# Income Distribution in the Third World:

## *Its Estimation Via Proxy Data*

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ABSTRACT. A two-stage least squares estimate of the *distribution of income* in the *Third World* is derived in this paper using the per capita ownership of cars, infant mortality rates, and the average daily caloric requirement along with the per capita *Gross Domestic Product.* Previous work by *Kuznets* 1955 had established a relationship between the distribution of income and GDP/CAP, but with the inclusion of the three additional "proxy" variables, the distribution of income is estimated with a great deal more precision. For example, the R-squared for the estimate of the share of income earned by the poorest 20% of households increases from 0.30 to 0.68 by incorporating the proxy variables.

Using the parameters estimated via two-stage least squares on a set of 23 countries for which the distribution of income is known, the paper then estimates the distribution of income for a set of 43 countries for which this data is unknown. The results indicate that countries like *Singapore* and *Sri Lanka* have relatively even distributions of income for their stage of development, and countries like *Brazil, Kenya, Bolivia,* and *Gautemala* have highly skewed distributions of income for their level of GDP/CAP.

## I

## Introduction

THE DISTRIBUTION OF INCOME in the Third World has always been an important concern of social scientists in many fields but remains difficult to measure. Since reliable data on the distribution of income exists for only about one third of all developing countries, a serviceable means of their estimation will be useful. The purpose of this paper is to construct a reasonable means of estimating the distribution of income by expanding upon the familiar Kuznets (1955) relationship by including additional variables that are correlated with the distribution of income.[1] The general form of the Kuznets curve can be written:

$$\text{SHARE} = a_0 + a_1Y + a_2Y^2 + u \qquad [1]$$

where SHARE is the share of total income of either the richest or poorest households, Y is Real GDP per capita, and u is a stochastic error term. The aim here

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is to expand equation [1] to include variables that will help predict SHARE more precisely than equation [1].

There are many variables that one can include that are highly correlated with SHARE. The variables chosen in this paper are per capita ownership of automobiles (CARS), the per capita caloric consumption (CAL), and the infant mortality rate (INF). While the results are nearly the same substituting other variables for the ones chosen here, it was found that these three variables best fit criterion described later in the paper.

The construction of the approximation for the distribution of income in this paper involves a two-step process. First, using country data for which the distribution of income is known, we construct an equation to predict the distribution of income using two-stage least squares (2SLS). 2SLS is used to avoid possible simultaneous equation bias. Then, using the parameters estimated, we calculate predicted values of SHARE for a group of countries for which SHARE is not known.

This paper uses income distribution data compiled by the World Bank for 23 developing countries for some period from 1970–80. To single out a particular year would shrink the data set to so few countries (three or four perhaps) as to render any empirical analysis impossible. Thus, this paper operates on the necessary assumption that there are no sudden major shifts in the distribution of income. It is presumed that changes in the distribution of income evolve slowly over time.[2] Thus, using data for the distribution of income within a few years of the midpoint of this decade will allow for a suitably large database without creating serious bias. Accordingly, all other variables used in the empirical analysis to follow are reported for 1975.

The measures for the distribution of income used are LOW20 and HIGH20, the income share of the poorest 20% and richest 20% of households, respectively. The data for LOW20 and HIGH20 are compiled by the World Bank and reported in various issues of the *World Development Report.*

Using OLS to estimate the Kuznets relation, equation [1], yields:

$$\text{LOW20} = 7.17 - \underset{(-2.11)}{0.0032\text{Y}} + \underset{(+1.84)}{6.83\text{E} - 07\text{Y}^2}$$

$$\text{R-squared} = .301 \qquad \text{s.e.e.} = 1.39 \qquad \text{N} = 23 \qquad [2]$$

$$\text{HIGH20} = 45.6 + \underset{(+1.96)}{0.011\text{Y}} - \underset{(-2.04)}{2.95\text{E} - 06\text{Y}^2}$$

$$\text{R-squared} = .160 \qquad \text{s.e.e.} = 5.89 \qquad \text{N} = 23 \qquad [3]$$

where terms in parenthesis below the coefficients are the heteroskedastic-consistent t-ratios (see White 1980), s.e.e. is the standard error of estimation, and N is the number of observations. (See Appendix A for the data and countries used to estimate the parameters of equations [2] and [3]). We can see that the Kuznets relationship can explain only 30% of the variation in LOW20 and only 16% of the variation in HIGH20. More importantly from a policy perspective, it is the deviations from the values predicted by [2] and [3] that are of interest. Thus, the purpose of this paper is to derive a more efficient and unbiased estimate of LOW20 and HIGH20.

In the final section of this paper, estimates of LOW20 and HIGH20 are used to classify countries as having a relatively skewed or a relatively even distribution of income compared with countries of similar levels of GDP per capita. This classif ication is done for both sets of countries, one for the countries for which the actual distribution of income is known, and the other for the set of countries for which the distribution is not known.

## II

## The Proxy Variables

As MENTIONED EARLIER, there are many possible proxy variables that could have been used. The following criterion was used for selecting the three proxies (CARS, CAL, and INF).

1. The proxies are highly correlated with the distribution of income.
2. There is a strong theoretical basis for the proxies correlation with the distribution of income.
3. Data for the proxies is available for a large number of Third World countries.
4. The proxies themselves are not highly collinear.

It is this last criterion that made the chosen combination of proxy variables most ideal. Most other possible proxies were too highly correlated with another proxy that it reduced the efficiency of estimating the t-ratios of the proxy variables.

**The Ownership of Cars.** Data for the per capita ownership of cars indicates that only a very small proportion of the population in the developing countries are able to purchase automobiles. The mean value for CARS is only 14.0 per 1000 population in 1975 for the countries included in this study. For comparison, nearly 1 in 2 people in the United States owned a car in 1975.[3] Thus, for these Third World countries, it is reasonable to assume that the actual ownership of automobiles is restricted by demand, namely, by the proportion of the population with sufficient income to buy an automobile. Further, we can safely assume that the proportion of the population that can purchase automobiles is a function of not only the average real income of the country, but also the distribution of that income. For this reason, we expect that the ownership of cars will be correlated with the income share of the wealthiest households, such that as the wealthiest share of income rises, ceteris paribus, the larger the ownership of cars per capita. The share of income of the poorest households is very highly collinear with the share of income of the wealthiest households, thus, CARS should make a reasonable indicator of the distribution of income. We also expect the proportion of the population that can afford cars to rise as income per capita rises.

**The Caloric Requirement.** The variable CAL is the daily average caloric intake of the population as a percent of the recommended minimum level of calories consumed per day. Food is a necessity and the major constraint on food consumption is presumably income, i.e. consumption levels below the minimum required caloric intake are most likely caused by too little income. For those with incomes above the amount necessary to satisfy their minimum need for food are likely to spend only a decreasing portion of their additional income on food. This implies that the percent of the recommended daily intake of calories is limited by the proportion of the population with the necessary income to purchase (or necessary resources to grow) enough food to fulfill their diets. Thus, like CARS, the demand for calories is related to the proportion of the population with a certain threshold income. Again, we expect that the percent of the population able to meet their required dietary intake of calories rises as income per capita rises. But once the threshold income is reached, higher levels of income should cause an increase in the caloric intake at a decreasing rate. As LOW20 increases, more income is being earned by the poorest households, so their caloric intake will increase substantially. As HIGH20 increases, LOW20 is decreasing, thus we expect that CAL is also a good indicator of the distribution of income.

**The Infant Mortality Rate.** The effect of the distribution of income on infant mortality rates (INF) is discussed in Waldman (1992). He has shown that as the share of income of the poor rises, infant mortality rates decline, ceteris paribus. Thus, like CARS and CAL, we expect INF to be a good indicator of the distribution of income. However, infant mortality rates are also a function of the harshness of the climate. Many African nations located near the equator, face extremely hot and arid conditions which increase infant mortality rates. If we compare infant mortality rates of the African countries in the Sahel region with those of similar countries, i.e. same income per capita, we find the countries in the Sahel have consistently higher infant mortality rates. Thus, using the infant mortality rate as an indicator of the distribution of income would give us a biased estimate for the countries in the Sahel. To correct for this, we first estimate equation [4] using OLS:

$$\text{LINF} = 8.12 - \underset{(-1.11)}{0.541\text{LY}} + \underset{(+3.65)}{0.465\text{SAHEL}}$$

$$\text{R-square} = 0.622 \qquad \text{s.e.e.} = 0.37 \qquad N = 65 \qquad [4]$$

where L before the variable denotes log of and SAHEL is a dummy variable which has the value of 1 for each of the countries in the Sahel region and 0 for the other countries. The infant mortality rates are then adjusted by subtracting 0.465 from the log of the infant mortality rate for the countries in the Sahel region. Appendix E lists the actual and adjusted infant mortality rates for the Sahel countries. We now expect INFA, defined as the adjusted infant mortality rate, to be an unbiased indicator of the distribution of income.

III

## The Empricial Estimation Process

As STATED, the primary purpose of this paper is to derive an estimate of the distribution of income for countries for which this data has not been explicitly compiled. Equations [2] and [3] yielded an OLS estimate of LOW20 and HIGH20 using only the Kuznets (1955) relation. We find that this relation gives us low R-squareds and is thus quite imprecise as an estimate of the distribution of income. More importantly, such an estimate does not provide any insight to the deviations from the Kuznets curve, which may be of extreme interest and importance. We wish to derive an estimate for the distribution of income that accounts for the deviations from the standard U-shaped curve postulated by Kuznets [1955].

The focus of this paper is to use the proxy variables discussed in the previous section to help estimate more precisely the distribution of income. Thus, we aim to derive estimates of LOW20 and HIGH20 using the following equation:

$$\text{SHARE} = a_0 + a_1\text{Y} + a_2\text{Y}^2 + a_3\text{LCARS} + a_4\text{LCAL} + a_5\text{LINFA} + u \qquad [5]$$

where L, again denotes log of, u the stochastic error term, and SHARE is either LOW20 or HIGH20.

However, we cannot estimate equation [5] by using OLS because of simultaneous equation bias. The direction of causality between SHARE and each of the proxies may be unidirectional in either direction or bidirectional. As such, we must estimate the parameters of equation [5] by use of two-stage least squares

(2SLS). In order to apply 2SLS to estimate equation [5] we must identify an appropriate number of exogenous variables which will help explain CARS, CAL, and INF but are not caused by the distribution of income. We can easily identify several instruments, the log of population (LPOP), the log of the area of the country (LAREA), the rate of inflation for the period from 1970–80, and a trade policy variable (TR). The first two instruments are demographic features of the country, the latter two instruments are indicators of government policy. Further more, Y and $Y^2$ are exogenous. The trade policy variable is constructed similar to the trade orientation index in Chenery and Taylor (1968). First, we estimate:

$$LXQY = a_0 + a_1 LY + a_2 LPOP + u \qquad [6]$$

where LXQY is the log of the share of exports plus imports in GDP. Then, we define TR as LXQY minus the value of LXQY estimated by applying OLS to equation [6]. Thus, a positive value of TR indicates a relatively open country, a negative value of TR indicates a more inward-looking country. The values of TR are listed in Appendix F.

The first step in the two-stage least squares process is to derive estimated values of LCARS, LCAL, and LINFA by regressing each proxy on only the exogenous variables. Thus, we use OLS to estimate equation [7] for each proxy:

$$LPROXY = b_0 + b_1 Y + b_2 Y^2 + b_3 LPOP + b_4 LAREA + b_5 TR + b_6 PI + u \qquad [7]$$

The results for each of the three proxies are:

$$\begin{aligned} LCARS = 4.83 &+ \underset{(+2.28)}{0.0017Y} - \underset{(-1.09)}{2.03E-07Y^2} - \underset{(-4.26)}{0.61LPOP} + \underset{(+3.26)}{0.31LAREA} \\ &+ \underset{(+0.76)}{0.32TR} + \underset{(+0.38)}{0.0016PI} \qquad \text{R-squared} = 0.856 \qquad [8] \end{aligned}$$

$$\begin{aligned} LCAL = 4.45 &+ \underset{(+5.07)}{0.00031Y} - \underset{(-5.33)}{7.78E-08Y^2} - \underset{(-0.76)}{0.010LPOP} \\ &+ \underset{(+0.00)}{2.77E-05LAREA} + \underset{(+2.31)}{0.088TR} + \underset{(+6.54)}{0.0027PI} \qquad \text{R-squared} = 0.780 \qquad [9] \end{aligned}$$

$$\begin{aligned} LINFA = 4.01 &- \underset{(-1.94)}{0.00058Y} + \underset{(+1.14)}{8.34E-08Y^2} + \underset{(+0.49)}{0.031LPOP} \\ &+ \underset{(+2.99)}{0.10LAREA} - \underset{(-3.52)}{0.59TR} - \underset{(-1.70)}{0.0038PI} \qquad \text{R-squared} = 0.806 \qquad [10] \end{aligned}$$

where the terms in parenthesis below the coefficients are the heteroskedasctic-consistent t-ratios.

We define LCARSH as the estimated value of LCARS using equation [8], LCALH as the estimated value of LCAL using equation [9], and LINFAH as the estimated value of LINFA using equation [10]. OLS can now be used to estimate unbiased parameters of equation [5] by substituting LCARSH, LCALH, and LINFAH for LCARS, LCAL, and LINFA, respectively. The results are:

$$\begin{aligned} \text{LOW20} = -9.53 &- \underset{(-1.69)}{0.0031}\text{Y} + \underset{(+2.50)}{8.64\text{E}-07}\text{Y}^2 - \underset{(-3.84)}{1.41}\text{LCARSH} \\ &- \underset{(-2.78)}{1.44}\text{LINFAH} + \underset{(+3.14)}{5.51}\text{LCALH} \qquad \text{R-squared} = 0.775 \end{aligned} \quad [11]$$

$$\begin{aligned} \text{HIGH20} = 92.21 &+ \underset{(+1.69)}{0.011}\text{Y} - \underset{(-2.66)}{3.60\text{E}-06}\text{Y}^2 + \underset{(+3.68)}{4.99}\text{LCARSH} \\ &+ \underset{(-2.33)}{7.02}\text{LINFAH} - \underset{(-2.26)}{18.7}\text{LCALH} \qquad \text{R-squared} = 0.617 \end{aligned} \quad [12]$$

where the terms in parenthesis below the coefficients are again, the hetero-skedastic-consistent t-ratios. We can form estimates of LOW20 by using the parameters estimated in equation [11] and using the actual values of LCARS, LCAL, and LINFA. Similarly we can form estimates of HIGH20 using the parameters estimated in equation [12] and the actual values of LCARS, LCAL, and LINFA. The actual values of LOW20 and HIGH20 are compared with the values of LOW20 and HIGH20 estimated through this two-stage process in Appendix B.

The correlation between the actual values of LOW20 and the estimated values of LOW20 using equation [11] is 0.82, a vast improvement over using only the Kuznets relation. If we estimate LOW20 using equation [2], the Kuznets relation, the correlation between the estimated and actual values of LOW20 is only 0.52. The correlation between the actual values of HIGH20 and the values of HIGH20 using equation [12] is 0.79, whereas the correlation between actual HIGH20 and HIGH20 estimated by equation [3], the Kuznets relation, is only 0.40. In both cases, the inclusion of the proxies sharply increases the precision with which the distribution of income can be estimated.

**The Interpolation Process**. It is the precision by which equations [11] and [12] estimate LOW20 and HIGH20 that provides the basis for proceeding to estimate values of LOW20 and HIGH20 for the countries for which the income distribution data is not available. This is done by using the parameters of equation [11] to estimate LOW20 using the actual values of LCARS, LCAL, and LINFA and the parameters of equation [12] to similarly estimate HIGH20 for the 43 developing countries for which all of the necessary data is available. Appendix C presents the fitted values of LOW20 and HIGH20 estimated by way of this interpolation process.

IV

## Classifying Countries Based on Their Skewness of Income

One of the main purposes of this proxy estimation of the distribution of income is to be able to classify the devloping countries on the basis of the relatively even or relatively skewed distribution of income. To do this, comparisons of the distribution of income among countries can only be done on the basis of the Kuznets (1955) relation. Thus, classification is done by comparing the estimated values (or actual values) of LOW20 and HIGH20 with the values predicted by the simple Kuznets relation used in equations [2] and [3]. We shall designate LOWKUZ as the value of LOW20 estimated using equation [2] and HIGHKUZ as the value of HIGH20 estimated using equation [3].

Let us define $SKEW_i$, the measure of the skewness of the distribution of income for country i, as follows:

$$SKEW_i = \frac{LOW20_i - LOWKUZ_i}{1.4} + \frac{HIGHKUZ_i - HIGH20_i}{5.9} \qquad [13]$$

The values 1.4 and 5.9 are the standard errors of estimation of equations [2] and [3], respectively. For the countries for which LOW20 and HIGH20 are not known, we use the values estimated by the 2SLS estimates of equations [11] and [12], respectively. Thus, the value of $SKEW_i$ is the number of standard errors above the Kuznets curve for LOW20 plus the number of standard errors below the Kuznets curve for HIGH20 for country i. A country with a relatively even (for its level of GDP/CAP) distribution of income would have a value of $SKEW_i > 0$ while a country with a relatively uneven distribution would have a value of $SKEW_i < 0$. A complete listing of the values of $SKEW_i$ for all 66 countries used in this analysis is listed in Appendix D.

From the estimates of $SKEW_i$, the countries with the most even distributions of income for their level of Y are Singapore (+4.3), Hong Kong (+2.7), Burkina Faso (+2.2), Burma (+2.1), and Sri Lanka (+1.8).[4] The countries with the most uneven distributions of income are Cameroon (−4.1), Kenya (−4.1), Brazil

(−3.0), Pakistan (−2.4), Bolivia (−2.4), Guatemala (−2.4), Rwanda (−2.4), Panama (−2.1), and Peru (−2.1).[5]

V

**Summary and Conclusions**

THIS PAPER PROPOSES a method for approximating the distribution of income. Toward this end, equations [11] and [12] are derived and estimated using two-stage least squares. The addition of these proxies to the traditional Kuznets relation estimated via equations [2] and [3], where the distribution of income is estimated using only average GDP/CAP, increases the precision of the estimated values of LOW20 and HIGH20 quite substantially. The addition of the proxies reduces the total sum of squared residuals for LOW20 by 68.2% and by 54.4% for HIGH20. In fact, the correlation between LOW20 and and the estimates of LOW20 is 0.82 and the correlation between HIGH20 and the estimates of HIGH20 is 0.79. Thus, the precision of the estimates obtained are compelling.

Using the estimates of LOW20 and HIGH20 obtained using equations [11] and [12] or their actual values where known, a measure of the skewness of the distribution of income is obtained by comparing the values of LOW20 and HIGH20 with the values predicted using only the Kuznets relation. As expected, we found that the East Asian countries of Hong Kong and Singapore topped the list of countries with the most even distribution of income, while the list of countries with highly skewed distributions of income included many Latin American countries.

The estimates provided in this paper should be interpreted cautiously. However, the analysis provided in this paper hopefully gives social scientists a framework for approximating the distribution of income given some small set of data that is more readily available. It may also be the case that a method of estimating the distribution of income such as one used in this paper may actually be more accurate than the traditional surveys done to measure the distribution of income because of the remoteness of large portions of the population, the unreliability of income data, and the problem of unreported income or income in the form of services.

The other purpose of this analysis is to identify countries which have a more skewed or more even distribution of income than others. These classifications may be useful to other social scientists wishing to conduct research related to the causes or effects of the distribution of income. Thus, hopefully, this paper contributes to the literature because it expands the set of countries for which income distribution can be analyzed.

## Notes

1. The Kuznets relation is the relationship between the distribution of income and average national income known as the U-Hypothesis. See Kuznets 1955.

2. Kuznets 1955 discusses the distribution of income as evolving over a long-period time. That is why he found that a simple statistical relationship exists between the distribution of income and Real GDP/CAP.

3. The actual figure was 492.1 cars per 1000 people for the United States in 1975.

4. The values in parenthesis are the value of $SKEW_i$.

5. See note 4.

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## Data Appendix

| VARIABLE | APPLICABLE DEFINITION AND SOURCES |
|---|---|
| Y | 1975 Real GDP per capita. (Summers and Heston 1984) |
| POP | 1975 population in 000. (Summers and Heston 1984) |
| LOW20 | Share of total income earned by the poorest 20% of households in year closest to 1975. (Various issues, *World Development Reports*) |
| HIGH20 | Share of total income earned by the richest 20% of households in year closest to 1975. (Various issues, *World Development Reports*) |
| CARS | The ownership of cars per 1000 people for 1975 (or closest year). (*World Tables*, 3rd ed., V. II, Social Data) |
| CAL | Average % of daily caloric requirement met for 1975. (*World Tables*, 3rd ed., V. II, Social Data) |
| INF | 1975 infant mortality rate or infant deaths per 1000 births. (*World Tables*, 3rd ed., V. II, Social Data) |
| INFA | Infant mortality rate adjusted for the extreme climactic conditions in the Sahel countries. (Described in text) |
| TR | The trade index created to measure the openness of the economy. (See text) |
| AREA | Country's area, 000 square kilometers. |
| PI | Annual rate of inflation from 1970-80. (*World Tables*, 3rd ed.) |
| QXY | Average share of exports plus imports in GDP for the period from 1970-80 expressed. (*World Tables*, 3rd ed.) |
| SAHEL | A dummy variable with the value of 1 for the countries in the Sahel region and 0 for all other countries. |
| LOWKUZ | The estimate of LOW20 constructed using the parameters of equation [2] |
| HIGHKUZ | The estimate of HIGH20 constructed using the parameters of equation [3] |
| SKEW | A measure of the distribution of income. (Described in text) |

## Appendix A

DATA USED FOR ESTIMATING EQUATIONS [11] AND [12]

| COUNTRY | LOW20 | HIGH20 | 1975 RGDP | 1975 POP | 1975 CARS | 1975 CAL |
|---|---|---|---|---|---|---|
| Argentina | 4.4 | 50.3 | 3159 | 25667 | 80.2 | 127.6 |
| Bangladesh | 6.2 | 46.9 | 373 | 78877 | 0.3 | 79.9 |
| Brazil | 2.0 | 66.6 | 1798 | 108032 | 44.7 | 105.9 |
| Costa Rica | 3.3 | 54.8 | 1835 | 1965 | 44.7 | 110.5 |
| Egypt | 5.8 | 48.0 | 929 | 36997 | 5.8 | 111.4 |
| El Salvador | 5.5 | 54.9 | 1005 | 3924 | 10.8 | 95.2 |
| Hong Kong | 5.4 | 47.0 | 2559 | 4400 | 27.3 | 110.4 |
| India | 7.0 | 49.4 | 472 | 608354 | 1.2 | 81.8 |
| Indonesia | 6.6 | 49.4 | 536 | 130192 | 2.9 | 101.8 |
| Kenya | 2.6 | 60.4 | 438 | 13685 | 7.1 | 89.5 |
| Korea | 5.7 | 45.3 | 1530 | 35281 | 3.0 | 109.0 |
| Malaysia | 3.5 | 56.1 | 1532 | 12309 | 33.1 | 113.2 |
| Mauritius | 4.0 | 60.5 | 1260 | 883 | 20.2 | 114.8 |
| Mexico | 2.9 | 57.7 | 2276 | 60153 | 39.9 | 113.5 |
| Panama | 2.0 | 61.8 | 2026 | 1639 | 40.4 | 103.0 |
| Peru | 1.9 | 61.0 | 1860 | 14745 | 17.4 | 102.3 |
| Philippines | 5.2 | 54.0 | 912 | 42015 | 9.1 | 105.2 |
| Sri Lanka | 6.6 | 46.6 | 661 | 13496 | 6.8 | 93.5 |
| Thailand | 5.6 | 49.8 | 930 | 41869 | 6.4 | 103.1 |
| Trinidad | 4.2 | 50.0 | 3173 | 1082 | 93.6 | 101.8 |
| Turkey | 3.5 | 56.5 | 1738 | 40078 | 9.6 | 114.5 |
| Venezuela | 3.0 | 54.0 | 3346 | 12666 | 75.4 | 95.4 |
| Zambia | 3.4 | 61.1 | 791 | 4846 | 18.5 | 92.3 |

Infant Mortality Rates are reported in Appendix E
YEAR is the year when LOW20/HIGH20 are reported

## Appendix B

ACTUAL AND ESTIMATED VALUES OF LOW20 AND HIGH20

| COUNTRY | ACTUAL LOW20 | ESTIMATED LOW20 | ACTUAL HIGH20 | ESTIMATED HIGH20 |
|---|---|---|---|---|
| ARGENTINA | 4.4 | 4.3 | 50.3 | 50.5 |
| BANGLADESH | 6.2 | 8.1 | 46.9 | 43.0 |
| BRAZIL | 2.0 | 1.6 | 66.6 | 64.1 |
| COSTA RICA | 3.3 | 3.5 | 54.8 | 55.8 |
| EGYPT | 5.8 | 5.1 | 48.0 | 53.2 |
| EL SALVADOR | 5.5 | 3.5 | 47.3 | 58.4 |
| HONG KONG | 5.4 | 5.6 | 47.0 | 45.0 |
| INDIA | 7.0 | 6.2 | 49.4 | 49.5 |
| INDONESIA | 6.6 | 6.2 | 49.4 | 49.3 |
| KENYA | 2.6 | 4.7 | 60.4 | 54.5 |
| KOREA | 5.7 | 6.8 | 45.3 | 44.7 |
| MALAYSIA | 3.5 | 3.7 | 56.1 | 55.4 |
| MAURITIUS | 4.0 | 4.3 | 60.5 | 54.0 |
| MEXICO | 2.9 | 2.8 | 57.7 | 58.4 |
| PANAMA | 2.0 | 3.0 | 61.8 | 56.7 |
| PERU | 1.9 | 2.6 | 61.0 | 60.8 |
| PHILIPPINES | 5.2 | 4.9 | 54.0 | 52.6 |
| SRI LANKA | 5.8 | 5.4 | 49.8 | 50.5 |
| THAILAND | 5.6 | 5.3 | 49.8 | 51.2 |
| TURKEY | 3.5 | 3.6 | 56.5 | 58.1 |
| VENEZUELA | 3.0 | 3.3 | 54.0 | 53.3 |
| ZAMBIA | 3.4 | 2.5 | 61.1 | 62.2 |

Estimated LOW20 based on equation [11]
Estimated HIGH20 based on equation [12]

## Appendix C

DATA USED FOR ESTIMATING LOW20 AND HIGH20

| COUNTRY | ESTIMATED LOW20 | ESTIMATED HIGH20 | 1975 RGDP | 1975 POP | 1975 CARS | 1975 CAL |
|---|---|---|---|---|---|---|
| Algeria | 2.3 | 61.5 | 1740 | 16018 | 17.9 | 93.5 |
| Benin | 4.8 | 54.0 | 458 | 3032 | 5.5 | 88.4 |
| Bolivia | 2.8 | 61.3 | 1077 | 4894 | 6.0 | 83.5 |
| Botswana | 3.5 | 58.0 | 993 | 750 | 4.8 | 78.0 |
| Burkina Faso | 8.0 | 43.5 | 292 | 5596 | 1.7 | 93.2 |
| Burma | 7.8 | 43.8 | 312 | 29800 | 1.2 | 107.9 |
| Burundi | 4.2 | 56.5 | 319 | 3720 | 1.2 | 98.5 |
| Cameroon | 2.6 | 61.0 | 833 | 7528 | 7.1 | 102.6 |
| Central Afr. | 2.4 | 61.5 | 517 | 2057 | 5.5 | 94.8 |
| Chad | 3.1 | 58.0 | 451 | 4030 | 19.0 | 74.6 |
| Chile | 3.6 | 57.1 | 1834 | 10196 | 25.1 | 109.3 |
| Colombia | 5.3 | 51.9 | 1596 | 23502 | 16.0 | 96.0 |
| Congo | 2.7 | 60.9 | 1156 | 1376 | 14.5 | 98.3 |
| Dominic Rep. | 3.5 | 57.7 | 1443 | 4697 | 15.2 | 99.8 |
| Ecuador | 6.1 | 49.1 | 1300 | 7063 | 7.4 | 88.0 |
| Ethiopia | 3.9 | 56.9 | 325 | 28763 | 1.8 | 76.8 |
| Ghana | 5.5 | 46.5 | 952 | 9990 | 6.2 | 89.0 |
| Greece | 4.8 | 50.8 | 3360 | 9047 | 48.5 | 138.5 |
| Guatemala | 2.5 | 61.6 | 1249 | 6243 | 12.2 | 92.6 |
| Guyana | 6.4 | 46.7 | 1283 | 762 | 33.9 | 108.5 |
| Haiti | 3.8 | 57.8 | 363 | 4584 | 3.9 | 86.9 |
| Honduras | 3.8 | 57.4 | 871 | 3093 | 5.9 | 91.2 |
| Ivory Coast | 4.9 | 54.3 | 1122 | 6755 | 10.7 | 106.8 |
| Lesotho | 4.5 | 55.5 | 534 | 1192 | 2.9 | 83.8 |
| Liberia | 4.7 | 55.4 | 830 | 1577 | 5.8 | 100.4 |
| Madagascar | 7.3 | 44.7 | 568 | 7603 | 7.3 | 109.5 |
| Malawi | 5.7 | 52.0 | 326 | 5204 | 2.1 | 95.7 |
| Mali | 3.1 | 59.8 | 263 | 5873 | 2.1 | 85.9 |
| Morocco | 3.2 | 59.8 | 1121 | 17160 | 18.7 | 109.0 |
| Nicaragua | 6.1 | 49.4 | 1364 | 2204 | 16.6 | 115.5 |
| Niger | 5.1 | 52.6 | 427 | 4720 | 2.0 | 84.4 |
| Nigeria | 6.0 | 49.5 | 1179 | 74884 | 1.4 | 80.1 |
| Pakistan | 2.9 | 60.9 | 594 | 70876 | 2.9 | 95.5 |
| Papua N.G. | 7.1 | 46.4 | 1008 | 2705 | 6.6 | 84.1 |
| Rwanda | 3.3 | 59.7 | 396 | 4358 | 1.5 | 95.5 |
| Senegal | 4.4 | 55.3 | 813 | 4977 | 9.2 | 92.4 |
| Sierra Leone | 2.6 | 59.3 | 567 | 3045 | 4.9 | 81.5 |
| Singapore | 8.7 | 36.7 | 2875 | 2238 | 66.6 | 130.8 |
| Tanzania | 3.0 | 60.3 | 455 | 15751 | 2.6 | 89.5 |
| Tunisia | 5.7 | 51.1 | 1473 | 5608 | 18.3 | 113.4 |
| Uganda | 7.2 | 45.7 | 613 | 11102 | 2.4 | 89.7 |
| Uruguay | 3.7 | 53.3 | 2731 | 2829 | 44.7 | 112.5 |
| Zaire | 6.1 | 49.7 | 382 | 24965 | 3.6 | 101.6 |

## Appendix D

SKEWNESS IN THE DISTRIBUTION OF INCOME

| **COUNTRY** | **SKEW** | **COUNTRY** | **SKEW** |
|---|---|---|---|
| Algeria | -1.9 | Korea | +3.0 |
| Argentina | +0.5 | Lesotho | -0.8 |
| Bangladesh | -1.3 | Liberia | -1.3 |
| Benin | +0.6 | Madagasca | +1.6 |
| Bolivia | -2.4 | Malawi | -1.0 |
| Botswana | -1.5 | Malaysia | -0.4 |
| Brazil | -3.0 | Mali | -1.9 |
| Burkina Fa. | +2.2 | Mauritius | -1.1 |
| Burma | +2.0 | Mexico | -0.8 |
| Burundi | -1.1 | Morocco | -1.5 |
| Cameroon | -4.1 | Nicaragua | +0.2 |
| Central Afr | -1.9 | Niger | +0.9 |
| Chad | -1.8 | Nigeria | +0.7 |
| Chile | -0.9 | Pakistan | -2.4 |
| Colombia | -1.0 | Panama | -2.1 |
| Congo | -0.4 | Papua NG | +1.3 |
| Costa Rica | -0.0 | Peru | -2.1 |
| Dominican | -1.0 | Philipin. | +0.2 |
| Ecuador | -0.0 | Rwanda | -2.4 |
| Egypt | +1.6 | Senegal | -1.5 |
| El Salvador | +1.7 | Sierra L. | -1.8 |
| Ethiopia | -1.2 | Singapore | +4.3 |
| Ghana | +1.5 | Sri Lanka | +1.8 |
| Greece | +1.1 | Tanzania | -1.5 |
| Guatemala | -2.4 | Thailand | +1.2 |
| Guyana | +0.7 | Trinidad | +0.4 |
| Haiti | -1.6 | Tunisia | +0.2 |
| Honduras | -1.0 | Turkey | -0.3 |
| Hong Kong | +2.7 | Uganda | +1.2 |
| India | +1.0 | Uruguay | +0.2 |
| Indonesia | +0.9 | Venezuela | -1.5 |
| Ivory Coast | -1.1 | Zaire | +0.1 |
| Kenya | -4.1 | Zambia | -2.6 |

Skew > 0 means a relatively even distribution of income for the country's GDP/CAP.

## Appendix E

ACTUAL AND ADJUSTED INFANT MORTALITY RATES

| COUNTRY | INF | INFA | COUNTRY | INF | INFA |
|---|---|---|---|---|---|
| Algeria | 131.7 | 77.8 | Korea | 39.7 | 39.7 |
| Argentina | 49.3 | 49.3 | Lesotho | 123.9 | 123.9 |
| Bangladesh | 142.8 | 142.8 | Liberia | 164.4 | 164.4 |
| Benin | 166.6 | 98.4 | Madagasc | 80.1 | 80.1 |
| Bolivia | 144.8 | 144.8 | Malawi | 184.4 | 184.4 |
| Botswana | 91.8 | 91.8 | Malaysia | 36.6 | 36.6 |
| Brazil | 88.7 | 88.7 | Mali | 165.0 | 97.5 |
| Burkina Fa. | 224.9 | 132.9 | Mauritius | 46.8 | 46.8 |
| Burma | 113.9 | 113.9 | Mexico | 64.2 | 64.2 |
| Burundi | 130.6 | 130.6 | Morocco | 122.0 | 122.0 |
| Cameroon | 120.8 | 71.4 | Nicaragu | 102.7 | 102.7 |
| Central Afr | 160.4 | 94.8 | Niger | 159.0 | 93.9 |
| Chad | 160.4 | 94.8 | Nigeria | 146.3 | 86.4 |
| Chile | 57.9 | 57.9 | Pakistan | 135.6 | 135.6 |
| Colombia | 63.2 | 63.2 | Panama | 33.4 | 33.4 |
| Congo | 140.0 | 82.7 | Papua NG | 118.0 | 118.0 |
| Costa Rica | 40.1 | 40.1 | Peru | 100.0 | 100.0 |
| Dominican | 78.4 | 78.4 | Philipin | 63.6 | 63.6 |
| Ecuador | 93.1 | 93.1 | Rwanda | 137.0 | 137.0 |
| Egypt | 110.0 | 110.0 | Senegal | 156.5 | 92.5 |
| El Salvador | 92.9 | 92.9 | Sierra | 220.5 | 130.3 |
| Ethiopia | 152.0 | 89.8 | Singapore | 15.7 | 15.7 |
| Ghana | 112.0 | 66.2 | Sri Lan | 48.0 | 48.0 |
| Greece | 24.0 | 24.0 | Tanzania | 113.3 | 113.3 |
| Guatemala | 81.1 | 81.1 | Thailand | 62.1 | 62.1 |
| Guyana | 52.8 | 52.8 | Trinidad | 37.5 | 37.5 |
| Haiti | 127.9 | 127.9 | Tunisia | 110.3 | 110.3 |
| Honduras | 103.1 | 103.1 | Turkey | 135.5 | 135.5 |
| Hong Kong | 14.9 | 14.9 | Uganda | 103.9 | 103.9 |
| India | 131.0 | 131.0 | Uruguay | 44.0 | 44.0 |
| Indonesia | 113.0 | 113.0 | Venezuela | 58.7 | 58.7 |
| Ivory Coast | 137.4 | 137.4 | Zaire | 121.8 | 121.8 |
| Kenya | 99.0 | 99.0 | Zambia | 115.3 | 115.3 |

## Appendix F

INSTRUMENTAL VARIABLES USED IN 2SLS

| COUNTRY | TR | PI | AREA |
|---|---|---|---|
| Argentina | -0.73 | 134.2 | 2759.9 |
| Bangladesh | -0.48 | 15.8 | 144.0 |
| Brazil | -0.36 | 42.1 | 8506.4 |
| Costa Rica | -0.31 | 16.2 | 50.6 |
| Egypt | +0.40 | 11.4 | 1002.6 |
| El Salvador | -0.25 | 10.8 | 21.0 |
| Hong Kong | +1.09 | 8.4 | 1.0 |
| India | -0.2 | 8.3 | 3287.6 |
| Indonesia | +0.48 | 20.5 | 1920.2 |
| Kenya | -0.07 | 10.2 | 582.3 |
| Korea | +0.66 | 19.7 | 98.5 |
| Malaysia | +0.61 | 7.4 | 330.0 |
| Mauritius | -0.30 | 15.2 | 1.9 |
| Mexico | -0.24 | 19.2 | 1972.2 |
| Panama | -0.13 | 7.5 | 76.9 |
| Peru | -0.23 | 34.3 | 1282.2 |
| Philippines | +0.08 | 13.0 | 299.9 |
| Sri Lanka | +0.12 | 13.1 | 65.6 |
| Thailand | +0.21 | 10.0 | 513.7 |
| Trinidad | -0.26 | 18.7 | 5.1 |
| Turkey | -0.44 | 32.7 | 781.2 |
| Venezuela | +0.24 | 12.4 | 911.2 |
| Zambia | -0.02 | 8.4 | 757.2 |

## *Inconsistency, Where Is Thy Sting?*

"POLITICS MAKES STRANGE BED FELLOWS" is a familiar statement. Neat turns of phrases too make odd, and sometimes telling, political associations. Stephen Fay suggests a memorable maxim concerning an advantage elected officials have over public servants to whom they often can shift blame for untoward events. In discussing the unfair advantage in dealing with truth and public information that the Treasury has over Bank of England employees, he noted "the Treasury can and will be absolutely vile, *perpetrating every political foul known to political man.*" Might this not serve as a description of recent behavior in Congress in opposition to the health care bills?

It may go along with odious comments and gratuitous and ignorant blanket insults to the government, its leaders, and civil servants all too frequently encountered in what is simultaneously called "the world's greatest democracy." Talk about being unclear on the concept!

Fay also recounts in his *Portrait of an Old Lady* (London: Penguin Books, 1988) the delightful remark of Christopher Dow who "described economists as fools licensed to ask awkward questions." This appropriate observation is a consistent variant of "Economics" as "the gadfly of the social sciences."

F. C. G.