

Cororaton, Caesar B.

Working Paper

Simulating the Income Distribution Effects of the 1988-1992 Tariff Reduction Using the APEX Model

PIDS Discussion Paper Series, No. 1996-01

Provided in Cooperation with:

Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Cororaton, Caesar B. (1996) : Simulating the Income Distribution Effects of the 1988-1992 Tariff Reduction Using the APEX Model, PIDS Discussion Paper Series, No. 1996-01, Philippine Institute for Development Studies (PIDS), Makati City

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Caesar B. Cororaton

DISCUSSION PAPER SERIES NO. 96-01

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January 1996

For comments, suggestions or further inquiries please contact:

The Research Information Staff, Philippine Institute for Development Studies
3rd Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: 8924059 and 8935705; Fax No: 8939589; E-mail: publications@pidsnet.pids.gov.ph
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**Simulating the Income Distribution Effects
of the 1988-1992 Tariff Reduction
Using The APEX Model**

Caesar B. Cororaton¹

A number of tariff reform programs, mostly unilateral programs, have been implemented in the Philippines. In the early 1980s, for example, the government implemented the 1981-1985 Tariff Reform Program (TRP) to liberalize the external sector of the economy. However, the implementation of the program was stalled as a result of the severe foreign exchange crisis which erupted in the second half of 1983. But when the Aquino government took over the administration in 1986, the tariff reform program was continued under three Executive Orders (EO) and a Republic Act (Tariff Bill). The ultimate aim of these tariff reform programs was to move towards a uniform tariff range and the eventual removal of all quantitative restrictions on imports. It is generally believed that this change will result in both efficiency and welfare gains.

In 1991, the government embarked on another five-year (1991-1995) tariff reduction program under the EO 470. Under this program, by 1995, the Philippines will have a much simplified tariff structure. The structure will consist of a nine-band tariff rates, with most of the "tariffed" items concentrated at 3, 10, 20, and 50 percent tariff rates.

These series of tariff reform programs effectively liberalized a number of regulated items. In the period 1986-1993, the number of regulated items was reduced from 1,924 to only 183. The number of regulated items can be further reduced with the acceleration of the tariff reduction programs in textiles, garments, and the industry's chemical inputs. Added to all this is the new tariff program which the government is presently studying that will further reduce and simplify the tariff structure to an across-the-board uniform tariff of 5 percent by the year 2004.

The recent study on the "Refinements in EPR Estimation Methodology"² introduced a number of changes to the existing methodology of calculating industry implicit tariff rates and effective rate of protection (EPR). One of the major refinements introduced is the inclusion of other trade protective measures such as duty exemptions, BOI incentives, duty drawbacks, VAT exemptions, and discriminatory excise tax in the computation of both the sectoral and industrial implicit tariff rates and EPRs.

¹Research assistance was provided by Consolacion Chua

²"Improving Trade Policy Reform and Implementation" (In particular, the paper on "Refinements in EPR Estimation Methodology, Draft Final Report"). AYC Consultants, Inc. A study completed through the assistance of the United States Agency for International Development (A.I.D), Contract No. 492-0457-C-00-3054-00.

The purpose of this paper is to simulate the economic effects (in particular, the income distribution effects) of the 1988-1992 changes in: (1) nominal tariff rates; and (2) implicit tariff rates computed in the study mentioned above. The economic effects are simulated using the APEX model, which is a computable general equilibrium (CGE) model of the Philippine economy.

Changes in Sectoral Nominal Tariff Rates

Table 1 presents the weighted nominal tariff rate change in broad industries in the period 1988-1992. Agriculture experienced the biggest drop in nominal tariff rate of -15.30 percent over the period.³ It is followed by the manufacturing sector, with a period reduction of -12.73 percent. Forestry is the next with a reduction in tariff of -11.11 percent, while the last is the mining sector, a reduction of -9.63 percent over the period.

In the simulation exercise, four types of tariff rate structures were analyzed (see Table 2):

(1) **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.

There is a general decline in the overall nominal tariffs in the period 1992-1988. The average change in nominal tariffs is -10.90 percent. There are 122 sectors with negative tariff change, 31 with no change, and 16 with positive change. The maximum tariff change is 150 percent, while the minimum is -78.38 percent.

(2) **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.

(3) **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 excise tax.

A general decline in the overall implicit tariffs in the period 1992-1988 even if all adjustments are incorporated in the computation. The average change in the implicit tariffs is -16.67

³One should note that these are just nominal tariff changes over the period. They do not reflect the real change in the sectoral and industrial protection level. The measure that would reflect more appropriately the change in the protection level is the effective rate of protection (EPR). In principle, EPR takes into account output tariff as well as input tariff. In others words, it takes into consideration net sectoral tariff.

percent. There are 93 sectors with negative tariff change, 38 with no change, 27 with positive change. There are 11 sectors with no values. The maximum tariff change is 150 percent, while the minimum is -100.00 percent.

(4) 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 in (2).

The APEX Model

APEX stands for agricultural policy experiments.⁴ The model is a computable general equilibrium (CGE) model of the Philippine economy. There are a number of CGE models constructed of the Philippine economy, but the APEX model is the most recent and the biggest in terms of the number of production sectors included. Although the original intention of the builders of the APEX model was to do policy experiments for the agricultural sector, at its present sectoral breakdown which is 50 sectors (see Table 3 for the sectoral names), it can accommodate policy experiments for the other two major sectors of the economy, the industrial and the service sectors.

The following equation shows how the APEX incorporates the variable tariff into the model. It shows how tariff variable gets inputted into the model. Note that all variables in the equation are expressed in percentage changes.

$$ppcom(i) = pimp(i) + exrt + Trx(i)*mtrate(i)$$

where:

- ppcom*: domestic price of each imported commodity
- pimp*: import price of commodity in foreign currency
- exrt*: foreign exchange rate
- Trx*: power of taxes on imported commodities
- mtrate*: tariff rate on commodity
- (i)*: sector index; $i = 1, \dots, 50$

The variable *Trx* is defined as

$$Trx = Mtax / (1 + Mtax)$$

⁴For a detailed description of the model see Clarete and Warr (1991) "The Theoretical Structure of the APEX Model of the Philippine Economy". Unpublished.

where M_{tax} is the tariff rate on imported goods in the 1989 Social Accounting Matrix (SAM) which was used to calibrate the APEX model. Thus, the variable is fixed in all simulation runs. In the $ppcom$ equation, therefore, the variable Trx is considered as parameter.

It is clear from the $ppcom$ equation that since everything is expressed in percentage changes, except for the parameters, the difference between the percentage change in the domestic price of each imported commodity (in local currency) and the percentage change in the import price of the commodity (in foreign prices), is due to the percentage changes in both the foreign exchange rate, $exrt$, and the tariff rate on the commodity, $mtrate$. In the simulations, the exchange rate is assumed fixed. Therefore, the difference can be attributed only to $mtrate$. In this manner, $mtrate$ can be considered as the percentage change in the implicit tariff, or the proportional difference between domestic price and border price of the commodity.

The direct effect of an increase in tariff rate on one sector will be an increase in the domestic price of its output, all things equal. However, there are also indirect effects as a result of the interaction among the sectors of the economy, but they are not captured completely in the above equation alone. However, the total effects can be captured if all equations in the model are considered simultaneously. The results of the simulations conducted in the paper using the APEX model, however, represent the total effects of a tariff change.

Simulation Results

The four sets of tariff rates discussed above were based on the 1988 I-O classification with 169 sectors excluding construction, utilities, and services. The APEX model has only 50 production sectors. Thus, to make the rates consistent with the model, they were re-grouped according to the APEX model classification by computing the weighted sectoral tariff averages. The weights used were the value of imports in the 1988 I-O table. The percentage changes in the different sets of tariff rates within the period 1992-1998 according to the sectoral classification of the APEX model are shown in Table 4. These percentage changes are the ones inputted into the model as the sectoral value of the variable $mtrate$. The model was then simulated using these different sets of tariff rate changes to determine the impact on the economy in terms of GDP growth and other macro effects, income distribution effects, and sectoral outputs and imports effects.

Furthermore, 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 5⁵.

⁵The table reports only the results on macroeconomic variables and income distributions. Although results are also available, they were not reported here because the focus of the discussion in the paper is the income distribution effects of tariff changes.

Under each of the four sets of tariff changes, two simulations were conducted. One for the case of a fixed foreign exchange rate, 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.⁶

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 to correct for the current account deficit effects, 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 is more favorable to the poorest income group even if prices would have to increase a bit 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 segment of the population. Furthermore, 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 some 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 impact 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 however, is shown under the case where the tariff change encompass

⁶In 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.

the 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.

ANNEX I:

General Description of the APEX Model⁷

The APEX model is a computable general equilibrium (CGE) model of the Philippine economy. APEX stands for agricultural policy experiments. The model is the most recent CGE model constructed and the biggest in terms of number of production sectors included. Although the original intention of the builders of the APEX model was to do policy experiments for agriculture, at its present sectoral breakdown which is 50 sectors it can accommodate policy experiments for the other two major sectors of the economy, the industrial and the service sectors.

The sectoral breakdown of the model is shown in Table 1. The entire agricultural sector is represented by 16 sectors in the model. It starts with rice (sections 1 and 2) and ends up in forestry (sector 16). The entire industrial sector has 28 sectoral breakdown in the model, 24 of which are manufacturing sectors, both food processing and non-food manufacturing. The other 4 sectors are mining and utilities sectors. The service sector is represented by 6 sectors in the model.

The APEX model is essentially a neoclassical, Walrasian, general equilibrium model wherein the market clearing variables are prices. The model has well-defined production (or supply) and consumption (or demand) sectors. These two major sectors are balanced through changes in prices.

The APEX model belongs to the Johansen (1960) class of applied general equilibrium models⁸. The distinguishing characteristic of a Johansen-type model is that it is written as a system of linear equations in percentage changes of the variables.⁹ To see this, assume a 2-sector model whose production is written as

$$(3) \quad Y = f(X_1, X_2),$$

where Y is output and X_1 and X_2 are inputs. In a Johansen-type model (3) is rewritten in linear percentage change form as

⁷The discussion in this section is generally based on Clarete and Warr (1992), "The Theoretical Structure of the APEX Model of the Philippine Economy". For a lengthy and detailed discussion of the structure of the model, see the reference cited.

⁸Johansen (1960), "A Multi-Sectoral Study of Economic Growth" Amsterdam: North-Holland. Another famous Johansen-type CGE model is the Orani model of the Australian economy which is twice as big as the APEX model.

⁹For a detailed treatment of a 2-sector model see Dixon, et. al. (1982), "Orani: A Multi-Sectoral Model of the Australian Economy". Amsterdam: North-Holland

$$(4) \quad y - e_1x_1 - e_2x_2 = 0,$$

where e_i is the elasticity of output with respect to inputs of factor i , and y , x_1 and x_2 are the percentage changes in Y , X_1 , and X_2 .

In matrix notation, this type of model can be represented by

$$(5) \quad Az = 0,$$

where A is an $(m \times n)$ matrix of coefficients and z is an $(n \times 1)$ vector of percentage changes in the model's variables. Since the A matrix is assumed fixed, (5) provides only a local representation of the equations suggested by economic theory, i.e., this equation is valid only for "small" changes in X_1 and X_2 .

Through appropriate closure, z may be partitioned into a vector of endogenous variables (y^*) and a vector of exogenous variables (x^*).¹⁰ Once the choice of exogenous variables has been made, (5) can be rewritten as

$$(6) \quad A_1y^* + A_2x^* = 0.$$

Provided A_1 is invertible, one can proceed from (6) to the solution

$$(7) \quad y^* = -A_1^{-1}A_2x^*.$$

This equation expresses the percentage change in each endogenous variable as a linear function of the percentage changes in the exogenous variables.

The exogenous variables can be chosen in many different ways. In fact, much of the flexibility of the APEX model in policy applications arises from the user's ability to swap variables between the exogenous and endogenous categories.

To date, the APEX model is the most disaggregated applied general equilibrium or computable general equilibrium model of the Philippine economy. In the production side, the model has 50 producer goods and services sectors. In the demand side, the model has 7 categories of consumer goods and 5 household types.

The model is divided into agricultural and non-agricultural sectors. There are 3 primary factors which are mobile among the various non-agricultural industries. These are variable capital, skilled and unskilled labor. Variable capital includes non-agricultural land and structures which are not necessarily devoted to any particular line of production activity, e.g. buildings and related fixed

¹⁰To solve this model $(n-m)$ variable must be declared exogenous.

structures. Thus, when relative prices change, owners of such land and capital assets can rent these assets out to producers who face more favorable terms of trade. Unskilled labor is also freely mobile between non-agricultural and agricultural parts of the economy. However, skilled labor (defined to include high school graduates) and variable capital are not used in agriculture. Thus, skilled labor and variable capital are mobile only among the non-agricultural industries of the model.

There are 5 households classified as quintiles in the personal income distribution. Each household is assumed to have its own respective endowments in the primary factors in the model, i.e., each household derives its income from the sale of factor services and non-factor income. The sources of household income include: labor income, returns to variable and fixed capital, and rental income from letting out farm lands in primary agricultural production. The household's non-factor income consists of lump sum net income transfers from the government.

There are 7 consumer goods and services which are directly consumed by the various households in the model. The consumed amounts of each of these consumer commodities and services are used as arguments in the underlying utility functions of the various households of the model. Unlike producer goods, consumer goods production requires only intermediate goods as inputs, and not primary factors.

Household savings determine the total savings available for investment. The model assumes that only physical capital assets are obtainable using such savings. Financial assets such as bonds, equity, and bank deposits are not incorporated into the model. With this level of savings, additional units of physical capital are produced during the current period. This capital is then allocated to each sector-specific capital goods and the variable capital using the relative user cost of such capital inputs.

An implicit financial assets market is assumed to exist whereby every household buys claims to every one of the fixed and variable capital stock. Such claims entitle the household to a portion of the newly produced capital during the current period. On the supply side of such a market are the respective supplies of fixed capital for each of the 50 sector and the variable capital. Their respective entitlement are then used to update the household's endowment in capital inputs, both fixed and variable.

Various industries of the model are classified as either export-oriented or import-competing. The criterion used for classifying these industries is the proportion of an industry's imports to its exports. If the ratio exceeds 1.5 then the industry is regarded as producing an importable. The observed exports of this industry is regarded as exogenous in the model. However, if this ratio is less than 0.5, then the industry is export-oriented. For ratios between 0.5 and 1.5, other relevant information was used in classifying the industry.

The APEX model assumes the country to be price taker in imported goods. As in other CGE models, the APEX model imposes imperfect substitutability between imports and locally produced products through the use of the Armington trade elasticities.

Export demand in the model have large but finite elasticities. The country can be regarded as price taker in a particular commodity in the world markets if the price elasticity of the world demand for the product is very large.

In the present model closure, the foreign exchange rate is assumed fixed.¹¹ This therefore assumes that equilibrium in the external sector is reached through foreign capital flows. On the domestic side, equilibrium is reached through adjustments in the domestic absorption until savings and government balances equate to zero. The model does this by introducing a lump sum tax which assumes a positive (negative) value whenever the government incurs a deficit (surplus). This tax is captured in the model by introducing a personal income tax rate shifter. The shifter scales this rate up or down depending upon whether the government is in deficit or surplus.

One important feature of the APEX model is that it uses empirically estimated behavioral parameters in its structure. Thus, essentially almost all of the elasticities in the production, consumption, and trade sectors were estimated econometrically using Philippine data.¹²

The benchmark period of the model is 1989. The major sources of data used to calibrate the model are: (i) 1985 input-output table. This is used to specify the production side of the economy. The 1985 IO table was updated to 1989 using the 1989 National Income Accounts of the Philippines; (ii) National Income Accounts for 1989; (3) 1991 Philippine Statistical Yearbook; (4) 1988 Family Income and Expenditure Survey; (5) 1989 Foreign Trade Statistics of the Philippines.

¹¹At its present structure, the APEX model cannot handle quite adequately a flexible foreign exchange rate. Our runs with flexible foreign exchange rate generated implausible results.

¹²For a detailed discussion on the data set used to calibrate the model see the paper of Clarete and Cruz, 1992, "The General Equilibrium Data Set of the Philippine Agricultural Policy Experiments (APEX) Model"

**Table 1. 1988-1992 Weighted Nominal Tariff Change
(In Percent)**

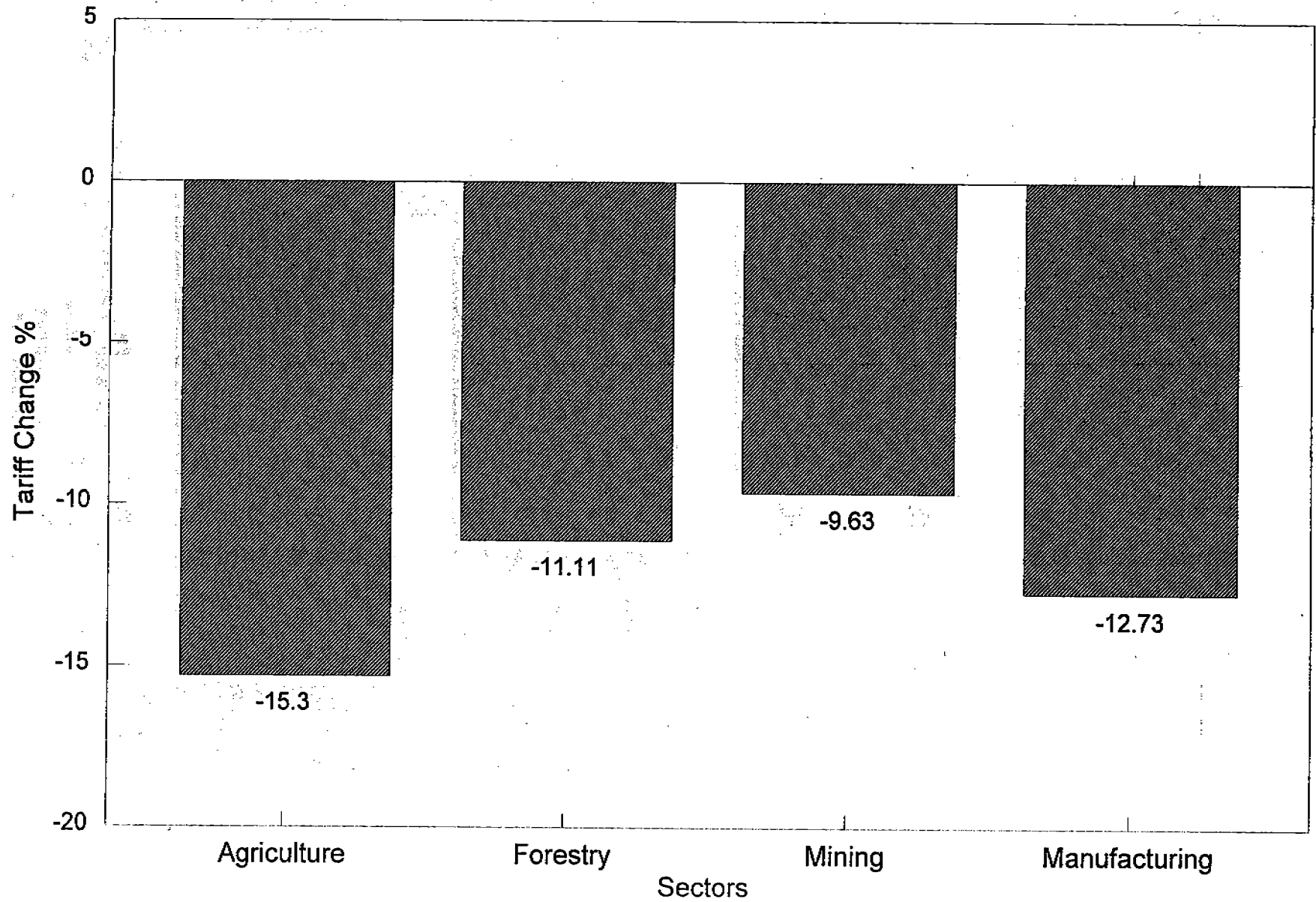


Table 2: Different Sets of Tariffs, 1988 I-O Classification

I-O Sectors	Nominal Tariffs			Average Tariffs			Implicit Tariffs: LB method			Implicit Tariffs: LD method		
	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988
1	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.49	-2.00	0.50	0.50	0.00
2	0.20	0.25	25.00	0.20	0.20	0.00	0.20	0.20	0.00	0.20	0.20	0.00
3	0.37	0.35	-5.41	0.23	0.24	4.35	0.23	0.21	-8.70	0.23	0.24	4.35
4	0.48	0.44	-8.33									
5	0.50	0.50	0.00	0.50	0.50	0.00	0.00	0.00		0.00	0.01	
6	0.50	0.50	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.50	0.50	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.50	0.47	-6.00	0.50	0.49	-2.00	0.48	0.47	-2.08	0.48	0.47	-2.08
9	0.49	0.46	-6.12	0.50	0.49	-2.00	0.49	0.49	0.00	0.49	0.49	0.00
10	0.42	0.44	4.76	0.27	0.50	85.19	0.00	0.00	0.00	0.00	0.00	0.00
11	0.42	0.43	2.38									
12	0.41	0.50	21.95									
13	0.20	0.12	-40.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.22	0.11	-50.00	0.10	0.10	0.00	0.10	0.10	0.00	0.10	0.10	0.00
15	0.50	0.45	-10.00	0.50	0.45	-10.00	0.31	0.28	-9.68	0.31	0.28	-9.68
16	0.33	0.31	-6.06	0.30	0.30	0.00	0.29	0.25	-13.79	0.31	0.30	-3.23
17	0.25	0.23	-8.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.28	0.25	-10.71	0.14	0.16	14.29	0.13	0.14	7.89	0.13	0.16	23.08
19	0.10	0.25	150.00									
20	0.14	0.22	57.14	0.12	0.11	-8.33	0.11	0.10	-9.09	0.12	0.11	-8.33
21	0.40	0.22	-45.00									
22	0.50	0.45	-10.00									
23	0.43	0.34	-20.93	0.37	0.27	-27.03	0.01	0.01	0.00	0.41	0.29	-29.27
24	0.10	0.10	0.00									
25	0.35	0.34	-2.86	0.22	0.22	0.00	0.19	0.19	0.00	0.19	0.19	0.00
26	0.44	0.37	-15.91	0.43	0.41	-4.65	0.09	0.05	-44.44	0.16	0.17	6.25
27	0.18	0.16	-11.11	0.18	0.12	-33.33	0.17	0.12	-29.41	0.18	0.12	-33.33
28	0.37	0.08	-78.38	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.10	0.05	-50.00	0.10	0.05	-50.00	0.02	0.00	0.00	0.30	0.18	-40.00
30	0.10	0.05	-50.00	0.10	0.10	0.00	0.00	0.17		0.13	0.20	53.85
31	0.10	0.10	0.00	0.10	0.10	0.00	0.02	0.02	0.00	0.02	0.04	100.00
32	0.10	0.10	0.00	0.10	0.10	0.00	0.09	0.00	-100.00	0.09	0.12	33.33
33	0.14	0.11	-21.43	0.20	0.12	-40.00	0.00	0.00	0.00	0.20	0.12	0.00
34	0.18	0.16	-11.11	0.10	0.10	0.00	0.10	0.10	0.00	0.10	0.10	0.00
35	0.17	0.14	-17.65	0.18	0.18	0.00	0.15	0.15	0.00	0.17	0.17	0.00
36	0.17	0.17	0.00	0.17	0.17	0.00	0.15	0.17	13.33	0.17	0.17	0.00
37	0.13	0.07	-46.15	0.08	0.01	-87.50	0.11	0.00	-100.00	0.19	0.01	-94.74
38	0.28	0.28	0.00	0.41	0.38	-7.32	0.41	0.38	-7.32	0.41	0.38	-7.32
39	0.50	0.50	0.00	0.50	0.45	-10.00	0.48	0.44	-8.33	0.50	0.46	-8.00
40	0.17	0.18	5.88	0.16	0.16	0.00	0.16	0.15	-6.25	0.16	0.16	0.00
41	0.33	0.31	-6.06	0.36	0.32	-11.11	0.36	0.31	-13.89	0.36	0.31	-13.89
42	0.50	0.42	-16.00									
43	0.42	0.37	-11.90	0.48	0.47	-2.08	0.40	0.46	15.00	0.46	0.46	0.00
44	0.46	0.43	-6.52	0.45	0.41	-8.89	0.25	0.23	-8.00	0.25	0.24	-4.00
45	0.44	0.40	-9.09	0.42	0.41	-2.38	0.21	0.20	-4.76	0.21	0.20	-4.76

Table 2: Different Sets of Tariffs, 1988 I-O Classification

I-O Sectors	Nominal Tariffs			Average Tariffs			Implicit Tariffs: LB method			Implicit Tariffs: LD method		
	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988
46	0.47	0.43	-8.51	0.49	0.44	-10.20	0.15	0.13	-13.33	0.16	0.14	-12.50
47	0.37	0.50	35.14	0.24	0.50	108.33	0.04	0.07	75.00	0.04	0.07	75.00
48	0.34	0.39	14.71	0.13	0.14	7.69	0.13	0.13	0.00	0.13	0.14	7.69
49	0.31	0.30	-3.23	0.32	0.30	-6.25	0.24	0.22	-8.33	0.25	0.22	-12.00
50	0.32	0.32	0.00	0.40	0.40	0.00	0.39	0.40	2.56	0.40	0.40	0.00
51	0.29	0.29	0.00	0.29	0.29	0.00	0.26	0.21	-19.23	0.26	0.27	3.85
52	0.45	0.45	0.00	0.42	0.45	7.14	0.36	0.42	16.67	0.41	0.43	4.88
53	0.49	0.45	-8.16	0.50	0.45	-10.00	0.47	0.43	-8.51	0.48	0.44	-8.33
54	0.42	0.34	-19.05	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00
55	0.49	0.46	-6.12	0.50	0.48	-4.00	0.42	0.42	0.00	0.43	0.52	20.93
56	0.43	0.47	9.30	0.49	0.50	2.04	0.00	0.00	0.00	0.00	0.00	0.00
57	0.50	0.45	-10.00									
58	0.50	0.46	-8.00	0.50	0.49	-2.00	0.49	0.48	-2.04	0.49	0.48	-2.04
59	0.24	0.20	-16.67	0.24	0.23	-4.17	0.24	0.23	-4.17	0.25	0.23	-8.00
60	0.29	0.29	0.00	0.25	0.25	0.00	0.25	0.23	-8.00	0.26	0.25	-3.85
61	0.28	0.27	-3.57	0.31	0.29	-6.45	0.31	0.28	-9.68	0.31	0.28	-9.68
62	0.40	0.34	-15.00	0.42	0.37	-11.90	0.39	0.31	-20.51	0.41	0.36	-12.20
63	0.50	0.49	-2.00	0.50	0.50	0.00	0.48	0.48	0.00	0.48	0.48	0.00
64	0.40	0.49	22.50	0.49	0.49	0.00	0.47	0.47	0.00	0.47	0.47	0.00
65	0.50	0.45	-10.00	0.50	0.45	-10.00	0.50	0.45	-10.00	0.50	0.45	-10.00
66	0.50	0.50	0.00	0.50	0.50	0.00	0.49	0.49	0.00	0.49	0.49	0.00
67	0.43	0.50	16.28	0.50	0.50	0.00	0.25	0.26	4.00	0.28	0.27	-3.57
68	0.43	0.49	13.95	0.45	0.50	11.11	0.40	0.45	12.50	0.40	0.45	12.50
69	0.37	0.35	-5.41	0.33	0.31	-6.06	0.25	0.27	8.00	0.36	0.33	-8.33
70	0.45	0.41	-8.89	0.44	0.39	-11.36	0.34	0.32	-5.88	0.35	0.32	-8.57
71	0.50	0.50	0.00	0.50	0.50	0.00	0.04	0.05	25.00	0.05	0.05	0.00
72	0.48	0.46	-4.17	0.48	0.48	0.00	0.29	0.34	17.24	0.37	0.35	-5.41
73	0.49	0.50	2.04	0.50	0.45	-10.00	0.43	0.46	6.98	0.47	0.46	-2.13
74	0.48	0.40	-16.67	0.50	0.40	-20.00	0.35	0.20	-42.86	0.40	0.33	-17.50
75	0.45	0.34	-24.44	0.49	0.38	-22.45	0.02	0.05	150.00	0.07	0.06	-14.29
76	0.35	0.35	0.00	0.38	0.38	0.00	0.38	0.38	0.00	0.38	0.38	0.00
77	0.35	0.31	-11.43	0.14	0.14	0.00	0.14	0.14	0.00	0.14	0.14	0.00
78	0.50	0.50	0.00	0.41	0.50	21.95	0.28	0.34	21.43	0.28	0.34	21.43
79	0.50	0.50	0.00	0.50	0.50	0.00	0.25	0.28	12.00	0.26	0.28	7.69
80	0.50	0.50	0.00	0.50	0.48	-4.00	0.05	0.05	0.00	0.05	0.05	0.00
81	0.48	0.47	-2.08	0.50	0.49	-2.00	0.13	0.12	-7.69	0.13	0.12	-7.69
82	0.24	0.24	0.00	0.28	0.27	-3.57	0.27	0.27	0.00	0.34	0.27	-20.59
83	0.48	0.47	-2.08	0.50	0.49	-2.00	0.36	0.39	8.33	0.42	0.40	-4.76
84	0.46	0.46	0.00	0.47	0.48	2.13	0.20	0.20	0.00	0.20	0.21	5.00
85	0.39	0.22	-43.59	0.40	0.24	-40.00	0.26	0.19	-26.92	0.32	0.20	-37.50
86	0.41	0.34	-17.07	0.46	0.32	-30.43	0.21	0.17	-19.05	0.25	0.18	-28.00
87	0.31	0.44	41.94	0.30	0.45	50.00	0.00	0.01	0.00	0.31	0.51	0.00
88	0.32	0.22	-31.25	0.24	0.22	-8.33	0.20	0.19	-5.00	0.21	0.19	-9.52
89	0.47	0.28	-40.43	0.49	0.30	-38.78	0.06	0.08	33.33	0.15	0.09	-40.00
90	0.49	0.30	-38.78	0.50	0.30	-40.00	0.00	0.00	0.00	0.05	0.03	0.00

Table 2: Different Sets of Tariffs, 1988 I-O Classification

I-O Sectors	Nominal Tariffs			Average Tariffs			Implicit Tariffs: LB method			Implicit Tariffs: LD method		
	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988
91	0.48	0.39	-18.75	0.50	0.30	-40.00	0.00	0.00	0.00	0.02	0.01	0.00
92	0.41	0.26	-36.59	0.37	0.23	-37.84	0.13	0.10	-23.08	0.15	0.13	-13.33
93	0.47	0.42	-10.64	0.50	0.45	-10.00	0.18	0.30	66.67	0.35	0.31	-11.43
94	0.50	0.45	-10.00	0.50	0.45	-10.00	0.01	0.00	-100.00	0.19	0.17	-10.53
95	0.47	0.41	-12.77	0.39	0.41	5.13	0.01	0.01	0.00	0.40	0.41	2.50
96	0.34	0.28	-17.65	0.32	0.27	-15.62	0.30	0.27	-10.00	0.33	0.30	-9.09
97	0.39	0.30	-23.08	0.40	0.30	-25.00	0.40	0.25	-37.50	0.42	0.33	-21.43
98	0.35	0.31	-11.43	0.36	0.32	-11.11	0.28	0.25	-10.71	0.29	0.26	-10.34
99	0.10	0.10	0.00	0.10	0.10	0.00	0.05	0.10	100.00	0.10	0.10	0.00
100	0.17	0.16	-5.88	0.10	0.10	0.00	0.09	0.00	-100.00	0.10	0.10	0.00
101	0.40	0.38	-5.00	0.47	0.42	-10.64	0.36	0.37	2.78	0.43	0.39	-9.30
102	0.13	0.11	-15.38	0.15	0.12	-20.00	0.13	0.11	-15.38	0.13	0.11	-15.38
103	0.06	0.04	-33.33	0.06	0.05	-16.67	0.02	0.00	-100.00	0.04	0.04	0.00
104	0.27	0.20	-25.93	0.24	0.14	-41.67	0.22	0.16	-27.27	0.27	0.30	11.11
105	0.22	0.13	-40.91	0.21	0.11	-47.62	0.21	0.11	-47.62	0.21	0.11	-47.62
106	0.36	0.27	-25.00	0.38	0.29	-23.68	0.37	0.28	-24.32	0.38	0.29	-23.68
107	0.15	0.13	-13.33	0.11	0.11	0.00	0.11	0.11	0.00	0.12	0.11	-8.33
108	0.37	0.34	-8.11	0.49	0.39	-20.41	0.44	0.36	-18.18	0.45	0.36	-20.00
109	0.48	0.42	-12.50	0.45	0.40	-11.11	0.42	0.37	-11.90	0.42	0.38	-9.52
110	0.26	0.20	-23.08	0.26	0.19	-26.92	0.20	0.20	0.00	0.24	0.21	-12.50
111	0.19	0.19	0.00	0.19	0.10	-47.37	0.16	0.10	-37.50	0.17	0.10	-41.18
112	0.19	0.11	-42.11	0.18	0.10	-44.44	0.10	0.05	-50.00	0.14	0.06	-57.14
113	0.30	0.30	0.00	0.30	0.30	0.00	0.24	0.24	0.00	0.24	0.24	0.00
114	0.46	0.44	-4.35	0.46	0.44	-4.35	0.24	0.23	-4.17	0.25	0.25	0.00
115	0.36	0.31	-13.89	0.34	0.30	-11.76	0.31	0.28	-9.68	0.40	0.32	-20.00
116	0.38	0.32	-15.79	0.38	0.32	-15.79	0.29	0.25	-13.79	0.30	0.26	-13.33
117	0.44	0.46	4.55	0.47	0.45	-4.26	0.20	0.19	-5.00	0.30	0.31	3.33
118	0.48	0.43	-10.42	0.50	0.45	-10.00	0.40	0.39	-2.50	0.44	0.40	-9.09
119	0.38	0.33	-13.16	0.40	0.35	-12.50	0.37	0.34	-8.11	0.39	0.36	-7.69
120	0.30	0.25	-16.67	0.31	0.25	-19.35	0.30	0.21	-30.00	0.31	0.25	-19.35
121	0.30	0.10	-66.67	0.18	0.18	0.00	0.32	0.01	-96.88	0.40	0.12	-70.00
122	0.34	0.33	-2.94	0.40	0.40	0.00	0.16	0.09	-43.75	0.17	0.18	5.88
123	0.40	0.40	0.00	0.40	0.40	0.00	0.00	0.00	0.00	0.41	0.40	0.00
124	0.29	0.29	0.00	0.28	0.29	3.57	0.22	0.23	4.55	0.26	0.26	0.00
125	0.20	0.20	0.00	0.15	0.14	-6.67	0.13	0.10	-23.08	0.13	0.13	0.00
126	0.27	0.26	-3.70	0.16	0.16	0.00	0.07	0.01	-85.71	0.31	0.15	-51.61
127	0.24	0.20	-16.67	0.36	0.11	-69.44	0.13	0.04	-69.23	0.13	0.04	-69.23
128	0.26	0.20	-23.08	0.16	0.09	-43.75	0.15	0.09	-40.00	0.15	0.10	-33.33
129	0.32	0.30	-6.25	0.31	0.29	-6.45	0.24	0.08	-66.67	0.30	0.29	-3.33
130	0.31	0.29	-6.45	0.28	0.27	-3.57	0.27	0.00	-100.00	0.32	0.25	-21.88
131	0.35	0.33	-5.71	0.32	0.31	-3.13	0.26	0.12	-53.85	0.29	0.29	0.00
132	0.35	0.34	-2.86	0.29	0.29	0.00	0.21	0.16	-23.81	0.30	0.30	0.00
133	0.35	0.34	-2.86	0.31	0.31	0.00	0.25	0.30	20.00	0.31	0.31	0.00
134	0.27	0.27	0.00	0.26	0.26	0.00	0.26	0.17	-34.62	0.34	0.26	-23.53
135	0.43	0.34	-20.93	0.41	0.32	-21.95	0.23	0.19	-17.39	0.29	0.24	-17.24

Table 2: Different Sets of Tariffs, 1988 I-O Classification

I-O Sectors	Nominal Tariffs			Average Tariffs			Implicit Tariffs: LB method			Implicit Tariffs: LD method		
	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988	Tariff Rates 1988	Tariff Rates 1992	Change 1992-1988
136	0.31	0.30	-3.23	0.29	0.27	-6.90	0.28	0.32	14.29	0.29	0.52	79.31
137	0.23	0.17	-26.09	0.23	0.17	-26.09	0.19	0.03	-84.21	0.22	0.16	-27.27
138	0.22	0.11	-50.00	0.24	0.11	-54.17	0.23	0.00	-100.00	0.23	0.10	-56.52
139	0.20	0.12	-40.00	0.18	0.11	-38.89	0.18	0.22	22.22	0.20	0.32	60.00
140	0.23	0.14	-39.13	0.16	0.10	-37.50	0.16	0.26	62.50	0.19	0.68	257.89
141	0.24	0.18	-25.00	0.21	0.16	-23.81	0.21	0.11	-47.62	0.21	0.16	-23.81
142	0.26	0.19	-26.92	0.23	0.13	-43.48	0.19	0.01	-94.74	0.19	0.12	-36.84
143	0.23	0.15	-34.78	0.26	0.18	-30.77	0.25	0.01	-96.00	0.26	0.44	69.23
144	0.43	0.38	-11.63	0.49	0.44	-10.20	0.27	0.00	-100.00	0.42	0.38	-9.52
145	0.23	0.17	-26.09	0.21	0.14	-33.33	0.13	0.08	-38.46	0.13	0.09	-30.77
146	0.31	0.19	-38.71	0.26	0.16	-38.46	0.19	0.11	-42.11	0.22	0.19	-13.64
147	0.45	0.37	-17.78	0.45	0.38	-15.56	0.34	0.22	-35.29	0.42	0.37	-11.90
148	0.37	0.31	-16.22	0.36	0.30	-16.67	0.18	0.19	5.56	0.31	0.25	-19.35
149	0.28	0.21	-25.00	0.28	0.22	-21.43	0.14	0.00	-100.00	0.15	0.13	-13.33
150	0.34	0.26	-23.53	0.27	0.19	-29.63	0.25	0.01	-96.00	0.27	0.19	-29.63
151	0.35	0.27	-22.86	0.34	0.26	-23.53	0.28	0.23	-17.86	0.44	0.27	-38.64
152	0.17	0.12	-29.41	0.12	0.10	-16.67	0.10	0.03	-70.00	0.12	0.10	-16.67
153	0.39	0.38	-2.56	0.35	0.33	-5.71	0.26	0.17	-34.62	0.30	0.28	-6.67
154	0.35	0.32	-8.57	0.29	0.27	-6.90	0.29	0.12	-58.62	0.29	0.27	-6.90
155	0.22	0.18	-18.18	0.25	0.24	-4.00	0.28	0.20	-28.57	0.41	0.23	-43.90
156	0.35	0.30	-14.29	0.38	0.38	0.00	0.37	0.37	0.00	0.37	0.37	0.00
157	0.24	0.18	-25.00	0.11	0.10	-9.09	0.11	0.03	-72.73	0.11	0.10	-9.09
158	0.15	0.12	-20.00	0.14	0.13	-7.14	0.13	0.00	-100.00	0.14	0.13	-7.14
159	0.19	0.14	-26.32	0.15	0.11	-26.67	0.17	0.11	-35.29	0.17	0.12	-29.41
160	0.28	0.25	-10.71	0.27	0.26	-3.70	0.25	0.24	-4.00	0.27	0.26	-3.70
161	0.48	0.43	-10.42	0.49	0.44	-10.20	0.34	0.13	-61.76	0.43	0.40	-6.98
162	0.45	0.27	-40.00	0.31	0.12	-61.29	0.11	0.06	-45.45	0.13	0.06	-53.85
163	0.21	0.19	-9.52	0.26	0.22	-15.38	0.19	0.17	-10.53	0.20	0.17	-15.00
164	0.31	0.31	0.00	0.27	0.27	0.00	0.22	0.22	0.00	0.23	0.24	4.35
165	0.22	0.22	0.00	0.33	0.28	-15.15	0.33	0.27	-18.18	0.34	0.28	-17.65
166	0.29	0.18	-37.93	0.39	0.27	-30.77	0.39	0.29	-25.64	0.39	0.30	-23.08
167	0.50	0.45	-10.00	0.50	0.45	-10.00	0.22	0.19	-13.64	0.23	0.22	-4.35
168	0.32	0.30	-6.25	0.43	0.30	-30.23	0.25	0.26	4.00	0.30	0.28	-6.67
169	0.42	0.37	-11.90	0.43	0.38	-11.63	0.15	0.13	-13.33	0.17	0.15	-11.76

Table 3: Production Sectors in the APEX Model

Sector No.	Sector Name	Sector No.	Sector Name
1	Irrigated Palay	26	Other Foods
2	Non-irrigated Palay	27	Beverages & Tobacco
3	Corn	28	Textile & Knitting Mills
4	Coconut, incl. Copra	29	Other Made-up Textile Goods
5	Sugarcane	30	Garments, Footwear, Leather & Rbr. Ftwr.
6	Banana & Othr fruits & nuts	31	Wood Products
7	Vegetable	32	Paper Products
8	Rootcrops	33	Fertilizer
9	Othr Commrci crops	34	Other Rubber, Plastic & Chem. Products excpt rub. ftwr.
10	Hogs	35	Products of Coal & Petroleum
11	Chicken & Poultry Prods.	36	Non-ferrous Basic Metal Products
12	Other Livestock	37	Cement, Basic Metals & Non-metallic Mineral Prods.
13	Agricultural Services	38	Semi-conductors
14	Marine Fishing	39	Metal Products & Non-electric Machineries
15	Inland Fishing	40	Electrical Machinery, Equipment & Parts
16	Forestry & Logging	41	Transport Equipment
17	Crude Oil, Coal & Natural Gas	42	Miscellaneous Manufacturing
18	Other Mining	43	Construction
19	Rice & Corn Milling	44	Electricity, Gas & Water
20	Sugar Milling & Refining	45	Transport & Communication Services
21	Milk & Dairy	46	Trade, Storage & Warehousing
22	Oils & Fats	47	Banks & Non-banks
23	Meat & Meat Products	48	Life & Non-life Insurance & Real Estate
24	Flour Milling	49	Government Services
25	Animal Feeds	50	Other Services

**Table 4: 1992 - 1988 Percentage Change of Different Sets of Tariffs,
APEX Classification**

APEX Sectors	Nominal Tariffs	Average Tariffs	Implicit Tariffs: LB Method	Implicit Tariffs: LD Method
1	0.00	0.00	0.00	0.00
2	25.00	0.00	2.00	0.00
3	25.00	0.00	0.00	0.00
4	4.76	85.19	0.00	0.00
5	2.38	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	-5.41	4.35	-8.70	4.35
8	-8.33	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00
10	-39.09	-0.12	-0.12	-0.12
11	150.00	0.00	0.00	0.00
12	-25.08	-27.03	0.00	-29.27
13	57.14	-8.33	0.00	0.00
14	-2.86	0.00	0.00	0.00
15	-15.91	-4.65	-44.44	6.25
16	-11.11	-33.33	-29.41	-33.33
17	-11.11	0.00	0.00	0.00
18	-6.02	-5.07	-95.28	31.76
19	0.00	0.00	2.56	0.00
20	-19.05	0.00	0.00	0.00
21	-13.70	-9.51	-2.52	-2.34
22	33.17	100.74	69.40	69.63
23	0.00	-10.00	-8.33	-8.00
24	0.00	0.00	-19.23	3.85
25	-16.67	-4.17	-4.17	-8.00
26	-8.99	-4.08	-6.01	-3.95
27	18.29	1.55	1.84	1.83
28	-8.08	-10.13	-2.66	-8.52
29	-22.35	-21.29	132.74	-13.58
30	-0.77	-3.09	0.59	-16.90
31	15.30	17.81	-6.61	-11.52
32	-11.10	-9.04	-66.84	-7.48
33	-33.33	-16.67	-100.00	0.00
34	-15.42	-15.03	-7.44	-12.11
35	-32.54	-45.11	-47.16	-53.51
36	-13.28	-28.54	-65.46	-47.64
37	-8.77	-8.25	-4.59	-7.32
38	-38.71	-38.46	-42.11	-13.64
39	-22.69	-27.17	-61.05	-24.33
40	-19.32	-17.37	-55.24	-13.48
41	-14.30	-6.76	-47.79	-16.75
42	-11.91	-11.63	-13.33	-11.77
43	0.00	0.00	0.00	0.00
44	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00

Table 5: APEX Simulations, Using Four 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

Note: hh1 is the bottom fifth of the population.
hh5 is the highest fifth of the population.