



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

ECONOMIC IMPACTS OF IMPORT LIBERALIZATION POLICY ON AGRICULTURAL FOOD SECTOR IN MALAYSIA

Roslina Binti Ali

Malaysian Agricultural Research and Development Institute (MARDI), Center of
Socio Economic, Market Intelligence and Agribusiness Research, Selangor,
Malaysia, Email: aroslina@mardi.gov.my

Aimi Athirah Ahmad

Malaysian Agricultural Research and Development Institute (MARDI), Center of
Socio Economic, Market Intelligence and Agribusiness Research, Selangor,
Malaysia

Suhana Safari

Malaysian Agricultural Research and Development Institute (MARDI), Center of
Socio Economic, Market Intelligence and Agribusiness Research, Selangor,
Malaysia

Abstract

Deficient domestic production and supply while substantial requirements from both local food industries and final consumption largely dictate the government to remove a non-tariff barrier through implementing unrestricted quota policy for beef, mutton, and coffee in Malaysia. Previous studies discovered varied impacts of the non-tariff barrier removal across countries and commodities. After approximately five years of implementation, it is pertinent to evaluate the impacts of import quota removal on both sides – local industries and consumers to those primary commodities. A secondary database was utilized before and after the quota removal period. The major quantitative methods, nonparametric trend test, and multivariate dummy regression were applied to identify the monotonic trends and to estimate the effects of quota removal, respectively, focusing on value-added exports and market prices. Before the regression analysis, diagnostic tests were conducted to confirm the validity of each estimated model. Following the implementation of liberalized import policy, all commodities experienced significant impacts, however, the impacts and magnitude differ considerably – value-added beef exports decreased as larger than mutton while value-added exports for coffee increased. The market prices significantly increased in both livestock commodities with mutton was nearly twice as a beef increment. Besides, the trend analysis indicated declining imports with increasing market prices for both beef and mutton after the quota removal, yet, coffee showed contrary effects. While the trade theory promises better off after removing non-tariff barriers, this study found different consequences between commodities across economic indicators at the national level.

Keywords: Import quota liberalization, food policy, non-tariff barrier, Malaysia

JEL Codes: Q17, Q18, Q13

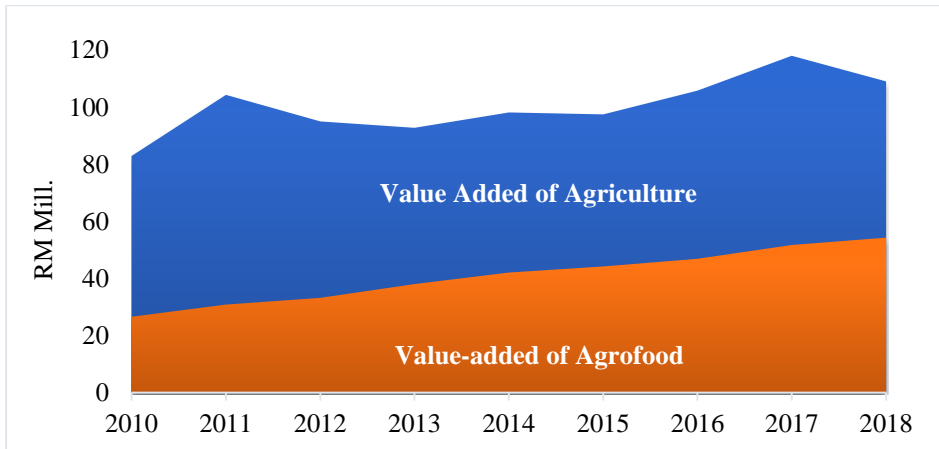
1. Introduction

Malaysia has revised the current trade policy, removing restricted import quotas and extended to the other primary food commodities, thus opening quota subsistence for a temporary basis. For decades, Malaysia has imposed quota restrictions for most primary food imports by regulating the maximum capacity that is permitted for authorized importers while no imports are allowed beyond those maximum with a standing policy goal that protectionism could help domestic producers and businesses at the expense of other countries. However, since January 2016, the government has removed the non-tariff barrier for multiple reasons. The policy decisions were primarily stemming from inadequate food supply to meet growing demand and its requirement each year, which largely caused price spikes, hence burdened consumers and with collectively purpose to facilitate importers for export industry expansion, particularly value-added products.

Consequently, this opened-quota would not only benefit importers, but also agricultural producers as well as industries that substantially relied on imported raw materials and resources, and thus improving industries' outcomes and performance. This policy revision is consistent with the agenda of the Ministry of Agriculture and Food Industry, Malaysia (MOA) to address food security concerns by ensuring the supply of primary food is met through both domestic production and imports while promising the viability and sustainability of domestic food producers. Currently, the unrestricted import quotas have been extended to the other primary food commodities, particularly beef, mutton, and raw coffee beans. These commodities have been identified as crucial domestic supply to both final consumption and value-added processing industry due to diminishing and stagnating domestic production with significantly lower self-sufficiency level and thus depending on imports for many years. Subsequently, removing this trade barrier through liberalizing import quotas would sustain the industry, especially those commodities that have constrained production capacities locally, as well as addressing food security concerns.

Currently, the share of value-added agro-food from the total value-added agriculture was about 40.4%, on average. The trends of value-added for agro-food gradually increased from 32.1% to 49.8% within the 2010 - 2018 period, with the largest value as maximum as RM54.3 mill (LCU) (Figure 1.1). The most recent share recorded that the value-added of agro-food was almost equivalent to the value-added industrial commodities (i.e. oil palm, rubber), which historically dominated the agricultural sector in this region. Hence, the unrestricted import quota seems a timely policy decision for local industries to expand their business performance. Since the proclamation is a short-term strategic plan, the opened-import quota policy requires preliminary evaluations after several years of implementation.

From the status quo, the overarching questions include 1) What are the economic impacts on the agricultural food sector after the restricted import quotas have been removed since January 2016?, 2) Is the liberalized import policy encouraged the expansion of value-added industry?, 3) What is the effects on producers and consumers welfare after opening the import quotas? Subsequently, this study evaluates the impact of import quota removal on agricultural food products in Malaysia. The findings should be able to draw some guidelines to food and trade policy directions. The specific objectives are 1) to analyze and distinguish the monotonic trends of import, value-added industry, and prices between restricted and unrestricted import quotas, 2) to estimate the economic impacts of import quota liberalization with emphasizing on exports of value-added and market prices in light of welfare effects on producers and consumers.



Note: The average conversion of currency rate is referred to as USD1=RM4.00

Source: Department of Statistics, Malaysia (2020)

Figure 1.1- Malaysia: Total Value-added of Agriculture and Agro-Food Sectors (RM Mill. LCU), 2010-2018

This study utilizes multivariate dummy regression models to estimate the economic impacts on the value-added industry and market prices after import quotas have liberalized. Due to data constraint, the estimation focuses on the main economic indicators – imports, value-added exports, CIF prices (Cost, import, and freight), and market prices for the specified food commodities: (1) beef, (2) mutton, and (3) coffee (i.e. raw coffee bean). Before the regression analysis, we measured monotonic trends and the association of those parameters. The first section reviews the non-tariff barrier policy and further comprises the status of specified industries, the empirical results and discussions, and finally the concluding remarks.

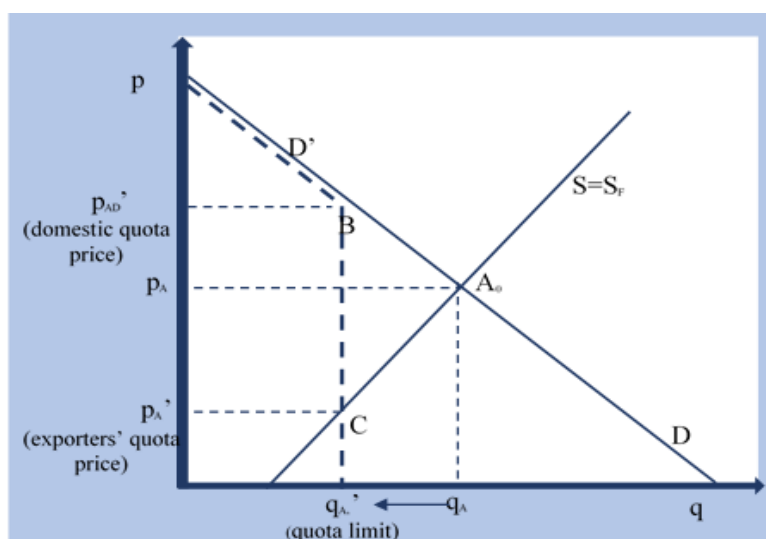
2. Unrestricted Import Quota Policy

An unrestricted import quota is classified as a non-tariff barrier, which refers to primarily import licensing, rules for valuation of goods at customs, pre-shipment inspections, rules of origin, and trade prepared investment measures (WTO, 2020). According to the Organization for Economic Co-operation and Development (OECD), these measures can be broadly divided into two groups – technical and non-technical measures. The technical measures include regulations, standards, testing and certification, normally sanitary and phytosanitary (SPS) and technical barriers to trade measures, whereas the non-technical includes quantitative restrictions (quotas, non-automatic import licensing), price measures, forced logistics or distribution channels, and so forth (OECD, 2020). Distinguishing with the autarky approach, numerous scholars found the removal of non-tariff barriers could improve and enhance economic growth and development, particularly for developing regions (Examples; Vollrath, 1985; Sun et al., 2010; WTO, 2012; Cadot and Mallouche, 2012; De Melo and Nicita, 2018; Hoekman and Nicita, 2018; Cadot et al., 2018).

Import quota liberalization is divergent to the most common trade liberalization mechanisms (i.e. opened trade or free trade). Import quota refers to government-imposed limits on the volume of specified commodities that are imported into a country during a specified period. Such quotas are put in place to protect domestic industries and local producers as quotas prevent a country's domestic market from becoming flooded with foreign

products, which are often more competitive and cheaper due to more cost-effective and lower cost of production in the international industries. However, some commodities are shortage due to inadequate domestic production that urged the government to open quota limits to stabilize market and prices, albeit the revised policy is often for a short-term basis, with a prediction that opening quota limits should encourage more imports coming to fulfill domestic shortages.

Theoretically, the analysis of imposing a quota is very similar to a tariff. The graphical description of import quota effects is shown in Figure 2.1. The quota limits the level of imports to q_A' . As a consequence, the domestic price of imports rises to p_A , D' , which is above the world price p_A . This indicates that the market price (p_A , D') shifts up from the equilibrium price (P_A), P_A to $P_{AD'}$, implying consumers pay a higher price with import quotas, so consumer surplus decreases; hence, they worse off in import market. The change in consumer surplus is a loss of area b . With quota removal, consumers pay lower prices at equilibrium price (P_A), and thus they are better off in import markets (i.e. consumer surplus increases). Consequently, import quotas reduce the import volume, raise the domestic price of goods, decrease the welfare of domestic consumers, increase the welfare of domestic producers, and hence would cause a deadweight loss.



Source: Adapted from UNCTAD (2013)

Figure 2.1- Application of Import Quotas

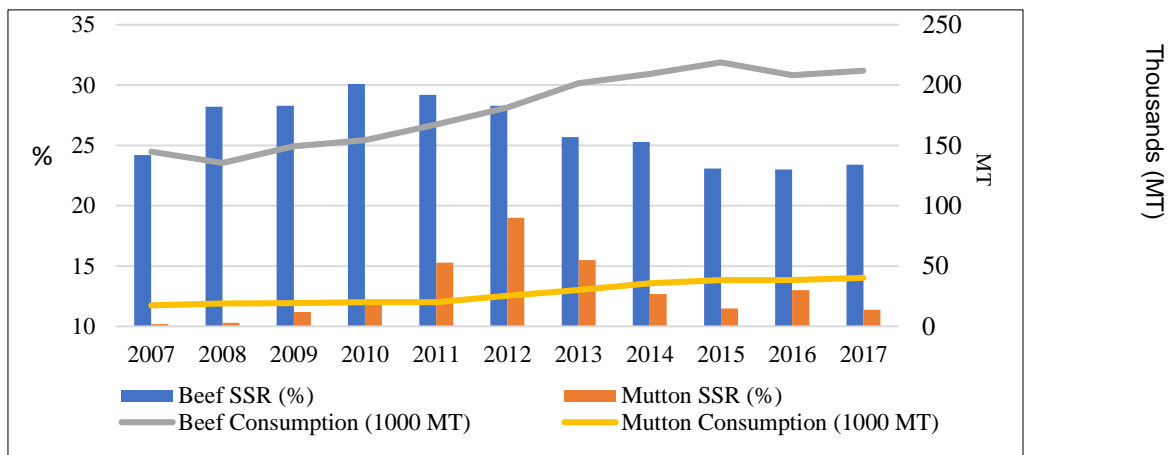
Notwithstanding, removing quotas should generate greater average imports with fewer bilateral trading partners (Fugazza and Conway, 2010), the impacts of import quotas removal varied between countries and commodities. Harrigan and Barrows (2006) found significant plunging in price adjustment and a minor decreased in quantity for restricted imports, yet none of such downward adjustments for the unrestricted import. This is consistent with Brambilla et al (2007) that discovered quantity increased while price decreased for restricted quotas from a specified exporting country and even it was significantly different from other restricted-quota exporters. Fugazza and Conway (2010) argued a contrary finding to theoretical trade predictions as the average trade was reduced while the average number of trading partners increased after a quota removal.

From exporting countries' viewpoints, a World Bank (2004) study provides an analysis of potential gains and losses from eliminating the quota system. The study found that whether a country would be better or worse off depending on the extent to export commodities and trading partners, the strength of the competitive relationship between exporters and complementarities associated with global production sharing, particularly the benefits from increased demand for a specified commodity. Lankes (2002) argued that quota removal might lead to a readjustment of production to the detriment of exporting countries in developing regions, which is confronted with competitive suppliers by the quota system. Previous studies manifested that the implementation of unrestricted quotas is not often a promising solution to increase domestic supply through encouraging more imports, hence could reduce prices, as the impacts tend to contradict the trade theory stances.

3. Current Status of the Industry

3.1 Beef and Mutton

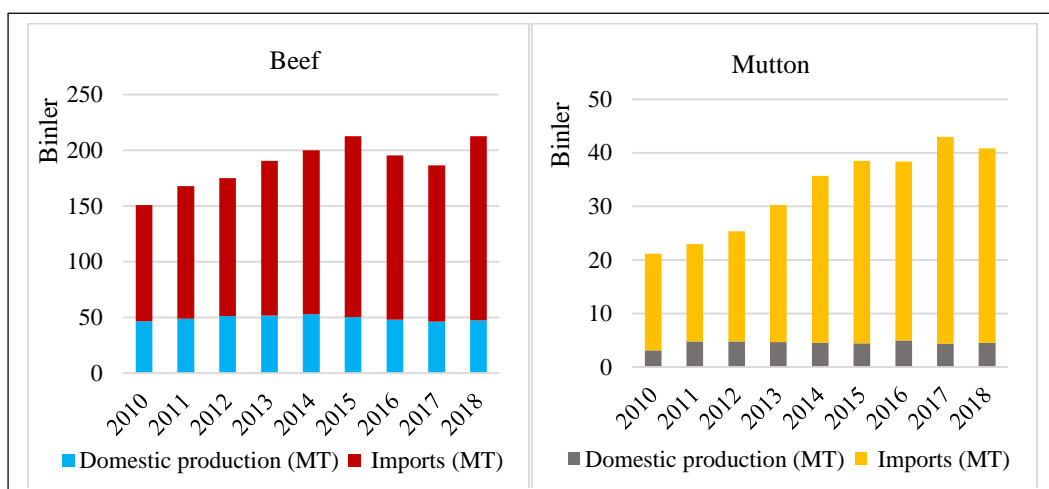
Malaysia has remained a net importer for meat commodities for many years due to insufficient domestic production to meet the growing demand. With stagnating trends, the average self-sufficiency rates (SSR) for beef and mutton were 26.3% and 12.9%, respectively. Hence, domestic meat supply is largely relied on imports as a maximum of 70% to 80% to satisfy the augmenting current demand for red meat. Growing population, urbanization, increasing households' income, and expenditure have triggered higher demand for red meat. The total consumption for beef was doubling from 144.7 (2007) to 211.7 (in thousand MT) in 2017 while mutton was tripling from 17.5 to 40.5 (in thousand MT) in the same period (Figure 3.1).



Source: Department of Veterinary Service, Malaysia (2018)

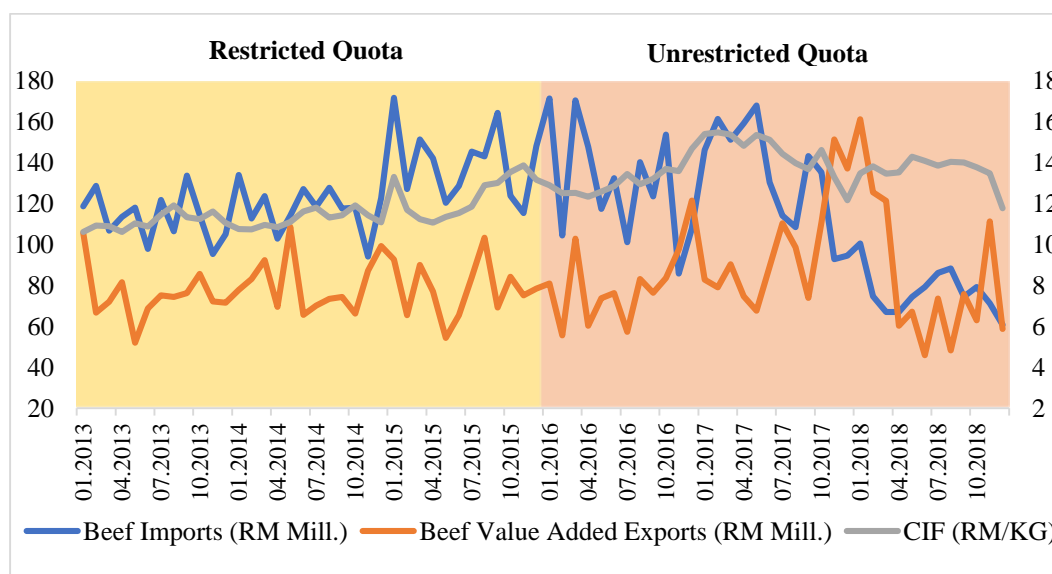
Figure 3.1-Malaysia: Self-sufficiency Ratios and Consumption for Beef and Mutton, 2007 – 2017

For many years, the Malaysian total supply of beef and mutton has largely relied on imports showing huge gaps between domestic productions. The total imports are decreasing over the years. Beef imports augmented from 104.3 to 165.1 (in thousands MT) whereas mutton tremendously increased from 18.1 to 36.3 (in thousands MT) during a 2010 – 2018 period (Figure 3.2).



Source: Department of Veterinary Service, Malaysia (2018)

Figure 3.2-Malaysia: Domestic Production and Imports for Beef and Mutton, 2010 – 2018

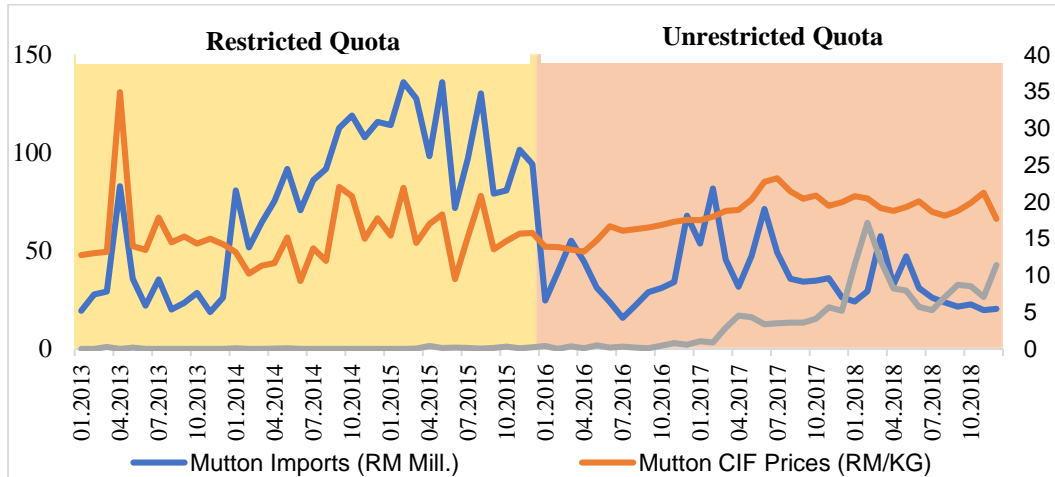


Source: Department of Veterinary Service, Malaysia (2018)

Figure 3.3 - Trends of Imports, Value-added Exports, and CIF Prices: Beef

The imported beef and mutton are not only allowed for final consumption but also provide sources to the local meat processing industry of value-added products. Substantial shrinkage in meat supply would have significant effects on both industries and consumers. Thus, opening quotas eliminate trade barrier and further encourage more imports of beef and mutton. However, according to a monthly database from 2013 to 2018, the import values (in Local Currency Unit – LCU) indicated downward trends for both beef and mutton. The average beef imports marginally declined from RM123.9 mill. to RM113.5 mill. for restricted and

unrestricted quotas, respectively. These decelerating trends however did not affect the value-added industry as the average of value-added exports increased RM7.8 mill. (Restricted quota) to RM8.7 mill. (Unrestricted quota) while the CIF prices hiked from RM116 to RM138 per 100 kilograms, on average before and after removing import quotas (Figure 3.3).



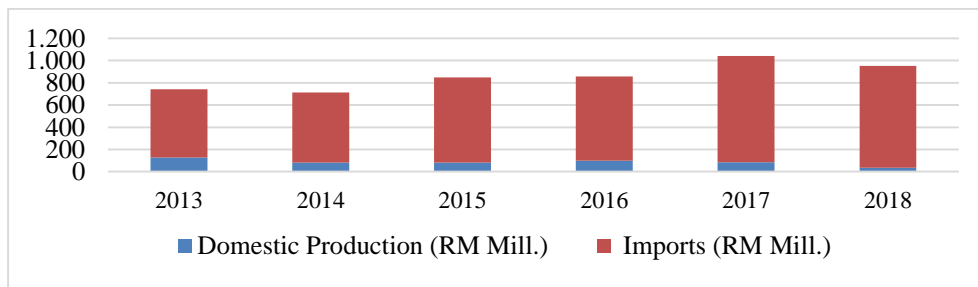
Source: Department of Veterinary Service, Malaysia (2018)

Figure 3.4 -Trends of Imports, Value-added Exports, and CIF Prices: Mutton

Similarly, mutton imports reduced doubled, from RM75.2 mil. to RM36.8 mil. with substantial augmenting value-added exports from RM0.1 mill. to RM4.4 mill. (on average), for restricted and unrestricted terms, while the CIF prices spiked from RM154 (restricted quotas) to RM184 (unrestricted quotas) per 100 kilograms (Figure 3.4).

3.2 Raw Coffee Bean

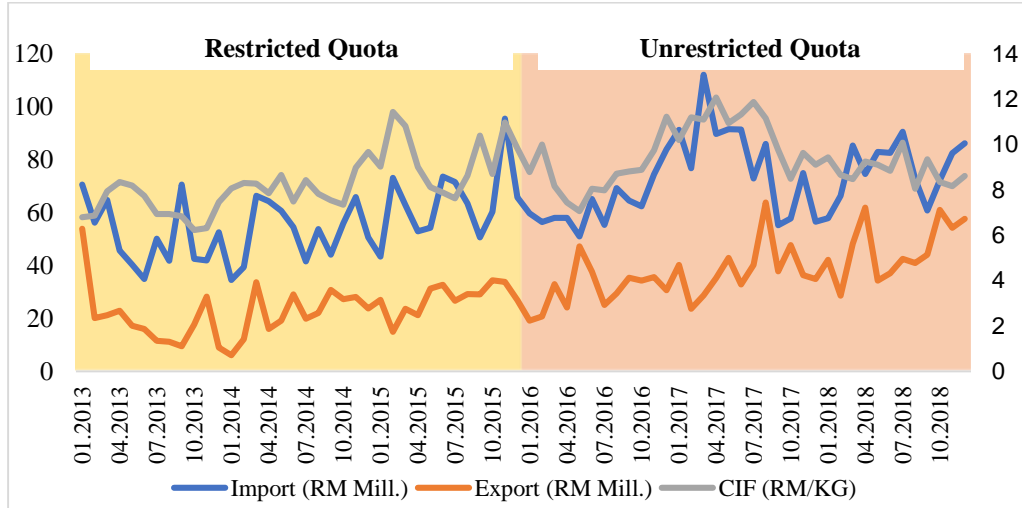
Coffee, either mono-cropping or intercropping (normally with coconut), has mostly produced by smallholders in Malaysia. While only Robusta and Liberica can be grown due to climatic and geographical reasons, yet the former has been largely planted. Malaysia largely relied on imports as much as 96% of shares of domestic supply are coming from imports. With limited growing varieties and highly diminished local production, this country tends to continue to be a net coffee importer (Figure 3.5).



Source: Department of Agriculture, Malaysia (2019)

Figure 3.5-Domestic Production and Imports for Coffee, 2013 – 2018

In contrast, coffee imports largely increased from RM55.8 mil. for restricted quotas to RM73 mill. for unrestricted quotas with doubling values, value-added exports from RM2.7 to RM4.5 mill. (On average), during different terms, while the CIF prices were going up from RM826.4 (restricted quotas) to RM939.4 (unrestricted quotas) per 100 kilograms (Figure 3.6).



Source: Department of Agriculture, Malaysia (2019)

Figure 3.6-Trends of Imports, Value-added Exports, and CIF Prices: Coffee

4. Theoretical Model and Diagnostic Analysis

This study utilized multivariate dummy regression models to predict a dichotomous endogenous variable of restricted import quota ($\delta_{b,m,c} = 0$) and unrestricted ($\delta_{b,m,c} = 1$) import quota for beef (b), mutton (m), and coffee (c). According to Rodriguez (2007), this model is appropriate when the data takes one of only two possible values representing the presence or absence of an attribute of interest. Before the analysis, we measured monotonic trends using non-parametric multivariate trend and statistical correlation tests to identify the associations between predictor variables for each commodity.

4.1 Nonparametric Trend Test

Lettenmeier (1988) extended the nonparametric Mann-Kendall (MK) test for trend to a multivariate trend test, which often was applied to detect monotonic trends in series of environmental data, climate data, or hydrological data (Mann, 1945; Kendall, 1975; Gilbert, 1987)¹. This ordinary MK test is based on pairwise comparisons of all observations Y_1, \dots, Y_n in a time series. The calculation of test statistic² can be presented as:

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^n \text{sgn}(X_j - X_k) \quad (1)$$

With

$$\text{sgn}(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases} \quad (2)$$

The mean of S is $E[S] = 0$ and the variance σ^2 is computed as:

$$VAR(S) = \sigma^2 = \frac{\{n(n-1)(2n+5) - \sum_{j=1}^p t_j(t_j-1)(2t_j+5)\}}{18} \quad (3)$$

Where;

P = the number of tied groups in the dataset.

t_j = the number of observations in the j th group.

The statistic S is approximately normal distributed to compute the test statistic (Z) as follows:

$$Z = \begin{cases} \frac{S-1}{\sigma} & \text{if } S > 0 \\ 0 & \text{if } S = 0 \\ \frac{S+1}{\sigma} & \text{if } S < 0 \end{cases} \quad (4)$$

Therefore, a positive (negative) value of Z indicates that the data tend to increase (decrease) with time.

4.2 Multivariate Dummy Regression

To estimate the effects of unrestricted import quota policy on food industries and consumers at the national level, multivariate regression was estimated. The first model is applied to estimate the impacts on value-added exports for beef (b), mutton (m), and coffee (c). The generic model can be presented as:

$$Y_{b,m,c}^t = C + \delta Q_{b,m,c} + \beta_1 \ln(X_1)_{b,m,c} + \beta_2 (X_2)_{b,m,c} + \beta_3 (X_3)_{b,m,c} + \beta_4 X_4 + \varepsilon \quad (5)$$

The dependent variable ($Y_{b,m,c}^t$) is value-added exports measured in metric tonnes in a particular period t for each commodity – b , m , and c – represents beef, mutton, and coffee, respectively. The regression includes import ($\ln(X_1)_{b,m,c}$) which is the natural log of import volumes, Cif price (cost, insurance, and freight) and ($\beta_2 (X_2)_{b,m,c}$) market price ($\beta_3 (X_3)_{b,m,c}$) both in real values, and exchange rate ($\beta_4 X_4$) is measured as the local currency unit (MYR) to each dollar of US\$. The dummy variable is the focus of analysis ($\delta Q_{b,m,c}$), which takes on a value of one in January 2016 and afterward, zero before. The regression model of value-added export can be specified as:

$$EXPVA_{b,m,c}^t = C + \delta QUOTA_{b,m,c} + \beta_1 \ln(IMPORT)_{b,m,c} + \beta_2 (CIF)_{b,m,c} + \beta_3 (MPRICE)_{b,m,c} + \beta_4 EXCH + \varepsilon \quad (6)$$

Another model estimates the impacts on a market price at a consumer-level following the opened import quota policy for beef and mutton. Coffee was excluded in this model since raw coffee bean is often marketed to food processors rather than final consumers. The dependent variable is $MPRICE_b$, mt in real prices, and the endogenous included dummy variable $QUOTA$, CIF , and $EXCH$. The model can be addressed as:

$$MPRICE_{b,m}^t = C + \delta QUOTA_{b,m} + \beta_1 \ln(IMPORT)_{b,m} + \beta_2 (CIF)_{b,m} + \beta_3 EXCH + \varepsilon \quad (7)$$

4.3 Diagnostic Tests

Regression diagnostics are used to evaluate the model assumption and investigate whether or not the observations with a large, undue influence on the analysis. Before estimating the predictor variables of each model, we examined the most crucial residual issues that often occur in regression models, which might violate the assumptions. Figure 4.1-4.3 displayed the diagnostic analysis results for beef, mutton and coffee models, respectively. The plot of residuals vs. fitted diagnoses both the linearity³ and homoscedasticity⁴ assumptions, the normal Q-Q plot evaluates normality⁵ based on residuals, the scale-location plot examines the homoscedasticity, and the Cook's distance plot measures the influence of each observation on the regression coefficients.

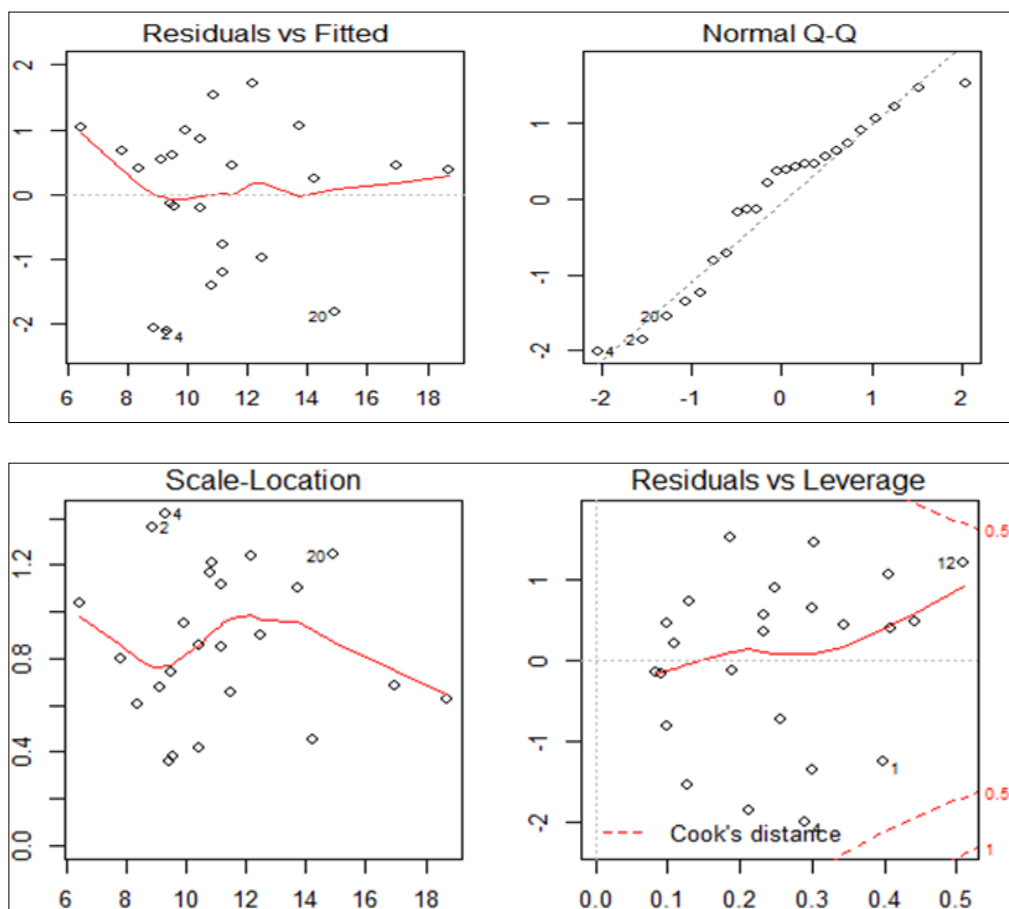


Figure 4.1- Diagnostic Analysis of Regression Model: Beef

We applied a Ramsey RESET test to measure the linearity and rejected the model is linear at .01 level of significance, and thus we confirmed the model is non-linear (Table 4.1).

Table 4.1- Ramsey RESET Test: Beef Model

| RESET | df1 | df2 | p-value |
|--------|-----|-----|----------|
| 8.7701 | 2 | 66 | .0004192 |

From the analysis, there were no serious issues were violated the assumptions of normality, homoscedasticity, and influential observation in the model. Then, we proceed to measure the potential of multicollinearity using the Variance Inflation Factor⁶ (VIF). Values of VIFs and tolerance that less than 2.5 and higher than 0.1, respectively, indicating multicollinearity does not occur in this model (Table 4.2).

Table 4.2-VIF and Tolerance of Predictor Variables: Beef Model

| | Ln (Import) | Ln (Export_VA) | Ln (Cif) | Mean |
|-----------|-------------|----------------|----------|-------|
| VIF | 1.1283 | 2.3785 | 2.4586 | 1.988 |
| Tolerance | .6372 | .6813 | .9021 | .7402 |

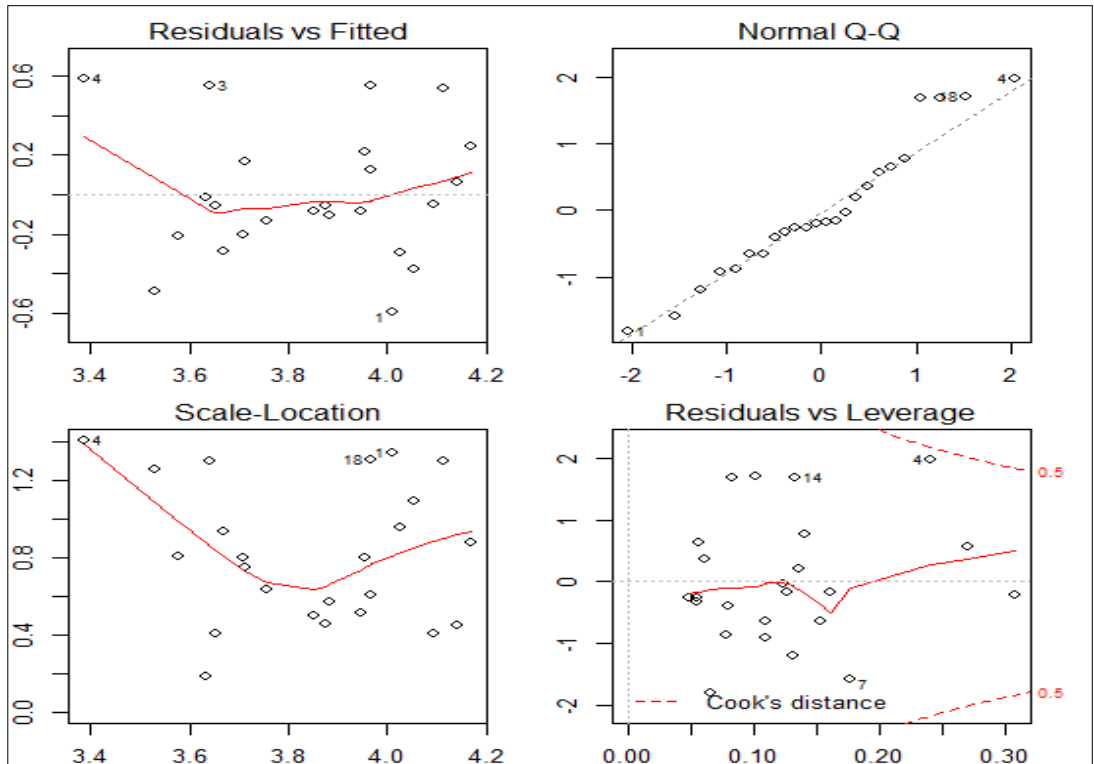


Figure 4.2- Diagnostic Analysis of Regression Model: Mutton

We rejected the RESET test at a .05 level of significance and indicated that the model for mutton is non-linear (Table 4.3).

Table 4.3- Ramsey RESET Test: Mutton Model

| RESET | df1 | df2 | p-value |
|--------|-----|-----|---------|
| 4.8728 | 2 | 66 | .01062 |

The values of VIFs were less than 2.5 and the tolerances were higher than 0.1 denoted that there were no multicollinearity issues in this model (Table 4.4).

Table 4.4-VIF and Tolerance of Predictor Variables: Mutton Model

| | Ln (<i>Import</i>) | Ln (<i>Export_VA</i>) | Ln (<i>Cif</i>) | Mean |
|------------------|---------------------------|------------------------------|------------------------|-------------|
| VIF | 1.5692 | 1.4676 | 1.1084 | 1.3817 |
| Tolerance | .6372 | .6813 | .9021 | .7402 |

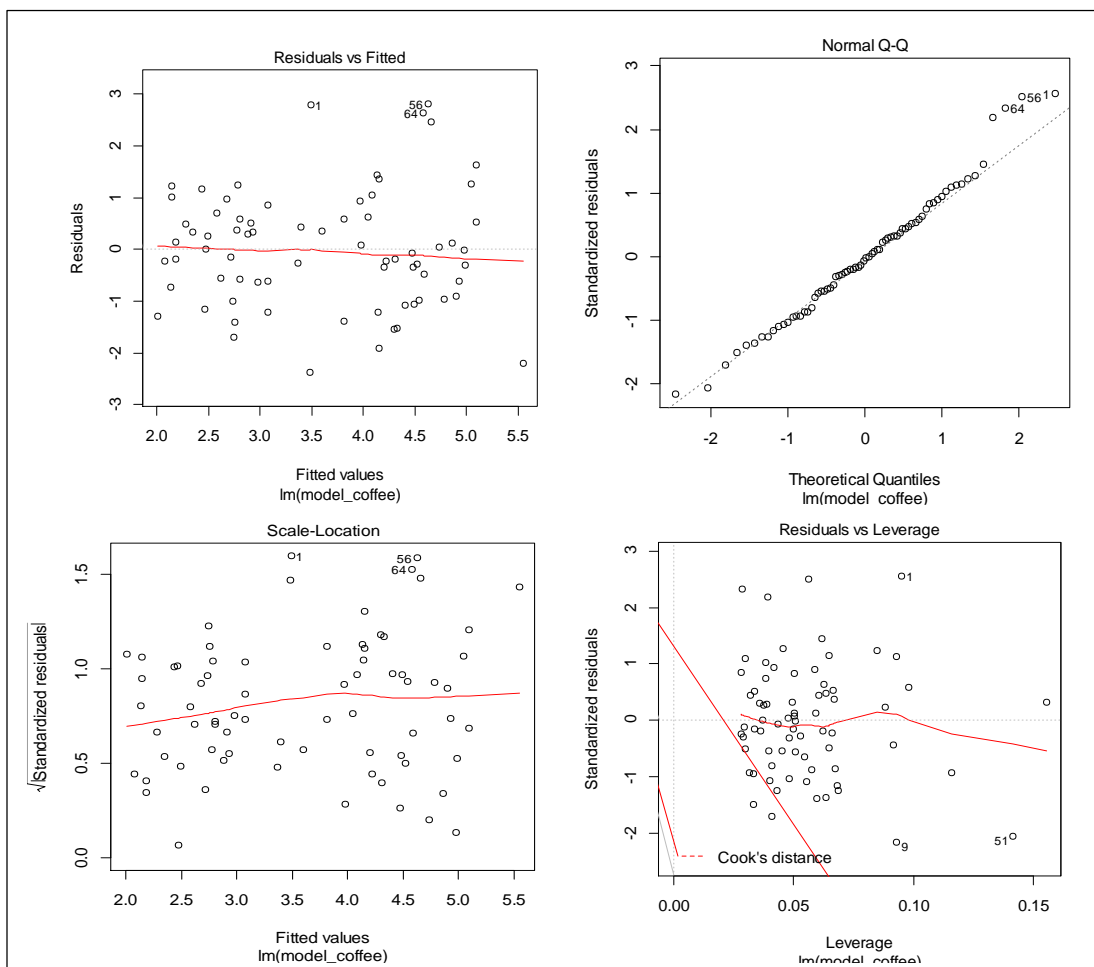


Figure 4.3-Diagnostic Analysis of Regression Model: Coffee

We could not reject the test indicating the model for coffee is linear (Table 4.5).

Table 4.5- Ramsey RESET Test: Coffee Model

| RESET | df1 | df2 | p-value |
|--------------|------------|------------|----------------|
| 1.7372 | 2 | 66 | 0.184 |

Both values of VIF and tolerance confirmed that the model for coffee does not occur multicollinearity since the VIFs were less than 2.5 and the tolerances were higher than 0.1 (Table 4.6).

Table 4.6- VIF and Tolerance of Predictor Variables: Coffee Model

| | <i>Import</i> | <i>Export_VA</i> | <i>Cif</i> | Mean |
|------------------|---------------|------------------|------------|-------------|
| VIF | 1.4089 | 1.1681 | 1.3612 | 1.3127 |
| Tolerance | .6372 | .6813 | .9021 | .7402 |

5. Empirical Results and Discussions

The following section presents and discusses the main results from restricted and unrestricted import quota policies of Malaysian bilateral trades for beef, mutton, and coffee. Time series data was utilized to estimate the changes in the variable in both policy conditions; restricted and unrestricted import quota using a monthly database of pre and post-implementation terms; 2013-15 and 2016-18, respectively. Before the analysis, we measured the trends of each variable using a non-parametric approach to detect the monotonic and temporal trends in a series of data points. Further, we evaluated the strength of relationships between imports and the measuring variables – exports of value-added and market prices.

5.1 Trends Detection

For beef, the negative coefficients for imports implied that both import values and volume were decreasing despite the implementation of opened- import quota policy, yet the market prices increased. Beef imports significantly decreased by RM 2.3 mill. per month (LCU) with market prices significantly increased by RM 242 for each metric ton per month (Table 5.1). These results contradict the trade theory that predicts higher imports and lower market prices after removing trade barriers.

Table 5.1- Results of Partial Trend Tests: Beef

| Parameters | Restricted Import Quota | | Unrestricted Import Quota | |
|--|--------------------------------|----------|----------------------------------|----------|
| | <i>S</i> | <i>Z</i> | <i>S</i> | <i>z</i> |
| Imports (RM Mill., LCU) | .926*** | .001 | -2.334*** | .000 |
| Imports (MT) | 70.611** | .014 | -226.939*** | .000 |
| Exports of value-added (RM Mill., LCU) | .020 | .314 | .012 | .300 |
| Price CIF (RM/Kg) | .051*** | .000 | .020 | .320 |
| Market Price (RM/Kg) | .082*** | .000 | .242*** | .000 |
| Consumer Price Index (CPI) | .758*** | .000 | .491*** | .000 |

Note: **, *** Sig. at .05 and .01 level of sig., respectively.

Similarly, mutton imports indicated declining trends after the import quota has been open. In value, the imports significantly decreased by RM 0.5 mill. (LCU) while both the CIF and market prices significantly increased at RM 124 and RM 644 per metric ton, respectively. However, the export of value-added showed significant and positive trends, augmenting at RM 0.29 mill. (LCU) per month (Table 5.2). This implies that declining trends of mutton imports will not be likely to affect export performance.

Table 5.2-Results of Partial Trend Tests: Mutton

| Parameters | Restricted Import Quota | | Unrestricted Import Quota | |
|--|-------------------------|----------|---------------------------|----------|
| | <i>S</i> | <i>z</i> | <i>S</i> | <i>z</i> |
| Imports (RM Mill., LCU) | 2.708*** | .000 | -.499*** | .029 |
| Exports of value-added (RM Mill., LCU) | .002** | .021 | .293*** | .000 |
| Price CIF (RM/Kg) | .055 | .133 | .124*** | .000 |
| Market Price (RM/Kg) | .068*** | .000 | .644** | .000 |
| Consumer Price Index (CPI) | .100*** | .000 | .166*** | .000 |

Note: **, *** Sig. at .05 and .01 level of sig., respectively.

Consistent with the trade theory, imports indicated increasing trends while consumer prices (i.e. CPI) were decreasing, albeit not statistically significant for raw coffee bean after the removal of the import quota barrier. The imports were significantly augmented at RM 511.8 mill. (LCU) and encouraged exports of value-added to rise significantly at RM 16.1 mill (LCU) (Table 5.3).

Table 5.3- Results of Partial Trend Tests: Coffee

| Indicators | Restricted Import Quota | | Unrestricted Import Quota | |
|---------------------------------------|-------------------------|----------|---------------------------|----------|
| | <i>S</i> | <i>z</i> | <i>S</i> | <i>z</i> |
| Imports (RM Mill., LCU) | 388.820* | .065 | 511.854** | .036 |
| Export of value-added (RM Mill., LCU) | 36.515** | .016 | 69.116*** | .000 |
| Price CIF (RM/Kg) | .067** | .000 | -.008 | .820 |
| Consumer Price Index (CPI) | .114** | .000 | -.011 | .338 |

Note: *, **, *** Sig. at .1, .05 and .01 level of sig., respectively.

5.2 Associations Measurement

Imports and value-added exports for beef showed significant positive associations implying that as imports increased, the exports are more likely to perform. The significant negative associations between imports and market price for both beef (-.664) and mutton (-.616) indicating as imports decrease, market prices tend to rise when implementing unrestricted quota policy. Instead, mutton showed a significant positive association (.667) between import and market prices for restricted quota implying as import increase, the market price is more likely to increase (Table 5.4).

Table 5.4- Results of Correlation Coefficients

| | <i>Restricted Import Quota</i> | | | <i>Unrestricted Import Quota</i> | | |
|----------------|--------------------------------|--------|--------------|----------------------------------|-------|--------------|
| | Exports of Value-added | CIF | Market Price | Exports of Value-added | CIF | Market Price |
| Beef Imports | -.200 | .072 | .274 | .533*** | .092 | -.664*** |
| Mutton Imports | .307* | -.057 | .667*** | -.275 | -.189 | -.616* |
| Coffee Imports | .186 | -.300* | n.a | .202 | -.148 | n.a |

Note: *, *** Sig. at .1 and .01 level of sig., respectively.

5.3 Dummy Multivariate Regression

Recall these regression models estimated the impacts of an unrestricted import quota on value-added products of beef, mutton, and coffee. Due to data availability, we utilized value-added exports to estimate those models for each focused commodities. All three commodities experienced significant impacts following the implementation of liberalized import policy after approximately three years. However, the impacts and magnitude differ considerably: value-added beef exports decreased larger than mutton while value-added coffee increased (Table 5.5).

Table 5.5- Regression Results Using Dummy Variables: Model of Value-added Exports

| Variables | Beef | Mutton | Coffee |
|-------------------------------|----------------------|----------------------|------------------|
| <i>QUOTA</i> | -.374* (-1.963) | -.292** (-2.116) | .233* (1.876) |
| <i>IMPORT</i> | -.145 (-1.064) | -.209*** (-2.713) | .138 (1.545) |
| <i>CIF</i> | .409 (1.937) | .067 (.987) | -.073 (-.630) |
| <i>MPRICE</i> | -.769*** (-3.654) | 1.222*** (10.651) | n.a |
| <i>EXCH</i> | .306 (1.450) | -.363*** (-3.825) | .549*** |
| <i>Adjusted R²</i> | 33.4 | 77.1 | 53.8 |

Note: Dependent variable is *EXPVA*; *, **, *** Sig. at .1, .05 and .01 level of sig., respectively.

Further, we estimate the impacts of unrestricted quota on the consumer price. The positive coefficients implied that market prices significantly increased in both livestock commodities, albeit different magnitude with mutton was nearly twice beef increment. These results, hence, contradict the trade theory that predicts market prices would be lower when the non-tariff barrier is removed (Table 5.6).

Table 5.6- Regression Results Using Dummy Variables: Model of Market Price

| Variables | Beef | Mutton |
|-------------------------------|----------------------|--------------------|
| <i>QUOTA</i> | .33*** (3.362) | .654*** (5.305) |
| <i>IMPORT</i> | -.383*** (-6.129) | .055 (.671) |
| <i>CIF</i> | .356*** (3.108) | .15* (2.153) |
| <i>EXCH</i> | .168 (1.469) | .21 (2.141) |
| <i>Adjusted R²</i> | 79.5 | 74.0 |

Note: Dependent variable is *MPRICE*; *, **, *** Sig. at .1, .05 and .01 level of sig., respectively.

6. Conclusions

Import liberalization policy becomes a crucial agenda, specifically for developing regions to address food security concerns due to inadequate domestic food supply to meet growing demand and population every year. With stagnating self-sufficiency levels while largely depending on imports for many years, Malaysia finally opened import quotas for beef, mutton, and coffee beginning 2016 although for a temporary basis. Approaching the five years of implementation, it is timely to identify the impacts of removing the non-tariff barriers for beef, mutton, and coffee at both sides – food industries and consumers at the national level. A nonparametric trend test and multivariate dummy regression were the main approaches to identify monotonic trends and to estimate the effects of opened quota policy on value-added export and market price. While trade theory expecting more imports after the removal of non-tariff barriers, the trend analysis indicated that all imports for beef and mutton showed negative trends, declined significantly compared to imports during the restricted period. However, value-added exports remained increasing after quota removal with import reduction. Market prices increased significantly for both beef and mutton, even larger magnitudes after the removal. In contrast, coffee showed positive trends after opened quota policy with significantly expanding imports and value-added exports while lowering import prices. Dummy regression results estimated that the exports of value-added products significantly decreased after implementing unrestricted import quota for beef and mutton. Mutton indicated a worsening effect after the quota removal when declining imports caused a higher market price. Coffee remained positive effects as imports showed increasing trends, the value-added exports were going up during pre and post-import liberalization, albeit a larger degree after quota removal.

After implementing for several years, the unrestricted import quota policy does not seem a promising solution to support beef and mutton domestic supply through imports. Instead, the open quota is less likely to promote the exports of beef value-added products. The prices of all commodities – beef, mutton, and coffee tend to increase after removing the quota barrier. However, this study evaluated some preliminary impacts utilizing data within three-year implementation from January 2016 to December 2018, and thus the estimation of each parameter represents the import quotas removal for that period. Due to data constraints, the data for each variable during restricted quota starting January 2013 to December 2015, which is the past three years before the policy revision. Further analysis should extend to the impacts of the revised policy at a macro level, broadening the scope of international economics through determining the consequences to bilateral trading regions. This study provides some economic insights on the removing non-tariff barrier of import quota for primary food commodities at the national level.

References

- Brambilla, I., Khandelwal, A.K., & Schott, P.K. (2007). China's experience under the MultiFiber Arrangement and the Agreement on Textiles and Clothing. NBER working paper 13346.
- Cadot, O. & Mallouche, M. (2012). Non-Tariff Measures: A Fresh Look at Trade Policy's New Frontier. CEPR and World Bank.
- Cadot, O., Gourdon, J. & Van Tongeren, F. (2018). Estimating Ad Valorem Equivalents of Non-Tariff Measures: Combining Price-Based and Quantity-Based Approaches. OECD Trade Policy Papers, No. 215, OECD Publishing, Paris, <https://doi.org/10.1787/f3cd5bdc-en>.
- De Melo, J. & Nicita, A. (2018). The Implications of Non-tariff Measures for Developing Countries' Exports Non-Tariff Measures: Economic Assessment and Policy Options for Development. UNCTAD.

- Fugazza, M. & Conway, P. (2010). The Impact of Removal of ATC Quotas on International Trade in Textiles and Apparel. Policy Issues in International Trade and Commodities Study Series No. 45. United Nation.
- Gilbert, R.O. (1987). Statistical Methods for Environmental Pollution Monitoring, Wiley, NY.
- Grace-Martin, K. (2020). What is a Logit Function and Why Use Logistic Regression? The Analysis Factor.
- Harrigan, J. & Barrows, G. (2006). Testing the Theory of Trade Policy: Evidence from the Abrupt End of the Multifibre Arrangement. NBER Working Paper 12579.
- Hoekman, B. & Nicita, A. (2018). Non-Tariff Measures and Trade Facilitation: WTO Disciplines and Policy Space for Development. Economic Assessment and Policy Options for Development, UNCTAD.
- Karl Wahlin, K. & Grimvall, A. (2010). Roadmap for assessing Regional Trends in Groundwater Quality. Environmental Monitoring and Assessment, (165), 1-4, 217-231. Retrieved from URL: <http://dx.doi.org/10.1007/s10661-009-0940-7>.
- Kendall, M.G. (1975). Rank Correlation Methods, 4th edition, Charles Griffin, London.
- Lettenmaier, D.P. (1988). Multivariate Non-Parametric Tests for the trend in Water Quality. Wiley Online Library.
- Mann, H.B. (1945). Non-parametric tests against the trend, *Econometrica*, 13:163-171.
- Organization for Economic Co-operation and Development (OECD). Tariffs are the Tip of the Iceberg: How behind the Border Issues Impact Trade. Retrieved from URL: <https://www.oecd.org/trade/topics/non-tariff-measures/>
- Pohlert, T. (2020). Non-Parametric Trend Tests and Change-Point Detection. Retrieved from URL: <https://cran.r-project.org/web/packages/trend/vignettes/trend.pdf>
- Rodriguez, G. (2007). Lecture Notes on Logit Model for Binary Data. URL: <http://data.princeton.edu>.
- Sun, L., Bogdanski, B.E.C., Stennes, B., & Cornelis Van Kooten, G. (2010). Impacts of Tariff and Non-tariff Trade Barriers on the Global Forest Products Trade: An Application of the Global Forest Product Model. *The International Forestry Review*, Vol. 12, No. 1 (2010), pp. 49-65.
- United Nations Conference on Trade and Development (UNCTAD). (2013). Non-Tariff Measures To Trade: Economic and Policy Issues for Developing Countries in International Trade Studies.
- University of California, Los Angeles. Logit Regression. Retrieved from URL: <https://stats.idre.ucla.edu/r/dae/logit-regression/>
- Vollrath, T. (1985). Developmental Consequences of Unrestricted Trade. Economic Research Service, United States Department of Agriculture.
- World Trade Organization (WTO). Understanding the WTO – Non-Tariff Barriers: Red Tape, etc. Retrieved from URL: <https://www.wto.org/english/thewto>
- World Trade Organization (WTO). (2012). Trade and public policies: A Closer Look at Non-Tariff Measures in the 21st Century.
- World Bank. (2004). Implications for Pakistan of Abolishing Textile and Clothing Export Quotas.

Acknowledgments

We gratefully acknowledge the Ministry of Agriculture and Food Industry, Malaysia for funding this research. Special thanks to the Department of Agriculture, Malaysia, Department of Veterinary Services, Malaysia, and the Department of Statistics, Malaysia for their contributions and cooperation.

-
- ¹ Mann, H.B. 1945. Non-parametric tests against the trend, *Econometrica* 13:163-171;
Kendall, M.G. 1975. *Rank Correlation Methods*, 4th edition, Charles Griffin, London;
Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*, Wiley, NY.
- ² Pohlert, T. (2020). *Non-Parametric Trend Tests and Change-Point Detection*.
- ³ The relationships between X and the mean of Y is linear.
- ⁴ The variance of residual is the same for any value of X.
- ⁵ For any fixed value of X, Y is normally distributed.
- ⁶ The VIF computes for each variable and the overall regression. If a predictor variable has a VIF over 20, then it may be collinear with another predictor. If the average across all predictors is substantially higher than one (perhaps 5 or higher), then there is multicollinearity across all the predictors.