahmani-Oskooee, 2001) and thus has a direct effect on the trade balance. Specifically, Bahmani-Oskooee (2001) noted that in an effort to gain international competitiveness and help to improve its trade balance, a country may adhere to devaluation or allow her currency to depreciate. Devaluation or depreciation increases exports by making exports relatively cheaper, and discourage imports by making imports relatively more expensive, thus improving trade balance. However, many economists believe there is a short run phenomena dubbed the "J-curve" effect in the movement of trade balance, in which there will be an initial deterioration before a country's trade balance eventually improves. A common explanation for this time path adjustment is based on the existence of contracts in international trade, in particular export contracts are written in domestic currency units and import contracts are written in foreign currency units. As a result, the price effects work faster than volume effects following the devaluation or depreciation of a country's exchange rate.

This study attempts to investigate whether exchange rate changes have significant and direct impact on the trade balances of ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Singapore and Thailand) with Japan, one of their major trading partners. However, from our plots of the exchange rate and trade balances for these ASEAN-5 countries, it seems that the role of exchange rate changes in initiating changes in the trade balances has been exaggerated. These results come as no surprise because various studies have found weak statistical evidence connecting exchange rate changes and the trade balance (see for example, Greenwood, 1984; Rose and Yellen, 1989; Mahdavi and Sohrabian, 1993; Buluswar *et al.*, 1996; Rahman and Mustafa, 1996; Rahman *et al.*, 1997). As such, this study proposes an alternative explanation to the observed behaviour of ASEAN-5 trade balances in the selected sample period. In particular, it hypothesizes that trade balance is affected by real money, rather than nominal exchange rate. A mathematical framework that provides theoretical background to this proposition is presented. Our empirical data analysis suggests that the real money effect proposition could consistently explain the observed trade balances in Malaysia, Singapore, Thailand and the Philippines during the period of study, with respect to Japan.

The rest of this paper is outlined as follows. Section II describes the empirical data of this study. Section III examines the exchange rate-trade balance relationship between ASEAN-5 countries and Japan. The mathematical derivation of the real money effect proposition is presented in Section IV. Section V provides empirical evidence of our proposition and the final section concludes this study.

II. EMPIRICAL DATA OF STUDY

This study examines the relationship between exchange rate and trade balance in the context of ASEAN-5 economies with respect to Japan, one of their major trading partners. The end-of-period nominal exchange rates for the countries involved, namely Indonesia (IDR), Japan (JPY), Malaysia (MYR), the Philippines (PHP), Singapore (SGD) and Thailand (THB) are collected from various issues of *International Financial Statistics* (IMF). Our trade balance data is constructed by subtracting imports payment from exports earning, both of which are obtained from *Direction of Trade Statistics Yearbook* (IMF), with a sample period spanning from 1986 to 1999. The choice of sample period is based on the availability of imports and exports data at the time of study. Besides, Consumer Price Indices (CPI) for these countries, which are utilised to estimate the equilibrium exchange rate suggested by the purchasing power parity (PPP) hypothesis, are collected from *International Financial Statistics*.

In this study, nominal bilateral exchange rate is defined as the foreign price of domestic currency. For example, the JPY/MYR exchange rate refers to the unit price of Malaysia ringgit (MYR) in terms of Japanese yen (JPY). The Japanese yen-based nominal bilateral

exchange rates of these ASEAN-5 economies, together with their corresponding long-term trends are plotted in Figure 1. A stylised fact depicted in these plots is that, in the period of study, the nominal exchange rates of these ASEAN-5 economies depreciate with respect to Japanese yen (JPY). This is obvious from the downwards-sloping long-term trend of each nominal bilateral exchange rate. The depreciation of ASEAN-5 exchange rates in the period of study is mainly due to the appreciation of Japanese yen with respect to the U.S. dollar, whereas during the same period, the US denominated ASEAN-5 exchange rates either remain stable or depreciate.

The plots of trade balances of ASEAN-5 economies with respect to their major trading partner- Japan are shown in Figure 2. The Malaysian trade balance generally deteriorates from 1986 to 1995, and from then it improves until 1999, the end period of this study. Similar stylised trend is clearly observed in the case of the Philippines, Singapore and Thailand, with the exception of Indonesian trade balance, in which the trend is less obvious.

III. EXCHANGE RATE-TRADE BALANCE RELATIONSHIP

The elasticity model of the balance of trade (Krueger, 1983) has shown the existence of a theoretical relationship between exchange rate and the trade balance. Generally, the nominal depreciation (appreciation) of exchange rate is assumed to change the real exchange rate (see for instance, Himarios, 1989; and Bahmani-Oskooee, 2001) and thus has a direct effect on trade balance. Bahmani-Oskooee (2001) noted that in an effort to gain international competitiveness and help to improve its trade balance, a country may adhere to devaluation or allow her currency to depreciate. Devaluation or depreciation increase exports by making exports relatively cheaper, and discourage imports by making imports relatively more expensive, thus improving trade balance.

With the above optimistic view, one would expect that the depreciation of ASEAN-5 exchange rates with respect to Japanese yen would improve these economies' trade balances with respect to Japan, during the sample period of study. However, from our plots of the exchange rates (Figure 1) and trade balances (Figure 2), the impact of the depreciation of ASEAN-5 exchange rates (Figure 1, downwards–sloping long-term trend) on the bilateral trade balances is surprisingly the other way round. For instance, we observed that, rather than improvement, Malaysian trade balance actually deteriorates up from 1986 to 1995, despite the fact that the ringgit had depreciated during this period.

Similar phenomenon is observed in other countries (except Indonesia, in which the trend is less clear). For period post 1995, there exists a short-run improvement of trade balance in all cases (except Indonesia). In particular, the trade balances recorded surpluses only in the last 3 years or so of our sample period comprising of 14 years in total. It seems that the role of exchange rate changes in initiating changes in the trade balances has been exaggerated. These results come as no surprise because various studies have found weak statistical evidence connecting exchange rate changes and the trade balance (see for example, Greenwood, 1984; Rose and Yellen, 1989; Mahdavi and Sohrabian, 1993; Buluswar *et al.*, 1996; Rahman and Mustafa, 1996; Rahman *et al.*, 1997). In this case, devaluation-based adjustment policies may not achieve the desired effects of nominal exchange rate changes (devaluation) on the balance of trade. The inconsistency between the optimistic theoretical view and empirical data simply means that there is a need to turn to other view, which could offer satisfactory explanation of the data. One possible way is turning back to the purchasing power parity (PPP) hypothesis. In particular, the movement of relative prices, which has impact on relative real money, must be taken into account. This is because trade balance depends on the demands for domestic goods relative to foreign goods, and these demands depend on relative prices, the comparison of foreign to domestic prices.

Figure 1
The Long-term Trend of Nominal ASEAN-5 Exchange Rates

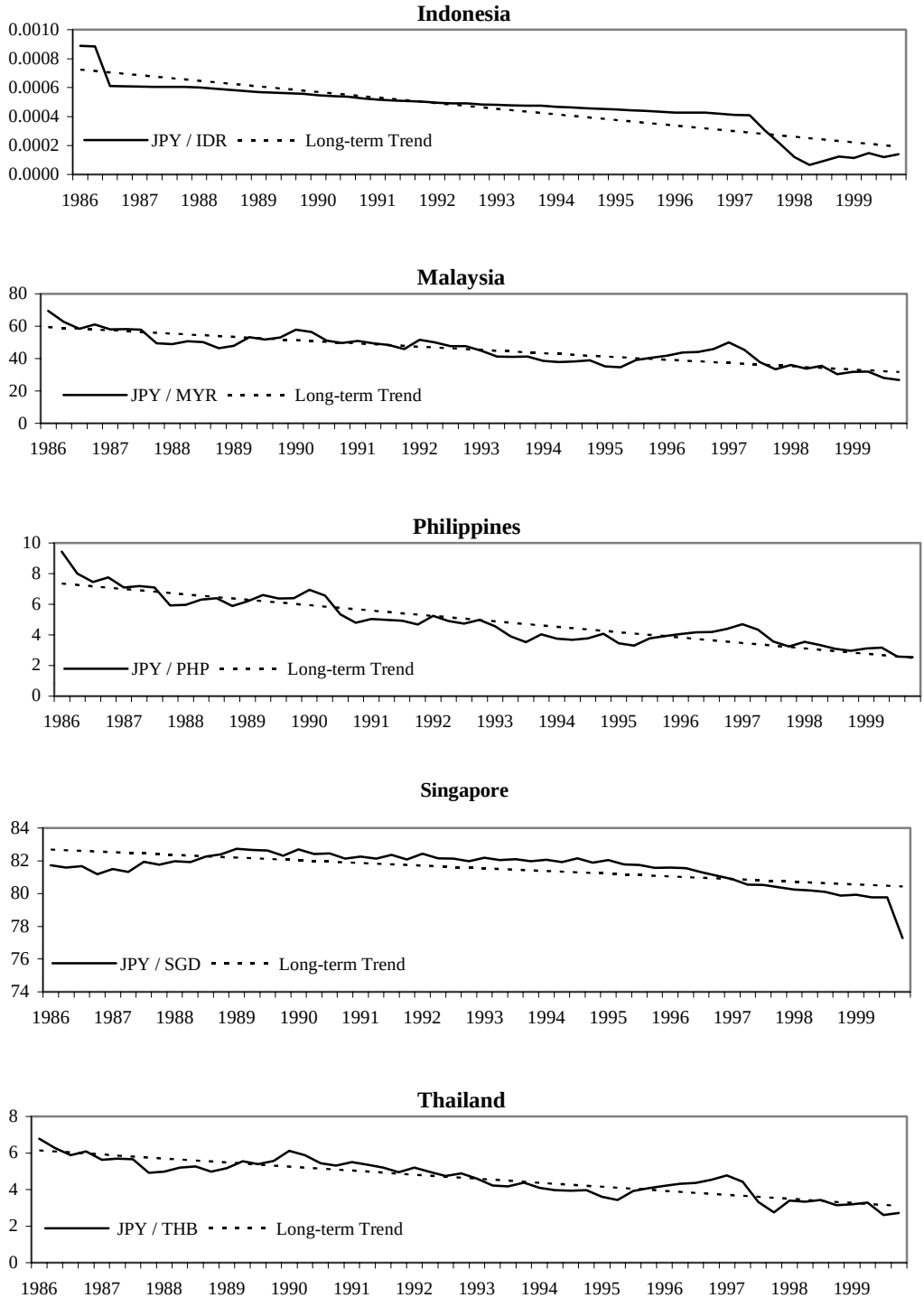
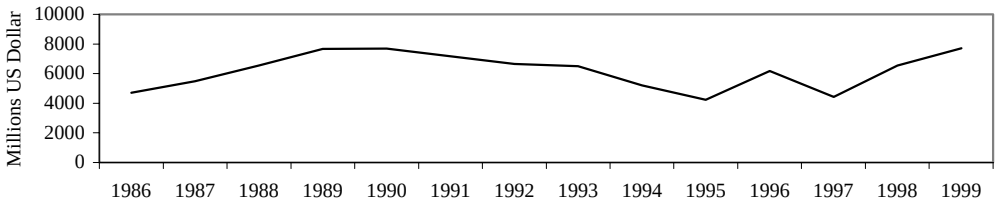
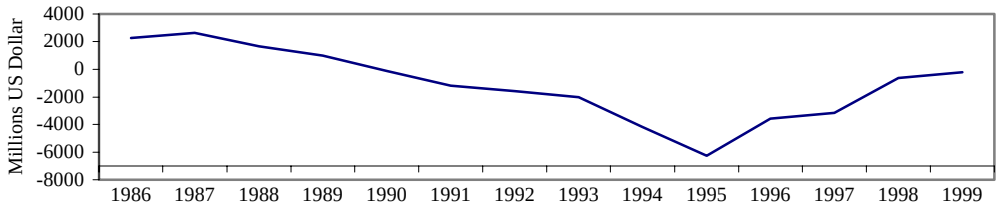


Figure 2
Trade Balances of ASEAN-5 Economies with Respect to Japan

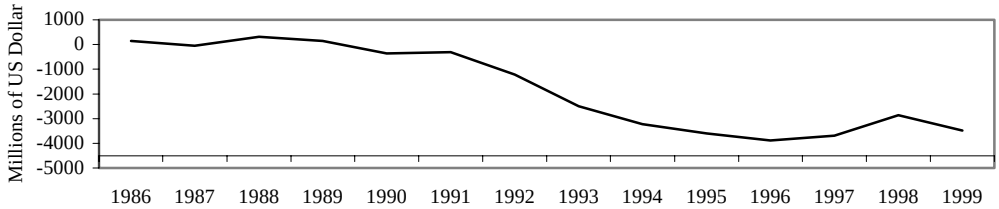
Indonesia



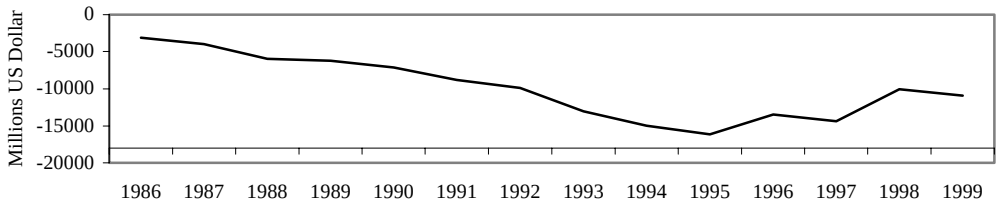
Malaysia



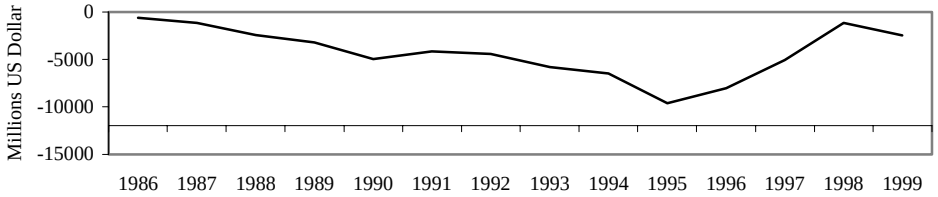
Philippines



Singapore



Thailand



IV. REAL MONEY EFFECT PROPOSITION

The Proposition

According to the PPP hypothesis, the same basket of goods faces the same price across countries when converted into the same currency. As such, the nominal exchange rate between any two countries should equate their price ratio (Balassa, 1964 and Lee, 1976, for instance, provide details for this hypothesis). In reality, discrepancies between the nominal exchange rate and price ratio are observed in the short run. However, the accumulated discrepancies may build up arbitrage profit, which will eventually be arbitraged away. Thus, in the long run, arbitrage profit equals zero, and nominal exchange rate would be restored to the equilibrium value as determined by the price ratio. Mathematically, PPP hypothesis can be expressed as:

$$e = \frac{\$^F}{\$^D} = \frac{P^F}{P^D} \tag{1}$$

where e stands for nominal exchange rate, $\$^F$ and $\$^D$ are the foreign and domestic currencies; whereas P^F and P^D refer to foreign and domestic aggregate price levels. In this study, Indonesia, Malaysia, the Philippines, Singapore and Thailand are taken as the domestic countries and Japan as their foreign trading partner.

Our real money effect proposition postulates that the impact of nominal depreciation of domestic exchange rate is transmitted to the trade balance through the real money effect, rather than the nominal exchange rate effect. As usual, real money is defined as the ratio of nominal money to aggregate price level.

Rearranging Equation (1), we obtain

$$\frac{\$^D}{P^D} = \frac{\$^F}{P^F} \tag{2}$$

or equivalently,

$$m^D = m^F \tag{3}$$

where m^D and m^F are defined as real money of domestic and foreign countries respectively.

In attempting to relate the real money to trade balance, we allow the nominal exchange rate and aggregate prices to fluctuate according to market forces, and assumed that as long as Equation (3) holds true, the given level of trade balance will remain unchanged. This is to say

that it is the inequality of Equation (3) that gives rise to changes in trade balance. Accordingly, our proposition is postulated as follows:

Suppose the real money of a country is less than that of Japan in value, notably $m^D < m^F$, *then the country's trade balance improves.*

The economic logic of this hypothesis is that whenever the real money of a domestic country is less than the real money of Japan, domestic currency will end up with a relatively lower purchasing power as compare to Japan's currency. As such, domestic goods and services would seem cheaper in the eyes of Japanese, thereby increasing their tendency to import more goods and services from domestic country. On the other hand, domestic citizens will buy less goods and services from Japan, which are deemed more expensive. The end result of lower purchasing power of domestic currency is the improvement of domestic trade balance with respect to Japan. By the same token, a domestic country's trade balance will deteriorate if its real money is more than that of yen's real value.

The theoretical aspect of trade balance-real monies relationship, which provides foundation for our proposition, will be formally derived shortly, while the viability of our proposition is examined in Section V.

Trade Balance as a Function of Real Monies

It is well known that trade balance (T) is a function of real exchange rate (q), domestic output (Y^D) and foreign output (Y^F); see for example Rivera-Batiz and Rivera-Batiz (1994: 336-337). Mathematically, we may write the trade balance function as:

$$T = T\,(q\,,\ Y^D,\ Y^F) \tag{4}$$

where q is defined as $\frac{eP^D}{P^F}$. From Equation (1), q may be further expressed as a function of real monies, as shown below:

$$q = \frac{\$^F}{\$^D}\cdot\frac{P^D}{P^F} = \frac{\$^F}{P^F}\cdot\frac{\$^D}{P^D} = m^F \cdot m^D = q\,(m^F,\ m^D) \tag{5}$$

Note that the quantity theory relationship (Froyen, 1993: 242) states that output (Y) is a function of real money (m), that is:

$$Y = Y\,(m) \tag{6}$$

Substituting Equation (5) and Equation (6) into Equation (4), we obtain

$$T = \mathrm{T}\,(q\,(m^F,\ m^D),\ Y^F\ (m^F), Y^D\ (m^D)) \tag{7}$$

Upon simplification, we arrive at

$$T = T\,(m^F,\ m^D) \tag{8}$$

Expressing Equation (8) in terms of changes (Δs),

$$\Delta T = \Delta T (\Delta m^F , \Delta m^D) \tag{9}$$

Equation (8) postulates that trade balance is a function of real monies of domestic country (m^D) and her trading partner (m^F), whereas Equation (9) suggests that changes in trade balance (ΔT) is a result of changes in real money of domestic country (Δm^D) as well as that of her trading partner (Δm^F). It is this last equation that provides us theoretical justification for our real money effect proposition in this section.

V. EMPIRICAL DATA ANALYSIS

In this section, we estimate the long-run equilibrium of nominal exchange rate based on the PPP hypothesis. This is accomplished by regressing the nominal rate on the relative prices, proxied by relative Consumer Price Indices (CPIs) of Japan and the ASEAN countries. The estimated results (dotted lines) are plotted in Figure 3, together with the observed nominal exchange rates (continuous lines).

It is noteworthy that if the observed rate is more than its PPP equilibrium (graphically, the dotted line is above the continuous line) for a particular ASEAN country, we have

$$\frac{\$^F}{\$^D} > \frac{P^F}{P^D} \tag{10}$$

By rearranging Equation (10), we obtain

$$\frac{\$^F}{P^F} > \frac{\$^D}{P^D} \tag{11}$$

or equivalently,

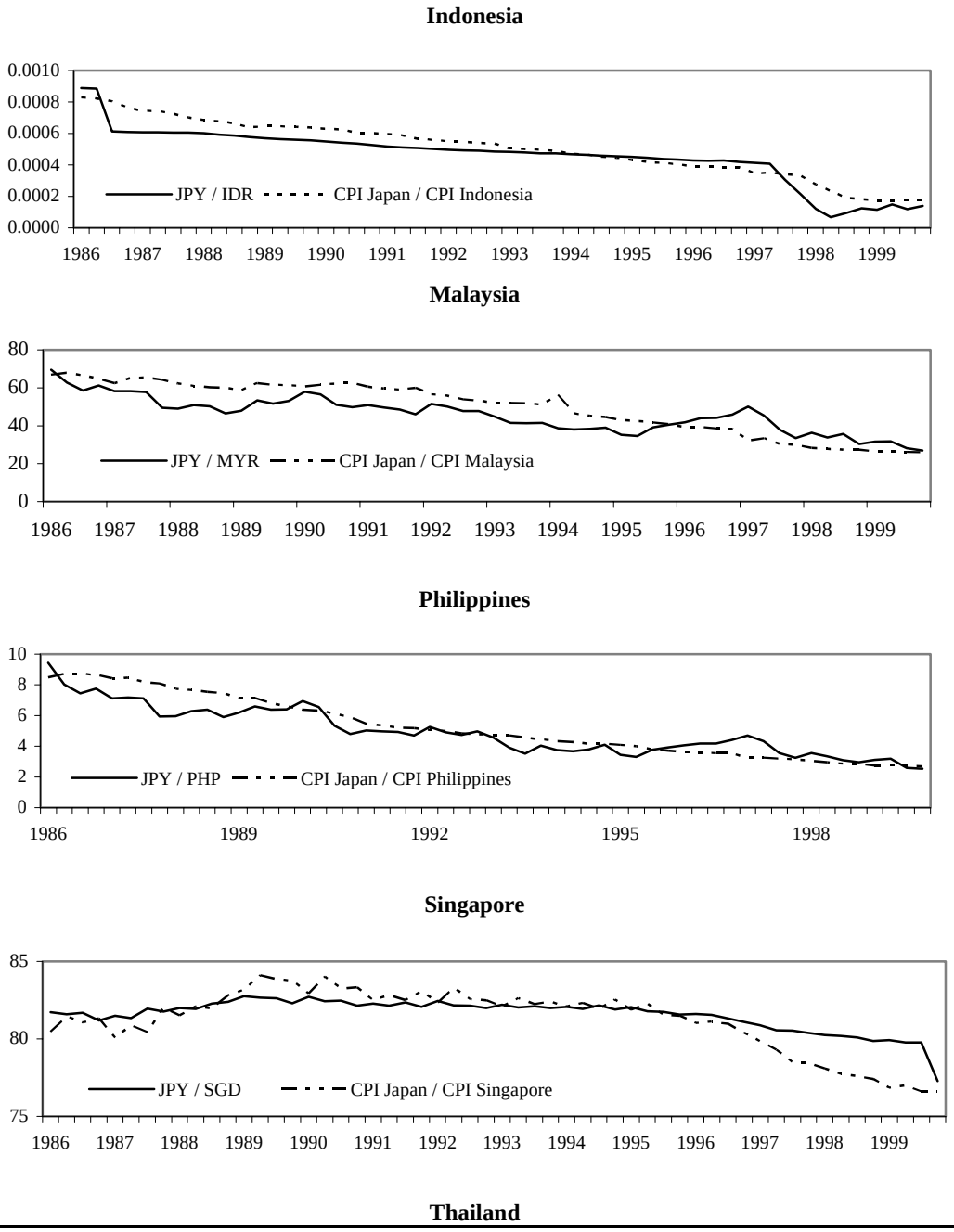
$$m^F > m^D \tag{12}$$

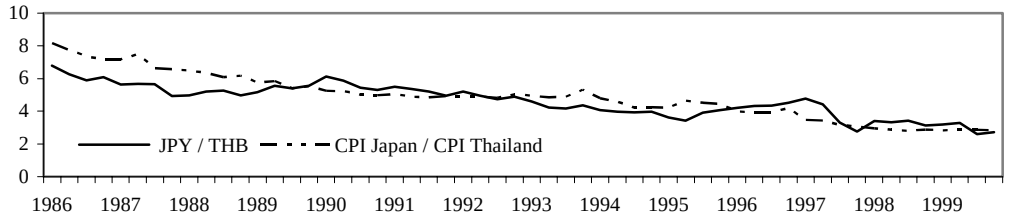
The inequality of Equation (12) implies that the real money of yen is more than that of the domestic country in value. As such, domestic trade balance tends to improve by our real money effect proposition. Similarly, if the observed rate is below its equilibrium (graphically, the dotted line is below the continuous line) for a particular ASEAN country, it implies that the real money of domestic country is more than that of yen in value. As such, the domestic trade balance tends to deteriorate.

Visual inspection of Figure 3 suggests that our proposition is supported by the empirical data of ASEAN-5 economies. For illustration, the real money of Malaysian ringgit is greater than that of yen from 1980 to 1995 (as indicated by the dotted line above the continuous line) and this is correctly reflected by the deterioration in Malaysian trade balance with respect to Japan, as shown by the downwards-sloping trend of Figure 2 within this period. For the period post 1995, the real money of Malaysian ringgit is smaller than that of yen (Figure 3, the dotted line is below the continuous line) and this is also correctly reflected by the improvement in Malaysian trade balance with respect to Japan in the same period as shown in

Figure 2. Thus, it is obvious that our real money proposition could provide satisfactory explanation for the observed trade balance behaviour during the study's sample period. Similar conclusion can be drawn by contrasting Figures 2 and 3 for other ASEAN economies, with the exception of Indonesia, in which the relationship is not clearly shown.

Figure 3
ASEAN-5 Exchange Rates and CPI Ratios





VI. CONCLUDING REMARKS

This study addresses the question of whether exchange rate changes have any significant and direct impact on trade balance. While the elasticity model of the balance of trade (Krueger, 1983) has shown the existence of a theoretical relationship between exchange rate and the trade balance, the empirical results on this relationship have been ambiguous. By examining the trade balances between ASEAN-5 countries and Japan for the sample period from 1986 to 1999, this study found that the role of exchange rate changes in initiating changes in the trade balances has been exaggerated. It is widely expected that the depreciation of ASEAN-5 exchange rates with respect to Japanese yen would improve these economies' trade balances with Japan during the sample period of study. In reality, the trade balances of these economies generally deteriorate from 1986 to 1995 (with the exception of Indonesia in which the trend is less clear), before the improvement in trade balances is actually observed. One important implication from these results is that devaluation-based adjustment policies may not achieve the desired effects of nominal exchange rate changes (devaluation) on the balance of trade. In other words, exchange rate cannot be used solely in managing the external balances of these ASEAN countries.

An alternative explanation to the observed behaviour of ASEAN-5 trade balances in the selected sample period has been postulated. We have shown mathematically that trade balance is affected by real money, rather than the nominal exchange rate. Thus, we propose that trade balance of a country will improve if its real money is less than that of Japan in value. The economic logic of this hypothesis is that whenever the real money of a domestic country is less than the real money of Japan, domestic currency will end up with a relatively lower purchasing power as compare to Japan's currency. As such, domestic goods and services would seem cheaper in the eyes of Japanese, thereby increasing their tendency to import more goods and services from domestic country. On the other hand, domestic citizens will buy less goods and services from Japan, which are deemed more expensive. The end result of lower purchasing power of domestic currency is improvement of domestic trade balance with respect Japan. By the same token, a domestic country's trade balance will deteriorate if its real money is more than that of yen's real value.

Our empirical data analysis suggests that the real money effect proposition could consistently explain the observed trade balances in Malaysia, Singapore, Thailand and the Philippines during the period of study, with respect to Japan. Thus, in order to cope with trade deficits, the governments of these ASEAN countries might resort to policy measures focusing on the variable of real money, which is the ratio of nominal money to aggregate price level. On the other hand, for devaluation-based adjustment policies (effected through nominal exchange rate) to achieve the desired effects on trade balance, it must be supplemented by stabilisation policies to ensure domestic price stability (Singh, 2002). Once again, it is important to stress that exchange rate cannot be used solely in managing the external balances of these ASEAN countries.

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