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RESEARCH ARTICLE

# Assessing the Poverty and Distributional Impact of Alternative Rice Policies in the Philippines

Caesar B. Cororaton
Virginia Polytechnic Institute and State University, United States of America
De La Salle University, Manila, Philippines
ccaesar@vt.edu

Krista Danielle S. Yu
De La Salle University, Manila, Philippines

**Abstract:** Philippine domestic prices of rice are significantly higher than world prices for similar rice quality. The WTO-approved Philippine rice waiver, which allows the government to continue its quantitative restrictions on rice imports, sustains the price gap in rice and prolongs the heavy burden on poor consumers who spend a significant amount of their income on rice. The results of rice policy simulations using a CGE model with poverty microsimulation indicate that a tariffication of the quantitative restrictions on rice imports, which maintains the level of protection to the local paddy farmers and the utilization of the generated revenue as cash transfers to targeted vulnerable groups, generates favorable income distribution and poverty reduction effects. Tighter quantitative restriction on rice imports under the rice self-sufficiency program increases the burden on poor households and generates perverse income redistribution from poor to rich.

***Keywords***: Philippines, Rice, Computable General Equilibrium, Rice Tariffication

***JEL Classification****:* C68, D58, F15

Upon their accession to the World Trade Organization (WTO) in 1995, the Philippines, Japan, and South Korea were granted special treatment on rice, which allowed them to impose quantitative restrictions (QR) on rice imports. The waiver request was based on the argument that rice is a sensitive product in these countries. The special treatment was scheduled to end by 2000 for Japan and 2004 for South Korea and the Philippines. Japan was able to comply with the schedule, while South Korea requested an extension until 2014 after which, it was able to comply with the implementation of tariffs. The Philippines also requested for an extension until 2012; however, a similar request was issued in 2013, which was approved by the WTO Council for Trade in Goods approved in 2014 allowing the extension to hold until June 2017. On April 27, 2017, Executive Order No. 23 (2017) was signed by the President of the Philippines, ultimately extending the QR until 2020. With this decision, the Philippines remains the only country under the WTO that restricts imports through QR.

Rice plays an important role in the Philippine economy. It is the staple food of Filipinos and is a major source of income for millions of Filipino farmers.

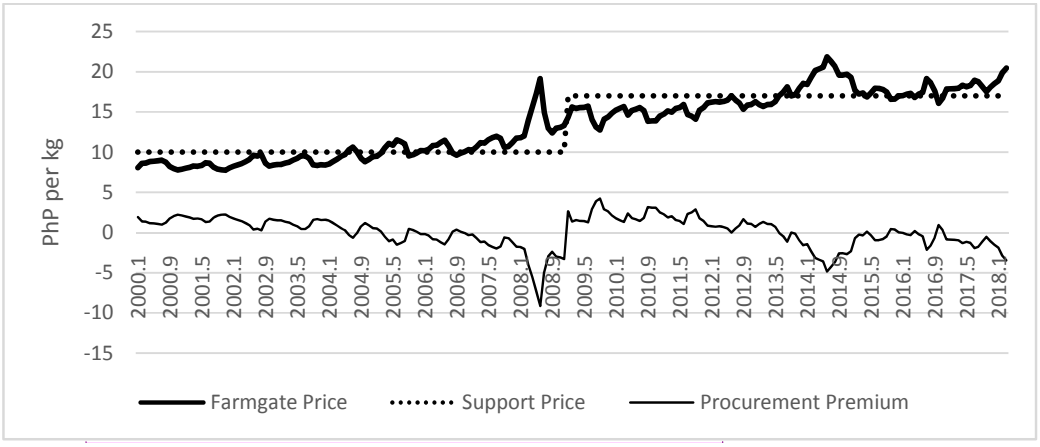
Because of the importance of rice, the government has historically been heavily involved in the rice market, with government regulations dating back to the 1960s. In 1972, the government established the National Food Authority (NFA) to help the country move towards rice self-sufficiency. Since its founding, the NFA has been heavily involved in the procurement of paddy as well as in the importation and distribution of rice. Its two primary mandates are to ensure that consumers have an adequate supply of rice at affordable prices and to help rice farmers receive reasonable returns.

This paper analyzes the poverty and distributional effects of adapting alternative rice policies in the Philippines using a computable general equilibrium (CGE) model and poverty microsimulation. The rest of the paper is organized as follows. The second section gives a brief discussion of the Philippine rice sector. The third section discusses the framework used in the analysis. The fourth section outlines four rice policy scenarios and presents the simulation results. The paper ends with a set of conclusions and insights for policy.

## Philippine Rice Policies

Seasonality contributes to the fluctuations in paddy supply and paddy prices. The NFA provides a promise of price stability through procuring paddy at a set support price. By purchasing paddy directly from the farmers at the support price, the NFA is able to build its stock, as well as increase the profits of farmers. However, this policy only works if the support price is higher than farmgate prices. Figure 1 shows that during the years 2000–2018, there were several periods when farmgate prices settled at levels below the NFA support price—in 2000–2004, 2009–2013 and some months in 2016. Table 1 shows that during these periods, there is increased paddy procurement given the higher support price that NFA applies. However, NFA does not have enough financial resources to sustain an aggressive procurement program. Hence, support price has remained unchanged and failed to catch up with the volatile and increasing farmgate prices over time.

On the other hand, rice importation has proved to be profitable. In 2003, the government, under the Arroyo administration, ordered the NFA to allow rice farmer federations and cooperatives to import rice. In addition to sales commissions, rice importers enjoy privileges from the Private Sector Financed Importation Tax Expenditure Subsidy (PSF-TES). In an attempt to protect the rice sector from imports, importations beyond 350 thousand metric tons are supposedly charged a 40% tariff, however, through the PSF-TES, the Philippine government shouldered these taxes through the Department of Finance's Fiscal Incentives Review Board. The tax waiver results from the practice that rice importers purchase on behalf of NFA, through setting the minimum access volume (MAV) set on an annual basis. While rice importers purchase rice in behalf of NFA, this does not accrue towards the NFA's inventory. Instead, rice importers sell these to the domestic market at wholesale prices above NFA's release price, generating higher profits for rice importers.




Source: Philippine Statistics Authority (2018); National Food Authority (2018).

***Figure 1.*** Farmgate and support price of paddy (PhP per kg).

**Table 1**
*Production and NFA Intervention in Paddy and Rice (Thousand Metric Tons)*

| | Paddy Production | | NFA Intervention | | | | |
|---|---|---|---|---|---|---|---|
| | | | Procurement | | Rice | Rice | Rice |
| | Production | % growth | Paddy | % of production | Injection | Importation | Consumption /1/ |
| 2000 | 12,389 | 5.1 | 663 | 5.4 | 1,169 | 617 | 8,050 |
| 2001 | 12,955 | 4.6 | 474 | 3.7 | 813 | 739 | 8,512 |
| 2002 | 13,271 | 2.4 | 300 | 2.3 | 1,239 | 1,238 | 9,201 |
| 2003 | 13,500 | 1.7 | 296 | 2.2 | 1,120 | 698 | 8,798 |
| 2004 | 14,497 | 7.4 | 208 | 1.4 | 1,342 | 984 | 9,682 |
| 2005 | 14,603 | 0.7 | 76 | 0.5 | 1,666 | 1,754 | 10,515 |
| 2006 | 15,327 | 5.0 | 74 | 0.5 | 1,615 | 1,628 | 10,824 |
| 2007 | 16,240 | 6.0 | 33 | 0.2 | 1,883 | 1,790 | 11,534 |
| 2008 | 16,814 | 3.5 | 683 | 4.1 | 2,027 | 2,341 | 12,430 |
| 2009 | 16,266 | -3.3 | 471 | 2.9 | 1,808 | 1,575 | 11,335 |
| 2010 | 15,772 | -3.0 | 502 | 3.2 | 1,759 | 2,217 | 11,680 |
| 2011 | 16,685 | 5.8 | 275 | 1.6 | 1,113 | 251 | 10,262 |
| 2012 | 18,032 | 8.1 | 361 | 2.0 | 766 | 120 | 10,940 |
| 2013 | 18,439 | 2.3 | 366 | 2.0 | 759 | 405 | 11,469 |
| 2014 | 18,967 | 2.9 | 27 | 0.1 | 1,317 | 1,080 | 12,461 |
| 2015 | 18,149 | -4.3 | 228 | 1.3 | 943 | 988 | 11,878 |
| 2016 | 17,627 | -2.9 | 108 | 0.6 | 1,052 | 891 | 11,467 |
| 2017 | 19,276 | 9.35 | 28 | 1.45 | 701 | 609 | 12,173 |

Source: National Food Authority (2018); Philippine Statistics Authority (2018)

/1/ Estimates based on 60% of paddy production (milling recovery rate) plus imports

**Table 2**
*Comparative Prices of Rice (Php/kg)*

| | Philippines | Vietnam /a/ | Thailand /a/ | NFA release |
|---|---|---|---|---|
| 2000 | 17.77 | 8.43 | 9.12 | 14.00 |
| 2001 | 17.61 | 9.06 | 9.36 | 14.00 |
| 2002 | 18.21 | 10.40 | 10.59 | 18.00 |
| 2003 | 18.30 | 10.86 | 11.45 | 18.00 |
| 2004 | 19.12 | 14.26 | 15.13 | 18.00 |
| 2005 | 20.93 | 15.80 | 17.12 | 18.00 |
| 2006 | 21.39 | 15.33 | 16.56 | 18.00 |
| 2007 | 22.59 | 16.28 | 16.89 | 18.00 |
| 2008 | 29.81 | 29.51 | 32.18 | 18.25 |
| 2009 | 31.17 | 21.95 | 26.30 | 25.00 |
| 2010 | 31.45 | 20.95 | 24.03 | 25.17 |
| 2011 | 32.06 | 24.27 | 26.56 | 27.00 |
| 2012 | 32.82 | 20.12 | 28.38 | 27.00 |
| 2013 | 34.49 | 18.49 | 25.67 | 27.00 |
| 2014 | 39.51 | 20.08 | 20.35 | 27.00 |
| 2015 | 38.14 | 18.24 | 20.37 | 27.00 |
| 2016 | 37.83 | 18.92 | 21.94 | 27.00 |
| 2017 | 38.01 | 18.24 | 20.37 | 27.00 |

Source: International Rice Research Institute (2018); National Food Authority (2018)

/a/ 25% broken; includes 20% transport cost

The NFA's inability to ensure that Filipino consumers have access to affordable rice has been going on for the last two decades. Through comparing the prices of regular-milled wholesale price of 25% broken rice, the FAO export price of Thai rice (25% broken), the FAO export price of Vietnam rice (25% broken), and the NFA release price in Table 2, it can be observed that domestic price and NFA release prices are higher than that of Vietnam and Thailand even if these prices account for shipping costs. Furthermore, prices in Vietnam and Thailand have been declining on the average in the past five years. However, the domestic price has been increasing while the NFA release price remains the same. In addition, the price gap between Vietnam and the Philippines has been increasing in recent years such that it is already large enough to buy another kilogram of rice.

High prices of rice is a heavy burden on consumers, especially on poor households. Based on the 2015 Family Income and Expenditure Survey (FIES), Table 3 shows that 20.2% of the total expenditure of poor households is on rice. The ratio is only 8.1% for non-poor households. Furthermore, the burden of high rice prices is heavier on rural households than on urban households. The rice share for poor rural households is 20.7% as against 17.8% for urban. For rural non-poor, the rice share is 10.2% as against 6.2% for urban non-poor.

The interest of Filipinos is not well served in the present structure of the rice sector. In addition, climate change magnifies these problems through reduced paddy production and soaring prices (Cororaton, Inocencio, Tiongco, Manalang, & Lamberte, 2018). Briones and dela Pena (2015) argued for more competition in the sector. Several alternatives have been considered to replace the QR such as shifting the burden of the government in planning importation requirements to the private sector (Intal, Cu, & Illescas,

**Table 3**
*Food Expenditure as a Percentage of Total Household Expenditure in the Philippines*

| | Poor | | | Non-Poor | | |
|---|---|---|---|---|---|---|
| | **2009** | **2012** | **2015** | **2009** | **2012** | **2015** |
| Philippines | | | | | | |
| Total food | 63.1 | 64.4 | 62.1 | 40.8 | 41.7 | 41.0 |
| Cereals | 29.1 | 29.1 | 27.4 | 10.8 | 11.1 | 11.2 |
| Rice | 22.6 | 22.3 | 20.2 | 8.0 | 7.9 | 8.1 |
| Rural | | | | | | |
| Total food | 63.3 | 64.7 | 62.5 | 45.1 | 45.3 | 44.2 |
| Cereals | 29.8 | 29.6 | 28.0 | 14.6 | 13.8 | 13.7 |
| Rice | 23.0 | 22.8 | 20.7 | 11.4 | 10.2 | 10.2 |
| Urban | | | | | | |
| Total food | 62.8 | 63.0 | 60.3 | 38.6 | 38.9 | 38.3 |
| Cereals | 26.3 | 26.9 | 24.7 | 8.9 | 9.1 | 9.0 |
| Rice | 21.4 | 20.0 | 17.8 | 6.3 | 6.2 | 6.2 |

Sources: Philippine Statistics Authority (2011, 2014, 2017).

2012), tariffication of the QR (Briones, 2012),and the provision of a compensatory payment scheme for rice farmers (Briones & Tolin, 2015).

## Framework of Analysis

The paper uses a CGE model and a poverty microsimulation to analyze the poverty and distributional effects of alternative rice policies in the Philippines. The CGE model was calibrated to a 2015 Philippine Social Accounting Matrix and the poverty model to the 2015 FIES.[1]

The Philippine CGE model includes three primary factors of production: labor (skilled and unskilled), capital, and land. Labor and capital are used in all sectors, while land is used in agriculture, fishing, livestock and forestry, and mining. The model has 19 sectors with separate sectors for paddy and rice milling (see Appendix). Households in the model are disaggregated in decile.

Sectoral output in the model is a composite of value added and intermediate input. Sectoral value added is a nested, two-stage constant elasticity of substitution (CES) function of primary factor inputs, while intermediate input is a fixed proportion of output. Cost minimization in the first stage yields the sectoral aggregate demand for labor and capital, and in the second stage the sectoral demand for skilled and unskilled labor, and the sectoral demand for capital and land.

The model has an allocation of a land module which consists of a two-stage structure. In the first stage, using a CET function,land is allocated to four uses: crops, forest, livestock, and fishery. In the second stage, cropland is allocated to the production of five crops: paddy, corn, coconut, sugar, and other crops. The allocation of land across these uses depends upon the elasticity of transformation: ($\sigma^{CET1}$) in the first stage, and ($\sigma^{CET2}$) in the second stage.

The model allows for some degree of transformation between domestic and export markets through a constant elasticity of transformation (CET) function. Revenue maximization yields the conditional supply functions in these markets. The world demand for Philippine products is specified as a simple constant elasticity form that is consistent with cost minimization subject to a CES function.

Imports and domestically produced goods are imperfect substitutes. This is specified by defining the Armington good as a CES composite of domestically produced and imported goods. Cost minimization subject to this CES function yields sectoral demand

for imports and domestically produced goods. However, the rice import quota is modeled using the mixed complementarity problem (MCP) framework (Rutherford, 2002). The import quota in the model is a system consisting of three relationships.

$$\left(m^{q}_{rice} - m_{rice}\right) \geq 0 \quad (1)$$

where $m^{q}_{rice}$ is the fixed level of rice quota and $m_{rice}$ rice imports. The domestic price of imported rice is

$$pm_{rice} = er \cdot pwm_{rice} \cdot (1 + rr_{rice}) \cdot (1 + itx_{rice}) \quad (2)$$

where $er$ is the exchange rate, $pwm_{rice}$ the world price of rice, $rr_{rice}$ is the scarcity rate due to the rice quota, and $itx_{rice}$ the indirect tax on rice. A complementary slackness relationship between the quota and the scarcity rate due to quota is given in (1) and (2). For example, if imports become more restrictive, $m^{q}_{rice}$ is reduced, but this violates the inequality in (1). To satisfy (1), $rr_{rice}$ in (2) increases. This increases the domestic price of rice imports in (2). An increase in $pm_{rice}$ reduces the volume of imports, $m_{rice}$ through the following equation.

$$m_{rice} = d_{rice} \cdot \left(\frac{pd_{rice}}{pm_{rice}}\right)\left(\frac{\theta_{m,rice}}{1-\theta_{m,rice}}\right)^{\sigma_{m,rice}} \quad (3)$$

where $d_{rice}$ is the demand for domestically produced rice, $pd_{rice}$ the domestic price of domestically produced rice, $\theta_{m,rice}$ share parameter of rice imports, and $\sigma_{m,rice}$ the CES elasticity of substitution.

Aside from the effects on $pm_{rice}$ and $m_{rice}$, a change in the $rr_{rice}$ as a result of the change in $m^{q}_{rice}$ will result in series of effects on quota rent (household income) and on the indirect tax revenue of the government.

Household demand is represented by a linear expenditure system (LES). Gross fixed capital formation (investment demand) is determined by the savings-investment equilibrium and is distributed among commodities using fixed shares. This yields sectoral investment demand functions that vary inversely with its prices. Given government total expenditure budget, a similar specification is adapted to government demand, which also yields sectoral government demand for goods and services that varies inversely with its price.

The sources of household income are factor incomes (labor, capital, and land), transfers, foreign remittances, and dividends. Household savings are a fixed proportion of disposable income. Households and enterprise pay direct taxes to the government. The sources of government income are tariffs, indirect taxes, direct taxes, and foreign grants. Government savings and total income are both endogenous variables in the model. However, government consumption is fixed in real terms. Household savings, as well as household income, are both endogenous variables. Income of enterprise is derived from a portion of total capital income. The general equilibrium is defined by the equality between supply and demand for goods and factors, and the identity in investment-savings. Foreign savings is fixed. The nominal exchange rate is the numeriare. The external account is cleared by changes in the real exchange rate, which is the ratio between the nominal exchange rate and endogenous local prices.

The model is sequential dynamic. Sectoral capital stock which is fixed in the current period is updated endogenously in the next period using a capital accumulation equation that depends on the current level of sectoral investment. Following Jung and Thorbecke (2001), sectoral investment is specified as Tobin's q. Labor is updated exogenously using the growth of the population.

To incorporate a rice quota system in the model, estimates of the scarcity rate due to the rice quota, $rr_{rice}$, and the quota rent are needed. Table 4 shows how the values of these variables were estimated using available information. Line (a) is the 2014–2015 average wholesale price of 25% broken, regular-milled rice. Line (b) is the average freight on board export prices of 25% broken Vietnam and Thailand rice expressed in PhP/kilo using the average exchange rate, plus 20% to represent transportation and other costs. Line (c) is the price gap between Lines (a) and (b). Line (d) is the average 2014–2015 Philippine rice imports.[2] Line (e) is the value of imports at Philippine prices in line (a). Line (f) the value of imports are prices in line (b). Line (g) is the estimated quota rent (Php 24.45 billion). Lastly, line (h) is the estimated quota rent (49.1%).

Under a QR scenario, the estimate of quota rent will go to the rice importers who enjoy tariff-free importation and, at the same time, sell the commodities at the domestic price.

The CGE results are used in a poverty microsimulation model to simulate the effects on poverty and income distribution. There are several approaches to linking CGE models with data in the

**Table 4**
*Estimate of Rice Quota Rent (Average 2014–2015)*

| | | |
|---|---|---|
| (a) | Philippine price, Php/kg | 38.83 |
| (b) | Average of Vietnam and Thailand prices, Php/kg (1) | 19.76 |
| (c) | Price gap, Php/kg | 19.07 |
| (d) | Imports, million kg | 1,283 |
| (e) | Value of imports at Philippine price, Php million | 49,793 |
| (f) | Value of imports at Vietnam and Thailand prices, Php million | 25,342 |
| (g) | Estimate of quota rent, Php million (2) | 24,451 |
| (h) | Estimate of quota rent, % (3) | 49.1 |

Source: Authors estimates

(1) CIF, which includes 20 percent as transportation and other costs
(2) Difference: (e) - (f)
(3) Ratio: (h) percent of (f)

household survey to analyze poverty and income distribution implications of changes in policies. One approach is a top-down method where the results of the CGE model with representative households are applied recursively to data in the household survey with no further feedback effects. In this method, the change in the income of the representative household in each of the household categories generated in the CGE model is used to estimate the change in the average income household of the same category (Decaluwé, Patry, Savard, & Thorbecke, 2000). The form of the income distribution within each household category is assumed, and the income variance within each category is estimated using data in the household survey. The income variance does not change during the simulation.

Another approach is to integrate actual incomes in the household survey into the CGE model (Cockburn, 2001; and Cororaton & Cockburn, 2007). Although this microsimulation approach poses no technical difficulty, it requires a computer with high computing power. This approach is better than the recursive approach because it allows for feedback effects from the economy to the households and vice versa. It also accounts for the heterogeneity of income sources and consumption patterns of households.

Another approach is to change the employment status of the household head in the survey. Similar to Ganuza, Barros, and Vos (2002), the poverty microsimulation method used in the paper changes the employment status of the household heads using information generated from the CGE model after a policy change. If the household head is unemployed initially in the household survey, he/she may gain employment if he/she is in the expanding sector of the economy after the policy shock.[3] In contrast, if the household head is employed initially, he/she may become unemployed if he/she belongs to a contracting sector of the economy after the policy shock. This change in the employment status of household heads after the policy shock together with the change in wages from the CGE model affect labor income of households (Cororaton & Corong, 2009; and Cororaton, 2013).

## Simulation

### *Definition of Simulations*

The paper analyzes four rice policy scenarios: (i) SIM1 wherein rice imports are reduced by 50% in line with the rice self-sufficiency program; (ii) SIM 2 wherein import rice quota is eliminated; (iii) SIM 3 wherein the import quota is replaced by a rice tariff equivalent (48.9%) which retains rice imports at the previous quota level, and wherein tariff revenue generated distributed as cash transfers to low-income households using the assumed distribution: 40% to the first decile, 30% to the second decile; 20% to the third decile, 7% to the fourth decile, and 3% to the fifth decile;[4] and (iv) SIM4 wherein rice tariffs in SIM 3 is reduced gradually to 25% over 10 years, and wherein the annual tariff revenue generated is distributed to low-income households similar to the scheme in SIM 3.

***Simulation Results***

The results presented in this section are percentage differences from the base, where the base retains the rice QR.

**Effects on paddy and rice.** The effects of the various scenarios on paddy and rice production, imports, and consumption are presented in Table 5. The 50% reduction in the import quota reduces rice imports by 50% and increases import price by 37.1%. The trade protection increases local production of paddy by 4.4% and rice by 5.6%. Output prices of the commodities also improve. Since paddy is input in the domestic rice production, the increase in the latter improves paddy demand by 4.4%. However, the total consumption of rice declines by 1.9% because of the 9.5% increase in the domestic price.

The elimination of rice QR under SIM 2 results in lower import price of rice by 32.9%, which leads to 113.3% increase in rice imports. Higher rice imports displace domestic production of rice by 9.2% and paddy by 7.6%. The output prices of paddy and rice decrease as well. The reduction in the import price of rice as a result of the elimination of the QR reduces the consumer price of rice by 14.7%, which increases rice consumption by 3.5%.

SIM 3 replaces the QR with rice tariff (48.9%) which retains rice imports at the previous quota level. Furthermore, the tariff revenue generated is distributed to low-income households as cash transfer. The effects on the paddy and rice sectors shown in the table are small, which are largely due to the general equilibrium effects of the cash transfer.

**Table 5**
*Effects on Paddy and Rice, % Change From Base*

| | | Production | Imports | Consumption |
|---|---|---|---|---|
| | | **SIM1 - Reduced Quota /a/** | | |
| Volume | Paddy | 4.42 | 10.18 | 4.43 |
| | Rice | 5.35 | -50.00 | -1.92 |
| Price | Paddy | 2.26 | 0.00 | 2.26 |
| | Rice | 6.91 | 37.06 | 9.49 |
| | | **SIM 2- Full liberalization /b/** | | |
| Volume | Paddy | -7.62 | -15.63 | -7.63 |
| | Rice | -9.20 | 113.26 | 3.49 |
| Price | Paddy | -3.71 | 0.00 | -3.71 |
| | Rice | -10.85 | -32.93 | -14.65 |
| | | **SIM 3- Tariffication + Cash transfer /c/** | | |
| Volume | Paddy | 0.21 | 0.48 | 0.21 |
| | Rice | 0.25 | 1.60 | 0.41 |
| Price | Paddy | 0.11 | 0.00 | 0.11 |
| | Rice | 0.31 | -0.13 | 0.26 |
| | | **SIM 4 - Gradual reduction in tariff + Cash transfer /d/** | | |
| Volume | Paddy | -1.77 | -3.42 | -1.77 |
| | Rice | -2.15 | 28.71 | 1.82 |
| Price | Paddy | -0.52 | 0.00 | -0.52 |
| | Rice | -0.76 | -8.13 | -2.00 |

/a/ Rice imports reduced by 50 percent
/b/ Rice QR eliminated
/c/ QR replaced by tariff equivalent and revenue allocated to cash transfer
/d/ Reduction in rice tariff to 25 percent in 10 years, average change from baseline

SIM 4 reduces the rice tariff in SIM 3 to 25% over 10 years. The effects are the average percent difference from the baseline over the 10 years. The decline in the import price of 8.1% is due to the gradual reduction in rice tariff. Rice imports increase by 28.7% as a result. The increase in rice imports is significantly less than in SIM 2 where the quota is eliminated. The smaller increase in rice imports results in smaller displacement in domestic paddy and rice production. The consumption of rice increases by 1.8%.

**Effects on factor prices**. The effects on factor prices presented in Table 6 are net of the change in the general price. The increase in the general price in SIM 1 as a result of the tightening of the rice import quota (discussed further below) leads to negative changes in wages and returns to capital. The returns to land increase mainly due to the improvement in the domestic production of paddy.

The negative effect on paddy production in SIM 2 decreases the returns to land by 5.2%. The positive effects on wages and capital are largely due to the reduction in the general price.

The factor price effects are small under SIM 3 mainly because the tariff equivalent retains the trade protection on rice. However, the gradual reduction in rice tariff under SIM 4 leads to lower factor price effects compared to SIM 2. The negative effect on the returns to land is due to the reduction in paddy production.

**Effects on factor movements**. The movements of factors across sectors presented in Table 7 are due to the general equilibrium effects of the change in rice policies. The labor movement is indicated by the ratio between labor in agriculture and labor in non-agriculture. A ratio of less than 100 implies labor movement from agriculture to non-agriculture, while greater than 100 means movement from non-agriculture to agriculture.

The positive effect on paddy production under SIM 1 leads to labor movement (skilled and unskilled) from non-agriculture to agriculture. Opposite labor movement is observed in SIM 2 where domestic paddy production is displaced by higher rice imports. SIM 3 has similar effects because rice tariff replaces the QR. SIM 2 and SIM 4 have similar effects on the labor movement. The deviation of the ratio from 100 is smaller in SIM 4 compared to SIM2.

Paddy production uses a significant amount of land. The positive effect on paddy in SIM 1 results in a 5.5% increase in paddy production land-use. Land-use in the other sectors declines. Opposite effects are observed under SIM 2 where higher rice imports displace domestic paddy production. The land-use effects in SIM 3 are positive on paddy and negative on the other sectors, but the changes are significantly lower compared to SIM1. The land-use effects under SIM 2 are similar to SIM 4, but the changes are much lower in the latter.

**Effects on income and prices**. Table 8 presents the effects on income across household groups (decile) and consumer prices. SIM 1 generates positive nominal income effects across household groups. However, there are also notable increases in consumer prices, particularly in lower income groups where the share of rice in the consumption basket is significant. For H1 (poorest), the net income effect is -1.36%, while

**Table 6**
*Effects on Factor Prices (net of inflation), % Change From Base*

| | SIM 1 /a/ | SIM 2 /b/ | SIM 3 /c/ | SIM 4 /d/ |
|---|---|---|---|---|
| Skilled | -0.265 | 0.451 | -0.001 | 0.043 |
| Unskilled | -0.068 | 0.183 | 0.017 | 0.018 |
| Returns to capital | -0.320 | 0.520 | 0.008 | 0.132 |
| Returns to land | 3.635 | -5.238 | 0.260 | -0.804 |

/a/ Rice imports reduced by 50 percent
/b/ Rice QR eliminated
/c/ QR replaced by tariff equivalent and revenue allocated to cash transfer
/d/ Reduction in rice tariff to 25% in 10 years, average change from baseline

**Table 7**
*Effects on Factor Movement*

| | | SIM 1 /a/ | SIM 2 /b/ | SIM 3 /c/ | SIM 4 /d/ |
|---|---|---|---|---|---|
| | | | **Labor /e/** | | |
| Skilled | Agriculture | 103.552 | 97.885 | 100.132 | 99.566 |
| | Non-Agriculture | 99.950 | 100.031 | 99.998 | 100.006 |
| Unskilled | Agriculture | 104.137 | 97.487 | 100.124 | 99.376 |
| | Non-Agriculture | 99.027 | 100.610 | 99.970 | 100.160 |
| | | | **Land-use /f/** | | |
| | Base share, % | | | | |
| Paddy | 45.76 | 5.50 | -10.02 | 0.22 | -1.50 |
| Corn | 8.59 | -4.08 | 6.62 | -0.06 | 1.83 |
| Coconut | 15.71 | -3.27 | 5.20 | -0.13 | 1.41 |
| Sugar | 6.81 | -3.19 | 5.09 | -0.11 | 1.43 |
| Other crops | 7.67 | -7.92 | 14.01 | -0.43 | 2.02 |
| Livestock | 3.64 | -7.83 | 14.07 | -0.44 | 1.99 |
| Forestry | 5.80 | -1.12 | 0.99 | -0.08 | 0.95 |
| Fishery | 4.74 | -7.61 | 12.58 | -0.01 | 2.09 |
| Mining | 1.27 | -14.89 | 29.71 | -0.91 | 3.35 |

/a/ Rice imports reduced by 50 percent
/b/ Rice QR eliminated
/c/ QR replaced by tariff equivalent and revenue allocated to cash transfer
/d/ Reduction in rice tariff to 25 percent in 10 years, average change from baseline
/e/ Ratio (%): Simulation÷Base
/f/ % change from base

**Table 8**
*Effects on Household Income and Consumer Prices, % Change From Base*

| | SIM 1 /a/ | | SIM 2 /b/ | | SIM 3 /c/ | | SIM 4 /d/ | |
|---|---|---|---|---|---|---|---|---|
| | **Income** | **Prices** | **Income** | **Prices** | **Income** | **Prices** | **Income** | **Prices** |
| H1 | 0.562 | 1.919 | -1.063 | -3.154 | 5.128 | 0.059 | 23.98 | -4.86 |
| H2 | 0.563 | 1.805 | -1.055 | -2.977 | 2.014 | 0.060 | 9.27 | -4.62 |
| H3 | 0.566 | 1.608 | -1.059 | -2.674 | 0.970 | 0.054 | 4.36 | -4.21 |
| H4 | 0.566 | 1.402 | -1.062 | -2.361 | 0.278 | 0.046 | 1.12 | -3.79 |
| H5 | 0.571 | 1.180 | -1.068 | -2.023 | 0.095 | 0.038 | 0.27 | -3.33 |
| H6 | 0.570 | 1.011 | -1.063 | -1.767 | -0.007 | 0.030 | -0.21 | -2.98 |
| H7 | 0.564 | 0.862 | -1.060 | -1.542 | -0.018 | 0.022 | -0.22 | -2.67 |
| H8 | 0.553 | 0.716 | -1.049 | -1.322 | -0.026 | 0.013 | -0.23 | -2.37 |
| H9 | 0.538 | 0.575 | -1.023 | -1.110 | -0.027 | 0.003 | -0.23 | -2.07 |
| H10 | 0.532 | 0.377 | -1.499 | -0.811 | -0.562 | -0.013 | -0.86 | -1.65 |

/a/ Rice imports reduced by 50 percent
/b/ Rice QR eliminated
/c/ QR replaced by tariff equivalent and revenue allocated to cash transfer
/d/ Reduction in rice tariff to 25 percent in 10 years, average change from baseline

**Table 9**

***Effects on Poverty and Income Distribution***

| | | Base 2015 | SIM 1 /a/ | | SIM 2 /b/ | | SIM 3 /c/ | | SIM 4 /d/ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Level | Level | Deviation from base | Level | Deviation from base | Level | Deviation from base | Level | Deviation from base |
| GINI Coeff. | | 0.45297 | 0.45392 | 0.001 | 0.44984 | -0.003 | 0.45026 | -0.003 | 0.43922 | -0.014 |
| Philippines | P0 | 21.50 | 21.71 | 0.20 | 20.99 | -0.52 | 21.09 | -0.41 | 17.51 | -4.00 |
| | P1 | 5.58 | 5.64 | 0.07 | 5.35 | -0.22 | 5.32 | -0.26 | 3.85 | -1.73 |
| | P2 | 2.08 | 2.12 | 0.04 | 1.98 | -0.10 | 1.93 | -0.15 | 1.24 | -0.84 |

Source: 2015 FIES and authors' calculations

P0 - poverty incidence P1 - poverty gap P2 - poverty severity

/a/ Rice imports reduced by 50 percent
/b/ Rice QR eliminated
/c/ QR replaced by tariff equivalent and revenue allocated to cash transfer
/d/ Reduction in rice tariff to 25% in 10 years, average change from baseline

for H10 (richest) the net effect is +0.16%. Thus, while tightening the control on rice imports (towards rice self-sufficiency) has positive effects on domestic paddy production, it is highly regressive.

SIM 2 generates negative nominal income that affects across groups, but the reduction in prices is significant especially in lower income groups. The net income effect for H1 is 2.1% while the effect on H10 is -0.7%. Although the elimination of rice QR has negative effects on domestic paddy production, it is progressive.

SIM 3 replaces QR with tariff which retains the protection on rice. However, it allocates the revenue generated as a cash transfer to lower income groups. The cash transfer increases the nominal income of H1 by 5.2% and H2 by 2%. Income of H10 declines. Although SIM 3 generates positive effects on prices, it is progressive because of the cash transfer.

SIM 4 reduces the tariff in SIM 3 to 25% over 10 years and transfers the generated annual revenue to lower income groups. This scenario is highly progressive. While the effects on domestic paddy production are negative under the scenario (but significantly lower compared to SIM 2), the positive income effects on the poorest household groups are significant (24% for H1 and 9.3% for H2). In addition, this scenario generates notable negative price effects, especially in poor households.

**Effects on poverty and inequality**. The poverty and distributional effects of the various rice policies are presented in Table 9. Poverty effects are indicated by changes in the Foster, Greer, and Thorbecke (1984) indices, where P0 denotes poverty incidence; P1 denotes poverty gap; and P2 denotes poverty severity. The effects on income distribution are denoted by the GINI coefficient. The poverty microsimulation uses the 2015 FIES as the base where the poverty index is 21.5% and the GINI is 0.45297.

Tighter control of rice imports under SIM 1(movement towards rice self-sufficiency) will increase the poverty incidence to 21.71% and the GINI to 0.45392. For a population of 100 million, the number of poor will increase by 203 thousand under this scenario. The elimination of the rice QR in SIM 2 will decrease the poverty incidence to 20.99% and the GINI to 0.44984. The number of poor will drop by 515 thousand under this scenario. SIM 3, which retains the protection on rice through tariffs and transfers the revenue as cash transfer, will decrease the poverty incidence to 21.09% and the GINI to 0.45026. The number of poor will decline by 409 thousand. SIM 4 is the most progressive rice policy. It will decrease the poverty incidence to 17.51% and the GINI to 0.43992 resulting to a significant drop in the number of poor of about four million.

**Table 9**

***Effects on Poverty and Income Distribution***

| | | Base 2015 | SIM 1 /a/ | | SIM 2 /b/ | | SIM 3 /c/ | | SIM 4 /d/ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Level | Level | Deviation from base | Level | Deviation from base | Level | Deviation from base | Level | Deviation from base |
| GINI Coeff. | | 0.45297 | 0.45392 | 0.001 | 0.44984 | -0.003 | 0.45026 | -0.003 | 0.43922 | -0.014 |
| Philippines | P0 | 21.50 | 21.71 | 0.20 | 20.99 | -0.52 | 21.09 | -0.41 | 17.51 | -4.00 |
| | P1 | 5.58 | 5.64 | 0.07 | 5.35 | -0.22 | 5.32 | -0.26 | 3.85 | -1.73 |
| | P2 | 2.08 | 2.12 | 0.04 | 1.98 | -0.10 | 1.93 | -0.15 | 1.24 | -0.84 |

Source: 2015 FIES and authors' calculations

P0 - poverty incidence P1 - poverty gap P2 - poverty severity

/a/ Rice imports reduced by 50 percent
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for H10 (richest) the net effect is +0.16%. Thus, while tightening the control on rice imports (towards rice self-sufficiency) has positive effects on domestic paddy production, it is highly regressive.

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**Effects on poverty and inequality**. The poverty and distributional effects of the various rice policies are presented in Table 9. Poverty effects are indicated by changes in the Foster, Greer, and Thorbecke (1984) indices, where P0 denotes poverty incidence; P1 denotes poverty gap; and P2 denotes poverty severity. The effects on income distribution are denoted by the GINI coefficient. The poverty microsimulation uses the 2015 FIES as the base where the poverty index is 21.5% and the GINI is 0.45297.

Tighter control of rice imports under SIM 1(movement towards rice self-sufficiency) will increase the poverty incidence to 21.71% and the GINI to 0.45392. For a population of 100 million, the number of poor will increase by 203 thousand under this scenario. The elimination of the rice QR in SIM 2 will decrease the poverty incidence to 20.99% and the GINI to 0.44984. The number of poor will drop by 515 thousand under this scenario. SIM 3, which retains the protection on rice through tariffs and transfers the revenue as cash transfer, will decrease the poverty incidence to 21.09% and the GINI to 0.45026. The number of poor will decline by 409 thousand. SIM 4 is the most progressive rice policy. It will decrease the poverty incidence to 17.51% and the GINI to 0.43992 resulting to asignificant drop in the number of poor of about four million.

## Conclusion and Policy Insight

The Philippines has sought to attain rice self-sufficiency for the past 30 years with the past five presidents developing different programs for farmers, all of which did not meet their targets (Ponce & Inocencio, 2018). Although each program used its own approaches such as seed and fertilizer subsidies, improvement of irrigation systems, and promotion of yield-enhancing technologies among others, they all have a common rationale of reducing import dependence and poverty alleviation to ensure food security. The strong linkage between politics and the rice sector prevents the government from pursuing the unpopular but more efficient decision of opening the market (Intal &Garcia, 2005). Hence, the Philippines remains to be the only country imposing QR. The QR is a major component of the country's rice self-sufficiency program which aims for zero rice importation.

The paper uses a CGE model and poverty microsimulation to analyze the poverty and distributional effects of various rice policies in the Philippines. The results indicate that the control on rice imports is highly regressive because it increases the domestic price of rice and puts significant burden on poor households. The simulation results indicate that reducing rice imports by 50% to increase the protection on domestic paddy production will increase the number of poor in the population by 203 thousand. However, eliminating the present rice QR will reduce poverty by 515 thousand. Retaining the protection on domestic paddy production through tariffication and earmarking the revenue generated as a cash transfer to poor households will reduce poverty considerably by four million in 10 years. Results have shown that maintaining the QR and chasing after rice self-sufficiency defeats the objectives of the government. The importance of identifying the means of distributing the collections from rice tariffication is crucial in ensuring that the estimated results are achieved. The influx of imported rice will definitely affect the income of rice farmers. However, positive welfare effects of liberalizing the rice sector cannot be ignored. Hence, the Philippine government should make sure that the cash transfers are targeted towards the rice farmers to allow them to cope with the price shock that will result from increased rice supply and provide training for alternative cropping and livelihood mechanisms. Furthermore, the Philippine government should reconsider its rice policy to achieve food security and at the same time reduce the incidence of poverty.

## Endnotes

[1] The specification of the CGE model is discussed in Cororaton, Inocencio, Tiongco, and Manalang (2016) and poverty microsimulation model in Cororaton and Corong (2009).

[2] In 2014-2015, of the average rice imports, 1,034 million kg was imported by the NFA and 249 million kg by the private sector (National Food Authority, 2018).

[3] The selection of who among the unemployed household heads in each category will get employed (or unemployed) is done through a random process. The random process is done repeatedly (30 times) to establish a confidence interval.

[4] SIM 3 and SIM 4 have government revenue-neutral closure.

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# Appendix

**Sectors in the CGE model**

| | |
|---|---|
| Paddy | Rice |
| Corn | Corn milling |
| Coconut | Light manufacturing |
| Sugar | Heavy manufacturing |
| Other crops | Construction |
| Livestock | Utilities |
| Forestry | Other services |
| Fishing | Trade |
| Mining | Public administration |
| Food manufactures | |