The effects of domestic rice market interventions outside business-as-usual conditions for imported rice prices

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The Philippine government intervenes in the domestic rice market through the imposition of import tariffs and the provision of producer and consumer subsidies. While policymakers are aware that these programmes come with allocative efficiency costs, they justify the programmes on the grounds that they insulate the domestic economy from unexpected price spikes in the international rice market. An interesting matter for policy evaluation is to quantify the insulation benefit that the programmes provide in circumstances of sudden severe import price spikes. To examine this question, we undertake a dynamic computable general equilibrium (CGE) simulation in which the Philippines is subject to an external rice price shock. We find that the insulation benefit of the support programmes under a 2008-like event is worth approximately 0.10% of real consumption. However, the cost of insuring against these price spikes is significant. We estimate the annual cost of the rice market interventions at approximately 0.40% of real consumption.

Keywords: food security; food subsidies; rice tariff; rice market; price insulation

JEL Classification: C68; Q18; H12; H21

I. Introduction

The Philippine government intervenes in the domestic rice market through the imposition of import tariffs and the provision of producer and consumer subsidies. Local policymakers are aware that these programmes carry allocative efficiency costs. Trade analysts such as Magno and Yanagida (2000), Salehezadeh and Henneberry (2002), Dawe (2006), Briones (2013) and Layaoen (2014) have argued for reductions in tariff and nontariff trade barriers on both the rice sector and the broader Philippine agricultural sector to promote economic efficiency. Similarly, there have been many proposals for the abolition or

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The causes of recent volatility in world food markets have been examined by Naylor and Falcon (2010), Timmer (2010), Headey et al. (2010) and de Gorter et al. (2013), among others. An important strand of recent research has been the examination of the volatility-amplifying role played by endogenous changes in agricultural interventions. For example, Martin and Anderson (2012) and Anderson and Nelgen (2012) examine how efforts by individual countries to insulate their economies from spikes in world food prices, via the manipulation of pre-existing agricultural trade barriers, may have contributed to the severity of these food price events. Such adjustments to support measures in the face of volatile food prices by a single country might augment the local insulation benefits provided by existing interventions, notwithstanding that simultaneous multicountry action in this regard might be amplifying for global price movements. However, the maintenance of a given level of pre-existing support for domestic food production will also provide baseline insulation from spikes in world prices. Hence, an interesting matter for policy evaluation is quantification of the insulation benefit provided by maintenance of in situ rice interventions in circumstances of sudden severe import price spikes. There is some evidence that considerations of this type are in the minds of policymakers when making the food security case for maintenance of rice market interventions. For example, in providing counterarguments to

Fig. 1. Prices of imported rice from 2000 to 2012.

Sources: Rice price data from FAO (2013). Trend line estimated by authors.
the efficiency case for liberalization, Department of Agriculture (2012) expresses concern that concentration and thinness in the global trade for rice contribute to the vulnerability of world rice prices to speculation and panic. Similar policy concerns are expressed in SEPO (2010), which notes that disruptions to world rice markets in the late 2000s led the Arroyo government to direct the Department of Agriculture to increase domestic rice self-sufficiency, an instruction reaffirmed by the new Aquino administration. These policy concerns are not unique to the Philippines. Volatility in world rice prices, caused in part by the thinness of trade, has led many rice-importing countries to seek to insulate their economies from this volatility through protection of their domestic rice producers and consumers (Intal et al., 2012).

To our knowledge, the insulating effect played by existing pre-event interventions has not been examined. In this article, we examine the question for the Philippines using a dynamic economy-wide model with detailed treatment of agricultural activity, land use and food security measures. We undertake a simulation in which the Philippines is subject to an external rice price shock of a magnitude similar to that experienced in 2008. We run this scenario against two alternative baselines: one in which current rice market interventions are in place (the ‘with support’ case) and one in which they have been removed (the ‘without support’ case). Broadly, we find that the rice market interventions provide insulation benefits in the event of a spike in the imported price of rice. However, these insulation benefits come at the cost of the economic gains that are foregone by retaining ongoing distortions in the rice market. In this article’s final section, we quantify this cost by examining the economic benefit of removal of the rice market interventions.

II. The Computable General Equilibrium (CGE) Model, Macroeconomic Closure and Database

Key features of PHAGE – an applied general equilibrium model of the Philippines

Our simulations are undertaken with a dynamic CGE model of the Philippines, PHAGE.² The core structure of PHAGE begins with the model of Dixon and Rimmer (2002), but extends this with a number of additions to better reflect the characteristics of the Philippine agricultural sector. In particular, PHAGE has a detailed treatment of agricultural activities, land use and food security measures.

The PHAGE model comprises 52 industries and 52 commodities. The agricultural sector is represented by 22 industries, while the manufacturing and service sectors are comprised of 19 and 11 industries, respectively. Three primary factors are identified in the model, namely labour, capital and land. Labour is further distinguished by skill, and land is differentiated based on agricultural use. The model carries the assumptions of constant returns to scale (CRS) production functions, utility-maximizing households and price-responsive export demands. Industries and households make decisions based on optimizing behaviour. Given input prices, each industry minimizes costs subject to a CRS production function. Households maximize utility, which is described by a nested Klein–Rubin utility function. Capital is industry-specific, with new units of capital allocated to industries on the basis of expected rates of return. New units of capital are formed from local and imported goods in a cost-minimizing way, subject to CRS capital production functions. The model recognizes imperfect substitutability between domestic and imported goods via the Armington CES assumption. Aside from domestic use, local goods are also demanded by foreign agents. The export demand for each Philippine-made product is inversely related to its foreign currency export price. PHAGE recognizes the consumption of commodities by the government and contains detailed treatment of direct and indirect taxes. The model carries the assumptions that all sectors are competitive and that zero pure profit conditions hold in all commodity markets. The purchasers’ price of a given commodity is equal to its basic price plus the value of any associated indirect taxes and margin services.

Four types of dynamic adjustment are implemented in the model. The first three follow Dixon and Rimmer (2002), and the fourth is a dynamic structure for land use change. First, net investment in year $t$ is installed as physical capital in year $t+1$. Second, changes in the net liability positions of the public and private sectors are determined by the investment/
savings imbalances of these sectors. Third, the labour market follows a lagged adjustment path, allowing a transition from a short-run environment in which wages are sticky and employment adjusts, to a long-run environment in which employment is given and wages are fully flexible.

As detailed in Mariano and Giesecke (2014), we combine within PHAGE two approaches to modelling land supply: Ferreira Filho and Horridge (2014) and Giesecke et al. (2013). With these approaches implemented in PHAGE, the land allocation process is divided into a two-tier problem. The first tier models the gradual adjustment of land across seven broad land types: paddy, annual crops, perennial crops, animal farming, aquaculture, forestry and unused agricultural land. Following Ferreira Filho and Horridge (2014), land can gradually move between these alternative types from one year to the next. These movements are governed by a land transition matrix, the elements of which describe the annual proportion of land type \( i \) in year \( t \) that becomes land type \( j \) in year \( t + 1 \).\(^3\)

The changes in these proportions are positively related to changes in relative land rental rates. Once year-to-year changes in broad land types have been determined in the first tier, we follow Giesecke et al. (2013) in allowing optimization problems in the second tier, specific to each of the seven broad land types, to allocate land within each year across 22 competing agricultural users according to relative land rental rates.\(^4\)

Lastly, PHAGE adopts a nested structure for modelling food demand. At the top level, household utility is Klein–Rubin in 5 broad food bundles and 29 disaggregated nonfood commodities. Each of the broad food types is modelled as CRESH composites of disaggregated food types.\(^5\) For example, the staples bundle is a CRESH composite of rice, unmilled corn, milled corn and legumes, tubers and root vegetables.\(^6\)

### Macroeconomic environment

We outline in this section the important features of the model’s macroeconomic closure as they relate to our rice price spike simulation. First, our modelling of the labour market follows the wage theory of Dixon and Rimmer (2002). Under this approach, short-run real wages are sticky, with short-run labour market pressures largely expressed as movements in employment. Over the medium to long run, wage flexibility returns employment to its baseline level. The rate of gradual wage adjustment is set such that the employment effects of exogenous shocks are largely eliminated after about 5 years.\(^7\)

Second, we assume that nominal economy-wide (private plus public) consumption spending is a fixed proportion of nominal gross national disposable income (GNDI). The ratio of real private to real public consumption spending is assumed to be exogenous. The model’s GNDI calculation tracks annual movements in net foreign liabilities and the net interest payments thereon. Aggregate economy-wide investment is determined as the sum of industry-specific investment.

Third, the values of all technology variables are held at their baseline forecast levels. That is, primary factor technical change and various types of input-saving technical change in intermediate use, capital creation and provision of margin services are not affected by the rice price spike.

### Database

Construction of the model’s database begins with the latest input–output (IO) data for the Philippines published by the National Statistics Coordination Board (NSCB, 2000). Before using this IO data as an initial solution to our CGE model, we first subject it to two types of adjustment, using the method described in Horridge (2004). The first set of adjustments updates

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\(^3\) We base our estimates of these proportions on the study of Mataia and Francisco (2010), the Census of Philippine Agriculture of NSO (2002) and land data from BAS (2012).

\(^4\) For detailed description of land modelling in PHAGE, see Mariano and Giesecke (2014).

\(^5\) CRESH: constant ratios of elasticities of substitution, homothetic (Hanoch, 1971). Modelling of each disaggregated food type follows the Armington assumption of CES aggregation over imported and domestic varieties.

\(^6\) The remaining broad groups are modelled as follows. Fruits and vegetables are a CRESH composite of vegetables, pineapple, other annual crops, coconut, banana, mango, citrus and other perennial crops. Meat and fish are a CRESH composite of hog, poultry, other livestock, fish and processed meat and fish. Other foods are a CRESH composite of sugar, coffee and other processed foods.

\(^7\) This is consistent with the macroeconomic model of the Central Bank of the Philippines, in which changes in employment under various simulations are largely eliminated after 5 to 7 years (see Majuca, 2011).
the data to a recent year (2010). These adjustments update expenditure and income-side macro-aggregates, and selected industry and commodity variables, particularly those relating to the paddy and rice markets.

The second set of database adjustments puts in place the 2010 database values for relevant subsidies and taxes in the rice market. The many policy interventions in the Philippines rice market include subsidies on prices received by farmers for paddy, subsidies on the consumer price of rice and tariffs on rice imports. More broadly, public financing of agricultural R&D, irrigation infrastructure and agricultural extension services also benefits paddy agriculture (Balisacan and Ravago, 2003). In adjusting our database, we use data from Bureau of Agricultural Statistics (BAS, 2012), the Philippine Rice Research Institute (PRRI, 2011) and the National Food Authority (NFA) to calculate the values for the four largest direct interventions in the rice market: a subsidy on prices paid by rice consumers, a subsidy on prices received by paddy farmers, a subsidy on prices paid for seeds by paddy farmers and a tariff on rice imports. We estimate the 2010 value of the subsidy on retail purchases of rice at 6.7 billion pesos, the value of the seed subsidy at 1.2 billion pesos and the value of the subsidy on paddy purchases at 1.1 billion pesos. These are recorded in the 2010 database as subsidies on sales by rice milling to households, sales of paddy to paddy agriculture and sales of paddy to rice milling, respectively. The 2010 database value of tariff revenue from rice imports was adjusted to reflect the rice tariff rate of 50% (TarfCom, 2010).

III. Simulation Design

Simulation shocks

Our aim is to examine the economic and food security implications of a temporary spike in the price of imported rice of a magnitude similar to that experienced by the Philippines in 2008. In Fig. 1, the 2008 c.i.f. foreign currency price of imported rice to the Philippines is approximately 60% above the trend line. Hence, we adopt 60% as the value for our temporary rice price shock. PHAGE is dynamic, tracking annual values from the model’s initial solution for 2010 through to a 2025 forecast. Consistent with the approach outlined in Dixon and Rimmer (2002), we report the effects of the price shock in terms of percentage deviations in results for key variables in the presence of the price shock away from baseline forecast values. Recall that our aim is to quantify the effect of domestic food security policies on the economic and food security implications of a temporary rise in the c.i.f. foreign currency price of imported rice. To do this, we require two alternative baselines:

1. One in which the four interventions supporting the domestic rice market discussed in the ‘Database’ section (a consumer rice price subsidy, a producer paddy price subsidy, a farmer seed subsidy and a rice import tariff) remain at their initial levels throughout the baseline forecast (hereafter, referred to as ‘with support’ scenario), and
2. One in which the four rice market interventions are permanently removed in 2013 from the baseline forecast (hereafter, referred to as ‘without support’ scenario).

We undertake two counterfactual simulations. These counterfactual simulations are identical to simulations (1) and (2) above in all respects other than that a once-off temporary 60% spike in the c.i.f. foreign currency price of imported rice is imposed in 2016. We report the outcomes under the two counterfactual simulations in terms of percentage deviations in results away from baseline forecast values. We examine how the same price shock has different impacts on the economy depending on whether the price support mechanisms are in place (baseline 1) or have been removed 3 years prior to the price shock (baseline 2). In this way, we elucidate the insulation effects of the rice market interventions in the face of a 2008-like spike in imported rice prices. Then in Section V, we undertake a simulation in which we examine the economic benefits of removing the four support mechanisms. This allows us to make comparisons between the insulation benefits that the programmes provide and the costs of the programmes in terms of the foregone potential gains from their removal.

8 In the ‘without support’ scenario, rice market support policies are removed in 2013. By imposing the temporary rice price spike shock in 2016, we have allowed the rice market 3 years to adjust resource allocation in response to the permanent removal of the rice market support policies.
Following Dixon and Rimmer (2002, p. 243), we make use of a simple back-of-the-envelope (BOTE) model (Table 1) to guide us in explaining the main routes of causation via which the price shock affects the macro-economy.

Equation (E1) describes the GDP expenditure-side identity in constant price terms, consisting of real private and public consumption, real investment, export volumes and import volumes. Equation (E2) is a CRS production function, linking real GDP to effective units of labour, capital and land inputs. Equation (E3) defines real GNDI equal to real GDP multiplied by a positive function of the terms of trade less interest payments on foreign debt plus overseas income transfers to household and government. In Equation (E4), total consumption \((C + G)\) is determined by GNDI via a given propensity to consume \(APC\). Equation (E5) defines real public consumption as a fixed proportion \((RCG)\) of real private consumption. In Equation (E6), import volumes are positively related to the level of domestic production (proxied by GDP) and the real exchange rate (proxied by the terms of trade). Equation (E7) relates export prices to export volumes via a downward sloping export demand schedule. In Equation (E8), the terms of trade are defined by the ratio of export prices to import prices. Because Equation (E2) is CRS, the marginal products of labour and capital \((MPL\) and \(MPK)\) are functions of the capital–labour ratio. This

### Table 1. A stylized representation of the main macroeconomic relationships in PHAGE model

| Back-of-the-envelope (BOTE) equations | Definitions of variables: |
|---------------------------------------|---------------------------|
| (E1) GDP = C + I + G + (X–M)         | A – primary factor augmenting technical change |
| (E2) GDP = A*f1(K, L, N)             | APC – average propensity to consume |
| (E3) GNDI = GDP*GNDI + NFL*R + FTRNS | C – real private consumption |
| (E4) C + G = APC*GNDI                | D – depreciation rate |
| (E5) C/G = RCG                       | F1 – normal rate of return |
| (E6) M = f4(GDP, TOT)               | FTRNS – real (consumption price deflated) foreign income transfers to households and government |
| (E7) P_X = f4(X)                     | G – real public consumption |
| (E8) TOT = f5(P_X/P_M)              | GDP – real gross domestic product |
| (E9) ROR = f6(K/L, A, TOT)          | GNDI – real (consumption price deflated) gross national disposable income |
| (E10) RW = f7(K/L, A, TOT)          | I, I_{t-1} – real investment in year \(t\) and \(t-1\), respectively |
| (E11) 1 = f8(ROR/F1)                | K, K_{t-1} – capital stock in year \(t\) and \(t-1\), respectively |
| (E12) K = K_{t-1}(1–D) + I_{t-1}    | L – employment (wage bill-weighted) |
|                                      | M – real imports |
|                                      | NFL – real (consumption price deflated) net foreign liabilities |
|                                      | P_M – real currency import price |
|                                      | P_X – foreign currency export price |
|                                      | R – rate of interest on net foreign liabilities |
|                                      | RCG – ratio of private to public consumption |
|                                      | ROR – rate of return on capital |
|                                      | RW – real (CPI-deflated) wage |
|                                      | TOT – terms-of-trade |
|                                      | X – real exports |
|                                      | N – land input (rental-weighted) |

**Notes:** Variables in bold denote exogenous.
The BOTE closure relates to the short run because the rice price spike is temporary. NFL is endogenous in PHAGE, but we suppress the details of its determination in BOTE and thus represent it as exogenous.

RW is also endogenous in PHAGE, but short-run movements in its value are constrained by an assumption of stickiness in the real consumer wage.

We suppress the PHAGE sticky wage mechanism in our BOTE description, but represent the mechanism’s short-run operation by the exogenous status of RW.

Aggregate land supply (area) is exogenous in PHAGE.

We represent this by the exogenous status of N in BOTE. However, we note that land can move between agricultural uses with different rental weights, providing for the possibility of small movements in the value of N in PHAGE.
accounts for Equations (E9) and (E10) which are based on the profit-maximizing first-order conditions for the use of labour and capital inputs. Equation (E11) indicates that investment expenditure is positively related to rates of return on capital. Lastly, Equation (E12) relates the start-of-year capital stock to investment in the previous year plus the depreciated value of existing capital.

IV. Simulation Results

In interpreting the simulation results, we first describe the direction of policy effects on each economic variable and then compare the magnitude of results between the two baseline scenarios. A general observation is that the economy responds similarly to the rice price shock under both baselines, but we shall find that the economy is more exposed to the economic consequences of the price spike under the ‘without support’ case. We expand on these results below.

Macroeconomic results

As discussed in Section III, the shock is a temporary increase in the imported price of rice, which rises by 60% relative to baseline in 2016 before returning to its baseline value in 2017 and tracking baseline thereafter. In terms of BOTE, this can be represented by an increase in the average price of imports ($P_M$). Via Equation (E8), this causes the terms of trade to decline relative to baseline. This is confirmed by the PHAGE results: in Fig. 2, under both baselines, we see that the rise in the price of imported rice causes a significant deterioration in the terms of trade. The negative deviation in the terms of trade is greater under the ‘without support’ baseline because the share of rice imports in total imports is higher under this scenario relative to the ‘with support’ case.

In Fig. 3, we see that there is no deviation in the 2016 capital stock. This is because deviations in year $t$ capital stocks depend on deviations in year $t-1$ investment (BOTE Equation (E12)). With the capital stock unchanged in 2016, and with the real wage sticky (represented by exogenous RW in BOTE), the decline in the terms of trade causes employment to fall via BOTE Equation (E10) (see Fig. 4). Consistent with the terms of trade decline being greater under the ‘without support’ case, the 2016 negative employment deviation is larger under the ‘without support’ case (Fig. 4).

Via Equation (E9), with no change in the 2016 capital stock, the decline in the terms of trade, together with the decline in employment, causes a temporary negative deviation in the rate of return on
capital (Fig. 3). In turn, this leads to a negative deviation in 2016 real investment via Equation (E11) (see Fig. 3). Consistent with both the negative 2016 terms of trade and employment deviations being larger under the ‘without support’ case relative to the ‘with support’ case, we find in Fig. 3 that the 2016 negative deviations in both the rate of return and investment are larger under the ‘without support’ case. Note in Fig. 3 that the 2016 negative investment deviations are manifested in 2017 as negative deviations in capital supply. However, the rice price spike is temporary. Imported rice prices return to their trend levels from 2017 onwards, and so too do the terms of trade deviation (Fig. 2). This leaves the post-2016 capital stock too low, given that the terms of trade have returned close to baseline. This explains the

Fig. 3. Changes in capital stock, rates of return on capital and real investment under two baseline scenarios (percentage deviation from baseline forecast)

Fig. 4. Changes in aggregate employment (wage bill-weighted) and real producer wage under two baseline scenarios (percentage deviation from baseline forecast)
positive deviation in the rates of return, which causes the investment deviation to turn positive from 2018 onwards (Fig. 3). By the end of the simulation period, the positive investment deviation returns the level of the capital stock to close to its baseline value.

In Fig. 5, we see that the price spike induces a temporary reallocation of agricultural land across competing uses. The rise in the price of imported rice induces substitution on the part of rice consumers towards the relatively cheaper competing domestic variety. This encourages domestic rice production. The increase in local rice production increases the demand for land in paddy agriculture. This causes the rental price of land used in paddy production to rise relative to other land uses. As illustrated in Fig. 5, this induces transformation in land use towards paddy agriculture, generating a sharp positive deviation in the supply of land to paddy agriculture. The increase in land allocation to paddy agriculture generates a concomitant reduction in land supply to other agriculture (Fig. 5). Note that in Fig. 5 we also report rental-weighted aggregate land supply. This declines relative to baseline in both scenarios, notwithstanding that the total available agricultural land area cannot deviate from its baseline value. This is explained by the relative land rental rates in the baseline data: that is, the rental value of nonpaddy land is higher than that of paddy land. As the rice price spike shifts land out of agricultural land uses with higher land rental rates than paddy agriculture, rental-weighted aggregate land supply experiences a negative deviation relative to baseline. In the long run, the quantity of land supplied to nonpaddy agriculture returns to baseline because the rice price spike is temporary. As such, the rental-weighted value of aggregate land supply also gradually returns to baseline.

As discussed above, in Figs 4 and 5 we find negative deviations in 2016 employment and rental-weighted land supply. Via BOTE Equation (E2), these negative deviations in primary factor use cause a negative deviation in real GDP. The negative deviation in primary factor use is larger under the ‘without support’ case relative to the ‘with support’ case. Hence, we would expect the negative deviation in real GDP to be larger under the ‘without support’ scenario. However, in Fig. 6, it is clear that the negative deviation in real GDP is 0.05 percentage points larger under the ‘with support’ scenario relative to the ‘without support’ scenario. This is due to a rise in allocative inefficiency in the ‘with support’ case as the spike in the rice price generates an expansion in activity of subsidized rice production. To make this more concrete, we begin by following

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**Fig. 5.** Changes in the supply of paddy land, nonpaddy land and aggregated land under two baseline scenarios (percentage deviation from baseline forecast)
Mariano and Giesecke (2014) in defining the value of the allocative efficiency effect as:

\[
ae(t) = y(t) - \sum_{f=1}^{3} factcont_f(t)
\]  

(1)

where

- \(ae(t)\) is the contribution to the real GDP deviation made by price-spike-induced changes in allocative efficiency in year \(t\);
- \(y(t)\) is a Laspeyres index for the percentage deviation in real GDP at market prices in year \(t\); and
- \(factcont_f(t)\) is the contribution to the real GDP deviation made by the deviation in employment of factor \(f\) (labour, capital and land) in year \(t\).

The contribution of changes in factor employment to real GDP, \(factcont_f(t)\), is defined as:

\[
factcont_f(t) = 100 \frac{VFAC_f^{(B)(t)} [XF_f^{(P)(t)} - XF_f^{(B)(t)}]}{VGDPI^{(B)(t)} XF_f^{(B)(t)}}
\]  

(2)

where

- \(VFAC_f^{(B)(t)}\) is the baseline forecast value of payments to factor \(f\) in year \(t\);
- \(VGDPI^{(B)(t)}\) is the baseline forecast value of GDP at market prices in year \(t\);
- \(XF_f^{(k)(t)}\) is the quantity of factor \(f\) employed in year \(t\) in the baseline \((k = B)\) and price spike scenario \((k = P)\).

The allocative efficiency, \(ae(t)\), is defined as:

\[
ae(t) = \frac{[VTAX^{(X)(t)^*}(XP - XB)]}{VGDPI^{(B)(t)}} \left(\frac{XP - XB}{KB^{(B)(t)}}\right)
\]

9 As described in Mariano and Giesecke (2014), the right-hand side of Equation 3 measures the contributions to the deviation in real GDP at market prices of changes in activity across tax bases carrying different rates of indirect taxation. Ignoring the division by \(VGDPI\) (which simply rebases all terms as a proportion of GDP), a typical right-hand-side element of Equation 3 is \([VTAX^{(X)(t)^*}(XP - XB)]\), where \(VTAX\) is the baseline value of indirect tax collections on the relevant activity, and \(XP\) and \(XB\) are quantities of the relevant activity in the policy case and baseline, respectively. \([VTAX^{(X)(t)^*}(XP - XB)]\) measures the per-unit gap between the market price and the basic price of the activity in question, and \((XP - XB)\) measures the policy-induced change in activity. Movements in \((XP - XB)\) affect real GDP at market prices by reallocating resources across activities for which there are gaps between marginal willingness to pay for the activity and the basic price of the activity.
where

\[ a_{e(i)}(t) = \frac{\sum_{c=1}^{2} \sum_{s=1}^{2} \sum_{i=1}^{2} \frac{VTA_X^{(B)}(t)}{VGD_B(t)} \left( \frac{X_{c,s,j}(i) - X_{c,s,j}^{(B)}(i)}{X_{c,s,j}} \right)}{\sum_{c=1}^{2} \sum_{s=1}^{2} \sum_{i=1}^{2} \frac{VTA_X^{(B)}(t)}{VGD_B(t)} \left( \frac{X_{c,s,j}(i) - X_{c,s,j}^{(B)}(i)}{X_{c,s,j}} \right)} \times \frac{X_{c,s,j}^{(k)}(i)}{X_{c,s,j}^{(B)}(i)} \] \quad (3)

\[ d_{ae(i)}(t) = \frac{\sum_{c=1}^{2} \sum_{s=1}^{2} \sum_{i=1}^{2} \frac{VTA_X^{(B)}(t)}{VGD_B(t)} \left( \frac{X_{Paddy,s,i,j}^{(P)}(i) - X_{Paddy,s,i,j}^{(B)}(i)}{X_{Paddy,s,i,j}} \right)}{\sum_{c=1}^{2} \sum_{s=1}^{2} \sum_{i=1}^{2} \frac{VTA_X^{(B)}(t)}{VGD_B(t)} \left( \frac{X_{Paddy,s,i,j}^{(P)}(i) - X_{Paddy,s,i,j}^{(B)}(i)}{X_{Paddy,s,i,j}} \right)} \times \frac{X_{Rice,s,i,j}^{(P)}(i) - X_{Rice,s,i,j}^{(B)}(i)}{X_{Rice,s,i,j}} \] \quad (4)

Using Equation 3, Fig. 6 shows that the external price shock generates a short-run loss in allocative efficiency \((ae)\) under both baselines, but this negative outcome is 0.08 percentage points greater under the ‘with support’ case relative to the ‘without support’ case. The price-spike-induced wedges between market prices and resource costs in paddy and rice production and consumption activities are greater in the ‘with support’ case than in the ‘without support case’. In terms of Equation 3, expansion in paddy and rice production under the price spike scenario generates larger allocative efficiency losses in the ‘with support’ case. To make this clearer, we isolate from the total allocative efficiency \((dae)\) a direct effect generated by expansion in paddy and rice production only and an indirect effect arising from policy-induced movements in tax bases outside the rice and paddy sectors. Specifically, we define the direct allocative efficiency \((dae)\) as:
where \( dae^{(1)} \) is the first of two direct allocative efficiency terms defined in this article (we define, for another purpose, \( dae^{(2)} \) later in the article). Note that Fig. 6 also reports \( dae^{(1)} \). It is clear in Fig. 6 that \( dae^{(2016)} \) accounts for the bulk of the outcome for \( ae^{(2016)} \) and that the negative deviation for \( dae^{(1)} \) is significantly larger under the ‘with support’ case, as expected.

Figure 7 plots deviations in real consumption and real GDP. In comparing the GDP and consumption deviations in Fig. 7, two outcomes are apparent: (i) under both baselines the real consumption troughs are deeper than the real GDP troughs; (ii) while the GDP deviation under the ‘with support’ baseline lies below the ‘without support’ GDP deviation, this relativity is not carried through to the outcomes for real consumption; that is, the consumption deviation under the ‘without support’ baseline lies below the ‘with support’ case. These results can be explained via BOTE Equations (E3) and (E4). Equation (E3) relates real (consumption price deflated) GNDI to real GDP, a function of the terms of trade \( f_2(TOT) \) and interest payments on net foreign liabilities and foreign income transfers to households and government. As we shall see, the latter effects exert a trivial influence on real consumption in this simulation.\(^{10}\) The major influence on the consumption/GDP relativities reported in Fig. 7 is \( f_2 \). The definition of \( f_2 \) is made clearer by exploring the source of Equation (E3):

\[
GNDI = \left( \frac{P_{GDP}}{P_C} \right) GDP - NFL \cdot R + FTRNS
\]

where \( P_{GDP} \) and \( P_C \) are the deflators for GDP and consumption, respectively, and all other variables are as defined in Table 1. Equation 5 makes clear that the term \( f_2(TOT) \) in BOTE Equation (E3) is \( P_{GDP}/P_C \). Why \( P_{GDP}/P_C \) can be said to be a function of the terms of trade is clear when we recall that \( P_{GDP} \) includes export prices while \( P_C \) includes import prices. The significant negative deviation in the terms of trade under both baselines (see Fig. 2) causes the negative deviation in GNDI to be deeper than the negative deviation in real GDP. This explains (via BOTE Equation (E4)) why the real consumption deviation, under either baseline, lies substantially below the corresponding real GDP deviation (outcome (i) earlier). But recall from our earlier discussion of Fig. 2 that the government rice
support programme insulates the terms of trade from the rice price spike, as demonstrated by the negative deviation in the terms of trade under the ‘with support’ case lying well above the ‘without support’ case (see Fig. 2). This explains why the real consumption deviation under the ‘with support’ case lies above the ‘without support’ case (outcome (ii) earlier).

The determinants of real consumption can be made clearer by substituting Equation 5 into Equation 4 and then taking the percentage change form of the resulting equation. The final percentage change expression for the real consumption deviation is then

\[
x_C = S_{GDP} x_{GDP} + S_I (p_I - p_C) + S_X (p_X - p_C) - S_M (p_M - p_C) - S_{INT} (int - p_C - \phi) + S_{FTRNS} (frns - p_C) - (G/[C + G]) \cdot APS (p_G - p_C)
\]

where \( x_{GDP} \) is the percentage change in real GDP, \( int \) and \( frns \) are the percentage changes in interest payments on net foreign debt and net foreign income transfers, \( \phi \) is the percentage change in the nominal exchange rate, and \( p_C, p_G, p_I, p_X \) and \( p_M \) are the percentage changes in the price deflators for private consumption, public consumption, investment, exports and imports. The \( S \)-terms are the ratios of \( GNDI \) to GDP (\( S_{GDP} \)), investment (\( S_I \)), exports (\( S_X \)), imports (\( S_M \)), foreign debt interest payments (\( S_{INT} \)) and foreign income transfers (\( S_{FTRNS} \)). For example, \( S_{GDP} = GDP/GNDI \). APS is the average propensity to save. All other variables are as previously defined.

Using Equation 6, the real consumption deviation for any given year can be decomposed into six determining factors, corresponding to six right-hand-side (RHS) terms of Equation 6. Table 2 presents such a decomposition for the year of the price spike, 2016. Starting at row (8), we see that the 2016 PHAGE result for the real consumption deviation is 0.10 percentage points higher under the ‘with support’ scenario (row 8, column 3). Comparing rows 7 and 8, we see that the decomposition of the real consumption deviation via Equation 6 is close to the true PHAGE result. Rows (1) to (6) allow us to understand the difference between the ‘with support’ and ‘without support’ values for real consumption in terms of the economic mechanisms described by the RHS terms of Equation 6. In row (1), we see that the real consumption loss via the negative deviation in real GDP is larger under the ‘with support’ case. As discussed earlier in reference to Fig. 6, the negative deviation in 2016 real GDP is deeper under the ‘with support’ case because of allocative efficiency losses caused by expansion of the heavily protected paddy and rice sectors. The deeper real

### Table 2. Decomposition of 2016 real consumption deviation under two baseline scenarios

| Consumption factors | Equation 6 RHS term: | (1) With support | (2) Without support | (3) Difference = (1) − (2) |
|---------------------|----------------------|------------------|---------------------|---------------------------|
| (1) Real GDP effect | \( S_{GDP} x_{GDP} \) | 0.323            | 0.282               | 0.041                     |
| (2) Terms-of-trade effect | \( S_N (p_X - p_C) - S_M (p_M - p_C) \) | 0.110            | 0.121               | 0.012                     |
| (3) Investment price effect | \( S_P (p_I - p_C) \) | 0.165            | 0.204               | 0.039                     |
| (4) Foreign debt effect | \( -S_{INT} (int - p_C - \phi) \) | 0.010            | 0.012               | 0.002                     |
| (5) Foreign transfer effect | \( S_{FTRNS} (frns - p_C) \) | 0.003            | 0.004               | 0.001                     |
| (6) Government price effect | \( -(G/C + G) APS (p_G - p_C) \) | 0.000            | 0.000               | 0.000                     |
| Aggregate real consumption deviation: | | | | |
| (7) Via Equation 6 = rows (1) + (2) + (3) + (4) + (5) + (6) | | | 0.611 | 0.714 | 0.103 |
| (8) 2016 PHAGE model simulation result (see Fig. 7) | | | | | 0.610 | 0.715 | 0.105 |
| (9) Difference = row (8) − row (7) | | | | | 0.001 | 0.001 | 0.002 |

\(^{11}\) Equation 6 is an extension of the real consumption Equation (E10) of Giesecke and Tran (2010). The full derivation of Equation 6 is available from the authors on request.
GDP loss under the ‘with support’ case contributes −0.04 percentage points to the difference between the real consumption outcomes under the two scenarios (row 1, column 3). However, as discussed earlier in reference to Fig. 2, the terms of trade loss under the ‘with support’ scenario are lower than that under the ‘without support’ scenario. In Table 2, we see that differences in the terms of trade outcomes under the two scenarios account for +0.10 percentage points of the difference in real consumption outcomes. On their own, the real GDP and terms of trade effects account for +0.06 (= −0.04 + 0.10) percentage points of the difference between the real consumption outcomes under the two scenarios. However, the total difference is +0.10 percentage points (row 8, column 3). The bulk of the remainder of the difference (+0.04 percentage points) is explained by the relative investment price effect (row 3).

Earlier in our discussion, we raised the question of why the government maintains the rice tariff and price subsidies when it is well known in Philippine policy circles that removing these interventions can improve economic efficiency. Some insight into the economic arguments presented in favour of continuing the support programmes is provided in Department of Agriculture (2012, pp. 8–9), who note that certain characteristics of the world rice market (viz. foreign government interferences in its operation, a thin global rice trade relative to the volumes of domestic demands and vulnerability to speculation- and panic-driven price swings) might militate against the standard economic efficiency grounds for domestic liberalization. This argument can be viewed as a willingness on the part of policymakers to incur some allocative efficiency losses in order to secure particular benefits arising from insulating the domestic economy against disturbances in the global rice market. In these terms, the government can be viewed as purchasing insurance (for real consumption) against foreign rice price shocks by maintaining the rice support mechanisms and incurring their associated economic costs. Empirical support for this insurance interpretation of the apparent willingness on the part of policymakers to incur the costs of protection in order to secure insulation benefits is provided by Clarete et al. (2013). In our simulation, the government rice support programme buys approximately 0.10% of real consumption insurance in the face of a 2008-like rice price spike (Table 2, row 7, column 3). The cost of this insurance is the potential gain in real consumption that is foregone by retaining the rice support programmes. We model this in Section V, where we find that this is worth approximately 0.4 percentage points of annual real consumption.

Our discussion so far has focussed on macroeconomic outcomes, particularly as they relate to real consumption. However, food security and the alleviation of poverty are important goals of Philippine’s agricultural policy (NEDA, 2011). In the next two sections, we investigate distributional and food security outcomes.

Distributional results

To elucidate the distributional impacts of the external price shock, we add to the PHAGE model a multi-household top-down income/expenditure extension based on data from the 2009 Family Income and Expenditure Survey in the Philippines (NSO, 2009). Following the methodology used in Giesecke and Tran (2010), this extension utilizes results for commodity prices, factor prices and factor employment from the CGE model to generate real consumption outcomes for different households groups. The PHAGE model distinguishes seven types of households: rural farming households (RFHH), rural nonfarming households (RNFH) and five urban households categorized into expenditure quintiles (UHQ1–UHQ5).

In explaining the distributional results, we present two sets of results: consumption deviations for seven household types under the ‘with support’ scenario (Fig. 8) and the difference between the annual consumption deviations under the ‘with support’ and ‘without support’ scenarios (Fig. 10). Our discussion on Fig. 8 allows us to identify the economic factors determining relative income prospects under the terms of trade shock. These factors do not differ under the two scenarios, so we do not report separate results for the ‘without support’ case. Instead, we report in Fig. 10 the difference between the household consumption outcomes under the two scenarios, allowing us to focus our discussion on the effects of

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12 As explained in Gieseke and Tran (2010), this relative price effect arises from Equation 6 assumption of a fixed nominal consumption share in GNDI. Under this assumption, ceteris paribus, a rise in the investment price relative to the consumption price must raise real consumption and lower real savings.
rice support on distributional outcomes under an environment in which imported rice prices temporarily rise sharply.

In Fig. 8, we see that the spike in the world rice price generates a transitory rise in the real consumption of RFHH and transitory falls in the real consumption of urban households and RNFH. The relative consumption outcomes for these households reflect differences in household income and expenditure shares. Starting with the income side of the household budget, data from NSO (2009) show that RFHH derive a high share of their income from agricultural activities, particularly paddy farming. As the world rice price shock generates a positive deviation in output of paddy agriculture (Fig. 9), it causes the real wage of agricultural labour and rates of return on paddy land to rise relative to baseline. This increases the incomes of RFHH relative to baseline.
In comparison, households living in urban areas derive relatively larger shares of their income from nonagricultural capital and labour. In Fig. 9, we see that the rise in the world rice price causes a transitory contraction in the output of sectors not directly related to agriculture. This leads to a negative deviation in the real wage of nonagriculture labour and rates of return on nonagricultural capital during the year of the rice price spike. These income sources figure prominently in the budgets of urban households, contributing to the negative deviations in real consumption for these households reported in Fig. 8. In Fig. 8, we also find that RNFH experience a negative deviation in real consumption, but of a magnitude approximately two-thirds that of urban households. This is because, while not as high as RFHH, wage and capital income from rice agriculture activities represent a higher share of the incomes of RNFH than they do of urban households.

Our discussion on Fig. 8 has so far focussed on household income. However, the rice price spike also affects real consumption through household expenditure. In particular, food items represent higher shares of the household budgets of low-income households than they do of high-income households. As we shall see, in reference to our discussion on Fig. 13, the rise in the imported rice price causes a rise in the general price of food items. Via the

expenditure share effect alone, we would expect the rise in food prices to generate the largest negative real consumption deviations for the poorest households (in particular, RFHH and quintiles 1 and 2 of the urban households). However, for RFHH, the expenditure share effect is more than offset by the positive income effect of higher farm incomes. This accounts for the net positive deviation in the real consumption of these households. For urban households, the combined effects of falling household income and increasing food prices cause their real consumption to fall relative to baseline (Fig. 8). Across the urban household groups, relative outcomes are influenced by income shares. In particular, while urban quintiles 1 and 2 have, as poor households, relatively high shares of their expenditure accounted for by rice, we nevertheless see in Fig. 8 that they experience negative real consumption deviations that are slightly less severe than those experienced by other urban households. Urban quintiles 1 and 2, despite being urban, receive some income from supplying unskilled labour to agriculture.

Figure 10 reports the percentage point difference in household-specific real consumption deviations under the two baseline scenarios. An interesting result is that RFHH experience a smaller deviation in their real consumption under the ‘with support’ case relative to the ‘without support’ case. This reflects the relative
scale of agricultural activity under the two baselines, with the agricultural sector smaller under the ‘without support’ scenario. When rice prices spike, a smaller agricultural sector is thus exposed to the full effects (i.e. unmediated by the tariff) of the rise in imported rice prices. This generates a greater percentage increase in farm incomes under the ‘without support’ case relative to the ‘with support’ case.

Food security results

We include in PHAGE four measures of food security: (i) the household food cover index (HFCI); (ii) the rice self-sufficiency index (RSSI), (iii) the food trade balance index (FTBI) and (iv) the household calorie intake index (HCII). The HFCI is a measure of the ability of households to meet their food expenditure requirements out of current income, calculated as the ratio of total household expenditure to the value of household spending on all food and drink items (Giesecke et al., 2013). The RSSI is an indicator used by the Philippine Department of Agriculture to gauge domestic food shortages and surpluses (BAS, 2013). This index measures the share of domestic rice consumption satisfied by domestic rice production. The FTBI is used by the Food and Agriculture Organization (FAO, 2003) for evaluating the food security impacts of trade reforms, particularly in net food-importing countries. This index measures the country’s financial capacity to secure its domestic food requirements through its export earnings (Ecker et al., 2010). The HCII has been widely used as an indicator of food security at the household level (FNRI, 2009). This index measures the changes in household calorie intake associated with the price-induced changes in the quantity of food consumed by households. Using these measures, Figs 11 and 12 report the impacts on our food security indices of a temporary rise in the rice import price. For each index, a negative deviation indicates deterioration in food security relative to baseline.

The price shock generates negative deviations in the HFCI, with the deviation deepest under the ‘without support’ baseline (Fig. 11). The price shock generates a fall in the HFCI numerator (aggregate household consumption) and a rise in the HFCI denominator (household food consumption). In Fig. 7, we see that the negative deviation in household consumption is deeper under the ‘without support’ scenario. Ceteris paribus, this contributes to the deeper negative deviation of the HFCI in Fig. 11. This is reinforced by the positive deviation in the denominator of the HFCI, which is higher under the ‘without support’ scenario. In Fig. 13, we see positive deviations in the aggregate food price and negative deviations in real food consumption. Food demand is price inelastic, leading to a rise in total food spending as the food price rises. The positive deviation in the

![Fig. 11. Changes in the household food cover index and rice self-sufficiency index under two baseline scenarios (percentage deviation from baseline forecast)](image-url)
price of food is greater under the ‘without support’ scenario, leading to a higher positive deviation in total food expenditure under this scenario relative to the ‘with support’ case.

Figure 12 reports results for the FTBI, which measures the ratio of total export earnings to the food import bill. The rise in the price of imported rice causes a short-run increase in the country’s food import bill, generating a short-run negative deviation in the FTBI. The negative deviation in this index is greater under the ‘without support’ scenario, reflecting the higher rice share in the food import bill relative to the ‘with support’ case.
The price shock generates a reduction in the calorie intake of households as illustrated in Fig. 12. In the ‘Key features of PHAGE – an applied general equilibrium model of the Philippines’ section, we described the modelling of household food demand within PHAGE as nested Klein–Rubin/CRESH. Household staples (rice, unmilled corn, milled corn, legumes, tubers and root vegetables) account for 70% of household calorie intake (FNRI (Food and Nutrition Research Institute), 2009). Hence, in understanding the result for household calorie intake, it is important to examine outcomes within the staples nest of the household consumption system. Figure 14 reports deviations in the quantity of household rice consumption and real (consumption value weighted) consumption of nonrice staple commodities. The spike in the price of imported rice causes a significant reduction in rice consumption (Fig. 14). This reduction is greater under the ‘without support’ scenario. The rise in the price of rice relative to other staples generates substitution towards nonrice staples (Fig. 14). In parameterizing the broad food nests, we were guided by estimates of own price elasticities for the major food groups from Balisacan (1994) and Lantican et al. (2011). In parameterizing the staples nest, we were guided by estimates of cross-price elasticities and the own price elasticity for rice from Balisacan (1994). Under this system, substitution possibilities between rice and other staples are higher than other food substitution possibilities outside the food staple bundle. In Fig. 14, we see this expressed as a large positive deviation in nonrice staple food demand relative to nonstaple food demand as households substitute away from rice. Despite the increase in demand for nonrice foods, with the significant fall in rice consumption, the net impact on calorie intake is negative (Fig. 12). The loss in calorie intake is greatest under the ‘without support’ scenario (Fig. 12), reflecting the deeper negative deviation in rice consumption under this scenario (Fig. 14).

While the results for the HFCI, FTBI and calorie intake indicators all signal a deterioration in food security, this is not the case for the RSSI (Fig. 11). The RSSI is measured by the ratio of domestic rice production to domestic rice consumption. As reported in Fig. 15, the rice import price shock encourages domestic rice production (the RSSI numerator) while discouraging domestic rice consumption (the RSSI denominator). This accounts for the positive deviation in the RSSI (Fig. 11). The production-promoting and consumption-discouraging effects of the price rise are greater in the absence of support (Fig. 15), leading to a greater positive deviation in the RSSI under the ‘without support’ scenario relative to the ‘with support’ scenario (Fig. 11). As a static indicator of an economy’s ability to absorb shocks to food availability, the RSSI may have its uses, but as a deviation measure of food security, we should interpret with caution an index that signals an improvement in food security when food prices rise.

![Fig. 14. Changes in food consumption (rice, nonrice staple foods and nonstaple foods) under two baseline scenarios (percentage deviation from baseline forecast)](image-url)
V. The Economic Cost to the Philippines of Rice Market Protection

By damping adverse real consumption and food security impacts, our discussion in Section IV suggests that the presence of ongoing support policies for domestic rice production can be beneficial in the event of an unanticipated shock to the imported price of rice. However, the rice support policies also generate ongoing costs to the Philippines. To quantify the economic costs of rice price subsidies and rice import tariffs, we undertake a separate PHAGE simulation in which we remove these support mechanisms in 2013. In Fig. 16, we present a decomposition of the real GDP effects of this simulation, using Equations 1–3, 7 and 8.

The removal of the rice tariff and domestic price subsidies generates a positive deviation in real GDP (Fig. 16). In the first year, the positive deviation in real GDP is just over 0.2%, but in the medium to long run, builds to approximately 0.4%. Approximately three quarters of the long-run real GDP increase are attributed to primary factor inputs. More specifically, the removal of the government rice support mechanisms generates positive deviations in employment in the short run and the capital stock in the long run. By encouraging land to move out of low-rent paddy agriculture and into higher valued uses, land also makes a positive contribution to the real GDP deviation reported in Fig. 16. Removal of the price distortions in rice production, rice consumption and rice importation also contributes to the positive deviation in real GDP via an improvement in allocative efficiency. In Fig. 16, the gain in allocative efficiency is divided into two components: a direct effect, generated in the markets directly affected by the policy interventions; and an indirect effect, arising from policy-induced movements in tax bases outside the rice and paddy sectors. Specifically, we define the direct allocative efficiency effect, \( \text{dae}_{(1)}^{(i)} \), from removal of the rice import tariff and domestic price subsidies as \( 13 \):

13 Note that \( \text{dae}_{(1)}^{(i)} \) and \( \text{dae}_{(2)}^{(i)} \) differ because they are tailored to measure the allocative efficiency effects of two different simulations. Our first simulation (Section IV) is about the spike in the price of imported rice. This shock affects all rice and paddy transactions (i.e. production, consumption, investment, exports and imports). Hence, the tax bases related to these transactions appear on the right-hand side of our calculation of \( \text{dae}_{(1)}^{(i)} \). Our second simulation (Section V) is about the removal of four types of tax/subsidy: (i) rice import tariff, (II) rice price subsidy to consumers, (iii) paddy price subsidy to producers and (IV) seed input subsidy to paddy farmers. The calculation of \( \text{dae}_{(2)}^{(i)} \) includes only those tax bases related to these policy-specific transactions, that is, (i) rice import purchases by households, (II) rice purchases by the household sector, (iii) paddy purchases by the rice milling sector and (IV) seed purchases by the paddy sector.
We define the indirect allocative efficiency effect, \( iae^{(t)} \), as:

\[
iae^{(t)} = ae^{(t)} - dae^{(t)}_{(2)}
\]

As is clear from the result for \( dae^{(t)}_{(2)} \) reported in Fig. 16, the bulk of the allocative efficiency effect arises from the removal of price distortions in the markets for imported and domestically produced rice. Figure 16 also reports the deviation in real consumption. Consistent with Equation 6, the real consumption deviation broadly tracks the real GDP deviation. On average, over the simulation period, the potential gain in real consumption from removing the support programmes is approximately 0.4% of baseline consumption, every year. In comparison, the price insulation benefit of retaining the support programmes, in the event of a 2008-like import price spike, is 0.10 per of baseline real consumption, in the event year only (see Fig. 7).
VI. Conclusion

Philippine policymakers understand that their interventions in the domestic rice market carry economic costs. Despite these costs, food security objectives have been advanced as justification for maintenance of the programmes. The degree to which rice market support programmes advance Philippine food security under business-as-usual conditions for world rice prices has been examined elsewhere (for example, Mariano and Giesecke, 2014). In this article, we have investigated a different dimension to the food security argument: by examining the insulation effects of maintenance of in situ rice tariffs and production and consumption subsidies when imported rice prices experience a sharp transient rise, we elucidate the food security case for rice market support programmes as insurance against price events outside business-as-usual conditions. Support for this interpretation of the Philippine’s food security policy motivation for rice market intervention can be found, for example, in SEPO (2010), Intal et al. (2012) and Department of Agriculture (2012). Similar policy motivations for ongoing rice market interventions in Indonesia, Japan and other Southeast Asian countries have been noted by Trethewie (2012), Tanaka and Hosoe (2011) and Clarete et al. (2013).

We investigate the effects of given rice market interventions outside of business-as-usual conditions by constructing two baseline simulations with a detailed dynamic CGE model: one in which current rice market interventions remain in place (the ‘with support’ case) and one in which they are permanently removed (the ‘without support’ case). Both baseline simulations are then subject to the same shock: a 2008-like increase in the foreign price of imported rice. We measure the insulation effects of the existing price subsidies and trade protection by comparing the effects of the price spike shock under the two alternative baselines. We find that the economy is more insulated from the price spike under the ‘with support’ case, for example, reducing the real consumption loss from a 2008-like event by approximately 0.10% relative to the ‘without support’ case. Our results also show that under the ‘with support’ case, households are less vulnerable to becoming food insecure in the event of a sudden spike in the imported price of rice. However, the cost of insuring against these price spikes is significant. By leaving these programmes in place, we find that the Philippines is foregoing a potential increase in real consumption of approximately 0.4% per annum. While it is ultimately for policymakers to judge, this would appear to be a very high ongoing price to pay for the benefit of mitigating the consumption loss associated with a 2008-magnitude rice price event.

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