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ECONOMIC IMPACTS OF RICE TARIFFICATION LAW ON THE PHILIPPINE RICE DOMESTIC MARKET

Ruby Jane C. Estadilla
National Graduate Institute for Policy Studies, 7-22-1 Roppongi,
Minato-ku, Tokyo 106-8677, Japan
Department of Agricultural and Applied Economics (DAAE),
College of Economics and Management (CEM),
University of the Philippines Los Baños, College, Laguna, Philippines
Corresponding author: rcestadilla1@up.edu.ph

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ABSTRACT

Lifting of quantitative restrictions on staple foods allows an influx of supply in the country favoring the consumers but hurting domestic producers because of lowered prices. Using partial equilibrium analysis, this paper examined how the policy shift on rice imports from quantitative restrictions to ad valorem tariffs affects domestic rice supply and household access and how it impacts market efficiency. Simulation results showed that the loss in producer protection resulted to a sizeable reduction in domestic rice production both in the short-run and long-run. On the other hand, food expenditure on rice is greatly reduced due to increased rice affordability and domestic consumption is improved. Inefficiency losses in consumer surplus is diminished, although producer surplus is decreased. But overall, net societal welfare is improved. The author noted that while this may improve the country's food security, food self-sufficiency is threatened, and the country's vulnerability to shocks in the international market is increased. Further, while the policy shift may address nutrition problems especially among low-income groups since reduced rice expenditures can increase their expenditures on meat and poultry products, this may be constrained by the multi-layered supply chain of rice in the Philippines which increases marketing costs, affecting rice retail prices.

Key words: ad valorem tariffs, quantitative restrictions, partial equilibrium analysis, international trade, rice market

INTRODUCTION

A change of trade policies on staple crops has always raised important debates as it has redistributive effects among key players (Swinnen 2021). For a net food importing country, a move to liberalize may improve its food access but this also put pressures on its domestic food producers. This has been the case for the Philippines after the implementation of Rice Tariffication Law (RTL) (RA 11203) in March 2019, which removed the quantitative restrictions on rice imports, replacing them with ad valorem tariffs. Historically, the Philippines adopted a "strict" protectionist trade policy for the rice sector combining quantitative restrictions and tariffs on rice imports with the NFA regulating the rice importation through a system of import licensing. The government allowed a Minimum Access Volume (MAV), which is the minimum volume of imports per year at a lower tariff rate ("in- quota tariff"). Previously, a MAV of up to about 239 thousand metric tons was approved for rice at a binding rate of 50 percent (actual rate applied both in-quota and out-quota) (Bordey et al. 2016; Briones 2019). However, with the government's application for extension of the special treatment for rice, WTO agreed

but the MAV was increased to 350 thousand metric tons until 2012 at an in-quota tariff rate of 40 percent and a special tariff treatment of only 35 percent was provided by the government to Association of Southeast Asian Nations (ASEAN) exporters under the ASEAN Trade in Goods Agreement (ATIGA) of 2009, and this MAV further increased to about 805 thousand metric tons after the government requested to waive its commitment to WTO until 2017 (Bordey et al. 2016; Briones 2019). With the expiration of the special treatment for rice, RA 11203 was passed, quantitative restrictions were repealed, MAV was reverted to its 2012 level at 350 thousand metric tons, and sanitary and phytosanitary import clearance for rice for the sole purpose of ensuring food safety was added among the import requirements (Republic Act No. 11203 2018). The law was also pushed through after the National Food Authority (NFA) ran out of stocks in the last quarter of 2018 and caused surging inflation in rice prices (Tobias 2019). With the passage of the law, the role of NFA changed with the removal of its powers and functions on rice importation and other regulatory functions in the local grains industry (NFA 2019) and this has permitted other private players to come in and so rice imports are expected to surge. However, this would also allow an increase in total domestic food supply (sum of local production and rice imports) and is expected to address the inflation in rice prices, making rice more affordable to the poor households such as the urban poor and the rural landless poor who are net buyers of rice. Nevertheless, this comes at the expense of rice farmers whose incomes are expected to decrease with the lowered paddy price.

Recent studies have been conducted to assess the initial impacts of RTL. In a study conducted by Cororaton and Yu (2019), which used rice policy simulations employing a Computable General Equilibrium (CGE) model, it was found that tariffication generates favorable income distribution and poverty reduction effects as compared to tighter quantitative restriction on rice imports. This was also supported by Balie et. al (2020) and Briones (2018 and 2019) which showed that RTL reduces consumer and producer rice prices affecting households on the production and consumption side, but the overall effects of the reform are beneficial since the benefits are spread widely across the population given that majority of households are net buyers of rice. Unfortunately, they also found that since the rice growers are net sellers, they are negatively impacted by the policy reform; although they argued that tariff revenues can somehow compensate the losses of rice farmers by increasing their productivity and making them more competitive through infrastructure support, as accounted for by the Rice Competitiveness Enhancement Fund (RCEF) which was crafted to improve the competitiveness and income of the domestic producers through its mechanization, seed, credit, and extension services program amidst the policy shift.

This paper validates and complements the initial findings of the previously cited literatures using partial equilibrium analysis proposed by Tsakok (1990). While CGE models (i.e., comparative static analysis) have the advantage of providing economywide analysis as these models encompass intersectoral linkages in contrast to partial equilibrium models which analyze markets in isolation, the latter is employed in the analysis since the main goal of this paper is to provide an in-depth and quantifiable impact analysis of the policy shift on a single market, which is the Philippine's rice domestic market, specifically on the price changes brought about by the policy, the response of the market agents as producers and consumers, and the implications of these responses on various economic and policy interests encompassing financial, welfare, and economic considerations. The study contributes to literature as it gives special attention on the magnitude of the impact of RTL on domestic rice supply and household access (in terms of household food expenditure), which affect the country's food security, and on how it impacts the rice market efficiency (by examining the changes in producer surplus, consumer surplus, and societal welfare). Quantifying these changes serves as a necessary input for the policymakers in determining the scale of response or intervention needed to mitigate the negative effects of the policy shift to the disadvantaged players as the lifting of the quantitative restriction on rice imports is a trade-off that involves transfer of welfare between the producers and the consumers.

Further, by examining the disaggregated welfare impact of the policy reform using previously estimated demand elasticities by income group and supply elasticities by farm size, the study provides understanding on how the policy reform affects equity in the society. While the policy reform may be beneficial in general for the society as concluded by Balie et al. (2020) and Briones (2019), its impact among income-groups and farmer-groups may vary. The disaggregated analysis is therefore essential to determine if the change in the policy will have adverse effects to economically vulnerable group (i.e., small-scale rice farmers) or if it will direct the economic benefits to the group for which the policy is designed to (i.e., low-income consumers) (Tsakok 1990). In addition, while some of the previously mentioned literature have already assessed whether the RTL is pro-poor, they fail to include depth in their analysis with regard to the size of the impact to the small-scale farmers who are expected to be the most negatively affected by the policy reform. Quantifying this impact may serve as basis in estimating the amount of subsidy, cash transfer, or the like necessary to mitigate the impact to this vulnerable group. However, it must be noted that the results of partial equilibrium models may over or understate the true impact of the shock as these models do not account the spillover or feedback effects of the policy change, but these models do indicate the broad magnitude of the problem (Thomsen 2021; Tsakok 1990). The author hypothesized that consumer surplus, producer surplus, and societal welfare have improved after the policy shift, improving the efficiency in the rice market. According to the OECD Trade Policy Paper written by Czaga (2004), although quantitative restrictions are motivated by the government's desire to protect domestic producers from foreign competitors, the costs they imposed outweigh the benefits both for the importing and exporting countries because quantitative restrictions undermine trade and economic efficiency more than tariffs as quota resources are administratively allocated by the state, whereas with tariffs, resources are allocated through price mechanisms. He noted that this harms consumers in the importing country as these create import substitution effects when the policy-induced scarcity of imports increased the price of the good in the domestic market to the maximum amount that the consumers are willing to pay.

On the equity side, it is hypothesized that the policy shift improved equity across income groups since low-income group spend more on rice than high-income group thereby, benefitting more on lower rice prices. Based on Philippine Statistics Authority's (PSA) data, average rice per capita consumption of upper-class group (AB and C) is 120.28 kgs per year while that of lower-class group (D and E) is 111.62 kgs per year but since around 72 percent of the population belong to the lower-class (Lantican et al. 2013), aggregate rice consumption of lower-class group is greater than the aggregate rice consumption of upper-class group. By definition, those belonging to Class AB have monthly income levels of at least PhP100,000 (USD 2,000), Class C have monthly income levels of PhP20,000 to PhP100,000 (USD 400 to USD 2,000), Class D have monthly income levels of PhP10,000 to PhP20,000 (USD 200 to USD 400), and Class E have monthly income levels of less than PhP10,000 (USD200) (Chua and Tiongson 2012). Worsened equity, however, is assumed across farmer groups since based on 2017 rice-based farm households survey conducted by Philippine Rice Research Institute (PhilRice), rice farming is generally small-scale wherein 83 percent of farmers are operating on less than two hectares and only 17 percent are operating on more than three hectares. The results of the study is useful in balancing the dilemma between equity and efficiency. The results also provided information on how the policy shift may affect the attainment of the second goal of the sustainable development goals (SDGs) that is to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture" (United Nations n.d.).

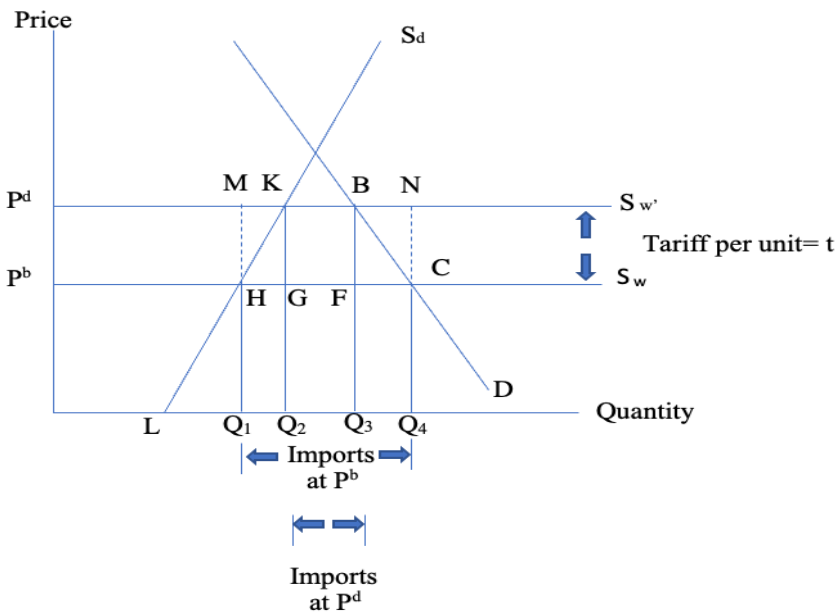
METHODOLOGY

In order to measure the welfare impacts of the policy shift from quantitative restrictions to ad valorem tariffs on rice imports, partial equilibrium analysis proposed by Tsakok (1990) was employed (Fig. 1). This type of analysis, as discussed by Tsakok, is necessary to determine the direction and magnitude of the impact of a change in price policy; although some limitations of the analysis is that it does not account the magnitude of spillover and feedback effects (i.e., interactions of the commodity

with close substitute or complements). The model also assumes that supply is readily available and accessible in the market, that is, the Philippines can buy rice in the international market whenever; although in reality, some of the suppliers in the international market may withhold their rice exports due to domestic market obligation.

Analytical framework. According to Tsakok, using the elasticity estimates and price data, analysts can calculate the financial implications of a change in the price of a commodity, welfare transfers between producers and consumers, and the net gains and losses in economic efficiency. The initial supply and demand conditions are represented by the supply curve S_d, demand curve D, and the supply curve of imports from the rest of the world S_w, which is horizontal because the importing country such as the Philippines is small (i.e., price taker) in the world market. The domestic price is the same as the world price P^b before the tariff is imposed and the consumers are willing to purchase quantity Q_4. At this price, the domestic producers are willing to supply only Q_1 while Q_4-Q_1 will be supplied by imports (Fig.1).

When a tariff is imposed at the ad valorem rate t, domestic price increases above the world price P^b to P^d, and the supply curve of imports is raised vertically to $S_{w'}$ due to the inclusion of the import tax. At this level, consumers will reduce their purchases of the commodity to Q_3, and the producers will respond to the higher price and will increase their output to Q_2. This will in turn reduce the quantity of imports to Q_3-Q_2.



Source: Tsakok (1990)

Fig. 1. Tariff on imports of a food commodity

Numerically, the impacts of the import tariff can be calculated using these formulas (Tsakok, 1990, pp.188-189):

- Change in government revenue (graphically represented by area *GKBF* in Fig. 1):

$$\Delta GR = \left(\frac{NPC-1}{NPC}\right)(W' - V') \qquad (1)$$

Where NPC= Nominal Protection Coefficient, which is the ratio of the domestic price that decision makers face given the intervention (P^d) and the border price they would have faced in the absence of the intervention (P^b);
W'= P^dQ_3, the value of consumption at domestic prices;
V'= P^dQ_2, the value of domestic production at domestic prices;

- Change in foreign exchange outlays (graphically represented by Q_1HCQ_4 – area Q_2GFQ_3 in Fig. 1):

$$\Delta FE = -\left(\frac{NPC-1}{NPC^2}\right)(e_s V' - n_d W') \quad (2)$$

Where: n_d = price elasticity of demand and
e_s= price elasticity of supply

- Net economic loss in consumption (NEL_c) (graphically represented by ΔFBC in Fig. 1):

$$\Delta NEL_c = 0.5 n_d \left(\frac{NPC-1}{NPC}\right)^2 W' \quad (3)$$

- Net economic loss in production (NEL_p) (graphically represented by ΔHKG in Fig.1):

$$\Delta NEL_p = 0.5 e_s \left(\frac{NPC-1}{NPC}\right)^2 V' \quad (4)$$

- Change in consumer surplus (WG_c) (graphically represented by area P^bP^dBC in Fig. 1):

$$\Delta WG_c = -\left[\left(\frac{NPC-1}{NPC} W'\right) + NEL_c\right] \quad (5)$$

- Change in producer surplus (WG_p) (graphically represented by area P^bP^dKH in Fig. 1):

$$\Delta WG_p = \left(\frac{NPC-1}{NPC}\right) V' - NEL_p \quad (6)$$

- Net effect of a tariff on imports (graphically represented by area HKG and area FBC in Fig.1):

$$Net\ effect = WG_p + WG_c + \Delta GR = -(NEL_p + NEL_c) \quad (7)$$

In this study, two scenarios were compared: (1) the pre-RTL period under quantitative restrictions and (2) post-RTL period under ad valorem tariffs in order to analyze the welfare impacts of the policy shift. In the case of quantitative restrictions, NPC was adjusted to measure the equivalent tariff as proposed by Tsakok (p.69), that is, NPC = (domestic retail price – handling from border to retail market)/ P^b. This was based on the idea that the summation of border price with tariff ($P^b(1+t)$) and handling cost from border to retail market is equal to the domestic retail price so rearranging the formula would yield the adjusted NPC under quantitative restrictions.

In disaggregating the analysis, the same procedure was employed but the market supply curves and market demand curves were disaggregated into the supply curves of large and small farmers and demand curves of low-income and high-income consumers. Various elasticities of supply estimated by Hayami and Herdt (1978) and Hinlo and Cruz (2013) and elasticities of demand estimated by Lantican et al. (2013 were used in the study to provide more sensitivity to the analysis. Although Tsakok (1990) provided some elasticity estimates which can be used by practitioners in the analysis, these were estimated between 1910 to 1974 so the author decided to use the most recent ones available. The results generated using the own-price elasticity of supply estimate of Hayami and Herdt (1978) were shown as Case A while the results generated using the own-price elasticity of supply estimate of Hinlo and Cruz (2013) were shown as Case B. In both cases, the own-price elasticities of demand estimated by Lantican et al. (2013) were used. It was also assumed that the price elasticity of large-scale farmers reaches the

long-run (LR) level as assumed by Hayami and Herdt (1978) due to their greater capacity for investment financing while the price elasticity of small-scale farmers remains at the short-run (SR) level. Both the short-run period (where some factors of production are fixed) and long-run period (all the factors of production are variable) were considered in the analysis to assess the impact of the policy shift in different time horizon. This type of analysis may be relevant because the gravity of the impact may change across time as players tend to better adapt or adjust in the long-term.

Data. Annual rice production, consumption, imports, and rice prices were obtained from the PSA and Food and Agriculture Organization (FAO) websites, and tariff rates and other relevant data were collected from the Bureau of Customs website and other government websites. The annual averages of these data covering 2010 to 2018 were used in the simulations. The CIF (cost, insurance, and freight) prices of milled rice imported from Thailand and Vietnam were used in the analysis as the world prices. This is because Thailand and Vietnam are the biggest trading partners of the Philippines in terms of rice. In 2018, for instance, based on FAO website, 48 percent of the Philippines' total rice imports or about 842.96 thousand metric tons (valued at 355 million USD) were from Thailand while 38 percent or about 674.56 thousand metric tons (valued at 280 million USD) were from Vietnam. The rest of the rice imports (14%) were sourced out from India, Myanmar, China, and Pakistan.

RESULTS AND DISCUSSION

Under RTL, the quantitative restrictions were lifted for rice imports coming from ASEAN countries and were replaced with just ad valorem tariffs. Previously, the minimum access volume (MAV) was at 805 thousand metric tons with varying in-quota and out-quota tariff rates. With the policy shift, the MAV was removed for rice imports coming from ASEAN countries and the MAV for non-ASEAN countries reverted to 350 thousand metric tons (Republic Act No. 11203 2018). Import tariffs imposed are as follows: 35 percent tariff on rice imported from the members of ASEAN under the ASEAN Trade in Goods Agreement (ATIGA), 40 percent in-quota tariff (volumes below 350 thousand metric tons) and 50 percent out-quota tariff (volumes above 350 thousand metric tons) on rice imported from the Most Favoured Nations (MFN), and 180 percent bound tariff rate is imposed on rice imports from non-ASEAN countries above 350 thousand metric tons (Tariff Commission 2021). Rice imports from Vietnam and Thailand are subject to ATIGA tariff rate of 35 percent which is equivalent to NPC of 1.35 (Table 1). Prior to RTL implementation, quantitative restrictions were imposed on rice imports with equivalent tariffs of 65 to 73 percent and NPCs of 1.65 to 1.73, implying a loss in producer protection between 18 to 22 percent.

Table 1. Tariff rates, CIF prices, and nominal protection coefficients for rice by trade agreement

Scenario	Tariff Rate (%) (a)	CIF Thai W/o Tariff (P/mt) [P^b or P^{cif}] (b)	CIF Thai With Tariff (P/mt) [P^b + t] (c)	CIF Viet W/o Tariff (P/mt) [P^b or P^{cif}] (d)	CIF Viet With Tariff (P/mt) [P^b + t] (e)	Nominal Protection Coefficient (f)
Non-ASEAN country	180					
MFN (out-quota)	50					
MFN (in-quota)	40					
ATIGA	35	9,495	6,318	20,377	27,509	1.35
QR	67 to 71	19,495	33,336	20,377	34,029	1.65 to 1.73

Source: Tariff Commission (2021)

Notes:

- Estimated handling cost from border to retail is assumed to be 10% of the border price (Briones 2019).
- MFN refers to the Most Favored Nations.
- ATIGA refers to ASEAN Trade in Goods Agreement.
- QR means quantitative restrictions.
- P/mt is Philippine pesos per metric ton.
- CIF (cost, insurance, and freight)

Rice produced in Nueva Ecija irrigated systems, a major rice-producing province in the Philippines, would need a 75 percent tariff protection to ensure competitiveness against imported rice from Vietnam, Thailand, or India. Otherwise, they will need to reduce their production cost by about 44 percent from PhP12.41 per kg to PhP6.97 per kg using better seeds/hybrid rice and improved agronomic techniques as well as improved milling efficiency and capacity utilization to maintain current profit margins (Bordey et al. 2016). RTL will result to a reduction in domestic production from 11.61 Mt to as low as 10.88 Mt in the short-run and 10.20 Mt in the long-run or equivalent to one to six percent reduction and nine to 12 percent reduction in domestic production, respectively (Table 2 and Table 3).

Table 2. Effect of the policy shift from quantitative restrictions (Pre-RTL) to Ad Valorem tariffs (Post-RTL)

	Pre-RTL				**Post-RTL**			
	TP: Thailand		**TP: Vietnam**		**TP: Thailand**		**TP: Vietnam**	
	Case A	**Case B**	**Case A**	**Case B**	**Case A**	**Case B**	**Case A**	**Case B**
Supply (million metric tons)								
Market: LR	11.61	11.61	11.61	11.61	10.39	10.20	10.55	10.32
Market: SR	11.61	11.61	11.61	11.61	10.88	11.50	10.94	11.51
Large-scale palay farmer (> than 2 has)	1.97	1.97	1.97	1.97	1.77	1.73	1.79	1.76
Small-scale palay farmer (< or = 2 has)	9.64	9.64	9.64	9.64	9.03	9.54	9.08	9.55
Demand (million metric tons)								
Market: Hicksian	12.79	12.79	12.79	12.79	13.50	13.50	13.44	13.44
Market: Marshallian	12.79	12.79	12.79	12.79	14.15	14.15	14.02	14.02
High-income consumer: Hicksian	3.82	3.82	3.82	3.82	4.08	4.08	4.05	4.05
High-income consumer: Mashallian	3.82	3.82	3.82	3.82	4.24	4.24	4.20	4.20
Low-income consumer: Hicksian	8.96	8.96	8.96	8.96	9.39	9.39	9.35	9.35
Low-income consumer: Marshallian	8.96	8.96	8.96	8.96	9.87	9.87	9.79	9.79
Trade								
Imports (Mt): Hicksian, LR	1.18	1.18	1.18	1.18	3.11	3.30	2.94	3.11
Imports (Mt): Hicksian, SR	1.18	1.18	1.18	1.18	2.62	2.00	2.49	1.93
Imports (Mt): Marshallian, LR	1.18	1.18	1.18	1.18	3.76	3.95	3.52	3.70
Imports (Mt): Marshallian, SR	1.18	1.18	1.18	1.18	3.27	2.65	3.08	2.52
Foreign exchange earnings (USD billion): Hicksian, LR	-1.62	-1.79	-1.62	-1.78	-0.96	-1.04	-1.01	-1.09

	Pre-RTL				Post-RTL			
	TP: Thailand		TP: Vietnam		TP: Thailand		TP: Vietnam	
	Case A	Case B	Case A	Case B	Case A	Case B	Case A	Case B
Foreign exchange earnings (USD billion): Hicksian, SR	-1.21	-0.70	-1.21	-0.69	-0.75	-0.45	-0.79	-0.47
Foreign exchange earnings (USD billion): Marshallian, LR	-2.17	-2.33	-2.16	-2.33	-1.35	-1.43	-1.42	-1.50
Foreign exchange earnings (USD billion): Marshallian, SR	-1.76	-1.24	-1.75	-1.24	-1.14	-0.84	-1.19	-0.87
Tariff Revenue (PhP billion): Hicksian, LR	8.02	8.02	8.38	8.38	21.23	22.54	20.95	22.19
Tariff Revenue (PhP billion): Hicksian, SR	8.02	8.02	8.38	8.38	17.89	13.67	17.78	13.76
Tariff Revenue (PhP billion): Marshallian, LR	8.02	8.02	8.38	8.38	25.63	26.94	25.14	26.38
Tariff Revenue (PhP billion): Marshallian, SR	8.02	8.02	8.38	8.38	22.29	18.08	21.96	17.95
Total Domestic Supply (Imports + Local Prod) (million metric tons)								
Hicksian, LR	12.79	12.79	12.79	12.79	13.50	13.50	13.49	13.43
Hicksian, SR	12.79	12.79	12.79	12.79	13.50	13.50	13.43	13.44
Marshallian, LR	12.79	12.79	12.79	12.79	14.15	14.15	14.07	14.02
Marshallian, SR	12.79	12.79	12.79	12.79	14.15	14.15	14.02	14.03
Welfare Effects (PhP billion)								
Consumption								
Total Expenditures: Hicksian	426.37	426.37	435.23	435.23	355.29	355.29	369.72	369.72
Total Expenditures: Marshallian	426.37	426.37	435.23	435.23	372.40	372.40	385.67	385.67
High-income consumer: Hicksian	127.34	127.34	129.99	129.99	107.38	107.38	111.41	111.41
High-income consumer: Marshallian	127.34	127.34	129.99	129.99	111.59	111.59	115.54	115.54
Low-income consumer: Hicksian	298.69	298.69	304.90	304.90	247.13	247.13	257.21	257.21
Low-income consumer: Marshallian	298.69	298.69	304.90	304.90	259.76	259.76	269.31	269.31
Change in consumer surplus: Hicksian	-169.57	-169.57	-162.32	-162.32	-88.95	-88.95	-92.53	-92.53
Change in consumer surplus: Marshallian	-160.50	-160.50	-154.24	-154.24	-90.20	-90.20	-93.47	-93.47
High-income consumer: Hicksian	- 50.17	- 50.17	-48.06	- 48.06	-26.68	-26.68	-27.73	-27.73
High-income consumer: Marshallian	- 47.87	- 47.87	-46.01	- 46.01	-26.99	-26.99	-27.96	-27.96
Low-income consumer: Hicksian	-119.96	-119.96	-114.76	-114.76	-62.18	- 62.18	-64.73	-64.73
Low-income consumer: Marshallian	-113.12	-113.12	-108.67	-108.67	-63.15	-63.15	-65.46	-65.46
Production								
Total Revenues: LR	387.03	387.03	395.08	395.08	273.45	268.44	290.22	283.89
Total Revenues: SR	387.03	387.03	395.08	395.08	286.34	302.66	300.94	316.62

	Pre-RTL				Post-RTL			
	TP: Thailand		TP: Vietnam		TP: Thailand		TP: Vietnam	
	Case A	Case B	Case A	Case B	Case A	Case B	Case A	Case B
Large-scale palay farmer	65.67	65.67	67.04	67.04	46.58	45.53	49.24	48.42
Small-scale palay farmer	321.36	321.36	328.04	328.04	237.65	251.07	249.78	262.71
Change in producer surplus: LR	145.90	143.21	140.20	137.80	66.29	64.36	70.02	68.11
Change in producer surplus: SR	152.77	161.46	146.32	154.06	71.34	77.96	75.01	81.56
Large-scale palay farmer	24.80	24.35	23.83	23.43	11.27	10.94	11.90	11.58
Small-scale palay farmer	126.80	134.01	121.45	127.87	59.21	64.71	62.26	67.70
Efficiency losses/gains								
Total: Hicksian, LR	-15.64	-18.34	-13.73	-16.13	-1.43	-2.05	-1.56	-2.23
Total: Hicksian, SR	- 8.77	-0.08	-7.61	0.13	0.28	2.69	0.26	2.79
Total: Marshallian, LR	- 6.58	-9.27	-5.66	-8.06	1.72	1.10	1.69	1.02
Total: Marshallian, SR	0.29	8.98	0.46	8.20	3.43	5.83	3.51	6.04
Production: LR	17.18	19.87	15.30	18.21	4.59	5.22	4.85	5.49
Production: SR	10.31	1.60	9.18	1.48	2.89	0.48	3.04	0.50
Consumption: Hicksian	-10.03	-10.03	-8.93	-9.32	-3.16	-3.16	-3.29	-3.32
Consumption: Marshallian	-19.09	-19.18	-17.00	-17.75	-6.31	-6.48	-6.54	-6.60

Notes:

- Own-price elasticities of supply used in Case A were as follows: LR= 0.5, SR = 0.3 (Hayami and Herdt 1978).
- Own-price elasticities of supply used in Case B were as follows: LR= 0.5785, SR= 0.0471 (Hinlo and Cruz 2013).
- Own-price elasticities of demand used in both cases were as follows: Market (Hicksian)= -0.2650, market (Marshallian)= -0.5046, high-income consumer (Hicksian)= -0.3126, high-income consumer (Marshallian)= -0.5159, low-income consumer (Hicksian)= -0.2235, low-income consumer (Marshallian)= -0.4814 (Lantican et al. 2013).
- Average exchange rate from 2010-2019 posted in Bangko Sentral ng Pilipinas is used in the analysis: 1 USD = 47 PhP.
- Tariff revenues pre-RTL period were computed based on the total volume of imports during that period valued at CIF price ATIGA rate
- TP refers to trading partner

Table 3. Effect of the policy shift from Quantitative Restrictions (Pre-RTL) to Ad Valorem tariffs (Post-RTL) in percent changes

	TP: Thailand		TP: Vietnam	
Supply	**Case A**	**Case B**	**Case A**	**Case B**
Market: Long-run	- 10.51	- 12.14	- 9.13	- 11.11
Market: Short-run	- 6.29	- 0.95	- 5.77	- 0.86
Large-scale palay farmer (> than 2 has)	- 0.15	- 12.18	- 9.14	- 10.66
Small-scale palay farmer (< or = 2 has)	- 6.33	- 1.04	- 5.81	- 0.93
Demand				
Market: Hicksian	5.55	5.55	5.08	5.08
Market: Marshallian	10.63	10.63	9.62	9.62
High-income consumer: Hicksian	6.81	6.81	6.02	6.02

	TP: Thailand		TP: Vietnam	
High-income consumer: Mashallian	10.99	10.99	9.95	9.95
Low-income consumer: Hicksian	4.80	4.80	4.35	4.35
Low-income consumer: Marshallian	10.16	10.16	9.26	9.26
Trade				
Imports: Hicksian, LR	163.56	179.66	149.15	163.56
Imports: Hicksian, SR	122.03	69.49	111.02	63.56
Imports: Marshallian, LR	218.64	234.75	198.31	213.56
Imports: Marshallian, SR	177.12	124.58	161.02	113.56
Foreign exchange earnings: Hicksian, LR	- 40.67	- 41.69	- 37.67	- 38.64
Foreign exchange earnings: Hicksian, SR	- 38.09	- 34.91	- 35.22	- 32.19
Foreign exchange earnings: Marshallian, LR	- 37.44	- 38.44	- 34.60	- 35.55
Foreign exchange earnings: Marshallian, SR	- 34.90	- 31.77	- 32.18	- 29.20
Tariff Revenue: Hicksian, LR	164.64	180.96	149.85	164.71
Tariff Revenue: Hicksian, SR	123.05	70.47	112.00	64.14
Tariff Revenue: Marshallian, LR	219.50	235.82	199.78	214.64
Tariff Revenue: Marshallian, SR	177.92	125.33	161.94	114.08

Welfare Effects	**TP: Thailand**		**TP: Vietnam**	
Consumption	**Case A**	**Case B**	**Case A**	**Case B**
Total Expenditures: Hicksian	- 16.67	- 16.67	- 15.05	- 15.05
Total Expenditures: Marshallian	- 12.66	- 12.66	- 11.39	- 11.39
High-income consumer: Hicksian	- 15.68	- 15.68	- 14.29	- 14.29
High-income consumer: Marshallian	- 12.37	- 12.37	- 11.12	- 11.12
Low-income consumer: Hicksian	- 17.26	- 17.26	- 15.64	- 15.64
Low-income consumer: Marshallian	- 13.03	- 13.03	- 11.67	- 11.67
Change in consumer surplus: Hicksian	- 47.54	- 47.54	- 42.99	- 42.99
Change in consumer surplus: Marshallian	- 43.80	- 43.80	- 39.40	- 39.40
High-income consumer: Hicksian	- 46.82	- 46.82	- 42.29	- 42.29
High-income consumer: Marshallian	- 43.62	- 43.62	- 39.23	- 39.23
Low-income consumer: Hicksian	- 48.17	- 48.17	- 43.59	- 43.59
Low-income consumer: Marshallian	- 44.17	- 44.17	- 39.76	- 39.76
Production				
Total Revenues: Long-run	- 29.35	- 30.64	- 26.54	- 28.14
Total Revenues : Short-run	- 26.02	- 21.80	- 23.83	- 19.86
Large-scale palay farmer	- 29.07	- 30.67	- 26.55	- 27.78
Small-scale palay farmer	- 26.05	- 21.87	- 23.86	- 19.92
Change in producer surplus: Long-run	- 54.56	- 55.06	- 50.06	- 50.57
Change in producer surplus: Short-run	- 53.31	- 51.72	- 48.73	- 47.06
Large-scale palay farmer	- 54.56	- 55.06	- 50.06	- 50.57
Small-scale palay farmer	- 53.31	- 51.72	- 48.73	- 47.06
Efficiency losses				
Total: Hicksian, LR	- 90.86	- 88.80	- 88.63	- 86.18
Total: Hicksian, SR	-103.17	-3,335.02	-103.37	2,075.14
Total: Marshallian, LR	-126.13	-111.81	-129.86	-112.66
Total: Marshallian, SR	1,067.44	- 35.04	656.27	- 26.35
Production: Long-run	- 73.25	- 73.75	- 68.28	- 69.88
Production: Short-run	- 71.99	- 69.75	- 66.94	- 66.43
Consumption: Hicksian	- 68.44	- 68.44	- 63.14	- 64.40
Consumption: Marshallian	- 66.93	- 66.20	- 61.53	- 62.85

Notes:

- Own-price elasticities of supply used in Case A were as follows: LR= 0.5, SR = 0.3 (Hayami and Herdt 1978).
- Own-price elasticities of supply used in Case B were as follows: LR= 0.5785, SR= 0.0471 (Hinlo and Cruz 2013).
- Own-price elasticities of demand used in both cases were as follows: Market (Hicksian)= -0.2650, market (Marshallian)= -0.5046, high-income consumer (Hicksian)= -0.3126, high-income consumer (Marshallian)= -0.5159, low-income consumer (Hicksian)= -0.2235, low-income consumer (Marshallian)= -0.4814 (Lantican et al. 2013).
- Average exchange rate from 2010-2019 posted in Bangko Sentral ng Pilipinas is used in the analysis: 1 USD = 47 PhP.
- Tariff revenues pre-RTL period were based on the total volume of imports during that period valued at CIF price ATIGA rate
- TP refers to trading partner
- Percent change was computed using the formula: (Post-RTL value – Pre-RTL value/Pre-RTL value)*100

In terms of farmer's revenue, this translates to a reduction of 20 to 26 percent in the short-run and 27 to 31 percent in the long-run from a maximum aggregate revenue of PhP395.08 billion pre-RTL period to as low as PhP286.34 billion in the short-run and PhP268.44 billion in the long-run post-RTL period. Given the estimated number of 2.4 million farmers in the Philippines, this is equivalent to a reduction of annual revenue per farmer from PhP164.62 thousand to PhP119.31 thousand in the short-run and PhP111.85 thousand in the long-run. There will still be gains in the producer surplus relative to zero intervention, but the gains will be reduced by 47 to 53 percent in the short-run and 50 to 55 percent in the long-run after the policy shift. However, this implies that the milled rice which can be bought at PhP33.62 to PhP33.73 per kg pre-RTL period under quantitative restrictions can now be bought by households at cheaper price of PhP26.32 to PhP27.51 per kg. In expenditure terms, this is equivalent to 11 to 17 percent reduction in their rice expenses (from PhP435.23 billion to PhP355.29 billion in aggregate terms or from PhP21.55 thousand to PhP17.59 thousand per household with a family of five). This will also reduce the welfare losses in consumer surplus from as high as PhP169.57 billion pre-RTL period to as low as PhP88.95 billion post-RTL period.

On the government side, the removal of quantitative restrictions will increase the government's revenue to a range of PhP13.67 billion to PhP22.29 billion in the short-run and to a range of PhP20.95 billion to PhP26.94 billion in the long-run—more than enough to cover the annual PhP10 billion appropriation for RCEF. This is because of the expected surge in rice imports by 64 to 177 percent in the short-run and by 149 to 235 percent in the long-run, that is, from 1.18 Mt pre-RTL period to a range of 1.93 to 3.27 Mt in the short-run and to a range of 2.94 to 3.95 Mt in the long-run post-RTL period, which will result to an increase in the total domestic rice supply from 12.79 Mt pre-RTL period to a range of 13.49 Mt to 14.15 Mt (equivalent to five percent to 11 percent increase) post-RTL period. The surge in the rice imports outweighs the reduction in the domestic rice production causing a net positive change in the total domestic rice supply. The increase in rice imports, however, increases the country's vulnerability to commodity price fluctuations in the international market and deteriorating terms of trade. Losses in foreign exchange will also be reduced due to the policy shift from a range of losses equivalent to USD 0.69 billion to USD 1.76 billion in the short-run to a range of losses equivalent to USD 0.45 billion to USD 1.19 billion attributed to the reduction in CIF rice prices which increases the availability of foreign exchange to the economy ignoring the cross-effects with other sources of inflow outflows for foreign exchange. In the long-run, losses in foreign exchange will be reduced from a range of USD 1.62 billion to USD 2.33 billion to a range of USD 0.96 billion to USD 1.50 billion.

Considering the net welfare impact of the policy shift to the society as whole, it was found that removing the quantitative restrictions improves the efficiency of the rice industry. In the pre-RTL period, there is a net efficiency loss ranging from PhP80 million to PhP8.77 billion in the short-run and PhP5.66 billion to PhP18.34 billion in the long-run. Although, there can be net efficiency gain in the short-run in the pre-RTL period if farmer's own-price elasticity of supply is less elastic (0.0471 instead of 0.3), as shown in case B using Marshallian's own-price elasticity of demand. In contrast, in the post-RTL period, there is a net efficiency gain of PhP260 million to PhP6.04 billion in the short-run and a net efficiency gain of up to PhP1.72 billion in the long-run. This is because although there is a reduction in gains in producer surplus, the improvement in consumption efficiency outweighs the losses in production. However, the net effect can be negative in the long-run if the real income effect is fixed, as shown by the estimation results using Hicksian's own-price elasticity of demand and the long-run own-price elasticity of supply.

Looking at the actual trends, there was a drop in the volume of domestic rice production immediately after the implementation of RTL (between 2018 and 2019) by 1.32 percent which can be explained by the three percent reduction in the area harvested in the same period. This is within the range of the author's estimate reduction of one to six percent in the domestic rice production in the short-run. This can be indicative of the fact that some farmers have shifted to other crops due to the reduction in paddy prices. PSA data showed that there was a huge drop in paddy prices from the annual average of PhP24.74 per kg in 2018 to PhP21.45 per kg in 2019. However, in the following years (2020 and 2021), rice production figures have improved considerably as shown in Table 4. This was despite the disruptions to farm operations caused by the COVID-19 pandemic, the series of strong typhoons, and lowered paddy prices. The efforts of the Department of Agriculture (DA) may have played a huge role on this with the full implementation of the RCEF in addition to their regular rice program and rice resiliency project, which is part of the stimulus program of the DA's "Plant, Plant, Plant" Program (otherwise known as *"Ahon Lahat Pagkaing Sapat (ALPAS) Kontra sa COVID-19 Program"*) launched in 2020 that provides fertilizer subsidy to the recipients of seed support and those who purchased or used their own seeds in a form of vouchers amounting to PhP2,000 per hectare for those using inbred seeds and PhP3,000 per hectare for those using hybrid seeds and which was specifically created to boost the domestic production in order to address the global rice supply situation affected by the temporary rice export suspension of Vietnam (Memorandum Order No. 52. 2020). Improved rice productivity is also noteworthy with the increasing trend in rice yields from 3.97 metric tons per hectare in 2018 to 4.15 metric tons per hectare in 2021 based on PSA data. This can be an indication of the improved efficiency in domestic rice production.

With regard to consumption, rice utilization accounts from PSA have shown that per capita consumption of rice has increased from 120 kgs per year in 2018 to 128 and 125 kgs per year in 2019 and 2020, respectively. The increased rice consumption might be explained by the increased affordability of rice and increased availability of rice in the local market. The Department of Finance (DOF) reported that the implementation of RTL in 2019 has decelerated inflation in the country as the entrants of rice imports has slashed prices by about PhP8 per kg on the average (Department of Finance 2020). PSA data also showed that between 2018 and 2019, total domestic rice supply increased by seven percent due to increased rice imports of about 56 percent. The increase in the total domestic rice supply between 2018 and 2019 is within the author's estimate which ranged from five to 11 percent in the short-run. The estimated increase in the rice imports, however, is higher (about 64 to 177 percent) compared to the actual.

Dela Peña (2014) noted that NFA's regulations allow the concentration of legally imported supplies in the hands of a few, making smuggling lucrative. Hence, the removal of NFA's powers and functions on rice importation and regulation could potentially reduce rice smuggling in the country. The positive implication of the policy shift on smuggling issue is also supported in theory by Tsakok (1990) noting that quantitative restrictions may tend to encourage smuggling if there is domestic scarcity of the

commodity and the price differentials between domestic and border prices are substantial, which is the case in the Philippines and will therefore enlarge parallel markets at the expense of official markets and collection of tariff revenues. Hence, the removal of the restrictions can also discourage this illegal practice. Rice smuggling has been a problem in the Philippines for so long as rice has been the top agricultural product being smuggled in the Philippines with around USD 1.96 billion worth of smuggled milled rice from 1986 to 2009 (Lantican and Ani 2020).

Table 4. Area harvested for rice, volume of rice production, and rice yield from 2010 to 2021, Philippines

	Area	Volume	Yield	Area	Volume	Yield
Year	(hectares)	(metric tons)	(mt/ha)		(% change)	
2010	4,354,161	15,772,319	3.62			
2011	4,536,642	16,684,062	3.68	4.19	5.78	1.53
2012	4,690,061	18,032,525	3.84	3.38	8.08	4.55
2013	4,746,091	18,439,420	3.89	1.19	2.26	1.05
2014	4,739,672	18,967,826	4.00	-0.14	2.87	3.00
2015	4,656,227	18,149,838	3.90	-1.76	-4.31	-2.60
2016	4,556,043	17,627,245	3.87	-2.15	-2.88	-0.74
2017	4,811,808	19,276,347	4.01	5.61	9.36	3.54
2018	4,800,406	19,066,094	3.97	-0.24	-1.09	-0.86
2019	4,651,490	18,814,827	4.04	-3.10	-1.32	1.84
2020	4,718,896	19,294,856	4.09	1.45	2.55	1.09
2021	4,805,077	19,960,170	4.15	1.83	3.45	1.59

Source of basic data: Philippine Statistics Authority

Disaggregating the welfare impact. Disaggregating the analysis, author's simulation found that the removal of quantitative restrictions causes small-scale farmers to reduce their rice output by one to six percent while large-scale farmers by nine to 12 percent. Larger percent reduction in output is expected with large-scale farmers since their own-price elasticity of supply is more elastic (0.5 to 0.5785) compared to small-scale farmers (0.0471 to 0.3) (Hayami and Herdt 1978; Hinlo and Cruz 2013). Expressed in quantity, this is a reduction from 9.64 Mt to a range of 9.03 to 9.55 Mt for small-scale farmers and a reduction from 1.97 Mt to a range of 1.73 to 1.79 Mt for large-scale farmers. In revenue terms, small-scale farmers' aggregate income will be reduced by 22 to 26 percent, that is, from an income range of PhP321.36 billion to PhP328.04 billion to an income range of PhP249.78 billion to PhP262.71 billion; whereas large-scale farmers' aggregate income will be reduced by 27 to 31 percent, that is, from an income range of PhP65.67 billion to PhP67.04 billion to an income range of PhP45.53 billion to PhP49.24 billion.

Gains in producer surplus of small-scale farmers will also be reduced by 47 to 53 percent, from a range of PhP121.45 billion to PhP134.01 billion to a range of PhP59.21 billion to PhP67.70 billion, while that of large-scale farmers will be reduced by 50 to 55 percent, from a range of PhP23.43 billion to PhP24.80 billion to a range of PhP10.94 billion to PhP11.90 billion. Hence, although both large-scale and small-scale farmers are negatively affected by the policy shift, larger economic loss is incurred by small-scale farmers because they contribute bulk of the total rice production, worsening the equity on the production side. While removal of quantitative restrictions increases efficiency, the displacement effects of the expected surge in rice imports will translate to larger negative income effects for household groups heavily relying on agriculture (especially palay production), worsening poverty situation and income inequality (Cororaton 2004).

However, the increase in income poverty comes in small increments and decreases over time. From the estimated loss of PhP2.84 billion in the first three years for the poor households to PhP2.10 billion in 2022 to 2024, to PhP500 million in 2025 to 2027, and further down to PhP134 million in 2028 to 2030, summing up to PhP14.9 billion for the six-year period, which is the minimum amount of cash transfers necessary to compensate the poor for any increase in their respective absolute poverty gaps (Briones 2021) This value of income loss suffered by the poor is way below the amount provided by the law (PhP60 billion) to mitigate its negative impact. It was recommended that targeted cash transfers be used to counter the poverty effect in the short-run and productivity improvement and infrastructure support provided, which are already accounted for in RCEF, to counter the long-term effects (Briones 2021; Cororaton 2004). This recommendation appears to be heard by the DA as it recently implemented the Rice Farmers Financial Assistance (RFFA) program, which gives direct cash transfers amounting to PhP5,000 to rice farmers with two hectares or less to till to compensate for the income losses they incurred due to drop of rice prices (Talavera 2022). The RFFA sources its fund from the annual excess of the PhP10 billion tariff revenues allocated for RCEF. According to DOF (2020), in only seven months after RTL's implementation, cash revenues of PhP12.3 billion were collected as of December 31, 2019, which was beyond the amount allocated yearly for RCEF. With the first two years of RTL's implementation, the DA was able to distribute cash assistance amounting to PhP7.6 billion in 2021 (Talavera 2022).

On the consumption side, removal of quantitative restriction increases rice consumption of low-income consumers by four to ten percent and of high-income consumers by six to 11 percent. Larger percent increase in demand is expected on high-income consumers since their own-price elasticity of demand (-0.3126 to -0.5159) is more elastic compared to low-income consumers (-0.2235 to -0.4814) (Lantican et al. 2013). Expressed in quantity, this is an increase from 8.96 Mt pre-RTL period to a range of 9.35 to 9.87 Mt for low-income consumers post-RTL period and an increase from 3.82 Mt pre-RTL period to a range of 4.05 to 4.24 Mt for high-income consumers post-RTL period. In expenditure terms, low-income consumers' aggregate expenditure will be reduced due to lower well-milled rice prices by 12 to 17 percent, that is, from an expenditure range of PhP298.69 billion to PhP304.90 billion to an expenditure range of PhP247.13 billion to PhP269.31 billion; whereas high-income consumers' aggregate expenditure will be reduced by 11 to 16 percent, that is from an expenditure range of PhP127.34 billion to PhP129.99 billion to an expenditure range of PhP107.38 billion to PhP111.41 billion. Consumer surplus of low-income consumers will also be improved from a loss ranging from PhP108.67 billion to PhP119.96 billion pre-RTL period to a loss ranging from PhP62.18 billion to PhP65.46 billion, while that of high-income consumers will be improved from a loss ranging from PhP46.01 billion to PhP50.17 billion to a loss ranging from PhP26.68 billion to PhP27.96 billion. This improves the equity in the consumption side since more savings are gained by low-income consumers than high-income consumers because the former spent larger share in rice expenditures than the latter. Rice affordability after the policy shift can improve food security in the country and may have an impact in addressing nutrition problems especially among the low-income group since reduced rice expenditures can increase their expenditures on high calorie foods such as meat and poultry products and can therefore, improve their diet diversity (Delos Reyes 2010). However, although the policy shift promises rice affordability, this may be constrained by the multi-layered supply chain of rice in the Philippines which increases marketing costs (Mataia et al. 2020), affecting rice retail prices. The continued efforts of the government in reducing the gap between the farmgate and retail prices of agricultural products including: (1) facilitation of efficient and seamless delivery of imported rice products from ports to markets; (2) effecting the immediate release of existing rice stocks in NFA warehouses; (3) watching closely the transport of rice from ports to NFA warehouses and retail outlets; (4) setting up of public markets where producers can sell their goods directly to consumers; and prioritizing the release of essential food items in the ports (DOF 2020), among others play a huge role in reaping the benefits of the policy reform.

CONCLUSIONS, RECOMMENDATIONS, AND POLICY IMPLICATIONS

Using partial equilibrium analysis, results showed that under post-RTL period, total domestic rice supply will increase substantially since the reduction in domestic rice production will be outweighed by the increase in the volume of rice importation. Household access to rice will also be improved especially among the low-income consumers, who aggregately spend more on rice than high-income consumers due to reduced rice expenditures. Inefficiency losses are reduced on the consumption side because the quantitative restrictions, which previously created a scarcity rent that blew up rice prices, were removed, and there are still gains in producer surplus relative to zero intervention, but the gains are reduced due to the reduced rice prices. Net effect to the society is positive mainly because the reduction of inefficiency losses on the consumer side outweighs the reduction of the welfare gains on the production side. In addition, more government revenues will be earned, and there will be some savings in foreign exchange. However, the increase in rice imports due to the removal of quantitative restrictions also increases the country's vulnerability to shocks in the international market, and while the policy shift may improve the country's food security due to more affordable rice prices, food self-sufficiency is threatened. Diversifying sources of imports may be explored for this purpose as also proposed by some experts since currently, the Philippines is importing rice primarily from Thailand and Vietnam, but Indian rice are also becoming cheaper.

On the other hand, the disaggregated simulations in this study showed that equity is improved on the consumer side because low-income consumers, who aggregately spend more on rice than high-income consumers, will save more on their rice expenditures. This may increase the expenditures of the households especially those belonging to the low-income group on high calorie foods such as meat and poultry products and can therefore, address nutrition problems in the country. However, it must also be noted that the policy shift must be coupled with cost-minimizing strategies that improve overall efficiency in the rice value chain to realize the gains of the policy reform. On the production side, equity is worsened because small-scale farmers contribute bulk of the local rice production and therefore, will be more aggregately affected by the lowered rice price and will suffer greater revenue losses. The continued targeted support to small-scale farmers which are currently being implemented through the RFFA program could help in offsetting the trade-offs between efficiency and equity in the domestic rice market.

Holistically, the implementation of RTL seems to have catalyzed the development of the rice sector. The pressures brought about by the policy shift to the sector have helped in increasing efficiencies and resiliency amidst shocks as evidenced by the improved rice productivity and its three percent growth in Gross Value Added (GVA) in 2020 and 2021 amidst the COVID-19 pandemic based on PSA data. In any case, this has also make the achievement of food security more sustainable.

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