Income Inequality and Food Security

by
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Income inequality is one of the major contributing factors to poverty and food insecurity in low-income countries. The objective of this study is to measure income inequality among countries and discuss the factors that could affect income inequality as they relate to food security. An improved understanding of these relationships will aid in projections of consumption as well as in the formulation of policies to reduce undernutrition. Income inequalty was measured by calculating the gini coefficient for a cross-section of 82 countries.

Introduction

Lack of access to food due to inadequate purchasing power has been identified as the prime cause of food insecurity. Even in countries where national per capita income is relatively high, including some in Southeast Asia and Latin America, the inequality in the distribution of income causes a substantial proportion of their populations to live in poverty and suffer from problems associated with chronic undernutrition. Projections of food availability and access in low-income countries, such as India, Pakistan, Cote d'Ivoire, Nigeria, and El Salvador, show that if food supplies were distributed evenly, all households would be able to meet their nutritional requirements. In these countries, a small reduction in income inequality, even in the absence of growth, can lead to substantial declines in poverty (Bruno, Ravallion, and Squire, 1996) and undernutrition. This article will attempt to measure the degree of income inequality; identify the key factors affecting income inequality; and link the relationship between these factors and the food security situation of developing countries. The findings of this paper can be used to explain how income inequality within a country evolves during the growth process. And, by knowing how the distribution of income will change, projections of the demand for food and the food security outlook can be improved.

Measurement of the Degree of Income Inequality

Income inequality is measured by calculating a Gini coefficient (measure of income inequality) for 82 countries using 1995 data (range of Gini is zero—complete equality—to one—perfect inequality). Of the 82 countries used in the analysis, 62 are developing countries from North Africa, Sub-Saharan Africa, Asia, Latin America, and the Caribbean. High-income countries include 17 OECD countries and 3 Asian newly industrialized countries (table D-1).

A broad range of income inequality is observed among the low-income countries analyzed (table D-2). The Gini coefficients range from a low of 0.27 in countries such as Bangladesh, Madagascar, Malawi, and Rwanda to a high of 0.54 in Guatemala. The degree of inequality also varies by region, with Asia having the lowest rate of inequality of 0.31 among low-income regions, while the average for the 13 Latin American and Caribbean countries, at 0.46, is the highest. The 17 OECD countries, while having significantly higher per capita incomes than the other countries, also exhibit significant variation in income inequality, with an average Gini coefficient of 0.32. Despite this variation, the Gini coefficients for the high-income countries are generally lower than the coefficients for the low-income countries.

Factors Affecting Income Inequality

While the Gini coefficient measures the degree of income inequality, it provides very little insight into the factors that determine it and cause it to change. A broad examination of personal income clearly suggests that income distribution is determined by the distribution of resources and assets among people and the prices received for their services. The change in the distribution of income from the rich to poor will happen when there is a change in the factors that affect the quantity, value, and productivity of assets controlled by the poor (Adelman and Morris). A recent USDA-ERS paper analyzed the significance of three broad groups of variables that could fit into this transfer principal: economic development and technology factors, economic growth variables, and socioeconomic factors. The question is, how can these factors can influence income inequality?

Economic Development and Technology Factors—Economic development, which is often measured by per capita income, is cited in the literature as one of the major determinants of income inequality. A widely held view is that economic growth at least in early stages of the development process causes income inequality to increase to the detriment of the poorest segments of the population. This is based in large

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The Gini Coefficient as a Measure of Income Inequality

The Gini coefficient has been used in nearly all research testing the relationship between income inequality and income (Braun). It is derived from the Lorenz curve, and represents the area between the diagonal and the Lorenz curve (figure D1). The Gini coefficient ranges from 0 to 1, with 1 indicating perfect income inequality. As a measure of inequality, the Gini index is more sensitive to changes in income shares in the middle of the distribution than to changes in shares at the upper or lower ends. Thus relatively small changes in its value can reflect substantial changes in the share of income received by the poorest households.

The cross-country income distribution published by the World Bank (1996) was used to calculate the Gini index for each country. The formula used was

$$G_o = (2 * \mathrm{cov}\ (Y_t, F\ (Y)) / Y)$$

where,

G_o = Gini index of income inequality

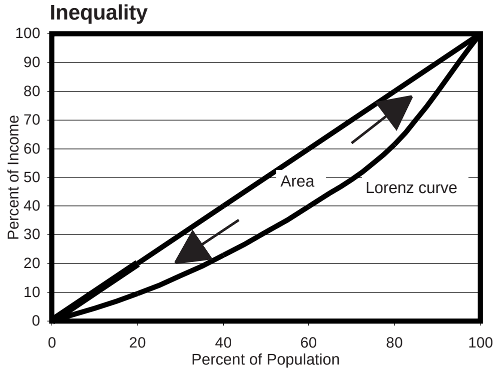
Y_t = mean income in U.S. dollars in tth quintile

F (Y) = cumulative distribution of income

Y = mean income in U.S. dollars.

Note: Further information concerning the derivation of the Gini formula used can be found in the articles by Lerman, et al., 1985.

Figure D-1-- Measuring Degree of Income Inequality



part on a conjecture made by Kuznets. He hypothesized that when national income was low, economic growth would cause income inequality to increase, but at some point during the growth process a point would be reached where continued growth would cause income inequality to begin to decline, forming an inverted U-shape. Inequality is low when national income is low because nearly everyone is living at or near the subsistence level. In the initial stages of the growth process, rapid population growth, urbanization, and industrialization lead to increased income inequality, but as the process continues, social and political factors emerge which then act to reduce income inequality.

Another development indicator is the size of the agriculture sector in relation to the rest of the economy. This is because in the early stages of the economic development, the size of the agricultural sector is large and most of the poor live in rural areas (as is true for most African countries for example). As the economic growth process progresses, labor, along with other resources, shift out of agriculture into the higher growth and higher wage sectors. This shift could cause the income/wage gap between agriculture and the high growth sectors to widen and as a consequence, income inequality to increase. At later stages of the development process (take the United States for example), agricultural productivity will converge with that of the high growth sectors, causing income inequality between the two sectors to decline (Adelman and Robinson). At this point, when the agriculture sector's size relative to the rest of the economy is small, the convergence of incomes is likely to have little effect on the overall distribution of income in the economy. As a result, one would expect a negative relationship between the relative size of the agricultural sector to the rest of the economy and income inequality.

Another significant variable is productivity of the agriculture sector. The agricultural sector in most low-income countries employs over half of the labor force. An improvement in agricultural productivity brought about by increased investment will raise incomes in the agricultural sector, thereby reducing income inequality.

Economic Growth Variables—The rate of economic growth also affects income inequality. This is because with more rapid rates of economic growth, the absorption of labor into the higher growth sectors occurs at faster rates. Unless a country is at a very low level of development, one would expect income inequality to be lower in those countries which are growing the fastest.

Another influential variable is the degree of openness to trade. This is because in developing countries trade protection lowers the return to the most abundant factor of production—labor—and increases it for the less abundant resource—capital. Therefore, with more open economies, income inequality will likely be lower.

Socioeconomic and Political Factors—Socioeconomic and political factors will have an important effect on the distribution of income in a country. The influence of the degree of social development on income inequality can be seen by comparing Sri Lanka to Brazil. Per capita income in Brazil is five times greater than per capita income in Sri Lanka. However, the degree of social development in Sri Lanka is much higher than in Brazil (Geyndt, 1996), and, in turn, the level of income inequality in Sri Lanka is much lower.

Political stability, which is closely related to economic growth and the food security situation in a country, is also very important. Political instability not only creates econom-

Table D-1--List of Countries Included in the Analysis and their Gini Coefficients

NORTH AFRICA		**EAST AFRICA**		**LATIN AMERICA**	
Algeria	0.36	Burundi	0.39	Bolivia	0.46
Egypt	0.36	Ethiopia	0.29	Colombia	0.47
Morocco	0.36	Kenya	0.51	Costa Rica	0.36
Tunisia	0.37	Rwanda	0.27	Dominican Rep.	0.46
CENTRAL AFRICA		Somalia	0.53	Ecuador	0.46
Cameroon	0.34	Sudan	0.53	El Salvador	0.46
Central African Republic	0.40	Tanzania	0.53	Guatemala	0.54
Congo (fka Zaire)	0.53	Uganda	0.30	Haiti	0.46
WEST AFRICA		**SOUTHERN AFRICA**		Honduras	0.53
Benin	0.40	Angola	0.40	Jamaica	0.38
Burkina Faso	0.40	Lesotho	0.51	Nicaragua	0.46
Cape Verde	0.34	Madagascar	0.27	Panama	0.52
Chad	0.40	Malawi	0.27	Peru	0.42
Cote d'Ivoire	0.34	Mozambique	0.51	**OECD**	
Gambia	0.34	Swaziland	0.51	Australia	0.36
Ghana	0.34	Zambia	0.40	Belgium	0.27
Guinea	0.51	Zimbabwe	0.51	Canada	0.33
Guinea-Bissau	0.51	**ASIA**		Denmark	0.32
Liberia	0.53	Afghanistan	0.40	Finland	0.30
Mali	0.39	Bangladesh	0.27	France	0.34
Mauritania	0.39	India	0.29	Germany	0.31
Niger	0.39	Indonesia	0.30	Italy	0.32
Nigeria	0.39	Nepal	0.28	Japan	0.27
Senegal	0.39	Pakistan	0.29	Netherlands	0.27
Sierra Leone	0.53	Philippines	0.37	New Zealand	0.37
Togo	0.39	Sri Lanka	0.28	Norway	0.29
		Vietnam	0.33	Spain	0.26
		NIC (other)		Sweden	0.28
		Hong Kong		Switzerland	0.36
		Korea		United Kingdom	0.37
		Singapore		United States	0.35

Table D-2--Regional Averages

Region	Number of countries	Avg Gini index	Avg GNP/cap 1995 U.S. dollars	Population in rural area 1995 Percent	1996 Freedom House Index
North Africa	4	0.36	1,298	49	5.6
Sub-Saharan Africa	36	0.42	393	71	4.9
Asia	9	0.31	439	74	4.8
Latin America	13	0.46	1,221	47	3.3
Developing Countries	62	0.41	656	65	4.6
OECD	17	0.32	22,279	20	1.2
New Industrialized States	3	0.36	15,600	9	3.3
All	82	0.39	6,083	54	3.8

The Freedom House Index (FHI) data came from "Freedom in the World: Annual Survey of Political Rights and Liberties, 1995-1996," published by Freedom House, New York. The FHI measures the degree of political freedom in a country. The index takes into account political rights and civil liberties in different countries of the world. It ranges from 1 to 7, with 1 representing the most free and 7 the least free.

ic hardship, but it places a disproportionate share of the burden on the poor—the segment of the population most vulnerable to food insecurity. For example, local wars and breakdown of law and order have disrupted the economies of Somalia and Rwanda, leading to impoverishment, famine, and widespread malnutrition.

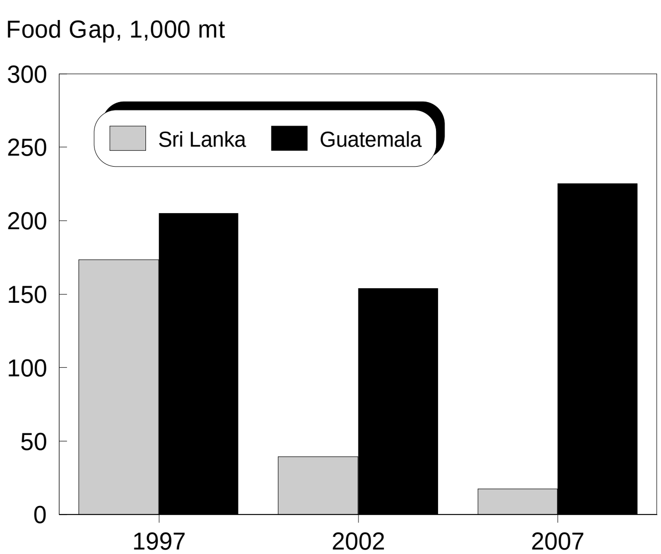
Implication of Income Inequality On Food Security

Food security is not directly determined by changes in income, but by the effect a change in income has on people's access to food. Access to food, and consequently, consumption of food, is more sensitive to changes in income the higher the income elasticity is for food. The income elasticity for food tends to be highest for the segments of the population with the lowest incomes. As a result, a change in the distribution of income that leaves per capita income unchanged, but causes income inequality to increase, will cause food consumption of the segments of the population which are most food insecure to fall. However, as household incomes increase, the incidence of poverty and undernutrition should fall and the rate at which the demand for food increases can also be expected to slow down.

Statistics relating some of the important determinants of income inequality to poverty and food security for selected countries are shown in table D-3. The relationship of income inequality to the incidence of poverty and food security can be seen by comparing the situations in the Latin American countries of Peru and Costa Rica. Both countries have similar per capita incomes, but Peru has a much higher degree of income inequality than Costa Rica. As a result, the percentage of the population living below the poverty line in Peru, 49 percent, is much higher than in Costa Rica, 19 percent. A similar result is found by comparing the Sub-Saharan African countries of Nigeria and Kenya. Both have similar incomes, but because income inequality in Kenya is higher, the percentage of the population living below the poverty line is also much higher than in Nigeria.

Comparing Sri Lanka with Guatemala shows the importance of human development and investment in the agricultural sector to the reduction of poverty and food insecurity. Both countries have similar levels of income in terms of purchasing power parity. In Sri Lanka, investment in agriculture and education is much higher than in Guatemala (World Bank Development Report, 1997). The fertility rate in Sri Lanka is 2.3 births/woman compared to 4.7 in Guatemala; the percentage of the population living below the poverty line is lower in Sri Lanka, 22 percent versus 53 percent in Guatemala. Consequently, the food gap is much higher in Guatemala than in Sri Lanka (figure D-2).

Figure D-2--Food Gap of Sri Lanka and Guatemala



Source: USDA.

In summary, income inequality compounds the problems of food insecurity in low-income countries. Various economic, social, and political factors operating within an economy influence the distribution of income in that economy. These factors are important, particularly in developing countries, which are not only confronted with income distribution problems, but face very low per capita incomes and declining food consumption. They emphasize the importance of increasing the rate of economic growth in conjunction with investing to increase the productivity of the agriculture sector and promoting human capital development. Investing in these areas should stimulate economic growth and raise the incomes of the poor relatively faster than other income groups. It will also lead to the reduction of poverty and increase access to food, thereby reducing the main cause of chronic undernutrition.

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Table D-3--Agricultural and Economic Indicators, Selected Countries

Country	Per captia income GNP 1995	Per captia income PPP 1995	Gini index* 1995	Iliteracy rate 1995	Agricultural land irrigated 1994	Fertilizer use 1994	Ag share of GDP 1995	Population living below poverty line	Total food gap** (nutritional)	Food gap** lowest 20% of population	Children undern. 1995
	$US	$US		Percent	Percent	kg/ha	Percent	Percent	1,000 tons	1,000 tons	Percent
Asia											
Bangladesh	240	1,380	0.27	62	33.9	108	30	48	5,456	1,593	67
India	340	1,400	0.29	48	28.3	80	27	53	0	0	63
Sri Lanka	700	3,250	0.30	10	29.2	113	22	22	97	63	48
Indonesia	980	3,800	0.28	16	15.2	85	18	15	0	0	46
Latin America and the Caribbean											
Peru	2,310	3,770	0.42	11	41.0	51	7	49	466	202	11
Guatemala	1,340	3,340	0.54	44	6.5	96	25	53	483	165	n.a.
Costa Rica	2,610	5,850	0.36	5	23.8	38	15	19	n.a.	n.a.	2
Dominican Rep.	1,460	3,870	0.46	18	16.9	64	15	20	86	36	10
Sub-Saharan Africa											
Kenya	280	1,380	0.51	22	1.5	31	24	50	745	304	22
Congo (fka Zaire)	120	490	0.53	n.a.	0.1	0.5	n.a.	n.a.	2,211	679	n.a.
Tanzania	120	640	0.53	32	4.3	11	52	51	1,028	364	28
Nigeria	260	1,220	0.40	43	0.7	12	33	29	692	672	43
North Africa											
Egypt	790	3,820	0.36	49	100.0	243	16	8	0	0	10
Tunisia	1,820	5,000	0.37	33	7.8	18	15	4	0	0	8

* Calculated using World Bank data, 1996.

** Results of the 1997 ERS Food Security Assessment Model.

Source: World Bank. World Bank Development Indicators, 1997 and World Development Report 1997.