MALAYSIAN RICE TRADE AND GOVERNMENT INTERVENTIONS

by

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Abstract

Malaysia's rice sector is highly protected, with the protection justified largely by arguments for food security. The government intervenes in the rice market by providing subsidies to farmers and consumers as well as imposing high import duties. Furthermore, the rice trade is controlled through a sole importer. In this paper, the welfare effects of eliminating the major government interventions in Malaysia's rice sector are evaluated. A modified spatial price equilibrium model that incorporates a sole importer with a fixed domestic price has been developed to measure the welfare impacts of the market distortions. Four scenarios were developed: (1) removal of the sole importer but continuation of the subsidies and existing tariffs; (2) removal of the subsidies but with the existence of the sole importer; (3) imposition of tariff and (4) free trade. Large net welfare gains and a significant reduction in government expenditures are likely if all forms of government interventions were to be eliminated and a free market allowed.

1.0 Introduction

Rice is an important crop in Malaysia despite the industry's contribution to the gross domestic product (GDP) being less than 1 per cent. Due to the national interest in food security, protection of farm incomes and ensuring a sufficient supply of rice, and since rice is the main staple food for the majority of the populace; the Government has implemented a range of protective policies (Tan 1987).

Rice in Malaysia is protected through price controls, subsidies, tariffs and buffer stocks. Buffer stocks are used to stabilize the domestic price from fluctuations in the world price. Since the rice crisis in 2008, the government has increased the rice stockpile from 92,000 Mt to 292,000 Mt. This is to ensure higher levels of self sufficiency. During 2009 the government allocated RM1.74 billion for various forms of subsidies and incentives (see Table 1). Furthermore, the retail prices for 5, 10 and 20 percent broken rice were controlled by the government. Despite, being a member of the ASEAN Free Trade Area (AFTA) and the World Trade Organization (WTO), the

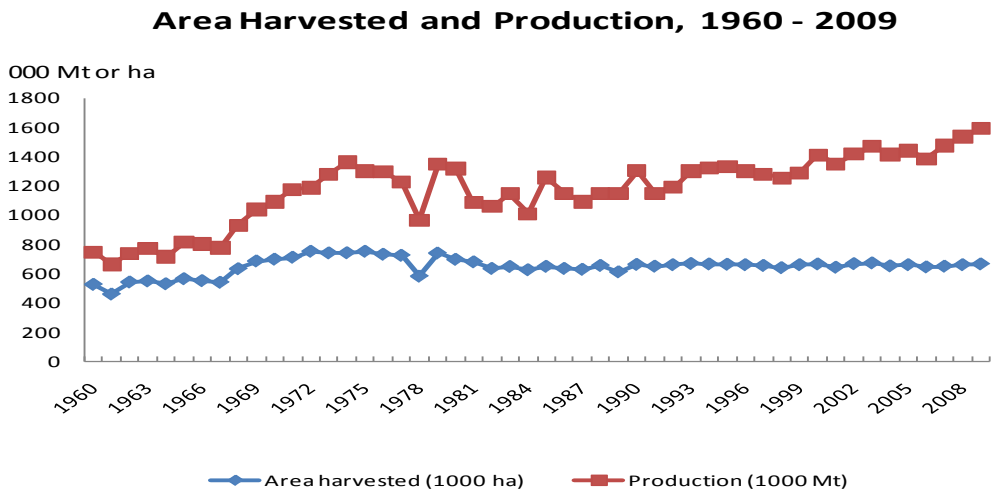
government still imposes high import duties on rice since it is included on the highly sensitive products list.

While trade barriers protect the domestic producers, at the same time, there is also a transfer of the burden of the support to consumers and taxpayer. Also world welfare is affected (Cramer, Wailes and Shui 1993). If government eliminated all the various kinds of trade barriers and allowed free trade, the world price, production and trade would increase and further enhance the welfare of both the importing and exporting nations (Cramer, Wailes and Shui 1993; Fan, Wailes and Cramer 1994; Magno and Yanagida 2000, Chen, McCarl and Chang 2006).

The aim of this paper is to measure the welfare effects on consumers and producers if all major government interventions for rice were to be eliminated. In the next section, an overview of the Malaysian rice sector and government policies is presented. The theoretical framework for a spatial equilibrium model and the estimation procedures are described in section 3 and then followed in section 4 with some simulation results for the different scenarios. In section 5, some policy implications for the rice sector are given for the various scenarios which include a free trade case. The last section concludes the paper with some comments on limitations and recommendations for future studies.

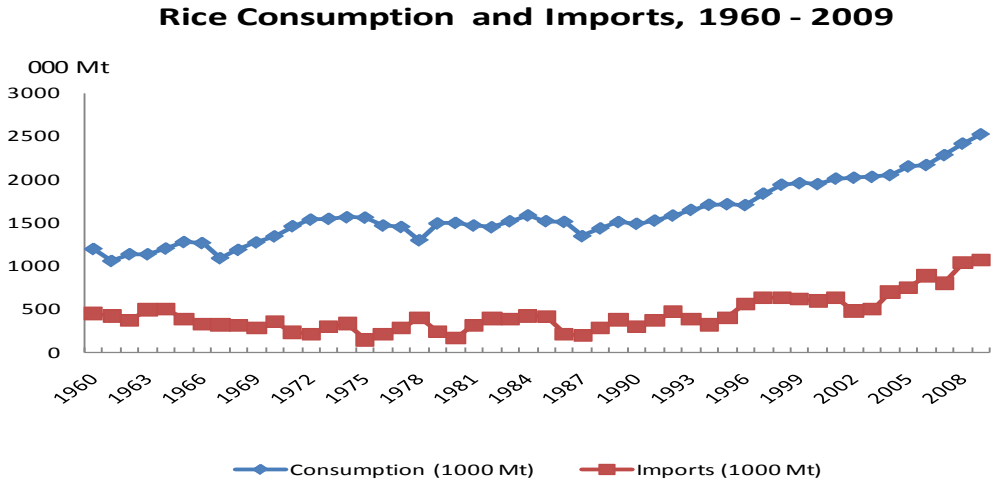
2.0 Overview of Malaysian rice sector

Malaysia's rice production has been increasing since the 1960s and almost doubled by 2009. Over 1.6 million tonnes of rice was produced compared to only 0.75 million tonnes in the 1960s, as shown in Figure 1. Over the same period, the area harvested has been rising slowly until the 1980s. Since then it has been stable between 612,000 to 696,000 hectares. However, the total rice consumption has increased over time, even though the per capita consumption dropped from 147.9 kg in 1960 to 91.7 kg in 2009. Production of rice has only been sufficient to meet about 65 percent of the domestic needs, thus the remaining 35 percent is imported from the main exporters, Thailand and Vietnam. As illustrated in Figure 2, the consumption and import patterns over the four decades shows an increasing trend.



Source: USDA, PSD online (2010).

Figure 1 Area harvested and rice production, 1960-2009



Source: USDA, PSD online (2010).

Figure 2 Consumption and imports of rice, 1960-2009

Even before Malaysia gained its independence in 1957 the government had intervened in the rice market. The Guaranteed Minimum Price (GMP) was introduced in 1949, to support the paddy price. In 2010, the government has increased the minimum paddy price from RM650 to RM750 per Mt. The government policies on rice are mainly focused on poverty elimination and sectoral growth. As the poverty among paddy farmers is high in Malaysia, the government regards this as an important and sensitive political issue (Fatimah and Mohd Gazali 1990). Price support, such as subsidies and incentives in this sector increases the government budget, which is reflected in

heavy taxes on consumers. A list of subsidies and incentives and their respective allocations for the year 2009 is shown in Table 1.

Besides subsidies, the government also imposes high import duties on rice as a measure to protect the domestic industry and for food security purposes. Currently, the import duties for rice imports are 20 percent under the Common Effective Preferential Tariff Agreement (CEPT) of AFTA and 40 percent under the Agreement on Agriculture (AoA) of the WTO. However, the existence of the sole importer, PadiBeras National Berhad (BERNAS)[1], as shown in Figure 1, has trade-distorting effects as the government provides a privilege to BERNAS to import rice at duty free rates. The actual situation is that there are no tariffs on rice trade as BERNAS has an exemption from the import duty. The actual imposition of a tariff can only be realized when BERNAS's license expires in 2016.

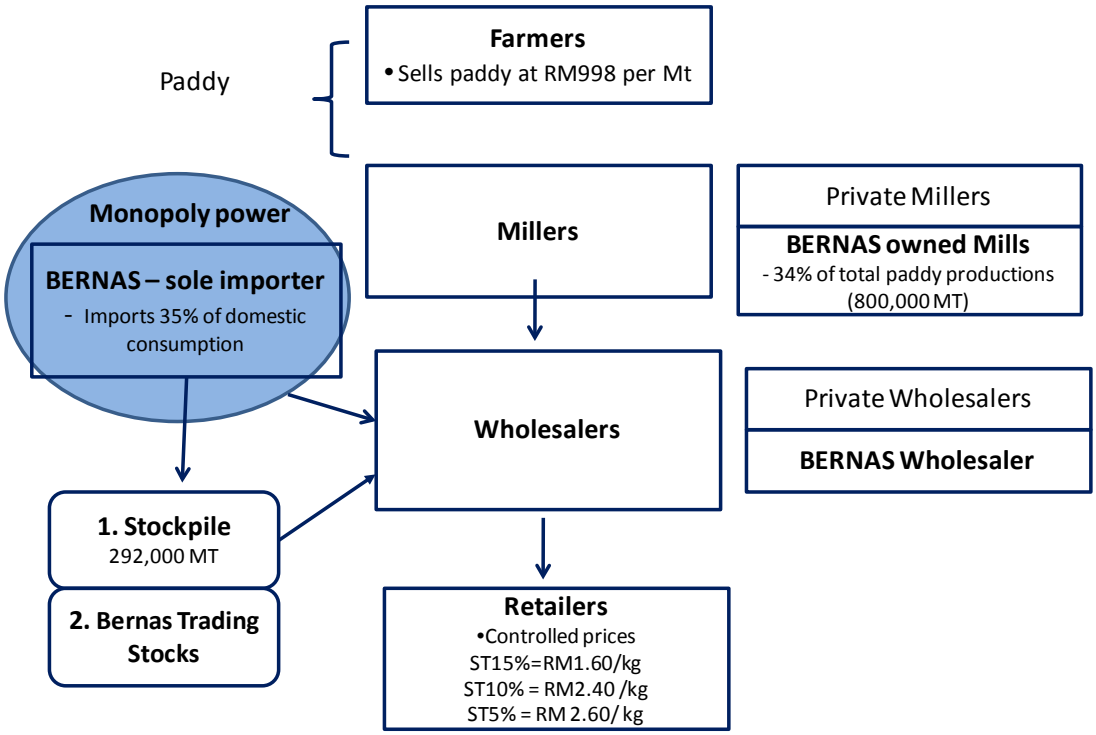


Figure 3 Role of BERNAS in Malaysian Paddy and Rice Industry

[1]BERNAS has regulated the paddy and rice sector in Malaysia since its privatization in January 1996 and is involved in paddy procurement and rice processing, importation and exportation, distribution and marketing activities.

Table 1 Subsidies and incentives in paddy production and rice industry in year 2009[a]

Types of subsidies/incentives	Descriptions	Allocations (RM mil.)
Subsidy for the paddy price	Farmers receive RM 248.10 for each MT of paddy sold.	448.00
Federal Government paddy fertilizer subsidy scheme	240kg/hectare mixed fertilizer (12 bag@ 20kg/bag) and 80kg/hectare for organic fertilizer (4 bag @ 20kg/bag)	275.06
Yield increase incentive	RM 650 for each 1 MT of increase in yield at the farm level compared to the previous year (base year).	40.00
Paddy production incentive[b]	Ploughing expenses at a maximum of RM 100 per hectare and additional fertilizer of RM 140 per hectare per season (maximum)	150.00
Additional fertilizer NPK	3 bag @ 50kg each bag/hectare	250.00
Subsidy for Pesticide Control	RM200/hectare/season	173.00
Rice Millers Subsidy[c]	Peninsular Malaysia: RM750/Mt Sabah & Sarawak: RM600/Mt	250.00
Subsidy Rice in Sabah and Sarawak	Difference between wholesaler price and purchasing cost of rice import	150.00
Total		1736.06

Source : Ministry of Agriculture and Agro-Based Industry (2010).

[a] Last updated on 27 August 2009
[b] Figure estimates based on area harvested and total expenses in year 2009.
[c] This subsidy started in 2008 during the rice crisis to encourage millers to produce ST15% broken rice. However, this scheme will be replaced by a consumer subsidy program called "Rice for the People Subsidy Programme"(SUBUR). The estimated cost for this program is approximately RM93.9 million.

Under the privatization agreement with the government, BERNAS is obliged to maintain and manage the national stockpile of rice to ensure sufficient supply and to stabilize price. Thus, the role of BERNAS in this study will be modeled as a fixed domestic price. Also, the buffer stock effects are not evaluated in the policy simulations. The welfare effects of removing the sole importer, the tariffs and the subsidies are evaluated in this paper.

3.0 Methodology

Spatial equilibrium models have been widely used in many studies, particularly trade analyses in the agricultural sector. The model was originally developed by Enke (1951) and then Samuelson (1952) and later refined by Takayama and Judge (1964, 1971). In its basic form a perfectly competitive market is assumed and the equilibrium of prices and quantities can be determined.

In this study, a net social revenue objective function is used compared to the initial net welfare objective function developed by Samuelson (1952). Since the latter function does not allow implementation of some policies, the net revenue objective function is more appropriate for analysing various government policies.

The spatial equilibrium model using the net social revenue objective function is a primal-dual formulation. In the primal-dual formulation, the primal model is essentially subtracted from the dual model and both model's constraints are included (MacAulay, 1992). Furthermore, this model consists of both prices and quantities together which is an advantage when analysing the effects of policy changes.

An assumption of perfect competition in the world rice market was used in this study despite rice being a relatively thinly traded commodity and controlled by a few exporting countries. However, a study by Karp and Perloff (1989) showed that the rice export market was closer to perfect competition than a collusive market. Also, it was assumed that rice is a homogenous product. For the Malaysian market various policy interventions were imposed on the model.

In the quantity formulation, the demand and supply functions are defined in terms of quantity units and the price is the dependent variable. The linear demand and supply functions for a set of n regions are defined as:

(1) Demand function: $P_y = \lambda - \Omega y$

(2) Supply function: $P_x = \nu - Hx$

where y and x are quantity demanded and supplied respectively; P_y and P_x are the demand price and supply price respectively. The variables, λ and ν are (n x1) vectors of the demand and supply intercepts and Ω and H are (n x n) matrices of demand and supply slope coefficients respectively.

Assuming linear supply and demand functions, the primal-dual model, using a net social revenue objective function in the quantity domain, was adapted from MacAulay (1992). The net social

monetary gain objective function or net revenue objective function consists of total revenue, ($P_y^{'}y$) less the total production costs ($P_x^{'}x$) and total transportation cost ($T^{'}X$) as in equation (3) below.

(3) Net Social Revenue: $NSR = P_y^{'}y - P_x^{'}x - T^{'}X$

The objective function (equation 4) is obtained by substituting equations (1) and (2) into (3) and is then maximized, subject to the set of constraints as in equations (5) and (6).

(4) Maximize NSR = $\left[\begin{bmatrix}\lambda\\-\nu\\-\mathrm{T}\\0\\0\end{bmatrix}-\begin{bmatrix}\Omega & 0 & 0 & \mathrm{I} & 0\\0 & \mathrm{H} & 0 & 0 & -\mathrm{I}\\0 & 0 & 0 & -G_y{}' & -G_x{}'\\-\mathrm{I} & 0 & G_y & 0 & 0\\0 & \mathrm{I} & G_x & 0 & 0\end{bmatrix}\begin{bmatrix}y\\x\\X\\\rho_y\\\rho_x\end{bmatrix}\right]'\begin{bmatrix}y\\x\\X\\\rho_y\\\rho_x\end{bmatrix}$

Subject to

(5) $\begin{bmatrix}\lambda\\-\nu\\-\mathrm{T}\\0\\0\end{bmatrix}-\begin{bmatrix}\Omega & 0 & 0 & \mathrm{I} & 0\\0 & \mathrm{H} & 0 & 0 & -\mathrm{I}\\0 & 0 & 0 & -G_y{}' & -G_x{}'\\-\mathrm{I} & 0 & G_y & 0 & 0\\0 & \mathrm{I} & G_x & 0 & 0\end{bmatrix}\begin{bmatrix}y\\x\\X\\\rho_y\\\rho_x\end{bmatrix} \leq 0'$

and

(6) $\left(P_y^{'}\ P_x^{'}X^{'}\right) \geq 0'$

Where the G_y and G_x are (n x n) matrices structured as in equation (7) and (8), to sum the shipments into and out of a region respectively.

(7) Gy = $\begin{bmatrix}1 & & 1 & & 1 & \\ & 1 & & 1 & & 1\\ \cdot & & \cdot & & \cdot & \\ & \cdot & & \cdot\ \cdots & & \cdot\\ & & \cdot & & \cdot & \\ & 1 & & 1 & & 1\end{bmatrix}$

(8) $G_X = \begin{bmatrix} -1\ -1 \ldots -1 & & & \\ & -1\ -1 \ldots -1 & & \\ & & \ddots & \\ & & & -1\ -1 \ldots -1 \end{bmatrix}$

Solution of the model was by using Microsoft Excel Solver.

The data for this study were obtained from the UN Comtrade and PSD online (2010) databases and data from 2009 were used as the base model scenario. The countries involved in this study were Malaysia, Thailand, Vietnam, Pakistan and the Rest of the World (ROW)[2]. Since the data for transportation costs were not available, proxies were used by calculating the unit value differentials between the countries. Elasticities of demand and supply in the selected countries were obtained from the Food and Policy Research Institute (FAPRI 2010).

The base case was developed using the 2009 trade data, which reflects the current policy situation with domestic subsidies and a sole importer, who fixed the domestic prices. A per unit domestic subsidy was calculated based on the total value of both the output and input focused subsidies (as in Table 1) and divided by production to obtain and approximate estimate of an output equivalent subsidy. This amounted to US$155 per tonne. In the spatial equilibrium model, the domestic subsidy was included in the price arbitrage condition as a negative transportation cost (in equation (9).

(9) $p_i - p^i \leq -t_{ii}$

Where p_i and p^i are the domestic demand and supply prices respectively and $-t_{ii}$ is the amount of subsidy, which is modeled as a negative transportation cost.

The role of the sole importer, BERNAS, was modeled as a fixed domestic price in the spatial equilibrium model using an additional constraint. If the BERNAS license expires (removal of sole importer status), the fixed price constraint will be removed and replaced it with and ad

[2] Thailand and Vietnam are the main rice exporters while Pakistan has a long-term agreement to exchange rice with palm oil under the free trade agreement with Malaysia.

valorem tariff of 20 percent for the ASEAN countries and a 40 percent ad valorem tariff for the rest of the world (ROW). The ad valorem tariffs, τ_{ij} were imposed in the domestic demand price with different tariff rates for different trade flows, as shown in the equation 10.

$$(10) \quad [R_\tau \quad G'_y \quad G'_x] \begin{bmatrix} \rho_y \\ \rho_x \end{bmatrix} \leq T$$

Where R_τ is an (n^2 x n^2) converter matrix and Ψ_{ij} is $1/(1 + \tau_{ij})$, and where τ_{ij} is the tariff rate imposed on the imports from region i. In this study, the value of Ψ_{ij} is 0.83 for imports from Thailand and Vietnam and 0.71 from Pakistan and ROW. It was assumed that the tariff rates applied by other countries were constant in this study.

Four scenarios were developed for the study. The first scenario was designed to analyze the effects of removing the sole importer status under which the duty free import license expired. In this scenario, import tariffs of 20 percent for the ASEAN countries and 40 percent for the ROW were applied as well as the domestic subsidies. The second scenario was developed to evaluate the welfare effects if government eliminated subsidies and retained BERNAS.

Another scenario was used to analyze the effects of imposing tariff and removing domestic subsidies and the fixed domestic price (role of BERNAS). Finally, a free trade scenario incorporated to assess the effects of eliminating all forms of government intervention so that the forces of supply and demand determined market prices.

4.0 Empirical results

In this section, the alternative degrees of trade openness were simulated and the price, quantity, imports and welfare effects are reported. Four different scenarios were analyzed. As the spatial equilibrium model is a primal-dual model that incorporates 2009 price and quantity points to derive the supply and demand functions and the observed price differences between countries to represent the transfer costs, the baseline estimates reproduce the original data as shown in Table 2. This also provides an excellent check on the model that it is performing as required.

In the base case, the supply price is higher than demand price, as the difference is the amount of subsidy of US$155.03 per tonne. The consumer and producer surpluses were US$2,758.74 million and US$1,688.16 million respectively. But, the government spends approximately US$339.92 to subsidize the paddy and rice industry, which is a burden on tax payers. All the scenarios reflect some degree of trade liberalization.

Scenario 1 : Removal of the fixed domestic price (tariff and subsidy remained)

The first scenario was with subsidies and a 20 percent ad valorem tariff for the ASEAN countries and a 40 per cent ad valorem tariff for ROW countries. When BERNAS's import duty exemption license expires, the tariff rates will become effective. In Table 2, the simulated values are presented for price, production, demand and imports as well as the welfare measures. Removal of the sole importer status increases the domestic price by about 19.8 percent, increasing from US$507.90 to US$608.37/tonne. As the price rises, the production also increases by 6.5 percent and the demand declines by 5.9 percent. The decline in consumption reduces the imports by 31.5 percent from the baseline model. As expected, the consumer expenditure increased by 12.7 percent due to a higher price, and at the same time, producer revenue rose by 22.7 percent. However, the net revenue decreased to US$524.8 million which is 51.0 percent less than the current policy.

A price change due to implementation of tariffs and subsidies will thus change both the consumer and producer surpluses. The consumer welfare declined by 11.5 percent but the producers gained by 13.5 percent due to the rise in domestic prices. Since the government gains US$89 million from imposing tariffs, but the amount of subsidies provided to rice producers was large. It is interesting to note, that the consumers in the exporting nations, Thailand, Vietnam and Pakistan, gained from this scenario but not the producers. This scenario is not preferred since the removal of BERNAS as sole importer does not increase the net welfare and government revenue

Table 2 Results for base case and policy scenarios (per cent change from base)

Item	Base case (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff and subsidy remained) (%	Removal of subsidy (fixed price remained) (% change)	Removal of subsidy and fixed price (tariffs imposed) (% change)	Removal of all trade barriers (% change)
	0	1	2	3	4
Supply Price (US$/Mt)	662.93	15.18	-23.39	-8.09	-23.29
Demand Price (US$/Mt)	507.90	19.81	0.00	19.96	0.13
Production ('000 Mt)	2,190.00	6.53	-10.06	-3.48	-10.01
Demand ('000 Mt)	3,259.00	-5.94	0.00	-5.99	-0.04
Import ('000 Mt)	1,069.00	-31.49	20.60	-11.13	20.40
Consumer expenditure (US$ mill.)	1,655.25	12.69	0.00	12.78	0.09
Producer revenue (US$ mill.)	1,451.82	22.70	-31.09	-11.29	-30.97
Net revenue (US$ mill.)	203.43	-58.72	221.88	184.54	221.75
Consumer surplus (US$ mill.)	2,758.74	-11.53	0.00	-11.62	-0.08
Producer surplus (US$ mill.)	1,688.16	13.48	-19.10	-6.84	-19.02
Net welfare gain (+)/loss (-)(US$ mill.)	1,070.58	-50.98	30.12	-19.16	29.80
Government revenue(+) /expenditure (-) (US$ mill.)	-339.52	19.73	189.94	230.62	189.99

Scenario 2: Removal of domestic subsidies (Fixed domestic price remained)

In this scenario, the domestic subsidies were eliminated and the fixed domestic price remained. Since the domestic subsidies were provided to producers, the consumers' price and demand and welfare are unaffected. The removal of domestic subsidies had reduced the supply price by 23.4 percent from baseline estimates, thus the production drops to 220,200 tonnes and the same amount of imports had increased. In term of welfare, consumers' surplue in Malaysia remain unchanged but producers' surplus fell by 19.1 percent from the baseline estimate. However, the net welfare increased by 30.1 percent and the government gained US$305 million from removing subsidies. This scenario is more preferred than scenario 1.

Scenario 3: Removal of domestic subsidies and fixed price effect (tariffs imposed)

In this policy scenario, import tariffs of 20 percent for ASEAN countries and 40 percent for the ROW were analyzed. The current policy, with a sole importer and subsidies, was replaced with a tariff. The implementation of ad valorem tariffs of 20 and 40 percent increased the domestic price by 19.9 percent from a baseline of US$507.90 to US$609.38, which is a smaller increase than in scenario I as shown in Table 2. Despite the price increase, production declined by 3.5 percent as a result of the removal of domestic. The imports and consumption of rice both declined by 11.1 and 6.0 percent, respectively.

With the removal of subsidies and the sole importer status, BERNAS, the consumers and producers lost welfare by 11.6 percent and 6.8 percent respectively. However, the revenue for government increased by more than double from the baseline estimates to US$ 443.5 million, gained largely from the removal of subsidy and tariff revenue. This situation would reduce the burden of tax on consumers.

Scenario 4: Removal of all trade barriers

Finally, the policy scenario in this section is for removal of BERNAS as a sole importer, removal of the subsidies and also the tariffs and without any form of government interventions. In this scenario, the demand price had a minimal increase of 0.1 percent and the rice production had declined by 10.0 percent. Despite removal of all trade barriers, the consumption decreased only by 0.04 percent. Imports increased by 20.4 percent to fill in the gap between production and consumption.

The results in this scenario are similar to those of scenario 2 (with subsidies removed) as illustrated in Table 2. Consumers' and producers' lost welfare yet the net welfare gain was US$1.38 billion, a 29.8 percent rise from the baseline estimates. As in scenario 2, the government revenue increase two fold from base case to US$305.5 million.

5.0 Policy implications on eliminating government interventions

Based on the alternative policy scenarios, scenario 2 and 4 are most preferred and it is interesting to note that both these scenarios provided similar results. The existence of BERNAS as a sole importer, who fixed the domestic rice price, means it is likely to set the domestic price close to the world price (as we observed in this case). This could be the reason for the similar results and the minimal increase in the domestic price.

Greater market distortions would be expected if the government (through BERNAS) fixed the domestic price much lower than the world price or if the world price increased significantly, as in the 2008 rice crisis. Thus, the current policy with a fixed domestic price only protects the industry, as far as the gap between domestic price and world price, and in this case it was marginal.

The results in scenario 3, imposing of tariffs, increases the government revenue but the consumer, producer and net welfare are affected due to the increase in the domestic price. Therefore, removing the fixed price of BERNAS, tariff rates and domestic subsidies and moves towards full liberalization would be beneficial to the government. However, due to the national interest in food security, it may be more advisable to practice partial liberalization while still complying with the WTO and AFTA regulations.

6.0 Conclusions

A spatial equilibrium model for Malaysian rice trade which incorporates the current policies of the sole importer (BERNAS) and domestic subsidies was used to evaluate the welfare effects of the market distortions. Four scenarios were developed to analyze the policy impacts on the demand and supply prices, production, demand, imports and welfare.

The results showed that by removing all trade barriers, despite the decline in the consumer and producer welfare, the net welfare increased and government revenue increased, as a

result of elimination of the subsidies. The existence of the sole importer had little effect in this study as the domestic price was fixed close to the world price. However, imposing a fixed price means a lack of transparency of the price signaling, which leads to market distortions if the world price surges either up or down.

Although, full liberalization increases net welfare and government revenue, due to the national interest in food security issues, the partial liberalization of rice trade with WTO and AFTA compliance would be recommended. Removing production based subsidies and replacing them with income support, would not only generate greater government revenue but also reduce the taxpayers' burden and improve the livelihood of farmers.

The work reported in this paper has some limitations, mainly the assumption that rice is considered to be a homogenous product. Since the consumption of rice is very much related to personal income, the policy implementation recommendations could be much more appropriate if the data for individual rice varieties were available.

Furthermore, a static model with one period of estimation and simulation provided only a limited perspective. Also, only a few countries were included in the model. In addition, the demand and supply behaviors were assumed to be linear and based on an elasticity estimate. Econometrically estimated nonlinear function could be used if appropriate.

A more detailed approach would be to include econometrically estimated dynamic supply and demand relationships which could be simulated over time and which would provide more detail on the dynamic consequence of removing the distorting policies. Such models might be used in further studies of rice deregulation in Malaysia.

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Appendix 1 : Welfare Impacts under different scenarios

Malaysia

Item	**Base case** (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff imposed and subsidy remained) **(Scenario 1)**			Removal of subsidy (fixed price remains) **(Scenario 2)**			Removal of subsidy and fixed price (tariff imposed) **(Scenario 3)**			Removal of all trade barriers **(Scenario 4)**		
	Value	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change
Supply Intercept	-878.8	-878.8			-878.8			-878.8			-878.8		
Supply Slope	0.7	0.7			0.7			0.7			0.7		
Demand Intercept	2200.9	2200.9			2,200.9			2,200.9			2,200.9		
Demand Slope	-0.5	-0.5			-0.5			-0.5			-0.5		
Supply Price (US$/Mt)	662.9	763.6	100.6	15.2	507.9	-155.0	-23.4	609.3	-53.6	-8.1	508.5	-154.4	-23.3
Demand Price (US$/Mt)	507.9	608.5	100.6	19.8	507.9	0.0	0.0	609.3	101.4	20.0	508.5	0.6	0.1
Production ('000 Mt)	2190.0	2332.9	142.9	6.5	1,969.8	-220.2	-10.1	2,113.8	-76.2	-3.5	1,970.7	-219.3	-10.0
Demand ('000 Mt)	3259.0	3065.3	-193.7	-5.9	3,259.0	0.0	0.0	3,063.8	-195.2	-6.0	3,257.8	-1.2	0.0
Imports ('000 Mt)	1069.0	732.4	-336.6	-31.5	1,289.2	220.2	20.6	950.0	-119.0	-11.1	1,287.1	218.1	20.4
Consumer expenditure (US$ mill.)	1655.2	1865.3	210.1	12.7	1,655.2	0.0	0.0	1,866.8	211.5	12.8	1,656.7	1.5	0.1
Producer revenue (US$ mill.)	1451.8	1781.3	329.5	22.7	1,000.5	-451.4	-31.1	1,287.9	-163.9	-11.3	1,002.2	-449.6	-31.0
Net revenue (US$ mill.)	203.4	84.0	-119.4	-58.7	654.8	451.4	221.9	578.8	375.4	184.5	654.5	451.1	221.7
Consumer surplus (US$ mill.)	2758.7	2440.6	-318.2	-11.5	2,758.7	0.0	0.0	2,438.2	-320.6	-11.6	2,756.6	-2.1	-0.1
Producer surplus (US$ mill.)	1688.2	1915.7	227.6	13.5	1,365.7	-322.4	-19.1	1,572.8	-115.4	-6.8	1,367.0	-321.2	-19.0
Net welfare gain/loss(US$ mill.)	1070.6	524.8	-545.7	-51.0	1,393.0	322.4	30.1	865.4	-205.2	-19.2	1,389.6	319.1	29.8
Subsidy (US$ mill.)	-339.5	-361.7			305.4			327.7			305.5		
Tariff (US$ mill.)		89.1						115.8			0.0		
Government revenue(+) /loss (-) (US$ mill.)	-339.5	-272.5	67.0	-19.7	305.4	644.9	189.9	443.5	783.0	230.6	305.5	645.0	190.0

Thailand

Item	**Base case** (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff imposed and subsidy remained) **(Scenario 1)**			Removal of subsidy (fixed price remains) **(Scenario 2)**			Removal of subsidy and fixed price (tariff imposed) **(Scenario 3)**			Removal of all trade barriers **(Scenario 4)**		
	Value	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change
Supply Intercept	-1,753.9	-1,753.9			-1,753.9			-1,753.9			-1,753.9		
Supply Slope	0.1	0.1			0.1			0.1			0.1		
Demand Intercept	10,388.7	10,388.7			10,388.7			10,388.7			10,388.7		
Demand Slope	-0.6	-0.6			-0.6			-0.6			-0.6		
Supply Price (US$/Mt)	494.7	493.7	-1.0	-0.2	494.7	0.0	0.0	494.3	-0.4	-0.1	495.3	0.6	0.1
Demand Price (US$/Mt)	494.7	493.7	-1.0	-0.2	494.7	0.0	0.0	494.3	-0.4	-0.1	495.3	0.6	0.1
Production ('000 Mt)	25,087.0	25,075.8	-11.2	0.0	25,087.0	0.0	0.0	25,083.1	-3.9	0.0	25,094.2	7.2	0.0
Demand ('000 Mt)	15,887.0	15,888.6	1.6	0.0	15,887.0	0.0	0.0	15,887.6	0.6	0.0	15,886.0	-1.0	0.0
Imports ('000 Mt)	-9,200.0	-9,187.2	12.8	-0.1	-9,200.0	0.0	0.0	-9,195.5	4.5	0.0	-9,208.3	-8.3	0.1
Consumer expenditure (US$ mill.)	7,859.3	7,844.2	-15.1	-0.2	7,859.3	0.0	0.0	7,854.0	-5.3	-0.1	7,869.1	9.8	0.1
Producer revenue (US$ mill.)	12,410.5	12,379.9	-30.6	-0.2	12,410.5	0.0	0.0	12,399.7	-10.8	-0.1	12,430.4	19.8	0.2
Net revenue (US$ mill.)	-4,551.2	-4,535.7	15.5	-0.3	-4,551.2	0.0	0.0	-4,545.8	5.5	-0.1	-4,561.3	-10.1	0.2
Consumer surplus (US$ mill.)	78,593.0	78,608.9	15.9	0.0	78,593.0	0.0	0.0	78,598.6	5.6	0.0	78,582.7	-10.3	0.0
Producer surplus (US$ mill.)	28,205.8	28,180.7	-25.1	-0.1	28,205.8	0.0	0.0	28,196.9	-8.9	0.0	28,222.0	16.3	0.1
Net welfare gain/loss(US$ mill.)	50,387.2	50,428.2	41.0	0.1	50,387.2	0.0	0.0	50,401.7	14.5	0.0	50,360.7	-26.5	-0.1

Vietnam

Item	**Base case** (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff imposed and subsidy remained) **(Scenario 1)**			Removal of subsidy (fixed price remains) **(Scenario 2)**			Removal of subsidy and fixed price (tariff imposed) **(Scenario 3)**			Removal of all trade barriers **(Scenario 4)**		
	Value	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change
Supply Intercept	-4,206.5	-4,206.5			-4,206.5			-4,206.5			-4,206.5		
Supply Slope	0.2	0.2			0.2			0.2			0.2		
Demand Intercept	2,194.7	2,194.7			2,194.7			2,194.7			2,194.7		
Demand Slope	-0.1	-0.1			-0.1			-0.1			-0.1		
Supply Price (US$/Mt)	365.8	364.8	-1.0	-0.3	365.8	0.0	0.0	365.4	-0.4	-0.1	366.4	0.6	0.2
Demand Price (US$/Mt)	365.8	364.8	-1.0	-0.3	365.8	0.0	0.0	365.4	-0.4	-0.1	366.4	0.6	0.2
Production ('000 Mt)	26,341.0	26,335.2	-5.8	0.0	26,341.0	0.0	0.0	26,339.0	-2.0	0.0	26,344.7	3.7	0.0
Demand ('000 Mt)	21,091.0	21,102.5	11.5	0.1	21,091.0	0.0	0.0	21,095.1	4.1	0.0	21,083.5	-7.5	0.0
Imports ('000 Mt)	-5,250.0	-5,232.7	17.3	-0.3	-5,250.0	0.0	0.0	-5,243.9	6.1	-0.1	-5,261.2	-11.2	0.2
Consumer expenditure (US$ mill.)	7,714.7	7,697.8	-16.9	-0.2	7,714.7	0.0	0.0	7,708.7	-6.0	-0.1	7,725.6	10.9	0.1
Producer revenue (US$ mill.)	9,635.0	9,606.6	-28.4	-0.3	9,635.0	0.0	0.0	9,625.0	-10.1	-0.1	9,653.4	18.4	0.2
Net revenue (US$ mill.)	-1,920.3	-1,908.8	11.6	-0.6	-1,920.3	0.0	0.0	-1,916.3	4.1	-0.2	-1,927.8	-7.5	0.4
Consumer surplus (US$ mill.)	19,286.7	19,307.8	21.1	0.1	19,286.7	0.0	0.0	19,294.1	7.5	0.0	19,273.0	-13.7	-0.1
Producer surplus (US$ mill.)	60,218.8	60,192.5	-26.3	0.0	60,218.8	0.0	0.0	60,209.5	-9.3	0.0	60,235.9	17.1	0.0
Net welfare gain/loss(US$ mill.)	-40,932.2	-40,884.7	47.4	-0.1	-40,932.2	0.0	0.0	-40,915.4	16.8	0.0	-40,962.9	-30.7	0.1

Pakistan

Item	Base case (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff imposed and subsidy remained) (Scenario 1)			Removal of subsidy (fixed price remains) (Scenario 2)			Removal of subsidy and fixed price (tariff imposed) (Scenario 3)			Removal of all trade barriers (Scenario 4)		
	Value	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change
Supply Intercept	-982.4	-982.4			-982.4			-982.4			-982.4		
Supply Slope	0.2	0.2			0.2			0.2			0.2		
Demand Intercept	2,630.6	2,630.6			2,630.6			2,630.6			2,630.6		
Demand Slope	-0.6	-0.6			-0.6			-0.6			-0.6		
Supply Price (US$/Mt)	401.3	400.3	-1.0	-0.2	401.3	0.0	0.0	400.9	-0.4	-0.1	401.9	0.6	0.2
Demand Price (US$/Mt)	401.3	400.3	-1.0	-0.2	401.3	0.0	0.0	400.9	-0.4	-0.1	401.9	0.6	0.2
Production ('000 Mt)	7,500.0	7,494.6	-5.4	-0.1	7,500.0	0.0	0.0	7,498.1	-1.9	0.0	7,503.5	3.5	0.0
Demand ('000 Mt)	3,750.0	3,751.7	1.7	0.0	3,750.0	0.0	0.0	3,750.6	0.6	0.0	3,748.9	-1.1	0.0
Imports ('000 Mt)	-3,750.0	-3,742.9	7.1	-0.2	-3,750.0	0.0	0.0	-3,747.5	2.5	-0.1	-3,754.6	-4.6	0.1
Consumer expenditure (US$ mill.)	1,504.8	1,501.7	-3.1	-0.2	1,504.8	0.0	0.0	1,503.7	-1.1	-0.1	1,506.8	2.0	0.1
Producer revenue (US$ mill.)	3,009.6	2,999.9	-9.7	-0.3	3,009.6	0.0	0.0	3,006.2	-3.4	-0.1	3,015.9	6.3	0.2
Net revenue (US$ mill.)	-1,504.8	-1,498.2	6.6	-0.4	-1,504.8	0.0	0.0	-1,502.5	2.3	-0.2	-1,509.1	-4.3	0.3
Consumer surplus (US$ mill.)	4,180.0	4,183.8	3.8	0.1	4,180.0	0.0	0.0	4,181.3	1.3	0.0	4,177.6	-2.4	-0.1
Producer surplus (US$ mill.)	5,189.0	5,181.5	-7.5	-0.1	5,189.0	0.0	0.0	5,186.3	-2.7	-0.1	5,193.8	4.9	0.1
Net welfare gain/loss(US$ mill.)	-1,009.0	-997.7	11.2	-1.1	-1,009.0	0.0	0.0	-1,005.0	4.0	-0.4	-1,016.3	-7.3	0.7

Rest Of the World (ROW)

Item	Base case (fixed price, BERNAS sole importer, subsidy)	Removal of fixed price (tariff imposed and subsidy remained) (Scenario 1)			Removal of subsidy (fixed price remains) (Scenario 2)			Removal of subsidy and fixed price (tariff imposed) (Scenario 3)			Removal of all trade barriers (Scenario 4)		
	Value	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change	Value	Difference from base year	Percent change
Supply Intercept	-2,322.50	-2,322.50			-2,322.50			-2,322.50			-2,322.50		
Supply Slope	0.01	0.01			0.01			0.01			0.01		
Demand Intercept	4,116.88	4,116.88			4,116.88			4,116.88			4,116.88		
Demand Slope	-0.01	-0.01			-0.01			-0.01			-0.01		
Supply Price (US$/Mt)	577.0	576.0	-1.0	-0.2	577.0	0.0	0.0	576.6	-0.4	-0.1	577.6	0.6	0.1
Demand Price (US$/Mt)	577.0	576.0	-1.0	-0.2	577.0	0.0	0.0	576.6	-0.4	-0.1	577.6	0.6	0.1
Production ('000 Mt)	469,662.0	469,500.0	-162.0	0.0	469,662.0	0.0	0.0	469,604.7	-57.3	0.0	469,766.9	104.9	0.0
Demand ('000 Mt)	486,793.0	486,930.5	137.5	0.0	486,793.0	0.0	0.0	486,841.6	48.6	0.0	486,703.9	-89.1	0.0
Imports ('000 Mt)	17,131.0	17,430.5	299.5	1.7	17,131.0	0.0	0.0	17,236.9	105.9	0.6	16,937.0	-194.0	-1.1
Consumer expenditure (US$ mill.)	280,879.6	280,472.0	-407.6	-0.1	280,879.6	0.0	0.0	280,735.5	-144.1	-0.1	281,143.4	263.8	0.1
Producer revenue (US$ mill.)	270,995.0	270,432.0	-562.9	-0.2	270,995.0	0.0	0.0	270,795.9	-199.0	-0.1	271,359.8	364.8	0.1
Net revenue (US$ mill.)	9,884.6	10,040.0	155.4	1.6	9,884.6	0.0	0.0	9,939.6	55.0	0.6	9,783.6	-101.0	-1.0
Consumer surplus (US$ mill.)	861,593.7	862,080.6	486.8	0.1	861,593.7	0.0	0.0	861,765.8	172.1	0.0	861,278.5	-315.3	0.0
Producer surplus (US$ mill.)	680,891.9	680,422.3	-469.6	-0.1	680,891.9	0.0	0.0	680,725.9	-166.0	0.0	681,196.1	304.2	0.0
Net welfare gain/loss(US$ mill.)	180,701.9	181,658.2	956.4	0.5	180,701.9	0.0	0.0	181,040.0	338.1	0.2	180,082.3	-619.5	-0.3