In a society with economic inequality, how should taxes payable by people with different incomes differ?

Progressive Taxation and Lorenz Curve in the Philippines

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The individual income tax system in the Philippines is progressive in nature. Progressive taxation poses a key policy issue for our society. There are various affirmative arguments for progression. Some of these are:

a. Progression aids the maintenance of economic stability and a high level of business activity.

b. Taxes should be levied in accordance with the benefits received by the taxpayer from government.

c. Progression equalizes sacrifices among taxpayers based on the hypothesis that money has a declining utility.

d. Progression is based on the taxpayer's ability to pay.

e. Progression operates to reduce economic inequality.

The main objective of this paper is to determine whether the present tax structure for individual income is over-progressive, under-progressive or just appropriate, given the present status of income distribution in the Philippines as depicted by the Lorenz curve.

THEORETICAL FRAMEWORK

A. Measuring Economic Inequality - The Lorenz Curve

One measure of economic inequality is a review of the income shares of various groups in the population. All groups, not just the poorest or the richest, are included. The Lorenz curve shows income inequality. Figure 1 illustrates the cumulative percentage of income on the vertical axis and the cumulative percentage of households (ranked from the lowest to the highest) on the horizontal axis. If all people received the same income, the relation between cumulative population proportions and cumulative proportions of income received would follow the graph's 45-degree line. When the distribution of income is less than completely equal, the Lorenz curve, relating the two, diverges from the 45-degree line. The Gini coefficient is the area A between the 45-degree line and the Lorenz curve divided by area A + B, the area of the whole triangle.

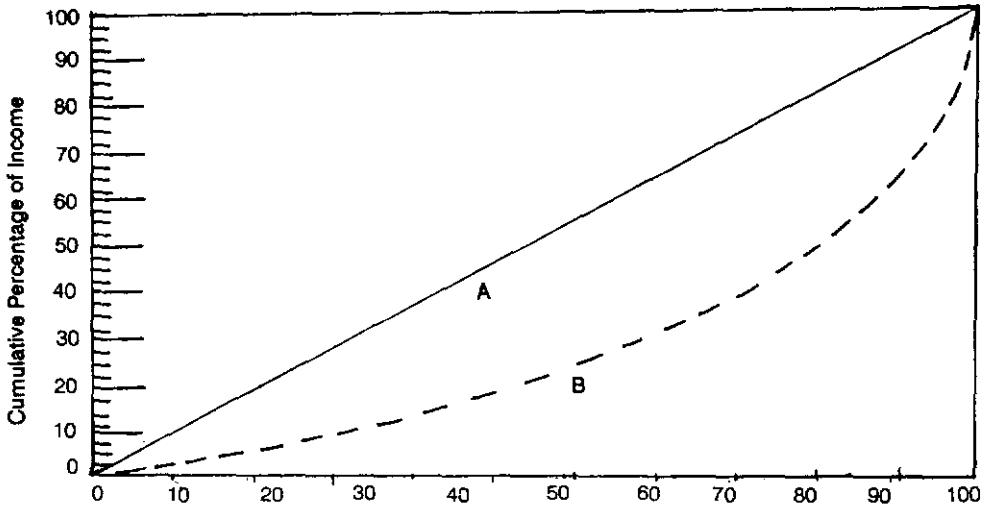
B. Progressive Taxation System

In a society with economic inequality, how should taxes payable by people with different incomes differ? How should the problem of vertical equity be resolved? Since the time of John Stuart Mill, vertical equity has been viewed in terms of an equal-sacrifice prescription. How should the amount of taxes paid differ for people with different incomes? To answer this, one must know the shape of the marginal utility (MU) of income schedule. Does equal sacrifice call for a progressive tax? The answer depends on both the shape of the income utility schedule and by what rule "equality of sacrifice" is defined. It may be interpreted to mean equal *absolute*, equal *proportional*, or equal *marginal*, sacrifice.

If marginal utility were constant, equal absolute sacrifice would require tax liabilities to be the same for all incomes. Equal sacrifice would call for a head tax. But with a declining MU schedule, tax liability must rise with in-

Figure 1

LORENZ CURVE



come. It does not follow, however, that a progressive tax will be called for. The required tax distribution will be progressive, proportional, or regressive, depending on whether elasticity of the marginal income utility with respect to income is greater than, equal to, or less than unity. Thus, under equal absolute sacrifice rule, there is no ready basis to conclude that it calls for progression.

Under the proportional sacrifice rule, a constant marginal utility schedule will call for proportional taxation. A declining but straight-line MU schedule calls for progression, but generalizations become difficult if the MU schedule falls at a decreasing rate.

Under the equal marginal sacrifice rule, if the marginal utility of income were constant, the distribution of the tax bill would be indeterminate. Given a declining MU schedule, equal marginal sacrifice calls for maximum progression.

There are serious difficulties with this entire approach. While the assumption of declining marginal utility schedule seems to be reasonable, the precise slope of the schedule is not known and schedules may differ among individuals.

It is more realistic and practical, therefore, to view the situation in terms of a social justice criteria wherein the cumulative proportion of tax paid should correspond to cumulative proportion of income received. We can now construct a theoretical tax distribution curve where we can plot the cumulative proportion of tax paid on the vertical axis and the cumulative percentage of households (ranked from the lowest to the highest) on the horizontal axis. The tax distribution curve is analogous to the Lorenz curve. We can also compute a "Gini-Tax" coefficient from the tax distribution curve in the same manner we computed the Gini Coefficient for the Lorenz curve. A measure that the existing progressive tax system reduces economic inequality is to obtain a close value for both the Gini coefficient and the "Gini-Tax" coefficient. An equal value for the two coefficients would mean that

the tax distribution curve is identical or equivalent to the Lorenze curve. In this case, progression perfectly addresses the issue of economic inequality.

GENERAL METHODOLOGY

The egalitarian aspects of progression in the Philippines shall be the main concern of this paper. Our approach is outlined as follows:

1. Develop a Lorenz Curve for Philippine society to show income inequality.
2. Estimate the theoretical amount of tax to be paid by each social class using the existing progressive tax system for individual income.
3. Compare the percentage share of tax paid to the percentage share of income by each social class to determine which social class absorbs most of the tax burden in relation to their ability to pay.

LIMITATIONS

The findings and conclusions in this paper are subject to the following assumptions:

1) The 1971 real income level equals the 1985 real income level. If the 1985 real income is greater than the 1971 real income, the theoretical tax computed would be higher and vice-versa.
2) The proportion of income class in 1971 resembles the 1985 proportion.
3) The over-all results depend upon the accuracy of the estimated average effective tax rate applied to each income class or quintile.
4) The main intent of this paper is to introduce a modified approach in structuring the taxation system. It would be very interesting to find what the over-all results could have been if more updated data were available.

EMPIRICAL DATA: The Philippine Household Income and the Tax Structure

A. *Household Income Distribution in the Philippines*

Quintile Percent Share of Total Household Income (Families Ranked from Lowest Income to Highest)	1965	1971	1985
Lowest 20 Percent	3.2	3.7	5.2
Second 20 Percent	7.8	8.2	8.9
Third 20 Percent	14.0	13.2	13.2
Fourth 20 Percent	20.2	21.0	20.2
Fifth 20 Percent	54.8	53.9	52.5
Gini-Coefficient	0.49	0.5472	0.5764

Source: 1965 DATA — PAURERT, Felix, et al. Income distribution, structure of economy and employment, 1981.
1971 — NEDA Philippine Statistical Yearbook
1985 — NEDA

The above figures can be plotted to construct the Lorenz curve for the Philippines (Please see Fig. 2). Note that economic inequality was increasing during the term of the previous administration.

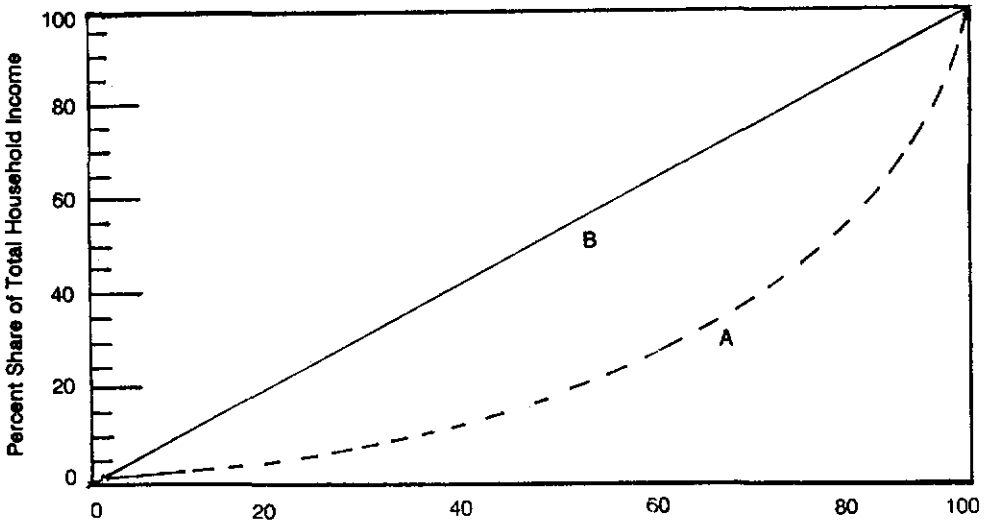
B. Percent of Family Income Received by Each Quintile for the Philippines in 1971

Families (ranked from Lowest Income to Highest)	Percent Share of Total Family Income	Total Family Income (Thousand Pesos)
Lowest 20 Percent	3.7	P 872,237
Second 20 Percent	8.2	1,932,718
Third 20 Percent	13.2	3,134,705
Fourth 20 Percent	21.0	4,981,219
Fifth 20 Percent	53.0	12,793,406
TOTAL	100.0	P 23,714,285

Source: NEDA Philippine Statistical Yearbook, 1985, p. 108.

Figure 2

LORENZ CURVE: PHILIPPINES, 1985



C. Distribution of Philippine Families by Income Class: 1971 No. of Families (in Thousands): 6,347

Income Bracket	Percentage Distribution	Cumulative Percentile
Under ₱ 1,000	17.3%	17.3
₱ 1,000 to ₱ 1,99	24.0	41.3
₱ 2,000 to ₱ 2,999	17.7	59.0
₱ 3,000 to ₱ 3,999	12.5	71.5
₱ 4,000 to ₱ 4,999	7.5	79.0
₱ 5,000 to ₱ 5,999	5.0	84.0
₱ 6,000 to ₱ 7,999	6.4	90.4
₱ 8,000 to ₱ 9,999	3.6	94.0
₱ 10,000 to ₱ 14,99	3.7	97.7
₱ 15,000 to ₱ 19,999	1.1	98.8
₱ 20,000 to ₱ 29,999	0.9	99.7
₱ 30,000 and over	0.3	100.0

Source: NEDA Philippine Statistical Yearbook, 1985, pp. 116-117

D. Distribution of Philippine Families by Income Class: 1985 (Note: Due to non-availability of data for 1985, the 1971 Income Class Distribution is inflated to the 1985 level using the CPI.)

NOTE:
CPI (1978) = 100 (BASE YEAR)
CPI (1971) = 39.8
CPI (1985) = 352.6
Multiplier = $\frac{\text{CPI (1985)}}{\text{CPI (1971)}} = \frac{352.6}{39.8} = 8.86$

Thus, 1985 INCOME LEVEL = 8.86 x 1971 INCOME LEVEL

Inflated Income Bracket	Percentage Distribution	Cumulative Percentage
Under ₱ 8,860	17.3	17.3
₱ 8,860 to ₱ 17,711	24.0	41.3
₱ 17,712 to ₱ 26,571	17.7	59.0
₱ 26,572 to ₱ 35,431	12.5	71.5
₱ 35,432 to ₱ 44,291	7.5	79.0
₱ 44,292 to ₱ 53,151	5.0	84.0

₱ 53,152 to ₱ 70,87	6.4	90.4
₱ 70,872 to ₱ 88,59	3.6	94.0
₱ 88,592 to ₱ 132,891	3.7	97.7
₱ 132,892 to ₱ 177,191	1.1	98.8
₱ 177,192 to ₱ 265,791	0.9	99.7
₱ 265,792 and over	0.3	100.0

E. The Present Individual Income Tax Table in the Philippines

Income Bracket	Tax Rate
Not Over ₱ 2,500	0%
₱ 2,500 to ₱ 5,000	1% over ₱ 2,500
₱ 5,000 to ₱ 10,000	₱ 25 + 3% over ₱ 5,000
₱ 10,000 to ₱ 20,000	₱ 175 + 7% over ₱ 10,000
₱ 20,000 to ₱ 40,000	₱ 875 + 11% over ₱ 20,000
₱ 40,000 to ₱ 60,000	₱ 3,075 + 15% over ₱ 40,000
₱ 60,000 to ₱ 100,000	₱ 6,075 + 19% over ₱ 60,000
₱ 100,000 to ₱ 250,000	₱ 13,675 + 24% over ₱ 100,000
₱ 250,000 to ₱ 500,000	₱ 49,675 + 29% over ₱ 250,000
Over ₱ 500,000	₱ 122,175 + 35% over ₱ 500,000

Given the modified Family Income Class Distribution for 1985 in Table D, it would be quite difficult to apply the tax table above because the income bracket shown in Table D does not correspond to the income bracket in the tax table. Inasmuch as our objective is to come up with an average effective tax rate by each Quintile of the income class, we adjust Table E to correspond to the income bracket shown in Table D. The adjusted individual income tax table is shown in Table F. Please note that the adjusted table is still equivalent to the present table. Only the lower and upper bound limits of the income bracket are changed while retaining the average effective tax rate applicable in the given income interval. Also, the number of steps were adjusted to conform with the number of steps in the income class distribution.

F. The Adjusted Individual Income Tax Table[1]

Income Bracket	Applicable Tax Rate
Not over ₱ 8,860	₱ 68
₱ 8,860 to ₱ 17,711	₱ 68 + 7% over ₱ 8,860
₱ 17,712 to ₱ 26,571	₱ 888 + 10% over ₱ 17,712
₱ 26,572 to ₱ 35,431	₱ 1,574 + 11% over ₱ 26,572
₱ 35,432 to ₱ 44,291	₱ 2,548 + 13% over ₱ 35,432
₱ 44,292 to ₱ 53,151	₱ 3,700 + 15% over ₱ 44,292
₱ 53,152 to ₱ 70,871	₱ 5,029 + 18% over ₱ 53,152
₱ 70,872 to ₱ 88,591	₱ 8,218 + 19% over ₱ 70,872
₱ 88,592 to ₱ 132,891	₱ 11,585 + 23% over ₱ 88,592
₱ 132,892 to ₱ 177,191	₱ 21,774 + 24% over ₱ 132,892
₱ 177,192 to ₱ 265,791	₱ 32,406 + 25% over ₱ 177,192
₱ 265,792 to ₱ 500,000	₱ 54,556 + 29% over ₱ 265,792
Over ₱ 500,000	₱ 122,175 + 35% over ₱ 500,000

1: Please see APPENDIX A for the summary of formulas and computations used.

G. Family Income by Each Quintile Adjusted from the 1971 Level to the 1985 Level Using CPI and Including the Applicable Average Effective Tax Rate for Each Quintile

Families (Ranked from Lowest Income to Highest)	Estimated Income Bracket Adjusted from 1971 Level to 1985 Level	Applicable Average Effective Tax Rate Using the Adjusted Tax Table
Lowest 20 Percent	Under ₱ 9,856	0.7% to 1.3%
Second 20 Percent	₱ 9,857 to ₱ 17,232	1.3% to 3.8%
Third 20 Percent	₱ 17,233 to ₱ 27,280	3.8% to 6.0%
Fourth 20 Percent	₱ 27,281 to ₱ 46,063	6.0% to 8.6%
Fifth 20 Percent	₱ 46,064 and above	8.6% to 12.0%

Note:

1) The average effective tax rate should not be confused with the marginal tax rate. As an example, for an income of ₱ 150,000, the average effective tax rate is 17.12 percent (that is, tax paid as a percentage of income) while the marginal tax rate at that income level is already 24 percent

2) Data in columns 1 and 2 of Table G is an aggregation of the data in Table D.

3) Data in column 3 is derived as a weighted average of applicable tax rate in proportion to the percentage distribution of the income class under consideration. Column 3 is the aggregate results from combining Tables D and F.

We can now make an estimate of the theoretical amount of tax paid by each quintile

in 1985. We can also compare the percentage share of tax paid to the percentage share of income by each quintile. The results are shown in the following tables.

H. Estimate of Theoretical Tax Paid by Each Quintile with 1971 as Base Income but Adjusted to 1985 Level

Table H.1

Families (Ranked from Lowest Income to Highest)	Income (Thousand Pesos) 1971 Base Income Adjusted to 1985 Level	Average Effective Tax Rate
Lowest 20 Percent	7,726,020	1.0%
Second 20 Percent	17,123,881	2.5%
Third 20 Percent	27,773,486	4.9%
Fourth 20 Percent	44,133,600	7.3%
Fifth 20 Percent	113,349,577	10.3%
TOTAL	210,108,564	

Table H.2

Families (Ranked from Lowest Income to Highest)	Theoretical Tax Amount Collected in 1985 (Thousand Pesos)	Percentage Share of Tax	Income
Lowest 20 Percent	P 77,280	0.46	5.2
Second 20 Percent	428,097	2.56	8.9
Third 20 Percent	1,360,091	8.11	13.2
Fourth 20 Percent	3,221,753	19.22	20.2
Fifth 20 Percent	11,675,006	69.65	52.5
TOTAL	16,762,227	100.00	100.00

Total Tax as Percent of Total Income = 7.98%

ANALYSIS AND EVALUATION OF RESULTS

Before we analyze the data and draw our conclusions, it would be interesting to compare some of our computed data with actual data in the United States. The validity of our conclusions depend upon the accuracy of the computed average effective tax rate applied to each Quintile. It is therefore important that we pay special attention to it. Using the estimated distribution of Tax Burden by Deciles, 1979 in the US (Musgrave p. 257), we were able to compare the Philippine estimate. (Note: US figures were transformed into Quintiles by averaging the two consecutive Deciles.)

Families (Ranked from Lowest Income to Highest)	Average Effective Tax Rate PHILIPPINES, 1985 (Paper's Estimate)	U.S., 1979
Lowest 20 Percent	1.0%	2.8%
Second 20 Percent	2.5%	6.1%
Third 20 Percent	4.9%	9.5%
Fourth 20 Percent	7.3%	11.15%
Fifth 20 Percent	10.3%	12.35%
TOTAL	7.98%	10.7%

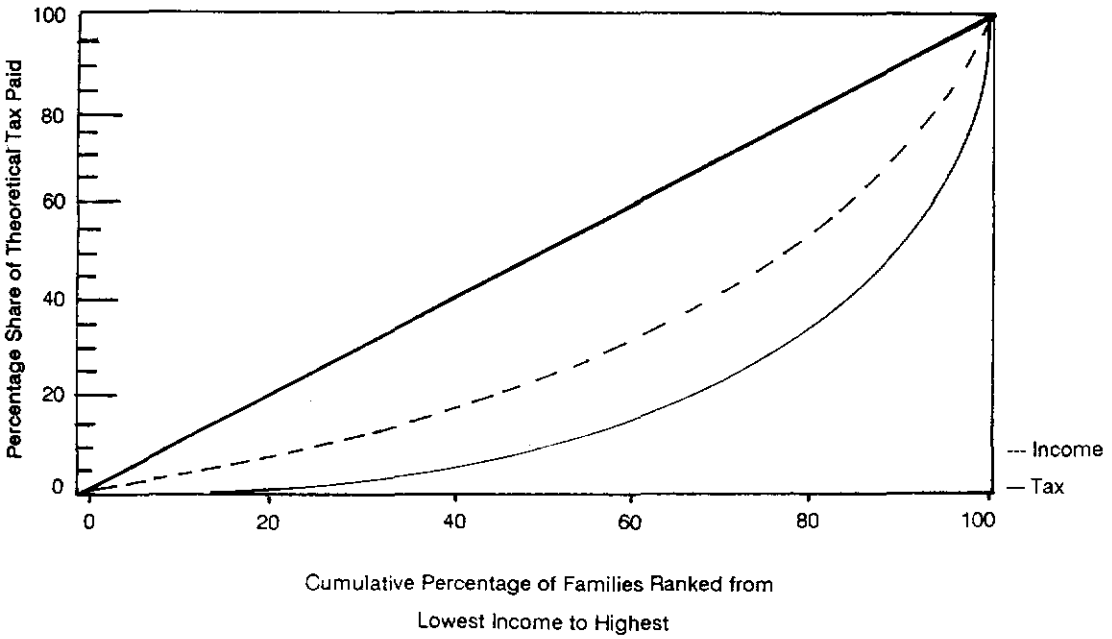
Both countries display a progressive tax system with the Philippine rate lower than the U.S. rate. This result is expected and consistent with reality. We can now accept the Philippine estimate with greater confidence and proceed to analyze the result of Table H.2, paying particular attention to the proportion of tax share vis-a-vis proportion of income share by each Quintile. In Figure 3, we plot the cumulative proportion of tax paid on the vertical axis and the cumulative proportion of families (ranked from the lowest income to highest). The shape of this curve is much different from that of the Lorenz curve. Earlier in the paper, we coined the term "Gini-Tax" coefficient as a measure of tax inequality. Our "Gini-Tax" coefficient yields a value of 0.62 which is higher than the Gini coefficient of 0.5764 for 1985. This means that theoretically, the percent share of tax of the families in the upper income bracket is higher than their percentage share of income.

CONCLUSIONS

Assuming a perfectly efficient tax collection system in the Philippines, there is no need to make the present tax structure more progressive. According to our results, 70 percent of theoretical tax revenues would come from the highest 20 percent of the households

Figure 3

Tax-Distribution Curve



although their total share of income is only 52.5 percent. On the other hand, the lowest 80 percent of households shoulder only 30 percent of the theoretical tax revenues, although their share of income is 47.5 percent. The estimated theoretical tax revenue from individual income in 1985 is ₱16.76B. Compare this to the actual tax revenue collection of ₱6.945B in 1985 (see R.G. Manasan's article). Based on our estimate, the lower 80 percent of the household could have paid ₱5.08B in taxes in 1985 assuming perfect efficiency in tax collection. The balance could have come from the upper 20 percent. In fact, if the tax collection system was perfectly efficient, collection from the upper 20 percent alone would have amounted to ₱11.7B, an increase of 68 percent over the actual tax revenue collected in 1985! We need not even tax the lower 80 percent of the household and still expect an increase of 68 percent in tax collection. This could mean that for household income of less than ₱46,064 (Table G), a zero-rated tax may be applied as long as the tax administration for the upper 20 percent of households is perfectly efficient. This not to say that only the upper 20 percent of households should absorb the tax burden. It only underscores the importance of efficient tax administration.

RECOMMENDATIONS

1) There is no need to restructure the existing tax table for individual income. It is progresssive enough given the present social structure. This is contrary to the recommendation in the Manasan article where the author recommended that the system be made more progressive by adjusting the top rates of the individual income tax upwards so as to recoup some of the revenue lost when these rates were reduced by BP 391 in 1981.

2) Instead of making the system more progressive to recoup the revenue losses, this paper recommends a more efficient tax collection system, paying closer attention to the upper income-bracket households.

APPENDIX A

1: Referring to the present Individual Income Tax Table, ₱ 8,860 falls between the ₱ 5,000 to ₱ 10,000 income bracket. The average amount of tax for income bracket zero to ₱ 8,860 is computed as the weighted average of the first three steps in the tax table, e.g.:

AVE. TAX

$$(0 \text{ to } ₱ 8{,}860) = \frac{2{,}500}{8{,}860} \times ₱ 0 + \frac{(5000-2500)}{8{,}860} \times ₱ 25 + \frac{(8{,}860-5000)}{8{,}860} \times ₱ 141 = ₱ 68$$

where

₱ 25 = 1% x (₱ 5,000 - ₱ 2,500)

₱ 141 = ₱ 25 + 3% x (₱ 8,860 - ₱ 5,000)

Note:

A) The succeeding marginal tax rates are computed as follows:

$$\text{Marginal Tax Rate} = \frac{\text{TAX (Y (N)) - OVERHEAD TAX}}{\text{Y (N) - Y (N-1)}}$$

where

TAX (Y (N)) = tax amount of the upper limit of income bracket as computed from the standard tax table

OVERHEAD TAX = minimum lump sum tax in the income bracket

Y (N) - Y (N-1) = the range of income bracket

B) The minimum tax in the income bracket is the maximum of the immediate previous bracket.

C) To illustrate, let us consider the income bracket ₱ 44,292 to ₱ 53,151. The applicable tax rate is computed as follows:

OVERHEAD TAX = ₱ 2,548 + 13%

(₱ 44,291 - ₱ 35,432)

= ₱ 3,700 (minimum or lump sum tax)

Refer to the present Income Tax Table so that:

TAX (Y(N)) = TAX (₱ 53,151)

= ₱ 3,075 + 15% (₱ 53,151 - ₱ 40,000)

= ₱ 5,047.65

$$\text{MARGINAL TAX RATE} = \frac{₱ 5{,}047.65 - ₱ 3{,}700}{₱ 53{,}151 - ₱ 44{,}292}$$

= 15.2%

= 15% as indicated in Section V, Table F

APPENDIX B

Computation of "GINI-TAX" Coefficient

(Note: Use data from Table H.2 and Fig. 3)

$$\text{"Gini-Tax" Coefficient} = \frac{A}{A + B}$$

where

A = Area bounded by the 45-degree line and the tax distribution curve

B = Area bounded by the horizontal axis, the tax distribution curve and the vertical line along the 100% line

= B1 + B2 + B3 + B4 + B5

B1 = (1/2) (20) (0.46) = 4.6
B2 = (1/2) (20) (2.56) + (20) (0.46) = 34.8
B3 = (1/2) (20) (8.11) + (20) (3.02) = 141.5
B4 = (1/2) (20) (19.22) + (20) (11.13) = 414.8
B5 = (1/2) (20) (69.65) + (20) (30.35) = 1,303.5

B = 1,899.2

A + B = (1/2) (100) (100)
= 5,000

$$\text{"Gini-Tax" Coefficient} = \frac{5{,}000 - B}{5{,}000}$$

$$= \frac{5{,}000 - 1{,}899.2}{5{,}000}$$

= 0.62016

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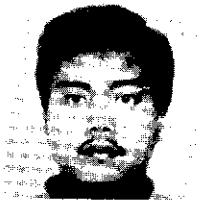

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