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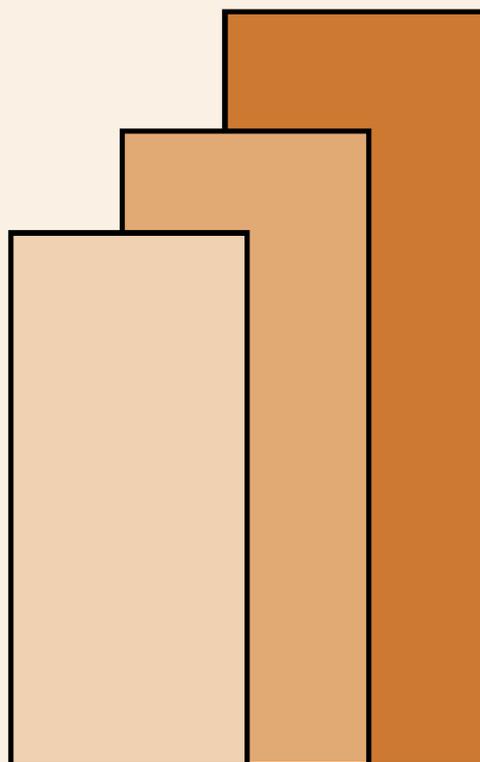
Celia M. Reyes and Caesar B. Cororaton

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Micro Impacts of Macroeconomic Adjustment Policies (MIMAP): The Philippine Case¹

Celia M. Reyes and Caesar B. Cororaton²

I. Introduction

The economic performance of the Philippines has been below par. Over the past few decades, it has not been able to sustain its growth process. Economic growth has generally been characterized to be a boom-bust one, and it has been accepted that this is primarily due to an economic structure that came about as a result of inward oriented economic policies. The unsustainable growth is clearly manifested in the chronic macroeconomic imbalances in the form of high fiscal deficit, low domestic savings, and sizable external account deficit. As a result, both inflation and interest rates are high, making the economic atmosphere in the country highly uncertain and not conducive to investment.

Thus, economic adjustments are necessary in putting back the economy in the right track to a sustainable growth. In fact, the Philippines has been undergoing major structural adjustments to correct these economic problems. Since 1986, the Philippine government has been introducing policy changes to correct the structural deficits. At present, more measures are in the pipeline, ready to be implemented.

However, although economic adjustments are necessary, there is some fairly good amount of evidence that unwarranted impacts may arise, especially on the poor or the vulnerable groups. Experience of several countries undertaking adjustment policies showed that there are differential impact of these adjustment policies at the household and firm level, and that most vulnerable groups of the society have borne more the adjustment costs than less vulnerable ones (Demery and Addison, 1987; and Cornia, Jolly, and Stewart, 1987).

The basic objective of the MIMAP project in the Philippines therefore is to look closely at the impacts of these adjustment measures on the poor. It will determine the little known impact of macroeconomic adjustment policies on household welfare. Understanding the micro impact of adjustment policies is important because it can aid policymakers in formulating and implementing countervailing measures (or appropriate "safety nets" measures) that will offset, or at least minimize, the adverse impact on the poor or vulnerable groups.

¹A paper prepared for the workshop on modelling micro-macro linkages, New Delhi, India (6-7 November 1995) and Islamabad, Pakistan (12-13 November 1995).

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The objectives of this paper are: (i) to review the growth performance of the Philippines; (ii) to look briefly into its economic structure; (iii) to review the economic reforms that have been implemented; (iv) to discuss the major components of the MIMAP project, especially the economic models that will be constructed and used in the analysis; (v) to show the preliminary results of the simulations that have been conducted.

II. Economic Performance

The growth of the Philippine economy decelerated over the past 40 years. In the period 1956-1970, real GDP grew an average of 4.7 percent per annum (see Table 1). This increased slightly to 5.9 percent per annum in the period 1971-1980. However, it dropped drastically to 1.5 percent per annum in the period 1981-1992.

Focusing on the last fifteen years, the economy had performed poorly, with a prolonged recession experienced in the period 1984-1985 when real per capita income contracted by -10.12 percent (Table 2). The recession was caused mainly by two factors: political uncertainty and unstable macroeconomic fundamentals. At the same time, the economy also proved to be highly unstable, with inflation rate surging to 35.2 percent.

During the first three years of the Aquino government, the economy recovered. Such recovery, however, was not sustained when political uncertainty and poor macroeconomic fundamentals once again plunged it into nearly zero growth in the early 1990s. This is when significant realignment and structural adjustments were installed.

There are now indications that the economy is starting to crawl up. In 1994 alone, the economy grew by 5 percent in real terms. It is, however, too early to tell whether the economy is now moving along a sustained growth path or not because the process of readjustment has not yet been completed and the effects of the process on the economy have not been fully realized.

III. Economic Structure and Policies

Economic Structure. The present industrial structure of the Philippine remains dualistic. The manufacturing sector, which enjoys high effective protection since the 1950s, employs only a small fraction of the labor force. The bulk of the labor force is employed either in backward agricultural sector or in urban centers with low productivity.

Tables 3 and 4 show the extreme dualism of the Philippine economy. The manufacturing sector which contributes about 25 percent to gross domestic product (GDP) employs only about 10 percent of the labor force. About two-thirds of the labor force is employed in agriculture, or in "other services" sector which contributes about one-fifth of GDP.

Industry, which in principle is supposed to absorb surplus labor from agriculture, failed to generate enough jobs to employ a labor force that has grown at almost 4 percent annually over the last decade.³ In fact, the share of industrial employment, particularly manufacturing, declined from 12.1 percent in 1960 to 9.7 percent in 1990. The reason for this is clear. The manufacturing sector has not been able to grow at rates high enough to become a lead sector of the economy. Its contribution to GDP has stagnated at about 25 percent over the last 30 years.

However, the decline in the share of agriculture in total employment has been significant. This development, together with the stagnant share of industrial employment implies that "it is services, a large part of which is so called 'informal sector', which served as the receptacle for labor shed by agriculture but which industry failed to absorb. Therefore, the lack of employment opportunities in industry condemns the majority of the labor force to jobs with low productivity and poor pay". (de Dios, 1992)

The export performance of the manufacturing sector is shown in Tables 5 and 6. One can observe that exports of Philippine manufactured goods have grown both as a share of total exports and as a share of GDP. In fact, at present, manufactured exports contribute about 70 percent to total exports.

One might think that this is the effect of a major restructuring effort of redirecting the economy away from import substitution and toward the world market. Although this has been the objective of some policy pronouncements, the direction towards this end has been very modest in reality. This is because of the very high import content of Philippine manufactured exports. Most manufactured exports consist of electronics (primarily semiconductors) and garments. In both export goods, the Philippines adds a thin slice of value added to import components, and then re-export them. "Thus the manufactured export sector is in effect an enclave with surprisingly little linkage to the domestic economy" (Krugman, et al, 1992).

As a result, the overall performance of Philippine export relative to its ASEAN neighbors is poor. Tables 7 and 8 show that the Philippines is fast losing market share in the world market. The Philippine share of total ASEAN export in 1970 was 17.7 percent. In 1985, this dropped to 6.9 percent. This share further declined to 5.9 percent in 1990.

The country's declining market share in the world market is evident in the comparative export performance of the Philippines and Thailand in the last six years. In 1985, exports of Thailand amounted to US\$7 billion, about US\$2.5 billion than that of the Philippines. In the last six years, exports of Thailand grew rapidly, averaging 26.2 percent growth per year, leaving the Philippines way behind. In 1991, Thailand's export was already US\$28 billion, more than 3 times that of

³The labor force increased from 18.2 million in 1981 to 25.2 million in 1991, or 3.8 percent annually. This is much faster than the population growth rate of 2.5 percent.

Philippine export value.

The present industrial structure is a result of a trade policy which generally provides strong incentives to import-substituting activities and heavy disincentives to export-oriented production. This has been the policy of the government since the 1950s. Although there were few changes implemented in the early and middle of 1980s, the basic orientation of the trade policy still favors import-substituting activities.

Trade Policy. The extent of the bias in the orientation of policies is reflected in the estimates of the effective protection rate (EPR) of Medalla (1990). The EPR is defined as the proportionate increase in domestic value added over free trade value added, and as such it measures the extent to which protection policy raises domestic prices above free trade prices, i.e., through tariffs, advance sales taxes on imports, mark-ups, and other non-tariff or quantitative trade barriers. A higher EPR thus means a higher level of protection.

The ratio of 100+EPR in export-oriented to that in import-replacing sectors is a rough guide to the overall orientation of the trade regime. Table 9 shows that the overall picture remains the same: Exports of both agriculture and manufactures have not been encouraged strongly, while domestic production of manufactures for local consumption has been favored. This structure is implied in the greater-than-one ratio of EPRs both in 1983 and 1988..

However, there has been some reduction in the structure of industry protection. The industry EPRs in 1988 are generally lower than that of 1983 (see Table 10). Industry EPRs are probably much lower today than 1988 because of the series of trade liberalization programs that have been put in place.

Exchange Rate Policy. Usually, countries which attempt to industrialize by providing manufacturers with a protected domestic market end up with an overvalued exchange rate that discourages exports. The Philippines is one example. Although the Philippine peso depreciated, both in nominal and real terms, compared to many developing countries, the depreciations were far less. In fact, the Philippine peso is far out of line compared to these countries. This is seen in Table 11.

The table shows that the Philippine real exchange rate was, on the average, 6 percent stronger during 1980-82 than it had been in 1970, compared to 10 percent depreciation for Indonesia and 20 percent depreciation for both Malaysia and Thailand. Since 1970, the peso has depreciated by just 30 percent in real terms, compared with 46 percent for Thailand, 49 percent for Malaysia, and 64 percent for Indonesia.

The overvaluation of the peso is clearly seen in Figure 1. One can observe that while Thailand, Indonesia and other Asia nations depreciated their currencies, the Philippines maintained an exchange rate of the peso to the US Dollar at a level considered by most analysts and the market to be overvalued. In general this policy stance was taken due to the preponderance of import-

dependent industries in the economy and thus their pervasive influence on policy. The government was also very sensitive to the nominal size of its dollar-denominated burden of foreign debt which have ballooned in domestic currency terms with a devaluation of the peso.

IV. Economic Reforms and Structural Adjustments⁴

The generally depressed performance of the economy over an extended period of time left the government with no choice but to introduce reforms. The reforms are aimed at: (a) restructuring the economy; (b) improving efficiency and competitiveness; and, (c) building a solid foundation for a sustained growth. In the period 1986-1994, the government embarked on a series of major reforms in the following areas: fiscal, financial, foreign exchange market, capital markets, foreign investment, and competitive environment.

Corollarily, the government took an aggressive stance in 1986-1993 by pursuing a unilateral trade liberalization program. To illustrate, the number of regulated items was reduced drastically from 1,924 to only 183 within the period. Moreover, in 1991, the government put in place a five-year tariff reduction program that simplifies the tariff structure and puts a nine-band tariff structure, with most of the items concentrated at around 3, 10, 20 and 50 percent tariff rates. More recently, there has been an acceleration of the tariff reduction on textiles, garments, and chemical inputs.

One of the major changes in the fiscal sector is the tax reform program which was instituted starting the second half of the 1980s. Among the major objectives of the program are to improve the elasticity of the tax system, tax administration and compliance by tax simplification and to promote equity and growth by reducing highly distortive taxes. Furthermore, the government adopted the Value Added Tax (VAT) system in the second half of the 1980s which replaced several sales taxes.

To restructure the financial market, the government removed controls on interest rates, rationalized the credit programs of the government so as not to compete with the private financial institutions, privatized several government-controlled banks, and liberalized bank entry, especially the entry and scope of foreign banks. The government also initiated the rehabilitation of the rural banking system, stopped the operation of weak private commercial banks through either closure or merger with other stronger banks. Moreover, the Central Bank abandoned its selective credit control and instead imposed uniform rediscounting for all activities.

The old Central Bank (CB) was rehabilitated to form what is now known as the Bangko Sentral ng Pilipinas (BSP) which is "free" of the huge stock of non-performing assets that almost crippled the old Central Bank. In principle, the BSP should now be able to perform its mandated function of maintaining stability in the economy.

⁴Based on Lamberte (1994).

A substantial number of controls in the foreign exchange market were likewise removed in the hope of increasing the flow of funds between the country and the rest of the world. For instance, exporters are no longer required to surrender their export proceeds and to seek prior BSP approval for their other forex-related transactions. Controls on capital repatriation, dividend, and interest remittance were also dismantled. Furthermore, overseas contract workers (OCWs) are no longer required to remit to the Philippines a certain portion of their income. There are, however, still existing controls with respect to foreign borrowing by both the private and public sectors, especially those that are guaranteed by the national government or government financial institutions.

Four major policy reforms were introduced that have a direct bearing on the development of capital. First, the double taxation of dividend income was eliminated through the abolition of the tax on intercorporate dividends and the gradual phase-out of the tax on shareholder's dividend income. Second, the Security and Exchange Commission formally issued the "Rules and Regulations Governing Investment Companies" in October 1989, signalling the revival of mutual funds. Third, as part of the foreign exchange deregulation program, rules and regulations covering foreign investments in BSP-approved securities were relaxed. Fourth, the two stock exchanges in the Philippines were unified, thereby eliminating inefficiencies such as price arbitrage in a situation where two markets are allowed to list the same issue/company. All these changes are deemed to facilitate the inflow of investment into the country.

The Foreign Investment Act of 1991 liberalizes entry of foreign investors within the provisions of the Constitution of the Philippines. As a general rule, there are no restrictions on the extent of ownership of export enterprises (defined as those exporting 60 percent of their output). As for enterprises oriented to the domestic market, foreigners are allowed to invest as much as 100 percent, unless the participation is prohibited or limited to a smaller percentage by existing laws and/or the provisions of the Foreign Investment Act.

To promote competition in the domestic economy, the government removed entry barriers in crucial industries such as telecommunications, transportation (land, sea, and air), banking and cement. At the same time, the government aggressively pursued its privatization program. In 1993, alone, the government sold to the public 19 government-owned or controlled corporations, including several major ones such as Petron, Philippine Shipyard and Engineering Corp., and Oriental Petroleum and Minerals Corp.

Although the economic reforms instituted thus far are already substantial, they are still far from complete. Recent studies, for example, have pointed out that in spite of the series of tariff reduction programs, the protection of local industries still remains relatively high⁵ and the incidence

⁵Various issues of PIDS Research Paper Series; Medalla E. (1990), AYC Constants (1995).

of tax evasion remains alarmingly high⁶, implying that substantial inefficiencies remain in the tax administration. Thus, more reforms are called for.

At present, the government is about to embark on a new tariff program which will further reduce and simplify the tariff structure to an across-the-board uniform tariff of 5 percent by the year 2004. The VAT system will also soon be expanded to cover other commodities and services which were not included in the first adoption of the system. Furthermore, Congress is now deliberating on a tax reform bill that will introduce more reforms to the existing tax structure and administration.

V. Framework of Analysis

Based on the series of discussions conducted, transmission channels and mechanisms were identified to carry out the objectives of the Project (Lamberte, et al., 1992). Transmission channels are the routes or conduits through which adjustment policies are worked out and eventually impact on the households and firms (the economic agents), while transmissions mechanisms are the variables which these economic agents will respond to.

The transmission channels are: (1) the product or goods market; (2) the factor markets; and (3) the provision of public goods and services. An important assumption here is that economic agents participate in the market economy, i.e., they produce and consume in the market economy. Furthermore, it is assumed that the parameters and the workings of the markets are affected by policies rules, regulations and market interventions introduced by the government, external factors and initial endowments.

The Project identified three transmission mechanisms: (a) relative prices; (b) income and purchasing power; and (c) access to resources like public services. Economic agents respond to changes in relative prices, which then affect the allocation of resources through income and substitution effects. Income or purchasing power determines the consumption bundle of households. Accessibility of public services will affect the level of welfare of households.

Furthermore, the Project identified three household outcomes as impact variables: nutritional status of household, health status, and education. Thus, changes in macroeconomic policies will go through these channels and mechanisms and will ultimately impact households in terms of changes in these household outcomes.

Based on the above framework, the Project envisions to conduct the following research activities:

⁶See Manasan R. (1993).

(1) **Monitoring System.** Development and institutionalization of a monitoring system to generate regular and updated information on the welfare status of the population, particularly the vulnerable groups. These groups include the urban poor, landless farmers, fisherfolk, and upland farmers.

Since poverty is multi-dimensional, a set of minimum basic need (MBN) indicators will constitute the MIMAP database. These indicators will cover the areas of health, nutrition, water and sanitation, housing, income and employment, and political participation.

While the ultimate aim is to set-up a nationwide monitoring system, the monitoring system will be installed first in areas where the target groups abound or in provinces which have been identified as priority-priority because they rank low in terms of MBN indicators based on available data. This community-based monitoring system (CBMS) has been pilot tested in one barangay (village) and will be installed in a few more barangays.

The CBMS utilizes selected barangay members to do the monitoring. Because of the need to build up first the capability of the local government units (LGUs), it would take time to set-up the monitoring system in many barangays. Thus, another approach being employed is the generation of data for selected population subgroups and municipalities from existing surveys of the National Statistics Office using special statistical techniques.

(2) **Quantitative Models.** The Project shall develop models that will test hypotheses on the micro impacts of macroeconomic adjustment policies. The models that will be developed are:

- macroeconometric model with an income distribution bloc
- an economy-wide model with a financial sector
- household models

The macroeconometric model will incorporate monetary and financial, fiscal and trade policy variables and will be used in analyzing the short-run effects of the adjustments, especially on the income distribution. As will be discussed below, the link with the income distribution bloc will be done in a two-stage mapping: (a) link factor income or value-added results of the macro model to sources of income; and (b) map sources of income to relevant socio-economic groups.

The specification of the economy-wide model will generally be patterned after the "micro-macro" model (or the maquette model) of Bourguignon. et. al. (1992). The model will be used to analyze the effects of the adjustments on relative prices and resource allocation, income distribution, and sectoral allocation of government budget on social services.

The household models will be constructed and estimated to generate the parameters needed

in setting up the linking matrix that will be attached to the economy-wide model. The matrix is needed in translating the sectoral effects from the economy-wide model to changes in the household outcomes. Figure 2 shows how the macroeconomic adjustment policies are translated into changes in household outcomes in four stages.

- changes in macro policies (stage 1) will be inputted into the economy-wide model (stage 2) to determine the changes in relative prices and resource allocation, household incomes, sectoral allocation of government budget on social services.
- these changes in sectoral variables will be inputted recursively into the linking matrix (stage 3). As will be discussed below, the parameters of this linking matrix will be generated from the household models that will be estimated separately.
- finally, through the use of this linking matrix, the impacts on household outcomes can be computed (stage 4). Thus, changes in macro policies will be translated into changes in nutrition, health, and education status of the households.

(3) Focus Studies

Case studies would provide better understanding of some sectors. A study of the labor market, particularly relating to the informal sector, would provide insights on how the population is responding to the macro policies. This study would also look into the participation of women in the labor market, and examine gender differentials in economic activity and wages, if any. A study focusing on environment would indicate the pressures on the environment arising from the changes in the economic and social environment and would also show how the environment is responding to these pressures.

VI. Macro Model with an Income Distribution Bloc⁷

A macroeconomic model is linked with an income distribution bloc. The macroeconomic model is used to generate the value added of the different production sectors. The value added per sector is then allocated to the different factor incomes: compensation, mixed income, operating surplus and depreciation. An income distribution submodel is then used to generate the net receipts of the different household groups. Presently, there are nine household groups corresponding to nine income classes.

Macroeconometric Model. The theoretical framework of the model is largely influenced by the structuralist approach to macroeconomics. Subscribing to the notion of equilibrium at less

⁷Based on Reyes and Yap (1994).

than full-employment, the structuralists assume that causality runs from demand injection to output determination. Hence, aggregate output is determined from the supply side. However, aggregate demand also has a role in the determination of output.

To obtain equilibrium at less than full-employment, the structuralists presented a two sector flex-price/fix-price model. In this model, agriculture is organized as a flex-price sector. Output in agriculture is assumed to be fixed in the short run, while its price varies to equate demand with available supply. On the other hand, industry is organized as a fix-price sector. It is assumed that there is excess capacity in this sector and firms practice markup pricing behaviour. Here, markup pricing can be justified through market power through corporate savings intended to finance capital formation and through internal coordination in multiproduct firms.

In general, the structuralist approach is consistent with the mixed-economy nature of the Philippine economy where institutional constraints such as oligopolistic market structure impede the operation of the market-clearing process leading to persistent unemployment, chronic fiscal deficits, and other macroeconomic imbalances.

Model Structure. There are four major blocks in the model, namely: 1) the real sector consisting of production, expenditure, and employment, wages and prices; 2) the fiscal sector; 3) the financial sector; and 4) the external sector.

These blocks are linked as follows (see Figure 3). The major components of the real sector are linked through aggregate expenditure categories which appear as determinants of quantity demand in the production subsector. In agriculture, quantity supplied adjusts to clear the level of quantity demanded while in the industrial sector a price equation functions as a supply equation with output determined by the level of demand. In turn, output determines the level of prices and employment. The financial sector affects output via the interest rate, the amount of net foreign assets and the liquidity variable which enters wholesale price index equation. The fiscal sector influences the monetary base and interest rate through the method of financing the budget deficit. It also affects the real sector through expenditures on capital and operating expenses which partly determine the level of output. The external sector affects the other sectors of the economy through the linkage of the various current account components with output and expenditures, as well as its contribution to net foreign assets via the BOP account.

The real sector of the model circumscribes the level of gross domestic output (GDP) in the economy. Here, output is modelled in two ways, using the value added approach, which constitutes the production subsector, and the expenditure approach. However, the interaction between aggregate supply and aggregate expenditure is such that equilibrium can be located at less than full employment. Following the structuralist model, the production subsector of the model consists of two categories, namely: the primary sector (agriculture) and the advanced sector (industry and services). However, the model deviates from the pure structuralist model wherein agricultural supply is fixed in the short run. In the postulated model, quantity adjustment in agriculture is made possible

with biotechnology and irrigation. On the other hand, the industrial and the services sectors are assumed to have excess capacity. Hence, supply responds to the level of aggregate demand. In the agricultural sector, prices are determined through market-clearing while the price levels in industry and services are based on mark-up pricing behaviour.

The expenditure subsector focuses on the determination of the different components of aggregate demand. Basically, this block consists of consumption and investment expenditures by both the private sector and the government. Private consumption expenditure is estimated to be positively related to disposable income, net wealth, and a proxy for past disposable income, and inversely related to the level of the real interest rate. In the same manner, government consumption depends on the productive component of operating expenditures (obtained by netting out interest payments).

Having determined aggregate output, the level of sectoral employment is now determined from the production side and the price level as a weighted average of individual sectoral prices. In the determination of sectoral employment, a modified version of input demand is postulated wherein the demand for labor is directly obtained from the demand for goods and services.

In the model, the fundamental role of the fiscal block is to determine the level of the budget deficit. This is attained through an accounting of the government's fiscal operation, namely expenditure and revenue generation. Here expenditure is treated as a policy variable and is therefore exogenous to the model. Tax revenue generation relating to both direct taxes and indirect taxes were estimated.

In a similar manner, the financial block of the model centers on the determination of the monetary aggregates and the interest rate. This block contains equations for the demand for narrow (MS) and broad money (TL).

It is apparent that the government's decision on the method of financing the deficit will have significant impact on this block. In the model, three methods of financing the deficit are highlighted, namely: 1) monetization of public debt; 2) external financing; and 3) domestic, open-market borrowing. To capture the crowding-out effect of open-market borrowing, the treasury bill rate is specified as a function of the inflation rate and the level of budget deficit financed through domestic borrowing. It should be noted that external financing is treated exogenously in the model.

Finally, the external block of the model replicates the flow of goods, services, capital, and transfers in and out of the Philippine territory. This block consists of import and export demand equations, the corresponding import and export price equations, and the balance of payments identities. The balance of payments identities integrate these various flows to obtain the trade balance, the current account balance, the capital account balance and the overall balance of payments. In turn, the overall balance feeds in the determination of net foreign assets which determines the level of imports.

Income Distribution Bloc. The changes in the level of economic activity as represented in the sectoral value added are related to changes in factor incomes. The allocations are based on predetermined proportions from the 1990 Social Accounting matrix. These changes are then translated into movements in incomes of the 9 household categories using the income distribution bloc (see Figure 4).⁸

Basic Structure. The general approach can be outlined using the following notations:

AGRI	-	value added in the agriculture sector (in current prices)
MFG	-	value added in the manufacturing sector (in current prices)
MQ	-	value added in the mining and quarrying sector (in current prices)
CONST	-	value added in the construction sector (in current prices)
EGW	-	value added in the electricity, gas and water sector (in current prices)
SERV	-	value added in the services sector (in current prices)
COMP	-	total compensation of employees (in current prices)
MIX	-	total mixed income (in current prices)
OS	-	total operating surplus (in current prices)
UnEnt	-	receipts of unincorporated enterprises
NonProf	-	receipts of non-profit institutions
PriFin	-	receipts of private financial corporations
PriNfin	-	receipts of private non-financial enterprises
PubFin	-	receipts of public financial corporations
PubNfin	-	receipts of public non-financial corporations
Gov	-	receipts of the government sector
Hhi	-	receipts of household i ($i = 1 \dots 9$)
ROW	-	transfers from the rest of the world

The following identities are defined:

- (1) $GDP = AGRI + MFG + MQ + CONST + EGW + SERV$
- (2) $GDP = COMP + MIX + OS + Depreciation$

where GDP is gross domestic product in current prices.

⁸Based on Yap (1995).

COMP, MIX, and OS are considered to be the factor incomes. For a particular year they can be generated from value added in each sector as follows:

$$(3) \quad \text{COMP} = k_{1A} \cdot \text{AGRI} + k_{1M} \cdot \text{MFG} + k_{1Q} \cdot \text{MQ} + k_{1C} \cdot \text{CONST} + k_{1E} \cdot \text{EGW} \\ + k_{1S} \cdot \text{SERV}$$

$$(4) \quad \text{MIX} = k_{2A} \cdot \text{AGRI} + k_{2M} \cdot \text{MFG} + k_{2Q} \cdot \text{MQ} + k_{2C} \cdot \text{CONST} + k_{2E} \cdot \text{EGW} \\ + k_{2S} \cdot \text{SERV}$$

$$(5) \quad \text{OS} = k_{3A} \cdot \text{AGRI} + k_{3M} \cdot \text{MFG} + k_{3Q} \cdot \text{MQ} + k_{3C} \cdot \text{CONST} + k_{3E} \cdot \text{EGW} \\ + k_{3S} \cdot \text{SERV}$$

k_{1A} is the proportion of agricultural value added that goes to compensation of employees, with a similar definition for $i = 2$ and 3 and for the various sectors (subscripts M, Q, C E and S).

For a particular household its primary receipts can be computed as:

$$(6) \quad \text{Hhi} = g_{1i} \cdot \text{COMP} + g_{2i} \cdot \text{MIX}$$

where g_{1i} is defined as the proportion of COMP that goes to household i with a similar definition for g_{2i} . OS is distributed initially to unincorporated enterprises, non-profit institutions and private and public corporations.

The values of g in Equation 6 can be computed only for the SAM year. Income distribution data are available only during the years when the Family Income and Expenditure Survey (FIES) is conducted. For the purposes of policy simulation, the values of g are assumed constant which is equivalent to the assumption that the change in the total amount of income from each source affects each recipient of income from that source proportionately to the amount received from that source. Fluctuations in economic activity bring about changes in the levels of COMP, MIX and OS but these factor incomes are distributed across households based on fixed proportions. This brings us to the issue of linking the income distribution bloc to the macroeconomic model.

The macroeconomic model is used to generate value added from the different sectors (i.e. the values for AGRI, MFG, etc.). The next step would be to apply Equations 3, 4, and 5 in order to generate the factor incomes. Finally, Equation 6 is used to allocate factor incomes across the

different households.

Net receipts of households, defined as total receipts and transfers less disbursements is defined as:

$$\begin{aligned}
 (7) \quad H_{hi} &= [g_{1i} \cdot \text{COMP} + g_{2i} \cdot \text{MIX} + g_{3i} \cdot \text{UnEnt} + g_{4i} \cdot \text{PriFin} \\
 &+ g_{5i} \cdot \text{PriNFin} + g_{6i} \cdot \text{PubFin} + g_{7i} \cdot \text{PubNfin} + g_{8i} \cdot \text{Gov} + g_{9i} \cdot \text{ROW}] \\
 &+ [h_{1i} \cdot \text{PriFin} + h_{2i} \cdot \text{PubFin} + h_{3i} \cdot \text{PubNfin} + h_{4i} \cdot \text{Gov} + h_{5i} \cdot \text{ROW}] \\
 &- [c_{1i} \cdot \text{PRIM}_i + c_{2i} \cdot \text{PRIM}_i + d_{1i} \cdot \text{PRIM}_i + d_{2i} \cdot \text{PRIM}_i + d_{3i} \cdot \text{PRIM}_i \\
 &+ d_{4i} \cdot \text{PRIM}_i]
 \end{aligned}$$

This is the expanded form of Equation 6.

The constants g_{3i} , g_{4i} , g_{5i} , g_{6i} , g_{7i} , g_{8i} and g_{9i} are the proportions of receipts of the various enterprises, the government, and the rest of the world that are received by household i . The determination of the receipts of these entities will be discussed below. On the other hand, the constants h_{ji} , $j=1...5$, are the proportions of the receipts of the various enterprises, the government and the rest of the world that are received by household i as secondary transfers. The variable PRIM represents primary income and is equal to the first set of bracketed terms:

$$\begin{aligned}
 &[g_{1i} \cdot \text{COMP} + g_{2i} \cdot \text{MIX} + g_{3i} \cdot \text{UnEnt} + g_{4i} \cdot \text{PriFin} + g_{5i} \cdot \text{PriNFin} \\
 &+ g_{6i} \cdot \text{PubFin} + g_{7i} \cdot \text{PubNfin} + g_{8i} \cdot \text{Gov} + g_{9i} \cdot \text{ROW}]
 \end{aligned}$$

The last set of bracketed terms in Equation 7 represent disbursements of the households which are received by the various entities. These are all set as a proportion of primary income. The values of these constants as calculated from the 1990 SAM are reported in Table 12.

The receipts of the various enterprises are determined as follows:

$$\begin{aligned}
 \text{UnEnt} &= 0.674 \cdot \text{MIX} + 0.532 \cdot \text{OS} + 0.026 \cdot \text{PriFin} + 0.036 \cdot \text{PubFin} \\
 &+ 0.0022 \cdot \text{ROW}
 \end{aligned}$$

$$\begin{aligned}
 \text{NonProf} &= 0.013 \cdot \text{PriFin} + 0.0068 \cdot \text{PubFin} \\
 \text{PriFin} &= 0.053 \cdot \text{OS} + \sum c_{1i} \cdot \text{PRIM}_i + 0.0303 \cdot \text{UnEnt} + 0.420 \cdot \text{NonProf} \\
 &\quad + 0.058 \cdot \text{PriFin} + 0.370 \cdot \text{PriNfin} + 0.154 \cdot \text{PubFin} \\
 &\quad + 0.034 \cdot \text{PubNfin} + 0.0874 \cdot \text{Gov} + 0.011 \cdot \text{ROW} \\
 \text{PriNfin} &= 0.303 \cdot \text{OS} + 0.065 \cdot \text{PriFin} + 0.0703 \cdot \text{PriNfin} \\
 &\quad + 0.0485 \cdot \text{PubFin} + 0.0053 \cdot \text{ROW} \\
 \text{PubFin} &= 0.0167 \cdot \text{OS} + \sum c_{2i} \cdot \text{PRIM}_i + 0.0022 \cdot \text{Unent} \\
 &\quad + 0.017 \cdot \text{PriFin} + 0.0728 \cdot \text{PriNfin} + 0.191 \cdot \text{Pubfin} \\
 &\quad + 0.022 \cdot \text{PubNfin} + 0.0468 \cdot \text{Gov} + 0.0035 \cdot \text{ROW} \\
 \text{PubNfin} &= 0.0964 \cdot \text{OS} + 0.0043 \cdot \text{PriFin} + 0.0395 \cdot \text{PubFin} \\
 &\quad + 0.00039 \cdot \text{ROW} \\
 \text{Gov} &= p \cdot \text{GDP}
 \end{aligned}$$

The values of the coefficients were also calculated based on the 1990 SAM. Thus we have a system of 16 equations and 16 unknowns (including all the HH_i s). The variable ROW is exogenous while the variable Gov can also be considered exogenous since it is taken to be a proportion of GDP which is determined outside this system.

The income distribution analysis will more reliable if factor incomes could be disaggregated by sector and distributed accordingly to the various household groups. Thus, the proportion of COMP that will go to household category i will vary across households and across sectors. Also the analysis will be more useful if households were classified according to deciles. Data for these two refinements are being processed and should be available before the end of the year.

The composite model will be linked with the household model to be able to ascertain the impact of these macro policies on household outcomes. This requires that the present macro model be further disaggregated to incorporate separate subsectors for major food items such as palay and sugar. Moreover, government expenditures by sector have to be included in the model. Finally, the services sector has to be disaggregated to have separate subsectors on health and education. This will enable the composite model to generate not just changes in incomes for the different income groups

but also changes in prices and government expenditures.

VII. Economy-Wide Model and the Linking Matrix

Economy-Wide Model. Major features of the goods and factor markets in the economy-wide model are:

1. Capital, once installed, is fixed within the period. Intersectoral capital mobility is achieved only through time by capital stock depreciation and new investments.

2. Gross sectoral output is determined in two separate production technologies: (a) value added is a CES or Cobb-Douglas function of capital and labor [thus, substitution between capital and labor is allowed]; (b) value added and intermediate inputs are related in fixed proportion, or leontief technology.

3. For each sectoral demand, some substitution is allowed between domestically produced goods in that sector and competitive imports to that sector using the Armington (1969) assumption. It is also possible to assume that a fraction of intermediate imports is noncompetitive. This limited substitution possibility implies that a devaluation will have a relatively strong contractionary effect from the supply side. On the export side, it is possible to have export demand to be less than infinitely elastic, so that the terms of trade are endogenous. Thus, devaluation can give some scope for import substitution and for a resource shift toward tradables.

4. Consumption functions for each socioeconomic group are price responsive and usually derived from a Stone-Geary utility function. This representation of consumption demand is flexible and allows for the representation of Engel effects across socioeconomic groups with different levels of income per capita and differences in the degree of responsiveness to price changes. Thus poor socioeconomic groups with consumption expenditures concentrated on essential commodities will be more adversely affected by a price increase.

5. The functioning of the goods markets would depend upon the degree of price flexibility. For example, if capitalists are assumed to have a behaviour so that they resist cuts in their profit rates (usually in an oligopolistic industrial sector), then a markup pricing rule is followed, instead of price adjustment to eliminate excess demand. The usual pricing rule used is

$$P^v = W(1 + m)(1 + \alpha P^{*e})$$

where P^v is value added price, W is wage rate, m is markup, α ($\alpha < 1$) depends on how much resistance there is to a cut in profits, P^{*e} is exogenous expected inflation. When the markup pricing

rule is functioning, the rate of capacity utilization in a sector, u , is adjusted to clear the market. That is,

$$q^d = q^s = uF(K,L)$$

where q^d is demand, q^s supply, $F(\)$ production function, K capital (fixed) and L labor. Thus, the clearing variable in the market is not price but quantity through the capacity utilization rate variable. Note that if $u = 1$ (usually assumed in the agricultural sector) then the market is under a Walrasian regime. If capacity utilization is variable and < 1 , (usually assumed in the industrial sector) then the market is under a Keynesian regime with markup pricing.

6. The functioning of the labor market would depend upon the degree of real wage resistance. If there is resistance to real wage cuts (again, in the industrial sector), then the adjustments in the labor market will again be done through quantity adjustments, that is, through unemployment. Real wage resistance is usually modelled by a Phillips curve determination of the wage growth rate:

$$W' = \alpha_0 + \alpha_1 P + \alpha_2 (\Delta L_u) ; \alpha_1 < 1$$

P is the endogenous price level. L_u is unemployment rate in the relevant sector labor category. (Note that usually the wage elasticity with respect to inflation, α_1 , is less for short-run simulations than for the run-long, indicating greater wage rigidity in the short-run than in the long run). This Phillips curve can be estimated econometrically.

Resistance to wage and profit cuts have strong implications for factoral distribution of income. Furthermore, poverty is likely to increase when there is resistance because the economy is not at full capacity. These are the principal short-run macro determinants of the distribution of income.

7. A financial sector will be built within the economy-wide model. The mechanism of the financial sector will be based on the standard IS-LM macroeconomic framework for an open economy in which asset prices are endogenously determined. There will be four assets that will be included in the model: (a) money; (b) government debt; (c) credit; and (d) net foreign currency assets. The financial agents are the government, the households, the banking system, the firms, and the foreign sector.

8. The economy-wide model is flexible enough to accommodate different closure rules. It can allow for a neoclassical closure rule where aggregate investment is set to equal aggregate

savings. It can also allow for a keynesian closure rule where a separate investment function is specified.

Linking Matrix. Orbeta (1994) presented a framework⁹ for simulating the effects of food policies. Three types of policy instruments were identified: supply shifters, demand shifters, and price wedges.

Given the estimated demand curves for food (q_i), the percentage change in quantities demand can be expressed as:

$$\dot{q}_i = \sum_j^n e_{ij} \dot{p}_j^d + \gamma_i \dot{y} \quad i = 1, \dots, n$$

where the dots indicate percentage changes, e_{ij} direct and cross-price elasticities of demand; p_j^d demand price; γ_i income elasticity of demand; and y income.

Supply changes can be represented as

$$\dot{q}_i = \sum_j^n s_{ij} \dot{p}_j^s + \delta_i \quad i = 1, \dots, n$$

where s_{ij} are the supply elasticities, p_j^s supply price and δ_i supply shift variable.

To allow for price subsidies, the equilibrium relationship is

$$\dot{p}_i^s = \dot{p}_i^d + \beta_i \quad i = 1, \dots, n$$

where β_i is the size of subsidy wedge for commodity i .

In matrix form these three sets of n equations can be expressed as

$$\begin{bmatrix} -H & O & I \\ O & -S & I \\ -I & I & O \end{bmatrix} \begin{bmatrix} \dot{P}^d \\ \dot{P}^s \\ \dot{Q} \end{bmatrix} = \begin{bmatrix} \Gamma \dot{y} \\ \Delta \\ \dot{B} \end{bmatrix}$$

⁹The framework was originally developed by Quisumbing (1985).

where

H : n x n matrix of demand elasticities, e_{ij}

S : n x n matrix of supply elasticities, s_{ij}

P^d : n x 1 vector of demand prices, p_i^d

P^s : n x 1 vector of supply prices, p_i^s

Q : n x 1 vector of quantities, q_i

Γ : n x 1 vector of income elasticities of demand, γ_i

Δ : n x 1 vector of supply shifts, δ_i

B : n x 1 vector of price subsidies, β_i

The solution for the changes in equilibrium prices and quantities as a function of the policy variables is

$$\begin{bmatrix} \dot{P}^d \\ \dot{P}^s \\ \dot{Q} \end{bmatrix} = \begin{bmatrix} (S-H)^{-1}(\Gamma\dot{Y} - \Delta - S\dot{B}) \\ (S-H)^{-1}(\Gamma\dot{Y} - \Delta - H\dot{B}) \\ H(S-H)^{-1}(S\dot{H}^{-1}\Gamma\dot{Y} - \Delta - S\dot{B}) \end{bmatrix}$$

Thus, given the changes in the equilibrium consumption of commodities, the percentage change in the equilibrium level of nutrient consumption is

$$\dot{N} = K \dot{Q} = K H(S-H)^{-1}(S\dot{H}^{-1}\Gamma\dot{Y} - \Delta - S\dot{B})$$

where K is an 1 x n vector of K_i , the fraction of initial total nutrient consumption provided by commodity i. This equation serves as the linking equation, while Q as the linking matrix.

This framework would allow one to compute for the changes in calorie and protein consumption under policy changes affecting the market for food. The same framework will be utilized in analyzing the health and education household outcomes of changes in macroeconomic policy environment. The parameters of the matrix will be derived from the household models that will be estimated separately.

VIII. Household Models

Orbeta (1995) specified the general function form of a household model for MIMAP

$$q = f(p, w, y, z, h)$$

where q is household outcome, p price of outputs, w prices of inputs, y household income, z provision of social services, and h a vector of other household and community characteristics. The movements of the explanatory variables are then fed into the above model to generate scenarios about q . The vector of other household and community characteristics h will be held constant. If q is determined, it will be inputted into the linking equation above to determine the household outcomes.

An important issue has to be emphasized in the development of the household model for MIMAP. Existing household models (e.g. the food demand equation of Quisumbing, 1985) have prices and income variables in the right hand side of the equation. However, it is clear that demand for food is also affected by other household and community characteristics such as disease incidence and education status. Thus, estimating household equations with only income and prices as explanatory variables will result in biases in the estimates of the parameters. Thus, to minimize the specification errors and the omitted variables biases, the household model of MIMAP would also include the different household and community characteristics, apart from the usual income and price variables.

IX. Preliminary Results

Status of the Models. The macroeconometric model consists of the model of the Philippine Institute for Development Studies (PIDS). To date, the PIDS model has been used by different analysts to analyze different policy issues in the Philippines and to generate macroeconomic forecasts. The income sub-model that will be attached to this macro model will be based on the 1990 Social Accounting Matrix (SAM) of the Philippine economy which is currently being developed and constructed. The 1990 SAM will be completed by December of 1995.

The economy-wide model will also utilize the 1990 SAM. Majority of the parameters of the model will be derived econometrically. A few of the parameters will be derived as a result of calibrating the model with the 1990 SAM. The economy-wide model should be running and be used in the analysis early part of 1996.

The household models will be estimated econometrically using nationally representative data sets. There is a separate effort in the Project that attempts to integrate various national surveys conducted by the government. Furthermore, additional work is being done in the Project to generate small-sample statistics. All these information will be utilized in the estimation of the household model for MIMAP.

Preliminary Results Attempts have been done in the Project to simulate the income

distribution and nutrition effects of the adjustments using existing models of the Philippine economy. The results of the simulations are summarized below.

1. Impact of Adjustment Policies on Growth and Equity.¹⁰ This section discusses an application of the composite model consisting of an annual macroeconometric model and the income distribution bloc¹¹ which was developed based on the 1990 Social Accounting Matrix. The simulation exercises consist of counterfactual simulations focusing on the impact of fiscal restraint and peso appreciation during the period 1991-1993. The change in income distribution is measured simply by comparing the percentage of income across the income groups. The results are very preliminary. It should be emphasized that because of the strong assumptions that underlie the development of the composite model, the latter is useful only for short-term analysis.

Impact of Increased Capital Expenditures, 1991-1993. The fiscal deficits in the early 1990s were to have been addressed by higher revenue and lower public expenditures. However, due to the nonpassage of the proposed tax measures combined with lower tax revenues following the economic slow down and the delay in the sale of public assets and firms, there was no recourse but to reduce public spending by more than the stipulated amount (Diokno, 1992). As a result, public investment as a percentage of GNP was only around 5 percent in 1991, much lower than the figures in the early 1980s of 7.4 to 9.8 percent (see Table 13).

This counterfactual simulation examines the effects of increasing government spending during the period 1991 to 1993. Capital outlays measured in current prices are increased by 0.5 percent of nominal GNP every year. The increase in spending is financed by domestic borrowing which leads to a rise in interest rates. The results are shown in Table 14.

The increase in public investment directly adds to the capital stock thereby increasing the productive capacity of the economy. This in turn reduces inflationary pressure. Output in the three major sectors, i.e. agriculture, industry and services, expands. The increase in public investment is matched by an increase in private investment. There is no crowding out effect since the increase in the interest rate is offset by the decline in inflation rate the effect of which is to reduce uncertainty in the macroeconomic environment.

The impact on income distribution of an increase in capital expenditures is presented in Table 15. What is shown is the percentage change of income that accrues to the nine households. The figures show that for all the three years, there is a slight increase in the receipts for all the households although the structure is regressive: higher income households experience a larger increase. The

¹⁰Based on Reyes and Yap (1995).

¹¹The parameters of the income distribution bloc were estimated using the preliminary version of the 1990 SAM.

increasing trend is broken only by the last household category.

Impact of a Peso Depreciation, 1992-93. The peso-dollar exchange rate started to appreciate in the latter part of 1990. Table 16 shows the average exchange rate from 1986-1993, with these values constituting the baseline scenario. If the government had not intervened to stabilize the peso, it would have depreciated against the dollar. We assume that the exchange rate would have been P28.\$1 in 1992 and 1993. The results of the counterfactual simulations are shown in Table 17.

In the short run, the depreciation impairs the economy's capacity to import the required raw materials, intermediate inputs and capital goods. This leads to a reduction in investment which is large enough to overcome the rise in exports. The overall result is a contraction in output and a rise in unemployment. Since it is the industrial sector that is more heavily dependent on imported inputs, it comes as no surprise that this sector suffers a decline in output. On the other hand, the agricultural output expands as exports from this sector are not too heavily import dependent. The higher peso cost of imports causes the price level to increase.

The results for the depreciation exercise are presented in Table 18. Similar to the first exercise, all household categories experience an increase in total nominal income but this time the structure is progressive: lower income households have a larger percentage increase.

Analysis. The results can be explained largely by the income structure of the households. The modal source of income for the first four household categories (the poorest households) is mixed income, which consists mostly of receipts from self-employment activities. Note that a significant part of this mixed income accrues to households in the form of returns from unincorporated enterprises. Thus, policies that favor sectors where self-employment is prevalent will lead to an improvement in income distribution.

It is interesting to note that the modal source of income for the last household category (the richest group) is also mixed income. Perhaps this consists mostly of undeclared income (e.g. fees of doctors).

Data in Table 19 obtained from the National Statistical Coordination Board (NSCB) show that among the six sectors that are analyzed, the agriculture and services sector show a significant part of output being translated to mixed income (an average of 59.2 percent for agriculture and 40.5 percent for services over the 1991-1994 period). Thus the peso depreciation, which leads to an output contraction in the industry sector and an output expansion in the agriculture sector, favors the mixed income category and has progressive income distribution effects. The reverse is true for the exercise where capital expenditures are increased.

The analysis of income distribution is based on income levels at current prices. In the case of the simulation on a peso depreciation, while real output contracts, output measured in current prices rises because of the increase in the general price level. This accounts for the increase in

income for all household categories. It may well be that the picture will change if the distribution effects of inflation will be incorporated. But given the limited data, a more exhaustive analysis is precluded.

2. Income distribution Effects of Tariff Reduction, 1988-1992.¹² The simulation used a computable general equilibrium (CGE) model of the Philippine economy. The model is called the APEX with 50 production sectors included. The model was used to analyze the reduction in tariff in the period 1988-1992 which is shown in Table 20. In terms of weighted nominal tariff rate change in broad industry categories in the period 1988-1992, agriculture experienced the biggest drop of -15.30 percent over the period. It is followed by the manufacturing sector of -12.73 percent reduction. Forestry followed next with a tariff reduction of -11.11 percent, while the mining sector experienced the least reduction of -9.63 percent over the period.

There is one major drawback, though, in the simulations. The set of simulations conducted considered output tariff changes only. A more appropriate analysis would have been changes in the effective protection rate (EPR), where changes in tariff rates on inputs are also considered. Although estimates of sectoral EPRs are available, they cannot be accommodated at the present specification of the APEX model. Perhaps, changes in EPRs can be considered in the economy-wide model that will be constructed for the MIMAP.

In the simulation exercise conducted, four types of tariffs changes were analyzed:

- **Nominal Tariff Rates.** These are the nominal tariff rate changes in the period 1988-1992 on commodities based on the Harmonized System codes as found in the Tariff Code as amended.
- **Average Tariff Rates.** These are the computed average tariff rates in the recent paper on EPR estimation. The averages were computed using as weights the value of domestic production of commodity *i* belonging to the given sector as found in the 1988 Census of Establishments and the value of imports of commodity *i* as found in the 1988 Philippine Foreign Trade Statistics.

The other two sets of tariffs are implicit tariffs derived using two different formulas. The computations of implicit tariffs include nominal tariffs on output and other protective measures.

- **Implicit Tariff Rates With all Adjustments** (named here as Implicit Tariffs: LB Method). The computation of implicit tariffs adjusts the average tariff for duty exemption, BOI incentives, duty drawback, VAT exemptions, and discriminatory

¹²Based on Cororaton (1995).

excise tax.

Implicit Tariffs with BOI Incentives Only (labelled here as Implicit Tariffs: LD Method). BOI incentives are viewed as subsidy on domestic production and are therefore treated as equivalent of a tariff. BOI incentives are assumed to affect the implicit tariff on output but not on input. Thus, BOI incentives are added to the average tariff rates.

The changes in the tariff rates inputted into the APEX model cover a four-year period change. Thus, to express the results in terms of average annual effect, all results were divided by 4. The annual average results of the simulations are summarized in Table 21.

Under each of the four sets of tariff changes, two simulations were conducted: one for the case of a fixed foreign exchange rate, and another for the case of an adjusted exchange rate. The adjustments were done up to the point where the current account deficit of the economy balances, i.e., it reaches zero.¹³

The average annual impact using nominal tariff rate change is 0.47 percent increase in real gross domestic product (GDP). There is a marginal increase in inflation of 0.04 percent. However, the increase in GDP is accompanied by a 0.11 percent increase in the current account deficit, as the increase in exports is surpassed by the increase in imports.

When the exchange rate was adjusted the current account deficit was brought back to zero, and the impact on GDP was reduced to 0.44 increase average per year. This is a result of a much higher impact on prices as a result of the adjustment in the exchange rate, an increase in CPI of 0.07 percent, as compared to the previous simulation.

In both simulations, the change in the tariff rates was progressive; households in the lowest income group (hh1) experience the highest increase in income as compared to the highest income group (hh5). The progressivity of the tariff rate change is emphasized in the results on income of households from labor income. Under the fixed exchange rate, hh1 gets an annual average increase in income of 0.14 percent, a lot higher than that of hh5 of only 0.01 percent.

The results under the adjusted exchange are more favorable to the poorest income group even if prices would have to increase a lot faster. This favorable impact can be explained using the results of the prices of unskilled labor, skilled labor, and the price of variable capital. In both cases, unskilled labor gets the highest increase in wages. Unskilled labor usually belongs to the poorest

¹³In principle, the adjustments should be done by treating the foreign exchange rate variable endogenously, so that if the tariff change results in a deficit in the current account, the exchange rate will automatically depreciate to bring back the current account into equilibrium. However, a number of policy experiments conducted using the APEX model by different analysts resulted in unrealistic results.

segment of the population. If one compares the increase in the price of capital and the price of labor, one observes that the price of variable capital increases a lot faster than the general price of labor. Since the model allows for the substitution between labor and variable capital, the increase in the price of capital relative to the price of labor results in a higher utilization of labor relative to capital. This factor price effects can explain the much higher increase in labor income for the poorest group relative to the richest group.

The pattern of effects is the same for the rest of the simulation results under the different tariff rate changes. However, it should be emphasized that if one considers the effects of all other taxes and subsidies, under implicit tariffs: LB method, one gets a much higher impact for both fixed exchange rate and flexible exchange rate. All these taxes and subsidies are also progressive.

One interesting result is shown in the case where the tariff change consists only of nominal tariff change and BOI subsidies. Based on the results (under Implicit Tariff: LD Method) BOI incentives generally do not bring about positive effects to the economy. It will only result in a higher deficit in the government balance.

3. Income Distribution Effects of Broadening of VAT. Using another CGE model of the Philippine economy, PhilCGE, (Habito, 1989), Cororaton (1994) simulated the income distribution effects of the proposed broadening the value-added tax scheme. The results in Table 22 show that the broadening of the value-added tax has favorable income distribution effects. Income would be redistributed from the rich segment of the population to those who belong to the lower income groups. The first three lowest income brackets would have a positive combined change in their income share (about +1.2 percentage change), while the last three highest income brackets would have a negative combined change in their income share (about -3.7 percentage change).

It should be noted that the broadening of the value-added tax here refers to the broadening of the VAT base to include the service and transport sectors, as distinguished from the controversial 10 percent VAT being proposed to replace the different kinds of sales taxes previously levied on some products. Moreover, the actual implementation of VAT involves a tax on output and credit on inputs. In the simulations, a simple 10 percent VAT is applied on the value added.

4. Household's Response in Nutrient Intake to Changes in Incomes and Prices. Using the same APEX model, Orbeta (1994) simulated the effects of a 1 percent tariff rate reduction and 1 percent foreign exchange rate devaluation on household intake of calorie and protein. Orbeta applied the linking equation and linking matrix discussed above using the parameters of Quisumbing (1995).

Table 23 shows the effects of a 1 percent across-the-board reduction in tariff rate. The effects of on both the calorie and the protein intake of all household groups are all positive. Furthermore, as income increases, the dependence on relatively more expensive sources of nutrients such as meat, poultry, eggs and milk products increase.

Preliminary results show that the percentage increase in producer prices is around 2 percent while the consumption expenditure ranged from 1.4 percent for the highest income class to 1.9 percent for the lowest income class.

Table 24 shows that the general price increase resulted in the reduction of consumption of most food items. Changes in food consumption generated a reduction of calorie and protein intake for all income groups except for the protein intake of the lowest income group. Thus, devaluation seems to have mixed effect. The highest reduction in calorie intake is shown to be experienced most by the second income quartile, followed by the fourth, then the first, and finally the third income quartile. The impact on the protein intake is similar except for the fourth income quartile where the effect is positive. This group is able to prevent a decline in protein intake by consuming more fish and seafoods relative to other income groups.

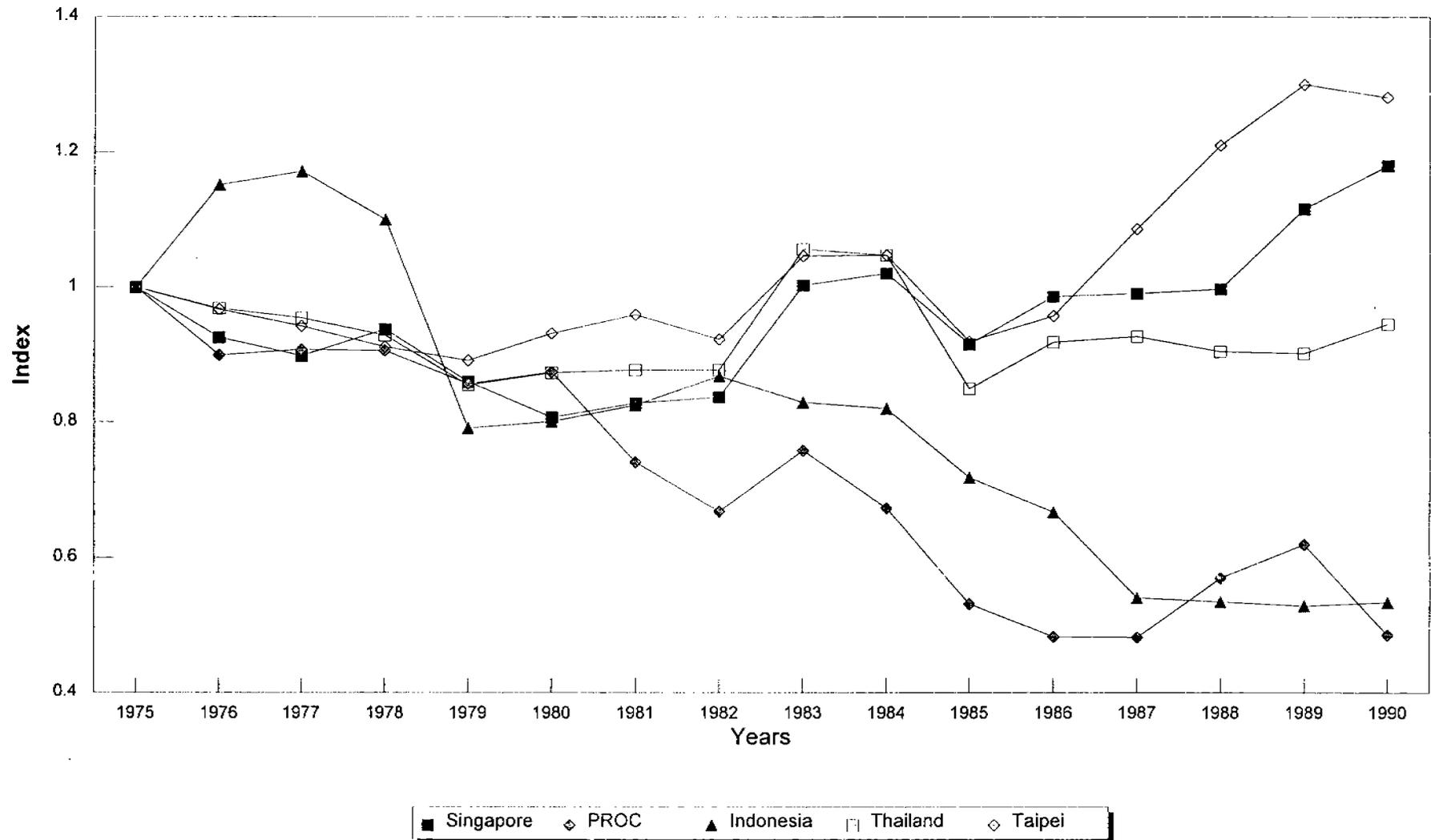
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List of Figures

**Figure 1: Price Competitiveness Index
Philippines vs. Selected Asian Countries**



Source: Intal, P. (1992)

Figure 2

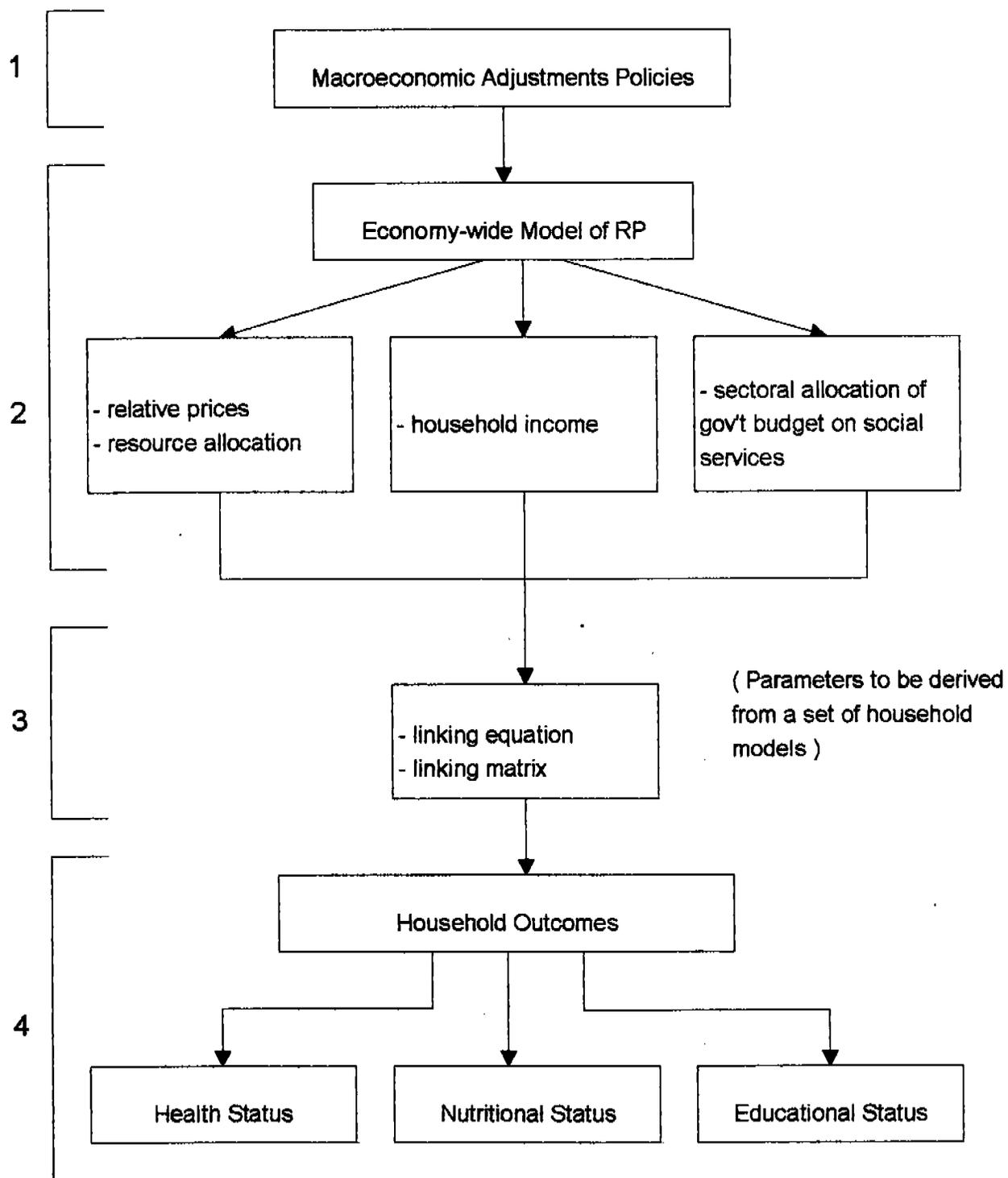


Figure 3
Linkages in the Macroeconomic Model

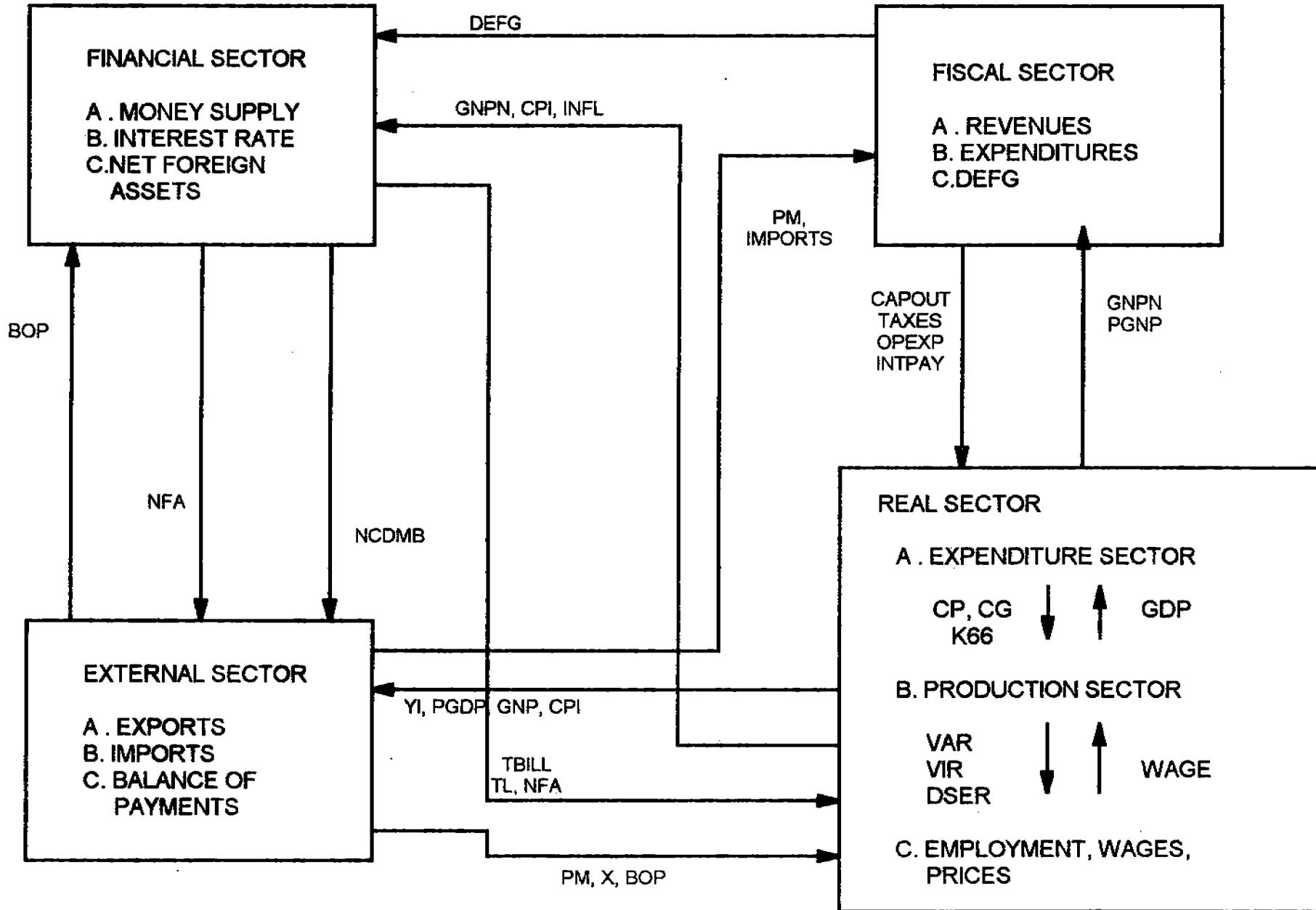


Figure 4
Structure of Composite Model

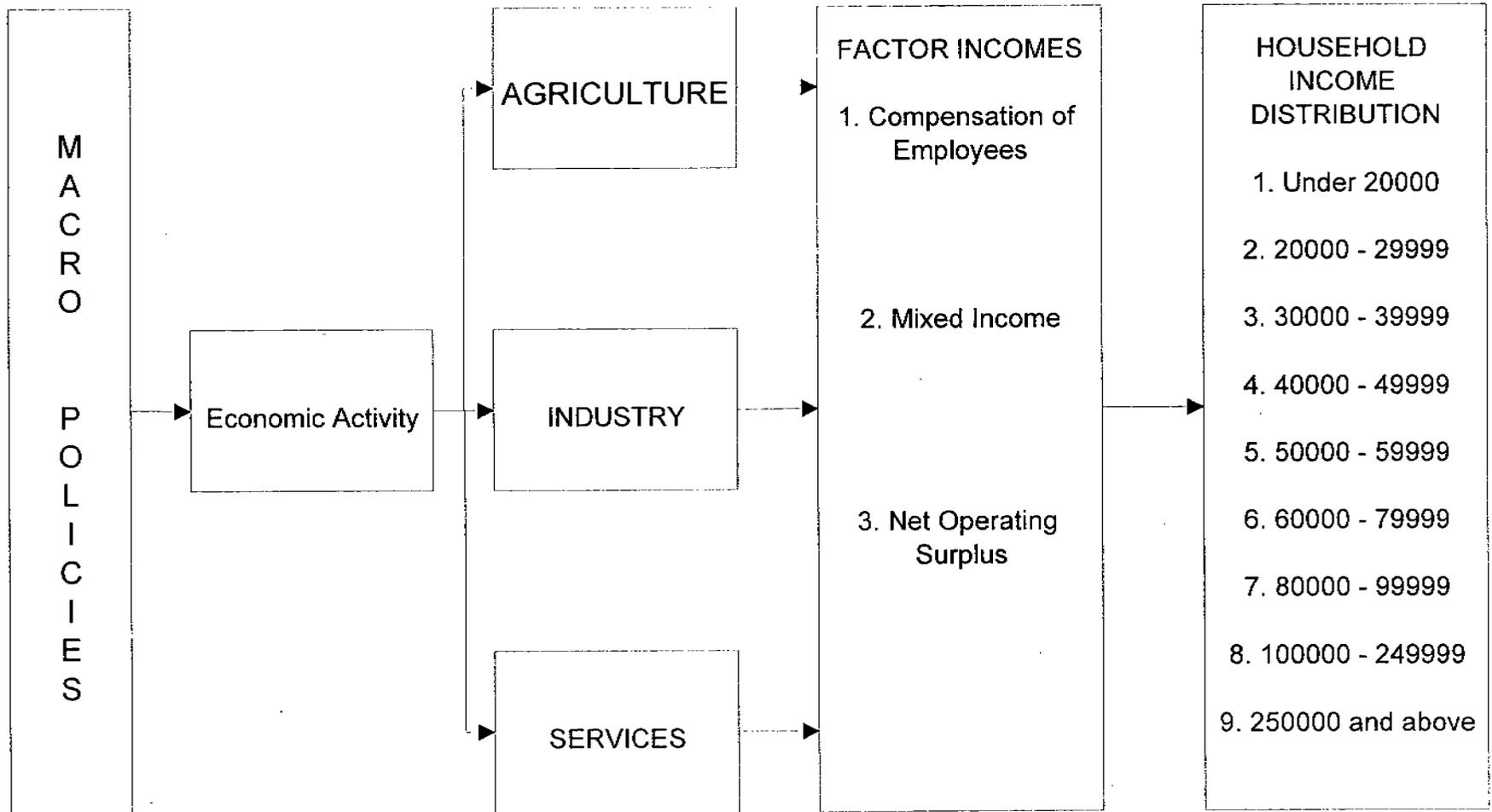


Table 1
Philippine Economy
1956-92

Indicators	Period		
	1956 - 70	1971 - 80	1981 - 92
Real Exports (gr in %)	3.5	10.3	4.2
Gross Domestic Product (gr in %)	4.7	5.9	1.5
Ratio of Budget Deficit w/ GDP (in %)	-0.1	-0.2	-2.7
Inflation Rate	4.3	14.8	14.1

Source: National Statistical Coordination Board,
National Statistics Office

Table 2
Philippine Economic Indicators
1956 - 92

Indicators	1980-83	1984-85	1986-89	1990-92	1993	1994
GNP growth rate	3.04	-7.89	5.54	1.79	2.62	5.08
GNP per capita real	0.46	-10.12	3.07	0.8	0.12	2.59
Inflation rate	12.2	35.2	5.9	13.9	7.6	9
Savings-Inv gap (% GNP)	-2.1	1.5	1.3	-3.5	-7.5	-6.14
Current Acct. gap (% GNP)	-9.62	-2.0	-0.65	-3.37	-5.87	-4.6
Deficit						
NG (% GNP)	-3.09	-1.99	-3.18	-2.22	-1.44	1.03
CPSD (% GNP)	-2.78	-4.05	-3.75	-3.0	-2.2	-2.2

Source: National Statistical Coordination Board, National Statistics Office

Table 3
Sectoral Employment Shares (%)

Sector	1960	1965	1970	1975	1980	1985	1990
Agriculture	61.2	56.7	53.7	53.5	51.4	49.0	45.2
Industry	12.6	11.3	12.6	12.1	11.6	10.7	10.7
Manufacturing	12.1	10.9	11.9	11.4	10.6	9.7	9.7
Services	26.2	31.5	32.1	34.1	36.5	40.2	44.0

Source: Philippine Statistical Yearbook

Table 4
Sectoral Output Shares (%)

Sector	1960	1965	1970	1975	1980	1985	1990
Agriculture	26.5	27.2	29.5	30.3	25.2	24.6	22.1
Industry	31.3	31.1	31.9	35.0	38.8	35.0	35.1
Manufacturing	24.5	23.6	24.9	25.7	25.7	25.1	25.4
Services	42.2	41.7	38.6	34.7	36.1	40.3	42.8

Source: National Statistical Coordination Board

Table 5
Trade and Outward Orientation (%)

Indicators	1980	1985	1992
Share of GNP :			
Exports	17.9	19.2	18.3
Imports	23.9	26.6	27.0
Share of Exports :			
Manufacturing	34.5	41.4	74.7
of which			
Electronics	11.6	14.6	27.7
Garments	8.7	10.8	21.6
Non-Manufacturing	65.5	59.6	25.3

Source : National Statistical Coordination Board

Table 6
Trade and Outward Orientation
(in million US \$)

Indicators	1980	1985	1992
Exports	5,788	5,722	9,824
Imports	7,727	7,946	14,520
Share of Exports			
Mfg	1,996	2,369	7,337
Electronics	671	838	2,724
Garments	502	618	2,125

Source : National Statistical Coordination Board

Table 7
Asean Export Growth
(% per annum)

Country	1965-80	1981-85	1986-91	1986	1987	1988	1989	1990	1991
Philippines	4.7	-4.0	13.9	4.6	18.1	23.7	10.6	4.7	8.1
Indonesia	9.6	-2.7	11.0	-22.3	19.5	13.4	17.8	16.7	9.8
Malaysia	4.4	3.9	18.1	-10.5	31.1	17.4	18.3	17.1	17.3
Thailand	8.5	2.2	31.4	24.7	31.7	36.1	25.7	15.0	23.8
Singapore				-0.9	28.7	38.3	13.8	17.2	12.1

Source : International Financial Statistics

Table 8
Asean Export
(in million US\$)

Country	1970	1975	1980	1985	1990
Philippines	1,064	2,263	5,788	4,629	8,186
Indonesia	1,173	6,888	21,795	18,527	26,807
Malaysia	1,640	3,784	12,868	15,133	28,956
Thailand	686	2,177	6,449	7,059	22,811
Singapore	1,447	5,110	18,200	21,533	50,684
TOTAL	6,010	20,222	65,100	66,881	137,444

Source : International Financial Statistics

Table 9
100+EPR for Key Sectors

Key Sectors	1985	1988
Exports : Agriculture	77.3	86.3
Manufacturing	79.1	85.8
Imports : Manufacturing	171.7	156.6
Ratio (Manufacturing)	2.2	1.8

Source : Medalla (1990)

Table 10
Effective Protection and Domestic Resource Cost
of Philippine Manufacturing Industries
1983 and 1988

PSIC	INDUSTRY	1983		1988	
		EPR	DRC/SER	EPR	DRC/SER
	TOTAL MANUFACTURING	42.8	1.7	28.3	1.5
	CONSUMER GOODS				
311	Food	32.9	1.6	22.3	1.1
312	Other food	11.0	1.3	21.3	1.0
313	Beverages	83.7	1.9	52.0	1.2
314	Tobacco	147.0	1.7	60.6	1.2
322	Apparel exc. footwear	3.1	0.9	3.9	1.0
324	Footwear exc. rubber	-6.5	0.9	-5.3	1.1
332	Furn. & fixt, exc. of metal	-2.6	0.9	1.9	0.9
386	Furn. & fixt. of metal	182.7	4.1	75.9	2.7
	INTERMEDIATE GOODS				
321	Textiles	92.8	4.9	30.6	3.5
323	Leather & leather prods.	-13.9	1.3	1.7	1.6
331	Wood and cork prods.	2.1	1.1	4.5	1.4
341	Paper & paper prods.	65.0	2.8	29.2	1.9
342	Printing & publishing	68.3	2.7	72.4	1.9
351	Industrial chemicals	53.2	2.2	8.5	3.1
352	Other chemical prods.	37.7	1.7	44.8	1.2
353	Petroleum refineries	56.6	1.5	59.6	1.8
354	Prods of coal and petrol	74.5	2.0	-5.5	0.6
355	Rubber products	129.3	2.1	18.9	0.9
356	Plastic prods., n.e.c.	119.7	2.6	20.9	1.2
361	Pottery and china	224.1	6.6	4.7	1.3
362	Glass and glass products	67.1	2.6	37.4	1.6
363	Cement	79.2	3.4	42.4	3.1
369	Other non-metallic mineral products	280.3	6.6	17.4	1.8
	CAPITAL GOODS				
371	Iron & steel	38.3	1.7	80.5	2.3
372	Non-ferrous metal basic prods.	-9.7	1.3	-11.3	1.7
381	Fabricated metal prods.	82.3	2.6	66.3	1.8
382	Machinery exc. electric	28.1	2.8	11.7	1.4
383	Electrical machinery	4.5	2.9	30.9	3.9
384	Transport equipment	50.6	2.4	48.8	1.4
385	Prof'l & scient. equipt.	-13.2	1.1	21.0	2.7
	OTHERS				
390	Other manufacturers	8.1	1.3	4.6	1.2

Source of Basic Data : Tecson, G. Catching Up Asia's Tiger, Vol. II. forthcoming.

Table 11
Real Exchange Rate Indices (1970=100)

Period	Philippines	Malaysia	Thailand	Indonesia	S. Korea
1970	100.0	100.0	100.0	100.0	100.0
1980-82	106.4	79.7	80.9	89.9	84.5
1989	72.3	52.9	56.4	35.7	73.8
1990	69.9	51.4	54.4	35.7	72.8

Source: International Financial Statistics

Table 12
Values of Coefficients in Equation for Households Net Receipts

COEFFICIENTS	g1	g2	g3	g4	g5	g6	g7	g8	g9	h1
Under 20,000	0.0232	0.0241	0.0435	0.0014	0.0000	0.0004	0.0000	0.0011	0.0000	0.0001
20,000 - 29,999	0.0546	0.0357	0.0829	0.0040	0.0000	0.0011	0.0000	0.0031	0.0000	0.0002
30,000 - 39,999	0.0693	0.0331	0.0871	0.0025	0.0000	0.0007	0.0000	0.0020	0.0000	0.0003
40,000 - 49,999	0.0736	0.0258	0.0695	0.0050	0.0000	0.0013	0.0000	0.0039	0.0000	0.0003
50,000 - 59,000	0.0794	0.0215	0.0558	0.0053	0.0000	0.0014	0.0000	0.0042	0.0000	0.0002
60,000 - 79,999	0.1280	0.0316	0.0784	0.0131	0.0000	0.0034	0.0000	0.0102	0.0000	0.0005
80,000 - 99,999	0.1038	0.0239	0.0594	0.0126	0.0000	0.0033	0.0000	0.0099	0.0000	0.0004
100,000 -249,999	0.3380	0.0800	0.1733	0.0792	0.0039	0.0202	0.0008	0.0601	0.0000	0.0020
250,000 and Above	0.1298	0.0500	0.1929	0.1458	0.0221	0.0335	0.0032	0.0997	0.0004	0.0011

COEFFICIENTS	h2	h3	h4	h5	c1	c2	d1	d2	d3	d4
Under 20,000	0.0009	0.0109	0.0036	0.0008	0.0000	0.0000	0.0000	0.0000	0.0134	0.0000
20,000 - 29,999	0.0019	0.0131	0.0063	0.0015	0.0017	0.0006	0.0000	0.0000	0.0097	0.0000
30,000 - 39,999	0.0023	0.0120	0.0072	0.0015	0.0014	0.0005	0.0000	0.0000	0.0111	0.0000
40,000 - 49,999	0.0024	0.0090	0.0069	0.0011	0.0024	0.0009	0.0000	0.0000	0.0232	0.0000
50,000 - 59,000	0.0020	0.0071	0.0059	0.0023	0.0047	0.0018	0.0000	0.0000	0.0309	0.0000
60,000 - 79,999	0.0045	0.0106	0.0118	0.0039	0.0033	0.0012	0.0000	0.0000	0.0439	0.0000
80,000 - 99,999	0.0036	0.0073	0.0093	0.0028	0.0077	0.0029	0.0000	0.0031	0.0760	0.0000
100,000 -249,999	0.0178	0.0195	0.0419	0.0090	0.0026	0.0010	0.0000	0.0033	0.0958	0.0000
250,000 and Above	0.0092	0.0051	0.0221	0.0015	0.0122	0.0046	0.0000	0.0083	0.1332	0.0004

Table 13
Public Investments, 1980 - 1991
(In Billion Pesos)

Year	National Government	Government Corporation*	LGUs	Total	Percentage of GNP
1980	8.4	11.1	0.5	20.0	8.2
1981	12.7	13.9	0.6	27.2	9.7
1982	9.3	13.3	0.7	23.3	7.4
1983	10.4	18.1	0.8	29.3	8.1
1984	9.8	12.9	0.9	23.6	4.6
1985	8.8	12.3	0.8	21.9	3.9
1986	11.7	5.9	0.6	18.2	3.1
1987	12.9	7.9	1.5	22.3	3.3
1988	15.2	9.0	1.4	25.6	3.2
1989	21.6	15.0	1.8	38.4	4.2
1990	29.1	26.8	2.6	58.5	5.5
1991	37.2	21.1	3.7	62.0	4.9

* 1990 figure based on GCMCC financial report as of 23 October 1991
and 1991 figure based on GCMCC financial report (October actual)
dated 25 November 1991

Source: Diokno (1992)

Table 14
Increase in Capital Expenditure

	Percent Change from Baseline		
	1991	1992	1993
GDP	0.82	0.95	0.95
Agriculture	0.10	0.13	0.11
Industry	1.86	2.13	2.15
Services	0.36	0.38	0.35
Consumer Price Index	-0.51	-0.62	-0.74
T-Bill Rate (Deviation from Baseline)	0.75	1	1.25

Table 15
Increase in Capital Expenditure

1991	INCOME		% Change
	Baseline	Adjusted	
HH1	38,798	38,889	0.23
HH2	73,507	73,700	0.26
HH3	79,290	79,519	0.29
HH4	69,428	69,651	0.32
HH5	63,516	63,740	0.35
HH6	96,505	96,854	0.36
HH7	72,830	73,098	0.37
HH8	235,846	236,704	0.36
HH9	160,077	160,491	0.26

1992	INCOME		% Change
	Baseline	Adjusted	
HH1	41,967	42,063	0.23
HH2	79,521	79,730	0.26
HH3	85,805	86,056	0.29
HH4	75,159	75,405	0.33
HH5	68,743	68,992	0.36
HH6	104,424	104,815	0.37
HH7	78,809	79,110	0.38
HH8	255,067	256,030	0.38
HH9	172,752	173,206	0.26

1993	INCOME		% Change
	Baseline	Adjusted	
HH1	46,452	46,508	0.12
HH2	88,027	88,163	0.15
HH3	95,021	95,194	0.18
HH4	83,267	83,450	0.22
HH5	76,143	76,337	0.25
HH6	115,641	115,950	0.27
HH7	87,279	87,519	0.27
HH8	282,296	283,071	0.27
HH9	190,606	190,919	0.16

Table 16
Peso-Dollar Exchange Rate,
1980 - 1993

Year	Exchange Rate
1980	7.51
1981	7.90
1982	8.54
1983	11.11
1984	16.70
1985	18.61
1986	20.39
1987	20.57
1988	21.10
1989	21.74
1990	24.31
1991	27.48
1992	25.51
1993	27.12

Table 17
Impact of Peso Depreciation

	Percent Change From Baseline	
	1992	1993
GDP	-0.66	-0.49
Agriculture	0.21	0.45
Industry	-2.00	-1.71
Services	-0.00	0.08
Consumer Price Index	4.95	2.99
BOP (million US \$)*	398	181

* deviation from baseline

Table 18
Changes in Nominal Household Income

1992	INCOME		% Change
	Baseline	Adjusted	
HH1	41,734	43,487	4.03
HH2	79,089	82,377	3.99
HH3	85,344	88,876	3.97
HH4	74,763	77,812	3.92
HH5	68,390	71,127	3.85
HH6	103,899	107,989	3.79
HH7	78,416	81,483	3.76
HH8	253,833	263,491	3.67
HH9	171,917	178,410	3.64

1993	INCOME		% Change
	Baseline	Adjusted	
HH1	45,720	46,865	2.44
HH2	86,645	88,791	2.42
HH3	93,528	95,833	2.40
HH4	81,969	83,959	2.37
HH5	74,967	76,755	2.33
HH6	113,878	116,550	2.29
HH7	85,954	87,958	2.28
HH8	278,120	284,426	2.22
HH9	187,884	192,083	2.19

Table 19
Share of Factor Income Per Sector
(In Percent)

Factor Income	Industry	1991	1992	1993	1994
COMPENSATION	Agriculture	0.1826	0.1820	0.1766	0.1779
	Mining and Quarrying	0.4152	0.4200	0.4200	0.4200
	Manufacturing	0.1832	0.1845	0.1887	0.1885
	Construction	0.5310	0.5310	0.5310	0.5310
	Electricity, Gas, and Water Services	0.2164	0.2128	0.2102	0.1873
		0.3040	0.3030	0.3055	0.3094
MIXED INCOME	Agriculture	0.5890	0.5858	0.5975	0.5950
	Mining and Quarrying	0.0661	0.0700	0.0700	0.0700
	Manufacturing	0.2810	0.2852	0.2859	0.2887
	Construction	0.1124	0.1092	0.1139	0.0997
	Electricity, Gas, and Water Services	0.0000	0.0000	0.0000	0.0000
		0.4047	0.4073	0.4062	0.4041
NET OPERATING SURPLUS	Agriculture	0.1753	0.1786	0.1737	0.1759
	Mining and Quarrying	0.3228	0.3100	0.3100	0.3100
	Manufacturing	0.4667	0.4629	0.4571	0.4540
	Construction	0.2577	0.2609	0.2562	0.2705
	Electricity, Gas, and Water Services	0.4681	0.4771	0.4484	0.4484
		0.2274	0.2265	0.2230	0.2100
DEPRECIATION	Agriculture	0.0531	0.0535	0.0521	0.0512
	Mining and Quarrying	0.1959	0.2000	0.2000	0.2000
	Manufacturing	0.0691	0.0674	0.0683	0.0688
	Construction	0.0989	0.0989	0.0989	0.0988
	Electricity, Gas, and Water Services	0.3155	0.3101	0.3415	0.3643
		0.0640	0.0632	0.0653	0.0764

Table 20
1988-1992 Weighted Nominal
Tariff Change, %

Sector	Tariff Change %
Agriculture	-15.3
Forestry	-11.11
Mining	-9.63
Manufacturing	-12.73

Table 21: APEX Simulations, Using 4 Different Sets of Tariffs

I. Macroeconomic Effects (Average Annual Percent Change,%)	Nominal Tariffs		Average Tariffs		Implicit Tariffs: LB Method		Implicit Tariffs: LD Method	
	Fixed FX	Adjusted FX	Fixed FX	Adjusted FX	Fixed FX	Adjusted FX	Fixed FX	Adjusted FX
Variables:								
real gdp	0.47	0.44	0.50	0.40	0.88	0.80	0.49	0.45
cpi	0.04	0.07	0.05	0.08	0.08	0.15	0.04	0.08
change in current account deficit	0.11	0.00	0.13	0.00	0.25	0.00	0.13	0.00
change in value of imports in foreign currency	0.13	0.14	0.13	0.14	0.16	0.26	0.07	0.14
change in value of exports in foreign currency	0.09	0.14	0.08	0.14	0.25	0.27	0.15	0.14
change in budget deficit	-0.01	-0.21	-0.02	-0.25	0.08	-0.35	0.04	-0.22
change in total government expenditure	-0.61	-0.75	-0.66	-0.82	-1.11	-1.41	-0.59	-0.78
change in government revenue	-0.60	-0.55	-0.64	-0.58	-1.19	-1.07	-0.62	-0.55
producer price of the capital good	-0.15	-0.11	-0.16	-0.12	-0.36	-0.29	-0.15	-0.11
prices of skilled and unskilled labor								
unskilled labor	0.19	0.25	0.20	0.27	0.35	0.48	0.19	0.26
skilled labor	-0.05	-0.09	-0.06	-0.10	-0.08	-0.17	-0.05	-0.10
price of variable capital	0.23	0.28	0.25	0.30	0.44	0.53	0.23	0.29
aggregate tariff revenue	-3.37	-3.33	-3.58	-3.53	-6.57	-6.48	-3.47	-3.41
income of HHs from the ownership of factors								
1 hh1	0.15	0.19	0.16	0.20	0.29	0.36	0.15	0.20
2 hh2	0.14	0.17	0.15	0.19	0.27	0.33	0.14	0.18
3 hh3	0.14	0.16	0.15	0.18	0.26	0.32	0.14	0.17
4 hh4	0.13	0.15	0.13	0.16	0.24	0.29	0.13	0.16
5 hh5	0.12	0.14	0.13	0.15	0.23	0.27	0.12	0.15
income of HHs from labor income								
1 hh1	0.14	0.18	0.15	0.19	0.26	0.35	0.14	0.19
2 hh2	0.12	0.15	0.13	0.17	0.23	0.30	0.12	0.16
3 hh3	0.11	0.13	0.12	0.15	0.21	0.26	0.11	0.14
4 hh4	0.09	0.11	0.10	0.12	0.18	0.22	0.10	0.12
5 hh5	0.01	-0.01	0.01	-0.01	0.02	-0.01	0.01	-0.01

Table 22
Income Distribution Effects of Broadening of VAT: Average
Effects of a 4-Period Simulation Using PhilCGE Model

Percentage Change in Income Share	
The first 3 lowest income brackets* (combined)	+1.18
The last 3 highest income brackets** (combined)	-3.68
<hr/>	
* income ranges between below P2,000 and P7,999 per year in 1978 prices.	
** income ranges between P30,000 and above per year in 1978 prices.	

Table 23
Impact of a 1 Percent Decline in Tariff Rates:
Preliminary Results

Income Quantile	Calorie Intake (% change)	Protein Intake (% change)
1	0.1722	0.1579
2	0.1586	0.1717
3	0.1233	0.1223
4	0.1180	0.1414

Table 24
Impact of a 1 Percent Devaluation:
Preliminary Results

Income Quantile	Calorie Intake (% change)	Protein Intake (% change)
1	-0.8056	0.0990
2	-1.2653	-1.0054
3	-0.1480	-0.0334
4	-0.6847	-0.5971