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Analyzing the Impact of Trade Reforms on Welfare and Income Distribution Using CGE Framework: The Case of the Philippines

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Philippine Institute for Development Studies
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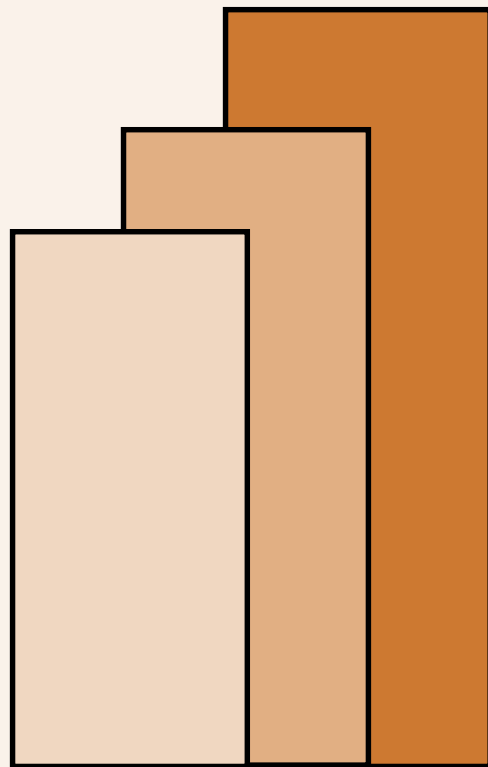
Caesar B. Cororaton

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**Analyzing the Impact of Trade Reforms on Welfare and
Income Distribution Using CGE Framework:
The Case of the Philippines¹**

Caesar B. Cororaton

**Revised Draft
January 2003**

Abstract

Tariff reform, particularly tariff reduction, is one of the major economic reforms implemented in the last one and half decades in the Philippines. The paper attempts to analyze the effects of the tariff reduction from 1994 to 2000 on household income and welfare using a computable general equilibrium (CGE) model calibrated to the 1994 social accounting matrix (SAM).

Insights that can be drawn from the tariff reduction experiments include: (a) significant drop in domestic prices; (b) improvement in export competitiveness through the effective depreciation in the real exchange rate; (c) reallocation of production and resources towards the non-food manufacturing sector, which is a dominant sector both in trade and production; (d) drop in agriculture wages and increase in production wages; and (f) factor substitution favoring skilled production workers.

The effects on nominal income are biased against rural households. This is largely because of the decline in agriculture wages and the improvement in production wages. However, the significant drop in prices, especially consumer prices, offsets almost all of these negative effects. As a result, both real household income and consumption improve. Therefore, the tariff reduction program is generally welfare-improving as indicated by the positive increase in the equivalent variation (EV) both for total and across households.

Keywords : CGE, Trade, Welfare, Income Distribution

¹Funded by the East Asian Development Network (EADN).

**Analyzing the Impact of Trade Reforms on Welfare and
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Caesar B. Cororaton²

Introduction

Trade liberalization was one of the major economic reform programs implemented in the last one and a half decades. The program was pursued in various phases incorporating policies of tariff reduction, simplification of tariff structure, and “tariffication” of quantitative restrictions. Some of these reforms were pursued unilaterally, while others were done under various multilateral agreements such as the World Trade Organization (WTO), as well as regional agreements under the Association of Southeast Asian Nations (ASEAN) such as the ASEAN Free Trade Area (AFTA).

Trade liberalization, particularly tariff reduction which is the focus of the paper, affects relative price that triggers changes in both sectoral price ratios and domestic-foreign price ratios. These changes in turn result in reallocation of production and resources, which lead to contraction in some production sectors and expansion in others. Furthermore, it generates a web of direct and indirect changes that makes it extremely difficult to trace down the effects on various households. To be able to gain a better understanding of the effects the analysis may therefore require an economy-wide model. In the literature one such model is the computable general equilibrium (CGE). The objective of the paper is to construct a CGE model calibrated to Philippine data that can be used to conduct simulation exercises that can help analyze the impact of tariff reforms on income distribution and welfare.

In a CGE framework, the effects of tariff reform on households may be traced through two channels: income and consumption channels. In the income channel, tariff reform may generate a series of changes in sectoral imports, exports, production, demand for factors and factor payments, and ultimately household income. Households who are endowed with factors that are used intensively in the expanding sectors may benefit from the tariff reform. On the other hand, in the consumption channel, tariff reform may change the structure of consumer prices. It will benefit those household groups whose consumer basket is dominated by goods with declining prices as a result of the tariff reform. Through these two channels the paper will attempt to trace the effects of the reduction in tariff rates from 1994 to 2000 on household income and welfare.

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A Quick Look at the Literature

Cloutier, Cockburn, and Decaluwé (2002) provides a comprehensive review of the CGE literature that focuses on the analysis of welfare, poverty, and distributional effects of trade liberalization. The review looks into how trade liberalization has been modeled in the CGE literature and discusses some major research findings. It would be too lengthy to replicate their discussion here, but for the present paper it would be important to highlight two general implications that one may be able to draw from the review:

i. While the literature has applied various model specifications in modeling trade reforms, the results are analyzed using two broad transmission mechanisms: income and consumption mechanisms. In the income side, trade reform impacts on imports, production, factor remuneration, and ultimately household income. On the other hand, in the consumption side trade reform impacts on the macroeconomy, altering as a result the structure of consumer prices.

ii. While there are some broad similarities in the overall specification of CGE models, the effects of trade reform are generally country-specific. The results greatly depend upon the countries' initial conditions in terms of the structure of foreign trade, production and factors, consumption and sources of household income. The results also depend on the degree of factor substitution in production and on commodity substitution in the consumer basket. Furthermore, the overall results depend upon the extent of the reform in terms of the magnitude of the reduction in trade barriers.

The lesson that one may be able to draw from all these is that one may not be able to make a general statement on the effects of trade reforms because the results are country-specific. Trade liberalization depends upon the structure of the economy and the extent of the reform. Therefore, it is extremely important to take into account the structure of the economy in analyzing the possible impacts of trade liberalization. Thus, it is necessary to go through the tedious task of constructing a social accounting matrix (SAM) that is based on actual data and to specify a CGE model that is based on the SAM.

Cororaton (1994) provided a comprehensive review of literature on CGE modeling in the Philippines. While there are a number of CGE models available in the country with various sectoral breakdown, it was observed that most of these models focused mainly on analyzing production efficiency and reallocation effects. The analysis of tracing down the impact of trade reforms to the household level has not been emphasized or has been completely missed out.

Cororaton (2000) attempted to analyze the effects of tariff reform on household welfare using a CGE model. However, the analysis in the paper suffers from two weaknesses: (i) the CGE model used in the simulation was calibrated in 1990, which was a bit outdated since much of the tariff reform took place in the mid 1990s; and (ii) the household disaggregation were in decile. In principle, it is conceptually difficult to pin down the effects of a policy shock at the household level if the groupings are in decile

because households can move in and out of one decile group after a policy change. Household groupings like socio-economic classes that are characterized by household resource endowments such as educational attainment are a lot better and more appropriate because the degree of household mobility across groups is much lesser.

These two weaknesses are addressed in the present research. A 1994 SAM was constructed using the 1994 Input-Output Table, the 1994 Family Income and Expenditure Survey, and various 1994 official economic information. A CGE model was specified and calibrated using this SAM. The household sector was disaggregated according to socio-economic groupings with household characteristics that are based on the educational attainment of the head of households. Households are grouped into urban and rural classes, and in each class into various educational levels of the head of households.

Trade Reforms

The trade reform program has three major components: the 1981-1985 Tariff Reform Program (TRP); the Import Liberalization Program (ILP); and the complimentary realignment of the indirect taxes. In TRP, there was a narrowing of the tariff rate structure from a range of 100-0 percent to 50–10 percent. During the period 1983-1985 sales taxes on imports and locally produced goods were equalized. Also, the mark-up applied on the value of imports (for sales tax valuation) was reduced and eventually eliminated.

However, because of the balance of payments, economic, and political crises during the mid-1980s the import liberalization program was suspended. In fact, some of the items that were deregulated earlier were re-regulated during this period. When the Aquino government took over the administration in 1986 the trade reform program of the early 1980s was resumed, which resulted in the reduction of the number of regulated items from 1,802 in 1985 to 609 in 1988. Furthermore, export taxes on all products except logs were abolished.

The government launched a major program in 1991 with the issuance of the Executive Order (EO) 470, which is called the TRP-II. This is an extension of the previous program in which tariff rates were realigned over a five-year period. The realignment involved the narrowing of the tariff rates through a series of reduction of the number of commodity lines with high tariffs, and an increase in the commodity lines with low tariffs. In particular, the program was aimed at clustering the commodities with tariffs within the 10–30 range by 1995. Despite the programmed narrowing of the tariff rates, about 10 percent of the total number of commodity lines were still subjected to 0-5 percent tariff and 50 percent tariff rates by the end of the program in 1995.

“Tariffication” of quantitative restrictions (QRs), i.e. converting QRs into tariff equivalent, started in 1992 with the implementation of EO 8. There were 153 commodities whose QRs were converted into tariff equivalent rates. In a number of cases, tariff rates were raised over 100 percent, especially during the initial years of the conversion. However, a built-in program for phase-down of the “tariffied” rates over a

five-year period was also put into effect. Furthermore, in the same EO, tariff rates on 48 commodities were further re-aligned.

De-regulation continued on the next 286 items under the tariffication program. By the end of 1992, only 164 commodities were covered under the QRs. However, the implementation of the Memorandum Order (MO) 95 in 1993 reversed the de-regulation process. In fact, QRs were re-imposed on 93 items, bringing up the number of regulated items under the QR to 257. This re-regulation came largely as the result of the Magna Carta for Small Farmers in 1991.

Major reforms were implemented under the TRP-III. The program embodied in the following EOs: (i) EO 189 implemented in January 1, 1994 which provided reduced tariff rates on capital equipment and machinery; (ii) EO 204 in September 30, 1994 which mandated tariff reduction in textiles, garments, and chemical inputs; (iii) EO 264 in July 22, 1995 which reduced tariffs on 4,142 harmonized lines in the manufacturing sector; and (iv) EO 288 in January 1, 1996 which reduced tariffs on “non-sensitive” components of the agricultural sector. The restructuring of tariff under these various EOs refers to reduction in both the number of tariff tiers and the maximum tariff rates. In particular, the program was aimed at establishing a four-tier tariff schedule, namely: 3 percent for raw materials and capital equipment that are not available locally; 10 percent for raw materials and capital equipment that are available from local sources; 20 percent for intermediate goods; and 30 percent for finished goods.

Table 1: Tariff Rates

	Tariff Rates (%)		
	1994	2000	% Change
Crops	15.9%	8.7%	-45.6
Livestock	0.7%	0.3%	-57.6
Fishing	34.1%	8.0%	-76.4
Other Agriculture	0.3%	0.2%	-19.9
AGRICULTURE	8.8%	4.5%	-48.8
Mining	44.1%	4.9%	-88.9
Food Manufacturing	37.3%	16.6%	-55.4
Non-food Manufacturing	21.1%	7.6%	-64.0
Construction			
Electricity, Gas and Water			
INDUSTRY	24.1%	8.4%	-65.3
Wholesale trade & retail			
Other Services			
Government services			
SERVICES			
TOTAL	23.9%	7.9%	-65.0

Source of basic data: Manasan & Querubin,1997

Another major component of the overall design of the tariff program is the uniform tariff rate, which is scheduled to be implemented starting 2004. Policy discussions on the issue, however, are still ongoing. At what level shall the tariff rate be made uniform eventually across sectors is still an unsettled issue at present.

Table 1 shows the weighted average tariff rates in 1994 and in 2000 across various sectors. The overall weighted tariff rate declined over these years by –65 percent: from 23.9 percent in 1994 to 7.9 percent 2000. The decline in the industry tariff rate is much higher than in agriculture: -65.3 percent and –48.8 percent, respectively.

In terms of specific sectors, the largest drop in tariff rates is in mining, -88.9 percent, while the lowest decline is in other agriculture, -19.9 percent. In terms of tariff rate level in 2000, food manufacturing still has the highest rate of 16.6 percent. Other agriculture has the lowest tariff rate of 0.2 percent. These changes in tariff rates over the period were the ones utilized in the simulation experiment.

Tariff Reform and Government Revenue

Revenue from import tariff is one of the major sources of government funds as shown in Table 2, which shows the structure of the sources of revenue of the government. In 1990, the share of revenue from import duties and taxes to the total revenue was 26.4 percent. This increased marginally to 27.7 percent in 1995. However, the share dropped significantly to 17.1 percent in 2001. One of the major factors behind the decline was the tariff reduction program.

Table 2: Sources of National Government Revenue (%)

	1990	1995	1999	2000	2001
Tax Revenue	83.9	85.7	90.2	89.1	86.9
Taxes on net Income and Profits	27.3	30.7	38.5	38.6	39.6
Excise and Sales Taxes	27.2	23.4	32.9	28.1	29.3
Import Duties and other Import Taxes	26.4	27.7	18.5	19.3	17.1
Other Taxes	3.0	3.9	0.4	3.1	0.9
Non-Tax Revenue	14.8	14.0	9.7	10.6	12.8
Grants	1.3	0.3	0.0	0.3	0.4
Total	100.0	100.0	100.0	100.0	100
(Deficit)/Surplus (billion pesos)	(37.2)	12.1	(111.7)	(134.7)	(147.0)
(Deficit)/Surplus (% of GNP)	-3.5	0.6	-3.6	-3.9	-3.8

Source: Selected Philippine Economic Indicators, Bangko Sentral ng Pilipinas

The share of direct taxes (income and profit direct taxes combined) increased consistently from 27.3 percent in 1990 to 30.7 percent in 1995 and to 39.6 percent in 2001. On the other hand, the share of government revenue from excise and sales taxes dropped from 27.2 percent share in 1990 to 23.4 percent in 1995. It however recovered to 29.3 percent share in 2001.

Since tariff revenue is a major source of government funds, a tariff reduction program could therefore have substantial government budget implications especially if it is not accompanied by another compensatory tax financing. In fact, it could pose a major policy challenge especially in a situation where government budget deficit is growing.

The last three years saw widening government budget deficit. From a budget surplus of 0.6 percent of GNP in 1995, the budget balance flipped to a deficit of -3.6 percent in 1999 and another -3.8 percent in 2000. In 2001, the deficit was still at -3.8 percent of GNP. This persistent government imbalance, if remained unchecked could not only create a host undesirable macroeconomic effects, but could also put into question the viability of a continued implementation of the tariff reduction program, unless other compensatory tax financing measures are implemented such as income tax and other excise and indirect taxes.

The Structure of the Economy in the 1994 SAM

The impact of tariff reduction would depend upon the initial conditions of the economy in the base year (which is 1994 in the present context) in terms of the structure of foreign trade (imports and exports), production, household consumption, factor endowments and sources of income. A brief discussion on these is given in this section. The discussion is based on the data in the constructed 1994 SAM³.

Table 3 shows the structure of production. Industry contributes 46.7 percent to the overall gross value of output of the economy. Of the total contribution of industry, 23 percent comes from non-food manufacturing sector and another 14.7 percent from food manufacturing. The output contribution of the entire service sector is 39.1 percent, of which 22.1 percent comes from other services and 11.3 percent from wholesale and retail trade. Total agriculture contributes 14.3 percent to the total, of which 6.8 percent comes from crops and another 4 percent from livestock.

Agriculture and service sectors have high value added content. The value added shares to their respective total value of output are 71.4 percent and 63.3 percent, respectively. Industry has far smaller value added ratio of 34.5 percent. Within industry, manufacturing has the smallest value added ratio: 30.8 percent for food manufacturing and 29.7 for on-food manufacturing. Incidentally, non-food manufacturing has the lowest ratio among all sectors.

In terms of sectoral contribution to the overall value added, the service sector contributes the largest share of 48.5 percent, followed by the industry sector with a share of 31.6 percent. Of the total industry share, non-food manufacturing contributes 13.8 percent.

About 55.1 percent of the overall value added is payment to capital, while the remaining 44.9 percent is payment to labor. Agriculture has the highest labor payment of 47.7 percent, while industry 40.6 percent.

³Appendix B discusses in detail how the SAM was constructed and the sources of information.

Table 3: Production and Factors

	Total Output	Value Added (%)		Factor Shares in Value Added(%)		Sectoral Factor Shares (%)	
	Share (%)	VA/X*	Share	labor	capital	labor	capital
Crops	6.8	77.7	10.3	50.6	49.4	11.6	9.28
Livestock	4.0	58.1	4.5	50.4	49.6	5.1	4.06
Fishing	2.7	71.7	3.7	35.8	64.2	3.0	4.37
Other Agriculture	0.9	82.3	1.4	50.1	49.9	1.5	1.25
AGRICULTURE	14.3	71.4	20.0	47.7	52.3	21.2	19.0
Mining	0.9	55.0	1.0	46.6	53.4	1.1	0.98
Food Manufacturing	14.7	30.8	8.8	36.5	63.5	7.2	10.19
Non-food Manufacturing	23.0	29.7	13.4	44.8	55.2	13.3	13.40
Construction	5.3	52.8	5.5	43.8	56.2	5.4	5.65
Electricity, Gas and Water	2.7	53.0	2.8	25.2	74.8	1.6	3.81
INDUSTRY	46.7	34.5	31.6	40.6	59.4	28.5	34.0
Wholesale trade & retail	11.3	64.1	14.2	34.0	66.0	10.8	17.06
Other Services	22.1	61.4	26.6	37.9	62.1	22.4	29.95
Government services	5.7	69.0	7.7	100.0	0.0	17.1	0.00
SERVICES	39.1	63.3	48.5	46.5	53.5	50.2	47.0
TOTAL	100.0	51.0	100.0	44.9	55.1	100.0	100.0

Source: 1994 Social Accounting Matrix estimated by the author.

* VA : Value added; and X: Total Output

Table 4 shows the structure of sectoral exports and imports (which include both merchandise and non-merchandise trade) in the SAM. In the import side, industry, particularly non-food manufacturing sector, dominates. Total industry has 88.8 percent of total imports, of which 76.1 percent comes from non-food manufacturing. Similar structure holds in the export side, with industry capturing a large share of almost 60 percent. Of the total industry export share, 48.2 percent is from non-food manufacturing exports.

The dominance of industry, particularly non-food manufacturing sector, in the country's foreign trade is largely due to the phenomenal rise of the semi-conductor sector in the 1990s. This is seen in Table 5 where the breakdown of merchandise export is presented. The export share of electrical and electrical equipment, which is largely dominated by exports of semi-conductor, surged from 24 percent in 1990 to 59.5 percent in 2000.

Garments used to be a major export item of the country before the 1990s. However, its share dropped significantly in the last decade from 21.7 percent in 1990 to only 6.9 percent in 2000. The same declining trend is observed in agriculture-based exports over the same period. In 1990, agriculture-based exports had a combined share of 18.2 percent. Over the years it dropped consistently to reach 4.6 percent only in 2000.

**Table 4: Imports and Exports Shares
(Merchandise and Non-Merchandise)**

	Shares (%)	
	Imports	Exports
Crops	0.7	3.1
Livestock	0.6	0.0
Fishing	0.0	3.4
Other Agriculture	0.1	0.0
AGRICULTURE	1.5	6.5
Mining	6.5	2.5
Food Manufacturing	5.4	8.6
Non-food Manufacturing	76.1	48.2
Construction	0.9	0.3
Electricity, Gas and Water	0.0	0.2
INDUSTRY	88.8	59.7
Wholesale trade & retail	0.0	14.3
Other Services	9.7	19.5
Government services	0.0	0.0
SERVICES	9.7	33.8
TOTAL	100.0	100.0

Source: Official 1994 Input-Output Table & 1994 SAM

Activities in the semi-conductor industry in the country have extremely small value added contribution. This is because the sector as a whole is dominated by assembly type operation only. Almost all of its input requirements are imported. Practically, labor is the only local contribution. Furthermore, the sector has very small link with the rest of the economy because semi-conductor firms are usually located in special places like the export processing zones. Thus, while the share of the sector to the total value of output is large, its contribution to the total value added is small.

Before discussing the structure of consumption and the sources of income of households, it would be necessary to have an idea of the disaggregation of the household sector. Table 6 shows the definition of the household sector. There are a total of twelve household groups in the analysis, six urban household groups and another six rural. The disaggregation is based on the type of work and the educational attainment of the head of the household.

The consumption structure of each household group is presented in Table 7. The largest items in the consumer basket across household groups come from food manufacturing, service sectors, and non-food manufacturing. Across household groups however, the consumption ratios vary considerably. For example, for UR1 35.5 percent of its consumption basket comes from food manufacturing. For UR2, it is only 27.4 percent. Thus, given these differences in the structure of consumption basket of the various household groups, a change in the structure of consumer prices as a result of a tariff reduction will have differentiated effects across the groups.

Table 5: Merchandise Exports (million US dollars, %)

	Value			Shares (%)		
	1990	1995	2000	1990	1995	2000
Coconut Products	503	989	595	6.1	5.7	1.6
Sugar and Products	133	74	57	1.6	0.4	0.2
Fruits and Vegetables	326	458	528	4.0	2.6	1.4
Other Agro-based Products	431	575	486	5.3	3.3	1.3
Forest Products	94	38	44	1.1	0.2	0.1
Agriculture-based	1,487	2,134	1,710	18.2	12.2	4.6
Mineral Products	723	893	650	8.8	5.1	1.7
Petroleum Products	155	171	436	1.9	1.0	1.2
Manufactures	5,707	13,868	33,989	69.7	79.5	91.2
Electrical and Electrical Equipment	1,964	7,413	22,178	24.0	42.5	59.5
Garments	1,776	2,570	2,563	21.7	14.7	6.9
Textile Yarns/Fabrics	93	208	249	1.1	1.2	0.7
Others	1,874	3,677	8,999	22.9	21.1	24.1
Others Exports	114	381	502	1.4	2.2	1.3
Industry-based	6,699	15,313	35,577	81.8	87.8	95.4
Total Merchandise Exports	8,186	17,447	37,287	100.0	100.0	100.0

Source: Balance of Payments Accounts, Bangko Sentral ng Pilipinas

Table 8 presents the structure of the sources of income of households. There are four types of labor considered in the analysis. There are two types of agriculture labor and two types of production labor, each categorized as skilled and unskilled. Skilled production workers include professionals, managerial, and other related workers. Furthermore, skilled worker is defined as those with at least high school diploma. The rest are categorized as unskilled.

Table 6: Household Definition

Urban Households:
Ur1: worked for private household and private establishment; zero education up to third year high school
Ur2: worked for private household and private establishment; high school graduate and up
Ur3: worked for government/government corporation
Ur4: self-employed without employee; zero education up to third year high school; including unemployed during 1994 survey.
Ur5: self-employed without employee; high school graduate and up; including unemployed during 1994 survey.
Ur6: employed in own family-operated farm or business; worked with pay in own family-operated farm or business; and worked without pay in own family-operated farm or business
Rural Households:
Rur1: worked for private household and private establishment; zero education up to third year high school
Rur2: worked for private household and private establishment; high school graduate and up
Rur3: worked for government/government corporation
Rur4: self-employed without employee; zero education up to third year high school; including unemployed during 1994 survey.
Rur5: self-employed without employee; high school graduate and up; including unemployed during 1994 survey.
Rur6: employed in own family-operated farm or business; worked with pay in own family-operated farm or business; and worked without pay in own family-operated farm or business

Source: 1994 Family Income and Expenditure Survey

There are four sources of capital income: income from capital used in agriculture, in industry, in wholesale and retail, and in other services. The reason for separating capital income from various sectors is that in the model specification sectoral capital is fixed. The zero-profit condition that is required in CGE model is implemented through a market-clearing rate of return to capital per sector. Thus, a policy shock will find its way, among other ways, through changes in the rate of return to capital per sector. Therefore, differentiated sectoral rates of return to capital will in turn result in differentiated capital income from various sectors.

Other sources of household income include dividends, government transfers, and foreign income. In the case of the Philippines foreign income is largely foreign remittances of contract workers.

One can observe that there are large differences in the sources of income across household groups. Tariff reduction that affects relative price ratios will affect factor demand, which in turn will affect factor prices, both wages and the rate of return to capital. These changes will have differentiated effects on household income.

Table 7 : Household Consumption Share (%)

	Urban Households						Rural Households					
	ur1	ur2	ur3	ur4	ur5	ur6	rur1	rur2	rur3	rur4	rur5	rur6
Crops	4.3	3.5	3.1	4.2	3.3	2.6	4.8	3.8	3.2	4.6	4.4	5.0
Livestock	5.0	4.0	3.5	4.8	3.7	3.0	5.6	4.4	3.7	5.2	5.1	5.8
Fishing	3.9	3.1	2.8	3.7	2.9	2.3	4.3	3.4	2.9	4.1	4.0	4.5
Other Agriculture												
AGRICULTURE	13.1	10.7	9.4	12.7	9.9	8.0	14.7	11.6	9.8	13.9	13.5	15.3
Mining	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2
Food Manufacturing	35.5	27.4	23.8	32.6	24.6	20.6	40.2	37.6	22.7	35.7	36.1	40.3
Non-food Manufacturing	12.7	14.7	16.2	13.8	15.8	16.5	10.8	12.7	16.5	12.8	13.9	12.8
Construction	0.3	0.3	0.3	0.3	0.4	0.4	0.2	0.2	0.3	0.2	0.2	0.2
Electricity, Gas and Water	1.3	1.2	1.2	1.4	1.3	1.1	0.9	1.2	0.6	1.1	1.6	1.0
INDUSTRY	49.8	43.7	41.6	48.3	42.3	38.7	52.2	51.8	40.3	50.1	52.0	54.4
Wholesale trade & retail	11.8	16.5	15.8	11.8	16.1	18.8	10.3	10.6	14.3	10.3	8.5	7.4
Other Services	25.2	29.1	33.2	27.1	31.7	34.5	22.7	26.0	35.6	25.7	26.1	22.8
Government services												
SERVICES	37.1	45.6	49.0	38.9	47.8	53.3	33.0	36.5	49.9	36.1	34.5	30.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: 1994 SAM

The CGE Model

A CGE model was specified and calibrated to the 1994 SAM to analyze the effects of tariff reforms on income distribution and welfare. The model is called PCGEM, whose complete set of equations is presented in the Appendix A.

PCGEM has 12 production sectors, 4 of which comprise agriculture, fishing and forestry. There 5 sectors in industry, including utilities and construction. The service sector is composed of 3 sectors, including government service sector. The model distinguishes two factor inputs, labor and capital, which determines sectoral value added using CES production function. The model incorporates 4 types of labor: skilled agriculture labor, unskilled agriculture labor, skilled production labor, and unskilled production labor. Agriculture labor is devoted to agriculture sector only. Similarly, production labors work in non-agriculture sector only. As defined earlier, skilled production workers include professionals, managerial, and other related workers with at least high school diploma.

Table 8 : Sources of Household Income (%)

	Urban Households						Rural Housholds					
	ur1	ur2	ur3	ur4	ur5	ur6	rur1	rur2	rur3	rur4	rur5	rur6
Agriculture-skilled	0.0	1.0	0.2	0.0	0.1	0.1	0.0	82.1	0.7	0.0	11.2	0.1
Agriculture-unskilled	6.6	0.0	0.1	1.4	0.0	0.1	64.5	0.0	25.6	16.2	0.0	13.2
Production-skilled	0.0	88.0	83.4	0.0	48.8	14.1	0.0	2.8	5.0	0.0	3.5	0.1
Production-unskilled	64.0	0.0	2.3	24.7	0.0	2.3	3.6	0.0	1.4	0.7	0.0	0.8
Capital in Agriculture	1.4	0.4	0.4	8.7	2.1	2.6	5.3	0.8	4.4	19.1	20.0	26.8
Capital in Industry	7.8	1.0	1.7	19.3	9.4	45.6	2.7	0.4	0.7	18.0	0.1	11.3
Capital in WRT*	4.6	1.2	2.5	12.3	10.9	10.3	0.7	2.6	0.4	6.1	0.1	5.8
Capital in OSER**	8.6	3.6	3.8	14.2	10.5	7.0	9.2	8.1	21.3	18.0	13.7	17.3
Dividends	1.6	3.3	3.4	8.3	8.1	15.6	0.3	0.0	0.5	2.4	33.6	7.4
Government Transfers	2.9	0.5	0.5	4.7	3.2	1.0	13.3	2.6	37.6	15.8	14.1	16.2
Foreign Soruces	2.5	1.2	1.8	6.5	6.9	1.3	0.5	0.6	2.4	3.7	3.7	1.1
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* WRT : Wholesale and retail trade

**OSER: Other services

Sectoral capital however is fixed. Value added, together with sectoral intermediate input, which is determined using fixed coefficients, determine total output per sector. In both product and factor market, prices adjust to clear all markets.

The household sector is divided into urban and rural. Each category is grouped into six socio-economic classes according to the level of education of the head of household. Table 6 provides a detailed definition of each household class.

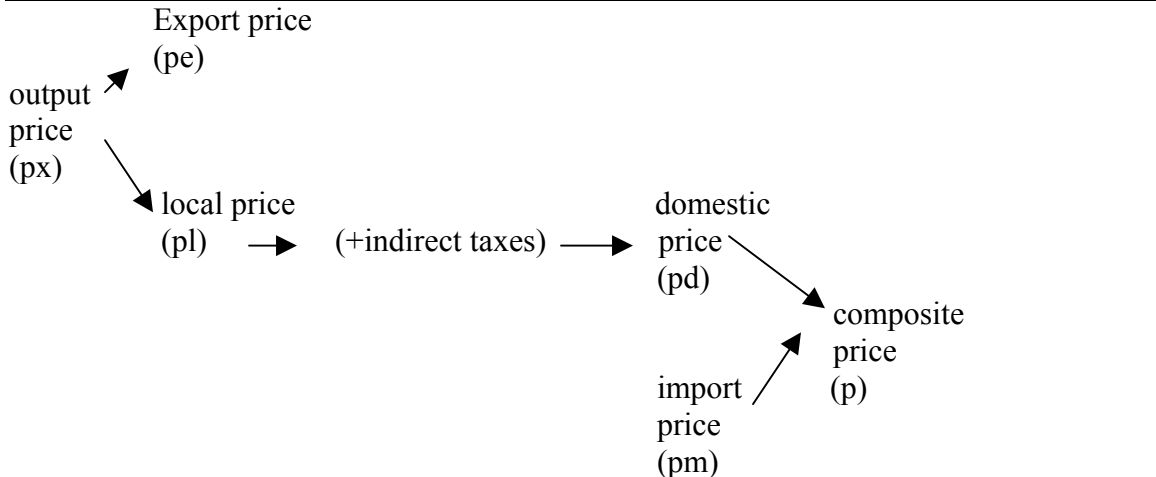
Figure 1 shows the basic price relationships in the model. Output price, p_x , affects export price, p_e , and local prices, p_l . Indirect taxes are added to the local price to determine domestic prices, p_d , which together with import price, p_m , will determine the composite price, p . The composite price is the price paid by the consumers.

Import price, p_m , is in domestic currency, which is affected by the world price of imports (p_{wm}), exchange rate (er), tariff rate (tm), and indirect tax rate (itx). Therefore, the direct effect of tariff reduction is a reduction in p_m . If the reduction in p_m is significant enough, the composite price (p) will also decline. Note that in the market consumers face the composite price. Thus, the composite price is also the consumer price.

Consumer demand is based on Cobb-Douglas utility functions. Armington-CES (constant elasticity substitution) function is assumed between local and imported goods,

while a CET (constant elasticity of transformation) is imposed between exports and local sales. Production and trade elasticities are discussed and presented in the Annex.

Figure 1: Basic Price Relationships in PCGEM



where $pm = p_{wm} * er * (1 + tm) * (1 + itx)$; p_{wm} is world price of imports; er exchange rate; tm tariff rate; itx indirect tax

The model closure used has the following features:

i. Government account closure. Government consumption is held fixed. Government income is also fixed by introducing an automatic compensatory tax. There are three compensatory taxes that are separately experimented in the paper: income tax, indirect tax, and a combination of indirect and income tax. These two assumptions together effectively fix government savings.

ii. Current account closure. The current account balance is held fixed. This in effect avoids the possibility of foreign financing for the tariff reduction program. That is, foreign debt is not accumulated while the reform process is undertaken. Moreover, the nominal exchange rate is held fixed. What clears the current account balance is the movement in the real exchange rate, which is captured effectively by the changes in the ratio between domestic and foreign prices.

iii. Total investment closure. Total savings is composed of government savings, foreign savings (both of which are held fixed) and private savings. The experiments conducted in the paper all assume a neoclassical closure wherein total savings is invested.

Experiments

There are 4 experiments conducted in the paper. Below is a brief description of each one of them.

Experiment 1 (E1). This experiment involves simulating the actual reduction in sectoral tariff rate as shown in Table 1. The compensatory tax is through additional income tax. This experiment is in line with the structure of the government revenue as presented in Table 2 wherein an increasing share of income tax revenue is observed during the period of declining share of tariff revenue. In effect, this experiment is revenue-neutral while it reduces the distortion coming from tariff rates. The results of this experiment are discussed in great detail below.

Experiment 2 (E2). This experiment is the same as E1 except that the compensatory tax is through additional indirect tax on output. Although this experiment is revenue-neutral, the additional indirect tax in effect replaces the distortion coming from tariff rates with distortion from indirect output tax. The term distortion in the present context implies that the imposition of taxes results in changes in the sectoral price ratios. The results of this experiment are presented in the Annex.

Experiment 3 (E3). This experiment is the same as in the previous two experiments except that the compensatory tax is through a combination of additional income and indirect taxes. The results are also presented in the Annex together with the results of E2.

Experiment 4 (E4). This experiment involves a set of simulation runs testing the sensitivity of the distribution and welfare effects to changes in production and trade elasticities. The Armington and the CET elasticities in trade and the substitution parameters in production were adjusted by +20 percent and -20 percent from the base values. The results are presented in the Annex.

Simulation Results

From Tariff Reduction to Reallocation of Production. The price and volume effects of experiment E1 are presented in Table 9. Tariff reduction results in an overall reduction in the domestic price of imports (δp_m) of -10.4 percent. Similarly, the overall composite price (δp_q) declines by -4.1 percent, while the domestic prices of local goods (δp_d) declines by -3.4 percent. Thus tariff reduction translates into reduced domestic prices.

What are the volume effects? The reduction in tariff results in shifts in the relative import-domestic price ratios, which in turn trigger substitution between imports and domestically produced goods. For example, import volume (δm) increases by 6.3 percent while domestic production declines by -0.6 percent. Taken together these changes result in a marginal increase in the total goods available in the market as shown by a 0.6 percent improvement in the composite goods (δq).

The overall decline in domestic prices creates an effective real exchange depreciation, which in turn increases export competitiveness across almost all sectors. This is reflected in the reduction in the sectoral price ratio between export prices and the

corresponding local prices $\delta(pe_i/pl_i)$ where pe_i is the export price in domestic currency and pl_i is local prices without indirect taxes. However, there is a marginal increase of 0.3 percent in the ratio for other agriculture, but this sector has very small export share, thus its impact on the overall export is correspondingly very small also. Because of these effects, overall export increases by 6.1 percent, which in turn increases total output marginally by 0.6 percent.

Table 9: Price and Volume Effects (E1)

	Price Changes (%)					Volume Changes (%)				
	δpm_i	δpd_i	δpq_i	δpx_i	$\delta(pe/pl)_i$	δm_i	δe_i	δd_i	δq_i	δx_i
Crops	-5.9	-0.9	-1.0	-0.8	-0.9	8.4	-0.8	-2.0	-1.8	-1.9
Livestock	-0.4	-1.1	-1.1	-1.1	-1.1	-2.9	-1.4	-1.9	-1.9	-1.9
Fishing	-18.5	-1.9	-2.0	-1.5	-1.9	20.3	1.0	-1.9	-1.8	-1.3
Other Agriculture	-0.1	0.4	0.3	0.3	0.3	0.5		0.1	0.1	0.1
AGRICULTURE	-3.4	-1.1	-1.1	-0.9		3.3	0.1	-1.8	-1.7	-1.6
Mining	-25.8	-8.1	-21.5	-4.5	-8.0	12.4	0.7	-11.3	5.6	-6.0
Food Manufacturing	-14.0	-2.0	-3.0	-1.8	-2.0	12.7	0.3	-2.1	-1.0	-1.9
Non-food Manufacturing	-10.4	-6.5	-8.5	-4.2	-6.5	6.3	12.1	2.2	4.2	5.7
Construction	0.0	-2.0	-2.0	-2.0	-2.0	-1.4	3.6	1.1	1.0	1.1
Electricity, Gas and Water	0.0	-2.4	-2.4	-2.4	-2.4		3.1	0.1	0.1	0.2
INDUSTRY	-11.9	-3.9	-6.6	-3.1		7.2	9.9	0.1	2.4	2.3
Wholesale trade & retail	0.0	-1.1	-1.1	-0.9	-1.7		0.2	-1.1	-1.1	-0.8
Other Services	0.0	-1.7	-1.6	-1.5		-3.2	0.9	-1.1	-1.3	-0.8
Government services				-0.4						0.4
SERVICES	0.0	-1.5	-1.4	-1.2		-3.2	0.6	-1.1	-1.2	-0.7
TOTAL	-10.4	-3.2	-4.1	-2.0		6.3	6.1	-0.6	0.6	0.6

where

m_i : imports

e_i : exports

d_i : domestic sales

q_i : composite commodity

x_i : total output

pm_i : import (local) prices

pe_i : export (local) prices

pd_i : domestic prices

pl_i : local prices

px_i : output prices

pq_i : composite commodity prices

On the whole, tariff reduction results in an increase in: (a) imports because of lower import prices, (b) exports because of improvement in competitiveness due to lower domestic prices; (c) overall output because of the export pull; and (d) total goods available in the market because of higher imports. However, domestic production for domestic sales (δd) declines because of substitution effects.

What are the effects at the sectoral level? The effects vary considerably across sectors, triggering reallocation of output. The effects are largely due to the differences in the sectoral structure of imports and exports, initial tariff rates, and the trade elasticities. As discussed below, the differentiated sectoral results, especially on factor prices, contribute largely to the varied effects across household groups.

Industry as a whole realizes the largest drop in import prices (-11.9 percent) as compared to agriculture's import prices drop of -3.4 percent. In terms of specific sectors,

the largest drop in import prices is observed in mining (-25.8 percent), in food manufacturing (-14.0 percent), and in non-food manufacturing (-10.4 percent). These differentiated effects are due to the different levels of initial tariff rate.

The sectoral effects on import volume are due to the differentiated effects on import prices and on the differences in the import elasticities (the armington elasticities). Taking these factors together results in the largest increase in import volume (δm_i) in fishing (20.3 percent), in food manufacturing (12.7 percent), and in crops (8.4 percent). Import volume for the non-food manufacturing sector registers an increase of 6.3 percent only. However, since the non-food manufacturing sector is the largest importer (76.1 percent of total imports, see Table 4), the bulk of the increase in the overall import volume comes largely from this sector.

One set of results on non-food manufacturing needs further elaboration. In particular, the results on the sector's imports (δm), domestic production (δd) and the composite (δq), since this sector is a major contributor to the various totals. One may observe that the drop in its import prices is larger than the decline in its domestic prices, -10.4 percent and -6.5 percent, respectively. Thus, one would expect that this relative price change favoring imports would lead to a reduction in domestic production. However, the result on domestic production indicates an increase of +2.2 percent. There are no inconsistencies in the results because the composite good (δq) for the sector registers an increase of 4.2 percent⁴.

Except for livestock, all sectors register an increase in exports. The increase is largely attributed to the improvement in export competitiveness across sectors as seen earlier. To reiterate, export competitiveness is indicated by the decline in the price ratio $\delta(p_e/p_l)$ is the export price in domestic currency and p_l is local prices without indirect taxes. One may observe from the results that the largest increase in export competitiveness is in mining (-8.0 percent), and in non-food manufacturing (-6.5 percent). However, the results on the mining sector may be less interesting because its share to the total export is small. But the result on the non-food manufacturing is critical as it contributes largely to the overall exports of the country (48.2 percent to total exports, see Table 4). This result, together with the increase in domestic production for non-manufacturing, brings about an overall increase in its total production of 5.7 percent. This is the only sector that registers a relatively significant increase in output. Marginal increases are observed in other agriculture (+0.1 percent), in utilities⁵ (+0.2 percent), construction (1.1 percent), and government services (0.4 percent).

Thus, the results indicate quite clearly that given the structure of the economy and the extent of the actual reduction in tariff rate reallocation of production favors the non-food manufacturing sector.

⁴If one puts these results in the framework of production theory where imports and domestic production are factor inputs and one isoquant indicates one level of output, the results would indicate an outward shift in the isoquant since q is higher together with higher imports and domestic production.

⁵Electricity, gas and water.

From Reallocation of Production to Factor Markets. What happens to the flow of resources across sectors? Since all sectoral capital is fixed, the flow of resources pertains to the sectoral movements of labor only across sectors as tariff is reduced. The results on factor price ratios and capital-labor ratios are important in assessing sectoral labor movements. The results are presented in Table 10.

Table 10: Effects on Factor Market

	Factor Intensity (k/l) _i		Change (%) in Return to Capital	Change (%) in Labor Demand				
	base	experiment		Aggregate Labor	L1*	L2*	L3*	L4*
Crops	0.98	1.02	-1.3	-3.7	-0.4	-0.3		
Livestock	0.99	1.02	-1.3	-3.7	-0.4	-0.3		
Fishing	1.79	1.86	-1.2	-3.5	-0.1	-0.1		
Other Agriculture	1.00	0.99	1.3	0.3	3.6	3.7		
AGRICULTURE			-1.1	-3.4				
Mining	1.15	1.31	-7.5	-12.6			-12.8	-15.3
Food Manufacturing	1.74	1.83	-2.3	-5.0			-5.4	-8.0
Non-food Manufacturing	1.23	1.09	9.8	13.1			12.6	9.5
Construction	1.28	1.25	2.9	2.5			2.1	-0.7
Electricity, Gas and Water	2.97	2.95	1.6	0.6			0.2	-2.5
INDUSTRY			3.6	4.9				
Wholesale trade & retail	1.95	1.99	-0.4	-2.3			-2.7	-5.4
Other Services	1.64	1.68	-0.3	-2.2			-2.6	-5.3
Government services				0.4			-0.1	0.0
SERVICES			-0.4	-1.4				
TOTAL			0.9					
Average Wage:				1.2	-2.2	-2.3	1.6	4.5

*L1, L2, L3, & L4: Labor type 1, 2, 3, & 4

The reduction in tariff results in an increase in both the overall average rate of return to capital (0.9 percent) and the average wage rate of aggregate labor (1.2 percent). Across sectors however, the results vary. For example, in the sectoral rate of return to capital, three sectors indicate an increase: non-food manufacturing (9.8 percent), construction (2.9 percent), and utilities (1.6 percent). The rest show a decline. As a result, these changes trigger factor substitution in favor of labor as indicated by the decline in their capital-output ratios. It is interesting to note that in terms of labor, there is a tendency for the demand for skilled labor to be pulled up. For example, the demand for labor is higher for L3 than for L4 in the case of the non-food manufacturing sector. In the case of both construction and utilities, the demand for L3 shows an increase whereas the demand for L4 indicates a decline. L3 is skilled production workers.

In sum, the results of the experiment indicate that the non-manufacturing sector benefits from both the effects of output reallocation and labor movement. Furthermore, there are indications that show that, as a result of the shifts in both output and factor price ratios, factor substitution favors skilled production workers in non-food manufacturing, construction and utilities sectors. Also, the results show that agriculture wages decline while production wages improve. All these will have important implications on income of households as discussed in the next section.

From Factor Markets to Household Income. What are the effects on the sources of income of households? The results are presented in Table 11.

The results concerning the demand for labor indicate that in the case of agriculture there is movement towards other agriculture sector. On the other hand, in the case of non-agriculture there is movement towards non-food manufacturing, construction and utilities. Movement towards non-food manufacturing however is significant at 13.1 percent.

Table 11: Effects on Household Income, percent change from base (E1)

	Total	Urban Households						Rural Households					
		ur1	ur2	ur3	ur4	ur5	ur6	rur1	rur2	rur3	rur4	rur5	rur6
Labor:	1.2	3.8	1.5	1.7	4.1	1.6	1.9	-1.9	-2.1	-1.4	-2.0	-1.3	-1.8
L1	-2.2	0.0	-2.2	-2.2	0.0	-2.2	-2.2	0.0	-2.2	-2.2	0.0	-2.2	-2.3
L2	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.3
L3	1.6	0.0	1.6	1.6	0.0	1.6	1.6	0.0	1.6	1.6	0.0	1.6	1.5
L4	4.5	4.5	0.0	4.5	4.5	0.0	4.5	4.5	0.0	4.5	4.5	0.0	4.5
Capital	0.9	1.0	0.2	0.4	0.9	0.7	2.4	0.1	-0.2	-0.3	0.6	-0.8	0.0
used in : Agriculture	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1
Industry	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.5	3.6
WRT*	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.4
OSER**	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Others: dividends	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
govt transfers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
foreign income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.9	2.9	1.4	1.5	1.6	1.0	1.9	-1.3	-1.8	-0.5	0.0	-0.5	-0.2

* WRT: Wholesale and retail trade

** OSER : Other services

The results on the average wage rate across labor types are interesting because they are particularly relevant in assessing the effects of household income. The effects indicate that agriculture wages decline for both skilled and unskilled, while production wages increase for both skilled and unskilled. The decline in agriculture wages is largely due to the overall decline in the demand for labor in agriculture⁶, which in turn is the result of the decline in the overall agriculture output as discussed earlier. The mechanism in effect is that, since the supply of agriculture labor is fixed any decline in factor demand because of lower output will result in lower wage rate. Wage rate is market-clearing in the model.

In the case of production workers wage rates for both skilled and unskilled increase, but the increase is larger in the latter than in the former. Again, similar mechanism is in effect. The supply of production labor is fixed similar to the supply of agriculture labor. Therefore, the improvement in the demand for labor, which largely comes from the non-food manufacturing sector because of the improvement in its output, translates into higher wages for production workers.

Overall household labor income increases by 1.2 percent as a result of the tariff reduction. However, the increase favors urban over rural households. In fact, all urban households enjoy positive increase in labor income, while all rural households suffer

⁶Factor demands are specified as first-order conditions for profit maximization.

from lower income. This effect is entirely due to the decline in agriculture wages as compared to the increase in production wages as a result of tariff reduction. These differentiated effects on wages are in turn the effects of reallocation of production favoring industry.

There are interesting results within urban households. The highest increase is observed in UR4 (4.0 percent) and in UR1 (3.8 percent). One should note that these groups are headed by household heads who are unskilled workers. Again, the differentiated effects within urban households are due to the much higher increase in wages for unskilled production workers (4.5 percent, see Table 10) relative to wages for skilled production workers (1.6 percent). One should note also that the differentiated effects in production wages have offset the increase in demand for skilled production workers as a result of tariff reduction as observed earlier.

In terms of capital income, the effects again are biased against rural households. All urban households enjoy positive increase in capital income. On the other hand, in rural households only RUR1 and RUR4 enjoy an increase in capital income. The increase in capital income for these households is largely due to the increase in income from capital employed in industry. Again, this is because of the reallocation effects favoring industry, particularly non-food manufacturing sector.

From Household Income to Household Consumption. What are the effects at the level of household consumption? As modeled, there are two major factors influencing household consumptions: domestic prices and household income. Table 12 shows the comparative household results on consumption, consumer prices, income, total and disposable (net) household income. The results are presented both in terms of nominal and real changes. Furthermore, the table also includes the results of the computations of equivalent variation, EV, which is a measure of welfare used in the analysis. Its detailed discussion however is in the next section.

Table 12: Household Effects, E1

Change (%) in:	All	Urban Households						Rural Households					
		ur1	ur2	ur3	ur4	ur5	ur6	rur1	rur2	rur3	rur4	rur5	rur6
Consumption: Nominal	-1.08	1.45	-0.87	-1.85	-1.11	-3.45	-0.68	-0.56	-0.50	-2.55	0.65	0.14	-4.77
Real *	1.87	4.37	2.05	1.07	1.86	-0.49	2.28	2.38	2.36	0.41	3.64	3.07	-1.74
Consumer Prices**	-2.95	-2.92	-2.92	-2.92	-2.98	-2.96	-2.96	-2.94	-2.86	-2.96	-2.99	-2.94	-3.03
Total Income: Nominal	0.88	2.93	1.39	1.46	1.58	1.01	1.89	-1.29	-1.78	-0.54	0.02	-0.46	-0.23
Real *	3.83	5.85	4.31	4.38	4.55	3.97	4.85	1.64	1.08	2.41	3.01	2.47	2.80
Disposable Inc: Nominal	-4.02	-1.52	-3.77	-4.78	-4.04	-6.32	-3.62	-3.41	-3.46	-5.52	-2.33	-2.93	-7.63
Real *	-1.07	1.40	-0.85	-1.86	-1.07	-3.36	-0.66	-0.47	-0.60	-2.56	0.66	0.01	-4.60
Welfare***	1.68	3.98	1.97	0.99	1.48	-0.78	2.17	2.13	2.55	0.10	3.54	2.82	-2.22

* Nominal change - change in consumer prices

** This is composite price, pq, weighted by the shares in the consumer basket

*** Computed using the formula discussed in the text

There are a number of interesting results. Start with consumer prices. Earlier, it was observed that because of tariff reduction, domestic prices drop. This decline translates into a reduction in consumer prices, averaging -2.95 percent. Across households, the variation in the drop in consumer prices is small, but the highest drop in seen in Rur6 (-3.03 percent) and the lowest in Rur2 (-2.86 percent).

On the average, overall nominal consumption declines by -1.08 percent. Across households the results vary. Households Ur1, Rur4 and Rur5 show positive increase in nominal consumption, while the rest indicate a decline. The largest increase is in Ur1, while the biggest drop is in Rur6.

However, expressed in terms of real consumption the general results change significantly. The relatively larger drop in consumer prices offsets the overall drop in nominal consumption. Across households the results vary. While almost all suffer from a decline in terms of nominal consumption, only Ur5 and Rur6 suffer from a drop in terms of real consumption. The rest enjoy higher real consumption.

The results on household income are also interesting. Earlier it was observed that tariff reduction results in a biased change in income in favor of the urban households. This is because of the drop in agriculture wages and the improvement in production wages. However, in terms of real income the results change significantly. All households, both urban and rural, enjoy a positive increase in real income. The real increase was largely due to the drop in consumer prices. However, the increase in urban real income is a bit larger than the increase in rural real income. Overall real income increases by 3.83 percent, as compared to the 0.88 percent improvement in nominal income.

In discussing the effects on disposable income, one is reminded with the closure rule used in this particular experiment, which incorporates an automatic compensatory tax on income. Because of this the results show a much larger drop in nominal disposable income. Total nominal disposable income declines by -4.02 percent, as compared to the increase in total nominal income of 0.88 percent. Across household the largest drop is observed in Rur6 (-7.63 percent) and in Ur5 (-6.32 percent).

However, the large drop in nominal disposable income is again partly offset by the drop in consumer prices, resulting in a much lower drop in real disposable income of -1.07 percent. Across households Ur1, Rur4, and Rur5 indicate positive increase in real disposable income, while the rest show negative change.

In sum, the significant drop in consumer prices as a result of the tariff reduction offset the negative effects in nominal values of income and consumption of households. In terms of nominal income, the results seem to indicate that tariff reform is regressive. However, if the effects on prices are taken into account, the whole story is altered. All households benefit in terms of higher real income and consumption. One implication of these results is that price reforms (tariff reduction is one major form of price reform) may have positive real effects on households. This will become clearer as the results of experiment E2 is discussed in the Annex. In experiment E2, tariff rate reduction is

compensated with additional indirect tax on output. This compensatory tax replaces tariff rates, which in effect introduces another form of price distortion.

Finally, From Trade Tariff Reforms To Household Welfare. The effects on household welfare are estimated through the equivalent variation (EV), which is one measure of welfare commonly used in the literature. The computation of EV in the present paper is based on the base consumption and consumer prices. In particular, it is computed as the percentage change from the benchmark (base) consumption and consumer prices. That is,

$$EV_h = 100 * \frac{\left(\sum_{td} Ch_{td,h} \cdot \prod_{td} \left[\frac{PQ_{0,td}}{PQ_{1,td}} \right]^{kt_ch} - \sum_{td} Ch_{0,td,h} \right)}{\sum_{td} Ch_{0,td,h}}$$

where EV_h is household welfare, $Ch_{td,h}$ and $Ch_{0,td,h}$ are household consumption before and after the simulation experiment, $PQ_{0,td}$ and $PQ_{1,td}$ are composite prices before and after the simulation. kt_ch is household consumption parameter. The index for tradable good is td , while the index for households is h .

From the equation it is clear that tariff reforms affect household welfare through the effects on prices and consumption. As discussed earlier, household consumption is influenced by household income and prices. Thus, the welfare effects shown in Table 12 are presented together with the effects on prices and income at the level of households.

The welfare analysis indicates that despite the compensatory income tax, the overall tariff reduction increases the EV by 1.68 percent. As such, the tariff reduction program is welfare-improving, although it is very small relative to the magnitude of the overall reduction in the tariff rate, which is -65 percent. The positive welfare effects come from the positive real income effects and the positive consumption effects, which in turn are due to the significant drop in prices as a result of tariff reduction.

Thus, across households the results in real terms are not as bad as it would seem as viewed initially from the nominal income change. Although Ur5 and Rur6 suffer from negative welfare change this is largely due to the negative effects from the compensatory income tax. The rest of the household classes enjoy positive welfare change.

Some Insights

Tariff reform, particularly tariff reduction, is a major piece of economic reform implemented in the last one and half decades in the Philippines. It is a major form of price reform. Its effect on households is extremely difficult to trace not only because of the web of direct and indirect effects that it will generate, the size and the direction of these effects are not generally known. In fact, in the literature one may not be able to

make sweeping statement regarding the effects of trade reform because the results are country-specific. Thus, the paper attempted to construct an updated SAM for the Philippine economy based on actual data for the use of specifying and calibrating a non-linear CGE model.

Some interesting insights that can be drawn from the tariff reduction experiments include: (a) significant drop in domestic prices; (b) improvement in export competitiveness through the effective depreciation in the real exchange rate; (c) reallocation of production and resources towards the non-food manufacturing sector, which is a dominant sector both in trade and production; (d) drop in agriculture wages and increase in production wages; and (f) factor substitution favoring skilled production workers.

The effects on nominal income are biased against rural households. This is largely because of the decline in agriculture wages and the improvement in production wages. However, the significant drop in prices, especially consumer prices, offsets almost all of these negative effects. As a result, both real household income and consumption improve. Therefore, the tariff reduction program is generally welfare-improving, as indicated by the positive increase in the EV, except for the following households Ur5 and Rur6. The negative welfare effects in these household classes are largely due to the compensatory tax on income.

References

- Baliscan, A. (1999). "Poverty Profile in the Philippines" (Mimeo)
- Clarete, R. and Warr, P. (1992). The Theoretical Structure of the APEX Model of the Philippine Economy. (Unpublished manuscript).
- Cloutier, M., Cockburn, J., and Decaluwé, B. (2002). Welfare, Poverty and Distribution Effects of Trade Liberalization: A Review of the CGE Literature. CREFA, Laval University. (Unpublished manuscript).
- Cororaton, C.B. (2000). The Philippine Tariff Reform: A CGE Analysis. Philippine Institute for Development Studies Discussion Paper No. 200-35.
- Cororaton, C.B. (1994) Structural Adjustment Policy Experiments: The Use of Philippine CGE Models. Philippine Institute for Development Studies Discussion Paper No. 99-03.
- Manasan, R. and Querubin, R. (1997) Assessment of Tariff Reform in the 1990s. Philippine Institute for Development Studies Discussion Paper No. 97-10.
- Selected Philippine Economic Indicators, Bangko Sentral ng Pilipinas. Various issues.
- 1994 Input-Output Table. National Statistical Coordination Board
- 1994 Family Income and Expenditure Survey. National Statistics Office.
- 1990 Social Accounting Matrix. National Statistical Coordination Board

Annex

This Annex discusses the results of experiments E2, E3, and E4.

Experiments E2 and E3

Experiment E2 replaces the compensatory tax on income in experiment E1 with a compensatory tax on indirect output. The compensatory indirect output tax affects domestic prices, import prices, and total indirect tax revenue of the government. It affects domestic and import prices through the following equations.

$$pd_{id} = pl_{id} \cdot [1 + itxr_{id} \cdot (1 + ntaxr)]$$

$$pm_{id_1m} = pwm_{id_1m} \cdot er \cdot (1 + tm_{id_1m}) \cdot (1 + itxr_{id_1m} \cdot (1 + ntaxr))$$

where:

- pd : domestic price
- ixtr : indirect tax
- ntaxr : compensatory tax
- pm : import price in domestic currency
- pwm : world price of imports
- er : nominal exchange rate
- tm : tariff rate

Thus, through these equations a tariff reduction is partly offset by an increase in the compensatory tax. Therefore, the full reduction in tariff is not realized because of a new indirect output tax.

On the other hand, Experiment E3 replaces the compensatory tax with a combination of income tax and indirect output tax. The income tax, as used in experiment E1, is through the following equation

$$dyh_h = yh_h \cdot (1 - dtxrh_h \cdot (1 + ntaxr))$$

where:

- d yh : disposable household income
- yh : household income
- dtxrh : direct income tax rate
- ntaxr : compensatory tax

Table 1-Annex : Effects on Price, %

	E 2			E 3		
	$\delta p m_i$	$\delta p d_i$	$\delta p q_i$	$\delta p m_i$	$\delta p d_i$	$\delta p q_i$
Crops	-4.4	-0.4	-0.5	-5.1	-0.6	-0.7
Livestock	1.1	0.2	0.3	0.4	-0.4	-0.4
Fishing	-16.6	0.2	0.1	-17.5	-0.8	-0.8
Other Agriculture	1.8	1.0	1.0	0.9	0.7	0.7
A G R I C U L T U R E	-1.9	0.0	-0.1	-2.6	-0.5	-0.5
Mining	-25.1	-7.5	-20.8	-25.4	-7.8	-21.1
Food Manufacturing	-11.4	1.4	0.3	-12.6	-0.2	-1.3
Non-food Manufacturing	-9.3	-4.8	-7.0	-9.8	-5.6	-7.7
Construction	1.3	-1.3	-1.2	0.7	-1.6	-1.6
Electricity, Gas and Water	0.0	-0.8	-0.8	0.0	-1.5	-1.5
I N D U S T R Y	-10.6	-1.8	-4.7	-11.2	-2.8	-5.6
Wholesale trade & retail	0.0	2.3	2.3	0.0	0.7	0.7
Other Services	3.0	1.0	1.2	1.6	-0.2	-0.1
S E R V I C E S	3.0	1.4	1.5	1.6	0.1	0.2
T O T A L	-9.0	-1.0	-2.0	-9.6	-2.0	-3.0

Table 1-Annex shows the price effects of both experiments. As expected, the full effect of the reduction in tariff rate is not realized. While E1 shows an overall reduction in import prices (δpm) of -10.4 percent (see Table 9 in the main text), E2 and E3 register a price reduction of -9.0 percent and -9.6 percent, respectively. The price reduction in the latter is relatively higher than in the former because the compensatory tax is only on indirect tax in E2 while it is on both indirect tax and income tax in E3. The results on the other prices, δpd and δpq , follow the same trend as in δpm .

At the sectoral level, there are significant changes because some of the sectoral prices indicate an increase in the case of E2. In particular, prices for livestock, fishing, and food manufacturing increase, as compared to a reduction in E1 and E3. Therefore, while the experiment reduces price distortion from tariff, it introduces a new set of distortion with additional indirect tax. This could have a significant effect on the households because as observed earlier a major part of the consumer basket of household comes from food manufacturing.

Table 2-Annex presents the volume effects. The volume effects are slightly lower in E2 and E3 as compared to E1. At the sectoral level the differences in the results for the three experiments are marginal.

Table 3-Annex shows the results on the factors of production. There are significant changes in the results that could have important implications at the household in both E2 and E3. While the overall average rate of return to capital increases by 0.9 percent in E1 (see Table 10 in the main text), it declines by -1.2 percent in E2 and by -0.2 percent in E3.

In the case of E1 the overall average wage rate of aggregate labor increases by 1.2 percent. In E2 it declines by -0.8 percent. However, in E3 it shows a positive increase of 0.1 percent.

Table 2-Annex : Effects Volume , %

	E 2			E 3		
	δm_i	δe_i	δq_i	δm_i	δe_i	δq_i
Crops	6.8	0.9	-1.4	7.5	0.1	-1.6
Livestock	-2.7	-1.0	-1.5	-2.8	-1.2	-1.7
Fishing	20.8	2.0	-1.2	20.6	1.5	-1.5
Other Agriculture	-0.3		0.3	0.0		0.2
A G R I C U L T U R E	2.6	1.5	-1.3	2.9	0.8	-1.5
Mining	11.4	1.0	4.9	11.9	0.8	5.2
Food Manufacturing	13.0	-0.5	-1.1	12.9	-0.1	-1.0
Non-food Manufacturing	6.3	10.7	3.9	6.3	11.4	4.1
Construction	-2.8	3.5	0.2	-2.2	3.5	0.6
Electricity, Gas and Water		3.4	0.3		3.2	0.2
I N D U S T R Y	7.1	8.6	2.1	7.1	9.2	2.2
Wholesale trade & retail		0.7	-1.6		0.5	-1.4
Other Services	-3.1	1.4	-1.0	-3.1	1.2	-1.2
S E R V I C E S	-3.1	1.1	-1.2	-3.1	0.9	-1.2
T O T A L	6.2	5.6	0.5	6.2	5.9	0.6

There are significant differences at the various types labor. Larger drop in agriculture wages is observed in E2 and E3, as compared to E1. The average wage rate for L3 drops by -0.5 percent in E2, as compared to an increase of 1.6 percent in E1 and 0.5 percent in E3. While the average wage rate for L4 increases in the three experiments, the improvement in E1 is significantly higher (4.5 percent), as compared to E2 (1.5 percent) and E3 (2.9 percent). However, differences in the effects on the volume of the factors of production in the three experiments are marginal.

Table 4-Annex presents the effects on the sources of household income. Because of the differences in the rates of return to various factors of production the effects on factor income of households vary in the three experiments. While E1 registers an increase of 1.2 percent in the total household labor income (see Table 11 in the main text), it registers a decline of -0.8 percent in E2. However, E3 shows an increase of 0.1 percent. In terms of the total household capital income, while E1 shows an increase of 0.9 percent, both E2 and E3 register a decline of -1.2 percent and -0.2 percent, respectively. In terms of the overall household, while E1 indicates an increase of 0.9 percent, E2 shows a decline of -0.8 percent. E3 registers no change.

At the various household levels the results do change considerably. In experiment E2, all household groups, except Ur1, show a decline in their respectively total nominal income. Furthermore, in this experiment the drop in total income for rural households is a lot higher. In terms of direction of change E1 and E3 generate the same results generally, except that the magnitude of change in the former is higher than the latter.

Finally, Table 5-Annex presents the differences in the effects on household welfare in the three experiments. While total household welfare improves by 1.68 percent as a result of the tariff reduction in experiment E1 (see Table 12 in the main text), it deteriorates by -0.1 percent in the case of E2 where the reduction in tariff is replaced with additional indirect tax. The major factor behind the decline in welfare in E2 is that

the decline in consumer prices is not large enough to offset the decline in both the nominal income and nominal consumption of households. As a result, both real income and real consumption decline. Furthermore, one can observe that E2 shows biased results against rural households.

Table 3-Annex : Effects on Factors of Production

	E 2			E 3		
	(k/l) _i	Change in	Change in	(k/l) _i	Change in	Change in
		Return	Aggregate		Return	Aggregate
		to Capital	Labor		to Capital	Labor
Crops	1.00	-2.6	-2.7	1.01	-2.0	-3.2
Livestock	1.01	-2.7	-2.9	1.02	-2.1	-3.3
Fishing	1.82	-1.8	-1.6	1.84	-1.5	-2.4
Other Agriculture	0.99	-0.4	0.6	0.99	0.4	0.4
A G R I C U L T U R E		-2.3	-2.3		-1.7	-2.8
Mining	1.32	-9.4	-12.7	1.31	-8.5	-12.6
Food Manufacturing	1.85	-4.6	-5.8	1.84	-3.5	-5.4
Non-food Manufacturing	1.11	6.4	11.1	1.10	8.0	12.0
Construction	1.28	-0.3	0.7	1.26	1.1	1.5
Electricity, Gas and Water	2.93	0.0	1.2	2.94	0.8	0.9
I N D U S T R Y		0.8	3.4		2.1	4.1
Wholesale trade & retail	2.01	-3.0	-3.3	2.00	-1.8	-2.9
Other Services	1.66	-1.7	-1.3	1.67	-1.0	-1.7
Government services			1.0			0.7
S E R V I C E S		-2.1	-1.0		-1.3	-1.1
T O T A L		-1.2			-0.2	
Average Wage: Aggregate labor			-0.8			0.1
Average wage: L1			-3.1			-2.7
Average wage: L2			-3.1			-2.7
Average wage: L3			-0.5			0.5
Average wage: L4			1.5			2.9

*L1, L2, L3, & L4: Labor type 1, 2, 3, & 4

Because of the larger drop in prices in E3 and in E2, total household welfare improves by 0.7 percent in the former because of positive increase in both real income and consumption. Across household groups the increase in the EV is a lot lower. In fact, Rur3 joins the list of household groups with negative EV. In E1 only Ur5 and Rur6 have negative EV.

Thus, the lesson that one may be able to draw from these additional experiments is that a tariff reform that is replaced with another form of price distortion may not at all be welfare-improving. In fact, given the structure of the Philippine economy and the extent of the tariff reduction, a tariff reform that is accompanied by a compensatory additional indirect tax on output results not only in a lower overall household welfare, but also in a biased set of effects against rural households. This policy reform may be anti-poor because of the fact that in the case of the Philippines more than about 70 percent of those who are in poverty are in the rural areas (Balisacan, 1999).

Table 4-Annex : Effects on Sources of Household Income, %

	E2			E3		
	Labor	Capital	Total	Labor	Capital	Total
ur1	1.1	-1.1	0.5	2.4	-0.2	1.6
ur2	-0.5	-1.5	-0.6	0.4	-0.8	0.3
ur3	-0.5	-1.6	-0.5	0.5	-0.6	0.4
ur4	1.3	-1.2	-0.3	2.6	-0.2	0.6
ur5	-0.5	-1.4	-0.7	0.5	-0.4	0.1
ur6	-0.3	-0.2	-0.2	0.7	1.0	0.8
rur1	-2.9	-1.5	-2.2	-2.4	-0.8	-1.8
rur2	-3.0	-1.8	-2.7	-2.6	-1.2	-2.3
rur3	-2.5	-1.8	-1.3	-1.9	-1.1	-0.9
rur4	-2.9	-1.3	-1.3	-2.5	-0.4	-0.7
rur5	-2.5	-2.0	-1.1	-1.9	-1.4	-0.8
rur6	-2.8	-1.6	-1.4	-2.3	-0.8	-0.8
total	-0.8	-1.2	-0.8	0.1	-0.2	0.0

Table 5-Annex: Effects on Household Welfare, %

E2	Consumption		Consumer	Total Income		Dis. Income		EV
	Nominal	Real	Prices	Nominal	Real	Nominal	Real	
ur1	0.8	1.1	-0.28	0.5	0.8	0.5	0.8	1.1
ur2	-0.2	0.0	-0.28	-0.6	-0.3	-0.6	-0.3	0.1
ur3	-0.1	0.2	-0.28	-0.5	-0.2	-0.5	-0.2	0.3
ur4	0.1	0.4	-0.36	-0.3	0.1	-0.3	0.1	0.4
ur5	-0.3	0.0	-0.35	-0.7	-0.4	-0.7	-0.4	0.0
ur6	0.2	0.5	-0.35	-0.2	0.2	-0.2	0.2	0.5
rur1	-2.0	-1.7	-0.30	-2.2	-1.9	-2.2	-1.9	-1.8
rur2	-2.5	-2.3	-0.20	-2.7	-2.5	-2.8	-2.6	-2.1
rur3	-0.8	-0.5	-0.29	-1.3	-1.0	-1.3	-1.0	-0.5
rur4	-0.9	-0.5	-0.39	-1.3	-0.9	-1.3	-0.9	-0.6
rur5	-0.6	-0.3	-0.32	-1.1	-0.7	-1.0	-0.7	-0.2
rur6	-1.0	-0.6	-0.43	-1.4	-0.9	-1.4	-1.0	-0.6
all	-0.4	-0.1	-0.32	-0.8	-0.5	-0.8	-0.5	-0.1
E3	Consumption		Consumer	Total Income		Dis. Income		EV
	Nominal	Real	Prices	Nominal	Real	Nominal	Real	
ur1	1.2	2.7	-1.50	1.6	3.1	-0.4	1.1	2.4
ur2	-0.5	1.0	-1.50	0.3	1.8	-2.0	-0.5	0.9
ur3	-0.9	0.6	-1.50	0.4	1.9	-2.5	-1.0	0.6
ur4	-0.5	1.1	-1.57	0.6	2.1	-2.0	-0.5	0.9
ur5	-1.7	-0.2	-1.55	0.1	1.6	-3.3	-1.7	-0.3
ur6	-0.2	1.3	-1.55	0.8	2.3	-1.7	-0.2	1.3
rur1	-1.4	0.2	-1.52	-1.8	-0.3	-2.8	-1.2	0.0
rur2	-1.5	-0.1	-1.43	-2.3	-0.9	-3.1	-1.7	0.0
rur3	-1.6	-0.1	-1.52	-0.9	0.6	-3.3	-1.7	-0.2
rur4	-0.2	1.4	-1.59	-0.7	0.9	-1.8	-0.2	1.3
rur5	-0.3	1.3	-1.53	-0.8	0.8	-1.9	-0.4	1.2
rur6	-2.7	-1.0	-1.63	-0.8	0.8	-4.3	-2.6	-1.3
all	-0.7	0.8	-1.53	0.0	1.5	-2.3	-0.7	0.7

Sensitivity Analysis

This section gives an analysis of how sensitive the household welfare effects are to changes in trade and production elasticities. All these are elasticities of substitution. Trade elasticities refer to the import (or the armington) elasticities, and the export (CET) elasticities. The production elasticities refer to the factor substitution between capital and aggregate labor.

The production elasticities are changed by +20 percent and –20 percent from the base elasticities; export elasticities by +20 percent and –5 percent⁷, and import elasticities by +20 percent and – 20 percent. All these experiments utilize the assumptions in E1, that is, (a) actual tariff reduction, and (b) compensatory tax on income.

The base values of the elasticities are presented in Table 6-Annex. The armington and the CET elasticities for 7 sectors were taken from another CGE model of the Philippines constructed by Clarete and Warr (1992). These sectors are crops, livestock, fishing, other agriculture, mining, food manufacturing, and non-food manufacturing. These elasticities were derived econometrically. However for the remaining sectors the elasticity of substitution is set at 1.2.

On the other hand, the elasticity of substitution between capital and aggregate labor is set at 1.5 for all sectors.

Table 6-Annex : Base Elasticities

	Armington*	CET*	Production**
Crops	1.95	1.27	1.5
Livestock	1.40	0.40	1.5
Fishing	1.10	1.50	1.5
Other Agriculture	0.85	0.40	1.5
Mining	1.10	1.50	1.5
Food Manufacturing	1.08	1.20	1.5
Non-food Manufacturing	0.92	1.37	1.5
Construction	1.20	1.20	1.5
Electricity, Gas and Water	1.20	1.20	1.5
Wholesale trade & retail	1.20	1.20	1.5
Other Services	1.20	1.20	1.5

* based on the estimated elasticities of Clarete and Warr (1992)
for crops to non-food manufacturing; assumed for rest of the sectors

** assumed

The results of the sensitivity analysis are summarized in Table 7-Annex. The welfare results across household are presented in Figure 1-Annex, Figure 2-Annex, and Figure 3-Annex.

⁷If export elasticities at the base values are changed by –20 percent it creates problems in the program because the values are extremely small. Thus only –5 percent is experimented.

Table 7-Annex : Summary of Analysis of Sensitivity to Changes in Elasticities

Type of Elasticity	Elasticity Range	Total of All Households		
		EV	Real Income	Real Consumption
Base		1.68	3.83	1.87
Production	+20%*	1.52	3.78	1.70
	% difference from base	-9.5	-1.3	-8.8
	-20%*	1.88	3.89	2.07
	% difference from base	11.9	1.7	11.2
Exports	+20%*	1.43	3.80	1.60
	% difference from base	-14.9	-0.8	-14.4
	-5%*	1.75	3.84	1.94
	% difference from base	4.4	0.3	4.1
Imports	+20%*	1.89	3.86	2.08
	% difference from base	12.3	1.0	11.5
	-20%*	1.45	3.79	1.62
	% difference from base	-14.0	-1.1	-13.1

* From base elasticities

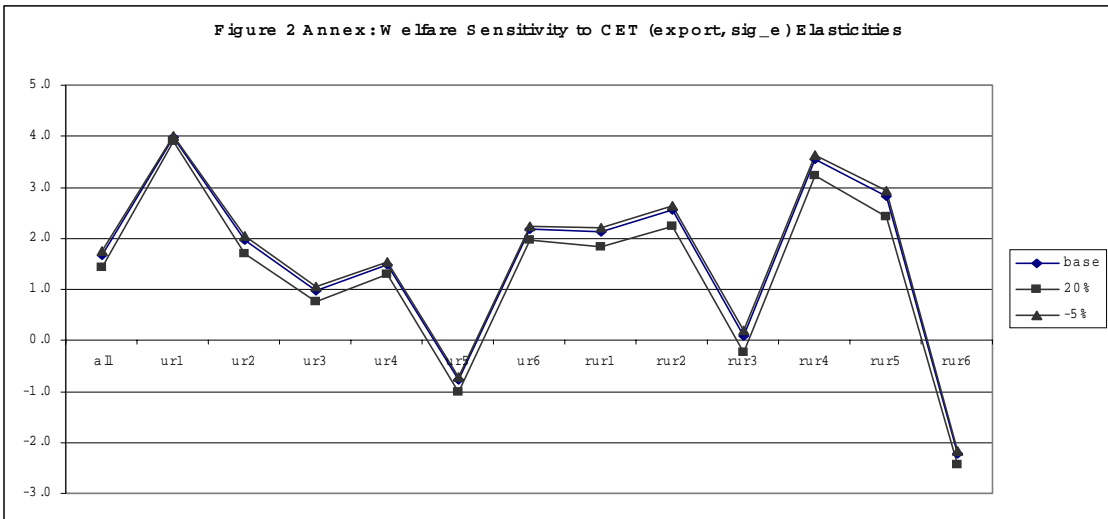
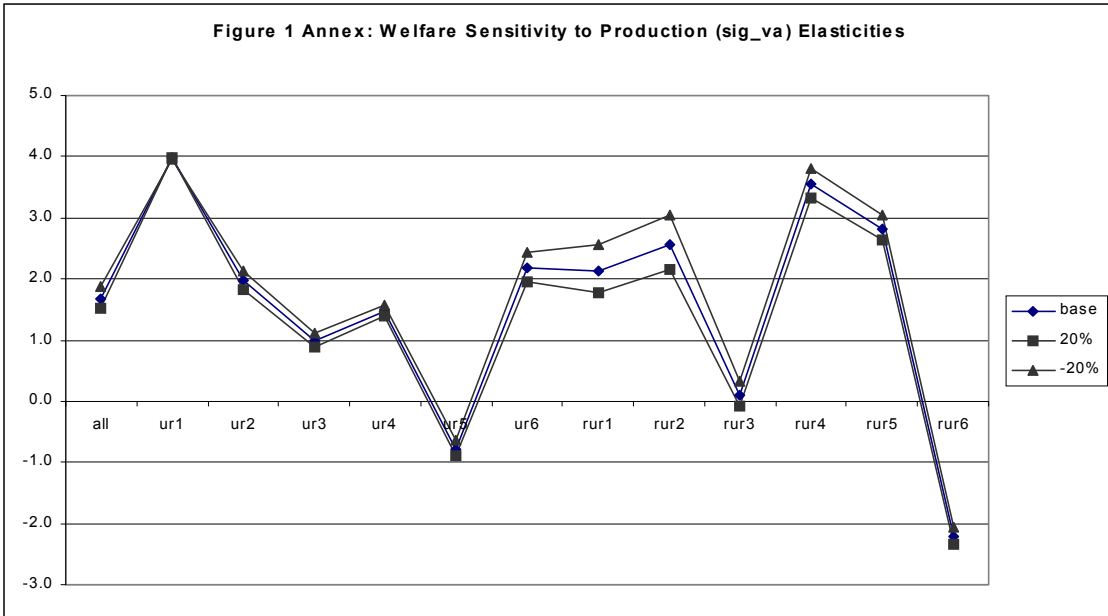
If production elasticities are increased by +20 percent from the base elasticities the overall EV result is still positive but its value decreases by -9.5 percent from the base result, i.e., from 1.68 percent to 1.52 percent. The decline is due to a larger decline in real consumption (-8.8 percent) than in real income (-1.3 percent).

If the production elasticities are decreased by -20 percent from the base elasticities, the change in the results is positive, i.e., higher than the base results. In particular the EV results improves by 11.9 percent from the base result.

The effects across various households are presented in Figure 1-Annex. One can observe that largest change in the EV is seen in Rur1 and Rur2.

The sensitivity of the household effects is slightly larger with changes in the export elasticity from the base elasticities than with the change in production elasticities. For example, if export elasticities are increased by +20 percent EV decreases by -14.9 percent from the base result. On the other hand if the elasticities are decreased by -5 percent, the EV increases by 4.4 percent from the base results.

Lastly, if the import elasticities are increased by +20 percent from the base elasticities, overall EV increases by 12.3 percent from the base result. On the other hand, if the elasticities are decreased by -20 percent, the results are decreased by -14 percent from the base results.



Appendix A:

Philippine Computable General Equilibrium Model (PCGEM): Core Equations

$$(1) \quad x_i = va_i \cdot kt_in_i \quad 12$$

$$(2) \quad va_{td} = kt_va_{td} \cdot \left[sh_va_{td} \cdot k_{td}^{-rh_va_{td}} + (1 - sh_va_{td}) \cdot l_{td}^{-rh_va_{td}} \right]^{\frac{-1}{rh_va_{td}}} \quad 11$$

$$(3) \quad va_{ntd} = l_{ntd} \quad 1$$

$$(4) \quad inp_i = kt_inp_i \cdot x_i \quad 12$$

$$(5) \quad mat_{td,i} = aij_{td,i} \cdot inp_i \quad 132$$

$$(6) \quad l_{td} = va_{td} \cdot \left[\frac{pva_{td} \cdot (1 - sh_va_{td})}{w \cdot kt_va_{td}^{rh_va_{td}}} \right]^{\frac{1}{1+rh_va_{td}}} \quad 11$$

$$(7) \quad l_{ntd} = \frac{px_{ntd} \cdot x_{ntd} - \sum_{td} mat_{td,ntd} \cdot pd_{td}}{w} \quad 1$$

$$(8) \quad l1_i = \left(\frac{w}{w1} \right) \cdot sh_l1_i \cdot l_i \quad 12$$

$$(9) \quad l2_i = \left(\frac{w}{w2} \right) \cdot sh_l2_i \cdot l_i \quad 12$$

$$(10) \quad l3_i = \left(\frac{w}{w3} \right) \cdot sh_l3_i \cdot l_i \quad 12$$

$$(11) \quad l4_i = \left(\frac{w}{w4} \right) \cdot sh_l4_i \cdot l_i \quad 12$$

$$(12) \quad x_{td_1e} = kt_x_{td_1e} \cdot \left[sh_x_{td_1e} \cdot e_{td_1e}^{rh_e_{td_1e}} + (1 - sh_x_{td_1e}) \cdot d_{td_1e}^{rh_e_{td_1e}} \right]^{\frac{1}{rh_e_{td_1e}}} \quad 10$$

$$(13) \quad x_{td_0e} = d_{td_0e} \quad 1$$

$$(14) \quad e_{td_1e} = d_{td_1e} \cdot \left[\left(\frac{pe_{td_1e}}{pl_{td_1e}} \right) \cdot \left(\frac{1 - sh_x_{td_1e}}{sh_x_{td_1e}} \right) \right]^{\text{sig_}e_{td_1e}} \quad 10$$

$$(15) \quad q_{td_1m} = kt_q_{td_1m} \cdot \left[sh_q_{td_1m} \cdot m_{td_1m}^{rh_m_{td_1m}} + (1 - sh_q_{td_1m}) \cdot d_{td_1m}^{rh_m_{td_1m}} \right]^{\frac{1}{rh_m_{td_1m}}} \quad 9$$

$$(16) \quad q_{td_0m} = d_{td_0m} \quad 2$$

$$(17) \quad m_{td_1m} = d_{td_1m} \cdot \left[\left(\frac{pd_{td_1m}}{pm_{td_1m}} \right) \cdot \left(\frac{sh_q_{td_1m}}{1 - sh_q_{td_1m}} \right) \right]^{\text{sig_}m_{td_1m}} \quad 9$$

$$(18) \quad ch_{td,h} = \frac{kt_ch_{td,h} \cdot dyh_h}{pq_{td}} \quad 132$$

$$(19) \quad g = px_{s12} \cdot x_{s12} \quad 1$$

$$(20) \quad inv_{td} = \frac{kt_inv_{td} \cdot tinv}{pq_{td}} \quad 11$$

$$(21) \quad yl1 = \sum_i w1 \cdot l1_i \quad 1$$

$$(22) \quad yl2 = \sum_i w2 \cdot l2_i \quad 1$$

$$(23) \quad yl3 = \sum_i w3 \cdot l3_i \quad 1$$

$$(24) \quad yl4 = \sum_i w4 \cdot l4_i \quad 1$$

$$(25) \quad yk_ag = \sum_{ag} r_{ag} \cdot k_{ag} \quad 1$$

$$(27) \quad yk_ind = \sum_{ind} r_{ind} \cdot k_{ind} \quad 1$$

$$(28) \quad yk_ser_tra = r_{s10} \cdot k_{s10} \quad 1$$

$$(29) \quad yk_ser_oth = r_{s11} \cdot k_{s11} \quad 1$$

$$(30) \quad \begin{aligned} yh_h = & w1 \cdot endw_l1_h + w2 \cdot endw_l2_h + w3 \cdot endw_l3_h + w4 \cdot endw_l4_h \\ & + k_yk_ag_h \cdot lmda_ag \cdot yk_ag + k_yk_ind_h \cdot lmda_ind \cdot yk_ind \\ & + k_yk_ser_tra_h \cdot lmda_ser_tra \cdot yk_ser_tra \\ & + k_yk_ser_oth_h \cdot lmda_ser_oth \cdot yk_ser_oth \\ & + kt_div_h \cdot div + trgov_h + yfor_h \end{aligned} \quad 12$$

$$(31) \quad dyh_h = yh_h \cdot (1 - dtxrh_h * (1 +ntaxr)) \quad 12$$

$$(32) \quad \begin{aligned} yf = & [(1 - lmda_ag - lmda_ag_f) \cdot yk_ag \\ & + (1 - lmda_ind - lmda_ind_f) \cdot yk_ind \\ & + (1 - lmda_ser_tra - lmda_ser_tra) \cdot yk_ser_tra \\ & + (1 - lmda_ser_oth - lmda_ser_oth) \cdot yk_ser_oth] \cdot (1 - dtxrf) \end{aligned} \quad 1$$

$$(33) \quad yg = tmrev + dtxrev + itxrev + grant_for \quad 1$$

$$(34) \quad tmrev = \sum_{td_1m} tm_{td_1m} \cdot m_{td_1m} \quad 1$$

$$(35) \quad \begin{aligned} dtxrev = & \sum_h dtxrh_h * (1 +ntaxr) \cdot yh_h + [(1 - lmda_ag - lmda_ag_f) \cdot yk_ag \\ & + (1 - lmda_ind - lmda_ind_f) \cdot yk_ind \\ & + (1 - lmda_ser_tra - lmda_ser_tra) \cdot yk_ser_tra \\ & + (1 - lmda_ser_oth - lmda_ser_oth) \cdot yk_ser_oth] \cdot dtxrf \end{aligned} \quad 1$$

$$(36) \quad itxrev = \sum_{td} itxr_{td} \cdot d_{td} \cdot pl_{td} + \sum_{td_1m} itxr_{td_1m} \cdot m_{td_1m} \cdot pwm_{td_1m} \cdot er \cdot (1 + tm_{td_1m}) \quad 1$$

$$(37) \quad in_td_{td} = \sum_i mat_{td,i} \quad 11$$

$$(38) \quad savh_h = aps_h \cdot dyh_h \quad 12$$

$$(39) \quad savf = yf - div - div_for \quad 1$$

$$(40) \quad savg = yg - g - \sum_h trgov_h - paygv_for \quad 1$$

$$(41) \quad pm_{td_1m} = pwm_{td_1m} \cdot er \cdot (1 + tm_{td_1m}) \cdot (1 + itxr_{td_1m}) \quad 9$$

$$(42) \quad pe_{td_1e} = pwe_{td_1e} \cdot er \quad 10$$

$$(43) \quad pq_{td_1m} = \frac{pd_{td_1m} \cdot d_{td_1m} + pm_{td_1m} \cdot m_{td_1m}}{q_{td_1m}} \quad 9$$

$$(44) \quad pq_{td_0m} = pd_{td_0m} \quad 2$$

$$(45) \quad px_{td_1e} = \frac{pl_{td_1e} \cdot d_{td_1e} + pe_{td_1e} \cdot e_{td_1e}}{x_{td_1e}} \quad 10$$

$$(46) \quad px_{td_0e} = pl_{td_0e} \quad 1$$

$$(47) \quad pd_{td} = pl_{td} \cdot (1 + itxr_{td}) \quad 11$$

$$(48) \quad pva_i = \frac{px_i \cdot x_i - \sum_{td} mat_{td,i} \cdot pq_{td}}{va_i} \quad 12$$

$$(49) \quad r_{td} = \frac{pva_{td} \cdot va_{td} - w \cdot l_{td}}{k_{td}} \quad 11$$

$$(50) \quad q_{td_0s11} = \sum_h ch_{td_0s11,h} + inv_{td_0s11} + in_td_{td_0s11} \quad 10$$

$$(51) \quad tin v = \sum_h savh_h + savf + savg + cab \quad 1$$

$$(52) \quad cab = (\sum_{td_1m} pwm_{td_1m} \cdot m_{td_1m} + lmda_ag_f \cdot yk_ag + lmda_ind_f \cdot yk_ind + lmda_ser_tra_f \cdot yk_ser_tra + lmda_ser_oth \cdot yk_ser_oth + div_for + paygv_for + \sum_{td_1e} pwe_{td_1e} \cdot e_{td_1e} - \sum_h yfor_h - grant_for) \cdot er \quad 1$$

$$(53) \quad ls = \sum_i l_i \quad 1$$

$$(54) \quad ls1 = \sum_i l1_i \quad 1$$

$$(55) \quad ls2 = \sum_i l2_i \quad 1$$

$$(56) \quad ls3 = \sum_i l3_i \quad 1$$

$$(57) \quad ls4 = \sum_i l4_i \quad 1$$

$$(58) \quad leon = q_{s11^n} - \sum_h ch_{s11^n, h} + inv_{s11^n} + in_td_{s11^n} \quad 1$$

Total Number of Equations

569

See page 37 for definition of variables.

Philippine Computable General Equilibrium Model (PCGEM)

Equations				Variables			
Name*	Equation No.	Equation Index	Number of Equations	Variables		Type of Variable	
				Name	Index	Endogenous No. of Variables	Exogenous No. of Variables
xeq	1	i	12	x	i	12	
vaeq1	2	td	11	va	i	12	
vaeq2	3	ntd	1				
intpeq	4	i	12	intp	i	12	
mateq	5	td,i	132	mat	td,i	132	
leq1	6	td	11	l	i	12	
leq2	7	ntd	1				
foc_l1eq	8	i	12	l1	i	12	
foc_l2eq	9	i	12	l2	i	12	
foc_l3eq	10	i	12	l3	i	12	
foc_l4eq	11	i	12	l4	i	12	
ceteq1	12	td_1e	10				
ceteq2	13	td_0e	1				
eeq	14	td_1e	10	e	td_1e	10	
qeq1	15	td_1m	9	q	td	11	
qeq2	16	td_0m	2				
meq	17	td_1m	9	m	td_1m	9	
cheq	18	td,h	132	ch	td,h	132	
geq	19		1	g			1
inveq	20	td	11	inv	td	11	
yl1eq	21		1	yl1		1	
yl2eq	22		1	yl2		1	
yl3eq	23		1	yl3		1	
yl4eq	24		1	yl4		1	
ykeq_ag	25		1	yk_ag		1	
ykeq_ind	26		1	yk_ind		1	
ykeq_ser_t	27		1	yk_ser_tra		1	
ykeq_ser_o	28		1	yk_ser_oth		1	
yheq	29	h	12	yh	h	12	
dyheq	30	h	12	dyh	h	12	
yfeq	31		1	yf		1	
ygeq	32		1	yg			1
tmreveq	33		1	tmrev		1	
dtxreveq	34		1	itxrev		1	
itxreveq	35		1	dtxrev		1	
intdeq	36	td	11	intd	td	11	
tinveq	37		1	tinveq		1	
savheq	38	h	12	savh	h	12	
savfeq	39		1	savf		1	
savgeq	40		1	savg		1	
pmeq	41	td_1m	9	pm	td_1m	9	
peeq	42	td_1e	10	pe	td_1e	10	

PCGEM (Cont'd)

Equations				Variables			
Name*	Equation No.	Equation Index	Number of Equations	Variables		Type of Variable	
				Name	Index	Endogenous	Exogenous
						No. of Variables	No. of Variables
ppeq1	43	td_1m	9	pq	td	11	
ppeq2	44	td_0m	2				
pxeq1	45	td_1e	10	px	i	12	
pxeq2	46	td_0e	1				
pdeq	47	td	11	pd	td	11	
pvaeq	48	i	12	pva	i	12	
req	49	td	11	r	td	11	
eq1eq	50	td_0s11	10	q	"td_0s11" **	1	
eq2eq	51		1				
eq3eq	52		1	cab			1
eq4eq	53		1	w		1	
eq5_11eq	54		1	w1		1	
eq5_12eq	55		1	w2		1	
eq5_13eq	56		1	w3		1	
eq5_14eq	57		1	w4		1	
walras	58		1	leon		1	
				pl	td	11	
				d	td	11	
				ntaxr		1	
				er			1
				pwe	td_1e		11
				pwm	td_1m		9
				k	td		11
				ls			1
				ls1			1
				ls2			1
				ls3			1
				ls4			1
				endow_11	h		12
				endow_12	h		12
				endow_13	h		12
				endow_14	h		12
				div-for			1
				grant-for			1
				paygv-for			1
				yfor	h		12
				div			1
				trgov	h		12
				dtxrf			1
				dtxrh	h		12
				itxr	td		11
				tm	td_1m		9
TOTAL			569			569	149

*Equation names in the GAMS code

**"td_0s11": the 11th sector

Variable Definition

er	: exchange rate
pd_{td}	: domestic price of td including tax
pet_{d_1e}	: domestic price of exports of td_1e
pl_{td}	: local price of td excluding tax
pm_{td_1m}	: domestic price of imports of td_1m
pq_{td}	: composite price of td
pva_i	: price of value added of i
pwe_{td_1e}	: world price of exports of td_1e
pwm_{td_1m}	: world price of imports of td_1m
px_i	: price of output of i
r_{td}	: price of capital in td
$mat_{td,i}$: interindustry matrix
w	: average wage rate
w1	: wage rate of type 1 labor
w2	: wage rate of type 2 labor
w3	: wage rate of type 3 labor
w4	: wage rate of type 4 labor
x_i	: output of i
va_i	: value added of i
$intp_i$: intermediate input
k_{td}	: capital in td
$l(i)$: aggregate labor demand in i
$l1(i)$: type 1 labor
$l2(i)$: type 2 labor
$l3(i)$: type 3 labor
$l4(i)$: type 4 labor
ls	: total supply of labor
ls1	: total supply of type 1 labor
ls2	: total supply of type 2 labor
ls3	: total supply of type 3 labor
ls4	: total supply of type 4 labor
$endw_11_h$: household labor endowment of type 1 labor
$endw_12_h$: household labor endowment of type 2 labor
$endw_13_h$: household labor endowment of type 3 labor
$endw_14_h$: household labor endowment of type 4 labor
$ch_{td,h}$: household h consumption of td
d_{td}	: domestic demand for td
g	: total government consumption
$intd_{td}$: intermediate demand for td
inv_{td}	: investment demand for td
tin	: total investment
q_{td}	: composite demand for td
e_{td_1e}	: exports of td_1e
m_{td_1m}	: imports of td_1m

cab	: current account balance
div_for	: dividends paid to foreigners
grant_for	: foreign grant to government
paygv_for	: debt service payment of government
yfor _h	: foreign income of household h
yl1	: type 1 labor income
yl2	: type 2 labor income
yl3	: type 3 labor income
yl4	: type 4 labor income
yk_ag	: capital income in agriculture
yk_ind	: capital income in industry
yk_ser_tra	: capital income in service trade
yk_ser_oth	: capital income in service others
yh _h	: income of household h
yf	: income of firms
yg	: income of government
div	: dividends
trgov _h	: government transfer in real terms to household h
dyh _h	: disposable income of household h
tmrev	: tariff revenue of government
dtxrev	: direct income tax revenue of government
itxrev	: indirect income tax revenue of government
dtxrf	: direct income tax rate on firms
dtxr _h	: direct income tax rate on household h
itxr _{td}	: indirect tax rate on td
tm _{td_1m}	: tariff rate on td_1m
ntaxr	: additional compensatory indirect tax rate
savf	: savings of firms
savg	: savings of government
sav _h	: savings of household
leon	: “walras law” variable

Index of Variables

sectors

s1	: crops
s2	: livestock
s3	fishing
s4	other agriculture
s5	mining
s6	food manufacturing
s7	non-food manufacturing
s8	construction
s9	utilities
s10	wholesale and retail trade

s11 other services
s12 government services /

Special index

td	tradable	{s1,s2,s3,s4,s5,s6,s7,s8,s9,s10,s11}
ntd	nontradable	{s12}
td_1e	with exports	{ s1,s2,s3,s5,s6,s7,s8,s9,s10,s11 }
td_0e	no exports	{s4 }
td_1m	with imports 1	{s1,s2,s3,s4,s5,s6,s7,s8,s11}
td_0m	no imports	{ s9,s10 }
td_0s11	with imports expect “s11”	{s1,s2,s3,s4,s5,s6,s7,s8,s9,s10}
ag	agriculture	{s1,s2,s3,s4 }
ind	industry	{ s5,s6,s7,s8,s9 }

Factors

f factors {1, 11, 12, 13, 14,k}

Households

h households {ur1, ur2 ur3 ur4 ur5 ur6, rur1, rur2 rur3 rur4 rur5 rur6}

Other Institutions

inst {firms, government}

Appendix B

The 1994 SAM of the Philippines

Aggregated SAM

The strategy adopted in constructing the 1994 social accounting matrix (SAM) started with a SAM specification that was highly aggregated, a 4-sector SAM. After completing all of the accounts of the aggregated SAM with information from various official sources, it was disaggregated into a detailed 48-sector SAM, with the former providing the control totals of each of the accounts in the disaggregated SAM. Finally, in the modeling exercise, the disaggregated SAM was aggregated back into 12 sectors.

Initially, production/commodity sectors were aggregated into agriculture, industry, services, and government services. Factors were broken down into capital and labor. There was only one household class, as well as one type of firm in the aggregated SAM.

Information on the inter-industry production/commodity sectors was derived by aggregating the 229-sector official 1994 input-output (IO) table in current producer prices into the major sectors. The original breakdown of sectoral value added in the original IO included compensation of employees, depreciation, indirect taxes less subsidies and operating surplus. In the derived SAM the total sectoral payment to labor was calculated by adding sectoral compensation of employees plus some derived adjustments calculated from the total sectoral operating surplus. The adjustment attempts to account for the labor component in the operating surplus. The adjustments applied involved the following steps.

- a. Derive the labor component in the household and unincorporated operating surplus by using the ratio calculated from the official 1994 gross domestic product (GDP) of the National Income Accounts (NIA) and compensation of employees, also of NIA, i.e.

$$\text{adj}_T = \text{HH_OS}_{nia} * (\text{L}_{nia} / \text{GDP}_{nia})$$

where adj_T is the overall adjustment, HH_OS_{nia} household and unincorporated operating surplus, L_{nia} is compensation of employees from the NIA, GDP_{nia} .

- b. Disaggregate total adjustment adj_T into sectoral adjustment, adj_i , using the sectoral share of compensation of employees from the IO (L_{IO_i}), i.e.,

$$\text{adj}_i = \text{adj}_T * (\text{L}_{IO_i} / \text{L}_{IO})$$

where L_{IO} the total compensation of employees from the IO. The sectoral adj_i was added to the original sectoral compensation of employees of the IO to get the adjusted sectoral payment to labor.

c. Derive the sectoral payments to capital residually, i.e. sectoral value added (net of indirect taxes) from the IO minus the adjusted sectoral payment to labor.

Sectoral intermediate inputs plus value added determine (net of indirect taxes) the sectoral total output. Adjustments were made in the indirect taxes row to make it consistent with the official government accounts. This is explained in detail below. Diagonal elements in the columns of commodities were derived residually using the sectoral output and exports. Information on the row of imports was taken from the import data in the IO.

The total of the sectoral indirect government taxes of the IO was observed to be substantially different from the 1994 national government accounts. The original sectoral values in the IO added up to only P95,402 million. In the government accounts total indirect taxes amounted to P 190,493 million, broken down into P87,786 million (46.08 percent) as tariff revenue and P 102,707 million (53.92 percent) as local indirect tax revenue. The row on sectoral indirect taxes was therefore adjusted to make them consistent with the 1994 government accounts. The adjustment entailed a number of steps:

i. Computation of tariff revenue. The computation involved the use of the data on imports in the IO and the weighted average nominal tariff rate computed by Manasan and Querubin (1997), in which the average tariff rates are available in detailed sectoral breakdown. To utilize this set of information, the original IO was first aggregated into 48 sectors and matched them with the sectors of the average nominal tariff rates. After a series of computations, the sectors were then aggregated back to the four major sectors above.

Sectoral tariff revenue was computed as

$$m_{net_i} = m_i / (1 + tm_i)$$

where m_{net_i} is imports of sector i net of tariff, m_i is imports inclusive of tariff, which is the value of sectoral imports taken directly from the aggregated IO, and tm_i is the weighted average nominal tariff rate. The sectoral tariff revenue is given by

$$tm_i = m_{net_i} * tm_i$$

To make the total of the computed sectoral tariff revenue consistent with the overall tariff revenue in the government accounts, the former sum was normalized to the magnitude of the latter. The sectoral calibrated tariff rates were derived from these normalized sectoral tariff revenue.

ii. Computation of local indirect taxes. The total local indirect taxes (taxes levied on locally produced items) from the official government accounts was distributed to sectoral values according to the original IO sectoral indirect taxes as weights. That is, the original sectoral indirect taxes from the IO were normalized so that the computed total was made consistent with the total local indirect taxes in the official government accounts.

Payment of households to the government is composed of direct income taxes and contribution to social security. Official information was utilized to supply the numbers in this particular cell in the SAM. Household savings is derived residually, i.e. household income, which is discussed below, and direct taxes and other payments and household consumption.

Total dividend paid to households is composed of payments of firms to households as well as dividends. Official data on both are available. Available information on dividends paid to foreign investors was also used in the SAM. Information on direct taxes paid by private corporations is available officially and therefore used in the SAM. Similar to households, savings of firms was derived residually using the derived income of firms and expenditures and outflows of firms. The total income of firms was made consistent with the total expenditures, which is officially available in the NIA.

Spending on government services was taken directly from the IO. Government flows to households is composed of government transfers to households, social security benefits, and interest payments of government on government debt papers to households, which are all officially available. Information on debt servicing of foreign public debt is also available and utilized in the SAM. Government income is the total government income in the government accounts. Government savings is determined residually.

Sectoral exports were taken directly from the IO. Household income from the rest of the world was sourced directly from the NIA. Information on transfers from the rest of the world to the government is composed of transfers to the government from the balance of payments data and rest of the world transfer from the NIA. Current account balance was calculated residually.

Putting all these information together did not result in a balanced SAM initially. A least square method was utilized to adjust the cells of the SAM so that the row sums are made consistent column sums. However, a number of cells were not allowed to change or were retained during the adjustment process. Most of these cells have values for the 1994 IO, which are generally thought to be consistent. The least square method minimizes the sum of squared deviations of the cells in the SAM, subject to the constraints that (i) row sums are equal to column sums and (ii) some cells are have fixed values. The process was done in GAMS.

Expanded SAM

The first expansion of the SAM was to disaggregate it into 48 industries. However in the modeling exercise, the industries were aggregated into 12 industries. There are 4 agriculture-related sectors, including finishing and forestry, 1 mining sectors, 2 manufacturing sectors, construction, utilities sector, 2 services sectors and a separate government services sector.

Wage rate was assumed unity in the modeling exercise. Thus wage payment in the SAM was considered as the number of workers employed in the respective sectors. The sectoral row on labor compensation in the SAM was disaggregated into 4 types, namely (a) Skilled agriculture workers (b) unskilled agriculture workers, (c) skilled production workers, and unskilled production workers. Skilled workers are those who have completed at least high school, while unskilled are those with no education up to third year high school.

Information used to group labor into these categories was derived from the Labor Force Survey (LFS), which regularly comes out very quarter. Thus for 1994, the quarter figures for January, April, July and October were averaged to derive ratios that disaggregated labor into the above categories.

The household sector was divided into urban and rural. Each one has 6 separate categories, in which each category is determined by the type of work and the level of education of the head of household. Information from the 1994 Family Income and Expenditure Survey was utilized and applied to break down the aggregate SAM. The breakdown of the household sector includes:

Urban 1 (Ur1): worked for establishments, unskilled

Urban 2 (Ur2): worked for establishments skilled

Urban 3 (Ur3): government employee

Urban 4 (Ur4): self employed with no employee; unskilled; including unemployed

Urban 5 (Ur5): self employed with no employee; skilled; including unemployed

Urban 6 (Ur6): employer or owner of business

Rural 1 (Rur1): worked for establishments, unskilled

Rural 2 (Rur2): worked for establishments skilled

Rural 3 (Rur3): government employee

Rural 4 (Rur4): self employed with no employee; unskilled; including unemployed

Rural 5 (Rur5): self employed with no employee; skilled; including unemployed

Rural 6 (Rur6): employer or owner of business

In disaggregating direct taxes into urban and rural households the percentage share distributions calculated from the 1994 FIES were used. The 1994 FIES also has information on savings for the entire Philippines, as well as for urban and rural households. These were utilized to disaggregate total household savings in the SAM. The approach was used to break down government transfers to households.

With regard to income, information on salaries and wages in the FIES was utilized to disaggregate total labor income of households into urban and rural. The same approach was used to break down household income from abroad. In disaggregating capital income, FIES data on entrepreneurial activities both in agriculture and non-agriculture, as well as in other sources, were used. Entrepreneurial activities in agriculture include crop farming and gardening, livestock and poultry raising, fishing, fishing and hunting. In non-agriculture, the following are covered: wholesale and retail trade; manufacturing community, social, recreational, and personal activities; transportation, storage and communication services; mining and quarrying; construction; and other related activities. In other sources, the following are included: rental from non-agricultural lands, buildings and other property; and rental value of owner occupied dwelling unit for income.

Because of the size of the SAM, it cannot be presented here. It is presented in a separate excel file called 1994SAM_Phil.