Original Research Article

Welfare Implication of Paddy Price Support Withdrawal from Malaysian Rice Sector: Partial Equilibrium Method Approach

Umar, Haruna Suleiman^{1,2}, Amin Mahir Abdullah¹, Mad Nasir Shamsudin¹, Zainal Abidin Mohamed¹

¹Department of Agribusiness and Information System, Faculty of Agriculture, Universiti Putra Malaysia, Serdang Selangor, Malaysia

²Department of Agricultural Economics and Extension, Faculty of Agriculture, Nasarawa State University, PMB135, Keffi (Lafia Campus), Nigeria

Abstract

The study was designed to analyze societal welfare implication of paddy price support withdrawal, as an alternative policy, from rice sector in Malaysia. Time series data (1980-2012) were collected and analyzed through different stages of analyses. The first stage of analysis involved time series econometric model namely, Auto Regressive Distributed Lag (ARDL), which was used in coefficients estimation. Estimated coefficients were subjected to, and passed the relevant diagnostic tests. The estimated elasticities were then used for the second stage of analysis- scenario simulation. Finally, the generated simulation results were further used in estimating the societal welfare changed through appropriate estimation technique. Results show producer welfare loss of about RM189 million, and RM198 million was saved as revenue. The net gain or societal welfare improvement was about RM9 million. Simulated results show up to 10% reduction in paddy producer price or farm income; this could serve as disincentive to rice producers. Since the country is concerned about achieving rice self-sufficiency and rice food security, necessary precautionary measures have to be instituted to prevent farmers exit from paddy farming, by putting a concerted effort towards channeling the trickle-down benefit of societal welfare improvement, resulting from policy option, to rice producers particularly the dominant smallholder group.

Note: 1 USD = RM 3.9300

Keywords: producer welfare loss; revenue save; societal welfare gain.

INTRODUCTION

The welfare economic approach to the analysis of effects of public policy intervention in crop commodity sector is often based on partial equilibrium analysis. The partial equilibrium analysis assumed that the impact of welfare induced policy intervention in one sector or market is not transmitted into the other sector or market in a given country. According to Raihan (2008), partial equilibrium (econometrics) model is the most suitable for policy analysis when the effects of that intervention on the rest of the economy are insignificantly small. Besides, the *ex-post* analysis which allows for the use of historical data to conduct analysis of past and present policy interventions and utilized the results for *ex-ante* simulations or future projection can only be handled by partial equilibrium model (PEM) or time series econometric model.

Usually, the estimated results from this model is used in determining welfare economic impact arising from government policy through analysis of consumer surplus, producer surplus (economic rent) and government cost. The aggregate nature of the policy outcomes derived its validity from generalized recommendations which may be conflicting when comparisons between individuals are made (Mustapha, 1998). This is because there could be some

displaced consumers left out from the welfare gains due to socioeconomic factors, such as poverty. Their willingness to pay, assumed to have equal marginal utility, may differ from reservation price of the rich class (Mustapha, 1998).

In early 1980s, the price subsidy, as a policy intervention in the Malaysia rice sector, was introduced by providing paddy/rice farmers with grant (price support) of RM33 per tonnes of paddy produced. The rate was later increased to RM167 per tonnes in 1982 (Ahmad and Tawang, 1999). In 1990, a further increase in the paddy price support was recorded to the current amount of RM248.10 per tonnes of paddy produced. The aggregate cost of paddy support price incurred by government is shown in Figure 1. The aggregate amount increased unsteadily from about RM468 million in 1990 to about RM531 million in 2000. The amount later increased to about RM 645 million in 2012. In addition, all paddy farmers enjoy additional grant of RM25 per 100kg of paddy delivered to the licensed mills or drying facility (GAIN Report, 2013).

The essence of this policy intervention like paddy price support, and also fertilizer subsidy is to achieve self-sufficiency in rice production and rice food security, as well as raising farm income and productivity. The government supports for the rice sector has been consistently maintained and reflected in both National Agricultural Plans (NAPs)

Figure 1: Aggregate Paddy Support Price per annum (RM) (1990-2012)

(Sources: Paddy Statistics Unit, Malaysian MOA & AI., 2013)

and Malaysia Plans. According to Fatimah et al. (2005), the price support scheme of Malaysian rice sector was able to increase output by 65.8% and contribute to a 38.6% change in income while fertilizer and price support components of production subsidy constitute 58% of total farm income.

Contrary to the support and protection of rice sector by Malaysian government, the country membership in the World Trade Organization (WTO) and ASEAN Free Trade Agreement (AFTA) makes it mandatory to open up rice sector to the market-driven policy option. The full implementation of the agreements connotes removal of trade barriers and production subsidy like paddy price support. However, Ahmed and Tawang (1999) observed that Malaysian rice subsidy alone constituted almost 50% of the farm income, and that a situation where all subsidies were to be withdrawn, the farm profitability would decline by 57%. Thus, this significant decline in income is believed to have welfare impact on small size farmers who constitute the majority of rice farmers in the country.

Therefore, the government's efforts toward striking a balance between maintaining the existing policy of granting production subsidy like paddy price support to paddy/rice producers, and her commitment to the implementation of multilateral agreements aimed at opening up agricultural sector to market driven policy, which implies the withdrawal of all forms of subsidies, depend on the knowledge garner from empirical analysis of societal welfare implications of such policy. Hence, the results of quantitative welfare analysis (using historical data) of possible policy option like producer price support withdrawal in the rice sector

would serve as reference tool to the Malaysia government in an efforts to establish trade-off between the goal of sustaining production support policy on the one hand, and discharging her bilateral agreements by making the rice sector a market driven on the other hand.

Some studies have attempted to analyze the welfare impact of liberalization policy particularly, production subsidy removal on Malaysian rice sector namely, Deviga et al. (2011), Ahmed and Tawang (1999), and Mustapha (1998). In their study of Malaysian rice trade and government intervention using a modified Spatial Price Equilibrium Model (SPEM) that incorporate sole importer with a fixed domestic price to measure the welfare impact of the market distortions, Deviga et al. (2011) observed large net welfare gains and a significant reduction in government expenditures if all forms of government interventions were removed and free markets were allowed. In this study, a net social revenue function was used instead of net welfare function. Elasticity of demand and supply were obtained from different secondary sources as the model used lack the capacity to estimate them. Importing elasticity from different sources could affect both authenticity of the final results and inferences made from the results. The methodology (SPEM) which did not give room for elasticity estimation, rely only on 2009 data thereby prone the result to small sample bias.

Studying the effect of trade liberalization on agriculture in Malaysia (rice sector in-focus), using time series econometrics, Ahmed and Tawang (1999) observed all-round efficiency and welfare gains mainly due to increase

in consumer surplus and a decrease in government spending on subsidies. The study also observed that imports increase significantly to cater for widen demand-supply gap, and farm income reduced by about 15%. The study did not mention welfare impact of paddy support price removal.

Mustapha (1998) studied welfare gains and losses under the Malaysian rice pricing policy and their relationships to the self-sufficiency, using Two-Stage Least Square Method, observed that the imposition of price control favoured consumers at the expense of producers as consumers' surplus increased, while producers suffered welfare loss and generally there was net welfare loss in the society. The policy instrument under analysis in this research was the imposition of price ceiling and their relationship to the self-sufficiency. The study did not consider welfare impact of production subsidy withdrawal, like paddy price support, from the rice sector.

In the study of economic policy impact on rice commodity and household welfares in Indonesia between the periods of 1979-2008 using two-stage Least Squares Method, Asaad (2010) observed that the policy of floor grain price is still needed to respond to the increased production of rice and that Indonesia's rice import price is influenced by world price and import tariff. He further observed that demand for rice has inelastic response to changes in the retail prices; production of rice grain is also not responsive to the price. Even though the research did not focus on price support to rice producers, the floor price policy, like price support is meant to protect rice producers in Indonesia. However, the study did not examine welfare implication of inelastic demand response to retail price changes and production of rice grain (a characteristic that is similar to Malaysia rice sector), as a result existing rice policy in the country. Such limitation could deny the policy maker opportunity of evaluating the effect of policy on the rice consumers and even the producers.

In view of the above shortcomings observed in the previous research on the subject matter, this study is intended to analyze welfare impact of paddy price support withdrawal, as a policy option, on Malaysian rice sector.

MATERIALS AND METHODS

The modified basic structure explaining rice market (sector) equilibrium as an adjustment process among demand, supply and price variables is determined within the framework of time series econometric model; a process described as partial equilibrium model. The utilization of this model involves specification and estimation of time series econometric models, and using the estimated coefficients from econometric models for simulation and welfare analyses.

The functional form of time series econometric model which explains the behaviour of actors in rice market in Malaysia consists of four components namely, the domestic rice producers, consumers, rice importing firm and agency in charge of policy formulation. In this model, the rice supply equation is disaggregated into area planted and yield, while rice demand market is represented by both domestic and import demand. The behavioural equations were equations of area planted and yield, and domestic demand. While identity equations involved total domestic production, total consumption, import demand, paddy producer price and price transmission equation.

(i) Area planted: The restricted area planted equation is the Nerlovian type and specified as follows:

$$LAPAP_t = \beta_0 + \beta_1 LAPAP_{t-1} + \beta_2 LPPPR_{t-1} + \beta_3 DPAP_t + \mu_t \quad 1$$

(ii) Yield: the yield equation was specified as a restricted equation too. The imposed restriction on both equations is necessitated by protectionist policy on the supply-side of rice sector.

$$LAPYD_t = \alpha_0 + \alpha_1 LFESUB_t + \alpha_2 TECH_t + \mu_t \quad 2$$

Where, LAPAP = Log of area planted; $LAPAP_{t-1}$ = Log of area planted in lag one period; $LPPPR_{t-1}$ = Log of paddy producer price in lag; DPAP = Dummy for paddy area planted (Dum = 1, if APAP_t is greater than 1983 paddy area planted and 0 if APAP_t is less than or equal to 1983 paddy area planted); $LAPYD_t$ = Log of paddy yield; $LFESUB_t$ = Log of fertilizer subsidy; $TECH_t$ = Technological trend; t = Time period in respective equation; α and β = coefficients for respective variables; μ_t = White-noise error term in the respective equations.

(iii) Domestic demand: The demand equation specified as follows:

$$LRPCN_t = \lambda_0 - \lambda_1 LRRPR_{1t} + \lambda_2 LWRPR_{2t} + \lambda_3 LPCY_{3t} + \mu_t \quad 3$$

Where, $LRPCN_t$ = Log of rice consumption per capita at period t; $LRRPR_{1t}$ = Log of rice retail price at period t; $LPCY_t$ = Log of income per capita; λ =coefficient to be estimated; μ_t = White-noise error term.

(iv) Import Demand: The import demand is considered as an excess demand over the country total rice production. The identity equation is expressed as follows:

$$RNIM_t = RTCN_t - DRPP_t \quad 4$$

Other identity equations were specified as follows:

$$RCN_t = RPOP_t \quad 5$$

$$DRPP_t = (APAP_t * APYD_t) * 0.644785983(CV) \quad 6$$

$$PPPR_t = PFPR_t + PPR_t \quad 7$$

The market clearing condition is given below:

$$\text{Market Equilibrium (ME)} = DRPP_t + RNIM_t - RTCN_t$$

Where $RNIM_t$ = Rice net import in period t ; $RTCN_t$ = Rice total consumption in period t ; $DRPP_t$ = Domestic rice production; POP_t = Country population in period t ; $PFPR_t$ = Paddy farm price at period t ; $PPRS_t$ = Paddy price support at period t ; CV = Conversion factor

(v) Price: The symmetric price transmission equation is specified as follows:

$$PFPR_t = f(RRP_t) \quad 8$$

The estimation of co-integrated equations to obtain long-run relationship was done using Auto Regressive Distributed lag (ARDL) because the integration order of the variables were $I(0)$ and $I(1)$, and because each equation was estimated as a single equation in view of the presence of single endogenous variable in each equation. The ARDL is specified as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^K \alpha_{1i} Y_{t-i} + \sum_{i=0}^K \alpha_{2i} x_{1t} + \sum_{i=0}^K \alpha_{3i} x_{2t-i} + \theta M_t + \epsilon_t \quad 9$$

Normalized Long-run relation coefficients were estimated as follows:

$$\alpha_0 = \frac{\alpha_0}{1 - \sum_{i=1}^K \alpha_{1i}} \quad \alpha_2 = \frac{\sum_{i=0}^K \alpha_{2i}}{1 - \sum_{i=1}^K \alpha_{1i}} \quad \alpha_3 = \frac{\sum_{i=0}^K \alpha_{3i}}{1 - \sum_{i=1}^K \alpha_{1i}} + \theta = \frac{\theta}{1 - \sum_{i=1}^K \alpha_{1i}} \quad 10$$

Where Y_t = Vector for dependent variables ($APAP_t$, $APYD_t$ and $RPCN_t$); Y_{t-1} = Vector for lag-dependent variables ($APAP_{t-1}$, $APYD_{t-1}$ and $RPCN_{t-1}$); X_t = Vector for exogenous variables as specified in the equations 1 to 3; M_t = Dummy variable as specified in equation 1; α = Coefficients to be estimated for different equations; θ = Coefficient for dummy variable

K = lag length

According to Labys and Pollak (1984) policy decision making can be simulated by changing the values of the exogenous policy variables and observe their impact on the target variables Y (endogenous variables). Malaysian Agricultural Policy Analysis (MAGPA) Model (2012) specified the equations for simulation and forecasting as follows:

$$Y_t = Y_{t-1} + Y_{t-1}(\Delta Y) \quad 11$$

$$\Delta Y_t = \alpha_1 * \Delta X_1 + \alpha_2 * \Delta X_2 + \alpha_3 * \Delta X_3 + \alpha_n * \Delta X_n \quad 12$$

$$\Delta Y = (Y_t - Y_{t-1}) / Y_{t-1} \quad 13$$

Where Y = Variable of interest to be projected; Y_{t-1} = One period lag value of the affected variable; ΔY_t = Annual growth rate for the endogenous variables estimated by equation 12 or annual rate of change of the exogenous variables estimated by equation 13; α_i = estimated coefficient; ΔX = percentage change in exogenous variables.

The analysis of welfare change determined through changes in producer surplus, represented by trapezoidal shape in demand and supply curve, is formulated as follows:

$$\Delta PPS = DPP_p (PPPR_p - PFPR_e) + \frac{1}{2} [(DPP_p - DPP_e) (PPPR_p - PFPR_e)] \quad 14$$

$$GR = (Q_p * P_p) - (Q_e * P_e) \quad 15$$

Society Welfare gain or Net Surplus = 14 + 15

Where ΔPPS = Change in Paddy Producer Surplus; DPP_p = Domestic Paddy Production at the current policy; DPP_e = Domestic Paddy Production at the alternative policy; $PPPR_p$ = Paddy Producer Price (Price at the current policy); $PFPR_e$ = Paddy Farm Price (Price at the alternative policy); GR = Government revenue; Q_p = Policy induced quantity of rice supply

P_p = Policy Price; Q_e = Alternative policy induced quantity of rice supply; P_e = Equilibrium price.

Unit root and co-integration tests were done using appropriate methods: The unit root test was done using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Auto Regressive Distributed Lag (ARDL) (Bounds) testing approach to co-integration, through joint test or F-test statistics was used. Given the relatively small size sample for this study (33 observations), the critical value for small size sample generated by Narayan (2005) was used. The lag length selections for each equation was determined through Hendry's general to specific procedure with minimum value of SIC (Schwarz Information Criterion).

Model validation and diagnostic tests were done to validate the predictive ability of the models for valid inferences about the estimated coefficients. The estimated equations were validated using Root Mean Square Percentage Error (RMSPE). The estimated coefficients were subjected to the following diagnostic tests: Autocorrelation (LM); and, Structural Stability (CUSUM of Square).

Time series data for the periods of 1980 to 2012 were collected from the Paddy Statistics, Ministry of Agriculture and Agro-based Industry, Malaysia; and, Food and Agricultural Organization (FAO) website. The collected data were measured as follows: $APAP_t$ = Paddy Area Planted (Ha) in period t ; $APYD_t$ = Paddy Yield (kg/ha) in period t ; $PPPR_t$ = Paddy Producer Price (RM/T) in period t ; $PFPR_t$ = Paddy Farm Price (RM/T) in period t ; $RRPR_t$ = Rice Retail Price (RM/T) in period t ; $WRPR_t$ = Wheat Retail Price (RM/T) in period t ; $FESUB_t$ = Fertilizer Subsidy (RM/annum) in period t ; $TECH_t$ = Technological progress (Trend); $PPRS_t$ = Paddy Price Support (RM/T) in period t ; $RPCN_t$ = Rice Consumption per Capita (Kg) in period t ; PCY_t = Income per Capita (RM) in period t ; $RTCN_t$ = Rice Total Consumption (T) in period t ; POP_t = Country Population (Number of people) in period t ; $RNIM_t$ = Rice Net Import (T) in period t ; $DRPP_t$ = Domestic Rice Production (T) in period t .

The software used for the analyses are: (a) Eviews 7 for time series econometric estimation and diagnostic tests; (b) Excel window and solver tool in excel window for scenarios simulation.

Table 1. Result of Unit Root Tests

Variables	Level		First Differencing	
	ADF	PP	ADF	PP
LAPAP	-3.56**	-3.54	-4.622***	-6.73***
LAPYD	-3.43	-3.26	-6.25***	-7.22***
LPPPR	-1.36	-1.48	-4.04***	-4.04***
LPFPR	-1.10	-1.20	-4.04***	0.04***
LFESUB	-1.03	-1.22	-4.59***	-4.59***
TECH	-	-15.40***	-	-
LRPCN	-3.37	-3.24	-7.34***	-7.35***
LRRPR	-4.03**	-3.96**	-	-
LWRPR	-3.53	-3.53	-9.93***	-9.76***
LPCY	-1.30	-1.71	-4.40***	-4.40***

Table 2. Co-integration test results

Dep. Variables (Represent each Equation)	K	SIC (Minimum Value)	F-Statistic	Narayan (2005) CV at 5%		Remark
				I(0)	I(1)	
$\Delta LAPAP_t$	1	-4.611	6.409***	5.393	6.350	Yes
$\Delta LAPYD_t$	2	-2.716	4.965**	4.269	5.473	Inc.
$\Delta LRPCN_t$	3	-2.718	6.977***	3.710	5.018	Yes

Note: (**) and (***) denote significant at 5% and 1%, respectively. K= exogenous variables in each equation; SIC= Schwarz Information Criterion (Minimum value in each equation); CV= Critical Values at 5% level of significant.

Table 3. LAPAP_t-Estimated Long-run Coefficients

Variable	Coefficient	Std. Error	T-Statistic
C	2.741367	1.283853	2.135266**
LAPAP _{t-1}	0.793249	0.095807	8.279621***
LPPPR _{t-1}	0.002096	0.008936	0.234596
DAPAP	0.033557	0.004896	6.853828***
Normalized Long-run Relation			
C	13.25926	0.292495	45.33162***
LPPPR _t	0.010140	0.043088	0.235325
DAPAP	0.034722	0.005242	6.623836***
R ² =0.75			
DW=2.13			
LM=5.03			

Note: (**) and (***) denote significant level of 5% and 1%, respectively.

RESULTS AND DISCUSSION

Empirical Results Presentation

The results of unit root tests are presented in Table 1. The results show that the following variables are I(1): LPPPR, LPFPR, LFESUB, LRPCN, LWRPR, LAPAP and LPCY. But the variables-LRRPR and TECH were confirmed to be stationary at level I(0).

The equations of LAPAP and LRPCN were confirmed to be co-integrated (Table 2). But LAPYD was having inconclusive Bound test results. But further confirmation tests such the

dynamic stability tests and the sign of error correction terms obtained from the equation suggested treating LAPYD as co-integrated equation.

(a) Estimated long-run coefficients: The discussion of the estimated coefficients is deliberately kept superficial because our interest here is just to show how coefficients used for simulation were estimated. The long-run coefficients were obtained by estimation of equations 9 and 10. In each of the respective equations, the long-run elasticities were obtained after normalizing on the lag dependent variables (Narayan, 2004). The estimated long-run level equations were made to pass autocorrelation test and structural stability test.

Table 4. LAPYD_t-Estimated Long-run Coefficients

Variable	Coefficient	Std. Error	T-Statistic
C	-1.713506	3.048768	-0.562032
LAPYD _{t-1}	0.671893	0.124725	5.386993***
LFESUB _t	0.225093	0.177601	1.267403
TECH _t	0.046734	0.018438	2.534630**
Normalized Long run Relation			
C	-5.222397	9.222433	-0.566271
LFESUB _t	0.686034	0.492667	1.392490
TECH _t	0.142434	0.042971	3.314619***
R ² =0.85			
DW= 2.06			
LM=2.639912			

Note: (**) and (***) denote significant level of 5% and 1%, respectively.

Table 5. LRPCN_t-Estimated Long-run Coefficients

Variable	Coefficient	Std. Error	T-Statistic
C	5.443459	1.110779	4.900577***
LRPCN _{t-1}	-0.214619	0.208336	-1.030157
LRPCN _{t-2}	-0.072065	0.165232	-0.436143
LRRPR _t	-0.023796	0.151709	-0.156853
LWRPR _t	0.094531	0.048315	1.956570*
LWRPR _{t-1}	0.158022	0.049989	3.161155***
LPCY _{t-1}	0.259050	0.086823	2.983657***
LPCY _{t-4}	-0.390882	0.094790	-4.123667***
Normalized Long-run Relation			
C	4.764291	1.311576	3.632493***
LRRPR _t	-0.020827	0.130806	-0.159220
LWRPR _t	0.221043	0.068889	3.208699***
LPCY _t	-0.115383	0.066622	-1.731902*
R ² =0.69			
DW=1.97			
LM=4.598489			

Note: (*), (**) denote significant level of 10% and 1%, respectively.

Table 6. Estimated paddy farm price (LPFPR_t) coefficients

Variable	Coefficient	Std. Error	T-Statistic
C	-0.981149	0.341391	-2.873980***
LPFPR _{t-1}	0.912534	0.061899	14.74231***
LRRPR _t	0.221581	0.080591	2.749448**
R ² =0.97			
RW=1.49			
LM=2.526508			
RESET=0.730160			

Note: (**) and (***) signify significant level of 5% and 1%, respectively.

(i) Estimated long-run coefficients for LAPAP_t-Equation: The partial adjustment of area planted toward the desire level captured by change in the lag dependent variable has expected positive sign and significant at 1% level. The long run elasticity of paddy producer price (PPPR) has expected positive sign but shows no significant relationship with area planted (APAP) to paddy (Table 3). The dummy variable (DPAP) shows significant influence on area planted to paddy.

(ii) Estimated long-run coefficients for LAPYD_t-Equation: The long run coefficient for the trend variable (TECH_t) has expected positive sign and statistically significant at 1% level. The long-run elasticity of fertilizer subsidy variable (FESUB_t) has expected positive sign but insignificant (Table 4).

(iii) Estimated long-run coefficients for LRPCN_t-Equation: Table 5 shows that owned price elasticity of rice demand has expected

Table 7. Model *Ex-post* Prediction Power (Validation) Tests

Dependent Variables	Root Mean Square Percentage Error (RMSPE)
LAPAP	0.03
LAPYD	0.24
LRPCN	1.60
LPFPR	0.70

negative sign but insignificant in the long run. The long run coefficient for wheat has expected positive sign and significant at 1% level. The long-run coefficient for income was negative, inelastic and significant at 10% level.

(iv) Estimated price transmission equation for LPFPR: Table 6 shows that the elasticity of RRPR (rice retail price) with respect to paddy farm price is significant. The result suggests that any movement in the retail price in response to global price changes would affect the domestic paddy farm price only in positive direction.

(b) The model *ex-post* prediction power (validation) test results:

The values of RMSPE were generally low (less than 2%) for all the dependent variables (Table 7). The results imply that predictive error associated with estimated equations in tracking the actual data (*ex-post* prediction) were very low and insignificant, hence could be used for *ex-ante* projection with expected high projection validity.

(c) Simulated effects of paddy price support withdrawal policy option: The simulation results of the target variables provided input for welfare analysis. The simulation results were also peripherally discussed since our focus, in line with the study objective, is on welfare impact of the alternative policy. The policy scenario simulated

was (i) SN 1: removing paddy price support while retaining any other production subsidy (ii) BL: The baseline scenario represents current government policy in rice sector (that is retaining all forms of production subsidies). The simulation of variables follows equations 11 to 13 as implemented by MAgPA (2012). The projection of the endogenous variables from 2013 to 2020 was made with 2012 data as base year. In determining the price at market clearing, the estimated variables from equation 11 to 13 were solved simultaneously using solver tool in excel window. The effect of SN1 scenario was compared with the baseline as both were projected to 2020 from 2013.

(i) Paddy producer price (PPPR): The paddy producer price is made up of paddy farm-gate price and paddy support price. If government decided to adopt alternative policy of SN1 on rice sector, then paddy producer price would decline by 10%, on the average, by 2020 (Table 8).

(ii) Domestic rice production (DRPP): The removal of paddy price support while retaining other production subsidy to paddy farmers (SN1) would result to decline of 0.1% (on the average) of domestic rice production, when compare with baseline projection, by 2020 (Table 8).

(iii) Rice net import (RNIM): The country normally resorts to rice importation to fill in the demand-supply gap. The implementation of SN1 policy option would boost quantity of rice import by 0.2%, on the average, by the year 2020 (Table 8). Such increases will exert pressure on the country's hard earned foreign reserve.

(d) Welfare Implication of the Policy Option: The societal welfare effect of the simulated scenarios was estimated based on equations 14 and 15. The projected values for 2020 were used for the estimation because, according to Labys and Pollak (1984), most time series econometric crop models of a supply-demand type perform

Table 8: Effect of Paddy Price Support Withdrawal (SN 1) on PPPR, RDPP, and RNIM

Variable	Scenario	Year								Ave. % Δ
		2013	2014	2015	2016	2017	2018	2019	2020	
PPPR	Baseline	1494	1598	1708	1825	1951	2086	2230	2383	
(RM/T)	SN 1	1254	1367	1490	1625	1771	1930	2104	2293	-10
RDPP	Baseline	1,724	1,774	1,826	1,878	1,933	1,989	2,046	2,105	
(‘000’ T)	SN1	1,724	1,773	1,824	1,877	1,931	1,986	2,043	2,102	-0.1
RNIM	Baseline	753.3	801.9	852.9	906.5	962.8	1,022	1,084	1,149	
(‘000’ T)	SN 1	753.7	802.7	854.1	908.2	965.0	1,025	1,087	1,153	0.2

Note: SN 1 = Policy scenario of paddy price support withdrawal;

Table 9: Societal welfare impact of SN1 policy option

Welfare Indicators	SN 1
Producer Welfare loss (‘000’RM)	189,314
Revenue Save (‘000’RM)	198,233
Societal Gain (‘000’RM)	8,919

Note: SN 1 = Policy scenario of paddy price support withdrawal; 1USD=RM3.9300

best in the short and medium run; but the approach becomes less effective at the long run. The 2020 projected values were considered as medium term projection values.

Table 11 shows that producer welfare loss as result of option SN1 policy, paddy price support withdrawal, is about RM189.314 million. This amount did not tally with the reported amount of RM354.17 million as producer welfare loss from the simulated paddy support price removal by Ahmed and Tawang (1999). The apparent discrepancy in the values between the two studies could be attributed to the period and rice farmer population differential. The SN1 would have aided saving of RM198.233 million in revenue, which would have been

expended on the paddy support price, by the government. Similarly, Ahmed and Tawang (1999) estimated RM 553 million in revenue saved from simulated paddy support price removal policy. The difference in the amount could be as a result of span of time between the first study and the current one and existing rice farmer population which is experiencing declining trend over the years. Moreover, unlike the Ahmed and Tawang (1999) study which relied on the external estimated coefficients, the current study undertook estimation of the coefficient using rice sector models after subjecting the models to the diagnostic tests for valid inference. Meanwhile, as a result of amount saved RM 198.233 million, the net gain (societal gain) is positive and stood at about RM9 million.

The loss in the producer welfare was due to the withdrawal of producer price support scenario. As a result of the simulation, there was a cut in the rice producer price or farm price of about 10%. Since the rice production is dominated by smallholder farmers, this reduction in income can serve as disincentive to rice production. However, this finding is in agreement with the general believed in the literature that liberalization of rice production (it should be noted that withdrawal of paddy support price policy option is targeted at liberalization of the sector) can bring about net gain in the society. According to Gulati and Narayanan (2002), liberalization of the rice trade could have beneficial effects for societal welfare with all-round effect manifestations including increase in wages, employment and investment. This would contribute to welfare improvement and poverty alleviation.

CONCLUSIONS

In this scenario, paddy farmers were worse-off in terms of welfare, but because of simulated revenue save, society as a whole were better-off from the implementation of the policy option as the net gain from the paddy price support withdrawal remain positive. Therefore, the implementation of alternative policy would leads to societal welfare improvement. However, situation that could cause reduction in paddy producer price or farm income by 10% which could leads to crowd-out phenomenon in the supply-side of the rice sector particularly among dominant group of the rice farmers in Malaysia-smallholders, should be considered as a serious threat to the rice self-sufficiency and food security policies currently implemented by Malaysia government. Hence, necessary measures should be instituted to prevent the abandonment of the rice farming to alternative enterprises by farmers by putting a concerted effort towards channeling the trickling-down benefit of societal welfare improvement to rice producers particularly the dominant smallholder group in the country.

REFERENCES

- Ahmed T.M.A., Tawang A. (1999): Effect of trade liberalization on agriculture in Malaysia: commodity aspects. The CGPRT Center Working Paper Series No. 46.
- Deviga V., Harri, M., Macaulay G. (2011): Malaysian rice trade and government interventions. Paper presented to the 55th Annual conference of the Australian Agricultural and Resource Economics Society, Melbourne 8-11th February.
- Fatimah A.M., Shamsudin M.N., Rosli S. (2005): Food security in Malaysia. In Public sector intervention in the rice industry in Malaysia, by E.C. Dano, and E.D. Samonte. www.zef.de/module/register/media/2692. Accessed 23-01-2014
- Global Agricultural Information Network (GAIN) report (2013): Grain and feed annual report for Malaysia. USDA Foreign Agricultural Service. www.gain.fas.usda.gov. Accessed 01/04/04.
- Labys W. C., Pollak P.K. (1984): Commodity Models for Forecasting and Policy Analysis. Nicholas Publishing Company New York, USA, 209 p.
- Mustapha N.H. (1998): Welfare gains and losses under the Malaysian rice pricing policy and their relationships to the self-sufficiency level. *Journal Ekonomi Malaysia* 32: 75-96.
- MAGPA Model (2012): Malaysian Agricultural Policy Analysis Model: User Guide. Institut Kajian Dasar Pertaniandan Makanan (IKDPM), Universiti Putra Malaysia, 51 p.
- Narayan P.K. (2004): Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji. A discussion paper. Department of Economics, Monash University, Australia. www.arrow.monash.edu.au:2167. Accessed 20-02-2014.
- Narayan P.K. (2005): The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics* 37: 1979-1990.
- Raihan S. (2008): Assessing the implications from trade liberation: use of different methods and their limitations. Module-9. www.cuts-citee.org. Accessed 10-03-2013

Received October 17, 2014

Accepted after revisions: August 28, 2015

Corresponding author:

Haruna Suleiman Umar

Department of Agricultural Economics and Extension

Faculty of Agriculture

Nasarawa State University, Keffi, PMB 135 Shabu-Lafia Campus, Nigeria

E-mail: umarhsuleiman@yahoo.com