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

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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 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 palay 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

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

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In 1995, the Philippines was granted a 10-year period of "special treatment" on rice, which allows the country to impose quantitative restrictions (QR) on rice imports. The waiver request was based on the Philippine government's argument that rice is "the main source of food security for the population." In 2006, the government was granted an extension of the waiver until 2012. In 2013, the government issued a similar request, and in June 2014, the World Trade Organization's (WTO) Council for Trade in Goods approved the request and forwarded a draft decision to the General Council. With this decision, the Philippines remains the only country under the WTO that restricts imports through QR. The extension holds until June 2017.

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 palay 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.

The paper analyzes the poverty and distributional effects of 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 next section gives a brief discussion of the Philippine rice sector. It is followed by a discussion of the framework used in the analysis. We then outline four rice policy scenarios and presents the simulation results. The paper ends with a set of conclusions and insights for policy.

## Philippine Rice Policies

During harvest season, palay supply surges while prices decline. To stabilize the market, the government, through the NFA, procures the palay from farmers at the support price. During the years 2000-2016, there were several periods when farmgate prices settled at levels below the NFA support price (Figure 1). This is seen in the positive procurement price premium (the difference between the support and farmgate prices) in 2000-2004 and 2009-2013 and some months in 2016. In 2009-2013 when the price premium was at its highest levels, in spite of relatively higher procurement ratio during the periods, the farmgate price failed to catch up with the support price (Table 1). This was largely due to NFA's lack of financial resources to support an aggressive procurement program because of its chronic deficit. After 2013, farmgate prices have slowly caught up with the support price with some periods in 2014 yielding negative premium for selling rice to the NFA.

In 2003, the government under the Arroyo administration ordered the NFA to allow rice farmer federations and cooperatives to import rice. Rice importation is highly profitable. High profits come from sales commissions, as well as from the Private Sector Financed Importation Tax Expenditure Subsidy (PSF-TES) where rice importers avail of the privileges of the NFA to waive import duties. Rice imports beyond 350 thousand metric tons are supposedly charged with 40% tariff, but through the PSF-TES rice importers are exempt from paying these duties. These taxes are instead shouldered by the Philippine government through the Department of Finance's Fiscal Incentives Review Board. Furthermore, although private rice importers buy rice in behalf of the NFA, the rice stocks they bought are not part of NFA's inventory but sold to the domestic market at wholesale prices, which are above the NFA release price. This practice continues to be

implemented over the years, with the minimum access volume (MAV) varying on year to year basis.

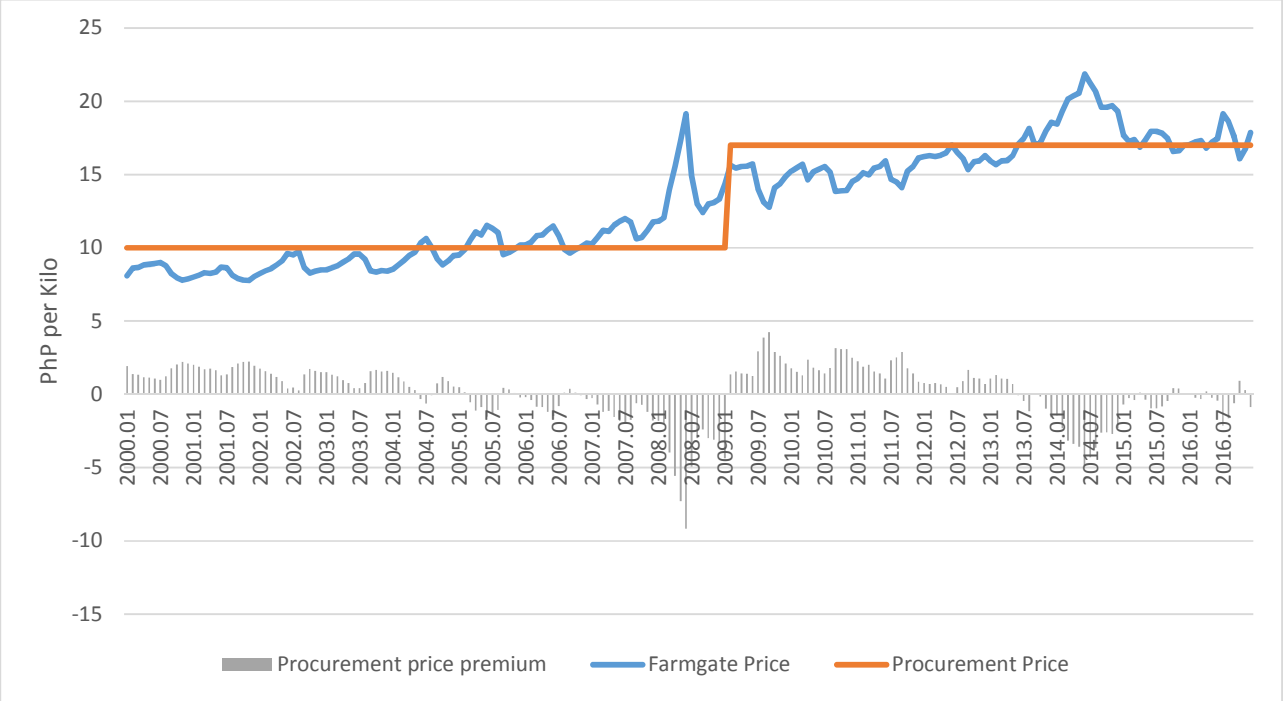


***Figure 1*. Farmgate and support price of palay (PhP per kilo).**

Source: Philippine Statistics Authority; National Food Authority

One of NFA's mandates is to make rice available to Filipino consumers at affordable prices. However, the data in Figure 2 indicates otherwise. The regular-milled wholesale price of 25% broken rice is compared with the NFA release price, the FAO export price of Thai rice (25% broken), the FAO export price of Vietnam rice (25% broken), and the NFA release price discount (the difference between wholesale price and the NFA release price). The wholesale price was above the NFA release price since 2004. Over the past five years, the difference between the wholesale and the NFA release price continues to increase with a peak year-on-year growth of 352% in July 2014. This indicates that the NFA has not been successful in stabilizing local rice prices. This is attributed largely to the NFA's chronic income imbalance.

**Table 1**
***Production and NFA Intervention in Palay and Rice (thousand metric tons)***

| | Palay Production | | NFA Intervention | | | | |
|---|---|---|---|---|---|---|---|
| | | | Procurement | | Rice | Rice | Rice |
| | Production | % growth | Palay | % 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 |

Source: National Food Authority; Bureau of Agricultural Statistics
/1/ Estimates based on 60% of palay production (milling recovery rate) plus imports

The Philippines imports more than three-quarters of its rice import requirements from Vietnam because the rice qualities are similar with the local rice. Based on the current trend, the gap between the two prices is widening—the local price is increasing while the Vietnam price is declining (Table 2). In 2012, the price gap was PhP12.70 per kilo. The gap increased by 26% in 2013 to PhP16.00 per kilo. This gap continues to widen—as in 2016, the gap was at PhP18.91 per kilo, a 48.9% increase from 2012 prices. In 2015, the price gap peaked at PhP19.90 per kilo, where the price gap is more expensive than an actual kilo of rice from Vietnam.

High prices of rice is a heavy burden on consumers, especially on poor households. Based on the 2012 Family Income and Expenditure Survey (FIES), Table 3 shows that 19% of the total expenditure of poor households is on rice. The rice expense is only 9% for non-poor households. Furthermore, the burden of high rice prices is heavier on urban households than on

rural households. The rice share for poor rural households is 16% as against 20% for urban. For rural non-poor, the rice share is 7% as against 10% for urban non-poor.

**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 |

Source: International Rice Research Institute
/a/ 25 percent broken; includes 20 percent transport cost

**Table 3**
***Food Consumption in the Philippines***

| | Poor | | | | | Non-poor | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1997 | 2000 | 2003 | 2009 | 2012 | 1997 | 2000 | 2003 | 2009 | 2012 |
| | Philippines /a/ | | | | | | | | | |
| Total Food /b/ | 64.6 | 63.3 | 62.6 | 60.1 | 61.99 | 49.9 | 48.1 | 47.7 | 40.7 | 41.5 |
| Cereals /c/ | 30.2 | 27.9 | 27.0 | 25.7 | 25.6 | 15.3 | 13.5 | 12.8 | 10.9 | 11.1 |
| Rice /d/ | | | | 19.7 | 19.4 | | | | 8.1 | 7.9 |
| | Rural | | | | | | | | | |
| Total Food | 64.9 | 64.2 | | 60.7 | 61.8 | 53.2 | 52.0 | | 45.0 | 45.1 |
| Cereals | 30.9 | 29.6 | | 26.8 | 26.5 | 19.0 | 17.2 | | 14.8 | 13.8 |
| Rice | | | | 20.4 | 20.2 | | | | 11.6 | 10.3 |
| | Urban | | | | | | | | | |
| Total Food | 63.3 | 61.1 | | 58.2 | 57.8 | 47.5 | 45.4 | | 38.5 | 38.9 |
| Cereals | 27.7 | 23.6 | | 22.0 | 22.2 | 12.5 | 10.9 | | 8.9 | 9.1 |
| Rice | | | | 17.3 | 16.3 | | | | 6.3 | 6.2 |

Source: Family Income and Expenditure Survey (FIES, 1997, 2000, 2003, 2009 2012)
/a/ No rural and urban breakdown in 2003 FIES
/b/ Percent of total consumption
/c/ Includes rice and corn
/d/ Cereals were disaggregated into rice, corn, and other cereals in 2009 and 2012 FIES

The interest of Filipinos is not well served in the present structure of the rice sector. Briones and dela Pena (2015) argued for more competition in the sector. Several alternatives have been considered to replace the QR such as by shifting the burden of the government in planning importation requirements to the private sector (Intal, Cu, & Illescas, 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, while the poverty model to the 2012 FIES[1] model.

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 palay 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.

[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).

The model has an allocation of 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, crop land is allocated to the production of five crops: palay, 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 import 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.

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

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

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

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 function that varies inversely with its prices. Given the government total expenditure budget, similar specification is adopted 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 government 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. Enterprise income is 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 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 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 FOB 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) is the value of imports based on 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%).

**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 |

[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.

| | | |
|---|---|---|
| (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% as transportation and other costs
(2) Difference: (e) - (f)
(3) Ratio: (h) percent of (f)

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 that link CGE models with data in the 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 difficultly, 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 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 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, affects labor income of households (Cororaton & Corong, 2009; and Cororaton, 2013).

## Simulation

### Definition of Simulations

The paper analyzes four rice policy scenarios: (i) SIM 1 wherein rice imports are reduced by 50% in line with the rice self-sufficient 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% for the first decile, 30% for the second decile; 20% for the third decile, 7% for the fourth decile, and 3% for the fifth decile;[4] and (iv) SIM 4 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

[3] The selection 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.

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

**Effects on palay and rice**. The effects of the various scenarios on palay 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 palay by 4.4% and rice by 5.6%. Output prices of the commodities also improve. Since palay is input in the domestic rice production, the increase in the latter improves palay demand by 4.4%. However, the total consumption of rice declines by 1.9% because of the 9.5% increase in the domestic price.

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

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

/a/ Rice imports reduced by 50%
/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

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 palay by 7.6%. The output prices of palay 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 palay and rice sectors shown in the table are small, which are largely due to the general equilibrium effects of the cash transfer.

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 quota is eliminated. The smaller increase in rice imports results in smaller displacement in domestic palay 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 increases mainly due to the improvement in the domestic production of palay.

**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%

/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

The negative effect on palay 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 palay 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.

**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, % | | | | |
| Palay | 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%
/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
/e/ Ratio (%): Simulation ÷ Base
/f/ % change from base

The positive effect on palay 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 palay 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 labor movement. The deviation of the ratio from 100 is smaller in SIM 4 compared to SIM.

Palay production uses significant amount of land. The positive effect on palay in SIM 1 results in 5.5% increase in palay production land-use. Land-use in the other sectors declines. Opposite effects are observed under SIM 2 where higher rice imports displace domestic palay production. The land-use effects in SIM 3 are positive on palay and negative on the other sectors, but the changes are significantly lower compared to SIM 1. 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 share of rice in the consumption basket is significant. For H1 (poorest), the net income effect is -1.37%, while for H10 (richest) the net effect is +0.55%. Thus, while tightening the control on rice imports (towards rice self-sufficiency) has positive effects on domestic palay production, it is highly regressive.

**Trade 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

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

SIM 3 replaces QR with tariff which retains the protection on rice. However, it allocates the revenue generated as 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 palay 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 on 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 (P0 – poverty incidence; P1 – poverty gap; and P2 – poverty severity), while the effects on income distribution by the GINI coefficient. The Table presents the poverty results for the entire Philippines as well as for urban and rural areas. The

poverty microsimulation uses the 2012 FIES as the base where the poverty index is 25.848% and the GINI is 0.47126.

Tighter control of rice imports under SIM 1(movement towards rice self-sufficiency) will increase the poverty incidence to 24.972% and the GINI to 0.47222. For a population of 100 million, the number of poor will increase by 124 thousand under this scenario. The elimination of the rice QR in SIM 2 will decrease the poverty incidence to 24.227% and the GINI to 0.46857. The number of poor will drop by 621 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 24.454% and the GINI to 0.46858. The number of poor will decline by 394 thousand. SIM 4 is the most progressive rice policy. It will decrease the poverty incidence to 20.875% and the GINI to 0.45773. The drop in the number of poor is significant, about 4 million.

**Table 9**
***Effects on Poverty and Income Distribution***

| | Base 2012 | SIM 1 /a/ | | SIM 2 /b/ | | SIM 3 /c/ | | SIM 4 /d/ | |
|---|---|---|---|---|---|---|---|---|---|
| | Level | Level | % ch. /e/ | Level | % ch. /e/ | Level | % ch. /e/ | Level | % ch. /e/ |
| GINI Coef. | 0.47126 | 0.47222 | 0.204 | 0.46857 | -0.569 | 0.46858 | -0.568 | 0.45773 | -2.870 |
| Philippines | | | | | | | | | |
| P0 | 24.848 | 24.972 | 0.499 | 24.227 | -2.502 | 24.454 | -1.587 | 20.875 | -15.989 |
| P1 | 6.836 | 6.920 | 1.224 | 6.589 | -3.616 | 6.558 | -4.067 | 4.931 | -27.864 |
| P2 | 2.679 | 2.724 | 1.701 | 2.559 | -4.470 | 2.512 | -6.233 | 1.690 | -36.895 |
| Urban | | | | | | | | | |
| P0 | 11.570 | 11.682 | 0.965 | 11.309 | -2.257 | 11.425 | -1.259 | 9.679 | -16.344 |
| P1 | 2.794 | 2.845 | 1.817 | 2.689 | -3.738 | 2.691 | -3.662 | 2.032 | -27.270 |
| P2 | 0.989 | 1.015 | 2.606 | 0.945 | -4.491 | 0.933 | -5.745 | 0.632 | -36.152 |
| Rural | | | | | | | | | |
| P0 | 35.584 | 35.718 | 0.377 | 34.671 | -2.566 | 34.988 | -1.674 | 29.927 | -15.896 |
| P1 | 10.105 | 10.215 | 1.091 | 9.742 | -3.589 | 9.685 | -4.157 | 7.276 | -27.997 |
| P2 | 4.044 | 4.106 | 1.522 | 3.864 | -4.466 | 3.788 | -6.329 | 2.546 | -37.042 |

/a/ Rice imports reduced by 50%
/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
/e/ % change from base
P0 - poverty incidence P1 - poverty gap P2 - poverty severity

## Conclusion and Policy Insight

The Philippines is the only country that imposes QR. The Philippines imposes QR on rice since 1995. The QR, a major component of the country's rice self-sufficiency program which aims for zero rice importation, is set to expire in mid-2017.

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% so as to increase the protection on domestic palay production will increase the number of poor in the population by 124 thousand. However, eliminating the present rice QR will reduce poverty by 620 thousand. Retaining the protection on domestic palay production through tariffication and earmarking the revenue generated as cash transfer to poor households will reduce poverty considerably by 4 million in 10 years. The Philippine government should reconsider its rice policy to achieve food security and at the same time reduce the incidence of poverty.

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## Appendix

### Sectors in the CGE model

| | |
|---|---|
| Palay | 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 | |