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The Impact of Tariff Reductions on Real Imports in Malaysia from 1980-2010: An Empirical Study

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マレーシアの関税削減と輸入の関係：1980－2010

モハマド　ジュイタ　ビンティ*

Abstract

This paper investigates the long run relationship of drastic tariff reductions on the real imports from 1980 - 2010 in Malaysia using the Johansen cointegration analysis. Time series data for eight sectors according to the Standard International Trade Classification were compiled. A dynamic vector error correction model is used to overcome the limited number of observations for each of the sectors. A log linear regression is run for each sector to test the effects of income, domestic price, import price, tariff rates on real imports in each of these sectors. With the independent variables selected, it is expected that as imports increase, income and domestic price increase, while import price and tariff rates decrease. The results from the regression exercise are mixed. It is observed that those sectors with expected negative signs for the tariff rate coefficient, are basic necessity goods sectors. The import demand for sectors with basic necessity goods has an expected relationship with the changes in tariff rates compared to the manufactured goods sectors, which exhibits an unexpected positive sign in its relationship. For the latter group, tariff rates and imports have a positive relationship suggesting that locally made manufactured products are able to perfectly substitute imported ones due to FDI spillover effects in the sector. This interpretation is appropriate for the case of Malaysia, whereby manufacturing activity is the main driver of its domestic economy since the early 1990s. This study is beneficial to determine the changes of import pattern of each sector in the wake of drastic tariff cuts.

Key words: tariff reductions, real imports, Stolper-Samuelson theorem, domestic price, import price, Malaysia

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1. Introduction

As the world economy shifts into a more globalized era, presently every developing nation is harnessing their resources in an effort to take part in a more free trade regime. Globalization promotes the practice of free trade and it is believed to promote a more levelled playing field in the world market, as tariff rates are driven down to near 0%. In other words, protectionism policy is at the brink of extinction with the rise of globalization. Globalisation in the long run, rewards efficient producers the competitive advantage that ensures its position in the global market. Even with the promise of more wealth and ensuring increased welfare for all, the issue of increased competition domestically in the midst of trade liberalization for both developed and developing nations, are widely discussed. In his book Making Globalization Work (2006), Stiglitz emphasized that with globalization, "Everyone was supposed to be a winner - those in both developed and the developing world. Globalization was to bring unprecedented prosperity to all."

Even Adam Smith, 1776 promoted the idea of free trade[i]. Here was how he put it at that time:

It is the maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy.. . . If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage.

With all of the advantages of free trade, however some economists are sceptical about the downside of globalisation which includes increased competition in the domestic economy which can lead to the absolution or demise of local businesses. With the world as one big market, local producers are forced to compete with cheaper imported goods or higher quality products. The survival of the fittest is being tested in today's economic environment, with more pressure being put not only onto business, but nations as well.

Malaysia, a small open economy, in the South East Asian region, is taking this threat and turning it into an opportunity. The ASEAN bloc has become the hub for intra trade activity. Intra- regional trade has been growing. According to Otsuki, 2011, intra-regional trade for manufactured goods within the ASEAN region has increased to 150 billion USD in 2008 if compared to 70 billion USD in year 2000[ii]. What makes this region a part of the world engine of economic growth nowadays, is that as we increasingly trade intermediary goods among ourselves in the assembly process of commodi-

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i Taken from the Concise Encyclopedia of Economics, http://www.econlib.org/library/Enc/FreeTrade.html

ii Statistics were taken from the paper by Otsuki, 2011 at http://www.osipp.osaka-u.ac.jp/archives/DP/2011/DP2011E006.pdf

ties, we also import and re-export the goods, outside the region to China, the US and Europe as end users for our products. This activity is how we are known as the entrepot center.

Due to the importance of this intra trade activity as the driver of the nation's economy, it is important to examine the effects of the reduction of tariff rates on real imports. Does the reduction of tariff rates lead to increased imports in all sectors in the Malaysian economy? Or does reduction of tariff rates only lead to increased imports in certain sectors? What are the other variables which are influencing imports? This research is a timely study because of the policy implications it brings. If tariff rate reduction leads to increased imports, (hence increased exports in the case of entrepot Malaysia), then policies aiming at tariff reduction will be very appropriate. However if this is not the case, policy makers need to understand the behaviour of import determinants to create precise and timely policies in boosting imports. The study will take a look at the behaviour of these variables in different sectors according to the segregation of Standard Industrial Trade Classification, Revision 3 at one digit level[iii]. The paper examines how reduction in tariff rates affect the demand for real imports in selected sectors in a small, open, developing economy of Malaysia using time series data from 1980 to 2010.

2. Background on Tariff Reduction through AFTA and WTO Initiatives

Before going into the theory of international trade, which highlights the benefits of international trade (both importing and exporting activities), let us first take a look at the evolution of trade liberalization in Malaysia and its commitment, both as an ASEAN and GATT/WTO member country.

On the 8th of August 1967, an agreement was drawn up between the six main Association of Southeast Asian Nations (ASEAN) members, which were Indonesia, Malaysia, the Philippines, Singapore and Thailand. In their vision ASEAN would represent, "the collective will of the nations of Southeast Asia to bind themselves together in friendship and cooperation and, through joint efforts and sacrifices, secure for their peoples and for posterity the blessings of peace, freedom and prosperity" (ASEAN Agreement). It is with that basic drive of cooperation and joint efforts, ASEAN Free Trade Area (AFTA) came about in year 1992. The primary goals of AFTA were to, "increase ASEAN's competitive edge as a production base in the world market through the elimination, within ASEAN, and to attract more foreign direct investment to ASEAN" (AFTA Agreement). AFTA has come a long way in changing trade patterns in Malaysia and the South East Asian region. As from year 2002, it is now in full

[iii] For a more information please visit http://unstats.un.org/unsd/cr/registry/regcst.asp?cl=14

swing, aiming to promote the region's competitive advantage as a single production unit. Even though specific rules and priorities are given for the elimination of tariff mainly for manufacturing and agriculture products in member countries, the non-tariff barrier is also expected to promote greater economic efficiency, productivity, and competitiveness. The region more than ever focuses in promoting a more levelled playing field for its member countries. When full trade liberalization is achieved, the area could not only be beneficial for the 10 member countries but also holds attractiveness for trading partners all around the world[iv].

Malaysia is also a founding member of the WTO, having a legacy as a member of the GATT since 1957. Through active participations in WTO negotiations, Malaysia continues to ensure that trade regulations and trade measures that are negotiated are fair and provide the flexibility for Malaysia to continue its development policy[v]. To date, under the commitment of GATT/WTO, the average MFN applied tariff rates for Malaysian goods are down to 8.8% in year 2010 compared to 11.3% in year 1995[vi]. This shows the continuous effort and commitment of Malaysia as a WTO member and how tariff rate reductions are not only induced by the ASEAN bloc agreement regionally but also the commitments of the GATT/WTO at an international level.

3. The Theory

The issue of trade liberalization is highlighted by the workhorse model of international trade, the Heckscher-Ohlin (1933) model, and its companion, Stolper-Samuelson (1941) theorem. The Hecksher-Ohlin model predicts that under a liberalized trade policy, countries will export goods that use the factor of production intensively which are relatively abundant domestically, and import goods that use the factor of production which are scarce. Additionally, the Stolper-Samuelson theorem links factor prices to product prices. The theorem states that with trade, factor price change can be affected only by product price changes. The mechanism behind this theory is further explained under the assumption that there are two countries with two factors of production, namely labor intensive good and capital intensive good. As price of a good decrease with trade, this will lead to a reduced return to the factor that it uses intensively and increase the return to the other factor. With changes in trade policies gearing towards pro- trade liberalization policies, tariff cuts are implemented, which leads to price changes of goods and factor prices. This theory fits well with the Malaysian case study because as tariff reduction is further implemented, this will lead not only to

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[iv] Information obtained from the ASEAN Secretariat website

[v] Taken from the MITI website, http://www.miti.gov.my/cms/content.jsp?id=com.tms.cms.section.Section_f5694606-c0a81573-78d578d5-759be8c9

[vi] Tariff rates obtained by the World Trade Indicators Report 2010 at http://info.worldbank.org/etools/wti/docs/Malaysia_taag.pdf

price changes of goods but most importantly it will affect the import patterns of these goods.

This 2 by 2 country and factor scenario is still a very simplistic scenario. However for the case of Malaysia it is more complex. Like in any other developing country, exporting activity is very important for the nation as it boosts economic growth through job creation of its workers, increasing wages of the unskilled laborers through demands of these laborers in the exporting commodity sectors and giving the opportunities for producers to access a bigger market outside their domestic market (IMF Publication, 2001).

The export sector is even more closely linked to its import sector as Malaysia is active in re-exporting intermediary goods to other countries outside the region. This fact is highlighted by Otsuki, 2011, in the introduction section. This paints a clear picture that Malaysia`s import is divided into two functions; for end users and for re-exporting purposes. This is why it is important to understand the determinants of imports, as export patterns are closely linked to import patterns, in the re exporting activity in Malaysia. This paper will further highlight the impact of tariff reductions in the wake of trade liberalization on the real imports of different groups of commodity in Malaysia.

4. Literature Review

There are many empirical studies on demand of imports. For example in the case of Malaysia, the studies which are conducted to examine the behaviour of import demand are Mohammad (1980), Semudram (1982), Awang (1988), and the Malaysian Institute of Economic Research (MIER) Annual Model (1990).

Awang (1988) found imports to be inelastic with respect to both income and relative prices with short run elasticities of 0.29 and -0.28 respectively. Using non-stationary data, The MIER Annual Model disaggregated imports into 3 categories: imports of primary commodities, oil and manufactures. Short run income and relative price elasticity of imports of manufacturers are 1.35 and -0.912.

For other countries, a study by Ghafar (1988), further highlights the finding on import demand in Trinidad and Tobago which suggests that exchange rate policies can be used to correct for balance of payments disequilibrium. In the case of the United States, Amponsah and Ofori-Boadu (2006), highlights that by applying a gravity model, the study confirms that devalued currencies of Asian exporters of textile products and liberalization of trade policies have significantly contributed to the increased imports of textile products to the U.S. Implications are derived from the abroagation of the WTO Agreement on Textiles and Clothing (ATC). In the case of the UK, Abbott and Seddighi (1996) found that it is found that there are significant

differences between the long-run elasticities of import demand with respect to the different components of final expenditure, over the period 1972 to 1990.

The studies done using Malaysia as the case study have mostly estimated a traditional import demand function and not the adjusted import demand function, where the dependant variable is the volume of imports, where the independent variables are real income and relative prices. For these studies, the assumption is that data are stationary. These studies were done when cointegration analysis and error correction model were not standard practice for time series analysis. Hence they used OLS regression models or partial adjustment approaches to estimate the import demand function. Granger and Newbold (1974) emphasized that if the stationary assumption is not satisfied, this can lead to spurious regression. Due to this, the OLS results would be unreliable.

Since Malaysia imports only a small share of total world imports, it may be quite realistic to assume that the world supply of imports to Malaysia is perfectly elastic as emphasized in Goldstein and Khan (1985). This assumption is realistic in the case of Malaysia because the rest of the world may be able to increase its supply of exports to this country even without an increase in price.

Economic investigations of import demand highlights that the demand for imports is a function of relative prices and real income as mentioned in Houthakker and Magee (1969), Leamer and Stern (1970), Murray and Ginman (1976) and Carone (1996).

From previous literature review, the traditional import demand function has branched out, to include other independent variables which can affect real import such as tariff rates. Caesar (2011) have used tariff and exchange rate as an extension of the general import demand function to study the determinants of import demand in Zambia. Egwaikhide (1999) have incorporated tariff rates into its import prices, in the empirical study for Nigeria. Karacaovali (2011) has also incorporated tariff rates in its model.

The choice between a linear and log-linear import demand equation is important because the influence of explanatory variables on demand is affected by the functional form. Kmenta (1971) stated that misspecification of the functional form can result in misspecification of the error term and violation of the classical assumptions of the error term. This leads the estimates to be biased.

Previous studies by Khan and Ross (1977), Boylan et. al (1980) and Doroodian et. al (1994) has proven that specification of a log-linear form is preferable when estimating import demand functions.

The author would like to highlight that despite the myriad literature on import determinants of Malaysia and other countries, this research has its own contribution to its existing literature. The author has incorporated tariff variable into the

traditional model, to observe the impact of tariff rates on real imports. This however has never been studied before for the case of Malaysia. This timely research attempts to determine not only the relationship, but also the degree of influence tariff has on behaviour of imports. The author also attempts to observe this relationship not only in the Malaysian aggregate economy as a whole, but also in the disaggregated form of commodity groupings.

5. Data

The variables used for this study are Value of Real Imports, Gross Domestic Product, Domestic Price Index, Import Price Index and Simple Average Tariff Rates. In this paper, import price indexes were constructed using import price data. It is important to note that in this research, import price includes international price, tariff rates and exchange rate components. For analytical purposes of this paper, it is assumed that tariff rates are included in the import price (Sawyer and Sprinkle, 1999). This assumption will be discussed in the methodology section in depth. All of the annual data from year 1980-2010 were supplied by the Department of Statistics Malaysia except for the tariff rates, which were obtained from the WITS website. The real imports variable is based on import value and not quantity as it is more comparable among the goods in a certain sector. The sectors are divided into 9 Standard of Industrial Trade Classification at 1- digit level. The author constructed an index for the real imports for each sector. For a more accurate analysis, the author chose the log form, so that the result of the coefficients of the variables can be interpreted as degree of elasticity. The author has focused her analysis on two levels. Firstly the author observes demand of aggregate import as a whole for Malaysia and secondly, observes the demand of imports for each of the 8 sectors according to the SITC Revision 3 segregation. These sectors are: 0. Food and Live Animals, 1. Beverages and Tobacco, 2. Crude Materials Inedible Except Fuels, 3. Mineral fuels, Lubricants and Related Materials, 4. Animal and Vegetable Oils, Fats and Waxes, 5. Chemicals and Related Products, 6. Manufactured Goods Classified Chiefly by Material, Machinery and Transport Equipment, 7. Miscellaneous Manufactured Articles. Sector 8 which is Commodities and Transactions Not Classified Elsewhere in the SITC will not be included in this study due to lack of sufficient data.

6. Methodology and Findings

This methodology is replicated from the study by Tang T. C. and Mohammad H. A. (2000), which looked at the demand of aggregate import as a whole for Malaysia. Instead of just looking into aggregate imports, the author also uses the same analytical steps in observing the different behavior of demand of imports for the 8 different sectors.

The traditional formula for an import demand function can be specified that relates the quantity of imports demanded to income, the price of imports and the price of the domestic substitute. Import demand at time t is written as below:

$$Mit = f\ (Ydt,\ Pmit,\ Pdit) \qquad (1)$$

where Mit is the quantity of imports demanded for commodity class i (to the ith at one digit level of the Standard International Trade Classification) at period t, Ydt is domestic income, Pmit is the price level for the import commodity class i and , Pdit is the price level for the domestic good i at time t.

The theory of demand suggests that ordinary demand functions are homogenous of degree zero in prices and income. This implies that the absence of money illusion and allows the demand for imports to be expressed as a function of real income and relative prices (Siddique, 1997). Therefore the traditional import demand function can be rewritten as:

$$Mit = g\ (Yt,\ Rit) \qquad (2)$$

Where Yt equals to Ydt/Pdt and represents real domestic income and Rit equals to Pmit/Pdit, which is the price of the ith digit import relative to the domestic price. This equation has the assumption that the effect of 2 price variables on demand will be equal but in opposite directions. Gafar, 1988 explained that the two most common functional forms used in the literature are in the linear and log-linear formulations. In linear terms, the empirical import demand function can be written as:

$$Mit = \delta + \alpha 0 Yt + \beta 0 Rit + \varepsilon it \qquad (3)$$

Where δ is the constant term, $\alpha 0$ is the marginal propensity to import, $\beta 0$ is the import coefficient of relative prices and ε it, is the random error term. From economic theory point of view, it is expected that $\alpha 0>0$. However Goldstein and Khan, 1976 explained that if imports represent the difference between domestic consumption and domestic production of imported goods, production may rise faster (slower) than consumption in response to rise in real income. Due to this, imports could fall (rise) as real income increases, resulting in negative (positive) sign for the coefficient $\alpha 0$.

The author however has constructed an adjusted import demand function, to include the tariff rate variable, T as an extension from the traditional function. Additionally in this adjusted equation, the import price level and domestic price level are disaggregated to relieve the restrictions imposed on the traditional demand function. This disaggregated version of the model is also highlighted by Fullerton, Sawyer and Sprinkle (1999) whereby the authors relax the assumption and separately introduces the composing elements of the relative price. Since the relative import price is

computed as P=[PM*(1 t T)x XR]/PD; the model is formulated as M=f(Y, PM*, PD, XR, T) where PM* is international price, PD is domestic price, XR is exchange rate and T is the import tariff. This assumption is acceptable for this study as tests undergone have shown no multicollinearity problems arising from among the chosen variables.

The author has chosen to disaggregate the log import price and log domestic price, due to the assumption that these prices do not move in the same degree, and also in opposite directions. It is worth to note the importance of the tariff variable in the model. Even though import prices do include exchange rates and tariff rates, the author believes that it is important to see the coefficient of tariff rates separately from the import price components and how it is affecting real imports on its own. The influence tariff rates have on real imports will be beneficial for policy makers especially in constructing/modelling precise and appropriate policies to promote trade - both importing and exporting activities.

For this kind of study both the linear and log linear specifications have been used as highlighted in the literature review section. The author has chosen the latter due to the fact that it is more commonly used. At the end of the day, the selection between these 2 forms of specifications is intuitional based on previous literatures.

With the disaggregation of the two prices, the behaviour of the import prices and domestic prices can be observed, for specific commodity groupings. As log-linear form is mostly adopted for this empirical study, the newly adjusted import demand function can be written as:

$$\ln \mathrm{Mit} = \delta + \phi 0 \ln \mathrm{Yt} - \beta 0 \ln \mathrm{Iit} + \theta \ln \mathrm{Dit} - \sigma \ln \mathrm{Tit} + \varepsilon \mathrm{it} \qquad (4)$$

where ln is the natural logarithm, Iit is the import price level of the *i*th commodity group, Dit is the domestic price level of the *i*th commodity group and Tit, is the tariff rate for the *i*th commodity group according to the SITC segregation. E*it* is the random error term.

For this study, Vector Error Correction Model (VECM) is being used due to limited annual observations for each sectors from year 1980-2010 (only 31 observations). VECM is the most appropriate for limited observations in time series. OLS is not appropriate for this time series study, as the outcome will be highly unreliable as mentioned in the literature review section.

Before the VECM analysis could take place, the author tested the time series data for each sector for multicollinearity problems. For each sector, Augmented Dickey Fuller (ADF) testing was undergone. The regression equation for ADF test (Dickey&Fuller, 1979) is stated as follows:

$$\Delta Yt = a + bt + cYt-1 + \Sigma_{i=1}^{k} d\Delta Yt-1 + et \qquad (5)$$

where Δ is the first difference operator, t refers to time trend, and k is additional terms in the first differences for the Augmented Dickey-Fuller test, et is the regression error assumed to be stationary with zero mean and constant variance. The test were carried out to test the null hypothesis of a unit root (c=0). The results are presented in Table 1 below. The table highlighted that all variables which are Real Imports, GDP, Domestic Price, Import Price and Simple Average Tariff are integrated in order one, I(1). This means that they are stationary in their first difference.

Table 1: Result of Augmented Dickey Fuller Test and the First Difference Test

Sector/Variable	Food and Live Animals			Beverages and Tobacco			Crude Materials Inedible Except Fuels			Mineral fuels, Lubricants and Related Materials		
	ADF level	FD		ADF level	FD		ADF level	FD		ADF level	FD	
ln imports	-2.83	-3.84	*	-3.15	-3.84	*	-2.48	-0.41	**	-2.17	-2.75	*
ln gdp	-0.81	-3.43	**	-0.81	-3.43	**	-0.81	-3.43	**	-0.81	-3.43	**
ln domprice	-2.14	-3.41	**	-2.23	-3.41	*	-1.56	-4.17	***	-1.43	-3.25	***
ln impprice	-4.33	-4.65	***	-2.44	-4.65		-2.22	-4.49	***	-1.91	-2.67	***
ln simpleavtariff	-2.26	-4.30	***	-2.58	-4.30	***	-2.50	-3.70	**	-1.72	-3.20	**

Notes: *,**,*** denoted rejection of a unit root hypothesis based on MacKinnon's critical value at 1 percent, 5 percent and 10 percent.
Note:
1) Constant and trend were included in level, and only constant in first difference (refer to Baghestani& Mott, 1997). In common practice, an augmentation of one or two, generally appears to be sufficient to secure lack of autocorrelation of the error terms (Ghatak, Milner & Utkulu, 1997) One augmented lag was used due to limitation of annual data (refer to Doroodian, Koshal & Al- Muhanna, 1994:912)
Source: Author`s compilation from regression output

Table 2: Result of Augmented Dickey Fuller Test and the First Difference Test

Sector/Variable	Animal and Vegetable Oils, Fats and Waxes			Chemicals and Related Products			Manufactured Goods Classified Chiefly by Material, Machinery and Transport Equipment			Miscellaneous Manufactured Articles.		
	ADF level	FD		ADF level	FD		ADF level	FD		ADF level	FD	
ln imports	-4.174	-7.13	***	-4.174	-7.13	***	-1.456	-2.926	*	-0.665	-2.459	
ln gdp	-0.805	-3.425	**	-0.805	-3.425	**	-0.805	-3.425	**	-0.802	-3.596	**
ln domprice	-2.428	-7.214	***	-2.428	-3.361	**	-2.587	-3.566	**	-4.052	-5.649	***
ln impprice	-3.952	-3.828	***	-3.952	-4.258	***	-3.007	-3.458	**	-1.887	-4.447	***
ln simpleavtariff	-2.247	-3.97	***	-2.247	-3.396	**	-1.672	-3.602	**	-2.35	-3.375	**

Notes: *,**,*** denoted rejection of a unit root hypothesis based on MacKinnon's critical value at 1 percent, 5 percent and 10 percent.
Note:
1) Constant and trend were included in level, and only constant in first difference (refer to Baghestani& Mott, 1997). In common practice, an augmentation of one or two, generally appears to be sufficient to secure lack of autocorrelation of the error terms (Ghatak, Milner & Utkulu, 1997) One augmented lag was used due to limitation of annual data (refer to Doroodian, Koshal & Al- Muhanna, 1994:912)
Source: Author`s compilation from regression output

After the ADF test were undergone, the author went on to the vector error correction model. Before the modelling could be done, for the Johansen method, it is crucial to specify an appropriate lag length for the VAR. For all of the eight subsectors, 2-year lag length was the most appropriate. As for the trace test, for each different sectors the cointegration ranking differs.

Table 3: Results of Unrestricted Cointegration Rank Test

Details	Aggregate	Food and Live Animals	Beverages and Tobacco	Crude Materials Inedible Except Fuels
Sample (n)	31	31	31	31
Observations after adjustments	28	29	29	28
Lags interval (in 1st differences)	1 to 2	1 to 1	1 to 1	1 to 2
Trace test	2	3	3	2
Maximum Eigenvalue	2	2	1	2

Source: Author`s compilation from regression output

Table 4: Results of Unrestricted Cointegration Rank Test

Details	Mineral fuels, Lubricants and Related Materials	Animal and Vegetable Oils, Fats and Waxes	Chemicals and Related Products	Manufactured Goods Classified Chiefly by Material, Machinery and Transport Equipment	Miscellaneous Manufactured Articles.
Sample (n)	31	31	31	31	31
Observations after adjustments	28	29	28	28	28
Lags interval (in 1st differences)	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2
Trace test	3	3	3	2	2
Maximum Eigenvalue	2	3	3	2	1

Source: Author`s compilation from regression output

In the next step, vector error correction model was estimated. The rank is set to the appropriate level. A vector error correction model was estimated to examine the long run behaviour of Malaysian imports (according to their 8 sectors). The lagged residual from the Johansen Cointegration Equation was included the dynamic general VECM. The general equation for VECM with 2 lag length is stated as below:

$$\Delta \ln \mathrm{Mt} = \mathrm{b0} + \mathrm{b1i}\,\Delta \ln \mathrm{Mt}-2 + \Sigma_{i=0}^{n} b2i \Delta \ln \mathrm{Yt}-2 + \Sigma_{i=0}^{n} b3i \Delta \ln \mathrm{It}-2 + \Sigma_{i=0}^{n} b4i \Delta \ln \mathrm{Dt}-2 + \Sigma_{i=0}^{n} b5i \Delta \ln \mathrm{Tt}-2 + \mathrm{b6}\ \mathrm{ECt}-2 + \mathrm{error\ term} \quad (6)$$

where EC is residual error derived from the cointegrating vector. This dynamic general equation is used separately for all the 8 sectors and presented in the next section.

7. Analysis of Findings

Before going into the details of the findings, it is worth to note the importance of the tariff variable in the model. The author believes that it is important to see the coefficient of tariff rates separately from the import price components and how it is affecting real imports on its own. Will tariff reduction change import patterns the same way for the aggregate economy and for the disaggregated sectors? Another important observation to focus on is the signs of these import price and tariff rate coefficients. Do they both have negative signs as predicted? How different are the coefficients from each other and which variable has a bigger influence on real imports?

Before going into the in depth analysis, Table 5 to Table 13 below present the summary of data in logged form which is used in the study.

Table 5: Summary of data for Aggregate Economy in logged form

Variable	Obs	Mean	Std. Dev.	Min	Max
importval	31	1.732258	0.4094526	1.11	2.3
gdpbillion	31	1.816774	0.2407127	1.42	2.17
impprice	31	1.973871	0.0788956	1.87	2.12
domprice	31	1.95129	0.1045862	1.82	2.15
tariff	31	1	0.140594	0.78	1.15

Source: Author`s calculation

The questions above are the questions which will be answered in this section. With this in mind let us take a look at the findings. Let us first take a look at the result of import demand for the aggregate economy as a whole.

There is a long run equilibrium among the variables but it is not significant. When we take a look at the table, it is clear that 1st difference, lagged 1 domestic price and tariff rates, play a role in influencing import demands in the economy as a whole. The elasticities of import demand with respect to tariffs and domestic price are 0.47 and 4.57, respectively. Import price is not significant in influencing real imports of the aggregate economy as a whole.

As for tariff rate, it is observed that it shows the unexpected negative sign. We can see that even as tariff decreases by 1 point, imports decreases by 0.47 in the aggregate economy. This unexpected sign further proves the need to look into the import sectors in a disaggregate manner to uncover why the tariff coefficient sign is positive instead of a negative sign.

Let us now take a look at the results, sector by sector. For Sector 0, Food and Live Animals, there is a long run equilibrium among the variables but it is not significant. For variables such as GDP lagged 1, import price in the first difference with lagged 2 and tariff rates, the coefficients show the expected sign at 1% , 5% and 10%

Table 6: Results of Final Estimates of Unrestricted Vector Error Correction Model

Variables	Sectors Aggregate	Food and Live Animals	Beverages and Tobacco	Crude Materials Inedible Except Fuels	Mineral fuels, Lubricants and Related Materials
Importval t-1	-0.18	-2.03	-0.54**	-0.84**	-0.84**
GDP t-1	1.43	1.53***	1.42**	1.26**	1.26**
Impprice t-1		1.09**	-0.62		-0.45
Dimportval t-1	0.06	0.41	-0.14	0.57	-0.14
Dimportval t-2	0.45	0.00		0.49	0.23
DGDP t-1	-2.63	0.17	-0.14	-0.68	0.80
DGDP t-2	-2.79	-0.13		-0.73	-2.59
Dimppricet-1	-4.98	-0.52	0.33	-0.06	-0.69
Dimppricet-2	-1.28	(-) 0.67*		1.02	1.04
Dompricet-1	4.57**	1.29**	-0.44	0.28	0.90
Dompricet-2	2.85*	1.05		-0.57	0.29
Tariff	0.47***	-0.21***	-0.06**	0.06	-0.13
R-squared	0.59	0.64	0.65	0.5	0.69
Adjusted R-squared	0.31	0.36	0.51	0.16	0.45
Schwarz criterion	-1.92	-3.71	-2.69	-2.22	-1.81
Durbin-Watson stat	2.21	2.36	2	2.27	2.24

Notes: *,**,*** denotes significance of p-value at 1%, 5% and 10% respectively. Values shown are coefficients of the variable
Source: Author`s compilation from regression output

Table 7: Results of Final Estimates of Unrestricted Vector Error Correction Model

Variables	Sectors Animal and Vegetable Oils, Fats and Waxes	Chemicals and Related Products	Manufactured Goods Classified Chiefly by Material, Machinery and Transport Equipment	Miscellaneous Manufactured Articles.
Importval t-1	-0.44*	-0.10	-0.45***	-0.58*
GDP t-1	1.82	-0.59	0.79**	1.66
Impprice t-1	-0.99	8.12*		
Dimportval t-1	0.10	-0.22	-0.01	0.39
Dimportval t-2		-0.15	0.39	0.43
DGDP t-1	-3.42	0.57	-0.22	-0.08
DGDP t-2		-0.94	-0.99	-1.25
Dimppricet-1	0.48	-3.16	1.80	0.91
Dimppricet-2		-3.29	2.88	3.00*
Dompricet-1	0.13	3.20	-1.45	1.21
Dompricet-2		2.43	-0.55	-2.49
Tariff	0.20	-0.19	0.25**	0.71***
R-squared	0.36	0.42	0.61	0.64
Adjusted R-squared	0.11	-0.12	0.34	0.39
Schwarz criterion	-0.04	-2.19	-2.25	-2.20
Durbin-Watson stat	1.92	2.14	2.16	2.1

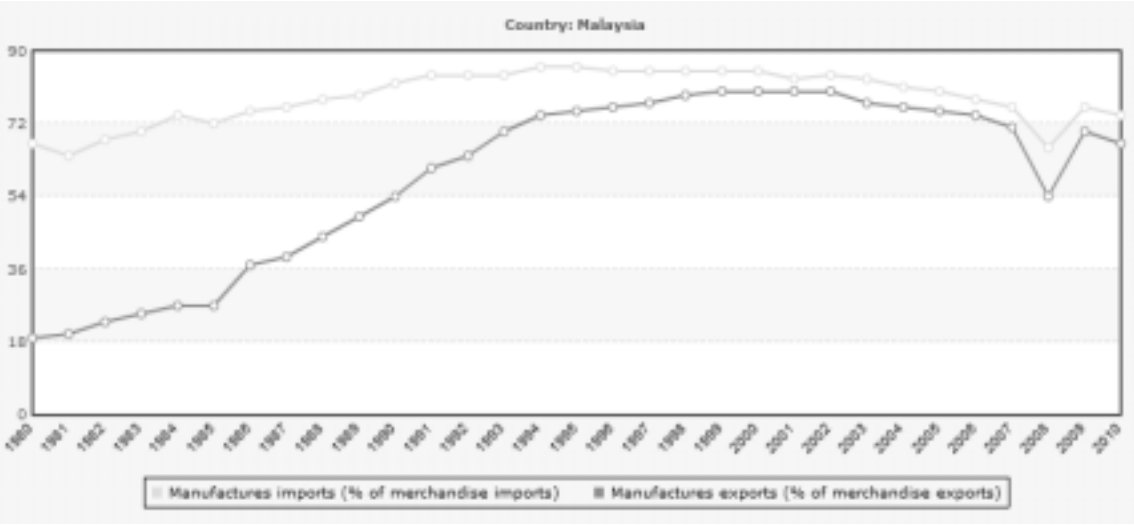
Notes: *,**,*** denotes significance of p-value at 1%, 5% and 10% respectively. Values shown are coefficients of the variable
Source: Author`s compilation from regression output

significance level. The long run elasticities of import demand with respect to GDP, import price and tariff rates are 1.53, -0.67 and -0.21, respectively. Here we can observe that with a 1 point decrease in tariff rate, imports drop by 0.21 point.

For Sector 1, Beverages and Tobacco, there is also long run equilibrium among the variables and it is significant at 5% level. GDP and tariff rates exhibit the expected signs. The long run elasticities of import demand with respect to GDP and tariff rates are 1.4 and -0.06, respectively. Here we observe that a 1 point tariff rate reduction leads to increased import by 0.21 point.

For Sector 3, Mineral Fuels, there is a long run equilibrium among the variables and it is significant at 5% level. GDP and tariff rate have the expected signs with the coefficients of 1.26 and -0.13, respectively. However tariff is not significant in influencing imports in this sector.

For Sector 6, Manufactured Goods Classified Chiefly by Material, it is observed that there is a long run equilibrium among the variables and it is significant at 1% level. The tariff sign however is positive in relations to imports. GDP has the expected positive sign, but the first difference, import price lagged 1 coefficient has a negative (but insignificant) sign in relations to imports. Here it can be concluded that a 1 point decrease in tariff rate leads to a 0.25 decrease of imports, and vice versa. A possible explanation for this relationship would be that through the benefits of FDI such as transfer of knowledge and technology advancements, local producers are able to use the knowledge to compete in producing cheaper and durable substitutable products. As tariff is decreased, the domestic markets need to be more competitive in marketing



Graph 1: Malaysian Manufactures Imports and Exports from 1990-2010
Source: World Development Indicator website (retrieved from the website on the 20th of February, 2012)

the products. One way to do this is to cut the costs and cut the prices of the products. With cheaper domestic substitutable products available, consumers or producers of final goods opt to choose the cheaper domestic goods for their consumption or use.

This is an appropriate interpretation since Malaysia's imports and exports of manufactures from overall merchandise trading account for 70% in year 2010. This is further highlighted by Graph 1 in the Appendix.

In Sector 7, Miscellaneous Manufactured Articles, it is observed that there is also long run equilibrium among the variables and it is significant at 10% level. Tariff rates sign is positive in relations to imports and it is the only variable which significantly influence imports.

For sector 2, there is also long run equilibrium among the variables. Nevertheless only GDP is significant in influencing imports in this sector, whereby tariff rate is not significant in affecting imports of crude materials.

For sector 4, the result shows that there is also long run equilibrium among the variables. However none of the variables exhibited the accepted significance level. Tariff rate does not play an important role in influencing import demands in this sector. In this case, other variables may be influencing the demand imports of Animal and Vegetable Oils such as preference or substitutability factor of local products.

Lastly, for sector 5, there is no long run relationship among the variables and only import price lagged 1 variable is significant but showing a positive sign in influencing the import demands of chemicals. It can be seen here demands for imports will increase by 8 points with the increase of a point in import prices. This shows the fact that these products do not have a perfect substitute in local domestic market. They are seen as special and irreplaceable commodities which cannot be replaced by local producers. This is why an increase of import price can lead to increased imports for this particular commodity group. This is an appropriate explanation due to the fact that most chemical manufacturers in Malaysia are foreign based companies whereby R&D allocations are far bigger in size than what is allocated for the local chemical industry. Malaysia presently is mostly concentrating in its manufacturing of electronic and electrical goods where it has the comparative advantage due to relatively cheaper, semi-skilled and skilled labour forces.

Due to the fact that this paper focuses on the effect of trade reform on imports, it is important to see the relationship between tariff reductions and real imports behaviour. As can be seen observed, tariff rates influence imports in different ways for different types of commodities. Table 8 below present the results for the signs and significance of the tariff rate variable.

To summarize, only 3 sectors are presented to have negative signs for their tariff variable in relations to real import. These sectors are Food and Live Animals, Tobacco

Table 8: Coefficients of Tariff Rates for Each Sector

Sectors	Coefficient of tariff	Significance level
Aggregate	0.47	**
Food and Live Animals	-0.21	**
Beverages and Tobacco	-0.06	**
Crude Materials Inedible Except Fuels	0.06	NS
Mineral fuels, Lubricants and Related Materials	-0.31	*
Animal and Vegetable Oils, Fats and Waxes	0.2	NS
Chemicals and Related Products	-0.19	NS
Manufactured Goods Classified Chiefly by Material, Machinery and Transport Equipment	0.26	**
Miscellaneous Manufactured Articles.	0.71	***

Source: Author`s regression output
Note: *,**,*** denote significance at 10 percent, 5 percent and 1 percent respectively. NS represents not significant.

and Beverages and Mineral Fuels and Chemicals and Related Products. Their coefficients are -0.21, -0.06, -0.13 and -0.19 respectively with all being highly significant at 1% level or insignificant. Only for Food and Live Animals and Tobacco and Beverages sectors, the tariff coefficients are negative.

What all of these two have in common is that they are basic necessity goods. The rest of the sectors have positive signs for their tariff variables in relations to real import. These sectors are; 2. Crude Materials Inedible Except Fuels, 4, Animal and Vegetable Oils, Fats and Waxes, 6. Manufactured Goods Classified Chiefly by Material and 7. Machinery and Transport Equipment. Their coefficients are 0.11, 0.67, 1.30, 0.49 and 1.18 respectively. Only two sectors have significant coefficients, and these sectors are manufactured goods and miscellaneous manufactured articles. For these sector, as tariff rate decreases, import demands for this product will also decrease and vice versa. This phenomenon suggests that consumers and users of these products are able to substitute them with local made products serving the same purpose and function as the imported products. A possible explanation might be that as tariff is decreased, the domestic markets need to be more competitive in marketing the products, hence providing better substitutes for the imported products.

Examining the results of the analysis, it can be concluded that the import demand for sectors with basic necessity goods are more sensitive by the changes in tariff rates compared to manufactured goods sector. For Food and Live Animals and Beverage and Tobacco sectors, a tariff decrease is seen as an incentive for importers to import products which is not available locally. The image of imported goods in this sector also plays an important role in import demands. As the middle income group is growing in size in Malaysia, with more affordable priced imported food, beverages and tobaccos the average Malaysian can afford to have a more diverse diet and lifestyle if

compared to five decades ago.

For the manufacturing goods sector, it is observed that a decrease in tariff rates lead to a decrease in import demand. A possible explanation might be that as tariff is decreased, the domestic markets need to be more competitive in producing the products, hence providing better substitutes for the imported products for local consumers and producers. This interpretation is appropriate for the case of Malaysia, whereby manufacturing activity is the main driver of its domestic economy since the early 1990s. With the benefits of FDI such as transfer of knowledge and technology advancements, local producers are able to use them to compete in producing most of the cheaper and durable substitutable products.

8. Conclusion

A number of conclusions can be drawn from this study. Firstly, if researchers are to obtain robust results it is important they choose the right methodology, appropriate for its time series data limitation. As this data set, has only 31 observations for each of its 8 sectors, the author has chosen the dynamic vector error correction model to estimate the long run behaviour of Malaysian imports according to sectors from year 1980-2010.

Secondly, all of the sectors exhibited positive signs for its GDP coefficient except for one sector which is Mineral fuels, Lubricants and Related Materials sector. This negative sign presented for the GDP coefficient suggests that, if imports represent the difference between domestic consumption and domestic production of imported goods, production may rise faster (slower) than consumption in response to rise in real income. Due to this, imports could fall (rise) as real income increases, resulting in negative (positive) sign for the coefficient $\alpha 0$ according to according to Goldstein and Khan (1976).

Thirdly, as an aggregate economy, it is clear that GDP and domestic price play a role in influencing import demands, with the expected positive signs. Nevertheless as for tariff rates, we can conclude that tariff rates effect real imports in different ways for different products; basic necessity products and manufactured goods.

Fourthly, the empirical results suggest that only 2 sectors which include basic necessity goods for end users and producers have all the expected positive sign for tariff rate variable. These sectors are Food and Live Animals and Beverages and Tobacco.

Lastly, as this paper focuses on the effect of trade reform on imports, it is important to see the nature of the relationship between these two variables and the coefficients it projects. The import demand for sectors with basic necessity goods are more sensitive by the changes in tariff rates compared to sectors with manufactured goods. For the latter group, tariff rates and imports have a positive relationship. A possible

explanation might be that as tariff is decreased, the domestic markets need to be more competitive in marketing and producing the products, hence providing better substitutes for the imported products for local consumers and producers. This interpretation is appropriate for the case of Malaysia, whereby manufacturing activity is the main driver of its domestic economy since the early 1990s. With the benefits of FDI such as transfer of knowledge and technology advancements, local producers are able to use them to compete in producing cheaper and durable substitutable products.

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