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EQUITY AND EFFICIENCY TRADEOFFS IN PHILIPPINE TAX REFORMS

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Introduction

The series of tax reforms undertaken by the Philippine government starting in the early 1970s came partly in response to studies that indicated an overall regressivity of the country's tax system. This had been the conclusion reached by Edita Tan in her 1975 incidence analysis of both taxes and government expenditures in the Philippines, and by the Joint Executive-Legislative Tax Commission in 1964, and again in 1974, by which time it was known as the National Tax Research Center. This observed regressivity stems mainly from the traditional heavy reliance on indirect taxation (e.g., sales and excise taxes) which has accounted for about 70 percent of government tax revenues.

The problem with indirect taxes is that their efficiency and equity effects tend to be in conflict. It is well-known to economists that welfare distortions are minimized when taxes fall heaviest on goods with low price elasticities of demand. But such goods also tend to have low *income* elasticities of demand; thus, sales taxes imposed on these goods would tend to be regressive. This also implies that sales taxes that are designed to be progressive (by taxing goods with high income elasticities more heavily) are likely to result in significant welfare losses to the economy. Thus, developing countries heavily reliant on indirect taxes are often faced with the difficult task of balancing equity and efficiency objectives, more so than in higher income countries where direct income taxation tends to be more predominant. The "ideal" tax system would be

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one that balances these two effects in a way that is consistent with society's relative valuation of the two goals. But while the literature on optimal taxation has yielded theoretical approaches to the problem, they have had limited practical applicability to implementors of tax policy.[1]

For the policymaker, the task of choosing an appropriate tax system is made simpler if the nature of the equity-efficiency tradeoff resulting from alternative tax structures is made explicit. The feasibility of computable general equilibrium (CGE) modelling now permits an explicit and complete definition of these tradeoffs. With the detailed information that is generated by a multisectoral CGE simulation model, it becomes possible to describe with a fair amount of detail the outcome of alternative tax policies (or other types of economic policy, for that matter), including their revenue, efficiency and equity effects.

The approach employed in this paper is to derive a frontier curve which defines the equity-efficiency tradeoff in the range of feasible tax structures for the Philippines. In effect, the objective is to be able to present tax policymakers with a menu of alternative tax structures which would yield the best combinations of efficiency and equity achievable for a given target level of government revenue. The choice, then, is made through the policymakers, and depends on the relative valuations of the efficiency and equity objectives (i.e., the implicit social welfare function as perceived by the policymaker). The analytical framework also permits an evaluation of the prevailing tax structure and changes thereon vis-a-vis the equity-efficiency frontier, giving an indication of the direction tax reforms should take to improve both equity and efficiency effects of the Philippine tax system.

The next section starts with a brief exposition of the methodology employed in the analysis. The "equity-efficiency frontier" curves are then derived, and subsequently used in evaluating major tax reforms undertaken in 1977 and 1981.

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1. The literature on optimal taxation is rich in theoretical analyses (see Sandmo 1976 for a survey). The closest to an operationally useful approach incorporating both efficiency and equity considerations are those offered by Feldstein (1972) and Deaton (1977). However, both approaches require a prior specification of the social welfare function, including values of its parameters, e.g., the social marginal utility of income.

Methodological Issues

The analysis requires the derivation of a tradeoff locus of equity and efficiency impacts of alternative tax policies, or what is essentially a "production possibility frontier" of equity and efficiency that can be yielded by all feasible tax structures, given fixed government revenues (Figure 1a). In practice, this frontier would be derived as a linear-segmented curve connecting a discrete number of tax structures, illustrated by points A to G in Figure 1b, where each point would be associated with a specific tax structure. The points of this curve are derived by simulating alternative tax structures using a CGE model of the Philippine economy developed for the purpose. The model aggregates the economy into 18 production sectors, 11 household groups and three primary factors (Table 1). As it is the model's application that is stressed in this paper, refer then to Habito (1984) or (1986) for a more complete documentation of the model. The CGE approach represents a significant improvement over past analyses on tax policies, which involved numerous assumptions on tax shifting because of their partial equilibrium framework. In contrast, these CGE simulations explicitly account for the interaction of the different sectors of the economy in response to tax policy changes.

Three procedural issues had to be resolved prior to the equity-efficiency analysis undertaken here. First, appropriate indicators of the efficiency and equity effects of alternative tax policies had to be defined. Efficiency is measured here by changes in the economy's total welfare, which is quantified by the equivalent variation (EV) resulting from a tax change.[2] The equivalent variation is the change in income necessary to bring the consumer to the post-tax reform level of utility if no reform had taken place. To measure income distribution effects, the familiar Gini coefficient derived from the Lorenz curve, is used where a coefficient of zero denotes a perfectly equitable income distribution, and a higher coefficient (up to unity, or 100 percent, if defined as an index) denotes greater inequality of income distribution. The Gini index is computed over *real* disposable incomes to incorporate cost-of-living effects of tax changes.

2. While output (i.e., GDP) might be a logical measure of efficiency, it can be shown to be an inadequate indicator of efficiency effects, because higher aggregate output need not imply higher aggregate welfare. Thus, we measure efficiency impacts using equivalent variation. See Habito (1984) for a fuller discussion of these issues.

TABLE 1
GOODS, HOUSEHOLDS, AND PRIMARY INPUTS IN THE CGE MODEL

PRODUCED GOODS

1. Agriculture and Fisheries
2. Forestry and Logging
3. Mining
4. Processed Food and Tobacco
5. Textiles and Apparel
6. Wood and Rubber Products
7. Paper and Printing/Publishing
8. Chemical Products
9. Petroleum Refining
10. Cement and Nonmetallic Mineral Products
11. Metals, Machinery and Misc. Manufactures
12. Transport Equipment
13. Electricity, Gas and Water
14. Construction and Real Estate
15. Trade
16. Banking, Finance and Insurance
17. Transportation, Storage and Communication
18. Services

HOUSEHOLDS (BY INCOME)

1. Under ₱ 1,000
2. ₱ 1,000 - ₱ 1,999
3. ₱ 2,000 - ₱ 2,999
4. ₱3,000 - ₱3,999
5. ₱ 4,000 - ₱ 4,999
6. ₱ 5,000 - ₱ 5,999
7. ₱ 6,000 - ₱ 7,999
8. ₱8,000 - ₱ 9,999
9. ₱ 10,000 - ₱ 14,999
10. ₱ 15,000 - ₱ 19,999
11. Over ₱ 20,000

PRIMARY FACTORS

1. Rural Labor
2. Urban Labor
3. Capital

Figure 1 a. The Equity-Efficiency Frontier"

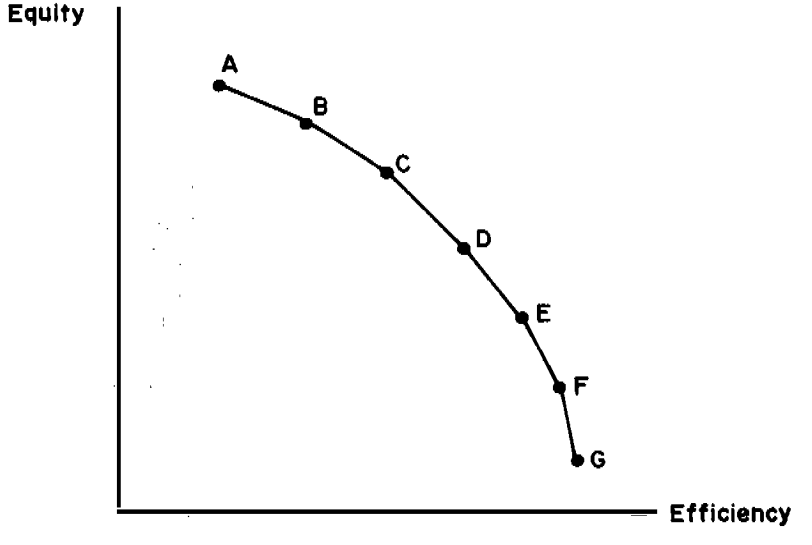

Figure 1b. Linear Segmented Equity-Efficiency Frontier

The second issue is the need to define the exact nature of the range of tax structures that would yield the expected tradeoff. The approach is to define a series of tax structures that range from progressive (i.e., distribution-improving) to regressive (i.e., distribution-worsening). For direct taxation, a divergence in equity impacts is easily achieved; one only needs to vary the tax rates imposed on the various household groups such that rates are higher on higher income groups to achieve progressivity, and the reverse to achieve regressivity. It is less straightforward to determine the structure of a regressive *indirect* tax package or a progressive one. For this, it is necessary to rank the 18 goods in the model on the basis of income elasticities to determine which goods need to be taxed more heavily to yield a regressive or progressive system of indirect taxes. A progressive tax scheme would tax those goods with higher income elasticities more heavily. Table 2 shows how the 18 goods rank on this basis; thus, a tax on transport equipment is progressive, but a tax on processed food and tobacco would be regressive.

TABLE 2
RANKING OF GOODS BY INCOME ELASTICITIES

Rank	Sector No.	Sector Name
1	12	Trans Eqpt.
2	7	Paper
3	11	Met/Mach.
4	17	Trans/Com
5	16	Finance
6	10	Cement
7	3	Mining
8	18	Services
9	14	Constr
10	2	Forestry
11	6	Wood/Rubbr
12	8	Chemicals
13	9	Petrol
14	5	Textile
15	15	Trade
16	13	Elec/Gas/Wtr
17	1	Agr/Fish
18	4	Food

The third issue is the need to keep real government revenues constant across all tax simulations to assure comparability of all alternative tax structures simulated. This is accomplished by introducing another equilibriating variable into the CGE model, i.e., a scaling factor (TXF) that adjusts tax rates uniformly up or down until the desired level of (constant) real government income is achieved.[3]

Equity-Efficiency Tradeoff Curves

The CGE model used for this analysis used 1974 as the benchmark equilibrium year, and was run for three forward equilibria covering the years 1976, 1978 and 1980. Thus, model simulations may be interpreted as medium-term analyses of effects of tax policy changes. Simulations were undertaken such that tax changes were made to take effect in 1976, and the effects described below were determined for 1980, i.e., four years after the policy change.

Three sets of experiments have been run to derive the tradeoff curve. The first modifies sales taxes to achieve varying levels of progressivity, while keeping other tax rates at their 1974 levels. The second set of experiments examines tax structures where there are no indirect taxes, with higher household income taxes compensating for the eliminated sales tax revenues. The third set simulates a tax structure where income taxes are quadrupled over their 1974 values, with a corresponding decrease in sales tax rates to maintain the base case real revenue levels.

Sales Tax Experiments

Table 3 gives alternative sales tax rate patterns of varying progressivity/regressivity used to derive the equity-efficiency locus for sales taxes. Table 4 and Figure 2 show the efficiency and equity effects of these sales tax structures. The alternative tax packages presented here tend to define a "frontier" for each type of tax formulation.[4]

3. This technique is discussed in greater detail in Shoven and Whalley (1977).

4. Many other tax structures that were tried yielded efficiency-equity combinations lying within the frontier, and are therefore not of interest; hence, they are not presented here.

TABLE 3
SALES TAX EXPERIMENTS

Sector	Base	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8
					Sales Tax Rates (%)				
1	2.42	12.00	12.00	8.07	5.90	1.75	0.00	0.59	0.20
2	6.77	0.00	0.00	4.51	5.90	8.32	6.00	5.86	4.70
3	6.29	0.00	0.00	3.56	5.90	10.07	12.00	11.13	10.00
4	5.73	18.0	15.00	8.54	5.90	0.88	0.00	0.29	0.10
5	2.69	0.00	0.00	6.64	5.90	4.38	2.00	2.34	1.20
6	3.50	0.00	0.00	5.22	5.90	7.01	5.00	4.69	3.30
7	4.51	0.00	0.00	0.95	5.90	14.89	25.00	23.44	32.80
8	3.59	0.00	0.00	5.69	5.90	6.13	4.00	3.52	2.10
9	21.84	0.00	2.00	6.64	5.90	4.38	2.00	2.34	1.20
10	3.14	0.00	0.00	2.85	5.90	11.39	18.00	17.58	17.60
11	3.00	0.00	0.00	1.90	5.90	13.14	21.00	20.51	24.60
12	5.78	0.00	0.00	0.47	5.90	15.77	25.00	25.00	37.50
13	9.43	0.00	10.00	7.59	5.90	2.63	1.00	1.17	0.50
14	7.23	0.00	0.00	4.51	5.90	8.32	6.00	5.86	4.70
15	6.05	0.00	8.00	6.64	5.90	4.38	2.00	2.34	1.20
16	8.42	0.00	0.00	1.90	5.90	13.14	21.00	20.51	22.60
17	9.16	0.00	0.00	1.90	5.90	13.14	21.00	20.51	26.70
18	3.64	0.00	0.00	3.56	5.90	10.07	12.00	11.13	10.00

TABLE 4
SALES TAX EXPERIMENTS: RESULTS FOR 1980

Experiment Code	Gini Index	Total EV	GDP
SB1	58.5	845.3	178423
SB2	57.8	902.3	176823
SB3	56.8	1100.0	174468
SB4	56.3	1084.9	173031
SB5	55.3	774.7	169801
SB6	54.9	534.2	167858
SB7	54.7	401.2	166766
SB8	54.7	120.1	166375

The set of feasible sales tax structures simulated ranges from an extremely regressive scheme, where the only goods taxed are food and agricultural products, to a very progressive scheme, where tax rates on goods figuring heavily in higher income groups' budgets go as high as 37 percent. The resulting Gini indexes for 1980, four years after the tax change, range from 54.7 to 58.5, whereas the index would have been 55.9 without any tax change (i.e., the base case). The improvement in efficiency, as measured by total equivalent variation, ranges from ₱120 million to ₱1,153 million, representing 0.07 to 0.67 percent of the base case 1980 GDP, respectively.

The locus of efficiency-equity combinations defined by the sales tax experiments exhibits a bowed-out shape, indicating that more and more equity can be obtained only at a higher efficiency cost, and vice versa. Indeed, Figure 2 indicates that there is a maximum efficiency that can be reached through sales taxation given a revenue constraint, beyond which any attempt to attain more efficiency by sacrificing more equity (i.e., beyond SB3, towards SB2 and SB1) becomes counterproductive, leading only to less efficiency in the tax system as well.

From Figure 2, it is evident that the base case tax structure was suboptimal; the base case lies completely within the efficiency-equity frontier. It is clear that tax reform was indeed desirable; it can be said that on both equity and efficiency grounds, the 1974 sales tax structure was taxing the wrong goods at the wrong relative rates.

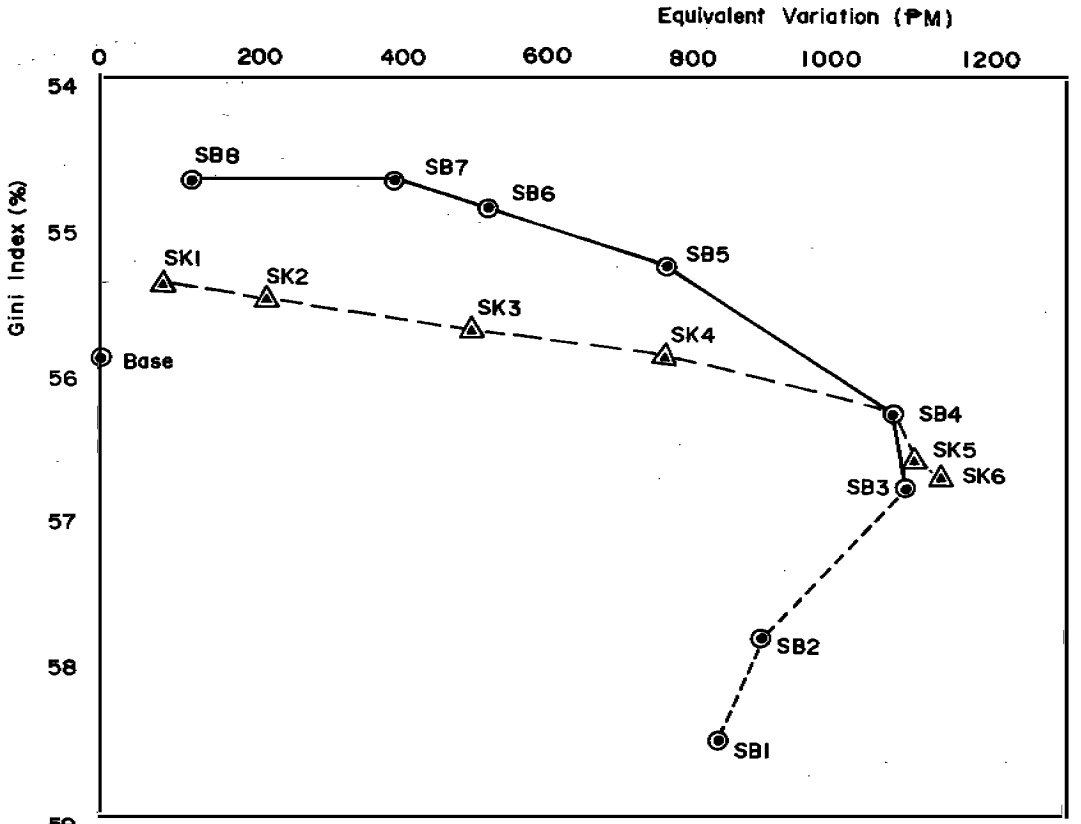

FIGURE 2
SALES TAX EXPERIMENTS (1980)

Income Tax Experiments

Table 5 gives seven household income tax schedules that yield the same real government revenues as in the base case if indirect taxes are completely eliminated. Experiments IT1 to IT4 represent progressive schedules, IT5 gives a flat income tax, and IT6 and IT7 represent regressive schedules. The summary measures of equity and efficiency impacts of these tax schemes are shown on Table 6, and Figure 3 illustrates these equity-efficiency combinations. One immediately striking result from Figure 3 is the apparent absence of a tradeoff, i.e. the progressivity of the income tax can be changed over a wide range with little effect on total welfare. However, this result is partly explained by the specification of the CGE model used for the simulations, wherein labor supply has been modelled exogenously. Thus, labor supply has in effect been specified to be perfectly inelastic and hence invariant with the rate of income tax. The income tax therefore becomes nondistortive as far as factor supplies are concerned.

The nature of the efficiency-equity locus obtained in Figure 3 has an important implication; it indicates that attempts to improve the distributional impact of the tax system by increasing the role of progressive income tax (i.e., as against indirect taxation) will have little cost to society in terms of its efficiency impacts. Note, however, that the apparent absence of a tradeoff may be due to the model's failure to provide for endogenous labor supply. However, to the extent that labor supplies are highly inelastic — and empirical evidence seems to bear this out — the above interpretation would be valid. If there is good reason to believe that labor supply elasticities are indeed low, then the results suggest that a move to increase the role of direct taxation to the extent made possible by administrative and political constraints would be Pareto-improving.

Income Tax-Sales Tax Combinations

To test the above assertion, a series of tax simulations were run wherein (1) sales taxes were combined with income taxes, and (2) income tax rates were raised to four times their 1974 levels. The alternative sales tax rates were patterned after the "SB" series of Table 3 for the sake of comparison, but scaled down to allow the increase in income taxes while maintaining the base case real government income levels. The tax structures characterizing this series of

TABLE 5
INCOME TAX EXPERIMENTS: HOUSEHOLD TAX RATES

Household	IT1	IT2	IT3	IT4
		Household Tax Rates (%)		
1	0.5	0.1	2.3	6.1
2	1.0	0.4	3.5	7.3
3	2.0	1.2	4.7	8.5
4	4.0	3.5	5.8	9.7
5	6.0	5.9	8.7	11.0
6	8.0	8.2	9.8	12.2
7	10.0	11.7	12.8	13.3
8	13.0	15.2	15.0	14.6
9	16.0	17.6	16.3	15.8
10	18.0	18.7	18.5	17.1
11	25.0	23.4	20.9	18.3

Household	IT5	IT6	IT7
	Household Tax Rates (%)		
1	15.0	23.6	46.6
2	15.0	22.4	40.8
3	15.0	21.2	35.0
4	15.0	20.1	23.3
5	15.0	18.9	20.4
6	15.0	17.7	17.5
7	15.0	16.5	14.6
8	15.0	15.3	13.4
9	15.0	14.2	11.7
10	15.0	11.8	9.3
11	15.0	9.4	7.0

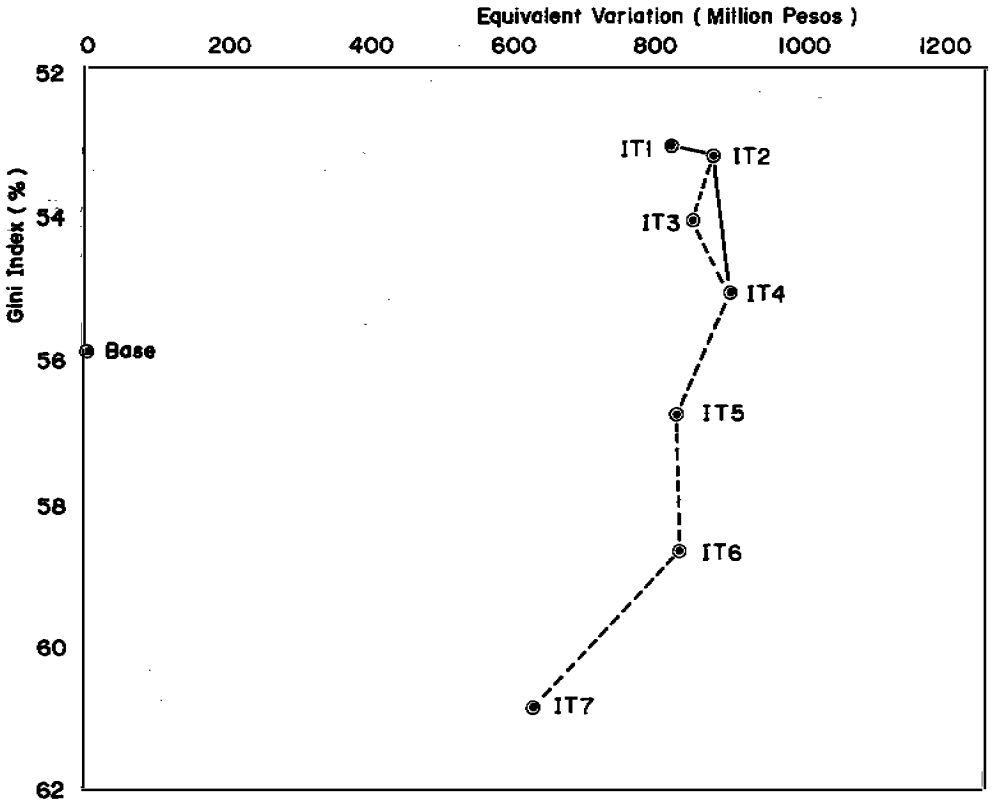

FIGURE 3
INCOME TAX EXPERIMENTS: GINI INDEX VS TOTAL EV (1980)

TABLE 6
INCOME TAX EXPERIMENTS: RESULTS FOR 1980

Experiment Code	Gini Index	Total EV	GDP
IT1	53.1	816.9	168710
IT2	53.2	878.0	169308
IT3	54.1	854.9	170472
IT4	55.1	900.1	171851
IT5	56.8	839.1	174006
IT6	58.7	840.9	176872
IT7	60.9	635.4	178381

experiments are summarized in Table 7, and the simulation results are presented in Table 8. Figure 4 shows the resulting equity-efficiency locus, in comparison to that derived from the earlier "SB" series. As expected, a general improvement is achieved by increasing the role of income taxation in the tax system; most of the tax schemes under the original "SB" series are dominated by the "ISB" series of tax structures, the exceptions being only the highly regressive structures. The country's recent shift to gross income taxation effectively represents movement in this direction, and is discussed in greater detail in a later section.

The Overall Frontier

Figure 5 combines the equity-efficiency loci that have been presented individually in Figures 2 to 4, and gives a general concept of the overall equity-efficiency frontier with respect to general tax policy. One significant observation that can be made from the combined frontier is the relatively narrow range of income distributions that can be *efficiently* attained through alternative tax policies. It appears impossible to achieve an income distribution beyond a Gini index of 53 percent with a progressive income tax that remains within the bounds of political feasibility. On the other hand, no further improvement in efficiency (in welfare terms) can be achieved by sacrificing income distribution beyond a Gini index of 57 percent. This observation indicates the limited potential of the tax system for effecting substantial improvements in income distribution, at least in the medium term. Nevertheless, in view of the commonly observed

TABLE 7
COMBINED INCOME TAX AND SALES TAX EXPERIMENTS: TAX RATES
(In percent)

Sector	ISB1	ISB2	ISB3	ISB4	ISB5	ISB6	ISB7	ISB8
				Sales Tax Rates (%)				
1	8.0	6.8	4.6	3.4	1.0	0.0	0.3	0.1
2	0.0	0.0	2.6	3.4	4.7	3.4	3.4	2.7
3	0.0	0.0	2.1	3.4	5.8	6.8	6.3	5.7
4	11.4	8.6	4.9	3.4	0.5	0.0	0.2	0.1
5	0.0	0.0	3.8	3.4	2.5	1.1	1.3	0.7
6	0.0	0.0	3.0	3.4	4.0	2.9	2.7	1.9
7	0.0	0.0	0.6	3.4	8.5	14.3	13.3	18.7
8	0.0	0.0	3.3	3.4	3.5	2.3	2.0	1.2
9	0.0	1.1	3.8	3.4	2.5	1.1	1.3	0.7
10	0.0	0.0	1.7	3.4	6.5	10.3	10.0	10.0
11	0.0	0.0	1.1	3.4	7.5	12.0	11.7	14.0
12	0.0	0.0	0.3	3.4	9.0	14.3	14.3	21.4
13	0.0	5.7	4.3	3.4	1.5	0.6	0.7	0.3
14	0.0	0.0	2.6	3.4	4.7	3.4	3.4	2.7
15	0.0	4.6	3.8	3.4	2.5	1.1	1.3	0.7
16	0.0	0.0	1.1	3.4	7.5	12.0	11.7	12.9
17	0.0	0.0	1.1	3.4	7.5	12.0	11.7	15.2
18	0.0	0.0	2.1	3.4	5.8	6.8	6.3	5.7

Household Tax Rates (%)

1	0.12	5	0.44	9	2.60
2	0.12	6	0.56	10	17.16
3	0.16	7	1.92	11	10.76
4	0.08	8	1.80		

TABLE 8
COMBINED INCOME TAX AND SALES TAX
EXPERIMENTS: RESULTS (1980)

Experiment Code	Gini Index	Total EV	GDP
ISB1	56.0	1034.1	173556
ISB2	55.6	964.2	172600
ISB3	54.9	967.2	170912
ISB4	54.6	927.3	169901
ISB5	54.0	583.7	167891
ISB6	53.7	670.6	166929
ISB7	53.8	597.7	166873
ISB8	53.7	490.0	166158

stability of the Gini index, even a one percentage point improvement in the index can be significant, particularly for a developing country like the Philippines where inequitable distribution of income remains a major problem..

From Figure 5, complete reliance on a progressive income tax system appears warranted from the point of view of the more progressive end, while greater dominance of indirect sales taxes defines more efficient but less equitable tax systems. [5] This is consistent with the commonly-held view with regard to the choice between direct and indirect taxation. To quote from Atkinson and Stiglitz (1980):

> . . . . In much popular discussion one can discern a form of assignment of *instruments* to *targets:* direct taxation is assigned to the equity objective, and indirect taxation is assigned to the goal of raising revenue efficiently. The rationale typically given. .. . is that indirect taxation, even differentiated according to luxuries and necessities, is a poor redistributive instrument. . . (original italics)

5. Obviously, there is no need to be limited to the distinct tax structures simulated in the above analysis,i.e., the choice of alternative sales tax structures is by no means discrete. The fifteen tax experiments chosen for this analysis (six of which defined the sales tax frontier) were meant simply to define the shape of the equity-efficiency frontier. It is possible to "interpolate"tax structures other than those used here.

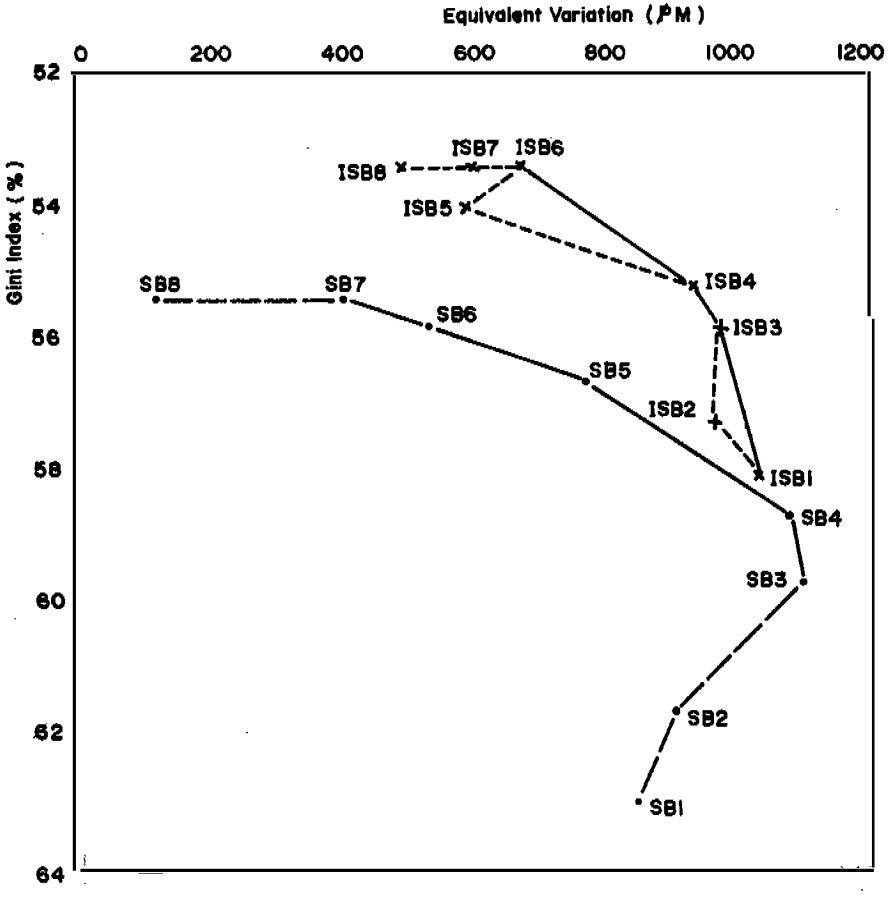

FIGURE 4
SALES TAXES WITH HIGHER INCOME TAXES: GINI INDEX VS. TOTAL EV (1980)

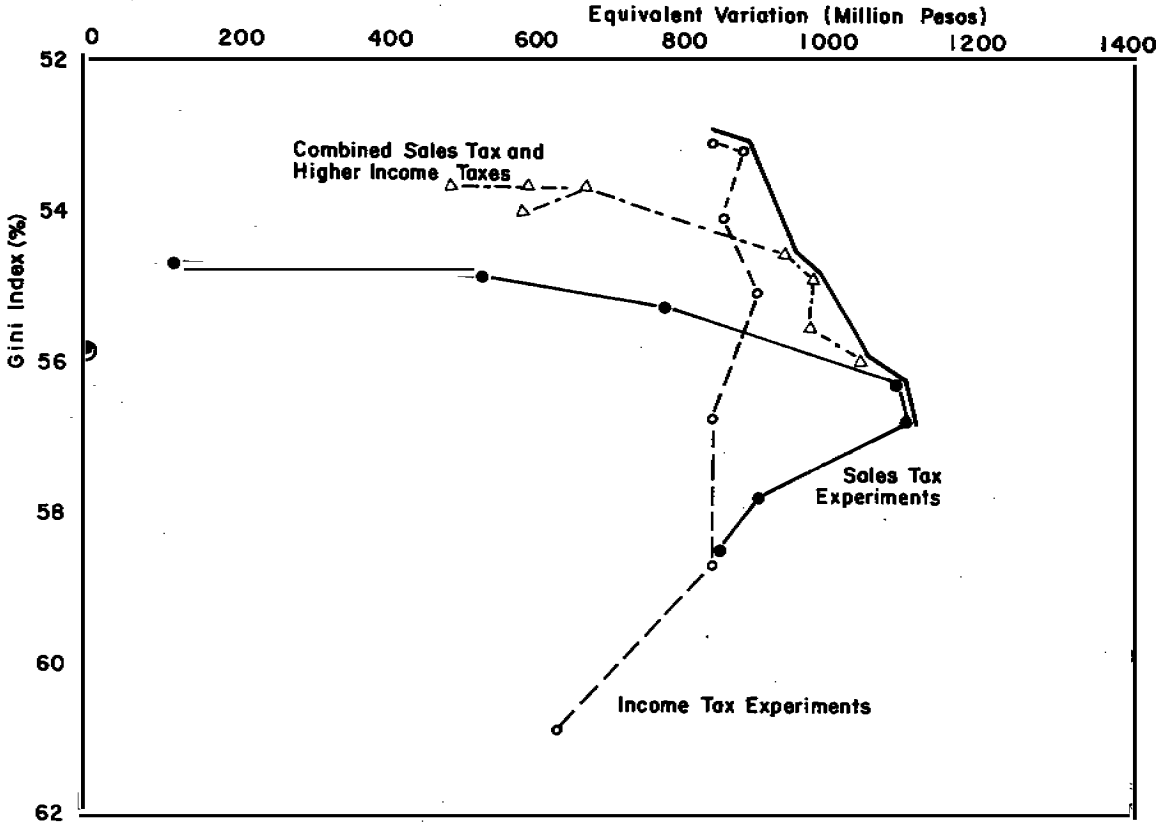

FIGURE 5
THE OVERALL "FRONTIER"

Thus, a compromise between the efficiency and equity goals must necessarily involve a combination of the two types of tax, with the dominance of one or the other determining whether the economy better achieves efficiency or equity objectives.

Recent Philippine Tax Reforms: An Assessment

Having obtained an indication of the efficiency-equity tradeoff defined by sales and income taxation in the Philippines, there is now a need to examine some of the more significant tax reforms undertaken by the government after 1974. For the present analysis, the adjustments in the structure of sales and specific taxes, and the shift to an income tax system based on gross income are highlighted. The primary motivation for this analysis is to determine how these respective reforms relate to the equity-efficiency frontier derived in the previous section. Thus, it can be determined whether the tax reforms actually improved the tax system and whether further improvements in tax policy can be made (i.e., if the economy remains within the frontier).

Indirect Taxes

There are four major types of indirect taxes in the Philippines: (1) the sales tax, (2) the specific tax, (3) the export tax, and (4) the import duty. Excise taxes (i.e., sales and specific taxes) have accounted for the largest proportion of indirect tax revenues in recent years, while the importance of import and export duties has steadily declined. For the most part, this trend has been due to the increase in petroleum product taxation in the past decade.

The structure of sales taxes underwent major changes in 1977; prior to that year, goods were taxed differentially according to four major categories: processed food (essentials) at 5 percent, ordinary commodities at 7 percent, semi luxuries at 40 percent, and luxuries (non essentials) at 70 percent. These rates were changed in 1977 to 5, 10, 25 and 50 percent, respectively.[6] Some changes were also introduced in the differential treatment of imported goods vis-à-vis their locally-produced counterparts.

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6. The reader is referred to Manasan (1981) for a more detailed documentation of the Philippine tax system.

Certain products are subject to fixed specific taxes per physical unit in lieu of *ad valorem* sales taxes, the most important ones being tobacco products, alcoholic beverages and refined petroleum products. Specific taxes were likewise redefined in 1977. Of particular interest are the specific taxes on refined petroleum products, which had undergone changes at the average of once every two years since 1973. The result had been a general increase in the tax rate on refined petroleum products, to the extent that petroleum tax revenues now account for over 20 percent of total tax revenues in the country.

The effective sales tax rates used in the base case run of the model (shown in Table 3) were computed by dividing net indirect taxes by the total output of each sector, as given in the 1974 input-output table of the Philippines. These rates therefore represent averages for each sector, reflecting aggregation of sectors that may be subject to different rates, plus some amount of tax evasion. In order to model the changes in excise taxes introduced in 1977, the base case effective rates were modified to reflect the known changes in the tax law. The approach has been to simply scale the base case tax rates up or down by a factor that summarizes the introduced tax changes, duly accounting for relative weights in sectors aggregating goods subject to different rates. The most dominant changes are the reduction of the rates on luxuries and semi luxuries (from 70 and 40 percent to 50 and 25 percent, respectively), the increase in the rates on ordinary articles (from 7 to 10 percent), and the change in specific taxes for tobacco, alcohol and petroleum products. Table 9 summarizes the post-1977 tax rates used in the model.

Table 10 and Figure 6 show the results of simulations with the modified sales tax structure. It can be seen that the sales tax changes actually moved the economy even farther away from the equity-efficiency frontier. As can be seen from Figure 6, an improvement in society's welfare could be achieved by moving towards a uniform sales tax rate (SB4), with hardly any distributional impact.

The biggest source of inefficiency in the sales tax structure appears to be the disproportionate amount of taxation borne by refined petroleum products, which was exacerbated by further increases in their specific tax rates after 1974. It may be noted that, of all indirect taxes in the Philippines, those on refined petroleum products have changed the most frequently, having been used by the government as an instrument for its petroleum pricing policy. The

TABLE 9
SALES TAXES USED IN MODEL BEFORE AND AFTER REFORMS

Sector No.	Base Case Rate	Post Reform Rate
1	2.42	2.42
2	6.77	6.77
3	6.29	6.29
4	5.73	5.73
5	2.69	3.84
6	3.50	5.00
7	4.51	4.51
8	3.59	5.13
9	21.84	32.10
10	3.14	3.14
11	3.00	2.10
12	5.78	5.78
13	9.43	13.50
14	7.23	7.23
15	6.05	8.64
16	8.42	8.42
17	9.16	9.16
18	3.64	3.64

TABLE 10
SALES TAX REFORM SIMULATION RESULTS (1980)

EQUITY/EFFICIENCY MEASURE	PRE–REFORM	POST–REFORM
Gini Index	55.94	55.85
Total EV (Million Pesos)	0	–360.03
GDP (Million Pesos)	171423	170771

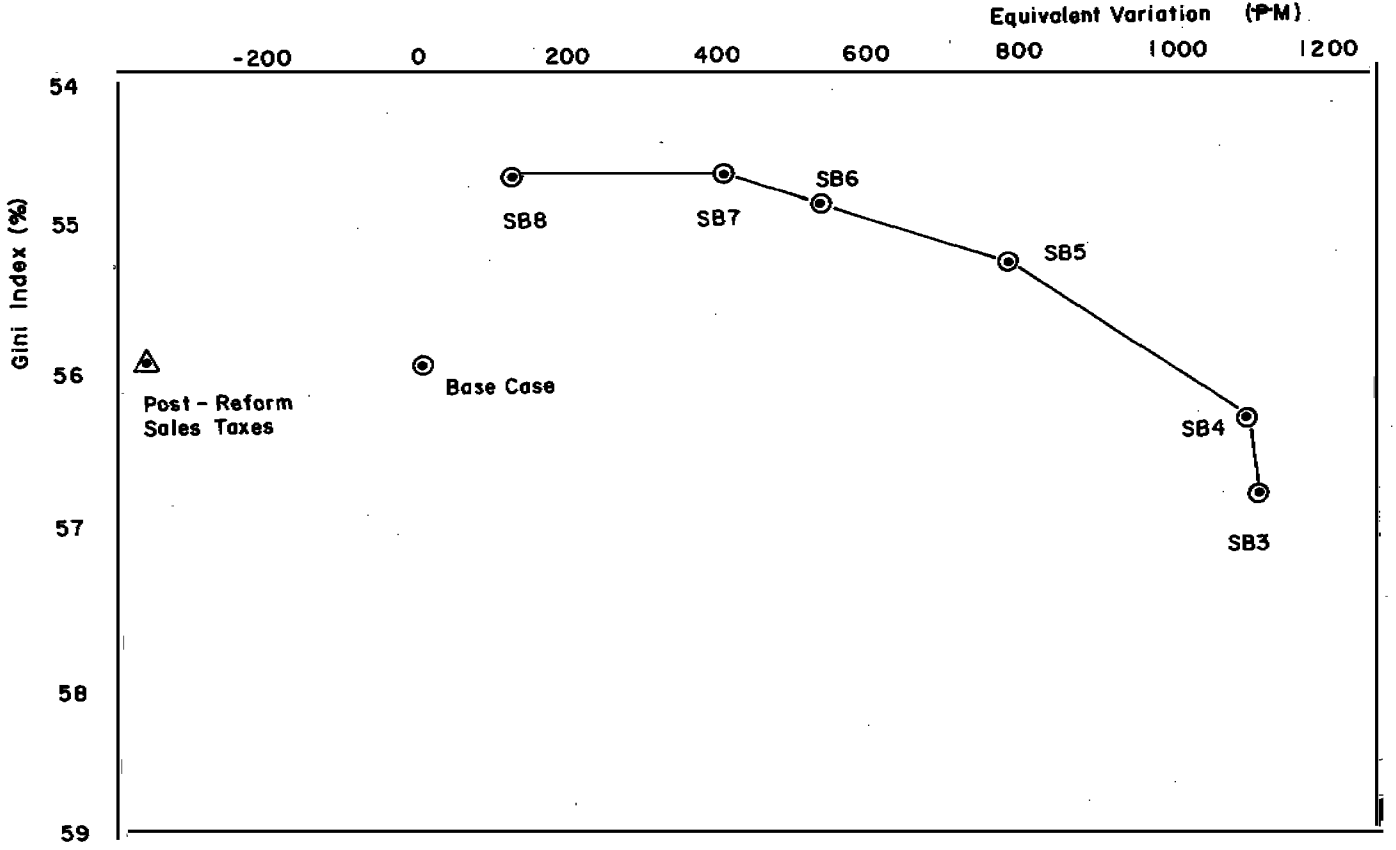

FIGURE 6
POST-REFORM SALES TAXES AND THE SALES TAX EQUITY-EFFICIENCY FRONTIER (1980)

generally upward trend in the rate of petroleum taxation appears to be solely motivated by revenue-generation objectives, and indicates that the government considers refined petroleum products as the most convenient target for this purpose. The 1984 increases in petroleum taxation, which the government made no secret of in its revenue-raising objective, once again bore this out. However, the analysis suggests that a better way of raising the required additional tax revenues would have been to spread out the increased tax rates among the different sectors of the economy to achieve a more uniform rate. There appears to be little justification beyond administrative convenience for concentrating the increased sales tax rates on the petroleum sector.[7]

Gross Income Taxation

Prior to 1981, all citizens and resident working aliens with a gross annual income of at least ₱1,800 were subject to the personal income tax, with rates ranging from 3 percent for net taxable incomes below ₱2,000 to a maximum of 70 percent, progressing through 37 step brackets. Net taxable income was computed as income from all sources net of allowable exemptions and deductions, which included medical expenses, school tuition for dependents in high school, business expenses, losses, interest payments, depreciation, charitable contributions and 10 percent of the gross income of a working spouse, each subject to a given maximum.

The personal income tax system underwent major changes in 1981, when personal deductions were eliminated for wage and salary income and income tax rates were restructured. The exemption level was raised from ₱1,800 to ₱3,000 *per annum.* Income is now categorized either as gross compensation income, defined as all income resulting from an employee-employer relationship (e.g., wages, salaries, bonuses, allowances, etc), or gross income, which refers to all other income (e.g., income from business or profession). While the usual deductions may still be claimed on the latter, only personal and dependent exemptions (up to a maximum of four dependents) may be claimed by persons who earn only compensation income. Taxable compensation income, defined as gross compensation

7. The only other valid reason for taxing petroleum products heavily would be for its conservation effect, i.e., the tax compensates for the external social cost (in terms of stability and security) of heavy reliance on imported oil. The present analysis ignores such "Pigouvian tax" effects.

income net of exemptions, and net taxable income, defined as gross income net of exemptions and deductions, are subject to different tax schedules, shown in Table 11. The tax schedules have been substantially simplified from the previous 37 step brackets to 11 for taxable compensation income and 5 for net taxable income.

Personal income taxes have been specified in the model as average tax rates which vary across income groups. This treatment is particularly restrictive, because the model takes the average and marginal tax rates to be identical. However, the inaccessibility of detailed income tax data precluded a more precise modelling of the income tax structure for this work. In order to reconcile the statutory prereform tax rates with actual data which determined the average rates used in the model, the following assumptions were made:

(a) Tax evasion/underreporting rates increase progressively from 10 percent for the sixth income group to 60 percent for the highest income group; and
(b) Claimed deductions amount to 10 percent of net income for all taxpaying income groups except for the top income group, which claims 50 percent deductions.

On the basis of each income group's average income per household and the above assumptions, the statutory prereform tax rates become consistent with the average tax rates implied by the data and used in the model (see Table 12).

Translating the *postreform* tax structure into average tax rates for the model is further complicated by the discriminatory treatment of compensation income and noncompensation income, where deductions cannot be claimed on the former. The income tax changes are also expected to increase the tax base by bringing about some reduction in tax evasion, as well as a reduction in the amount of deductions claimed where they are allowed. Thus, the assumptions made above cannot be directly applied for the prereform case to the postreform tax structure. While it is hard to determine by how much tax evasion and deduction rates have been reduced under the new system, three alternative assumptions for the analysis are made using 10 percent, 25 percent and 50 percent reductions alternatively. Under the new structure, the average family with 4.4 children would claim exemptions amounting to ₱14,000 (₱6,000 for head of family and ₱2,000 each for the maximum four dependents allowed). Thus, household income must exceed ₱14,000 for a household to pay any income tax. On the basis of 1980 average incomes, it can therefore

TABLE 11
PERSONAL INCOME TAX RATE SCHEDULE (1981)

Net Taxable Income		Tax Rates	
Over	But Not Over	of Excess Over	
On Taxable Compensation Income:			
0	₱ 2,500	0%	
2,500	5,000	1%	
5,000	10,000	25 + 3%	₱ 5,000
10,000	20,000	175 + 7%	10,000
20,000	40,000	875 + 11%	20,000
40,000	60,000	3,075 + 15%	40,000
60,000	100,000	6,075 + 19%	60,000
100,000	250,000	13,675 + 24%	100,000
250,000	500,000	49,675 + 29%	250,000
500,000		22,175 + 35%	500,000
On Taxable Net Income:			
0	10,000	5%	
10,000	30,000	500 + 15%	10,000
30,000	150,000	3,500 + 30%	30,000
150,000	500,000	39,500 + 45%	150,000
500,000		197,000 + 60%	500,000

TABLE 12
TRANSLATING PRE–REFORM INCOME TAXES INTO AVERAGE TAX RATES FOR THE MODEL

Income Group	Average 1974 Income (Pesos)	Assumed Evasion Rate (%)	Assumed Deduction Rate (%)	Average Taxes Paid* (Pesos)	Implied Avg Tax Rate (%)	Rate Used in Model (%)
1	1,207	**	**	0	0.00	0.03
2	2,362	**	**	0	0.00	0.03
3	3,307	**	**	0	0.00	0.04
4	4,614	**	**	0	0.00	0.02
5	6,370	**	**	0	0.00	0.11
6	8,675	10	10	11.00	0.12	0.14
7	10,138	10	10	46.55	0.46	0.48
8	15,995	40	10	71.82	0.45	0.45
9	20,707	47	10	133.03	0.64	0.65
10	49,889	48	10	2,111.37	4.23	4.29
11	127,982	60	50	3,392.03	2.65	2.69

be assumed that the lowest six income groups pay no income tax without significant departure from reality. Table 13 presents the derivation of the average tax rates implied under the new system, given the alternative assumptions on reduction of tax evasion and deduction rates—deductions cannot go below 10 percent because one can always opt for the standard deduction of 10 percent of net income. These are the rates used for the simulations of the new income tax structure.

The equity and efficiency effects of the tax change are presented in Table 14, and illustrated in Figure 7. Compared to the base case, the change in the structure of the income tax leads to no significant effect on the distribution of income. Nor is there any significant efficiency effect; the change in tax structure either leads to a small increase (28.6 million pesos) or small decrease (5.53 million pesos) in welfare depending on the assumption of improvement in tax collection. Similarly, the change in GDP from the base tax structure tends to be minimal, ranging from –₱110 million to

TABLE 13
DERIVATION OF IMPLIED AVERAGE TAX RATES FROM GROSS INCOME TAXATION

Group	Income (Pesos)	Rate (%)	Deduc-tion Rate* (%)	Paid** (Pesos)	Rate (%)
			10% Improvement in Collection:		
1	1,600	na	na	0	0.00
2	3,233	na	na	0	0.00
3	4,791	na	na	0	0.00
4	6,985	na	na	0	0.00
5	9,655	na	na	0	0.00
6	13,349	na	na	0	0.00
7	16,374	9	10	40.94	0.25
8	25,522	36	10	104.64	0.41
9	33,628	42	10	248.85	0.74
10	81,388	43	10	1,839.37	2.26
11	187,419	54	45	4,179.44	2.23
			25% Improvement in Collection:		
1	1,600	na	na	0	0.00
2	3,233	na	na	0	0.00
3	4,791	na	na	0	0.00
4	6,985	na	na	0	0.00
5	9,655	na	na	0	0.00
6	13,349	na	na	0	0.00
7	16,374	7.5	10	50.76	0.31
8	25,522	30	10	173.55	0.68
9	33,628	35	10	353.09	1.05
10	81,388	36	10	2,490.47	3.06
11	187,419	45	37.5	7,796.63	4.16
			50% Improvement in Collection:		
1	1,600	na	na	0	0.00
2	3,233	na	na	0	0.00
3	4,791	na	na	0	0.00
4	6,985	na	na	0	0.00
5	9,655	na	na	0	0.00

Table 3 (Continued)

Group	Income (Pesos)	Rate (%)	Deduction Rates* (%)	Paid** (Pesos)	Rate (%)
6	13,349	na	na	0	0.00
7	16,374	5	10	70.41	0.43
8	25,522	20	10	288.40	1.13
9	33,628	23.5	10	474.15	1.41
10	81,388	25	10	3,654.32	4.49
11	187,419	30	25	15,162.20	8.09

*Cannot be less than 10 percent because taxpayers can always opt for the standard 10 percent deduction.

**Based on the income tax schedule prevailing in 1974.

TABLE 14
INCOME TAX REFORM SIMULATION RESULTS (1980)

Equity/Efficiency Measure	Pre-Reform (Base Case)	Post-Reform % Reduction In Tax Evasion 10	25	50
Gini Index	55.94	55.87	55.86	55.87
Total EV (Million Pesos)	0	28.61	20.21	5.53
GDP (Million Pesos)	171,423	171,312	171,234	171,143

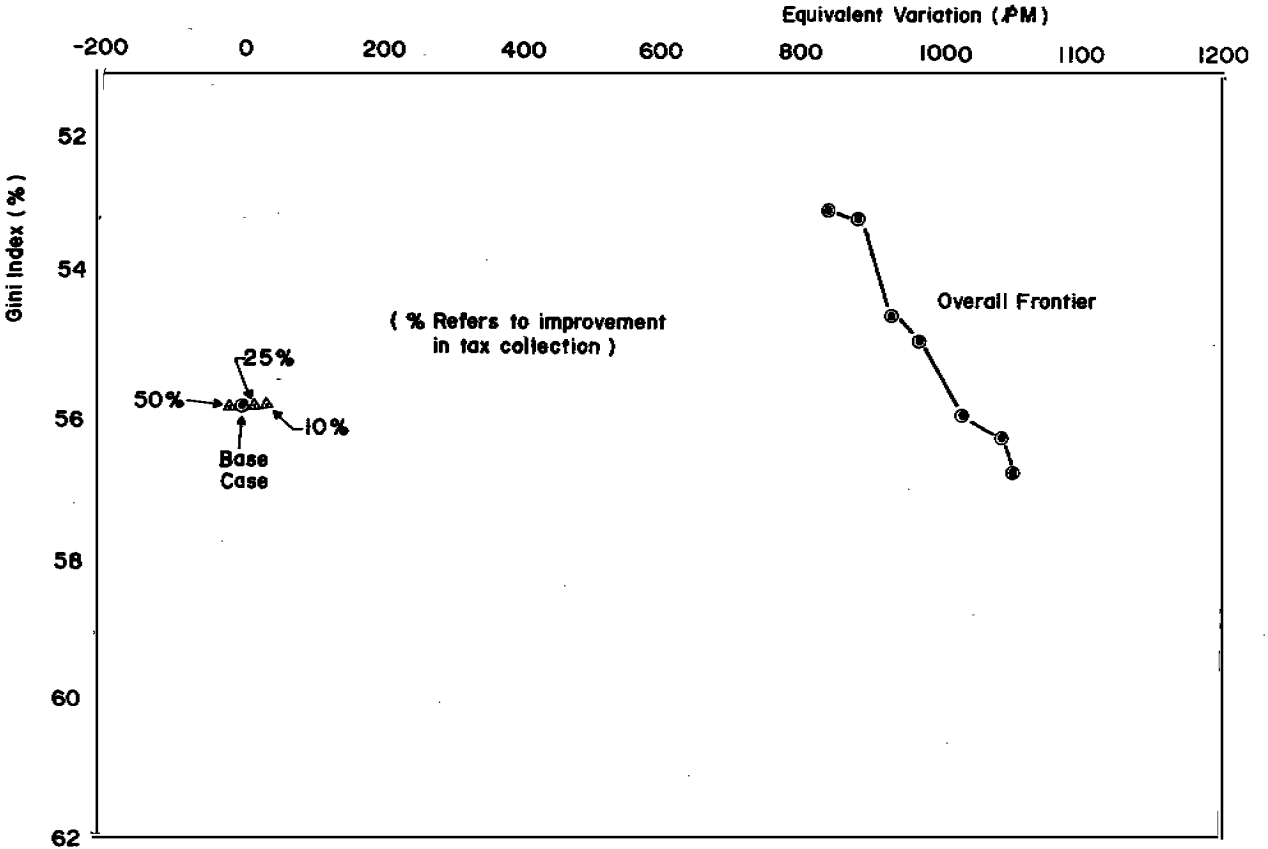

FIGURE 7
GROSS INCOME TAXATION AND THE WELFARE-EQUITY FRONTIER (1980)

–₱280 million, or a .06 to .16 percent drop. However, these results are again partly due to the failure of the model to capture welfare or output effects due to the labor-leisure choice of individuals, because labor supplies are assumed fixed in the model. This would not be a serious omission if the labor supply elasticities of households were small; and although the evidence on this is not conclusive, most estimates do tend to bear this out. The results indicate that the tax change has not appreciably affected households' welfare arising from their consumption behavior.

To the extent that the improved tax administration could lead to increased income tax revenue collection, these results suggest that the shift to gross income taxation was a neutral revenue-enhancing measure. This can be seen from the negligible shift in the economy's position relative to the equity-efficiency frontier attainable through tax policy.[8] This supports the increasingly popular argument that, given the limited share of total tax revenues accounted for by income taxes in the Philippines, any move that increases its role vis-à-vis indirect taxes would be beneficial.

Conclusions

This study was motivated by the need for an operational approach for making tax policy choices on the basis of their equity and efficiency impacts, and by the lack of a general equilibrium framework for assessing Philippine tax policies. Simulations with a computable general equilibrium model of the Philippine economy made it possible to quantify the efficiency and equity impacts of alternative tax structures. By deriving an "equity-efficiency frontier" achievable through tax policy, an assessment of recent tax reforms became possible, and led to the following observations:

1. The sales tax reforms of 1977 worsened the economy's position relative to the equity-efficiency frontier. The distributional impact of the sales tax system does not seem to be appreciably

8. These results are largely consistent with the findings of Castelo et al. (1984), except for their apparently erroneous conclusion that gross income taxation led to reduced government revenues. This observation was due to their exclusion of capital gains taxes from the measured revenues under the new system, whereas they were part of the measured revenues for the previous income tax system.

affected, but there is a clear efficiency cost. This has apparently been caused by the further increase in the rate of petroleum product taxation, which had already accounted for a disproportionately large share of indirect taxation prior to the tax reforms.

2. The recent shift to gross income taxation appears to have raised the collectible revenues from the income tax with little cost on the efficiency and equity impact of the tax. Thus, the change represents a positive reform, especially because it permits an increase in the role of the income tax without substantially changing individual tax burdens. This has been accomplished mainly through the improvement of administrative efficiency and collection rates that the gross income tax system permits.
3. There is a good argument for increasing the role of direct income taxation in the Philippine tax system, which has traditionally been dominated by indirect taxes. These simulations show that direct taxation can be used to improve equity in the economy without any appreciable decline in aggregate welfare.

The preceding analysis has indicated that, even after the reforms of 1977 and 1981, there remains much scope for improvement of the Philippine tax system. By explicitly deriving the alternatives defining an equity-efficiency frontier, the approach demonstrated can provide government policymakers with the alternative directions which tax policy can take to effect such an improvement.

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