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Analyzing the Impact of Philippine Tariff Reform on Unemployment, Distribution and Poverty Using CGE-Microsimulation Approach

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Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Analyzing the Impact of Philippine
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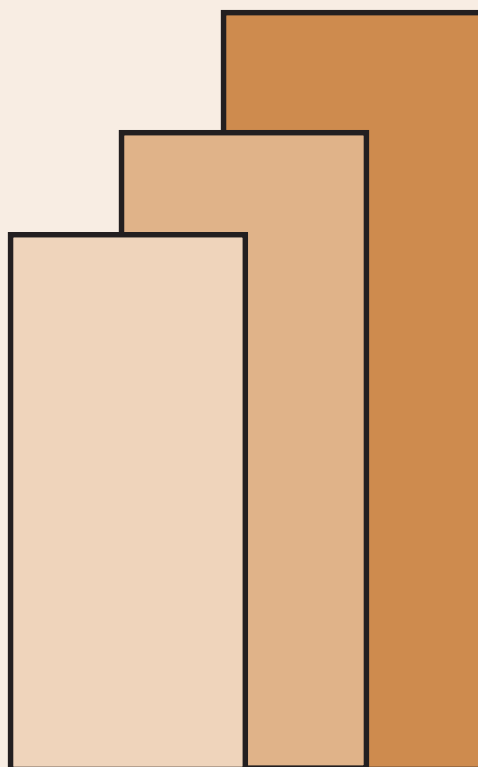
Caesar B. Cororaton

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Analyzing the Impact of Philippine Tariff Reform on Unemployment, Distribution, and Poverty Using CGE-Microsimulation Approach

Caesar B. Cororaton

Abstract

This paper examines the effects of the reduction in tariff rates in the Philippines from 1994 to 2000 on unemployment, distribution and poverty using a CGE-microsimulation approach wherein the representative household assumption in the traditional CGE modeling is replaced with individual households. The approach allows one to model the link between trade reforms and individual household responses, and their feedback to the general equilibrium of the economy. The present paper incorporates the entire 24,797 households of the 1994 Family Income and Expenditure Survey.

Tariff reduction leads to higher imports and exports. Although domestic production for the local market declines, the overall production improves. These are due to the substitution and scale effects of tariff reduction.

Production reallocation and resource movements as a result of the reduction in tariff favor the non-food manufacturing sector. Agriculture contracts, while industry expands. The decline in the former leads to higher unemployment rate in agriculture labor, lower agriculture wage, and lower rate of return to capital in agriculture. All these have negative effects on income of rural households. However, the expansion in the latter, particularly in the non-food manufacturing sector, results in lower unemployment rate in production workers, higher wages, and higher rate of return to capital in industry and services. These translate into favorable income effects for households in urban centers, particularly the National Capital Region (NCR). As a result, the problem of income inequality deteriorates.

The effects on poverty are generally favorable. The improvement is largely due to the drop in consumer prices. The poverty effects, however, vary considerably across households. Female-headed households with high education in the NCR and in other urban centers benefit the most in terms of poverty reduction. This effect is due to the expansion in the non-food manufacturing sector, which is located mainly in urban centers. Although rural households are also affected favorably, the impact is minimal as compared to the effects on urban households. This effect is attributable largely to the contraction in agriculture.

Keywords: Tariff reform, unemployment, income distribution, poverty, CGE

Analyzing the Impact of Philippine Tariff Reform on Unemployment, Distribution, and Poverty Using CGE-Microsimulation Approach¹

Caesar B. Cororaton²

Introduction

Tariff reform is major pro-market reform implemented in the Philippines, which the government has been aggressively implementing. Some components of the reform have been pursued unilaterally, while other multilaterally through the various agreements in the World Trade Organization (WTO), as well as through regional agreements in the Association of Southeast Asian Nations (ASEAN) such as the ASEAN Free Trade Area (AFTA). Since its implementation in the 1980s, significant changes have taken place. Tariff rates have been reduced, tariff structure simplified, and quantitative restrictions “tariffied.” The objective of the paper is to analyze the impact of the reform implemented from 1994 to 2000 on unemployment, distribution and poverty.

Tariff reduction affects relative prices, which trigger changes in both the sectoral price ratios and in the domestic-foreign price ratios. Changes in these price ratios in turn lead to production and resource reallocation. Thus, some production sectors will contract, while others will expand. Furthermore, changes in the price ratios will generate a web of direct and indirect changes that makes the task of tracking down the effects on the various households of the economy extremely difficult. Thus, to be able to gain a better understanding of the effects of a tariff reduction and to draw insights on the transmission mechanism of how households are affected, an economy-wide model is almost necessary. In the literature, one such model is the computable general equilibrium (CGE).

In this paper, a CGE model that integrates detailed individual household information from the family income and expenditure survey (FIES) is developed in an approach called CGE-microsimulation. The approach replaces the usual representative household assumption in a traditional CGE model with individual households in the FIES to capture the interaction between policy reforms and individual household responses, and their feedback to the general economy. In the paper, the 1994 FIES, which consisted of 24,797 households, is integrated into the CGE model. The integration of CGE and household data allows one to track down changes in the family income, family consumption and poverty threshold for a given policy change (Cockburn, 2001; and Cororaton, 2003(c)). In particular, one can investigate the transmission mechanism of how households are affected by changes in factor incomes as a result of factor and output price changes, and by changes in the consumer prices.

¹The paper benefited from the comments and suggestions of John Cockburn, Nabil Annabi and Bernard Decaluwé. However, all errors and gaps in the analysis are the sole responsibility of the author. Research assistance was provided by Milet Belizario.

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The effects of tariff reform on households in a CGE framework may be traced through the following channels: income and consumption. 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.

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 observed to be 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 upon 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 the trade barriers.

Based on these insights, one cannot therefore make any general statement about 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.

In the Philippines, Cororaton (1994) provided a comprehensive review of literature on CGE modeling. It is observed that while there are a number of CGE models available in the country with various sectoral breakdown, most of these models focused the emphasis mainly on analyzing production efficiency and reallocation effects. The analysis of tracing down the impact of trade reforms to the level of households in terms of poverty effects 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 suffers from two weaknesses: (i) the CGE model used in the simulation was calibrated to the 1990 social accounting matrix (SAM), which is 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 a particular decile group after a policy change. To address these weaknesses, Cororaton 2003(a) and Cororaton 2003(b) specified a CGE model on an updated 1994 SAM using household groupings in socio-economic classes that are characterized by household resource endowments such as educational attainment. However, while these socio-economic household groupings represent a significant improvement over the previous model because the degree of household mobility across groups is much less, it is still inadequate in capturing the effects of tariff reform on poverty. Thus, to address the concern, Cororaton 2003(c) applied a CGE-microsimulation approach by incorporating detailed individual household information from the FIES. In particular, the approach incorporates the 24,797 households in the 1994 FIES. This approach replaces the usual representative household assumption in a traditional CGE model with individual households in the FIES to capture the interaction between policy reforms and individual household responses, and their feedback to the general economy. The present paper however, is an extension of Cororaton 2003(c). It incorporates another possible transmission channel through the unemployment effects.

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.

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 are the ones utilized in the simulation experiment.

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

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.

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

Since tariff revenue is a major source of government funds, a tariff reduction could therefore have substantial government budget implications especially if it is not accompanied by a compensatory tax financing. In fact, it could pose a major policy challenge in situations 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 of these is given in this section. The discussion is based on the data in the constructed 1994 SAM (Cororaton, 2003(a)).

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.

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.

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

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.

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. 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.

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

Sources of Income and Consumption Structure

Table 6 shows the sources of average household income. More detailed information on the sources of household income is presented in Appendix A2. The sources of income are grouped according to the specification of the CGE model used, which is discussed at length in the next section. One can observe that while the major sources of household income are skilled production labor and capital in industry and in agriculture, there are significant differences in various locations in the country. Take for example urban and rural households. While urban households depend 39.8 percent of their total income on skilled production labor, rural households have 22.2 percent from this income source. Rural households also depend 19.5 percent of their income on unskilled agriculture labor. In terms of capital income, there are also wide differences. Rural households depend 16.8 percent of their income on returns to capital in agriculture, while urban households have only 2.4 percent dependence. Urban households depend heavily on returns to capital in industry and other services. Another noticeable difference is in dividend incomes. Households in the National Capital Region (NCR) source 18.3 percent of their income from dividends, while zero for rural households. Thus, based on these wide differences in the sources of household income, changes in factor price ratios as a result of the tariff reforms will have differentiated effects across households in various locations in the country.

Table 6: Sources of Household Income: Various Regions (%)

	Labor				Capital				Dividends	Transfers	Foreign Remittances	Total
	Skilled Agriculture	Unskilled Agriculture	Skilled Production	Unskilled Production	Agriculture	Industry	Wholesale & Retail	Other Services				
Philippines	1.7	7.4	35.1	7.5	6.2	11.2	5.6	9.9	6.7	5.6	3.1	100
NCR	0.2	0.1	40.7	4.9	0.2	9.5	5.4	14.2	18.3	3.6	2.9	100
Urban*	1.2	3.0	39.8	6.8	2.4	11.3	6.1	11.8	9.2	5.2	3.2	100
Rural	2.9	19.5	22.2	9.4	16.8	10.9	4.2	4.6	0.0	6.8	2.7	100

*Including NCR, National Capital Region

Source: 1994 FIES

Table 7 presents the structure of consumption of households in various locations in the country. One can observe that there are also differences in the pattern of consumption in urban and rural households, but the difference is not as significant as in the sources of household income. On the whole, 30.4 percent of household consumption comes from the food manufacturing sector. About the same percentage comes from other services sector. Non-food manufacturing contributes 14.6 percent to household consumption on the average.

Table 7: Structure of Household Consumption

	Crops	Livestock	Fishing	Mining	Food Manufacturing	Non-food Manufacturing	Construction	Utilities	Trade & retail	Other Services
Philippines	3.9	4.4	3.5	0.1	30.4	14.6	0.3	1.2	12.5	29.1
NCR	3.6	4.1	3.2	0.1	27.8	15.2	0.4	1.3	14.0	30.3
Urban*	4.4	5.1	4.0	0.1	35.4	13.4	0.2	1.1	9.5	26.6
Rural	3.3	3.8	3.0	0.1	25.2	15.7	0.5	1.4	16.0	31.0

*Including NCR, National Capital Region

Source: 1994 FIES

Unemployment, Distribution and Poverty Profile

Table 8 presents the unemployment rate by level of education. One can observe that there is relatively higher unemployment rate in labor categories with higher level of education. In fact, for unskilled labor, defined loosely as those with zero education up to third year high, unemployment rate was 5.97 percent in 1990 as compared to 11.39 percent for those with educational level of at least fourth year high school. The gap in the unemployment rates continued even in 2000. For purposes of the analysis in the paper, the numbers for 1995 are utilized, i.e., for unskilled workers in agriculture and non-agriculture sectors, the unemployment rate applied is 6.12 percent, while for skilled 11.36 percent.

Table 8: Philippine Unemployed Rate (%)

Educational Level	1990	1995	2000
No Grade Completed	6.36	5.82	7.69
Elementary	5.06	5.32	6.51
1st to 5th Grade	4.80	5.20	6.00
Graduate	5.30	5.43	6.97
High School	10.11	9.95	11.82
1st to 3rd Year	8.94	8.65	10.81
Graduate	10.94	10.81	12.38
College	11.66	11.76	13.16
Undergraduate	12.84	13.29	13.91
Graduate	10.74	10.20	12.46
Not Reported	36.00	24.14	25.68
Overall	8.13	8.36	10.14
Unskilled*	5.97	6.12	7.62
Skilled**	11.39	11.36	12.91

* No grade completed up to third year high school

** High school graduate and up

Source: LFS, NSO, various years

To put the poverty situation in the Philippines in historical perspective, Table 9 presents the official poverty incidence³ from 1985 to 2000. Poverty incidence declined by about 10 basis points in the last 15 years from 49.3 percent in 1985 to 39.4 percent in 2000. However, through the years the gap between urban (particularly the National Capital Region, NCR) and rural poverty incidence widened. While urban areas saw significant decline in poverty incidence from 37.9 percent in 1985 to 24.3 percent in 2000, rural places witnessed generally stable incidence of more than 50 percent. The largest improvement in the poverty situation is in the NCR, with the incidence dropping from 27.2 percent in 1985 to 11.4 percent in 2000. Its poverty incidence even dropped to single digit in 1997 (8.5 percent).

Indicators of income distribution do not show favorable signs either. Over the past decade, there was a marked deterioration in the distribution of the country's wealth. During the 12-year period beginning 1985, the wealthiest quintile of families exhibited an increase in its income share, while the other quintiles suffered income reduction. The income share of the poorest or the first quintile fell from 5.2 percent in 1985 to 4.9 percent in 1994 before reaching 4.4 percent in 1997. Conversely, the share

³Head count ratio.

of the wealthiest income group improved from 52.1 percent in 1985 to 55.8 percent in 1997.

Table 9: Distribution and Poverty

	1985	1988	1991	1994	1997	2000
Gini Ratio	0.446		0.468	0.464	0.487	0.451
Poverty Incidence:						
Philippines	49.3	49.5	45.3	40.6	36.8	39.4
Urban	37.9	34.3	35.6	28.0	21.5	24.3
NCR	27.2	25.2	16.7	10.4	8.5	11.4
Rural	56.4	52.3	55.1	54.3	50.7	54.0

Source: National Statistical Coordination Board, and National Statistics Office.
NCR is National Capital Region

The deterioration in income distribution during the past decade represented some movement in the income distribution picture, which had been relatively stable since 1961. From the time until the mid-1980s, there were very small movements in the income shares of the different income groups. During this period of relatively "stable inequality", the share of the richest income group remained substantially large while that of the poorest income group remained substantially small.

Since 1961, except for the years 1988-1991, the Gini ratio showed slow but steady decline. However, from 1994 to 1997, however, the Gini ratio worsened significantly from 0.468 to 0.487, the latter representing the highest registered figure in the three and a half-decades. In 1985, the average income of a family belonging to the wealthiest decile was 18 times the income of a family belonging to the poorest decile. In 1997, this went up to 24. In terms of spatial income disparity, the same trend was observed as the ratio of the average family income in the poorest region likewise increased from 3.2 in 1995 to 3.6 in 1997. In 2000 the Gini coefficient slid down to 0.451.

Detailed poverty profile in the Philippine in 1994 is shown in Table 10 wherein poverty is disaggregated into household head and level of education, urban-rural, and regional.

Of the number of people in 1994 living below the poverty threshold, 76.8 percent belong to families headed by male with low education. The poverty incidence of this group is 55.4 percent. The number of people below poverty that belong to families headed by female with high education is only 0.9 percent of the total. This group has the lowest poverty incidence of 11.2 percent.

Of the total people under poverty, 3.5 percent reside in the NCR where the poverty incidence is 10.4 percent. In contrast, of the total people living below poverty, 65.7 percent are located in the rural areas, where the poverty incidence is 54.3 percent.

Table 10: Philippine Poverty Profile in 1994

Population		67,430,864
No. People Under Poverty		27,372,971
Poverty Incidence		40.6%
Poverty by Family Head and Level of Education	No. of People (% Distribution)	Poverty Incidence, %
Female, Low Education	7.1%	38.7
Female, High Education	0.9%	11.2
Male, Low Education	76.8%	55.4
Male, High Education	15.1%	22.4
	100.0%	
Poverty by Urban/Rural	No. of People (% Distribution)	Poverty Incidence, %
NCR	3.5%	10.4%
Urban, excluding NCR	30.7%	35.5%
Rural	65.7%	54.3%
	100.0%	
Poverty by Regions	No. of People (% Distribution)	Poverty Incidence, %
NCR	3.5%	10.4%
Region 1	7.2%	54.0%
Region 2	4.0%	42.3%
Region 3	7.5%	31.3%
Region 4	11.2%	35.4%
Region 5	10.6%	60.7%
Region 6	11.0%	49.8%
Region 7	6.6%	39.8%
Region 8	5.7%	44.7%
Region 9	5.0%	50.3%
Region 10	7.9%	54.2%
Region 11	8.0%	45.2%
Region 12	4.7%	59.0%
Region 13	2.7%	56.4%
Region 14	4.2%	65.3%
	100.0%	

* Low education = zero schooling to third year high school

High education = third year high school and up

* NCR = National Capital Region

Region 1 = Ilocos

Region 8 = Eastern Visayas

Region 2 = Cagayan Valley

Region 9 = Western Mindanao

Region 3 = Central Luzon

Region 10 = Northern Mindanao

Region 4 = Southern Tagalog

Region 11 = Southern Mindanao

Region 5 = Bicol

Region 12 = Central Mindanao

Region 6 = Western Visayas

Region 13 = Cordillera Administrative Region (CAR)

Region 7 = Central Visayas

Region 14 = Autonomous Region of Muslim Mindanao (ARMM)

The regions with the largest number of people under poverty are Regions 4, 5, and 6, comprising more than 30 percent of the total. However, in terms poverty incidence, the Autonomous Region of Muslim Mindanao (Region 14) is the highest with a poverty incidence of 65.3 percent. Region 5, the Bicol Region, follows, with poverty incidence of 60.7 percent. Outside NCR, the region with the lowest poverty

incidence is Region 3, the Central Luzon Region, with poverty incidence of 31.1 percent.

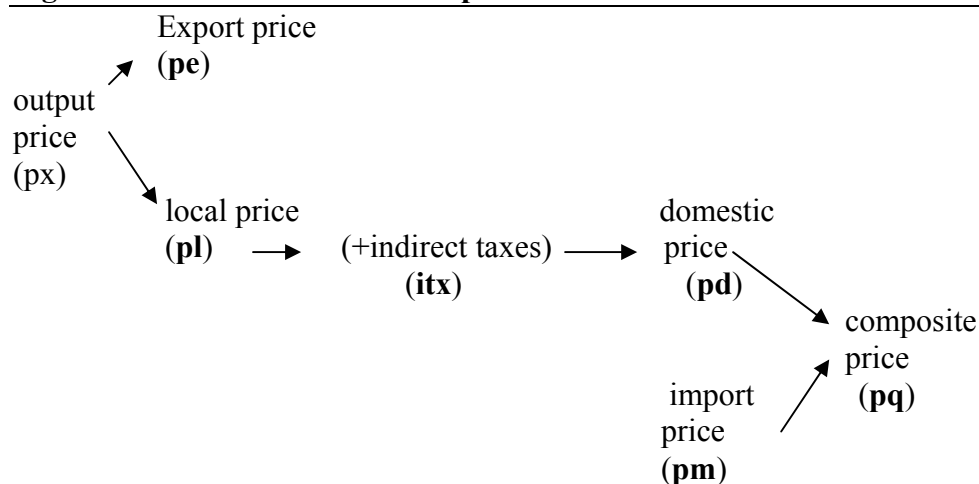
Model Description

A computable general equilibrium (CGE) model calibrated to the 1994 SAM is employed to analyze the effects of tariff reduction on unemployment, distribution and poverty. The model is called PCGEM, whose complete set of equations is presented in the Appendix B.

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 only to agriculture sector, while production labor works for both non-agriculture and agriculture sector. As such, agriculture labor movement is only limited to agriculture sector, while production workers can move across all sectors. Furthermore, skilled production workers include professionals, managerial, and other related workers. Skilled worker is defined as those with at least high school diploma.

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.

Figure 1: Basic Price Relationships in PCGEM



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

Figure 1 shows the basic price relationships in the model. Output price, px , affects export price, pe , and local prices, pl . 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_q . 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, 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.

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. The Armington and the CET elasticities are presented in Table 11.

To incorporate unemployment into the model, wage curve equations for each labor types are specified based on the general specification of Blanchflower and Oswald (BO, 1995). Wage curve is a relationship between the level of unemployment rate and the level of wages, which has been discovered by BO to have strong international empirical regularity. The relationship can be depicted on a graph with the level of unemployment rate on the horizontal axis and the level of wages on the vertical axis. Based on a set of international microeconomic evidence covering more than a dozen countries, the relationship between the level of unemployment rate and the level of wages depicts a downward sloping curve. The relationship therefore implies that if the level of unemployment rate increases in a particular location and time, the level of wages falls, all other things remain constant. This relationship is almost identical across different countries in the world and across different periods of time. Based on their empirical analysis, the estimated unemployment elasticity of pay is about -0.1 . Because of this regularity, it has been claimed that the “uniformity runs counter to orthodox teaching (based on time-series analysis) which claims that countries have very different degrees of wage flexibility”.

To capture this relationship in the CGE model the following equations are specified

$$\frac{w_i}{pvaind_j} = kt_wage_i \cdot unemp_i^{elas_wge}$$

where w_i is wage rate of labor type i ; $pvaind_j$ is weighted index of value added price in major sector j ; kt_wage_i is scale parameter; $unemp_i$ is unemployment rate in labor type i , and $elas_wge$ is wage curve elasticity, which is -0.1 . There are four labor types: skilled agriculture labor, unskilled agriculture labor, skilled production labor and unskilled production labor. Furthermore, unemployment rate is determined by the following equation

$$unemp_i = \frac{(ls_i - \sum_s l_i_s)}{ls_i}$$

where l_{s_i} is supply of labor of labor type i , and l_{i_s} labor demand in production sector s .

Model Closure

The model closure used in the simulation analysis has the following features:

Government Budget Balance. Nominal government consumption varies, while real government consumption is held fixed. This rationale behind this is to take out any possible effects of variations in government spending on poverty. Its price however is flexible.

Total government income is held fixed as well. Any reduction in government income from tariff reduction is compensated endogenously by direct income tax on households.

Government budget balance is flexible due to the endogenously determined price of total real government consumption.

Government transfers to households are held fixed in real terms, while nominal government transfers received by households vary with consumer prices.

Total investment. Total nominal investment is flexible, while its real value is fixed. Holding total real investment fixed avoids any possible intertemporal welfare effects in the simulation, thereby isolating the analysis from the interaction between trade policies and growth issues via changes in the level of real investment. The price of total real investment however is flexible.

Foreign Savings. Current account balance is held fixed. It therefore avoids any influence of international resources financing domestic policy changes. Nominal exchange rate is fixed, since the model does not have any monetary variables. The foreign trade sector is therefore cleared by the real exchange rate, which in effect is the ratio of the nominal exchange rate multiplied by the world export prices over domestic prices. Thus exports and imports respond to movements in the real exchange rate.

Private Savings. The propensities to save of the various household groups in the model adjust proportionately to accommodate the fixed total real investment assumption. Introducing a factor in the household saving function that adjusts endogenously to a policy shock does this⁴.

⁴That is, introducing the variable *adj* in Equation (43) in the Appendix.

Simulation Results

The simulation exercise utilizes the reduction in the sectoral tariff rates presented in Table 1, which are actual changes from 1994 to 2000. On the average, the overall reduction in tariff rate is -65 percent. Furthermore, the compensatory tax applied is through direct taxes on household income. As discussed earlier, this is line with the development during the period wherein the fall in the share of government revenue from tariff is partly offset by the rise in the share of direct taxes on income and profit.

The results on price and volume are presented in Table 11. The overall reduction in tariff rate of -65 percent leads to an overall reduction in the domestic price of imports (pm) of -10.4 percent. Similarly, the overall composite price (pq) declines by -4.1 percent, while the domestic price (pd) declines by -2.6 percent. The overall local price (pl) decreases by -2.6 percent. Local prices are prices net of taxes, which present the local cost of goods. Therefore, one of the benefits of reducing tariff rates is reduction in all domestic prices.

Table 11: Price and Volume Effects

	Trade Elasticities		Tariff		Price Changes (%)					Volume Changes (%)				
	Armington	CET	tm _i 0	Δtm _i (%)	Δpm _i	Δpd _i	Δpq _i	Δpx _i	Δpl _i	Δm _i	Δe _i	Δd _i	Δq _i	Δx _i
Crops	1.95	1.27	14.9	-45.6	-5.9	-1.3	-1.4	-1.2	-1.3	7.9	0.0	-1.7	-1.5	-1.6
Livestock	1.40	0.40	0.6	-57.6	-0.4	-1.7	-1.7	-1.7	-1.7	-3.8	-1.3	-1.9	-2.0	-1.9
Fishing	1.10	1.50	31.9	-76.4	-18.5	-2.1	-2.1	-1.6	-2.1	20.5	1.6	-1.5	-1.5	-0.9
Other Agriculture	0.85	0.40	0.3	-19.9	-0.1	0.2	0.2	0.2	0.2	0.3		0.1	0.1	0.1
AGRICULTURE			7.6	-48.9	-3.1	-1.4	-1.5	-1.3	-1.4	2.3	0.8	-1.7	-1.5	-1.4
Mining	1.10	1.50	40.9	-88.9	-25.8	-9.4	-21.8	-5.2	-9.4	10.4	2.6	-11.4	4.2	-5.2
Food Manufacturing	1.08	1.20	33.7	-55.4	-13.9	-2.3	-3.3	-2.1	-2.3	12.7	1.1	-1.7	-0.6	-1.4
Non-food Manufacturing	0.92	1.37	19.5	-64.0	-10.4	-6.2	-8.3	-4.0	-6.2	5.4	10.1	1.0	3.1	4.2
Construction	1.20	1.20	0.0	-		-3.4	-3.4	-3.4	-3.4	-5.4	2.9	-1.3	-1.4	-1.3
Electricity, Gas and Water	1.20	1.20	0.0	-		-2.0	-2.0	-2.0	-2.0		2.8	0.3	0.3	0.4
INDUSTRY			21.9	-65.3	-11.7	-4.1	-6.5	-3.2	-4.1	6.1	8.4	-0.3	1.5	1.4
Wholesale trade & retail	1.20	1.20	0.0	-		-0.5	-0.5	-0.4	-0.5		0.3	-0.2	-0.2	-0.1
Other Services	1.20	1.20	0.0	-		-1.4	-1.3	-1.2	-1.4	-2.0	1.2	-0.4	-0.5	-0.2
Government services	-	-						-0.4						0.0
SERVICES						-1.1	-1.0	-0.9	-1.1	-2.0	0.8	-0.4	-0.2	-0.2
TOTAL			19.4	-65.0	-10.4	-2.6	-4.1	-2.0	-2.6	5.2	5.4	-0.4	0.5	0.4

where

mi : imports

ei : exports

di : domestic sales

qi : composite commodity

xi : total output

pmi : import (local) prices

pdi : domestic prices

pli : local prices

pxi : output prices

pqi : composite commodity prices

The reduction in tariff rate results in changes in the relative domestic-import price ratios, which triggers substitution effects between imports and domestically produced goods. For example, import volume (m) increases by 5.2 percent, while domestic production (d) declines by -0.4 percent. These changes taken together however, result in a marginal improvement in the total supply of goods available in the market as shown by the increase in the composite goods (q) of 0.5 percent.

The overall decline in local prices creates an effective real exchange depreciation, which in turn increases export competitiveness. Real exchange rate is

defined as p_e/p_l , where p_e is the domestic price of exports and p_l is local price. Since the nominal exchange rate and p_e are assumed fixed, any decline in the local price leads to an effective real exchange rate depreciation. Thus, the decline in p_l of -2.6 percent indicates a real exchange rate depreciation effect of tariff reduction. This effect leads to an overall export growth of 5.4 percent, which in turn increases total output marginally by 0.4 percent.

On the whole, tariff reduction leads to lower prices. However, the decline in import prices in local currency is significantly higher than the decline in domestic prices. This results in substitution effects favoring imports. Import volume therefore increases, while domestic production for local sales declines. However, the decline in local prices leads to depreciation in the real exchange rate, which creates an export pull effect that increases export volume. Moreover, despite the decline in domestic production for local sales, the increased availability of imported goods as a result of the reduction in tariff rate improves the overall supply of goods in the local market. Similarly, despite the decline in domestic production for local sales, the export pull effects coming from the real exchange rate depreciation improves the overall production of the economy.

From Tariff Reduction to Production Reallocation

What are the effects at the sectoral level? The effects vary considerably, triggering reallocation of output across sectors. The effects are largely due to the differences in the sectoral structure of imports and exports, initial tariff rates, and the trade elasticities (armington and CET elasticities⁵).

The overall industrial sector realizes the largest drop in import prices of -10.4 percent. The drop in agricultural import prices is only -3.1 percent. In terms of specific sectors, the largest drop in import prices is observed in mining (-25.8 percent), in fishing (-18.5 percent), in food manufacturing (-13.9 percent), and in non-food manufacturing (-10.4 percent). These differentiated effects are due to the different levels of initial tariff rate before the reduction in tariff rates.

The sectoral effects on import volume are due to the differentiated effects on import prices and on the differences in the armington elasticities. All these factors together results in large increase in import volume in fishing (20.5 percent), in food manufacturing (12.7 percent), and in mining (10.4 percent). Import volume of the non-food manufacturing sector registers an increase of 5.4 percent only. However, since the non-food manufacturing sector is the largest importer (76.1 percent of total imports, see Table 4), the increase in the overall import volume comes largely from this sector.

⁵The armington and the CET elasticities utilized in the model are based on the elasticities in another CGE model in the Philippines called the Agriculture Policy Experiments model (APEX) (Clarete and Warr, 1992), which were estimated econometrically, while the initial tariff rates were based on the estimates of Manasan and Querubin (1997).

One set of results that need further elaboration is the effect on the non-food manufacturing sector's imports (m), domestic production (d) and the composite good (q), since this sector is a major contributor to the total. One may observe that the decline in its import prices is significantly larger than the drop in its domestic prices, i.e., -10.4 percent and -6.2 percent, respectively. Thus, the relative price change favoring imports should lead to a reduction in domestic production. However, the result on domestic production indicates an increase of +1.0 percent. There are no inconsistencies because the composite good (q) for the sector registers an increase of 3.1 percent⁶.

Except for livestock, all sectors register an increase in exports. The increase is attributed largely to the improvement in export competitiveness across sectors because of the drop in local prices, pl. The largest increase in export competitiveness is in mining (-9.4 percent), and in non-food manufacturing (-6.2 percent). The results on the mining sector, however, may be of less interest because its share to the total export is very small. But the result on the non-food manufacturing sector 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 in the non-food manufacturing sector, brings about an overall increase in its total production of 4.2 percent. This is the only sector that registers a relatively larger increase in output. Marginal increases are observed in other agriculture (+0.1 percent) and in utilities⁷ (+0.4 percent).

Thus, it is quite clear in the sectoral results that the reduction in tariff rates brings about production reallocation favoring the non-food manufacturing sector.

From Production Reallocation to Factor Markets

What happens to the flow of resources across sectors? Since all sectoral capital is fixed, this pertains to the sectoral movement of labor. The results on the factor price ratios as well as on the capital-labor ratios are important in assessing labor movements. The results are presented in Table 12.

The reduction in tariff rates leads to a general improvement in factor prices. The overall rate of return to capital improves by 0.9 percent, while the overall wage of aggregate labor increases by 1.0 percent. Across sectors the results on the rate of return to capital vary significantly. It increases in other agriculture (1.1 percent), non-food manufacturing sector (10.7 percent), utilities (2.4 percent), wholesale trade and retail (0.6 percent), and other services (0.5 percent), while it declines in the rest of the sectors.

The increase in the rate of return to capital in the non-food manufacturing sector is higher than the increase in the wage for the aggregate labor (10.7 percent and

⁶If 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.

⁷Electricity, gas and water.

1.0 percent, respectively). This results in factor substitution favoring labor. This is seen in the decline in the capital-labor ratio from 1.23 in the base (see Table 12) to 1.13 after the tariff cut. In fact, the non-food manufacturing sector is the only sector with noticeable decline in the capital-labor ratio, indicating movements of labor towards this sector. In fact, the non-food manufacturing sector absorbs labor from other sectors. Employment in the sector increases by 9.6 percent. However, there are marginal increases in employment both in utilities and in other agriculture, 1.4 percent and 0.2 percent, respectively.

Table 12: Effects on Factor Market

	Factor Intensity (k/l) _i		Value Added Changes (%)		Change (%) in Return to Capital	Change (%) in Labor Demand				
	base	simul.	δva_i	δpva_i		L*	L1**	L2**	L3**	L4**
Crops	0.98	1.01	-1.6	-0.6	-2.1	-3.1	-1.0	-0.8	-3.2	-4.1
Livestock	0.99	1.02	-1.9	-1.0	-2.9	-3.8	-1.8	-1.5	-3.9	-4.8
Fishing	1.79	1.84	-0.9	-0.6	-1.4	-2.4	-0.3	-0.1	-2.5	-3.4
Other Agriculture	1.00	0.99	0.1	1.1	1.1	0.2	2.3	2.5	0.0	-0.9
AGRICULTURE			-1.6	-0.5	-1.9	-2.9	-0.9	-0.6	-3.0	-4.0
Mining	1.15	1.29	-5.2	-5.0	-10.0	-10.9			-11.0	-11.8
Food Manufacturing	1.74	1.81	-1.4	-1.5	-2.9	-3.8			-4.0	-4.8
Non-food Manufacturing	1.23	1.13	4.2	6.2	10.7	9.6			9.5	8.5
Construction	1.28	1.32	-1.3	-0.7	-2.0	-2.9			-3.0	-3.9
Electricity, Gas and Water	2.97	2.92	0.4	2.1	2.4	1.4			1.3	0.4
INDUSTRY			1.2	2.3	3.0	2.7			2.4	1.9
Wholesale trade & retail	1.95	1.95	-0.1	0.7	0.6	-0.4			-0.5	-1.4
Other Services	1.64	1.65	-0.2	0.7	0.5	-0.5			-0.6	-1.5
Government services			0.0	1.0		0.0			-0.1	0.0
SERVICES			-0.2	0.7		-0.4			-0.4	-1.5
TOTAL					0.9				0.2	0.8
Change in average wage, % -->						1.0	-1.1	-1.4	1.1	2.0
Change in unemployment rate, % -->							6.1	9.8	-2.6	-11.5

where

va_i : value added

pva_i : value added prices

*L aggregate labor

k_i : capital

r_i : price of capital

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

l_i : labor

w_i : price of labor

There are interesting insights that can be observed from the results across different labor types. Agriculture wage declines for both skilled and unskilled type by -1.1 percent and -1.4 percent, respectively. Other agriculture sector has not been able to absorb displaced agriculture labor from crops, livestock, and fishing for both skilled and unskilled type. Thus, the overall employment in agriculture declines by -0.9 percent for skilled and -0.6 percent for unskilled. As a result, unemployment rate increases by 6.1 percent in skilled agriculture labor and 9.8 percent unskilled agriculture labor.

Some of the skilled and unskilled production workers in agriculture move to the non-food manufacturing sector and to a lesser extent to utilities. The same is true for some of the production workers in the service sector. Skilled production labor in the non-food manufacturing sector improves by 9.5 percent and unskilled labor by 8.5 percent. For the utilities sector, the improvement is 1.3 percent for the skilled and 0.4

for the unskilled. These results suggest that the reduction in tariff rates leads to relatively higher demand for skilled labor in industry, particularly the in non-food manufacturing sector. Because of the strong absorption effects coming from the non-food manufacturing sector, the overall employment of skilled and unskilled production labor improves. As a result, unemployment rate declines by –2.6 percent for skilled production labor and –11.5 percent for unskilled. Also, the average wage for skilled production labor increases by 1.1 percent. For unskilled, average wage improves by 2 percent.

In sum, the results of the simulation indicate that the non-food manufacturing sector benefits from both the effects of production reallocation and labor movement. Furthermore, there are indications that show that, as a result of the shifts in output and factor price ratios, factor substitution tends to favor skilled production workers in the non-food manufacturing and in the utilities sectors. Furthermore, the results indicate that the reduction in tariff rate leads to higher unemployment rate for agriculture labor. Agriculture wages also decline.

From Factor Markets to Household Income

What are the effects on the sources of income of households? Table 13 shows the overall household income effects of tariff reduction from labor and capital income sources. Other income sources are omitted in the table because foreign remittances, transfers, and dividends are all assumed fixed in the simulation.

Household income from agriculture labor declines for both skilled and unskilled types. This is due to the drop in agriculture wages and the increase in unemployment in both skilled and unskilled agriculture labor as observed earlier. However, due to the favorable effects on production labor, both in terms of wage increases and employment improvement, especially in the non-food manufacturing sector, household income from skilled production labor increases by 1.3 percent and from unskilled production labor by 2.8 percent.

Household income from the return to capital in agriculture declines by –1.9 percent, but increases in industry by 3.0 percent, in wholesale and retail by 0.6 percent, and in other services by 0.5 percent. These income effects from capital are coming mainly from the change in the sectoral rates of return to capital because sectoral capital is fixed in the simulation.

Table 13: Household Income Effect (%)

	Labor				Capital			
	Skilled Agriculture	Unskilled Agriculture	Skilled Production	Unskilled Production	Agriculture	Industry	Wholesale & Retail	Other Services
Total Households	-2.0	-2.0	1.3	2.8	-1.9	3.0	0.6	0.5

From Household Income to Income Distribution

What are the effects on income distribution? Table 14 presents the results on the Gini coefficient before and after the tariff rate reduction. The problem of income inequality deteriorates as indicated by the increase in the Gini coefficient from 0.4644 before the tariff reduction to 0.4672 after the tariff reduction, or an increase in the coefficient of 0.60 percent. The worsening of income inequality is due mainly to the contraction in agriculture output, the increase in unemployment in agriculture labor, and the drop in agriculture wages.

Table 6 indicates that households in the rural areas depend heavily on agriculture labor, particularly unskilled, and on the return to capital in agriculture. Furthermore, Table 10 shows that much of the poor families are located in the rural areas. Thus, any unfavorable effect of tariff reduction on agriculture dampens the major source of income of households in the rural areas. On the other hand, the favorable effects on industry, particularly the non-food manufacturing sector, in terms of output, employment and wages, improve the major sources of income of households in urban areas. Since there is significantly less number of poor families in urban areas than in rural places, tariff reduction therefore worsens the problem of income inequality in the Philippines.

Table 14: Income Inequality effects of Tariff Reduction

	Gini Coefficient		
	Before	After	% change
Philippines	0.4644	0.4672	0.60%
Std Dev.	0.0029	0.0029	

Link Between Tariff Rate Reduction and Poverty

The paper assesses the effects of tariff reduction on poverty through the use of poverty measures based on the Foster-Greer-Thorbecke (FGT) poverty indices. In general, the FGT poverty index is given by⁸

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - y_i}{z} \right]^{\alpha}$$

where n is population size, q number of people below poverty line, y_i is income, z is poverty line or poverty threshold. Poverty threshold is equal to the food threshold plus the non-food threshold, where threshold refers to the cost of basic food and non-food requirements. The parameter α can have three possible values, each one indicating a measure of poverty.

⁸See Ravallion (1992) for detailed discussion. The poverty and income inequality indices were computed using the DAD 4.2 software of Duclos, Araar, Fortin (2002).

- a. Head count index of poverty ($\alpha = 0$). This is the common index of poverty which measure the proportion of the population whose income (or consumption) is below the poverty line
- b. Poverty gap ($\alpha = 1$). This index measures the depth of poverty. That is, it depends on the distance of the poor below the poverty line.
- c. Poverty Severity ($\alpha = 2$). This index measures the severity of poverty

Thus, poverty is affected by household income y and by the poverty threshold z . In the analysis below household income change as a result of the change originating from factor incomes, while poverty threshold change as a result of the change in consumer prices. To carry out the analysis, the following adjustments are done.

(i) Convert all results on households to individuals by utilizing the household family size and the household adjusted weighing factor of the 1994 FIES. This converts the 24,797 households in the FIES to 67,430,864 individuals.

(ii) Adjust all official poverty thresholds in 1994 by deflating them with the results on the consumer price index derived from the simulation. Poverty thresholds are available for the whole Philippines, for the whole urban and rural, and for 14 regions, broken into urban and rural areas. The consumer price index is derived as the weighted composite price (pq_i), where the weights are the shares in the consumption basket of households of the various areas and regions.

(iii) The results on nominal household income are the ones used in the computation of the various poverty indices instead of nominal disposable income because of the compensatory tax that is imposed on household income.

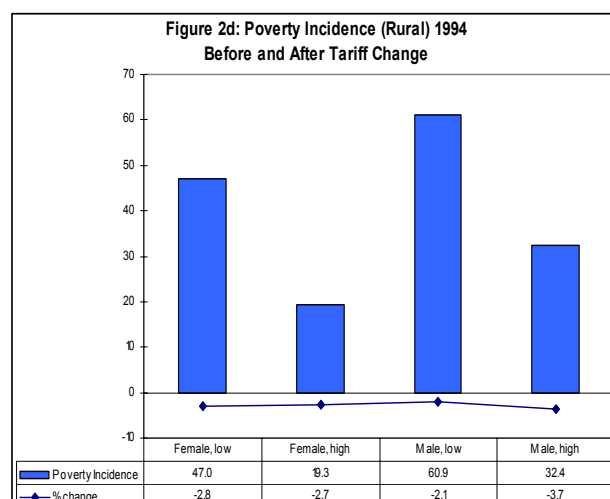
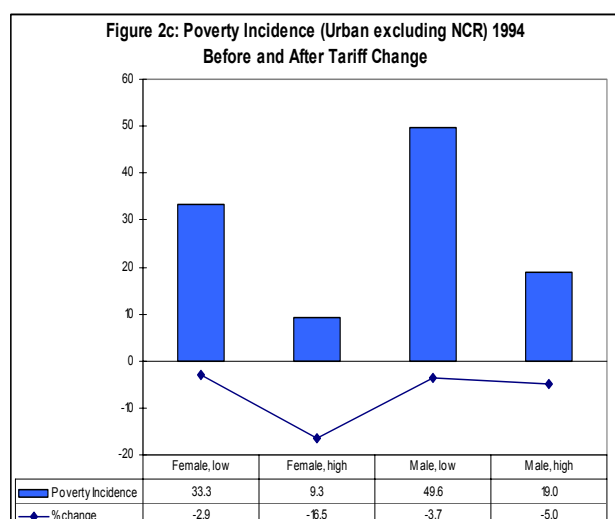
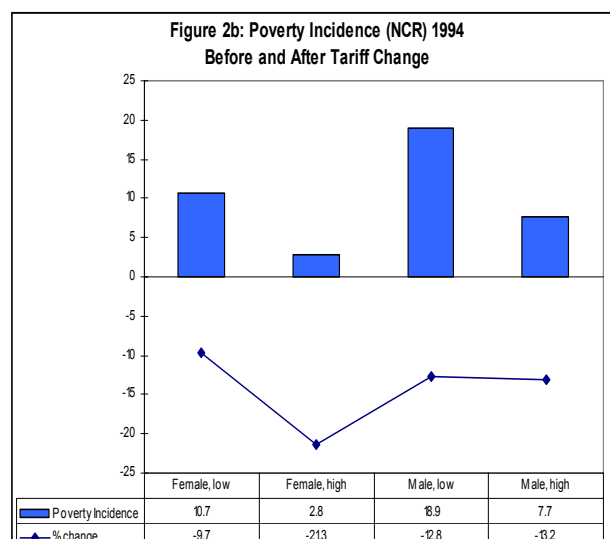
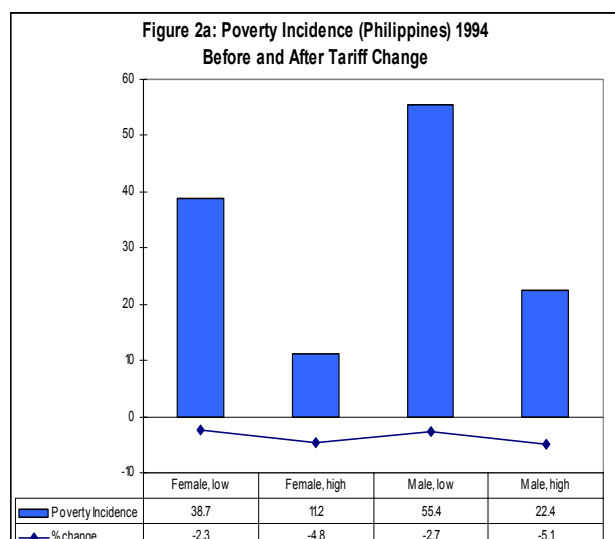
(iv) To be able to draw insights from the results, the poverty indices are summarized in four broad household groupings: (a) female-headed households with low education; (b) female-headed households with high education; (c) male-headed households with low education; and (d) male-headed households with high education. Low education means those with zero education up to third year high school, while high education implies those who are high school graduate and up. The results are aggregated for the whole Philippines, for the NCR, for urban areas excluding the NCR, and for rural areas. Further disaggregation is also available for the 14 different regions in the country, which are presented in Appendix A1 but not discussed in this section.

Figures 2a to 2d present the results on the poverty incidence for the whole Philippines, for the NCR, for urban areas excluding NCR, and for rural areas. The bar charts present the 1994 poverty incidence, while the line segments indicate the rate of change of the poverty incidence after the tariff change.

As presented in Table 10, the highest poverty incidence in 1994 for the whole country is observed to be in the group of male-headed households with low education, while the lowest is in female-headed with high education. The same pattern is

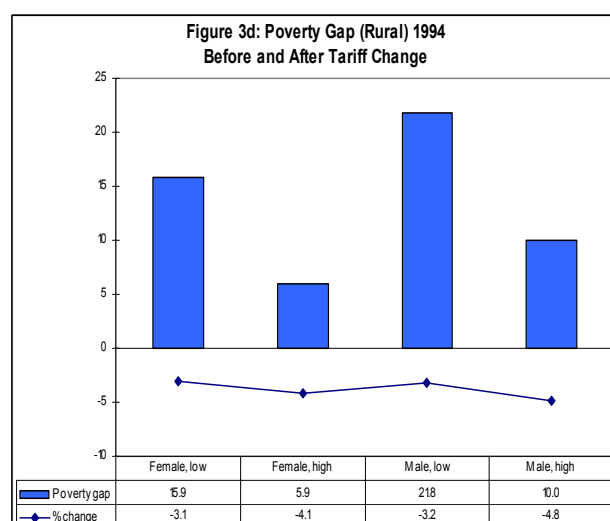
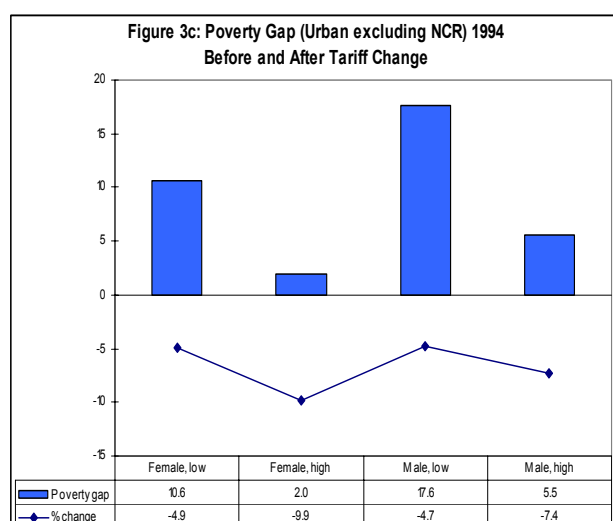
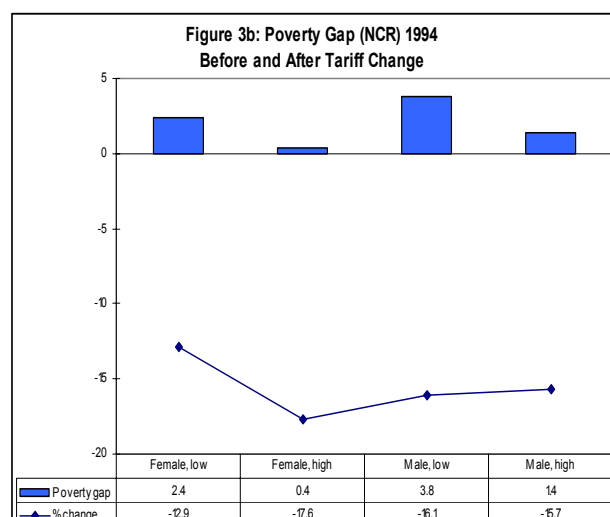
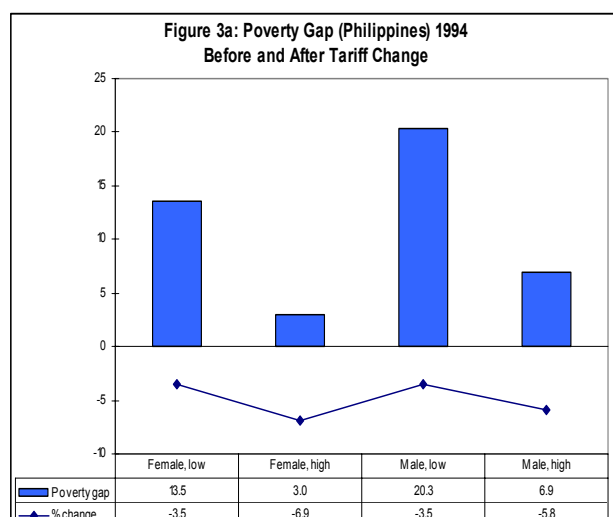
observed for all areas in the country as shown in the figures, although the degree of poverty varies. One can observe that the highest poverty incidence is in the rural areas.

Generally, the level of poverty incidence drops for all groups. The general drop is due largely to the decline in the consumer prices that lowers the nominal value of the poverty threshold for all groups in all areas. In Table 12, the overall composite price (pq), which is also the consumer price, drops by -4.1 percent as a result of tariff reduction.



However, the effects on poverty incidence vary considerably across households in the different areas. The sharpest decline in poverty incidence is in the NCR, while the lowest is in the rural areas. Urban areas excluding the NCR also register a decline in poverty incidence, but the drop is significantly lower than the NCR, but relatively higher than the rural areas. In the NCR, across household groups, the largest drop is in female-headed households with high education (-21.3 percent), while the lowest decline is in female-headed households with low education (-9.7

percent), see Figure 2b. Similar pattern holds in urban areas excluding the NCR, but the degree of change is relatively less. However, a different pattern emerges in rural places. The highest drop is in male-headed households with high education (-3.7 percent), while the lowest drop is in male-headed households with low education (-2.1 percent), see Figure 2d.



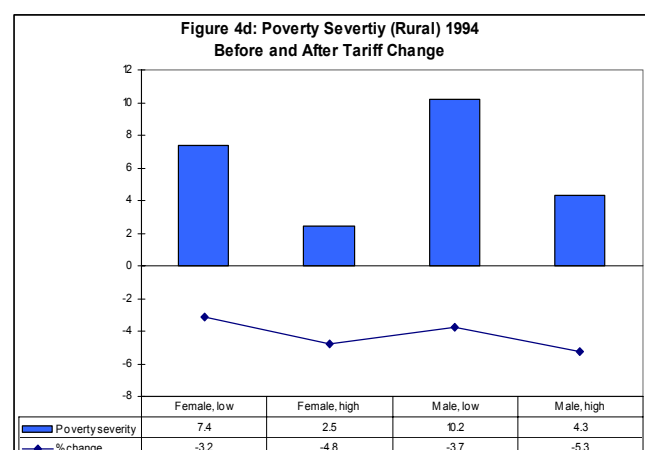
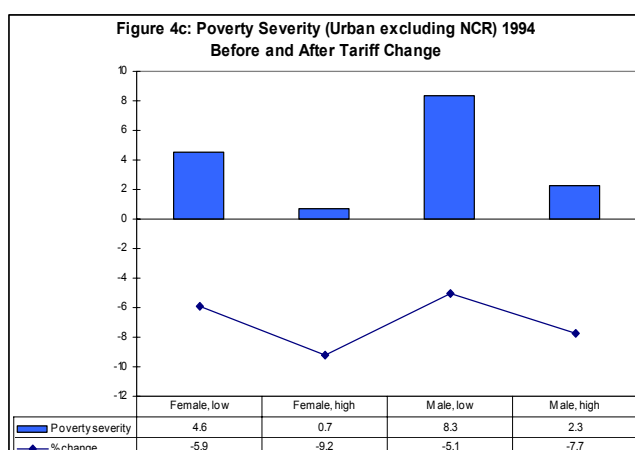
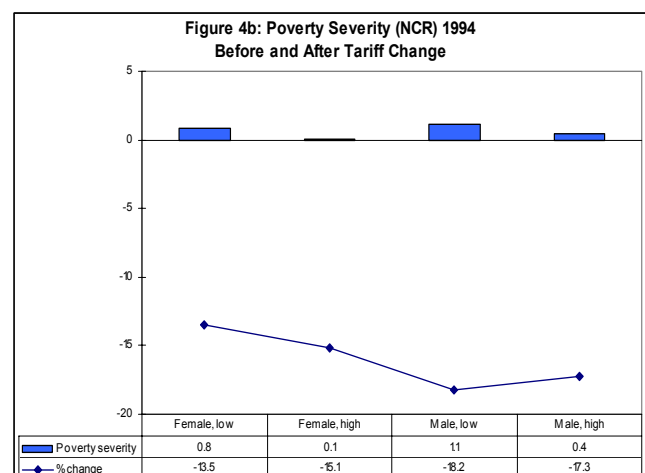
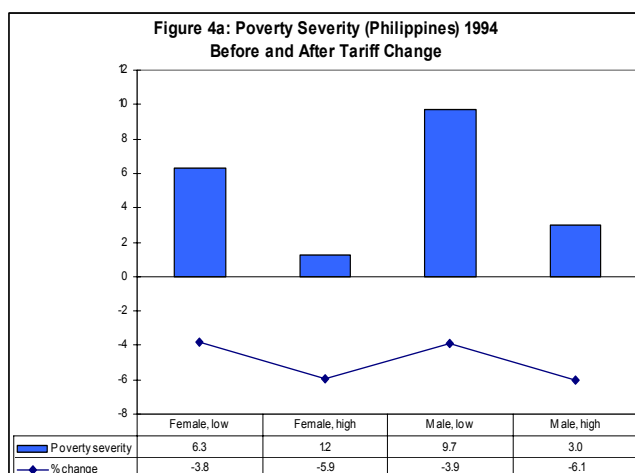
These differentiated effects across households are due largely to the effects on the sources of income of households⁹. It was observed in Table 6 that rural households depend heavily on unskilled agriculture labor and on returns to capital in agriculture. Because agriculture contracts as a result of the reduction in tariff, unemployment increases in agriculture labor. Its wage drops as well. Therefore, as shown in Table 13, income from agriculture labor drops. Furthermore, since agriculture contracts, the rate of return to capital in the sector also drops. This further aggravates the situation in the rural areas. Thus the impact of the reduction in tariff on rural households, although favorable, is marginal as compared to urban areas, particular the NCR.

⁹Appendix A2 presents detailed sources of income households in various regions.

As discussed earlier, production reallocation and resource flows favor the non-food manufacturing sector as a result of the reduction in tariff. This sector is located largely in urban areas. Its overall production improves despite the increase in import inflows. The increase is due mainly to the rise in its exports. It is interesting to note that the biggest contributors to exports in the non-food manufacturing sector are semi-conductor and garments. These industries are located mostly in export processing zones and the workforce is dominated by female. Usually, these industries employ workers with at least high school diploma and with vocational training. This may be the factor behind the sharpest drop in the poverty incidence in female-headed households with high education, both in the NCR and in urban areas excluding the NCR.

In terms of the depth of poverty, as indicated by the poverty gap index, the results of tariff reduction are heavily biased in favor of female-headed households with high education located in the NCR. The results are presented in Figures 3a to 3d. Although rural households are also favorably affected with declining poverty gap, they have the least effects. Again, similar forces do play in driving such results.

Figures 4a to 4d present the results on poverty severity index. Generally similar pattern of effects can be observed from the results.



Detailed results on the three poverty indices for all the regions in the country are presented in Appendix A1. Although the results will not be discussed at length, it is worthwhile to point out that the results vary across regions. The variations are due largely to the differences in the sources of household income (see Appendix A2) and the composition of the consumer basket in the various regions.

Summary and Conclusion

The paper is set out to analyze the effects of the reduction in tariff in the Philippines during the period 1994 to 2000 on unemployment, distribution and poverty. Tariff reduction is a major part of the trade liberalization program aggressively implemented by the government since the 1980s. To date, significant changes have already taken place: tariff rates have been drastically reduced, tariff structure simplified, and quantitative restrictions tariffed.

The approach used in the analysis is CGE-microsimulation wherein detailed individual household information from the FIES are integrated into a CGE model that is calibrated to the actual Philippine SAM to be able to capture the interaction between policy reforms and individual household responses, and their feedback to the general economy. To understand the effects, three transmission mechanisms are analyzed, which are: household income, consumption, and unemployment. Tariff reduction alters relative prices, particularly sectoral prices and domestic-import prices. Changes in relative prices lead to production reallocation and resource movements through the various substitution processes that are captured in the CGE model.

A number of interesting insights can be drawn from the simulation exercise involving tariff reduction.

1. Tariff reduction results in a drop in both the domestic price of imports and the domestic price of locally produced goods. The decline in import prices results in higher imports, while the drop in local prices effectively increases export competitiveness, which in turn translates into higher exports. Although higher imports put pressure on local production, the export pull effect as a result of improved competitiveness offsets the negative effect on output. Thus, overall output improves. Also, the supply of goods available in the market improves.

2. The non-food 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 change in the output and factor price ratios, factor substitution favors skilled production workers in non-food manufacturing, utilities and other agriculture sectors.

3. Agriculture wages decline as a result of the drop in output of agriculture. Also, the contraction in agriculture leads to higher unemployment in both skilled and unskilled agriculture labor. Furthermore, the drop in agriculture output results in lower rate of return to capital in agriculture. These effects translate into lower income

for rural households, since they depend largely on agriculture labor income and capital income from agriculture. On the other hand, the resource reallocation effects towards industry, particularly the non-food manufacturing sector, increase the wage for production workers and the rate of return to capital in industry. It also reduces unemployment in both skilled and unskilled production labor. These effects improve the income of urban households in the different regions, including the NCR.

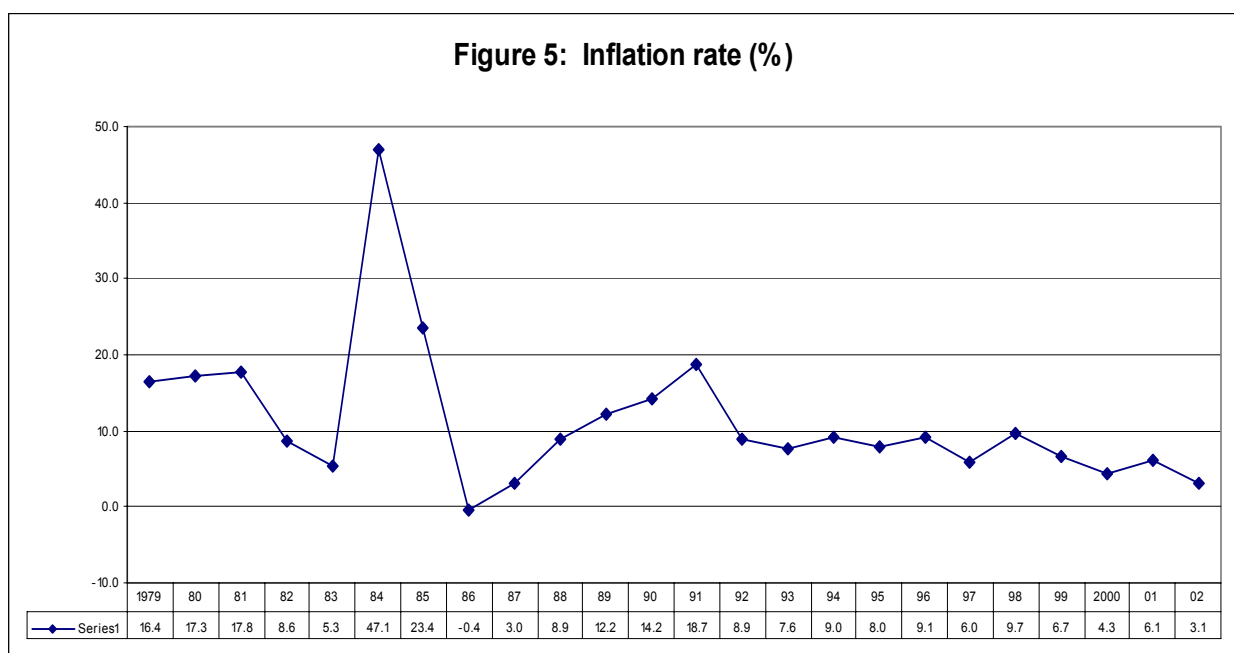
4. There is an apparent bias in favor of households in urban centers as tariff rates are reduced. This is because of the production reallocation and resource flow effects towards the non-food manufacturing sector. Since poor people are located largely in rural areas, this worsens the problem of income inequality in the country. The Gini coefficient deteriorates from 0.4644 before the tariff reduction to 0.4672 after the tariff cut.

5. The poverty effects are calculated using the FGT indices: poverty incidence, gap, and severity. The poverty effects are analyzed using two transmission channels: income and consumption. The income channel is examined using the results on factor incomes as described above, while the consumption channel is looked at in terms of the effects on the consumption basket of households and the poverty threshold. The decline in the composite prices (an indicator of consumer prices in the model) as a result of the reduction in tariff rates leads to lower nominal poverty threshold. As a result, all indices computed show favorable poverty effects. However, the poverty effects vary considerably across household groups. Because of the bias in favor of urban centers, particularly the NCR, the reduction in poverty is concentrated mainly in those areas. The NCR is observed to have registered significant drop in poverty incidence, gap and severity. Urban centers excluding the NCR also display sizeable reduction in poverty, but much lesser than in the NCR. It is ironic that while the poor abounds in rural areas, the lowest decline in poverty is in rural places. This effect is due largely to the contraction in agriculture and the improvement in industry, particularly the non-food manufacturing sector. This sector is concentrated mainly in urban centers.

It is also interesting to note that one of the driving forces is the expansion in exports of the non-food manufacturing sector. Exports from this sector are dominated by exports of semi-conductor and garments. These industries are located mainly in export processing zones with a workforce dominated by female. Usually, workers in these industries have at least high school diploma and with vocational training. It is interesting to relate this with the results here that the largest improvement in poverty is observed in households headed by female with high education.

6. The general improvement in poverty is not so much due to the improvement in income as a result of factor price changes, but to the reduction in domestic and consumer prices. One should note that these sets of results are arrived at from a simulation exercise using a competitive equilibrium model. As such there are no oligopolistic market structures built into the model. Thus, any tariff reduction should in principle translate into lower domestic and consumer prices. Are the results realistic considering the fact that the sector that benefits the most in terms of resource reallocation and factor movement is the non-food manufacturing sector, which is

believed to have strong oligopolistic structure in the Philippines? Although this issue can be adequately addressed quantitatively, the model has to be extended further to accommodate non-competitive market structure. This is beyond the scope of the present paper, which incidentally is good area for future research. However, in the absence of such an extended model, at this juncture it would be appropriate to look at the trend of inflation in the 1990s and onwards, the period when reforms intensified. From a high of 18.7 percent in 1991, inflation rate declined slowly to reach 3.1 percent in 2002 (see Figure 5). There was a short blip though of 9.7 percent in 1998, but this was largely due to the severe drought brought about by the El Nino effect¹⁰. For sure, inflation is caused by a host of factors including supply pressures, but the competition brought in by the lowering of tariff rates in the 1990s has certainly put a strong downward pressure on inflation rate in recent years.



¹⁰ Agriculture production registered the highest drop in output in 30 years.

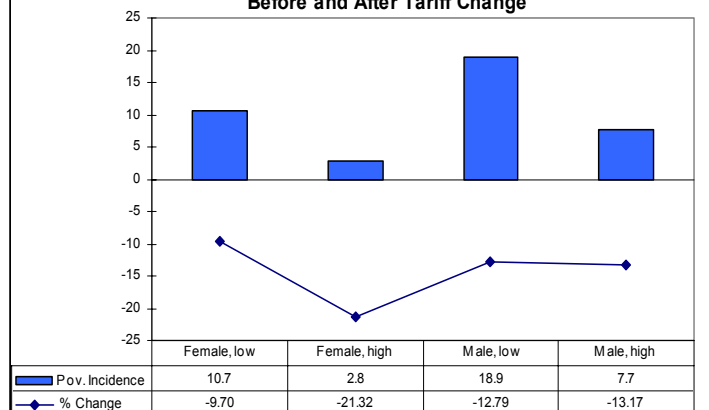
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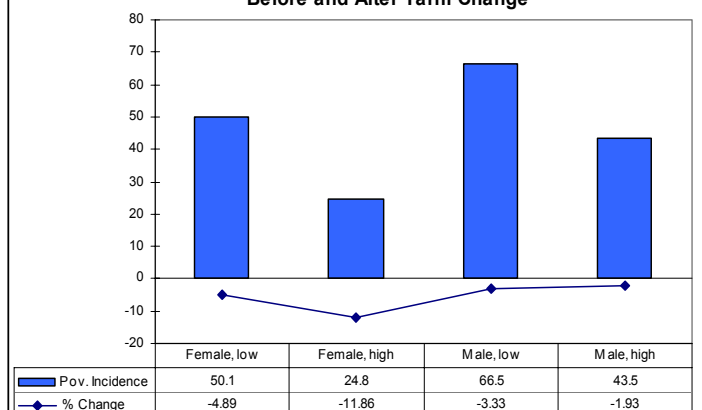
APPENDIX A1:

Regional Disaggregation of Poverty Indices

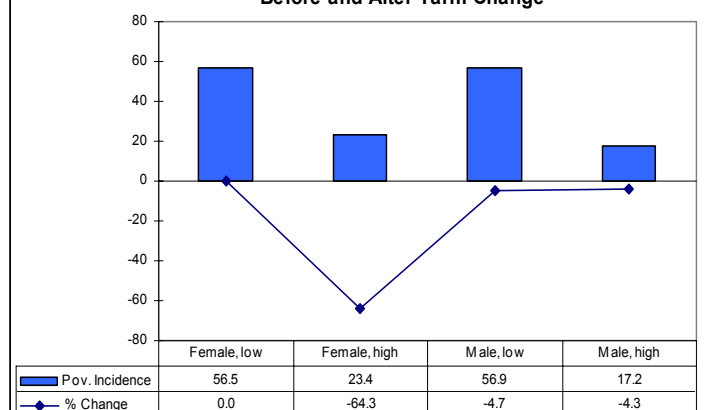
**Figure A1.1 NCR, Poverty Incidence, 1994
Before and After Tariff Change**



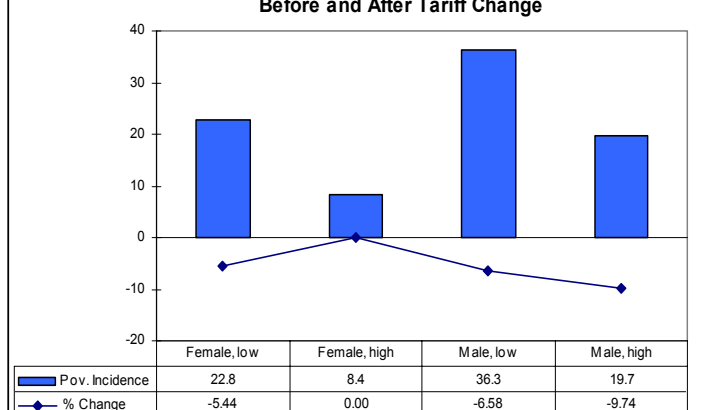
**Figure A1.2 Region 1 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



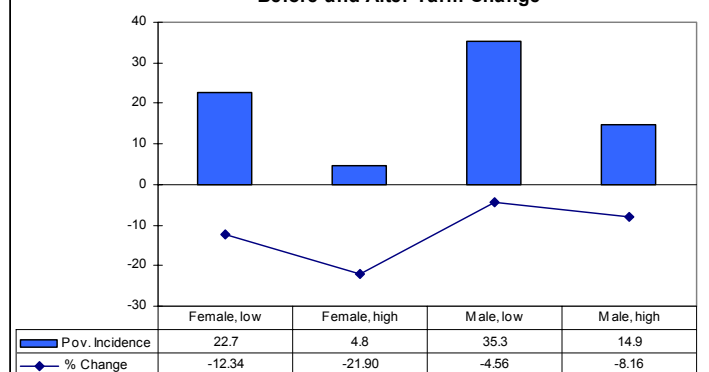
**Figure A1.3 Region 2 (Urban), Poverty Incidence, 1994
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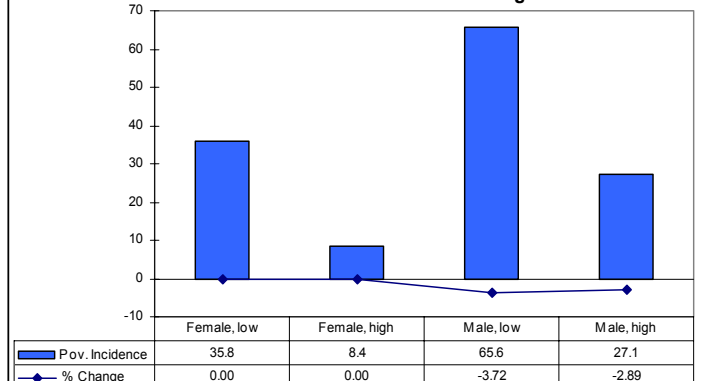
**Figure A1.4 Region 3 (Urban), Poverty Incidence, 1994
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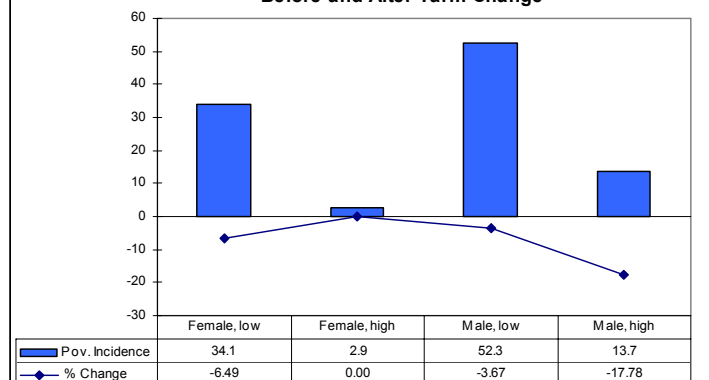
**Figure A 1.5 Region 4 (Urban), Poverty Incidence, 1994
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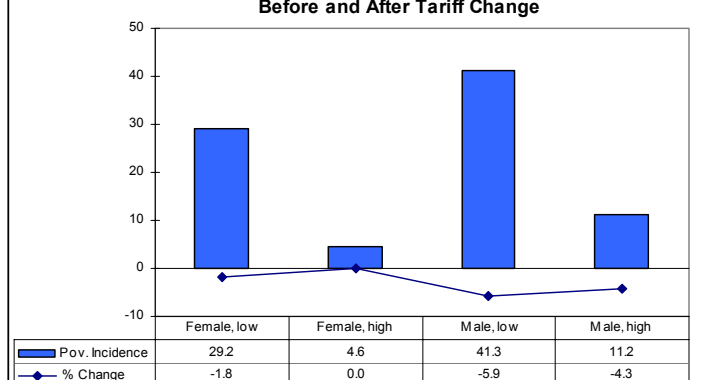
**Figure A1.6 Region 5 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



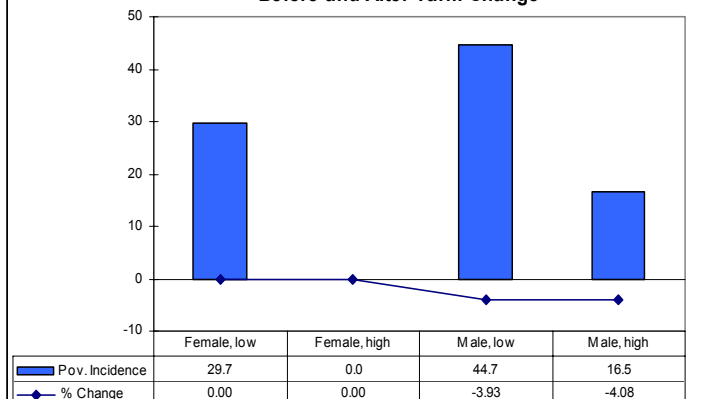
**Figure A1.7 Region 6 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



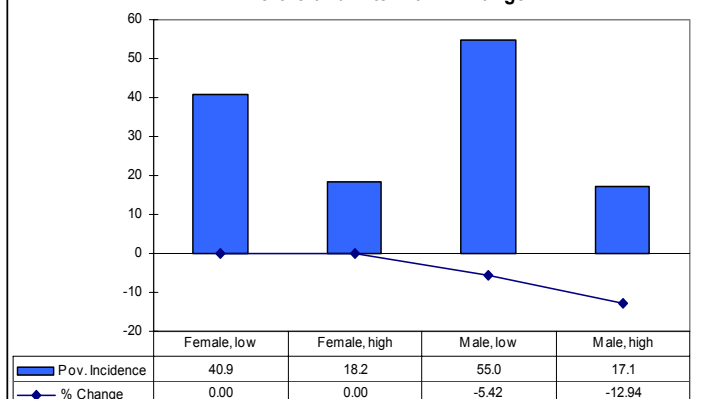
**Figure A1.8 Region 7 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



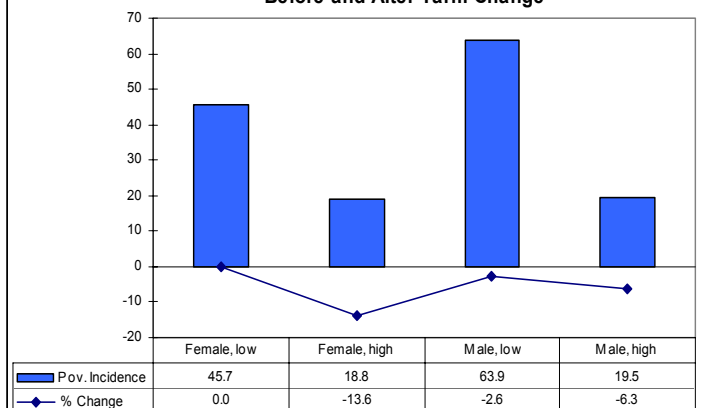
**Figure A1.9 Region 8 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



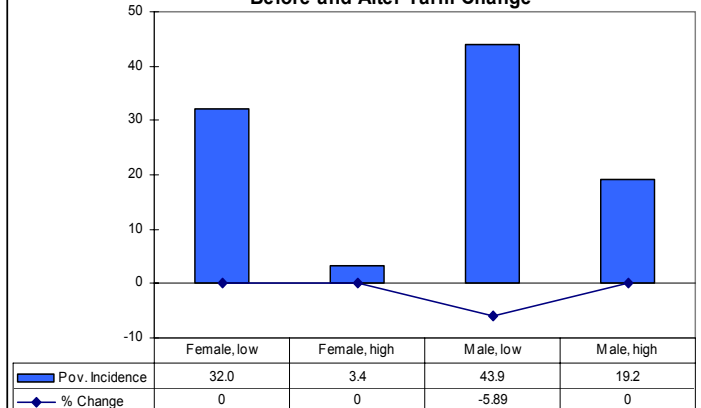
**Figure A1.10 Region 9 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



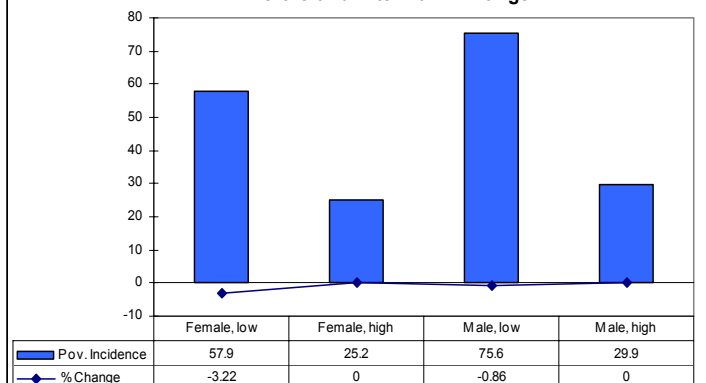
**Figure A1.11 Region 10 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



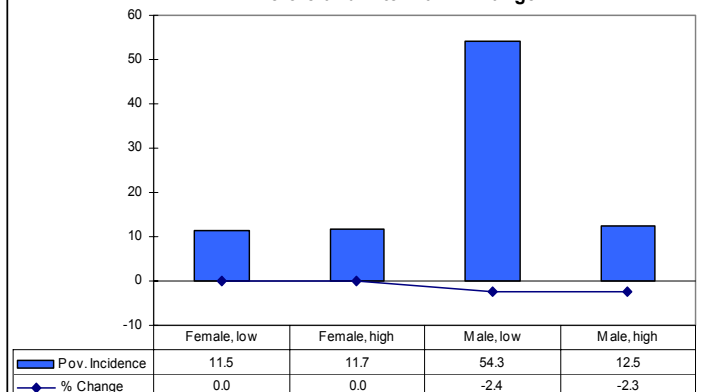
**Figure A1.12 Region 11 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



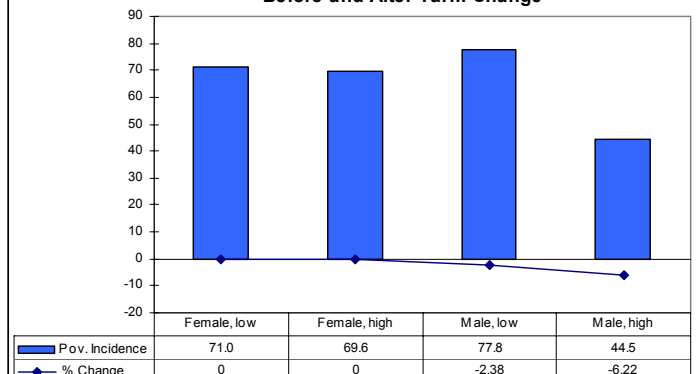
**Figure A1.13 Region 12 (Urban), Poverty Incidence, 1994
Before and After Tariff Change**



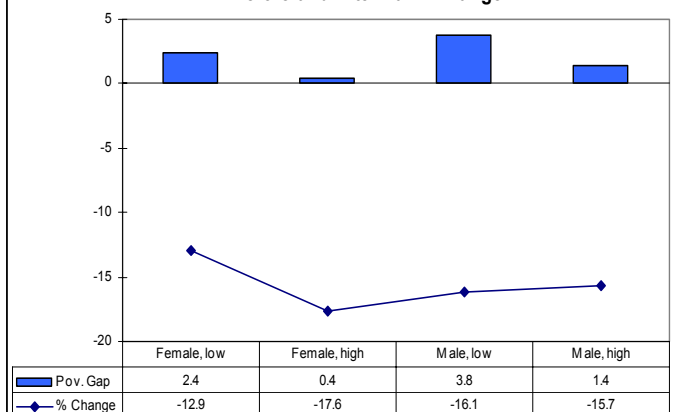
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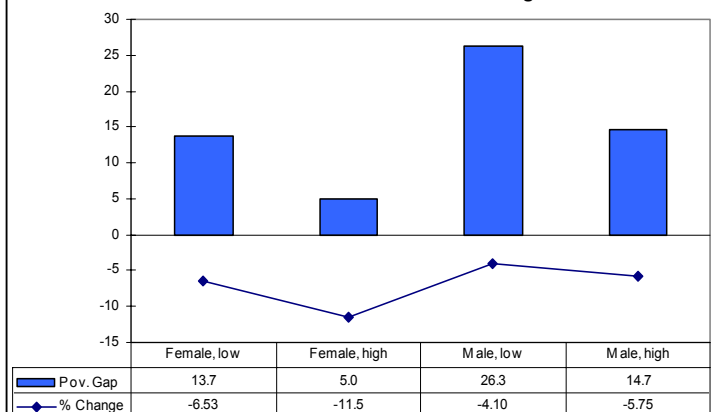
**Figure A1.15 Region 14 (Urban), Poverty Incidence, 1994
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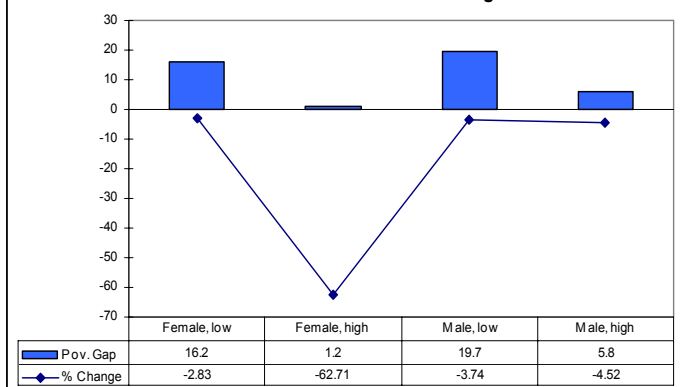
**Figure A2.1 NCR, Poverty Gap, 1994
Before and After Tariff Change**



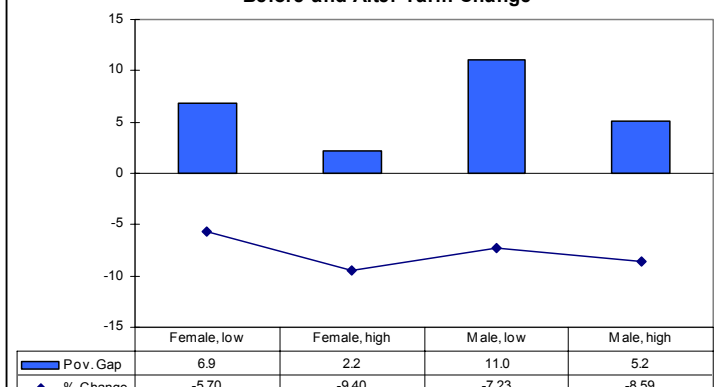
**Figure A2.2 Region 1 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



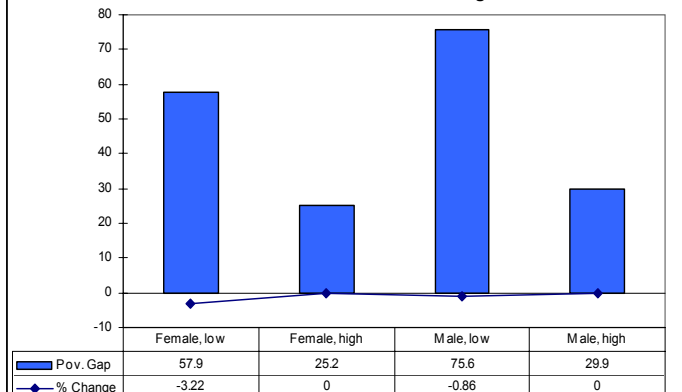
**Figure A2.3 Region 2 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



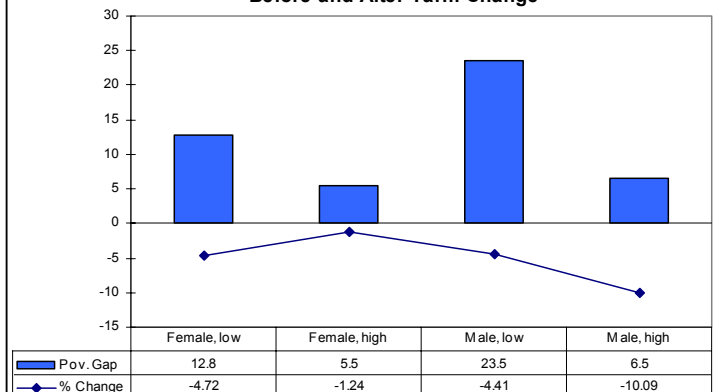
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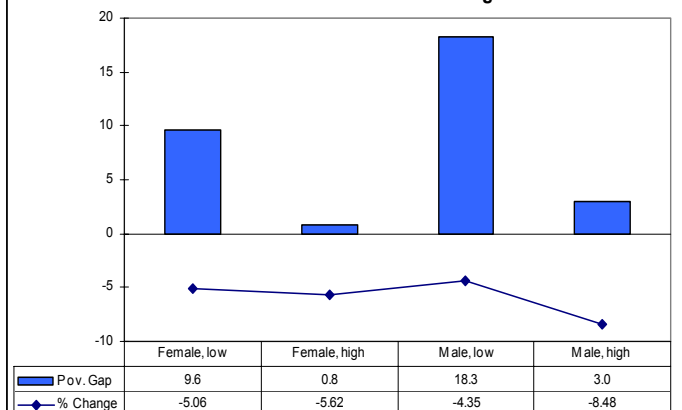
**Figure A2.5 Region 4 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



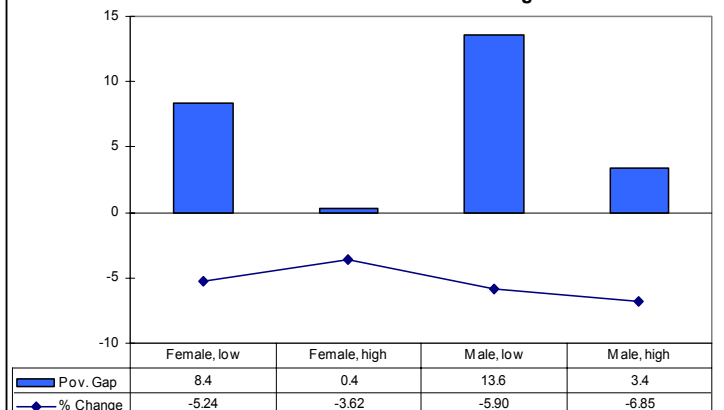
**Figure A2.6 Region 5 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



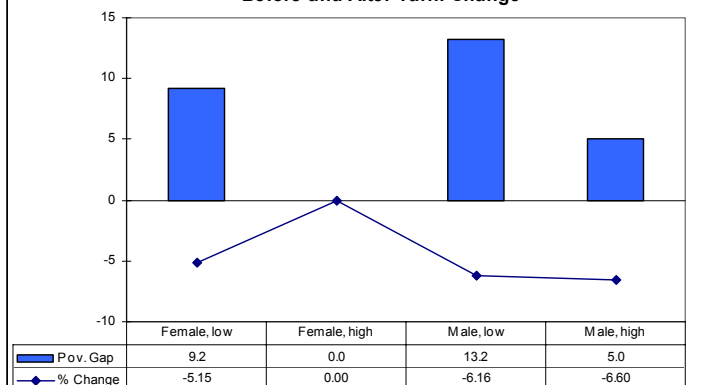
**Figure A2.7 Region 6 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



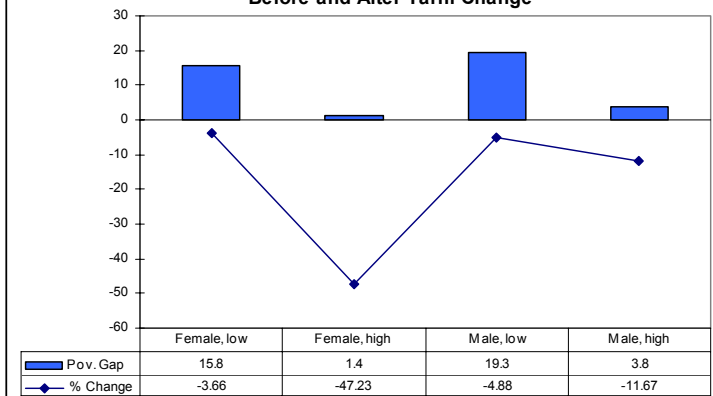
**Figure A2.8 Region 7 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



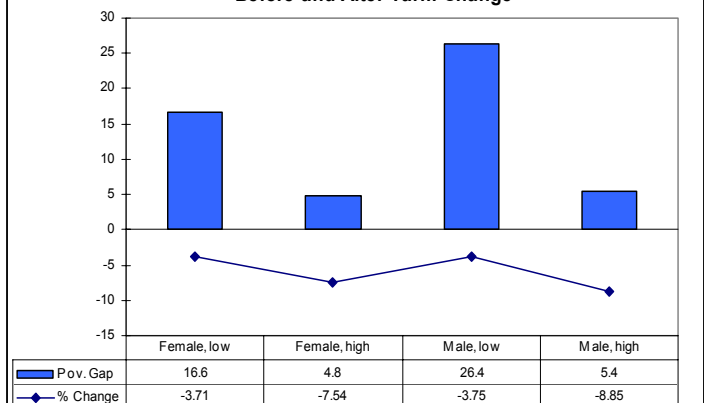
**Figure A2.9 Region 8 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



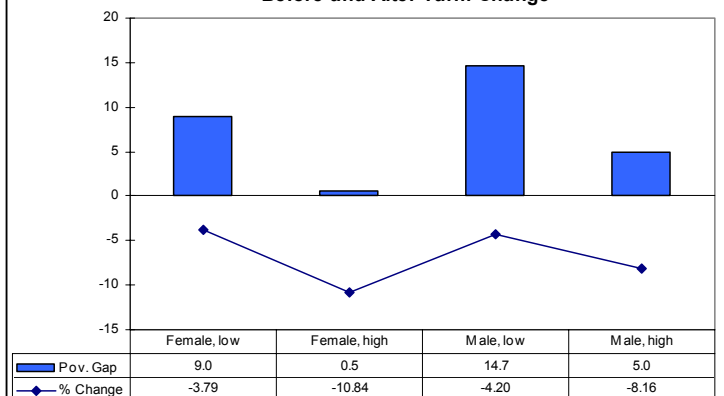
**Figure A2.10 Region 9 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



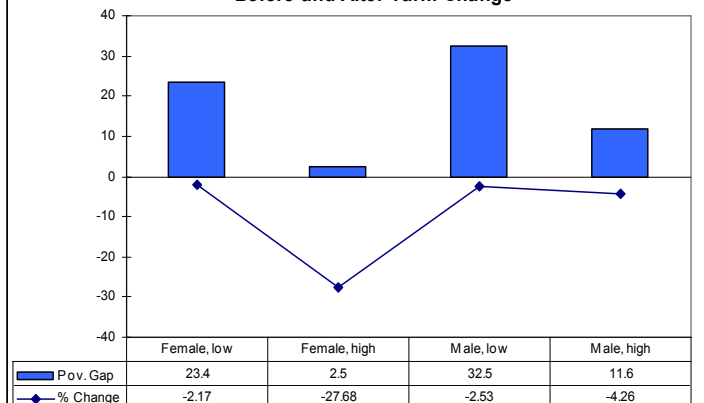
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Before and After Tariff Change**



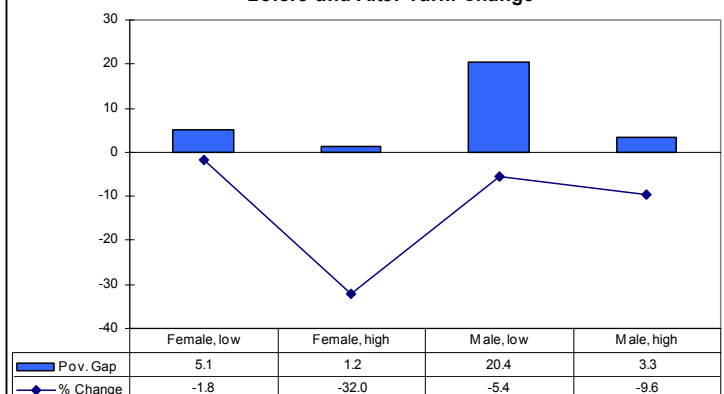
**Figure A2.12 Region 11 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



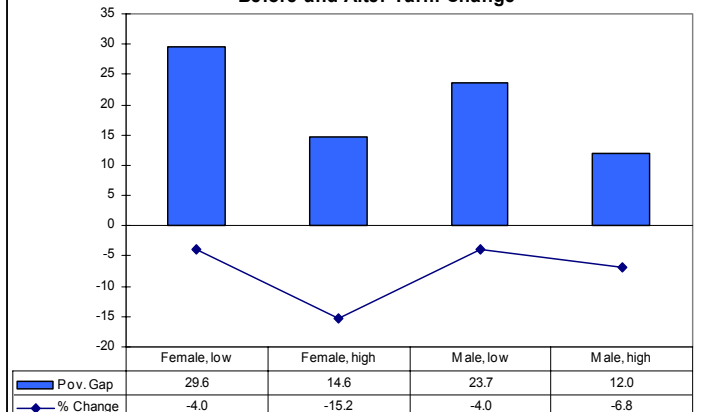
**Figure A2.13 Region 12 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



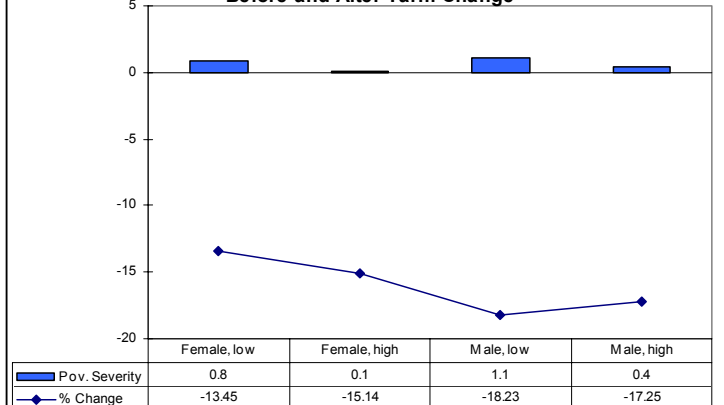
**Figure A2.14 Region 13 (Urban), Poverty Gap, 1994
Before and After Tariff Change**



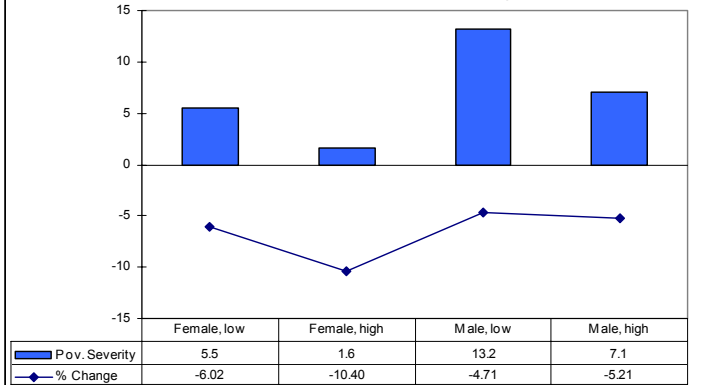
**Figure A2.15 Region 14 (Urban), Poverty Gap, 1994
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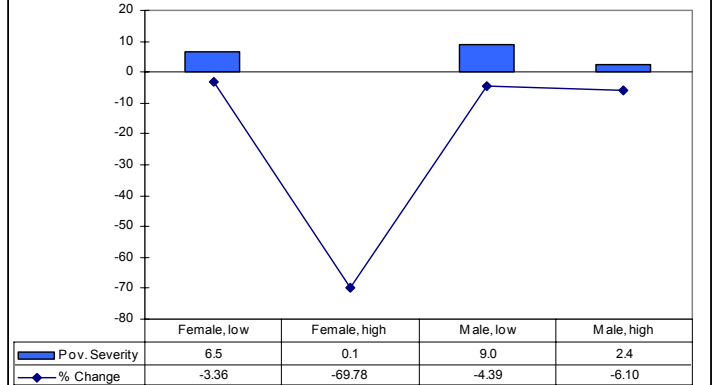
**Figure A3.1 NCR, Poverty Severity, 1994
Before and After Tariff Change**



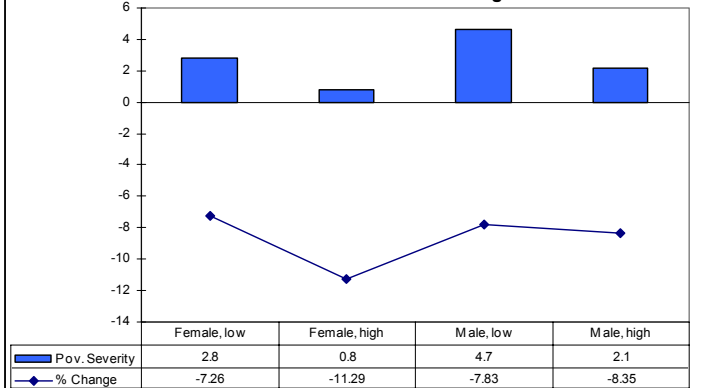
**Figure A3.2 Region 1 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



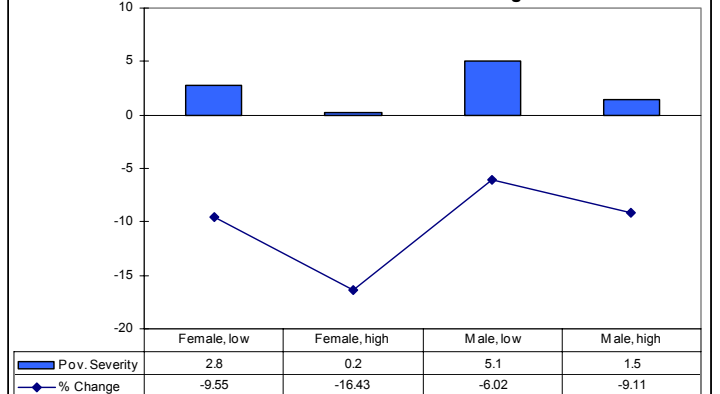
**Figure A3.3 Region 2 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



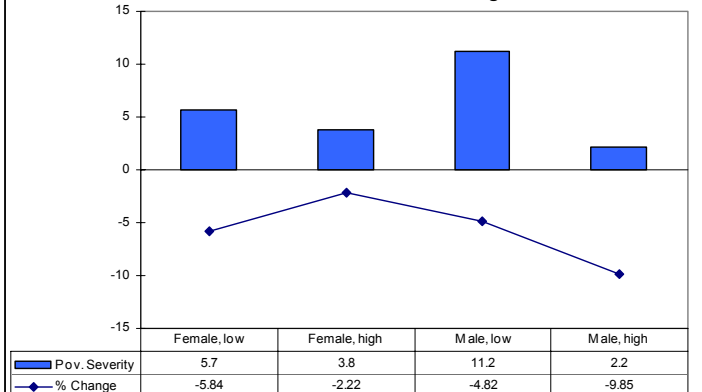
**Figure A3.4 Region 3 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



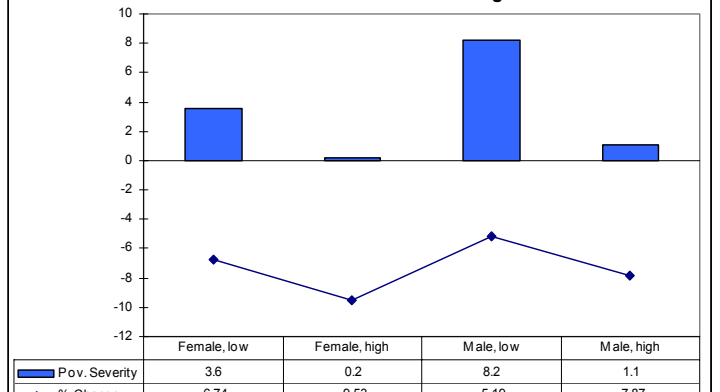
**Figure A3.5 Region 4 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



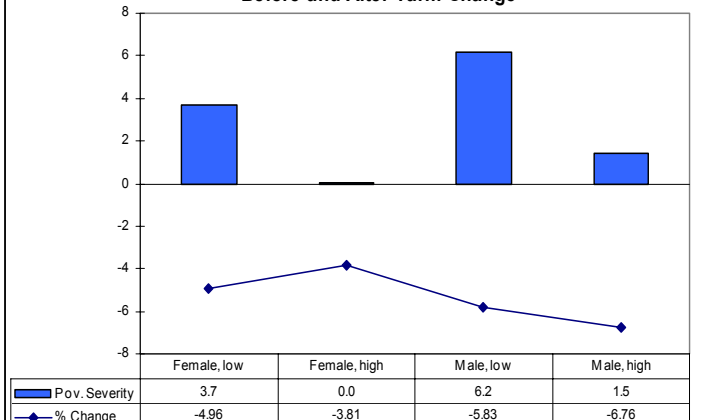
**Figure A3.6 Region 5 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



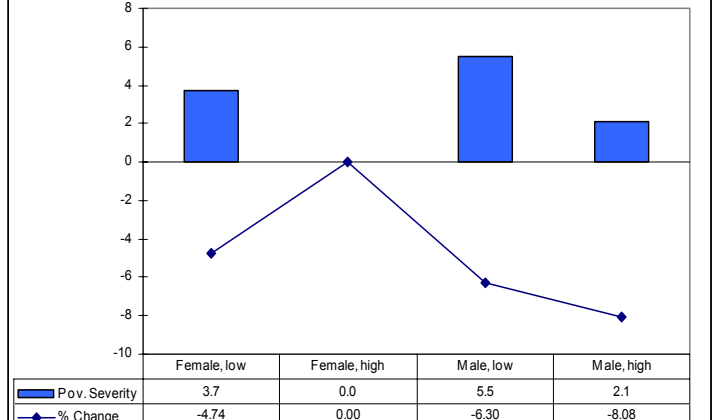
**Figure A3.7 Region 6 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



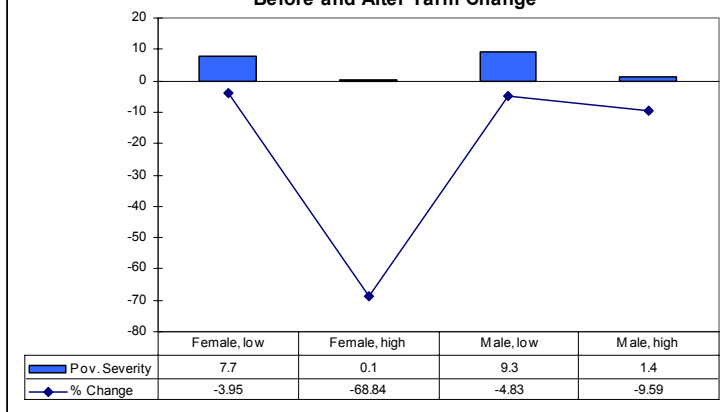
**Figure A3.8 Region 7 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



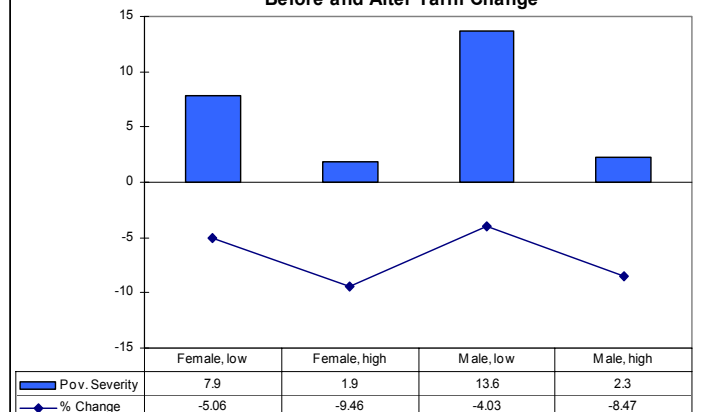
**Figure A3.9 Region 8 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



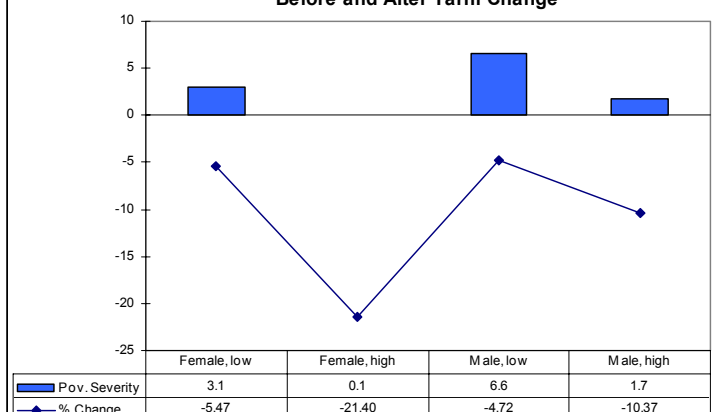
**Figure A3.10 Region 9 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



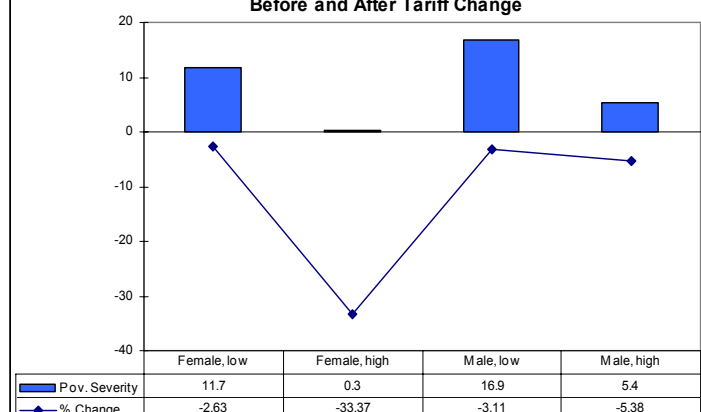
**Figure A3.11 Region 10 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



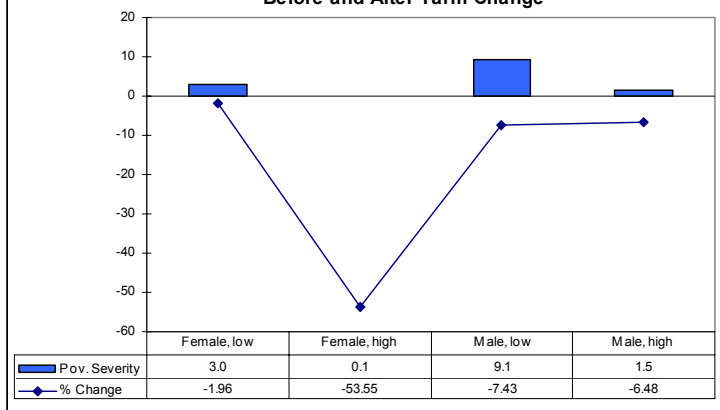
**Figure A3.12 Region 11 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



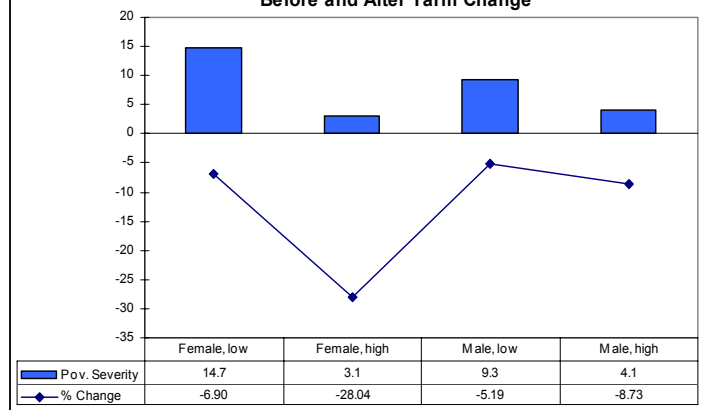
**Figure A3.13 Region 12 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



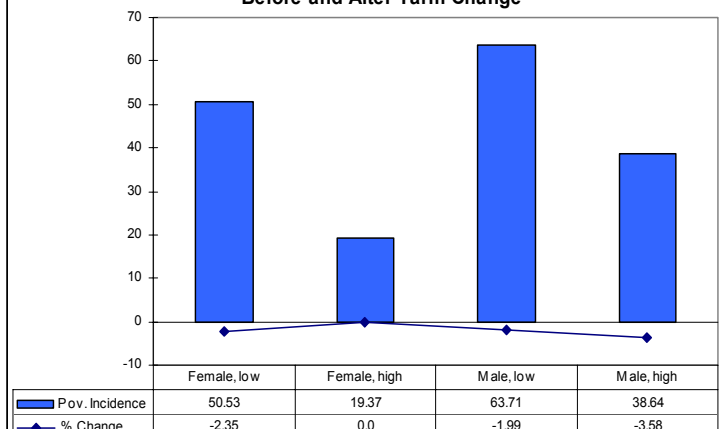
**Figure A3.14 Region 13 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



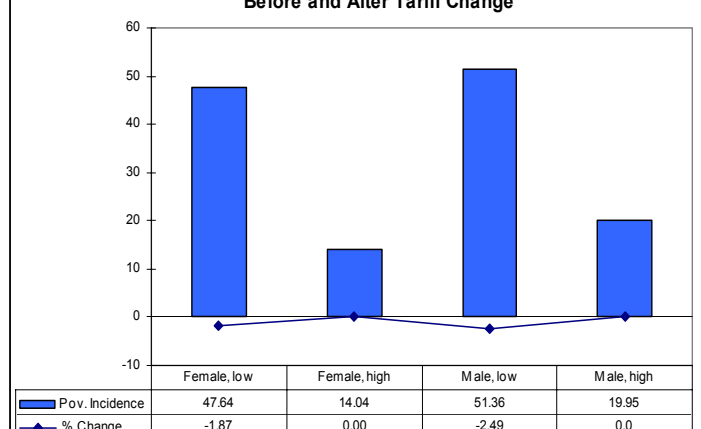
**Figure A3.15 Region 14 (Urban), Poverty Severity, 1994
Before and After Tariff Change**



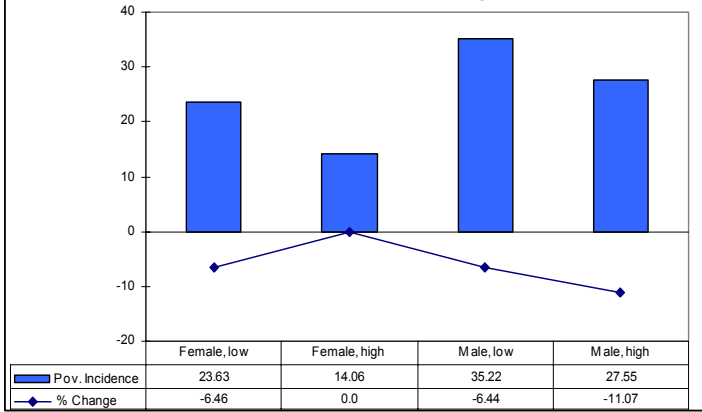
**Figure A4.1 Region 1 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



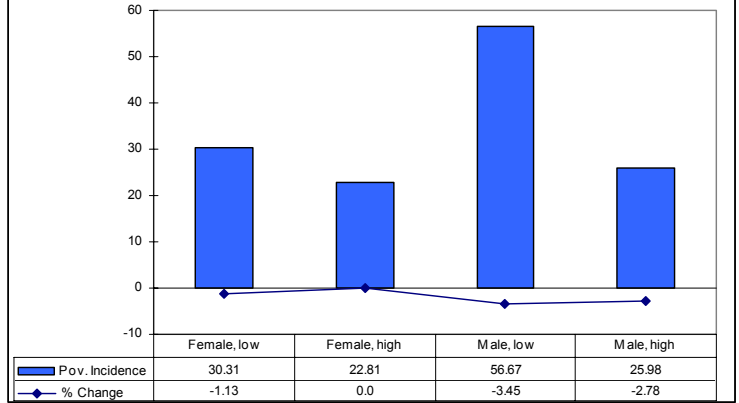
**Figure A4.2 Region 2 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



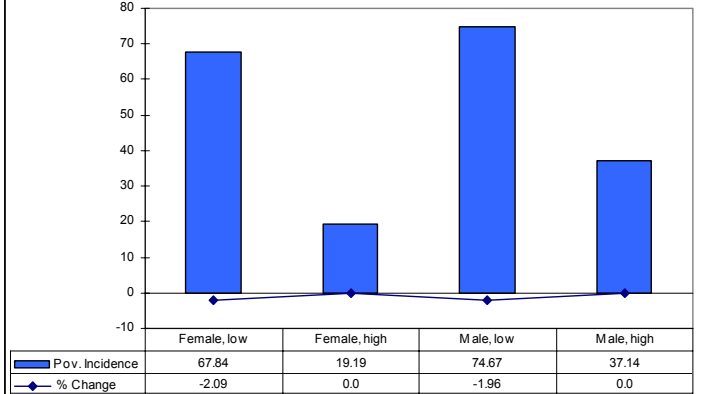
**Figure A4.3 Region 3 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



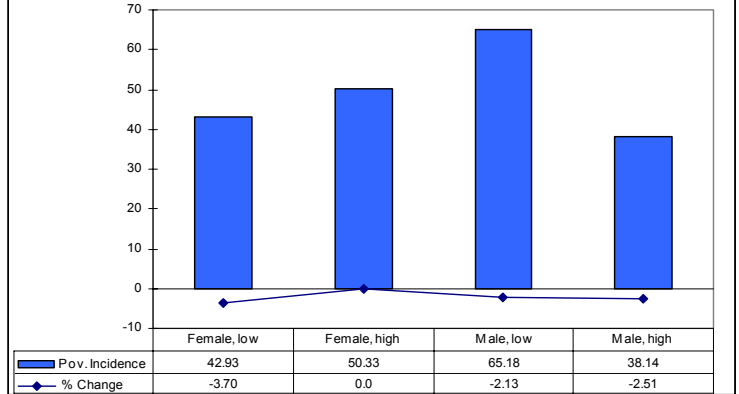
**Figure A4.4 Region 4 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



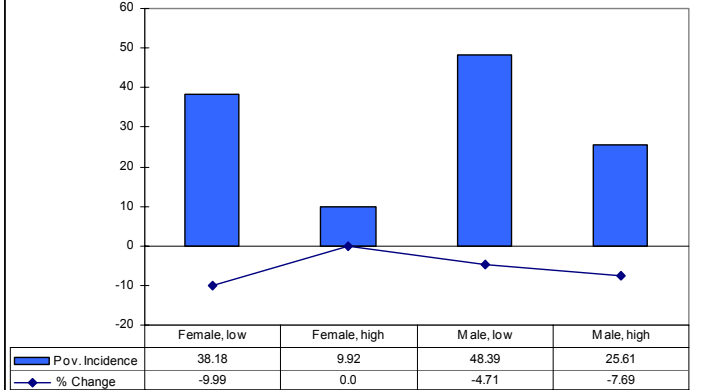
**Figure A4.5 Region 5 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



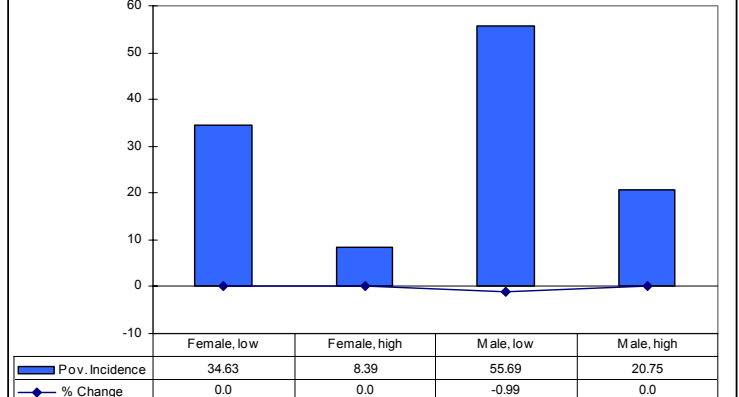
**Figure A4.6 Region 6 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



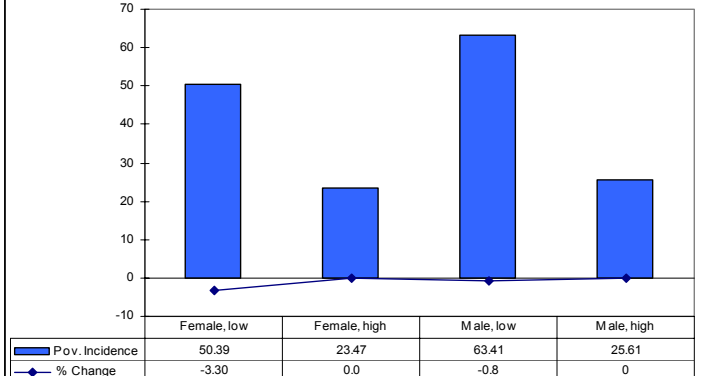
**Figure A4.7 Region 7 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



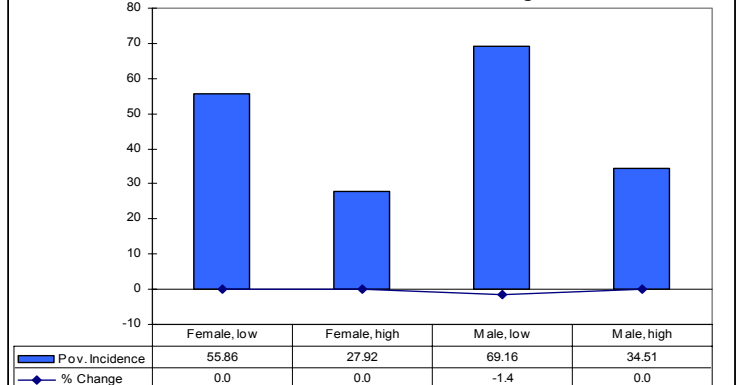
**Figure A4.8 Region 8 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



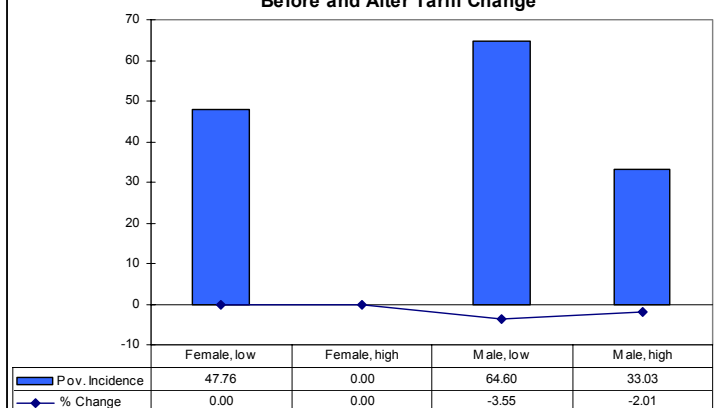
**Figure A4.9 Region 9 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



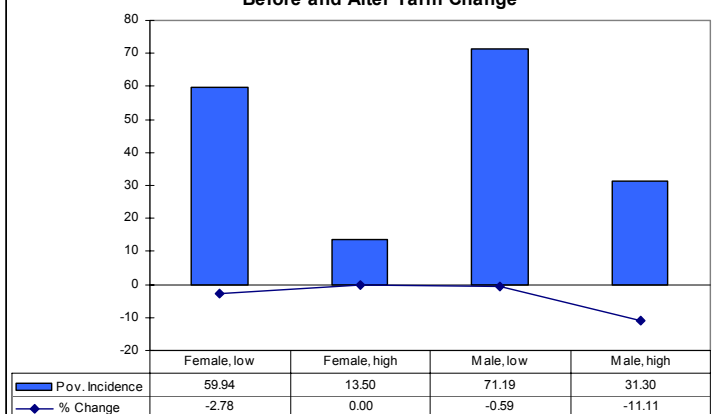
**Figure A4.10 Region 10 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



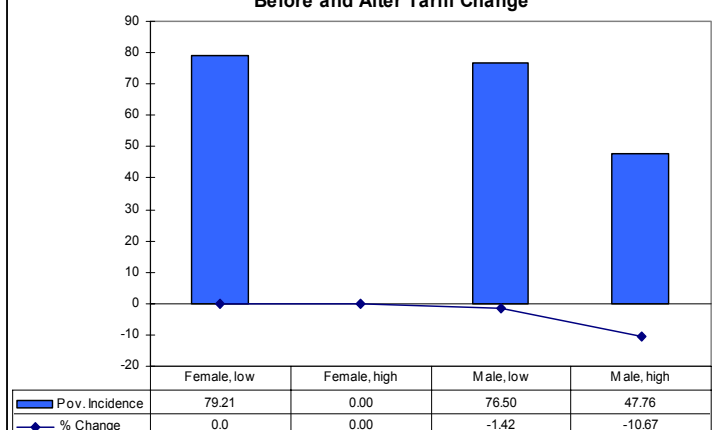
**Figure A4.11 Region 11 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



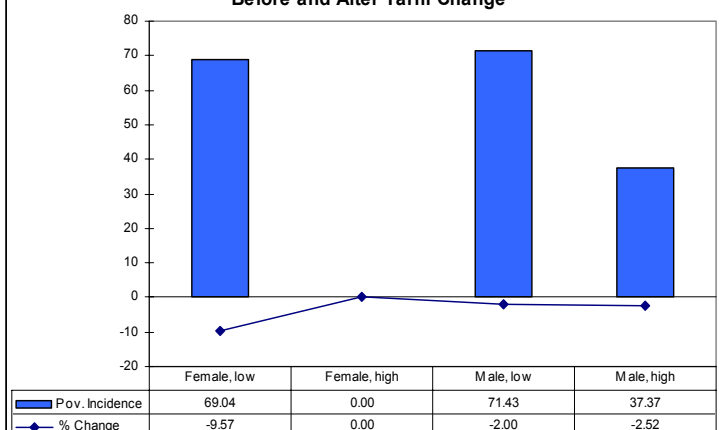
**Figure A4.12 Region 12 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



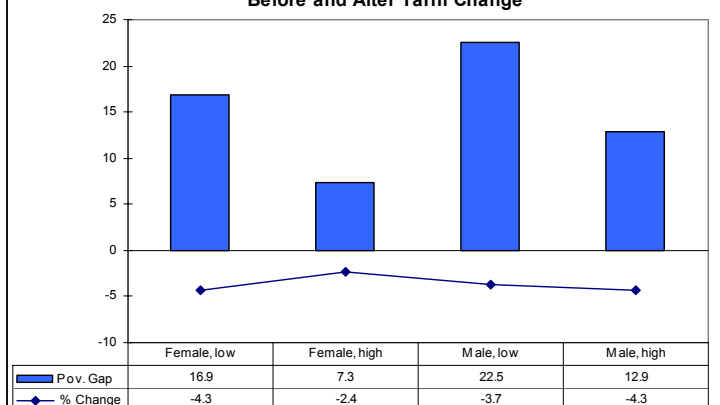
**Figure A4.13 Region 13 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



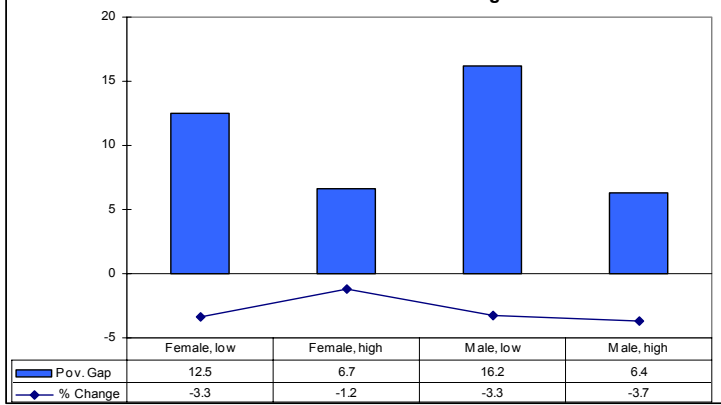
**Figure A4.14 Region 14 (Rural), Poverty Incidence, 1994
Before and After Tariff Change**



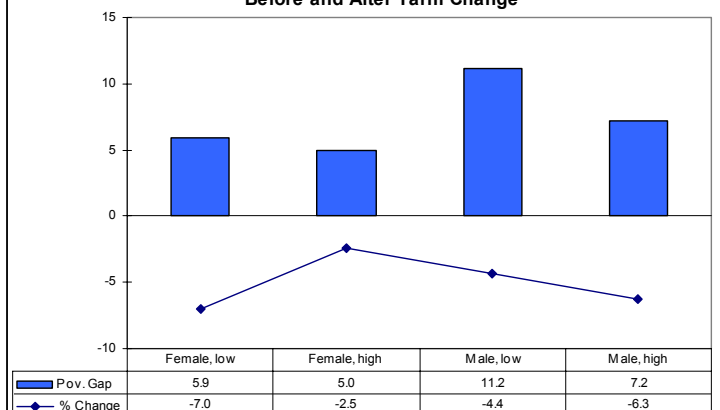
**Figure A5.1 Region 1 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



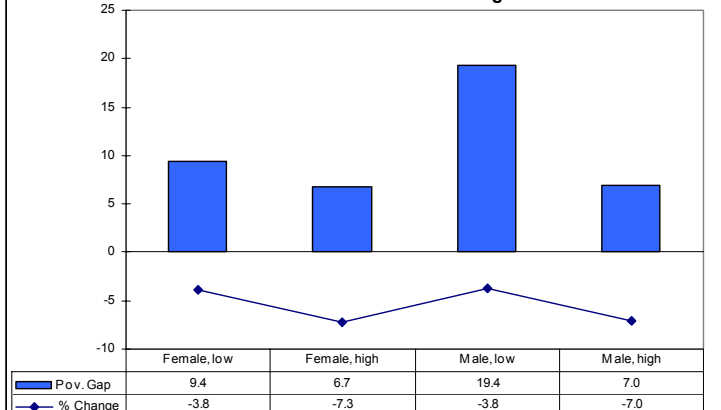
**Figure A5.2 Region 2 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



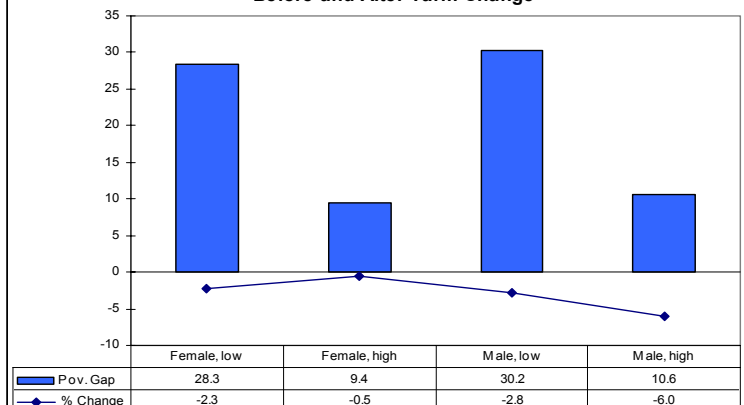
**Figure A5.3 Region 3 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



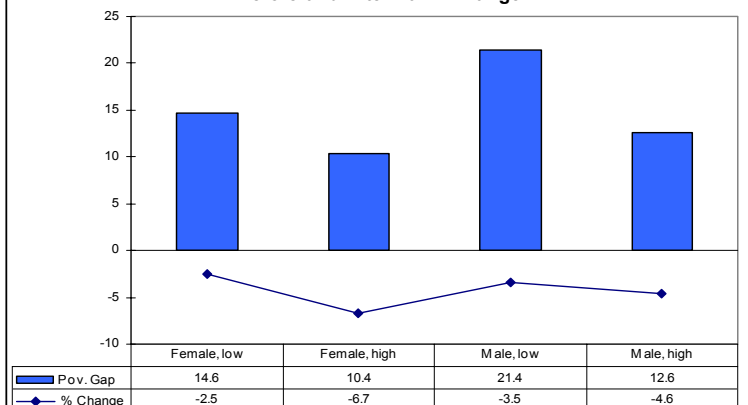
**Figure A5.4 Region 4 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



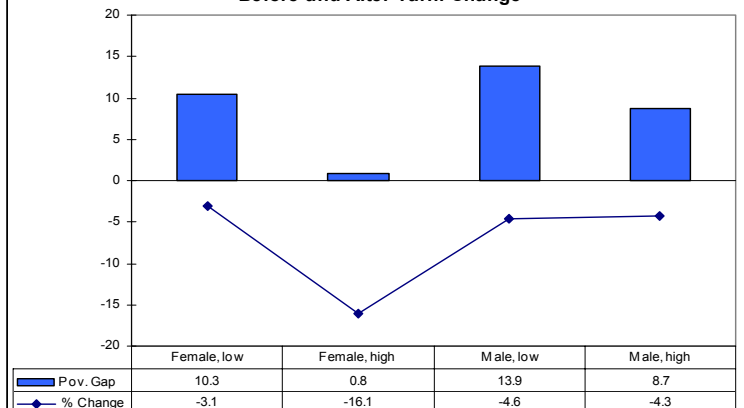
**Figure A5.5 Region 5 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



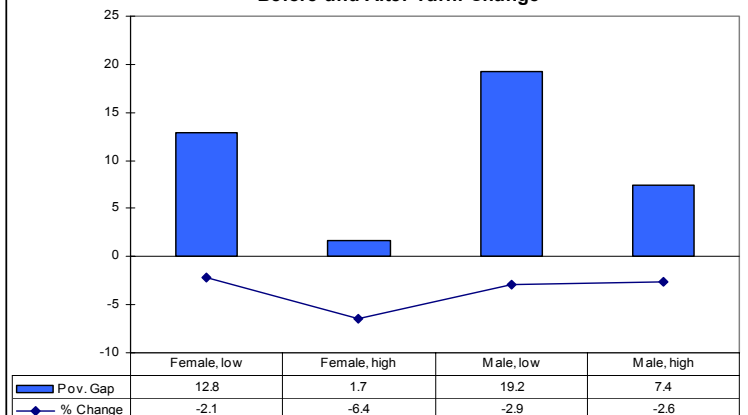
**Figure A5.6 Region 6 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



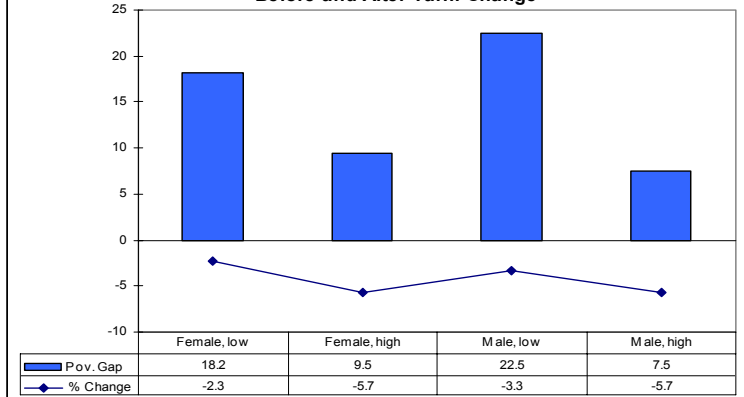
**Figure A5.7 Region 7 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



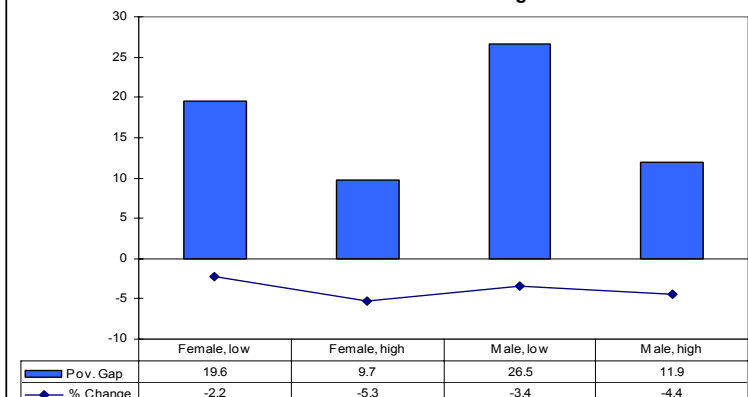
**Figure A5.8 Region 8 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



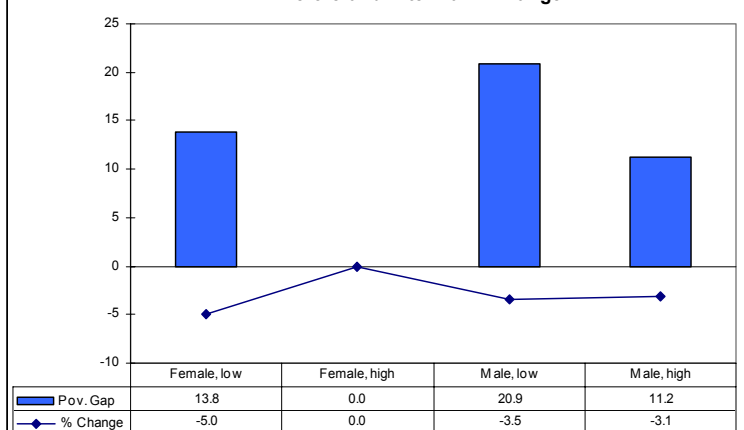
**Figure A5.9 Region 9 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



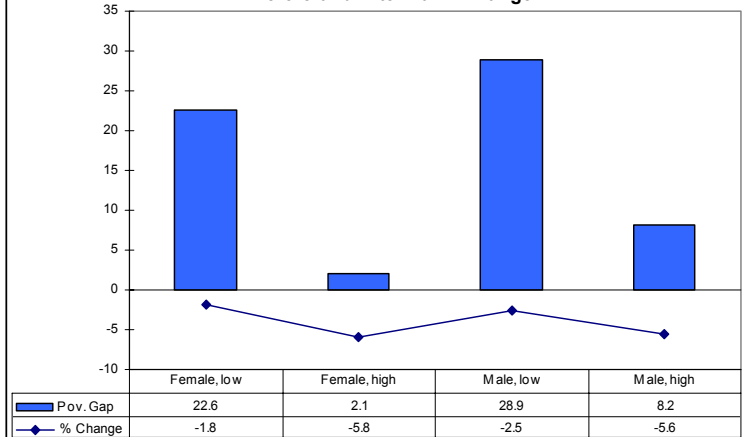
**Figure A5.10 Region 10 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



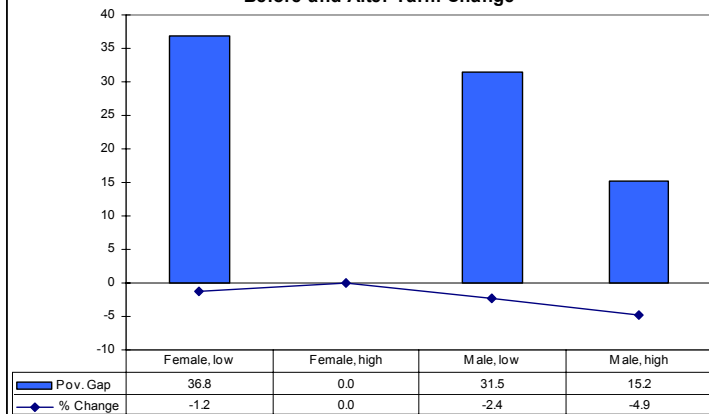
**Figure A5.11 Region 11 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



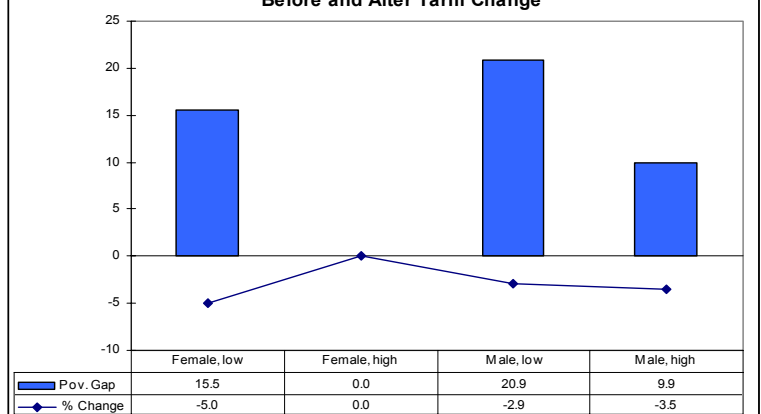
**Figure A5.12 Region 12 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



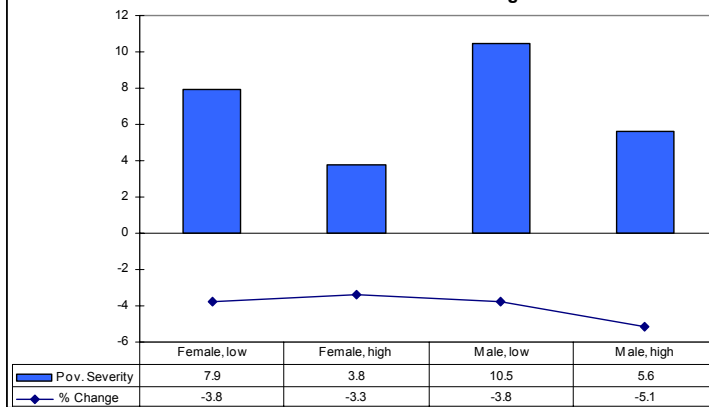
**Figure A5.13 Region 13 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



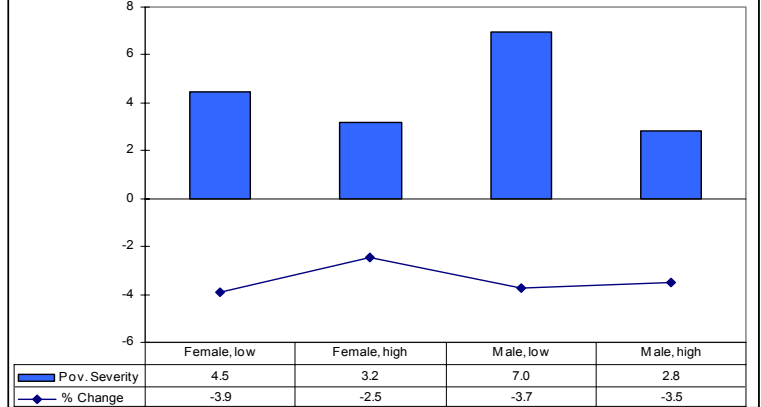
**Figure A5.14 Region 14 (Rural), Poverty Gap, 1994
Before and After Tariff Change**



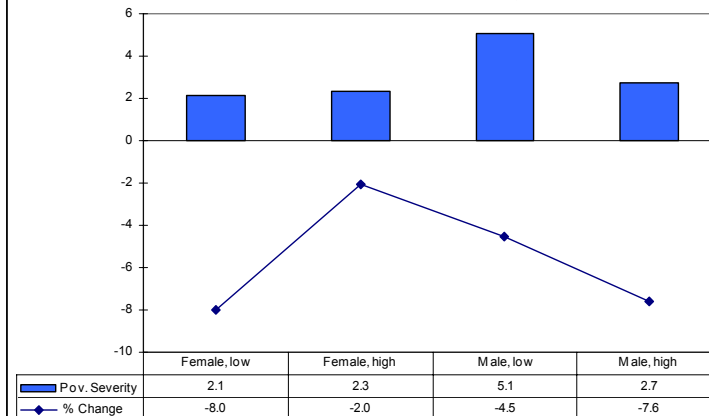
**Figure A6.1 Region 1 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



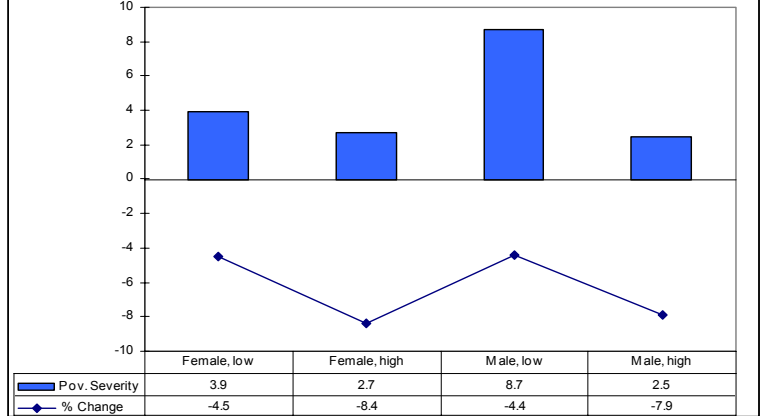
**Figure A6.2 Region 2 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



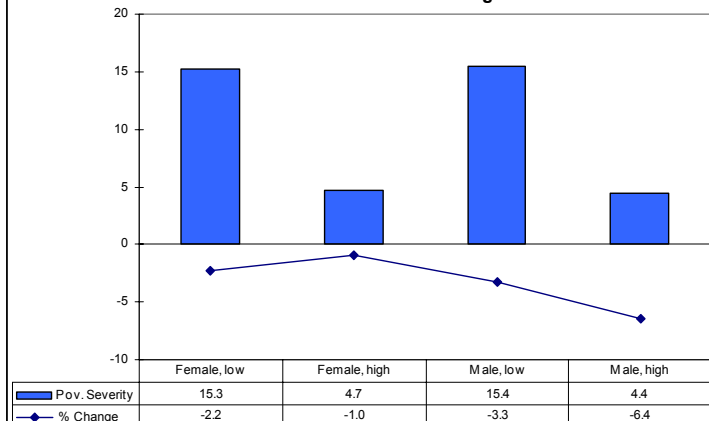
**Figure A6.3 Region 3 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



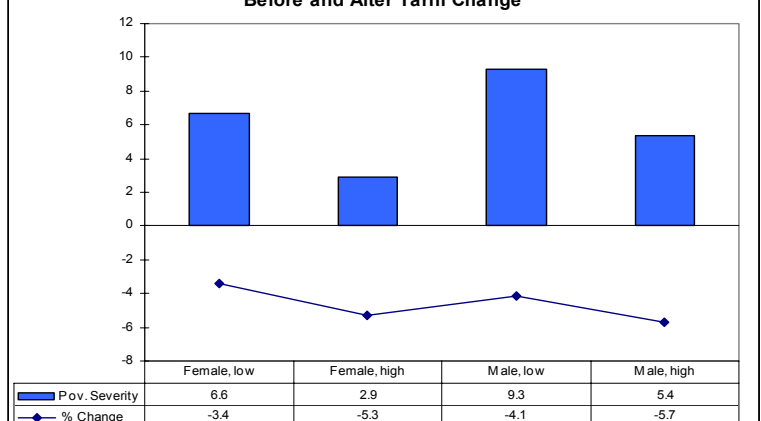
**Figure A6.4 Region 4 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



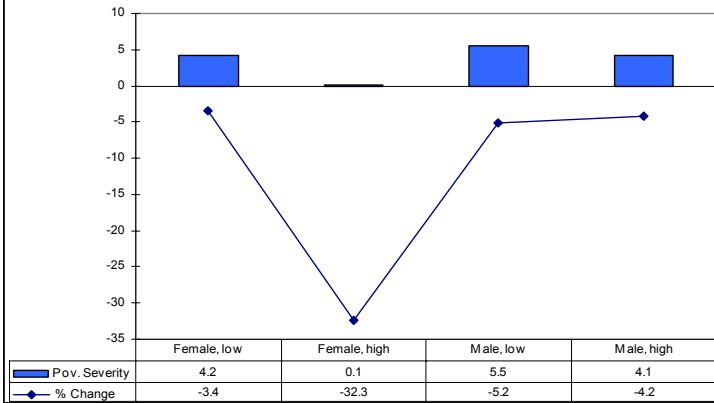
**Figure A6.5 Region 5 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



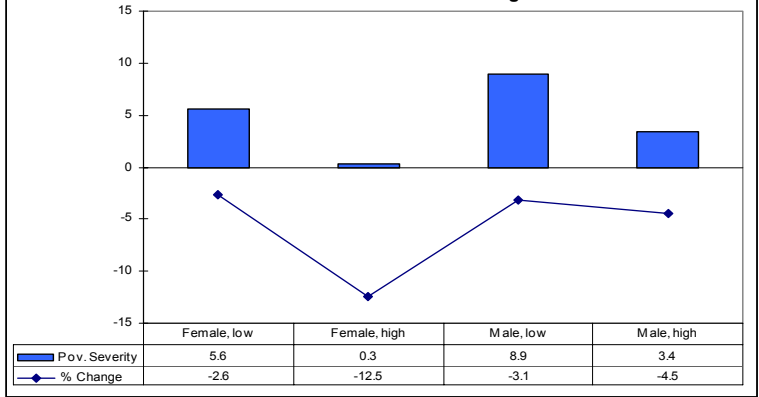
**Figure A6.6 Region 6 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



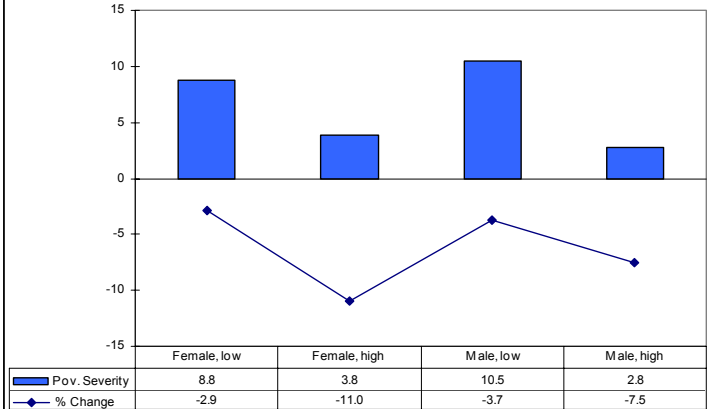
**Figure A6.7 Region 7 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



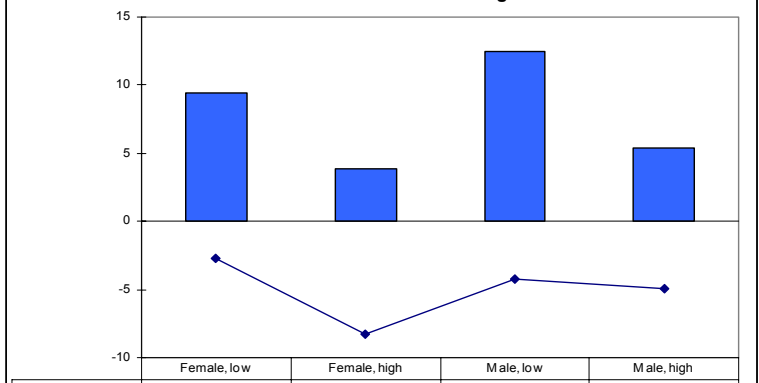
**Figure A6.8 Region 8 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



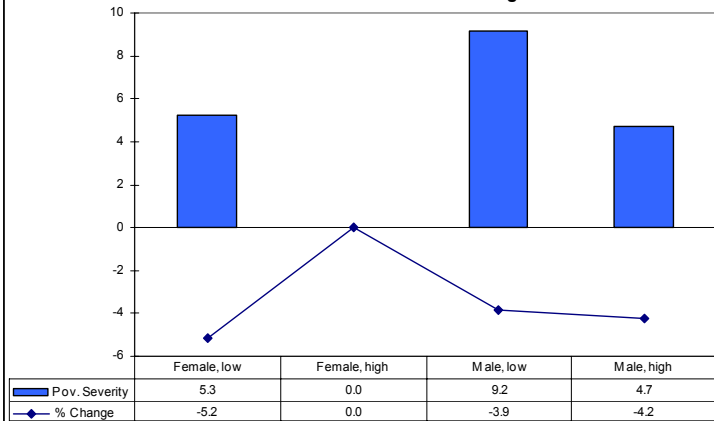
**Figure A6.9 Region 9 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



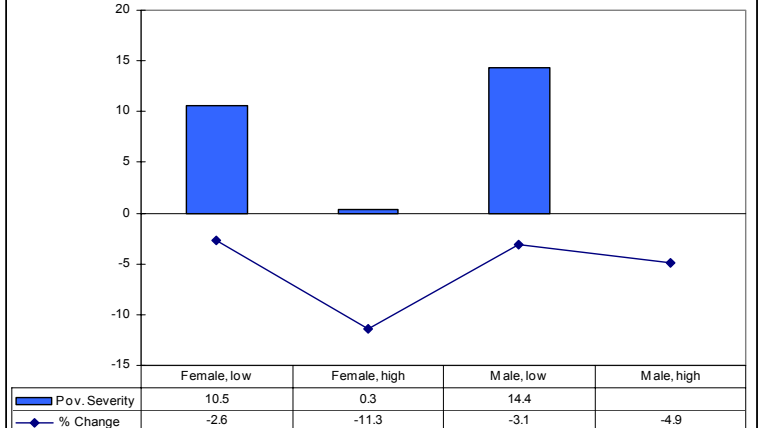
**Figure A6.10 Region 10 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



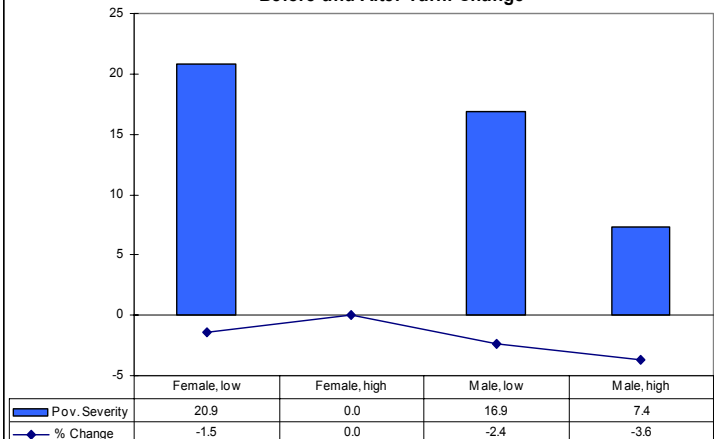
**Figure A6.11 Region 11 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



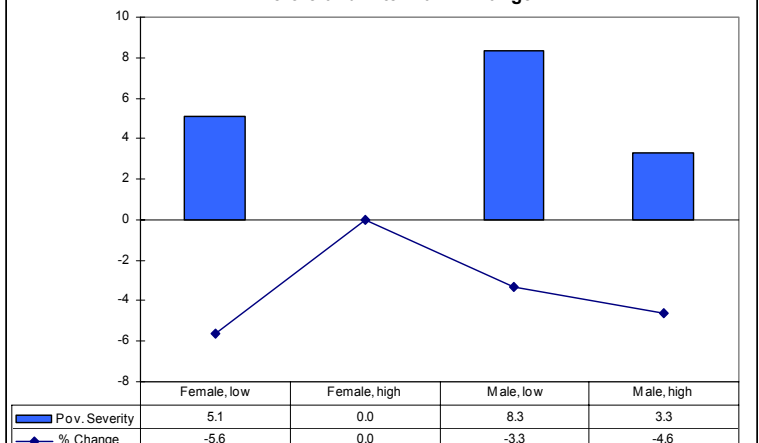
**Figure A6.12 Region 12 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



**Figure A6.13 Region 13 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



**Figure A6.14 Region 14 (Rural), Poverty Severity, 1994
Before and After Tariff Change**



APPENDIX A2: Detailed Sources of Household Income

Table A2.1: Sources of Household Income: Various Regions (%)

	Labor				Capital				Dividends	Transfers	Foreign Remittances	Total
	Skilled Agriculture	Unskilled Agriculture	Skilled Production	Unskilled Production	Agriculture	Industry	Wholesale & Retail	Other Services				
Philippines	1.7	7.4	35.1	7.5	6.2	11.2	5.6	9.9	6.7	5.6	3.1	100
NCR	0.2	0.1	40.7	4.9	0.2	9.5	5.4	14.2	18.3	3.6	2.9	100
Region 1	1.4	7.8	30.5	8.2	10.0	14.4	4.1	6.6	0.0	10.8	6.2	100
Region 2	1.9	15.6	30.0	5.2	16.9	11.5	3.4	6.1	0.0	6.7	2.7	100
Region 3	1.6	8.6	29.8	12.1	7.5	13.0	6.0	9.4	0.5	6.4	5.1	100
Region 4	1.8	7.1	37.5	10.9	5.9	13.1	5.7	8.8	0.0	5.4	3.8	100
Region 5	1.5	13.0	33.7	7.3	10.5	14.5	5.4	5.4	0.0	7.1	1.6	100
Region 6	3.8	21.9	27.1	6.4	7.9	9.3	5.4	6.8	0.2	7.6	3.4	100
Region 7	0.6	9.0	31.8	12.3	6.7	15.1	6.0	7.5	0.7	8.2	2.1	100
Region 8	0.7	13.2	28.0	9.2	14.3	9.6	9.6	4.4	1.4	7.0	2.5	100
Region 9	1.0	10.8	33.5	8.7	15.2	10.4	6.9	6.2	0.0	5.9	1.4	100
Region 10	4.3	16.6	34.7	8.0	9.2	8.6	5.0	5.8	0.0	6.6	1.2	100
Region 11	7.8	15.7	28.0	6.3	9.2	12.2	6.4	6.9	0.0	5.8	1.7	100
Region 12	3.5	13.8	30.4	5.3	14.6	14.9	5.3	6.0	0.0	4.9	1.3	100
Region 13	1.1	2.7	38.9	8.0	12.9	9.2	3.1	12.1	0.0	9.0	2.9	100
Region 14	0.1	0.6	27.4	2.3	39.4	6.2	10.2	5.7	1.1	5.9	1.2	100

Source: 1994 FIES

Table A2.2: Sources of Household Income: Various Regions, Urban and Rural (%)

		Labor				Capital				Dividends	Transfers	Foreign Remittances	Total
		Skilled Agriculture	Unskilled Agriculture	Skilled Production	Unskilled Production	Agriculture	Industry	Wholesale & Retail	Other Services				
Philippines	Urban	1.2	3.0	39.8	6.8	2.4	11.3	6.1	11.8	9.2	5.2	3.2	100
	Rural	2.9	19.5	22.2	9.4	16.8	10.9	4.2	4.6	0.0	6.8	2.7	100
Region 1	Urban	1.1	4.7	35.7	7.2	5.1	15.0	5.0	9.1	0.0	11.6	5.4	100
	Rural	1.6	10.3	26.3	9.0	14.0	13.9	3.4	4.6	0.0	10.2	6.8	100
Region 2	Urban	2.7	7.1	45.8	4.6	7.8	4.9	4.9	10.3	0.0	8.6	3.2	100
	Rural	1.5	20.0	21.8	5.5	21.7	14.9	2.5	3.9	0.0	5.7	2.5	100
Region 3	Urban	1.4	4.5	34.4	11.6	4.3	13.5	6.8	10.1	0.8	6.8	5.7	100
	Rural	2.0	17.3	19.7	13.2	14.4	11.9	4.2	8.0	0.0	5.6	3.7	100
Region 4	Urban	1.4	3.2	42.9	10.0	3.0	14.1	6.2	10.1	0.0	5.2	3.8	100
	Rural	2.7	15.6	25.9	12.8	11.9	10.9	4.5	6.0	0.0	5.8	3.9	100
Region 5	Urban	0.8	6.0	41.4	5.8	5.2	15.2	6.9	8.0	0.0	8.1	2.6	100
	Rural	2.1	18.5	27.5	8.4	14.7	14.0	4.1	3.4	0.0	6.3	0.8	100
Region 6	Urban	2.0	9.8	39.0	6.4	3.9	10.5	6.8	9.8	0.0	7.5	4.5	100
	Rural	5.8	34.9	14.5	6.5	12.2	8.1	4.0	3.7	0.4	7.7	2.3	100
Region 7	Urban	0.4	3.2	40.6	10.7	2.4	16.6	6.9	9.3	1.0	6.8	2.0	100
	Rural	1.0	20.6	14.2	15.4	15.5	11.9	4.3	3.9	0.0	11.1	2.2	100
Region 8	Urban	0.2	4.3	35.8	9.5	5.8	8.8	16.5	6.5	3.4	7.2	2.0	100
	Rural	1.0	19.7	22.3	8.9	20.7	10.2	4.6	2.9	0.0	6.9	2.8	100
Region 9	Urban	0.6	6.1	42.5	8.9	5.8	11.4	7.4	8.9	0.0	6.4	1.9	100
	Rural	1.4	15.2	24.9	8.5	24.2	9.3	6.5	3.7	0.0	5.3	0.9	100
Region 10	Urban	5.9	13.1	42.1	7.6	4.1	6.2	5.8	7.2	0.0	6.8	1.3	100
	Rural	1.9	22.2	23.0	8.5	17.4	12.5	3.7	3.5	0.0	6.3	0.9	100
Region 11	Urban	7.5	8.6	33.2	5.9	5.3	16.0	7.2	8.5	0.0	5.9	1.9	100
	Rural	8.2	28.5	18.6	7.1	16.3	5.5	5.1	3.9	0.0	5.6	1.2	100
Region 12	Urban	3.8	9.9	35.5	4.0	9.0	18.4	5.4	8.1	0.0	4.6	1.3	100
	Rural	3.1	17.7	25.4	6.6	20.1	11.4	5.2	3.9	0.0	5.2	1.3	100
Region 13	Urban	0.3	1.3	46.1	6.2	3.2	9.5	3.6	17.2	0.0	9.5	3.1	100
	Rural	2.1	4.3	30.3	10.2	24.8	8.8	2.6	5.8	0.0	8.5	2.7	100
Region 14	Urban	0.0	0.0	24.3	1.9	25.0	9.7	19.9	8.9	3.5	5.5	1.2	100
	Rural	0.2	0.8	28.8	2.5	46.0	4.5	5.7	4.3	0.0	6.1	1.2	100

Source: 1994 FIES

Appendix A2
Micro-Philippine Computable General Equilibrium Model
(MICRO-PCGEM)

- (1) $x_i = va_i \cdot kt_in_i$ 12
- (2) $va_{td} = kt_va_{td} \cdot \left[sh_va_{td} \cdot k_{td}^{-rh_va_{td}} + (1 - sh_va_{td}) \cdot l_{td}^{-rh_va_{td}} \right]^{\frac{-1}{rh_va_{td}}}$ 11
- (3) $va_{ntd} = l_{ntd}$ 1
- (4) $inp_i = kt_inp_i \cdot x_i$ 12
- (5) $mat_{td,i} = aij_{td,i} \cdot inp_i$ 132
- (6) $l_{td} = va_{td} \cdot \left[\frac{pva_{td} \cdot (1 - sh_va_{td})}{w \cdot kt_va_{td}^{rh_va_{td}}} \right]^{\frac{1}{1+rh_va_{td}}}$ 11
- (7) $l_{ntd} = \frac{px_{ntd} \cdot x_{ntd} - \sum_{td} mat_{td,ntd} \cdot pd_{td}}{w}$ 1
- (8) $l1_i = \left(\frac{w}{w1} \right) \cdot sh_l1_i \cdot l_i$ 12
- (9) $l2_i = \left(\frac{w}{w2} \right) \cdot sh_l2_i \cdot l_i$ 12
- (10) $l3_i = \left(\frac{w}{w3} \right) \cdot sh_l3_i \cdot l_i$ 12
- (11) $l4_i = \left(\frac{w}{w4} \right) \cdot sh_l4_i \cdot l_i$ 12
- (12) $w1 = \frac{kt_wage1 \cdot unemp_l1^{elas_wge}}{pvaindx_a}$ 1
- (13) $w2 = \frac{kt_wage2 \cdot unemp_l2^{elas_wge}}{pvaindx_a}$ 1
- (14) $w3 = \frac{kt_wage3 \cdot unemp_l3^{elas_wge}}{pvaindx}$ 1
- (15) $w4 = \frac{kt_wage4 \cdot unemp_l4^{elas_wge}}{pvaindx}$ 1
- (16) $x_{td_1e} = kt_x_{td_1e} \cdot \left[sh_x_{td_1e} \cdot e_{td_1e}^{rh_e_{td_1e}} + (1 - sh_x_{td_1e}) \cdot d_{td_1e}^{rh_e_{td_1e}} \right]^{\frac{1}{rh_e_{td_1e}}}$ 10
- (17) $x_{td_0e} = d_{td_0e}$ 1

$$(18) \quad e_{td_1e} = d_{td_1e} \cdot \left[\left(\frac{pe_{td_1e}}{pl_{td_1e}} \right) \cdot \left(\frac{1 - sh_x_{td_1e}}{sh_x_{td_1e}} \right) \right]^{sig_e_{td_1e}} \quad 10$$

$$(19) \quad q_{td_1m} = kt_q_{td_1m} \cdot \left[sh_q_{td_1m} \cdot m_{td_1m}^{rh_m_{td_1m}} + (1 - sh_q_{td_1m}) \cdot d_{td_1m}^{rh_m_{td_1m}} \right]^{\frac{1}{rh_m_{td_1m}}} \quad 9$$

$$(20) \quad q_{td_0m} = d_{td_0m} \quad 2$$

$$(21) \quad m_{td_1m} = d_{td_1m} \cdot \left[\left(\frac{pd_{td_1m}}{pm_{td_1m}} \right) \cdot \left(\frac{sh_q_{td_1m}}{1 - sh_q_{td_1m}} \right) \right]^{sig_m_{td_1m}} \quad 9$$

$$(22) \quad ct_h = dyh_h - savh_h \quad 24797$$

$$(23) \quad ch_{td,h} = \frac{kt_ch_{td,h} \cdot ct_h}{pq_{td}} \quad 272767$$

$$(24) \quad g = px_{s12''} \cdot x_{s12''} \quad 1$$

$$(25) \quad inv_{td} = \frac{kt_inv_{td} \cdot tinv_n}{pq_{td}} \quad 11$$

$$(26) \quad yl1 = \sum_i w1 \cdot l1_i \quad 1$$

$$(27) \quad yl2 = \sum_i w2 \cdot l2_i \quad 1$$

$$(28) \quad yl3 = \sum_i w3 \cdot l3_i \quad 1$$

$$(29) \quad yl4 = \sum_i w4 \cdot l4_i \quad 1$$

$$(30) \quad yk_ag = \sum_{ag} r_{ag} \cdot k_{ag} \quad 1$$

$$(31) \quad yk_ind = \sum_{ind} r_{ind} \cdot k_{ind} \quad 1$$

$$(32) \quad yk_ser_tra = r_{s10''} \cdot k_{s10''} \quad 1$$

$$(33) \quad yk_ser_oth = r_{s11''} \cdot k_{s11''} \quad 1$$

$$(34) \quad \quad \quad 24797$$

$$\begin{aligned} yh_h &= w1 \cdot Kt_endw_l1_h \cdot \sum_i l1_i + w2 \cdot Kt_endw_l2_h \cdot \sum_i l2_i \\ &+ w3 \cdot Kt_endw_l3_h \cdot \sum_i l3_i + w4 \cdot Kt_endw_l4_h \cdot \sum_i l4_i \\ &+ k_yk_ag_h \cdot lmda_ag \cdot yk_ag + k_yk_ind_h \cdot lmda_ind \cdot yk_ind \\ &+ k_yk_ser_tra_h \cdot lmda_ser_tra \cdot yk_ser_tra \\ &+ k_yk_ser_oth_h \cdot lmda_ser_oth \cdot yk_ser_oth \\ &+ kt_div_h \cdot div + trgov_h \cdot pindex + yfor_h \end{aligned}$$

$$(35) \quad dyh_h = yh_h \cdot (1 - dtxrh_h -ntaxr) \quad 24797$$

$$(36) \quad \quad \quad 1$$

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

$$(37) \quad yg = tmrev + dtxrev + itxrev + grant_for \quad 1$$

$$\begin{aligned}
(38) \quad tmrev &= \sum_{td_1m} tm_{td_1m} \cdot m_{td_1m} & 1 \\
(39) \quad dtxrev &= \sum_h (dtxr_h +ntaxr) \cdot yh_h + [(1-lmda_ag-lmda_ag_f) \cdot yk_ag \\
&+ (1-lmda_ind-lmda_ind_f) \cdot yk_ind \\
&+ (1-lmda_ser_tra-lmda_ser_tra) \cdot yk_ser_tra \\
&+ (1-lmda_ser_oth-lmda_ser_oth) \cdot yk_ser_oth] \cdot dtxrf & 1 \\
(40) \quad itxrev &= \sum_{td} itxr_{td} \cdot d_{td} \cdot pl_{td} + \sum_{td_1m} itxr_{td_1m} \cdot m_{td_1m} \cdot pwm_{td_1m} \cdot er \cdot (1+tm_{td_1m}) \\
(41) \quad in_td_{td} &= \sum_i mat_{td,i} & 11 \\
(42) \quad tin_n &= pinv \cdot tin_r & 1 \\
(43) \quad savh_h &= adj \cdot aps_h \cdot dyh_h & 24797 \\
(44) \quad savf &= yf - div - div \cdot for & 1 \\
(45) \quad savg &= yg - g - \sum_h trgov_h \cdot pindex - paygv_for & 1 \\
(46) \quad pindex &= \sum_{td} sh_q1_{td} \cdot pq_{td} & 1 \\
(47) \quad pinv &= \prod_{td} \left(\frac{pq_{td}}{kt_inv_{td}} \right)^{kt_inv_{td}} & 1 \\
(48) \quad pm_{td_1m} &= pwm_{td_1m} \cdot er \cdot (1+tm_{td_1m}) \cdot (1+itxr_{td_1m}) & 9 \\
(49) \quad pe_{td_1e} &= pwe_{td_1e} \cdot er & 10 \\
(50) \quad pq_{td_1m} &= \frac{pd_{td_1m} \cdot d_{td_1m} + pm_{td_1m} \cdot m_{td_1m}}{q_{td_1m}} & 9 \\
(51) \quad pq_{td_0m} &= pd_{td_0m} & 2 \\
(52) \quad px_{td_1e} &= \frac{pl_{td_1e} \cdot d_{td_1e} + pe_{td_1e} \cdot e_{td_1e}}{x_{td_1e}} & 10 \\
(53) \quad px_{td_0e} &= pl_{td_0e} & 1 \\
(54) \quad pd_{td} &= pl_{td} \cdot [1+itxr_{td}] & 11 \\
(55) \quad pva_i &= \frac{px_i \cdot x_i - \sum_{td} mat_{td,i} \cdot pq_{td}}{va_i} & 12 \\
(56) \quad r_{td} &= \frac{pva_{td} \cdot va_{td} - w \cdot l_{td}}{k_{td}} & 11 \\
(57) \quad q_{td_0s11} &= \sum_h ch_{td_0s11,h} + inv_{td_0s11} + in_td_{td_0s11} & 10 \\
(58) \quad tin_n &= \sum_h savh_h + savf + savg + cab & 1 \\
(59) & & 1
\end{aligned}$$

	$cab = [\sum_{td_1m} pwm_{td_1m} \cdot m_{td_1m} + lmda_ag_f \cdot yk_ag$ $+ lmda_ind_f \cdot yk_ind + lmda_ser_tra_f \cdot yk_ser_tra$ $+ lmda_ser_oth \cdot yk_ser_oth + div_for + paygv_for -$ $\sum_{td_1e} pwe_{td_1e} \cdot e_{td_1e} - \sum_h yfor_h - grant_for] \cdot er$	
(60)	$ls = \sum_i l_i$	1
(61)	$ls1 = uemp_l1 \cdot ls1 + \sum_i l1_i$	1
(62)	$ls2 = uemp_l2 \cdot ls2 + \sum_i l2_i$	
(63)	$ls3 = uemp_l3 \cdot ls3 + \sum_i l3_i$	1
(64)	$ls4 = uemp_l4 \cdot ls4 + \sum_i l4_i$	1
(65)	$leon = q_{s11''} - \sum_h ch_{s11'',h} + inv_{s11''} + in_td_{s11''}$	1
Total Number of Equations		<hr/> 372362

Micro-Philippine Computable General Equilibrium Model (MICRO-PCGEM)							
Equations				Variables			
				Variables		Type of Variable	
						Endogenous	Exogenous
Name*	Equation No.	Equation Index	Number of Equations	Name	Index	No. of Variables	No. of Variables
xeq	1	i	12	x	td	11	
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	
wge_cureq1	12		1	unemp_11		1	
wge_cureq2	13		1	unemp_12		1	
wge_cureq3	14		1	unemp_13		1	
wge_cureq4	15		1	unemp_14		1	
ceteq1	16	td_1e	10				
ceteq2	17	td_0e	1				
eeq	18	td_1e	10	e	td_1e	10	
qeq1	19	td_1m	9	q	td	11	
qeq2	20	td_0m	2				
meq	21	td_1m	9	m	td_1m	9	
cteq	22	h	24,797	ct	h	24,797	
cheq	23	td,h	272,767	ch	td,h	272,767	
geq	24		1	g			1
inveq	25	td	11	inv	td	11	
yl1eq	26		1	yl1		1	
yl2eq	27		1	yl2		1	
yl3eq	28		1	yl3		1	
yl4eq	29		1	yl4		1	
ykeq_ag	30		1	yk_ag		1	
ykeq_ind	31		1	yk_ind		1	
ykeq_ser_tr	32		1	yk_ser_tra		1	
ykeq_ser_of	33		1	yk_ser_oth		1	
yheq	34	h	24,797	yh	h	24,797	
dyheq	35	h	24,797	dyh	h	24,797	
yfeq	36		1	yf		1	
ygeq	37		1	yg			1
tmreveq	38		1	tmrev		1	
dtxreveq	39		1	itxrev		1	
itxreveq	40		1	dtxrev		1	
intdeq	41	td	11	intd	td	11	
tinveq	42		1	tinveq_n		1	
savheq	43	h	24,797	savh	h	24,797	
savfeq	44		1	savf		1	
savgeq	45		1	savg		1	
pindexeq	46		1	pindex		1	
pinveq	47		1	pinveq		1	
pmeq	48	td_1m	9	pm	td_1m	9	
peeq	49	td_1e	10	pe	td_1e	10	

MICRO-PCGEM (Cont'd)

Equations				Variables			
Name*	Equation No.	Equation Index	Number of Equations	Variables		Type of Variable	
				Name	Index	Endogenous No. of Variables	Exogenous No. of Variables
ppeq1	50	td_1m	9	pq	td	11	
ppeq2	51	td_0m	2				
pxeq1	52	td_1e	10	px	i	12	
pxeq2	53	td_0e	1				
pdeq	54	td	11	pd	td	11	
pvaeq	55	i	12	pva	i	12	
req	56	td	11	r	td	11	
eq1eq	57	td_0s11	10	q	"td_0s11" **	1	
eq2eq	58		1				
eq3eq	59		1	cab			1
eq4eq	60		1	w		1	
eq5_11eq	61		1	w1		1	
eq5_12eq	62		1	w2		1	
eq5_13eq	63		1	w3		1	
eq5_14eq	64		1	w4		1	
walras	65		1	leon		1	
				pl	td	11	
				d	td	11	
				ntaxr		1	
				adj		1	
				x	"s12"***		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		24,797
				endow_12	h		24,797
				endow_13	h		24,797
				endow_14	h		24,797
				div-for			1
				grant-for			1
				paygv-for			1
				yfor	h		24,797
				div			1
				trgov	h		24,797
				dtxrf			1
				dtxrh	h		24,797
				itxr	td		11
				tm	td_1m		9
TOTAL			372362			372362	173643

*Equation names in the GAMS code

***output of government sector is fixed

**"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
pindex	: general price
pinv	: price of investment
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
unemp_11	: unemployment rate of type 1 labor
unemp_12	: unemployment rate of type 2 labor
unemp_13	: unemployment rate of type 3 labor
unemp_14	: unemployment 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
ct _h	: total consumption of household h
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 _v	: 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
dy _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
dtxrh _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 tax rate
adj	: adjustment factor
savf	: savings of firms
savg	: savings of government
savh _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, l1, l2, l3, l4,k}

Households

h h1,...,h24797

Other Institutions

inst {firms, government}