EFFECT OF EXCHANGE RATE CHANGES ON TRADE BALANCE AND DOMESTIC PRODUCTION IN MALAYSIA

By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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This thesis attempts to investigate the effect of exchange rate changes on the bilateral trade balance and the domestic production of Malaysia. The first issue of this study examines the impact of exchange rate changes on the bilateral trade balance of Malaysia with its 6 major trading partners. Most of the previous studies that have assessed the short-run and the long-run effects of exchange rate changes on trade balances relied upon linear adjustment processes with assorted outcomes. However, the recent innovations in the co-integration analysis has allowed for estimations from the perspective of a nonlinear relationship. In this study, the appreciation is separated from depreciation of exchange rate through the partial sum concept and thereby nonlinearity is introduced into the model to demonstrate the asymmetric effect of exchange rate changes on the bilateral trade balance. By applying the nonlinear ARDL method of Shin *et al.* (2014), the results discover short-run and long-run asymmetric effects of exchange rate changes on the Malaysian trade balance, particularly with China, Hong Kong, Singapore and the US. Several policy implications can be derived from the findings such as bilateral level studies give out more country-specific findings and the nonlinear model plays an important role in differentiating the effects of appreciations from depreciations.

The second issue, investigates the effects of exchange rate changes on the domestic production of Malaysia. Currency depreciation is expected to have positive or negative effects on domestic production. By separating ringgit appreciation from its depreciation using the partial sum concept, nonlinearity is introduced into the model to show that the effect of exchange rate changes on domestic production is asymmetric. Using the nonlinear ARDL model of Shin *et al.* (2014), the results show that the exchange rate changes do have asymmetric effect on the domestic production. In the short-run, both ringgit

appreciation and depreciation have expansionary effects. Meanwhile in the long-run, ringgit appreciation appeared to be contractionary while ringgit depreciation expansionary. This suggests that exchange rate played a key role in Malaysian domestic production process. The policy implications derived from this study are that the monetary and fiscal policies have been fruitful in developing the domestic output, the supply side are crucial in reducing cost of productions and the government should policies that can monitor the exchange rate behavior.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KESAN PERUBAHAN KADAR PERTUKARAN MATAWANG TERHADAP KESEIMBANGAN PERDAGANGAN DAN PENGELUARAN DOMESTIK DI MALAYSIA

Oleh

FARWEEN BINTI KAMALUDDIN

Disember 2020

Pengerusi : Mohd Naseem Niaz Ahmad, PhD
Fakulti : Sekolah Perniagaan dan Ekonomi

Tesis ini cuba mengkaji kesan perubahan kadar pertukaran terhadap keseimbangan perdagangan dua hala dan pengeluaran domestik Malaysia. Isu pertama kajian ini mengkaji kesan perubahan kadar pertukaran pada keseimbangan perdagangan dua hala Malaysia dengan 6 rakan dagang utamanya. Sebilangan besar kajian terdahulu yang menilai kesan jangka pendek dan jangka panjang perubahan kadar pertukaran matawang pada keseimbangan perdagangan bergantung pada proses penyesuaian linear dengan pelbagai penemuan hasil kajian. Walau bagaimanapun, inovasi terkini dalam analisis kointegrasi, telah memungkinkan untuk membuat anggaran dari perspektif hubungan yang tak linear. Dalam kajian ini, naik nilai dipisahkan daripada susut nilai kadar pertukaran melalui konsep jumlah separa dan dengan itu, anggaran tak linear diperkenalkan ke dalam model untuk menunjukkan kesan asimetrik perubahan kadar pertukaran pada keseimbangan perdagangan dua hala. Dengan menggunakan kaedah ARDL tak linear Shin et al. (2014), hasilnya mendapati kesan asimetri jangka pendek dan jangka panjang perubahan kadar pertukaran terhadap imbangan perdagangan Malaysia, terutamanya dengan China, Hong Kong, Singapura dan AS. Beberapa implikasi dasar dapat diperoleh daripada penemuan seperti kajian peringkat dua hala memberikan lebih banyak penemuan berdasarkan negara dan model tak linear memainkan peranan penting dalam membezakan kesan naik kadar nilai daripada penyusutan.

Isu kedua, mengkaji kesan perubahan kadar pertukaran terhadap pengeluaran domestik Malaysia. Susut nilai mata wang dijangka memberi kesan positif atau negatif terhadap pengeluaran domestik. Dengan memisahkan naik nilai ringgit daripada susut nilai menggunakan konsep jumlah separa, anggaran tak linear diperkenalkan ke dalam model untuk menunjukkan bahawa kesan perubahan

kadar pertukaran pada pengeluaran domestik adalah tidak simetri. Menggunakan model ARDL tak linear Shin *et al.* (2014), hasilnya menunjukkan bahawa perubahan kadar pertukaran mempunyai kesan tidak simetri terhadap pengeluaran domestik. Dalam jangka masa pendek, naik nilai dan susut nilai ringgit mempunyai kesan pengembangan. Sementara itu dalam jangka masa panjang, naik nilai ringgit kelihatan mengecut sementara susut nilai ringgit mengembangkan pengeluaran domestik. Ini menunjukkan bahawa kadar pertukaran matawang memainkan peranan utama dalam proses pengeluaran domestik Malaysia. Implikasi dasar yang diperoleh dari kajian ini adalah bahawa dasar kewangan dan fiscal telah membuahkan hasil dalam mengembangkan keluaran domestic, sisi penawaran sanagat penting dalam menurunkan kos produksi dan kerajaan harus membuat dasar yang dapat memantau susut naik nilai tukar.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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Date: 12 August 2021

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I hereby confirm that:

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LIST OF ABBREVIATIONS

AD	Aggregate Demand
ADF	Augmented Dickey Fuller
AIC	Akaike's information criterion
ARDL	Autoregressive Distributed Lag
AS	Aggregate Supply
CPI	Consumer Price Index
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Squares
ECM	Error Correction Model
G	Government Expenditures
GDP	Gross Domestic Product
IFS	International Financial Statistics
LM	Lagrange Multiplier
IMF	International Monetary Fund
M	Monetary Policy
ML	Marshall-Lerner
M2	Broad Money Supply
MYR	Malaysian Ringgit
NARDL	Nonlinear Autoregressive Distributed Lag
NEG	Partial sum of negative changes
NER	Nominal Exchange Rate
OP	Oil Price
POS	Partial sum of positive changes

PP	Phillips Perron
RER	Real Exchange Rate
AD	Aggregate Demand
ADF	Augmented Dickey Fuller
AIC	Akaike's information criterion
ARDL	Autoregressive Distributed Lag
AS	Aggregate Supply
CPI	Consumer Price Index
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OP	Oil Price

POS	Partial sum of positive changes
PP	Phillips Perron
RER	Real Exchange Rate
REER	Real Effective Exchange Rate
RESET	Ramsey's Test
TB	Trade Balance
USD	United State Dollar
W	Wage Rate
WDI	World Development Indicator
$Y^{Malaysia}$	Malaysian Income
Y^{f}	Partner's Income

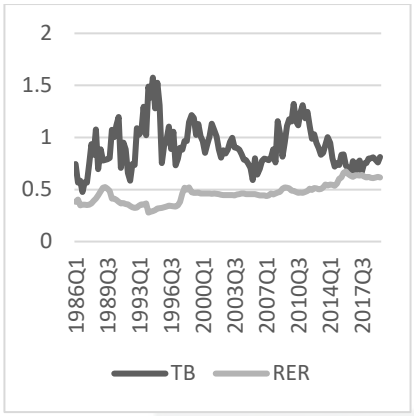
CHAPTER 1

INTRODUCTION

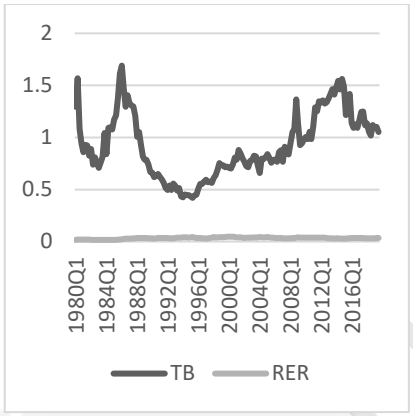
1.1 Research Background

Ever since the Nixon Shock took place in 1971, currencies from all over the world are allowed to become free-floating. In other words, nations are allowed to reevaluate or devaluate their currencies based on the demand and supply of foreign exchange market. Moreover, after the Asian Financial Crisis (AFC) occurred back in 1997, many nations have been experiencing massive exchange rate floatation. Exchange rate changes have been often linked up with several major indicators such as exports, imports, consumptions and trade balance. Most researchers widely focus on these scopes (Duasa (2009), Alotaibi (2016), Dincer and Kandil (2009), Iyke and Ho (2019) and; Bahmani-Oskooe and Xi (2014)). However, there are fewer studies conducted on indicators such as the domestic output. Currency depreciation (appreciation) are predicted to make exports cheaper (expensive) and imports expensive (cheaper) by modern theorists which will eventually improve (deteriorate) the nation's trade balance and domestic output. However, in the case of trade balance, this process will not occur immediately due to some rigidity such as the terms of trade (ToT), where a fall in ToT implies that the country concerned will now use more exports to buy the same quantity of imports. This short-term reduction before an increase in the trade balance is called the "J-curve" effect.

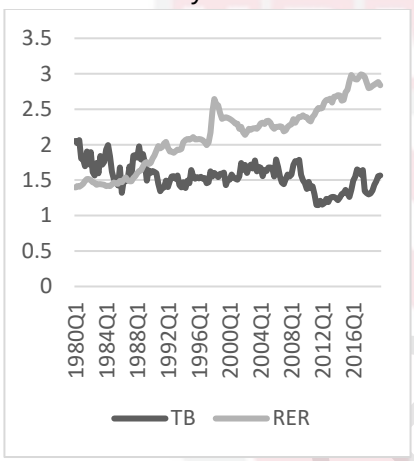
According to Magee (1973), a temporary deterioration of the trade balance in the short term due to currency depreciation or devaluation before improving in the long term is known as the J-curve phenomena. This was claimed to be due to the lag structure by Bahmani-Oskooee (1985). The findings for J-curve effects are found to have some mixed results in some studies. Bahmani-Oskooee and Halicioglu (2017) found that Turkey did not exhibit any "J-curve" pattern with only five out of its 11 trading partners. Meanwhile, in another similar study conducted by Bahmani-Oskooee *et al.* (2017), it was found that the "J-curve" effect was prominent only in its model with Canada, U.S. and Malaysia out of its 11 trading partners. Hence, in order to reduce the bias, Halicioglu (2007, 2008b) estimated bilateral trade balances between Turkey and its partners using different co-integration methods based on Rose and Yellen's (1989) approach. Thus, it can be said that the bilateral trade balance between countries responds differently to the exchange rate movement.



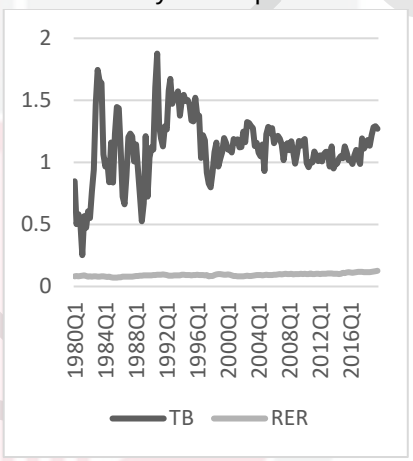
Malaysia - China



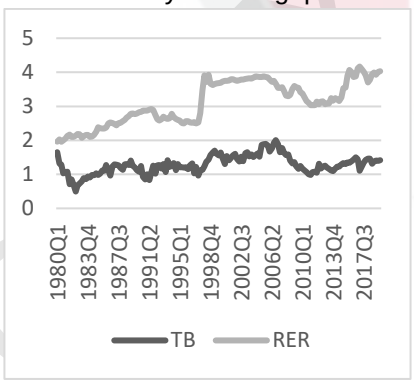
Malaysia - Japan



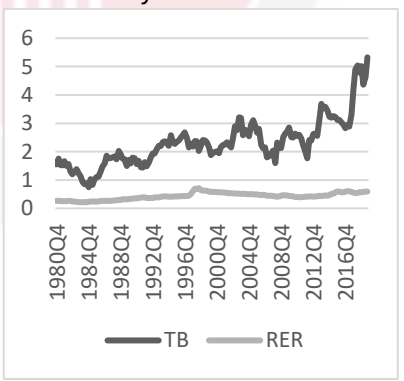
Malaysia - Singapore



Malaysia - Thailand



Malaysia - the United States



Malaysia - Hong Kong

Figure 1.1: Plot of Malaysia's trade balance with each partner

Figures 1.1 demonstrates the evolution of bilateral exchange rates and trade balance of Malaysia with its six major trading partners over the study

period. Based on the figures, it can be said that depreciation improved the trade balance only in the case of Malaysia-US, deteriorated the trade balance in the case of Malaysia-China and Malaysia-Singapore. Meanwhile, no prominent relationship could be seen in the case of Malaysia-Japan, Malaysia-Thailand and Malaysia-Hong Kong. According to theories, exchange rate depreciations improve the trade balance whilst appreciation deteriorates it. This is why it seems to be necessary to concisely explore some ideas on the relationship between these two variables for the case of Malaysia and its partners in order to assist policymakers in constructing policies.

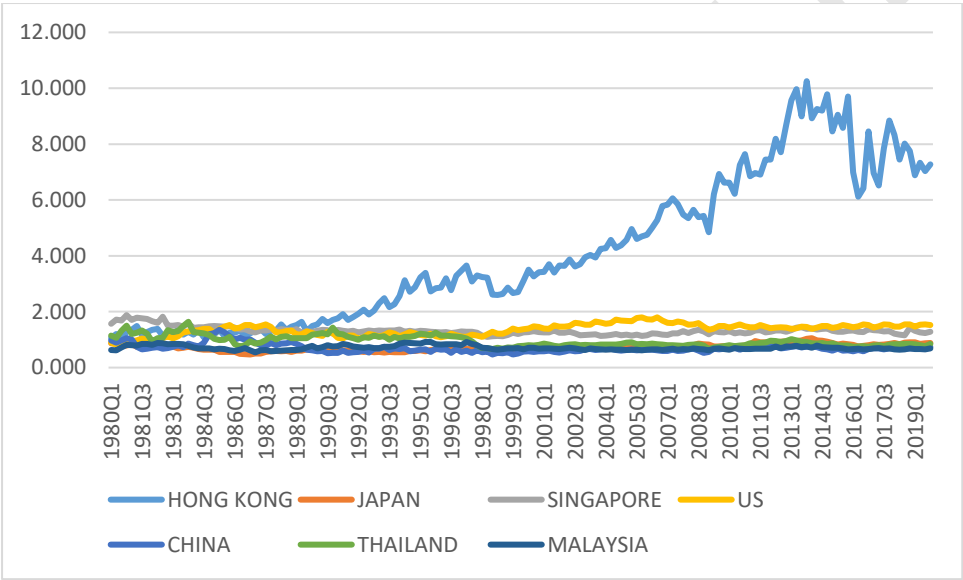


Figure 1.2: The trade balance of Malaysia and its major trading partners

Based on figure 1.2, the trade balance of Hong Kong depicted fluctuations throughout the study period. Hong Kong's trade surplus soared highly till year 2013 and began decreasing slightly years after. Meanwhile, the trade balance of the remaining partner countries as well as Malaysia did not show any significant large trade surpluses. Those countries maintained a steady trend of trade surplus.

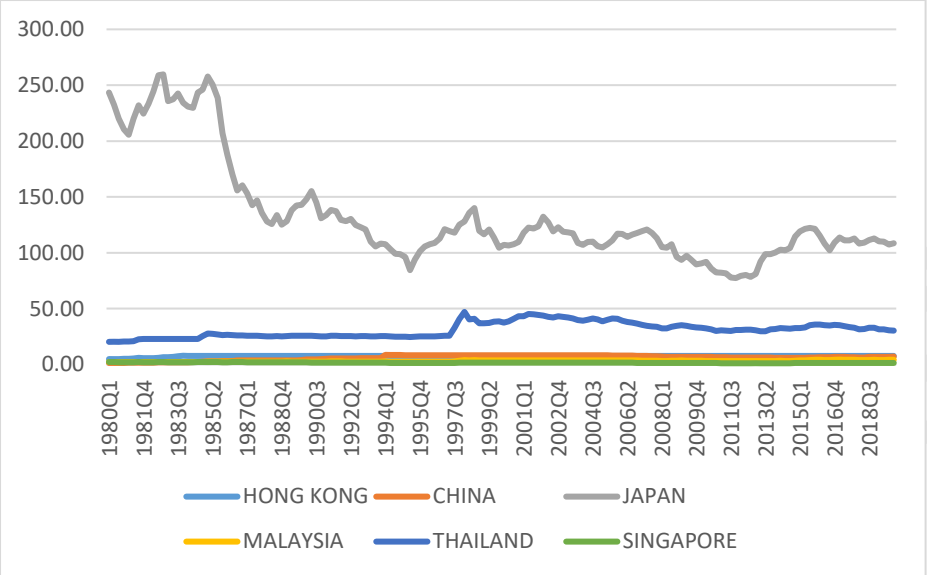


Figure 1.3: The real bilateral exchange rate of Malaysia and its major trading partners

On the other hand, based on figure 1.3, the real bilateral exchange rate (RER) of all the trading partners of Malaysia except Japan depicted a steady trend over the period. Their exchange rates remained around the same value. Meanwhile, Japan depicted a highly volatile RER throughout the study period. The trend shows an overall appreciating exchange rate with slight depreciations with the highest in mid 1980s. The RER of the vehicle currency namely the US is not depicted in the figure as it remains fixed at 1.

Meanwhile, domestic productions are often related to exchange rates because it involves supply and demand to and from partner countries which basically depends on the price of the goods produced. The effect of exchange rate changes on domestic production can be easily determined by referring to the aggregate demand (AD) and aggregate supply (AS) models. Many nations usually allow their currencies to depreciate expecting increase in their exports which will eventually increase the aggregate demand and hence the production. In short, depreciation will be expansionary. This is only possible for an export-oriented economy. Meanwhile, in the case of an import-oriented economy, depreciation would increase the cost of imported goods and eventually hurt the aggregate supply leading to an increase in the cost of production and hence the domestic production will decline. If the aggregate supply declines more than the increment in aggregate demand, then the depreciation will be contractionary. In short, devaluation stimulates aggregate demand but at the same time it also hurts the aggregate supply. Therefore, these predictions give out ambiguous results for currency depreciation. The idea of

"contractionary devaluations" was formerly introduced by Alexander back in year 1952 as he assumed devaluations to be inflationary. As inflation arises, consumption declines and eventually domestic output also declines. According to Chou and Chao (2001), Rajan and Shen (2006) and Bussiere *et al.* (2012), contractionary devaluations are common in developing countries.

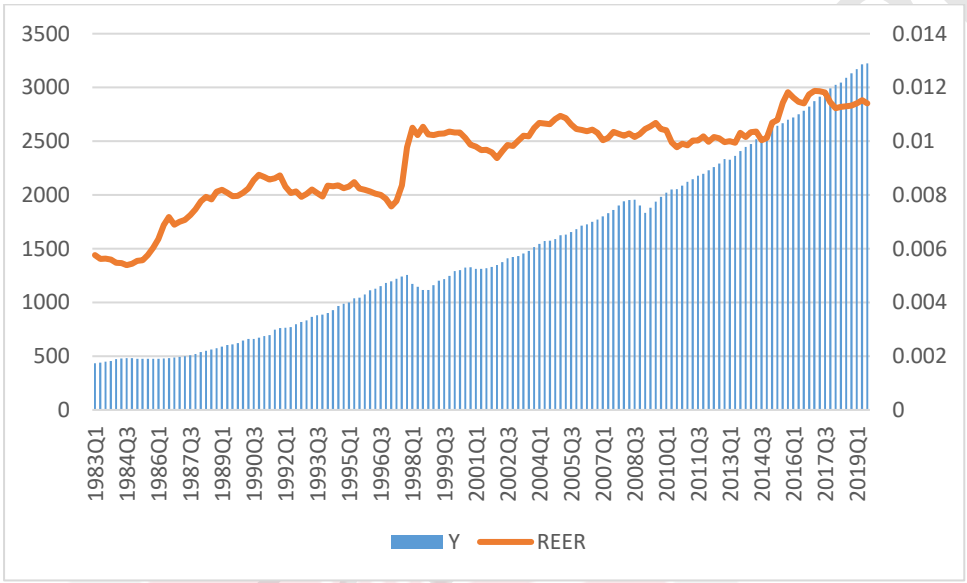


Figure 1.4: The domestic production in Malaysia

The domestic production in Malaysia is prone to the real effective exchange rate (REER). Figure 1.4 demonstrates the evolution of domestic productions in Malaysia and REER over the study period. This verifies that both domestic production and REER depicted an overall increasing trend except during the 1997 Asian Financial Crisis.

1.2 Problem Statement

Changes in exchange rates affects both the domestic production and also the trade balance simultaneously. A trade surplus indicates positive trade balance and trade deficit indicates negative trade balance. Trade balances are often linked to domestic productions because the expenditure method in calculating a nation's gross domestic product (GDP) incorporates trade balance, where a surplus increase whereas a deficit reduces the nation's GDP. In other words, the trade balance portrays the micro effect of exchange rate changes on a nation whereas the domestic production portrays the macro effect. Thus, it would be more enlightening if this study incorporates both the macro and micro scope.

The effect of exchange rate on trade balance and domestic output have been extensively debated through array of econometric techniques. Even though, most of the studies that engaged in this research area that focuses on the linear relationship have yet to reach a real consensus. Disputably, the impact of exchange rate on trade balance and domestic output appeared to be at variance depending on appreciation or depreciation of exchange rate. Basically, the nonlinear relationship in the exchange rate-macroeconomics cannot be discounting, which could potentially be misspecified, which are biased.

Trade balances and domestic productions are closely related to demand. The demand for product and services is the most crucial element of international trade. Meanwhile, on the other hand, the demand for a certain product or services highly depend on exchange rates. When the exchange rate of an exporting country depreciates, the demand for its products will increase. Higher demand will lead to higher production and hence higher export rate. Increasing exports rate will then eventually improve the nation's trade balance. Thus, in such situation, a change in exchange rate impacted both the domestic production and then the trade balance. in other words, export increases whilst import reduces a nation's trade balance.

In addition, study on the asymmetric effect of exchange rate on trade balance and domestic output, specifically among developing economies like Malaysia seems to be limited and inadequate. Indeed, a number of studies may have also suffered from aggregation biasness as most of past studies centered on panel observations to what extent lead to a heterogeneity problem, which are biased Bahmani-Oskooee and Malixi (1992), Brada et al. (1997), Akbostanci (2004), and Bahmani-Oskooee and Kutan (2009). Therefore, there is a need to address the issue of time series nonlinear effect of exchange rate changes on the trade balance and domestic output, specifically for open economy namely Malaysia, which actively relies on its external sector as main engine of economic progress.

There have been several studies conducted to examine the response of exchange rate changes on domestic production. Based on the aggregate demand and aggregate supply model, the expected direction of movement of the domestic output can be easily determined. A depreciation reduces consumption and increases net exports of the aggregate demand. If the decline in consumption is more than offset by the increment in net exports, the aggregate demand could expand. However, depreciation also increases the cost of imported inputs which might decline the aggregate supply. Hence, the definitive impact of a depreciation on the domestic production of different nations can only be determined through empirical analysis.

For the growth of an economy to be stable in the long term, it is crucial for the trade and foreign exchange markets to be stable as well in order to guarantee a stable exchange rate system and terms of trade. However, exchange rate fluctuations often affect the domestic production. For developing countries like Malaysia, exchange rate changes adversely affect the tradable goods by lowering producers' real prices.

Currency depreciation affects both factors in the same way. However, this might not hold on different countries with different economic status. For instance, the exchange rate effect on USA might not be the same for other developing countries such as Malaysia. Thus, this brings us to the issue of this study; how does exchange rate changes affect the bilateral trade and domestic production in Malaysia. Exchange rates and its regimes play an important role in emerging economies. Economists and policymakers have different views on the impact of exchange rates on growth. Politicians are convinced that lower exchange rate triggers growth whereas economist are unconvinced that the currencies may drive growth in the long-run. Economists believe exchange rates to be an endogenous variable, where their contribution could be hard to be disentangled. Query on whether engineering an exchange rate depreciation aids in growth is still uncertain. Thus, this thesis aims contribute to the present literatures by shedding some lights for the exchange rate designs and also the international monetary system.

1.3 Objective of the Study

The general objective of this study is to investigate the effect of exchange rate changes on trade flows and output level of Malaysia. Particularly, the specific objectives are as follows:

1. To investigate the effect of exchange rate changes on the trade balance.

2. To examine the effect of exchange rate changes on the domestic production.

1.4 Significance of the Study

This study attempts to contribute to the development of the knowledge in several manners. First, this study contributes empirical evidence on the scant studies on the perspective of asymmetric analysis through the developing countries i.e. Malaysia that heavily depend on external sector as its main driver of economic growth. Second, this study may have not suffered from aggregation biasness as this study pays attention on single time series analysis, specifically focus on the case of Malaysian bilateral

trade balance model and Malaysian domestic output model. In addition, this study also considers both sides of aggregate demand and aggregate supply into the model of domestic output, which considered to be more comprehensive analysis. Finally, this study considers to be more extensive and may draw robust results as the study sample period is sufficiently large that spans over the year 1980 - 2019. Hence, the findings obtained in this study may lead to a new dimension to the literature by bridging the gap and shedding some light on the effect of exchange rate changes on trade balance and domestic output, particularly for a relatively small stock of evidence, namely Malaysia.

1.5 Organization of the Study

This thesis is designed based on the empirical chapter format; where Chapter 1 provides an introduction of this thesis. Chapter 2 provides the literature review, which is divided into two parts; first, review of related literature on exchange rate and bilateral trade balances followed by the review of literature on exchange rate and domestic production. Chapter 3 discusses the effect of exchange rate on the bilateral trade balances of Malaysia, the estimation methodology used and its empirical results. Chapter 4 discusses the effect of exchange rate on the domestic production of Malaysia, the estimation methodology used and the empirical results. Finally, Chapter 5 incorporates the summary of this thesis and concludes all the findings, ending with some future research recommendations.

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