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Impacts of the Free Trade Area of the Pacific (FTAAP) on Production, Consumption, and Trade of the Philippines

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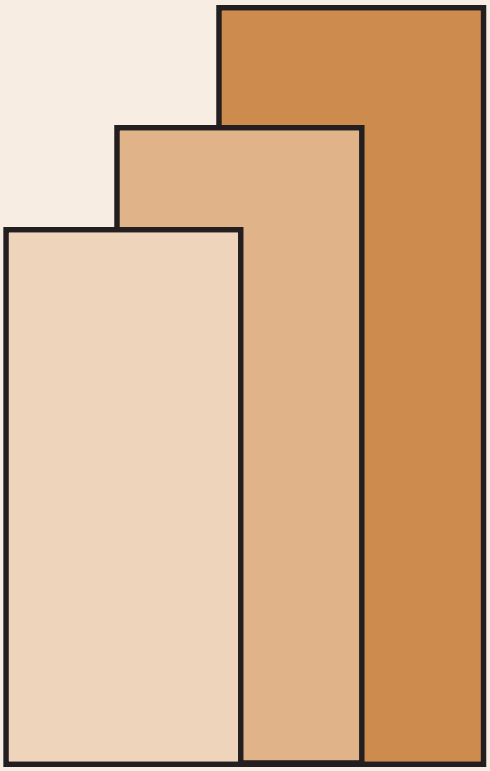

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U-Primo E. Rodriguez

Abstract

This paper examines the economy-wide impacts of a Free Trade Area of the Asia Pacific (FTAAP) on the Philippine economy. In particular, it uses an applied general equilibrium model to determine the effects of alternative scenarios on aggregate and sectoral outputs, consumption, and international trade. The paper also compares the FTAAP to reforms which are confined to the *ASEAN plus 3* and to a broader set of tariff changes that covers all the trading partners of the Philippines.

The findings of the paper are as follows. First, the FTAAP is likely to benefit the Philippines in the form of higher aggregate output and employment. However, such gains are not projected for all industries as the simulation results indicate declines in the outputs of activities related to rice and corn. Second, the benefits from the FTAAP are likely to come more from the removal of tariffs on nonagriculture products. Finally, the aggregate gains from the FTAAP are larger than an arrangement which is limited to *ASEAN plus 3* countries. However, the differences in the impacts do not appear to be very large.

Keywords: applied general equilibrium models, Asia Pacific Economic Cooperation, free trade area, international trade, Philippines

Final Report

Impacts of the Free Trade Area of the Pacific (FTAAP) on Production, Consumption and Trade of the Philippines*

May 2008

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Impacts of the Free Trade Area of the Pacific (FTAAP) on Production, Consumption and Trade of the Philippines

U-Primo E. Rodriguez[1]

1. INTRODUCTION

In 1994, leaders of the Asia Pacific Economic Cooperation (APEC) strengthened its commitment to stimulate economic growth through regional integration and free trade. Manifested in the so-called "Bogor Goals," it expressed a desire to achieve free and open trade and investment in the in the region by 2010 for developed economies and 2020 for developing economies. This was reinforced in Hanoi in 2006 when APEC leaders called for "further studies on ways and means to promote regional economic integration, including a Free Trade Area of the Asia-Pacific as a long-term prospect…" (APEC, 2007a).

While the Philippines is not a stranger to free trade areas and other regional trading arrangements, there remains a number of economic issues that need to be clarified.[2] The basic question is whether the country will experience net economic benefits from the Free Trade Area of the Asia-Pacific (FTAAP). Moreover, it is also important to identify the economic sectors that are likely to lose or gain from such an arrangement. Answers to these concerns are essential in defining the position of the country on the FTAAP in general and on specific issues in the event that formal negotiations take place.

Applied General Equilibrium (AGE) models have been used extensively in the analysis of trade reforms. Its appeal arises mostly from the ability to capture the interaction of various agents and sectors in different markets. As with other numerical models, AGE

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[2] Medalla and Lazaro (2005) provides an update of the Philippines' participation in free trade areas and regional trading arrangements.

models are also able implement a wide variety of shocks or experiments. The applications range from the evaluation of unilateral to multilateral reforms. Unilateral reforms typically involve the removal tariff and non-tariff barriers of a country. The commodity coverage of such changes are either selective (i.e., focused on one or a few commodities) or across-the-board. Similar approaches have also been used for AGE models applied to multilateral reforms. However, owing much to the nature of such reforms, these were commonly evaluated using multi-country AGE models. As a review of these studies is beyond the scope of this paper, the interested reader is encouraged to consult Shoven and Whalley (1992) and Srinivasan and Whalley (1986) for early reviews on the applications AGE models to international trade.[3]

The use of AGE models which are focused on trade policy in the Philippines began in 1984 with the work of Clarete (1984a). Since then, there have been quite a number of models devoted to the subject.[4] The themes and results discussed in such papers do not really differ much from those discussed earlier and hence requires no further elaboration.

AGE models have also been used for analyzing trade reforms within the confines of the APEC. Motivated primarily by the "Bogor Goals," a common objective in the analyses was to identify the impacts on trade flows, macroeconomic and sectoral indicators and welfare of removing trade barriers among APEC member countries. In many instances, the experiments focused on the non-discriminatory nature of the reforms proposed in the Bogor Declaration. One difference among the studies is in the country coverage of the reforms. For example, Lewis et al. (1995) compared the impacts of reforms involving all APEC member countries to an arrangement that omits either the US, China or countries belonging to the Association of Southeast Asian Nations (ASEAN). McKibbin (1996), on the other hand, examined the effects of reforms that are only confined only to the

[3] An excellent collection of recently constructed models can also be found in the websites of Monash University (http://www.monash.edu.au/policy/) , Ecomod (http://www.ecomod.net/) , GTAP (https://www.gtap.agecon.purdue.edu/), PEP (http://www.pep-net.org/NEW-PEP/index.html), etc.

[4] Some examples of Philippine AGE models which that been applied to trade policy are Cabalu and Rodriguez (2007), Cororaton (2006), Rodriguez and Cabanilla (2006), Cororaton et al. (2005), Cororaton (2004), Cororaton (2003), Inocencio et al. (2001), Cororaton (2000), Rodriguez (2000), Cororaton (1994), Gaspay (1993), Clarete and dela Pena (1992), Clarete and Warr (1992), Clarete (1991), Clarete (1989) and Clarete (1984b).

ASEAN. Wang and Coyle (2002) and Lewis et al. (1995) adopted a slightly different strategy by comparing reforms limited to the APEC to one that is global in nature. Another difference concerns the nature of the trade reforms. Wang and Coyle (2002) and McKibbin (1996) compared the impacts of arrangements which are discriminatory and non-discriminatory to non-APEC member countries. A final source of difference in the experiments is the commodity coverage of the reforms. Scollay and Gilbert (1999) and Gilbert et al. (2000), for example, explored the impacts of removing trade barriers on agriculture and food among APEC member countries.

The results from the studies can be summarized as follows. First, there appears to be a consensus that removing trade barriers within the APEC is beneficial to its members as a whole. However, it is also possible that some member countries might actually lose from such an arrangement. For example, Wang and Coyle (2002) cited the potential decline in the real GDP growth of Mexico. Second, excluding selected members from the reforms implies lower gains for the region. Lewis et al. (1995) found lower gains when either the US, China or ASEAN are excluded. They also found that the lost benefits are largest when the US is not included in the arrangement. Finally, Wang and Coyle (2002) and Lewis et al. (1995) showed that the gains from global trade liberalization are larger than reforms which are limited to APEC members only.

Most of the studies above are multi-country in nature. There was very little focus, if at all, on the effects of the APEC-related trade reforms on the Philippines. This study attempts to fill the gap by examining the effects of the FTAAP on the Philippines only. It hopes that such an analysis will bring about a better understanding of the impacts of such an arrangement on the country.

The primary objective of this study is to provide an economywide analysis of the FTAAP on the Philippines. Its specific objectives are as follows. First, it describes current trends in international trade between the Philippines and other APEC member countries. Second, using an AGE model, it seeks to determine the impacts of the FTAAP on aggregate and sectoral outputs, consumption and trade. Finally, it compares the impacts

of the FTAAP with a free trade area that is confined to the ASEAN, China, Japan and South Korea (ASEAN +3).

This paper is divided as follows. Section 2 is an analysis of trends in Philippine trade with its partners in APEC. Section 3 provides a description of the model and experiments. Section 4 presents the simulation results and Section 5 concludes the paper.

2. PHILIPPINE TRADE WITH APEC COUNTRIES

The APEC as a group is the most important trading partner of the Philippines. In 2006, its transactions with APEC members amounted to about USD 64.7 billion, or nearly two-thirds of its total trade (Table 1). It is the top destination of Philippine exports, accounting for three-fourths of the USD 47.1 billion total. Slightly more than half of its imports are also sourced from the APEC.

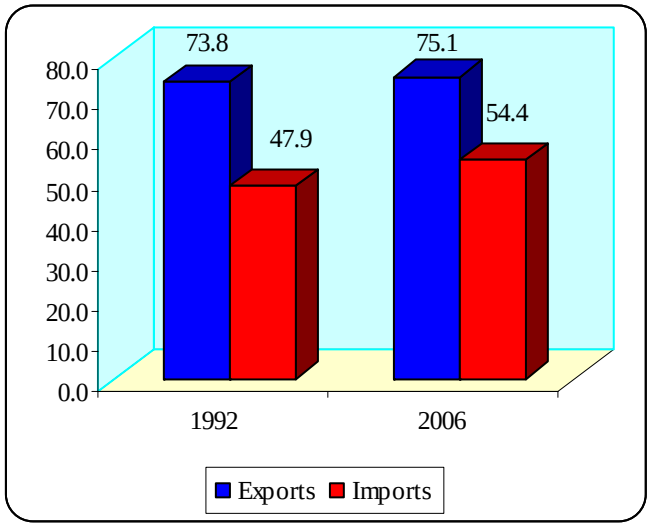
Table 1. International Trade of the Philippines

Item	APEC	World
Value of trade (billion USD, 2006)		
Exports	35.4	47.1
Imports	29.3	53.9
Total Trade	64.7	101.0
Growth rate of value of trade (%, 1993-2006)		
Exports	12.5	12.4
Imports	11.0	10.0
Total Trade	11.7	10.8

Source of basic data: United Nations, Comtrade Database, http://comtrade.un.org/

The importance of the APEC as a source and destination of Philippine products has also been growing in recent years. Between 1992 and 2006, Philippine imports from APEC members rose by an average of 11.0% per year. This is about one percentage point higher than the growth rate of its total imports. Philippine exports to the APEC followed a similar pattern. As a result of its relatively rapid growth, the current share of APEC countries in Philippine trade is higher than what it was 15 years ago. For example, Figure 1 shows that the share of imports from APEC member countries in 2006 was about 6.5 percentage points higher than in 1992.

Figure 1. Share of APEC in Total Trade of the Philippines, %



Source of basic data: United Nations, Comtrade Database, http://comtrade.un.org/

Over the same period, there were also substantial changes in the pattern of trade between the Philippines and specific APEC member countries. Among the notable changes are the decline in the importance of the US and Japan, and the emergence of China and the ASEAN in Philippine trade (Table 2). While the US continued to be the top destination of the Philippine-made goods, its share in total exports dropped significantly from 39.3% in 1992 to 18.5% in 2006. Over the same period, there was also a marked increase in the shares of China (mainland), Hong Kong, Malaysia, Singapore and Thailand. The largest increase was for China, whose share in 2006 was more than eight times higher than in 1992. A similar, albeit less pronounced, pattern can be observed for imports. Between 1992 and 2006, the share of Japan in total Philippine imports declined from 21.2% to 14.2%. This coincided with increased importance of China and Singapore.

Table 2. Trade between the Philippines and APEC members

	Imports			Exports		
	Growth rate	Share in total		Growth rate	Share in total	
Country	1993-2006	1992	2006	1993-2006	1992	2006
Australia	4.4	3.0	1.2	13.1	1.2	1.0
Brunei	779.3	0.6	0.0	14.6	0.0	0.0
Canada	3.7	1.4	0.5	5.6	1.6	0.6
Chile	19.1	0.3	0.0	5.9	0.2	0.0
China	27.1	1.3	7.2	33.4	1.2	9.8
Hong Kong	8.5	4.8	4.0	16.9	4.7	7.5
Indonesia	15.1	1.3	2.0	23.0	0.4	0.8
Japan	7.1	21.2	14.2	12.3	17.8	16.8
Korea (South)	13.0	4.8	6.1	19.5	1.8	3.0
Malaysia	14.4	2.6	4.0	29.0	1.3	5.6
Mexico	30.1	0.1	0.1	26.6	0.2	0.3
New Zealand	9.7	0.7	0.5	13.0	0.1	0.1
Papua New Guinea	41.7	0.4	0.3	19.6	0.0	0.0
Peru	21.0	0.1	0.1	334.8	0.0	0.0
Russian Federation	16.0	0.6	0.4	24.4	0.1	0.0
Singapore	18.1	3.7	8.3	23.2	2.6	7.4
Thailand	23.7	0.9	4.0	27.1	1.0	2.8
USA	9.7	18.3	16.1	6.9	39.3	18.5
Vietnam	52.6	0.1	1.3	40.9	0.3	0.8
World	10.0	100.0	100.0	12.4	100.0	100.0

Source of basic data: United Nations, Comtrade Database, http://comtrade.un.org/

3. MODEL AND EXPERIMENTS

3.1 Structure of the model and key assumptions[5]

The analytical tool used in the study follows the basic structure of the model developed by Inocencio et al. (2001). It is a model that divides the Philippine economy into four major blocks; namely, production, households, government, and foreign trade.

Each commodity in the production block has a representative firm that uses capital, labor and intermediate goods to produce its output. The firm is assumed to be an optimizing agent (i.e., maximizes profits) that is operating in a perfectly competitive market. The outcomes from the optimization process are used to specify the input demand and output supply equations in the model.

[5] The equations of the model are presented in Annex 1.

The household block is assumed to have representative household that is endowed with capital and labor. Payments to capital and labor, along with net transfer payments, represent household income. This income is then allocated for savings, taxes and consumption.

The consumption of goods and services is determined through an optimization process. The representative household is assumed to maximize its utility or satisfaction by selecting the quantities of goods and services it will consume subject to given prices and desired spending (income less taxes and savings).

The government generates revenues mainly through taxes on income, transactions and imports. Its collections are then allocated for expenditures on goods and services and net transfers. Any discrepancy between government revenues and outlays is then reflected though the budget deficit.

The foreign trade block captures exports and imports. It is modeled under the assumption that the Philippines is a price taker in world markets; which implies that the import supply and export demand functions are perfectly elastic. The formulation of the export supply and import demand equations are based on the assumption that domestic and foreign goods are, or at least perceived to be, not perfectly substitutable – the Armington assumption.

In the case of imports, it is assumed that domestic agents purchase a composite of a commodity that is sourced locally and from abroad. The objective of the domestic agent is to minimize the cost of purchasing this composite by selecting the quantities of domestic and foreign goods. The first order equations from this optimization process are used for the import demand equations of the model. The assumption that domestic and foreign goods are differentiated is captured by means of a Constant Elasticity of Substitution (CES) function.

The output of the representative firm is sold to domestic and foreign markets (export supply). The export supply equations are determined by assuming that the firm seeks to maximize its revenues from selling to these markets. In doing so, the firm is assumed to be constrained by its gross output, prices and an aggregator represented by a constant elasticity of transformation (CET) function.

The major blocks of the model are integrated by means of equilibrium conditions. The supply side is composed of the output of domestic firms and imports. On the other hand, the demand side is composed of government spending on goods and services, household consumption, intermediate demand and exports (foreign demand). These equilibrium conditions determine domestic prices. The model also includes a series of aggregating equations which calculate macroeconomic indicators.

The model developed by Inocencio et al. (2001) is not directly useful in the analysis. The reason is that it does not disaggregate between the regional sources and destinations of imports and exports, respectively. This issue was addressed by reformulating the CES and CET functions.

Equation 1 shows the revised formulation for the CES function. It indicates that, for each good, domestic agents purchase a commodity (DA_i) that is a composite of the domestically produced good (DD_i) and imports from region r (MR_{ir}).

$$DA_i = \left(DD_i^{\frac{\sigma_M - 1}{\sigma_M}} + \sum_r MR_{ir}^{\frac{\sigma_M - 1}{\sigma_M}} \right)^{\frac{\sigma_M}{\sigma_M - 1}} \qquad (1)$$

where: σ_i^M = elasticity of substitution between domestic goods and imports

The import demand equations, by source, are derived as follows. It is assumed that the objective of the domestic agent is to find the combination of the DD_i and MR_{ir} that will minimize the total cost of purchasing DA_i. This optimizing process is implemented under the assumption that DA_i and all prices are determined elsewhere in the model. The first order conditions from this process are used as the equations for the regional import demands.

The key properties of the import demand equations are as follows. First, the ratio import demand from a region and the domestic good is inversely related to the price of the imported good relative to the domestic good. In other words, the Philippine demand for goods made in a region will decline if there is an increase in the price of imports from that region relative to counterparts from other regions. Second, the import demand from a particular source is positively related to the demand for the composite good. That is, the demand for imports from a region will rise if the demand for the composite good is higher.

Export supply equations, by destination, are specified using a similar approach. However, the objective of the firm is to find the combination of exports to different destinations (XR_{ir}) and DD_i which will maximize the revenues from producing a pre-determined level of output (Q_i). The optimizing process is implemented under the assumption that prices to all destinations are given. It also assumes that the total output of a commodity is a CET composite of goods DD_i and XR_{ir} (Equation 2). The first order conditions from the optimization process are used as the regional export supply equations.

$$Q_i = \left(DD_i^{\frac{1+\sigma_X}{\sigma_X}} + \sum_r XR_{ir}^{\frac{1+\sigma_X}{\sigma_X}} \right)^{\frac{\sigma_X}{1+\sigma_X}} \qquad (2)$$

where: σ_i^X = elasticity of transformation between domestic goods and exports

The key properties of the export supply equations are as follows. First, exports to a particular destination are positively related to its relative price. In other words, domestic firms want to sell more to a region if there is an increase in its prices relative to the prices of other regions. Second, exports to a particular destination are positively related to total output. That is, exports to a region will rise if total output higher.

3.2 Disaggregation of the model and data sources

The model is disaggregated at two levels. The first is a disaggregation of the economy into commodities/industries. The second disaggregates imports and exports by source and destination, respectively.

The model has 12 industries/commodities in the first level of disaggregation (Table 3). The first four industries represent the *Agriculture, Fishery and Forestry* sector. The next four industries represent *Industry* and remainder is for *Services.*

The model explicitly identifies five regions in the second level of disaggregation. The first three regions (*ASEAN-Other*, *APEC-ASEAN* and *APEC-Plus3*) represent *ASEAN+3*. On the other hand, *APEC-ASEAN*, *APEC-Plus3* and *APEC-Other* represent the potential members of the FTAAP.

Table 3. Disaggregation of the model

Commodities

Palay and corn
Other crops
Livestock and poultry
Other Agriculture[1]
Mining
Rice and corn milling
Food manufacturing[2]
Non-food manufacturing
Transport and communication
Retail and wholesale trade
Government services
Other services

Regions

ASEAN-Other:	Cambodia, Laos and Myanmar
APEC-ASEAN:	Brunei, Indonesia, Malaysia, Singapore, Thailand, Viet Nam
APEC-Plus 3:	China (includes Hong Kong and Macau), Japan, South Korea
APEC-Other:	Australia, Canada, Chile, Mexico, New Zealand, Papua New Guinea, Peru, Russian Federation, United States of America
ROW	Rest of the World

Notes: [1] Includes fishery and forestry.
[2] Excludes rice and corn milling.

The dataset used in constructing the model is based on the 2000 Input-Output (IO) table of the Philippines.[6] In constructing the Social Accounting Matrix (SAM), this IO table was complemented by tariff rates and other macroeconomic data from the Philippine Tariff Commission and the National Accounts of the Philippines, respectively. Imports and exports were disaggregated by source and region using information from the Comtrade database of the United Nations. All the elasticities used in the model were obtained from existing AGE models of the Philippines.

3.3 Experiments

The trade reforms were implemented through the elimination of tariffs on commodities which are imported from different regions. Five experiments were conducted in the study (Table 4). Experiment 1 attempts to capture the formation of the FTAAP by removing tariffs on all imports coming from members of the APEC. This was followed by the removal of tariffs with a different country composition. Experiment 2 confines the tariff changes to the ASEAN+3 countries only. In contrast, Experiment 3 represents a broad set of changes in which tariffs are removed for all countries. The last two simulations represent the selective removal of tariffs among FTAAP member countries. Experiment 4 is a scenario in which the tariff changes are confined to agricultural commodities only while Experiment 5 exempts agriculture.

Table 4. Description of the experiments

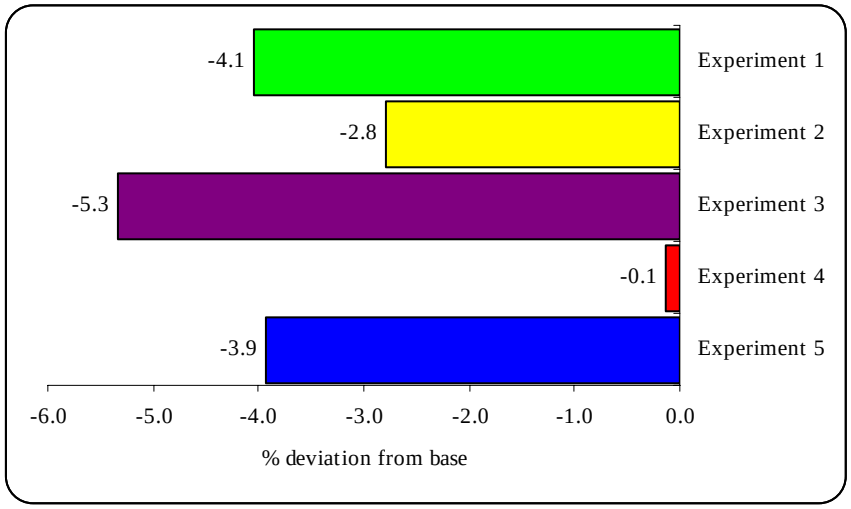
Experiment	Description
1	Tariffs removed for all imports coming from FTAAP member countries
2	Tariffs removed for all imports coming from ASEAN+3 countries
3	Tariffs removed for all imports coming from all countries
4	Tariffs removed for all agricultural imports coming from FTAAP member countries
5	Tariffs removed for all non-agricultural imports coming from FTAAP member countries

Figure 2 shows the implications of the various experiments for the aggregate price of imports; i.e., the average price of imports for all commodities and regions. It indicates

[6] The model of Inocencio et al. (2001) uses information from the 1994 Input-Output table.

that the FTAAP (Experiment 1) causes a 4.1% decline in the aggregate price of imports. As expected, this is lower than the 5.3% decline associated with the removal of tariffs from all countries (Experiment 3). The smallest decline in import prices is reported for Experiment 4. Apart from a coverage that is limited to APEC member countries, this also captures the relatively small share of agricultural commodities in total imports.

Figure 2 Impacts on the aggregate price of imports, % deviation from base



4. SIMULATION RESULTS

This section describes the results from the five experiments mentioned earlier. It begins with a description of the potential impacts of the FTAAP (Experiment 1). This is then compared to the effects of alternative arrangements (Experiments 2 to 5).

4.1 Impacts of the FTAAP

4.1.1 Macroeconomic impacts

The simulation results suggest that a FTAAP has net economic benefits for the Philippines. This is represented by the estimated 0.58% and 1.71% expansion in Gross Domestic Product (GDP) and total employment, respectively (Table 5). The FTAAP is also projected raise aggregate exports and imports by 0.74% and 5.74%, respectively. As

expected, one downside from the agreement is the fall in government revenues. This finding is explained by the sharp decline in tariff revenues.

Table 5 Macroeconomic impacts of the FTAAP, % deviation from base

Variable	Impact
Real GDP	0.58
Components of real GDP	
Personal consumption	2.24
Government consumption	-
Investment	7.09
Exports	0.74
Imports	5.74
Total employment	1.71
Government revenues	(14.20)
Tariff revenues	(76.14)

With the exception of real government spending, which is assumed constant in the analysis, all the expenditure components of national output are expected to expand. From an analytical perspective, the most significant is the increase in consumption expenditure. Accounting for about 71.78% of the total, the 2.24% increase in consumption spending contributes 1.61 percentage points of the increase in GDP. The finding that the impact on GDP is lower than this value reflects the 5.74% increase in imports.

At this point, it is worth noting that impacts on exports are likely to be underestimated.[7] Confining the tariff changes to the Philippines omits the potential positive impacts on exports arising from the removal of trade barriers in other FTAAP member countries.

4.1.2 Sectoral impacts

The simulation results show that all but two of the industries are expected to have higher levels output (Table 6). The largest projected expansion is for *Transport and Communication* at 1.16%. This is closely followed by *Other Crops* at 1.12%. The industries estimated to have lower outputs are *Palay and Corn* and *Rice and Corn Milling*. This can be attributed to the relatively high initial tariffs and trade elasticities for

[7] This caveat applies to all the experiments conducted in this study.

these commodities.[8] Despite the relatively sharp projected output decline in *Palay and Corn* and *Rice and Corn Milling*, aggregate output is still expected to expand because these industries only account for only 3.98% of the total. Given the assumption of sector-specific capital, changes in sectoral employment follow the pattern of changes in output.

The simulation results also suggest that the tariff changes can bring about a restructuring of the agricultural sector. It indicates a reallocation of resources away from traditional crops like *Palay and Corn* to the production of *Other Crops* and *Livestock and Poultry*.

Table 6 Impacts of the FTAAP on industries, % deviation from base

Industry	Q	L	C	M	X
Palay and Corn	(2.84)	(5.46)	5.67	100.00	(2.11)
Other Crops	1.12	3.14	1.62	2.02	(0.96)
Livestock and Poultry	1.09	3.11	1.23	17.14	0.75
Other Agriculture	0.65	2.49	0.80	1.79	0.13
Mining	0.28	1.26	2.51	0.62	0.20
Rice and Corn Milling	(1.04)	(2.99)	8.08	200.00	1.19
Food Manufacturing	0.95	3.69	2.39	9.56	0.42
Nonfood Manufacturing	0.50	1.77	5.25	6.03	0.79
Transport and Communication	1.16	4.72	1.30	1.19	0.85
Retail and Wholesale Trade	0.79	3.01	0.88	0.81	0.41
Government Services	0.89	3.15	1.02	0.93	0.54
Other Services	0.01	0.01	2.46	0.01	0.01
All industries	0.58	1.71	2.24	5.74	0.74

[1] Q = output, L = employment, C = Consumption, M = imports, X = exports

Holding domestic prices constant, lower tariffs translate to lower relative prices of imports. The likely consequence is an increase in imports and lower domestic prices. The simulation results show that the imports of all commodities will rise. The largest increases are reported for *Palay and Corn* and *Rice and Corn Milling*; i.e., commodities that had the highest tariff rates in the base case.

Lower domestic prices improve the incentives from exporting. However, the impacts on exports also depend on the pattern of changes in output. The simulation results show that exports rise for all but two commodities – *Palay and Corn* and *Other Crops*. In the case

[8] In the base case, the tariff rates for *Palay and Corn* and *Rice and Corn Milling* are 27.5% and 44.3%, respectively. These are at least four times higher than 5.6% weighted average of tariff rates for all commodities.

of *Palay and Corn*, the increase in the relative price of exports suggests that the decline in exports is due mostly to lower output.[9] On the other hand, the decline in the exports of *Other Crops* is caused primarily by the lower relative price of exports.[10] However, as these commodities only account for only about 0.95% of the total, the net impact of the FTAAP on aggregate exports is still positive.

4.1.3 Effects on regional trade

The simulation results indicate an expansion in Philippine trade with all regions in the model (Figure 3). While the increase in exports across regions is relatively well-balanced, the story is quite different for imports. The expansion in imports is clearly biased in favor of the FTAAP member economies, especially the APEC-ASEAN region (ASEAN members that are members of APEC). The reason is that the removal of tariffs for FTAAP members reduces the price of imports from this region relative to other regions in the world (ASEAN-Other and ROW). This causes a shift in demand towards imports from FTAAP members.

Figure 4 shows that the increase in the imports of FTAAP members is attributed mostly to the increase in imports of *Nonfood Manufacturing*. It also indicates that the cause of the relatively large increase in imports from APEC-ASEAN countries is *Rice and Corn Milling*. The reason is that APEC-ASEAN accounts for about 84.03% of total *Rice and Corn Milling* imports of the Philippines.

[9] The simulation results suggest that the price of its exports relative to its price in the domestic market is expected to rise by 2.49%.
[10] The simulation results suggest that the price of its exports relative to its price in the domestic market is expected to fall by 1.55%.

Figure 3 Effects on regional trade volumes, % deviation from base

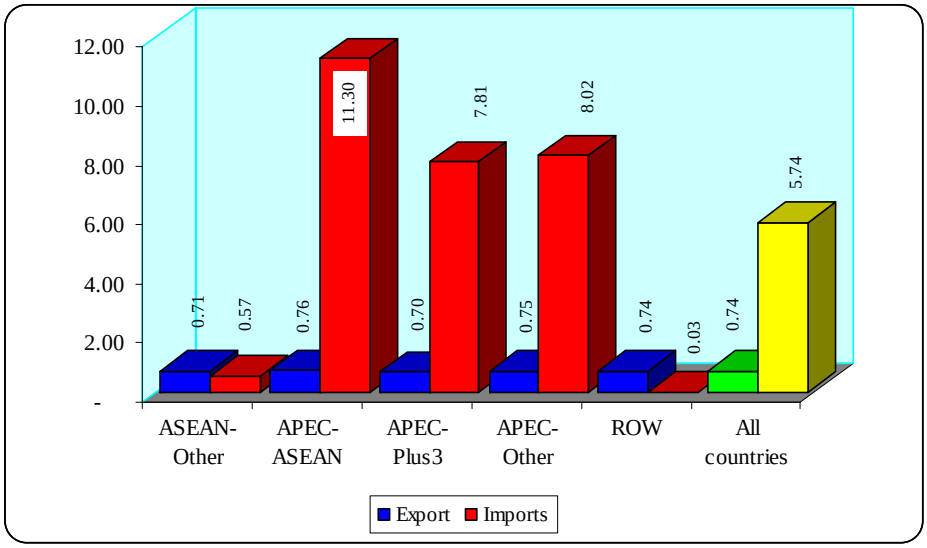
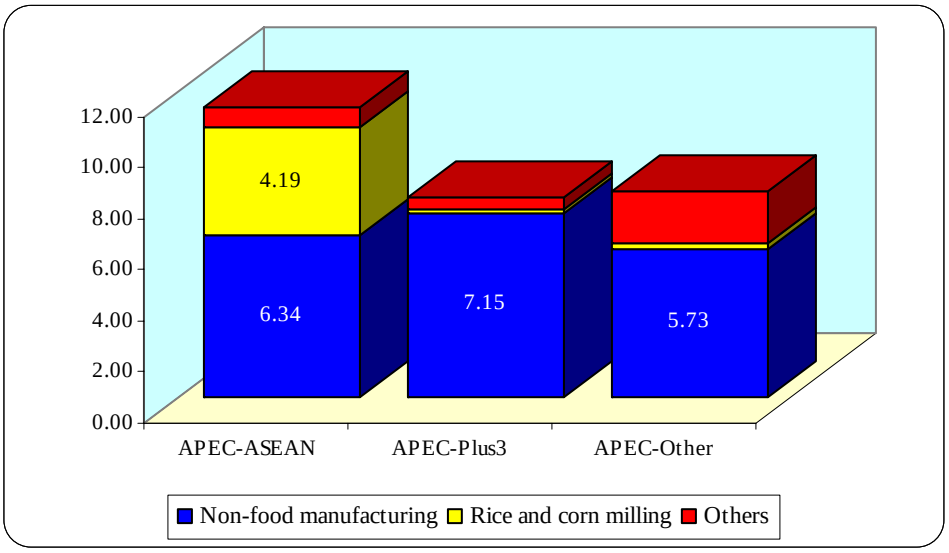


Figure 4 Sources of the higher imports for selected regions, percentage points



4.2 FTAAP and other potential arrangements

4.2.1 Macroeconomic impacts

Table 7 shows the macroeconomic impacts of the FTAAP against other potential arrangements. It indicates that only the removal of tariffs on imports from all countries (Experiment 3) is expected to generate larger gains in terms of real GDP and total employment than the FTAAP (Experiment 1). The reason is that Experiment 3 involves

the broader set of tariff changes in terms of country and commodity coverage. On the other hand, the smallest impacts were found for an FTAAP in which the removal of tariffs is confined to agricultural commodities (Experiment 4). Consistent with the pattern observed earlier, this experiment involves smallest change in the weighted average of tariffs.[11]

Table 7. Macroeconomic impacts, % deviation from base

Variable	Experiment[1]				
	1	**2**	**3**	**4**	**5**
Real GDP	0.58	0.40	0.75	0.01	0.57
Personal consumption	2.24	1.56	2.86	0.10	2.15
Government consumption	-	-	-	-	-
Investment	7.09	5.36	7.01	0.95	6.31
Exports	0.74	0.54	1.05	(0.02)	0.75
Imports	5.74	4.18	6.65	0.47	5.33
Total employment	1.71	1.18	2.22	0.04	1.68
Government revenues	(14.20)	(9.80)	(18.77)	(0.36)	(13.80)
Tariff revenues	(76.14)	(52.57)	(100.00)	(2.18)	(73.76)

[1] Experiment 1 = removal of tariffs on all imports from FTAAP members; Experiment 2 = removal of all tariffs from ASEAN+3 countries; Experiment 3 = removal of tariffs from all countries; Experiment 4 = removal of agricultural tariffs on imports from FTAAP countries; Experiment 5 = removal of non-agricultural tariffs on imports from FTAAP countries

The macroeconomic results also suggest a number of important points. First, the direction of the impacts for the key macroeconomic variables is generally the same. The only exception is with Experiment 4, in which the tariff changes result in a decline in aggregate exports. Second, ignoring the impacts on government revenues, the removal of tariffs from all countries is superior to the FTAAP in terms of gains in total employment and output. Third, the FTAAP is expected to generate benefits that larger than an arrangement that is confined to ASEAN+3 (Experiment 2). Fourth, the aggregate gains to Philippines are largest if the FTAAP cuts across all industries. In other words, exempting selected commodities from such an arrangement is likely to generate gains that are smaller. Fifth, the gains from the FTAAP are likely to come mostly from the removal of tariffs from non-agricultural commodities. This can be seen from the relatively small differences in the estimated impacts for Experiments 1 and 5.

[11] This is captured by the relatively small change in the aggregate price of imports which was reported in Section 3.3.

The simulation results also suggest that there seems to be very little difference between the impacts of the first three experiments. The increase in GDP from the FTAAP is higher than the ASEAN+3 by only about a third of the impacts on the latter. On the other hand, the removal of tariffs on all countries causes an increase in GDP that is higher by only about a quarter of the change estimated for the FTAAP.

4.2.2 Sectoral impacts

Figure 5 shows the impacts on the outputs of the three major sectors of the economy. It indicates two important findings. First, the impacts of the tariff changes are generally positive. The only exception is in Experiment 4, in which the tariff changes are expected to cause a decline in the output of the *Agriculture, Fishery and Forestry* sector. Second, the smallest gains are generally for the *Agriculture, Fishery and Forestry* sector while the largest gains are expected for *Services*. The exception is in Experiment 4, where the *Industry* sector is expected to post the largest gains.

Figure 5. Impacts on sectoral outputs, percent deviation from base

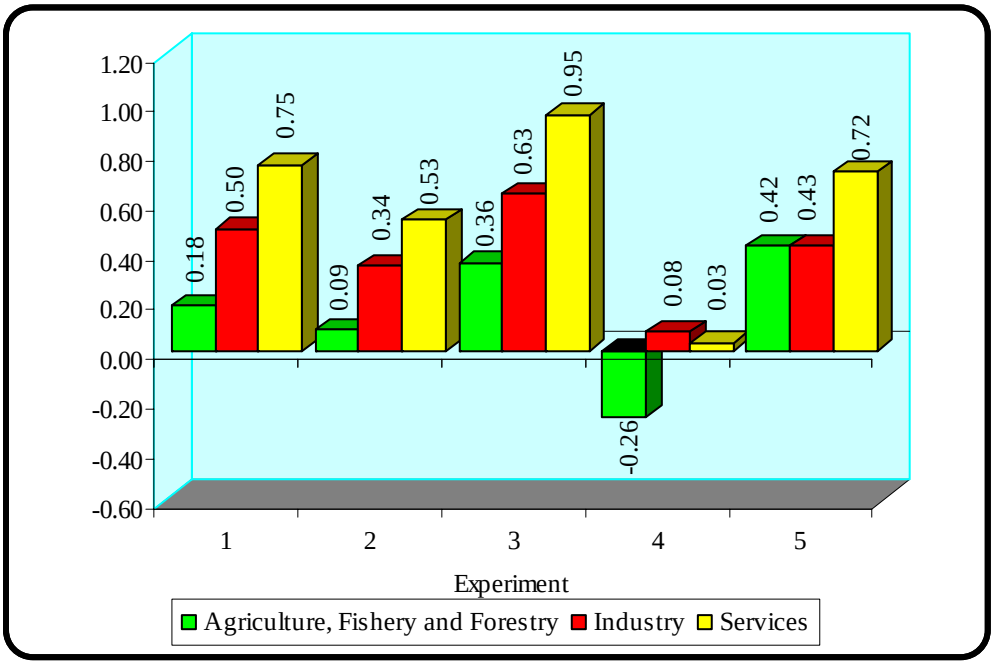


Table 8 presents a more disaggregated analysis of the impacts on output. It indicates that, with the exception of Experiment 4, the effects on sectoral outputs follow the pattern for Experiment 1. In other words, the largest gains are usually found for *Other crops*, *Livestock and Poultry* and *Transport and Communication*. On the other hand, the largest losses are for *Palay and Corn* and *Rice and Corn Milling*.

Table 8 Effects on industry outputs, % deviation from base

Industry	Experiment[1]				
	1	**2**	**3**	**4**	**5**
Palay and Corn	(2.84)	(2.24)	(2.60)	(1.71)	(1.28)
Other Crops	1.12	0.73	1.30	0.24	0.89
Livestock and Poultry	1.09	0.87	1.18	0.05	1.06
Other Agriculture	0.65	0.45	0.84	0.01	0.64
Mining	0.28	0.22	0.12	-	0.27
Rice and Corn Milling	(1.04)	(1.51)	(0.72)	0.86	(1.92)
Food Manufacturing	0.95	0.66	1.20	0.11	0.84
Nonfood Manufacturing	0.50	0.38	0.62	0.04	0.47
Transport and Communication	1.16	0.83	1.45	0.04	1.12
Retail and Wholesale Trade	0.79	0.56	0.99	0.05	0.75
Government Services	0.89	0.62	1.14	0.03	0.86
Other Services	0.01	0.01	0.01	-	0.01
All Industries	0.58	0.40	0.75	0.01	0.57

Introducing exemptions into the FTAAP slightly alters the results. When tariff changes confined to agricultural commodities (Experiment 4), *Rice and Corn Milling* is expected to be among the industries that will gain. The reason is that this is exempted from the tariff changes. Despite being exempted from the tariff changes in Experiment 5, *Palay and Corn* still experiences the second largest decline in output. The reason is that this is a major input in the production of *Rice and Corn Milling*. This means that the source of the reduction in the output of *Palay and Corn* is the fall in its demand as an input.

The sectoral results for consumption, employment and trade are presented in Annex 2. These reveal three important patterns for the results. First, the impacts generally follow the pattern of changes associated with the removal of trade barriers among FTAAP members (Experiment 1). This is especially the case for Experiments 2 and 3 because only the country coverage of the tariff changes is different from Experiment 1. There are however slight differences in the results for the other experiments. In Experiment 4, for

example, the imports of *Palay and Corn* do not expand because this commodity is exempted from the tariff changes. For a similar reason, the imports of *Rice and Corn Milling* do not expand in Experiment 5.

Second, the magnitudes of the impacts are usually largest in Experiment 3. The reason for this can be traced to the fact that this scenario involves the broadest set of tariff changes in terms of country and commodity coverage.

Finally, the most sensitive commodities are *Palay and Corn* and *Rice and Corn Milling*. The explanation here can be traced once again to the relatively large tariff changes and trade elasticities for these commodities.

4.2.3 Effects on regional trade

Table 9 shows the impacts on regional trade volumes of the alternative arrangements. It indicates that exports to all regions are expected to expand in all scenarios except Experiment 4. The findings also show that the largest gain to exports is for the removal of tariffs on all countries. It also highlights the earlier finding that omitting agriculture from the FTAAP is likely to hurt exporters. While differences do not appear to be very large, the simulation results suggest that ASEAN countries which are members of APEC (APEC-ASEAN) are likely to experience the largest increases in exports in most of the experiments.

In the case of imports, the pattern of changes is again very similar for all scenarios except Experiment 4. The largest increase in imports is generally observed for APEC-ASEAN countries. Moreover, the lowest increases are found for countries not belonging to ASEAN+3 or APEC. The differences in the impacts are also lower in Experiment 3 because tariffs on all imports coming from all regions are removed. For Experiment 4, the removal of tariffs generates relatively small increases in imports. This may be attributed to the fact that this experiment involves the smallest changes in tariff rates as a whole.

Table 9 Effects on regional trade, % deviation from base

Variable	Experiment				
	1	**2**	**3**	**4**	**5**
Imports					
ASEAN-Other	0.57	5.35	5.30	0.28	0.32
APEC-ASEAN	11.30	11.50	10.57	0.33	10.00
APEC-Plus3	7.81	8.02	6.95	0.60	7.27
APEC-Other	8.02	(0.18)	7.36	0.86	7.23
ROW	0.03	0.04	4.23	0.19	(0.11)
All countries	5.74	4.18	6.65	0.47	5.33
Exports					
ASEAN-Other	0.71	0.51	1.01	(0.01)	0.72
APEC-ASEAN	0.76	0.55	1.08	(0.02)	0.77
APEC-Plus3	0.70	0.52	1.01	(0.03)	0.73
APEC-Other	0.75	0.54	1.06	(0.02)	0.76
ROW	0.74	0.54	1.06	(0.02)	0.76
All countries	0.74	0.54	1.05	(0.02)	0.75

4.2.4 Digression: Exempting activities associated with rice and corn

The previous experiments showed that *Palay and Corn* and *Rice and Corn Milling* are likely to be the most adversely affected industries with a FTAAP. What follows is a quick examination of the impacts of exempting these two industries from the removal of tariffs.

Table 10 compares a FTAAP that covers all commodities (Experiment 1) to a scheme that exempts the two industries mentioned above (Experiment 6). It indicates three important results. First, the exemptions allow *Palay and Corn* and *Rice and Corn Milling* to expand as a result of the FTAAP. Moreover, these industries will be among the largest gainers from the tariff changes. Second, all industries are expected to expand with Experiment 6. However, the industries which are not exempted are projected to expand at a smaller rate compared to Experiment 1. The largest impact is on the *Livestock and Poultry* industry, which is expected to experience an increase in output that is about 0.67 percentage points lower than in Experiment 1. Third, in the presence of exemptions, aggregate output is expected to expand by 0.54 percent. This is 0.04 percentage points smaller than in Experiment 1.

The findings above capture an important trade-off that is associated with exempting *Palay and Corn* and *Rice and Corn Milling* from the tariff changes. It shows that such an initiative is likely to cause the expansion of the exempted industries. However, this comes at the expense of smaller increases in the outputs of the other industries and of the economy as a whole.

Table 10. Impacts on industry and aggregate outputs (% deviation from base)

Industry	Experiment 1	Experiment 6[1]
Palay and corn	(2.84)	0.93
Other crops	1.12	0.75
Livestock and poultry	1.09	0.42
Other agriculture	0.65	0.61
Mining	0.28	0.25
Rice and corn milling	(1.04)	1.02
Other food manufacturing	0.95	0.84
Non-food manufacturing	0.50	0.29
Transport and communication	1.16	1.00
Retail and wholesale trade	0.79	0.62
Government services	0.89	0.79
Other services	0.01	0.01
All Industries[2]	0.58	0.54

[1] Exempts the *Palay and Corn* and *Rice and Corn Milling* industries from the tariff changes.
[2] This also represents Real GDP at factor cost.

5. CONCLUDING REMARKS

The simulation results raise three important points. First, the FTAAP is likely to lead to net benefits in the form of higher GDP and employment. However, not all industries are expected to gain as illustrated by the contraction of *Palay and Corn* and *Rice and Corn Milling.* Such changes indicate a potential restructuring of agriculture away from traditional crops like *Palay and Corn* towards other crops.

Second, evaluated on the basis of the impacts on aggregated output, the FTAAP is superior to the ASEAN+3 but inferior to the removal of tariffs across regions. However, the differences do not appear to be substantial, suggesting the need for a broader and deeper assessment of the effects of pursuing a FTAAP.

Third, the simulation results suggest that most of the gains from the FTAAP are likely to be realized with the removal of tariffs on non-agricultural products. However, this finding must treated with extreme care as the simulation results still indicate that an across the board removal of tariffs generates the largest aggregate benefits. In addition, the experiments ignore the potential benefits that could arise from the removal of tariffs on Philippine agricultural exports to FTAAP member countries.

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ANNEX 1. EQUATIONS OF THE MODEL

A. MODEL EQUATIONS

Production block

Industry value added

$$VA_i = \alpha_i \, L_i^{\beta_i} \, K_i^{1-\beta_i}$$

Labor demand

$$L_i = \frac{\beta_i \cdot PVA_i \cdot VA_i}{W}$$

Price of value added

$$PVA_i = \frac{PCS_i - \sum_j A_{ij} \cdot PCD_i - \tau_{1i} \cdot P_i}{A_i}$$

Return to fixed capital

$$RFK_i = PVA_i \cdot VA_i - W \cdot L_i$$

Industry output

$$Q_i = \frac{VA_i}{A_i}$$

Intermediate demand

$$ID_{ji} = A_{ji} \cdot Q_i$$

Household Block

Gross income of households

$$Y = \sum_i W \cdot L_i + \left(1 - \tau_2\right) \cdot (1 - \eta_1) \cdot \sum_i RFK_i$$

Disposable income of households

$$YD = Y + TRHG + TRHF - TAXY$$

Household savings

$$SH = \eta_2 \cdot YD$$

Household consumption

$$C_i = \frac{\gamma_i \cdot \left(1-\eta_2\right) \cdot YD}{PCD_i}$$

Government Block

Government revenues
$$GREV = TAXI + TAXY + TAXM + TAXC$$

Revenues from indirect taxes

$$TAXI = \sum_i \tau_{1i} \cdot P_i \cdot Q_i$$

Revenues from income taxes
$$TAXY = \tau_3 \cdot Y$$

Revenues from import taxes

$$TAXM = \sum_r \sum_i \tau_{4ri} \cdot PMFR_{ri} \cdot EXC \cdot MR_{ri}$$

Revenues from corporate taxes
$$TAXC = \tau_2 \cdot \sum_i RFK_i$$

Government spending on goods

$$GSPEND = \sum_i PCD_i \cdot G_i$$

Government savings
$$SG = GREV - GSPEND - TRHG - TRRG$$

Foreign Trade

Foreign savings

$$ST = \sum_r \sum_r PMFR_{ri} \cdot EXC \cdot MR_{ri} + TRRG - TRHR - \sum_r \sum_r PXFR_{ri} \cdot EXC \cdot XR_{ri}$$

Export supply, by commodity and destination

$$XR_{ri} = DD_i \cdot \left[\frac{\delta_{ri}^X}{1-\delta_{ri}^X} \cdot \frac{PXR_{ri}}{P_i} \right]^{\sigma_{ri}^X}$$

Import demand, by commodity and destination

$$MR_{ri} = DD_i \cdot \left[\frac{\delta_{ri}^M}{1-\delta_{ri}^M} \cdot \frac{P_i}{PMR_i} \right]^{\sigma_{ri}^M}$$

Domestic price of exports, by commodity and region

$$PXR_{ri} = PXFR_{ri} \cdot EXC$$

Domestic price of imports, by commodity and region

$$PMR_{ri} = PMFR_{ri} \cdot EXC \cdot \left(1+\tau_{4ri}\right)$$

Other equations

Product market equilibrium

$$Q_i = DA_i + \sum_r \left(XR_{ri} - MR_{ri} \right)$$

Domestic spending by commodity

$$DA_i = C_i + INV_i + G_i + \sum_j ID_{ij}$$

Investment by commodity

$$INV_i = \frac{\psi_i \cdot S}{PCD_i}$$

Total savings (eliminated via Walra's Law)

$$S = SH + SG + ST + \eta_1 \cdot \left(1-\tau_2\right) \cdot \sum_i RFK_i$$

Domestic demand for the domestically produced commodity

$$DD_i = Q_i - \sum_r XR_{ri}$$

Total employment

$$LTOT = \sum_i L_i$$

Composite price in demand

$$PCD_i = \frac{P_i \cdot DD_i + \sum_r PMR_{ri} \cdot MR_{ri}}{DA_i}$$

Composite price in supply

$$PCS_i = \frac{P_i \cdot DD_i + \sum_r PXR_{ri} \cdot XR_{ri}}{Q_i}$$

Consumer price index (numeraire)

$$CPI = \sum_i \gamma_i \cdot PCD_i$$

B. VARIABLE DEFINITIONS

Endogenous variables

Variables	Description
C_i	Household consumption of commodity *i*
DA_i	Domestic spending on commodity *i*
DD_i	Domestic demand for the domestically produced component of commodity *i*
EXC	Exchange rate
GREV	Government revenues
GSPEND	Government spending on goods
ID_{ij}	Intermediate demand for commodity *j* of industry *j*
INV_i	Investment demand for commodity *j*
L_i	Labor demand of industry *i*
LTOT	Total employment
MR_{ri}	Imports of commodity *i* that are sourced from region *r*
PCD_i	Composite price in demand of commodity *i*
PCS_i	Composite price in supply of commodity *i*
P_i	Output price of industry *i*
PMR_{ri}	Domestic currency price of importable good *i*, sourced from country *r*
PVA_i	Price of value added of industry *i*
PXR_{ri}	Domestic currency price of exportable good *i*, destined for country *r*
Q_i	Output of industry *i*
RFK_i	Return to fixed capital in industry *i*
S	Total savings
SG	Government savings
SH	Household savings
TAXC	Tax revenues from corporations
TAXI	Tax revenues from indirect taxes
TAXM	Tax revenues from import tariffs
TAXY	Tax revenues from income
VA_i	Value added of industry *i*
XR_{ri}	Exports of commodity *i* that are destined for region *r*
Y	Household income
YD	Household disposable income

Exogenous variables and parameters

Variables	Description
γ_i	Share of commodity *i* in total household spending
τ_{1i}	Tax rate on goods and services
τ_2	Tax rate on corporate income
τ_3	Tax rate on household income
τ_{4ri}	Tariff rate on commodity *i,* imported from region *r*
η_1	Corporate savings rate
η_2	Household savings rate
α_i	Constant in the production function
δ_{ri}^X	share parameter in the transformation function (i.e., between exports and domestic output)
δ_{ri}^M	share parameter in the Armington function (i.e., between imports and domestic output)
σ_{ri}^X	elasticity of transformation between domestic goods and exports
σ_{ri}^M	elasticity of substitution between domestic goods and imports
ψ_i	Investment share of industry *i*
A_i	Proportion of value added in total output
A_{ij}	Input-output coefficient
CPI	Consumer price index
G_i	Government expenditure on good *i*
LS	Labor supply
$PMFR_{ri}$	Foreign price of commodity *i*, imported from region *r*
$PXFR_{ri}$	Foreign price of commodity *i*, exported to region *r*
ST	Foreign savings
TRHF	Net transfers from foreigners to households
TRHG	Net transfers from government to households
TRRG	Net transfers from government to foreigners
W	Wage rate

ANNEX 2: SELECTED SECTORAL RESULTS FROM THE EXPERIMENTS, % DEVIATION FROM BASE

Industry	Experiment				
	1	**2**	**3**	**4**	**5**
Employment					
Palay and Corn	(5.46)	(4.31)	(5.00)	(3.30)	(2.48)
Other Crops	3.14	2.05	3.65	0.67	2.49
Livestock and Poultry	3.11	2.47	3.39	0.14	3.05
Other Agriculture	2.49	1.72	3.23	0.05	2.44
Mining	1.26	0.99	0.53	0.02	1.25
Rice and Corn Milling	(2.99)	(4.34)	(2.08)	2.54	(5.51)
Food Manufacturing	3.69	2.57	4.70	0.42	3.28
Nonfood Manufacturing	1.77	1.32	2.18	0.13	1.67
Transport and Communication	4.72	3.35	5.95	0.18	4.56
Retail and Wholesale Trade	3.01	2.13	3.76	0.19	2.85
Government Services	3.15	2.20	4.03	0.12	3.04
Other Services	0.01	0.01	0.02	-	0.01
Consumption					
Palay and Corn	5.67	3.99	6.22	2.37	3.39
Other Crops	1.62	0.84	2.16	0.53	1.08
Livestock and Poultry	1.23	0.55	1.82	0.23	0.97
Other Agriculture	0.80	0.56	1.02	0.07	0.74
Mining	2.51	1.71	4.48	0.09	2.43
Rice and Corn Milling	8.08	6.83	8.52	1.02	7.23
Food Manufacturing	2.39	1.17	3.23	0.11	2.28
Nonfood Manufacturing	5.25	3.75	6.99	-	5.24
Transport and Communication	1.30	0.91	1.75	0.01	1.29
Retail and Wholesale Trade	0.88	0.61	1.18	0.01	0.87
Government Services	1.02	0.71	1.30	0.04	0.98
Other Services	2.46	1.72	3.16	0.09	2.38
Exports					
Palay and Corn	(2.11)	(1.66)	(1.89)	(1.31)	(0.90)
Other Crops	(0.96)	(0.61)	(1.04)	(0.27)	(0.71)
Livestock and Poultry	0.75	0.57	0.83	0.04	0.72
Other Agriculture	0.13	0.09	0.18	-	0.13
Mining	0.20	0.13	0.92	(0.06)	0.25
Rice and Corn Milling	1.19	0.44	1.34	1.62	(0.38)
Food Manufacturing	0.42	0.18	0.60	0.12	0.30
Nonfood Manufacturing	0.79	0.58	1.14	(0.03)	0.82
Transport and Communication	0.85	0.61	1.09	0.01	0.84
Retail and Wholesale Trade	0.41	0.30	0.52	0.02	0.39
Government Services	0.54	0.38	0.69	0.02	0.52
Other Services	0.01	0.01	0.01	-	0.01

Imports					
Palay and Corn	100.00	59.94	100.00	100.00	(5.80)
Other Crops	2.02	1.08	2.32	0.87	1.17
Livestock and Poultry	17.14	2.54	19.86	14.30	2.56
Other Agriculture	1.79	1.24	2.62	0.88	0.90
Mining	0.62	0.45	0.86	0.05	0.58
Rice and Corn Milling	200.00	200.00	300.00	(2.57)	300.00
Food Manufacturing	9.56	3.57	12.94	0.10	9.47
Nonfood Manufacturing	6.03	4.45	7.04	0.34	5.74
Transport and Communication	1.19	0.85	1.49	0.05	1.15
Retail and Wholesale Trade	0.81	0.58	1.01	0.05	0.77
Government Services	0.93	0.65	1.18	0.04	0.89
Other Services	0.01	0.01	0.01	-	0.01