

ECONOMIC GROWTH AND INCOME INEQUALITY IN KOREA

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## ECONOMIC GROWTH AND INCOME INEQUALITY IN KOREA

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## 1. INTRODUCTION

The Korean society is undergoing deep and rapid changes in every of its aspects and the objective of this paper is to present and analyze the evidence concerning economic growth and income distribution since 1960. It focuses on economic inequality and levels of welfare as an important aspect of societal change, while the problem of inequality encompasses all dimensions of a society.

The analysis submitted here gives us the opportunity to answer for Korea some of the questions raised in current discussions of economic development. In recent years, there has been a rising concern with poverty and inequality during the process of economic growth. Following what Hirschman has called "development disasters" in several countries, social scientists and planners have begun questioning the value of economic growth for a rapid eradication of poverty. This new pessimism is definable by a series of propositions which should be scrutinized for Korea, such as:

1. "Underdeveloped countries show markedly greater relative inequality than the developed countries" [2], "...In the developing countries inequalities in income distribution are greater than they were in the industrialized countries before the trend toward growth inequalities was reversed...and...they have become more pronounced in most though perhaps not all countries" ([1], p. 329).

2. "...In a number of countries in which the national average per capita income has reached a level substantially above the bench mark of say, \$100,..., a substantial proportion still has a per capita income below [the] international poverty line" ([1], p. 330).

3. "Higher growth rates generate greater inequality" [2] and "...in the great majority of developing countries the benefits of economic development accrue chiefly to the upper income groups--the highest 20% or 40% of the population--and...in some countries the poorest 20% or even a larger percentile do not participate in the process of economic development at all" [1].

4. "Economic growth by itself may not solve or even alleviate the problem of poverty within a reasonable period of time" [2].

The evidence presented covers mostly the period 1960-1970 and is too short to provide a test for the famous Kuznets hypothesis that "one might... assume a long swing in the inequality characterizing the secular structure; widening in the early phases of economic growth when the transition from the preindustrial to the industrial civilization [is] most rapid; becoming stabilized for a while; and then narrowing in the later phases" ([18], p. 18).

In the first part of the discussion we present the empirical evidence concerning economic inequalities on a nationwide basis. We discuss the sources of evidence, their strength and their limitations, and we provide results of similar analyses for other countries as a basis for international comparisons. Having presented the aggregate evidence we discuss the sources of inequality in Korea and their contribution to the national situation. In a third section we discuss some of the limitations of our measurements and present a variety of views concerning the definition of equality. The main findings of this paper are reviewed in a final section. In an appendix we explain briefly the alternative quantitative representations of income inequality which have been used in the mainstream of the analysis.

We have avoided references to status differentiation and inequality, changing status ideology, occupational structure and social mobility which

are the subject of another presentation. Neither shall we make references to the aspects of political development which have such an extensive bearing on the exact nature of inequality, such as political ideologies, the process of power distribution and political participation; they are the subject of a third discussion.

## 2. THE EMPIRICAL EVIDENCE ON A NATIONWIDE BASIS

The evidence on nationwide patterns of income distribution in Korea is not very extensive nor systematically collected. A variety of survey and non-survey analyses have been made; they are presented here in summary form. The span of time covered by the studies presently available is 1959-1970. In this section we discuss earlier results; additional analyses are presented in later sections.<sup>1</sup>

### 2.1 The Industrial Development Committee Survey for 1958

The first survey of income distribution for Korea was done in 1959 for the Industrial Development Committee of the Ministry of Reconstruction. The survey was taken in June-July 1959 using a three-stage random sample of 2,822 households from urban areas with populations of 20,000 or more. Information was collected only on total personal income in 1958 for each income earner, each respondent indicating the bracket he belonged in among 20 possible choices. No expenditure information was collected to verify the selection of income bracket. The type of question asked, the sampling

<sup>1</sup>The following discussion is heavily indebted to the paper by Chae, Mun-kyoo, Income Size Distribution in Korea [9].

procedures and most particularly the exclusion of farm households greatly diminish the significance of the results. Only a Lorenz curve was estimated and the value of the Gini coefficient deduced from it is  $G = .359$  (see Table 1).

## 2.2 Chae's Analyses of Income Tax Data for 1958, 1960, 1961

Using wage and salary income data together with business income data from the Office of National Tax Administration, Chae has analyzed the distribution of income based on income earners rather than households. He converted tax brackets into income brackets on the basis of the tax rates. He also had to develop adjustment procedures to estimate the actual number of tax-payers. Chae estimated Lorenz curves, Gini coefficients, Pareto distributions, and Gini functions for four different populations: (1) the national data, (2) business income, (3) wages and salaries, (4) agricultural income. While the tax data is comprehensive and has a large statistical base it suffers from a problem of representativity and underreporting given the efficiency of tax collection in that period. Nonetheless the results are quite informative.

Using the usual form of the Pareto distribution:

$$\log N = \log A - \alpha \log X$$

Chae obtains the following results for the nationwide data:

$$1958: \log N = 21.5198 - 2.73 \log X$$

$$1960: \log N = 19.6381 - 2.39 \log X$$

$$1961: \log N = 19.5928 - 2.35 \log X$$

The slight decreases of the value of  $\alpha$  suggests a deterioration toward greater income inequality over these three years.<sup>2</sup> The corresponding

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<sup>2</sup>See the Appendix for a more complete discussion of the Pareto distribution and other measures of inequality.

TABLE 1. GINI COEFFICIENTS OF INCOME CONCENTRATION

	National	Wages and Salaries	Business Income	Farm Income	Urban Income	Data Base
1958 (I.D.C. Survey)	.359	----	----	----	----	Urban sample of 2,822 households
1958 (Chae)	.464	.446	.551	.371	----	National Income Tax Returns
1960 (Chae)	.448	.450	.548	.387	----	National Income Tax Returns
1961 (Chae)	.438	.429	.553	.393	----	National Income Tax Returns
1958-61 Av. (Chae)	.450	.442	.550	.384	----	National Income Tax Returns
1966 (Chung-Ang)	.335	.296	.278	.299	.315	799 Urban + 971 Rural Households
1968 (E.P.B.)	.363	.241	.523	.310	.367	10,000 Urban + 10,000 Rural Households
1970 (Chae)	.375	.380	.625	.309	----	National Income Tax Data
1970 (Renaud)	----	.250	----	----	----	1970 Census Data + Wage Survey
1972 (E.P.B.)	Unreleased					

values of the Theil inequality index are:

1958 :  $T = .120$

1960 :  $T = .137$

1961 :  $T = .187$

In terms of Gini coefficients, Chae obtains the opposite results of a mildly improving income distribution (see Table 1). The possible explanation of the contradiction appears to lie in the poor fit of the Pareto distribution for his three samples as suggested by his graphical representation (see [9], p. 6).

The most solid result of his analysis is the expected finding that inequality within group is the highest for business income, then come wages and salaries, and finally agricultural income. The national Gini coefficient is closest to that of wages and salaries.

### 2.3 The Chung-Ang University Income and Expenditures Survey of 1966

This survey was designed for the analysis of income distribution and consumption patterns by income brackets, involving a total of 799 households in urban areas and 971 households in rural areas, using interview and bookkeeping methods for the two months of January and March 1966. Lorenz curves, Gini coefficients and Pareto coefficients were estimated for four separate groups: wage and salary earners, trade and business households, farm households and non-farm households.

Because of its small sample size, of excessively narrow income intervals of 2,000 Wons for annual income (\$7.41 of 1966) and inappropriate compilation, the results are weak. The degree of income dispersion is quite small according to the Gini coefficient calculated for each of the four groups. The survey did not include a Gini coefficient for the entire



sample; in his paper, Chae estimates it to be equal to .335. The values of parameter  $\alpha$  for the Pareto distributions fitted on the four income groups must have been misreported since they fall below the minimum theoretical value of one (see Appendix, Section 5.a for a discussion of this point).

#### 2.4 The Unpublished Survey of 1968

The first survey without problems with respect to sampling procedures or the definition of the measurement unit has been performed in December 1968 to cover the income of the 12 months from December 1967 to November 1968. It provides the first truly reliable benchmark for the analysis of the evolution of income distribution in Korea. As of this date its content has not been released officially.

According to Chae, it consisted of a stratified sample of 20,000 households equally divided between rural and urban areas. On the income side various income sources were surveyed in detail. On the expenditures side, five major categories were established: food and beverages, housing, fuel and light, clothing and miscellaneous expenditures. The five Gini coefficients which Chae reports from this survey show that the degree of income inequality in Korea was low in 1968 with the greatest degree of inequality to be found for business income and the smallest for wage and salary earners (see Table 2).

#### 2.5 Chae's Estimates for 1970 Based on Tax Data

With such heterogenous attempts at measuring income inequality Chae performed the same analysis on the 1970 tax data which he had performed

TABLE 2. LORENZ CURVES BY SECTORS  
(Share of Total Income for Each Population Decile)

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	D <sub>7</sub>	D <sub>8</sub>	D <sub>9</sub>	D <sub>10</sub>	Total	Decile Inequality
<u>National</u>												
1958 (I.D.C.)	1.7	4.1	5.2	6.5	7.5	8.5	9.5	12.0	14.0	30.0	100.0	.289
1960 (Chae)	1.8	2.7	3.8	5.2	6.8	8.7	11.0	13.5	16.5	30.0	100.0	.344
1966 (Chung-Ang)	2.5	3.5	5.3	7.2	8.0	9.5	10.7	13.0	15.6	24.7	100.0	.267
1968 (E.P.B.)	2.7	4.3	5.1	6.4	6.8	8.9	9.3	11.8	14.7	30.0	100.0	.294
1970 (Chae)	2.5	4.0	5.0	6.5	6.5	8.0	9.8	12.7	15.5	29.5	100.0	.308
<u>Urban</u>												
1966 (Chung-Ang)	2.0	4.0	6.5	7.5	8.5	9.5	10.5	12.5	15.0	24.0	100.0	.244
1968 (E.P.B.)	2.5	3.9	5.6	6.8	6.9	9.7	9.6	11.3	15.2	30.5	100.0	.300
<u>Rural</u>												
1960 (Chae)	2.0	4.0	5.0	7.0	8.0	9.5	11.0	12.5	18.0	23.0	100.0	.272
1966 (Chung-Ang)	3.0	4.3	5.7	7.0	8.5	9.5	11.0	13.0	16.6	21.5	100.0	.244
1968 (E.P.B.)	3.0	4.8	6.4	6.8	7.5	9.3	9.9	12.4	14.6	25.3	100.0	.248
1970 (Chae)	3.0	4.3	5.7	7.0	8.0	9.5	10.5	13.0	16.5	22.5	100.0	.248
<u>Wage &amp; Salaries</u>												
1960 (Chae)	2.0	3.0	5.0	6.0	8.0	9.0	10.5	12.0	16.5	28.0	100.0	.300
1968 (E.P.B.)	3.1	4.9	6.9	7.8	9.5	10.3	12.2	13.6	14.9	16.8	100.0	.198
1970 (Chae)	2.0	3.5	5.0	6.0	7.0	9.0	9.8	13.2	16.0	28.5	100.0	.308
<u>All Occupations</u>												
1970 (Renaud)	5.6	6.7	7.7	7.2	7.5	7.7	7.8	9.4	16.5	24.1	100.0	.227
<u>Business Income</u>												
1960 (Chae)	2.0	2.3	3.2	3.5	4.8	5.7	8.5	10.3	13.7	48.0	100.0	.461
1968 (E.P.B.)	2.2	2.6	3.3	4.2	5.0	6.9	7.3	9.6	15.1	44.8	100.0	.444
1970 (Chae)	2.5	1.5	2.0	3.0	3.0	4.5	6.5	10.0	16.5	52.5	100.0	.544

(Source: Chae [ ], Table 1)

earlier for 1958, 1960 and 1961. Compared to the average of these three years, Chae found a much improved income distribution in 1970 for the entire country and agricultural income. The degree of inequality for wage and salary earners was found improved. He found a deterioration of income distribution only within the business income group. The decline in the national Gini coefficient was from an average value of .450 for the three early years down to .375 a decade later in 1970.<sup>3</sup>

## 2.6 International Comparisons of Income Distribution

In his 1972 paper Chae has reported the share of total income for each decile for five different years between 1958 and 1970. The result for the comprehensive national income distribution are very consistent except for the Chung-Ang survey which seems to underestimate strongly the shares of upper deciles. There is no clear trend apparent from the four other observations; if anything the Chae results show an improvement during the 1960's for the low income groups, and the overall distribution (see Table 2).

While it is clearly hazardous to make international comparisons of surveys which do not rely on strictly identical procedures and definitions, the international evidence indicates that Korea ranks among the countries with the smallest degree of income inequality in Asia. Oshima has shown that Korea, Taiwan, Japan as well as Malaya have a moderate degree of

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<sup>3</sup> A reporting problem with these comparisons is that Chae provides in his text, page 5, the four values of .448, .450, .548 and .387 for all Korea, wages and salaries, business income and agricultural income, while he reports for the same year of 1960 the values of .418, .378, .557 and .338 in his Table 1. We report the first series of results in Table 2.

income inequality, compared to other countries in South-East Asia and less inequality than the United States [25]. We are using for the present comparison the results of the 1968 survey which is the most reliable for Korea and the 1963 and 1968 U.S. results compiled by Budd [7] because they are the most comprehensive. The conclusions of the Oshima comparisons still hold: the lowest forty percent of the population in the three East-Asian countries enjoy a greater share of national income than the corresponding group in the United States. However, the share of the top two deciles ( $D_9 + D_{10}$ ) is slightly less for the U.S. in 1968 (43.1%) than for Korea the same year (44.7%), indicating that middle-class groups are stronger in the United States than in Korea.

It is clearly arbitrary to use the United States as a reference point, but it remains that Korea does not have more inequality than that country; less, if one chooses to emphasize the most disadvantaged low income groups. Since the American income distribution has changed very little between 1960 and 1970 the choice of year is not crucial (see [7] for time series analyses). Alternative methods of international comparisons used by Chenery et al. covering sixty-six countries confirm this finding that Korea is one of the countries enjoying the least degree of income inequality ([10], Table 1).

### 3. THE SOURCES OF INEQUALITY IN KOREA

#### 3.1 Further Results on the Dispersion of Earnings by Occupation in 1970

Among all the estimates discussed in the previous section, the results obtained by Chae are the most informative because they are based on the same data source and the same analytical procedures. However, they are

TABLE 3. COMPARISON OF SIZE DISTRIBUTION OF FAMILY INCOME, SELECTED ASIAN COUNTRIES, UNITED STATES  
BY INCOME SHARES OF DECILE GROUP

Country	Year	Share (in Per Cent) of Total Income for Each Decile Group										Total	Gini Coeff.	Index of Decile Inequality
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	D <sub>7</sub>	D <sub>8</sub>	D <sub>9</sub>	D <sub>10</sub>			
United States*	1963	0.8	2.5	4.4	6.1	7.8	9.6	11.5	13.5	16.5	27.3	100	.42	0.32
	1968	1.0	2.9	4.5	6.3	7.9	9.6	11.3	13.4	16.0	27.1	100	.40	0.31
Japan	1963	3.0	4.7	5.7	7.3	7.9	9.0	10.4	12.0	16.0	24.0	100	.35	0.25
Taiwan	1964	3.0	4.8	5.7	6.9	7.6	8.9	9.8	13.2	13.8	26.3	100	.36	0.26
South Korea**	1968	2.7	4.3	5.1	6.4	6.8	8.9	9.3	11.8	14.7	30.0	100	.36	0.29
Philippines	1965	1.1	2.9	3.0	4.7	5.8	6.9	9.0	11.6	15.0	40.0	100	.51	0.41
Thailand	1962	2.8	2.9	3.1	4.1	5.1	6.8	8.2	9.3	14.7	43.0	100	.50	0.42
Malaya	1957/58	2.6	3.9	6.1	5.1	7.2	8.5	10.3	12.4	16.1	27.8	100	—	0.29
Ceylon	1963	1.5	3.0	4.0	5.2	6.3	7.5	9.0	11.2	15.5	36.8	100	.45	0.37

Sources:

- \* (U.S.) Edward C. Budd [7], pp. 251 and 255.  
 \*\* (S. Korea) Chae [9], Table 1.  
 Others Harry T. Oshima [25], p. 13.

very dependent upon the quality of tax collections and on the definition of income-receiving units. The most reliable picture of the Korean income distribution remains the 1968 survey and until the new 1972 survey is made available (or at least its summary statistics like the Gini coefficients) it is difficult to cross-check the findings of an seemingly improving income distribution during the last decade provided by the four annual observations obtained by Chae.

At the present time, we can also examine the distribution of wages and earnings according to occupation for wage and salary earners in 1970 by combining the information of the 1970 Population Census to the results of the comprehensive wage survey of 1971 covering all occupations. The 1970 census results give the distribution of the employed population on the basis of the 80 two-digit occupational categories on October 1, 1970. The 1970 comprehensive wage survey gives average national earnings (regular wages, additional wages and bonuses) for the three-digit occupational classification six months later on April 1, 1971. While it is well established that wage levels are not the same in different provinces, it is still possible to estimate the degree of inequality nationwide and for each province under the acceptable assumption that relative wage differentials between occupations at the provincial level are consistent with the national rankings of these occupations according to wages.<sup>4</sup>

The results are reported for Korea, all Sis, all Eups and Myons, as well as for the 11 provinces in Table 4. These new estimates based on reliable and comprehensive sources are very close to the best information available earlier in the 1968 survey. The increase of the Gini coefficient

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<sup>4</sup> Note that this assumption is not as limiting as it would appear at first sight, because we are focusing on inequality within each area separately; then we compare relative inequality with the Gini coefficients at different locations.

TABLE 4. GINI COEFFICIENTS FOR WAGE AND SALARIES  
BY OCCUPATIONS - KOREA 1970

Population Covered	Gini Coefficient	Rank
All Korea	.250	-
Sis	.307	-
Eups	.261	-
Myons	.124	-
Seoul	.313	11
Pusan	.302	10
Kyonggi	.241	9
Kangwon	.198	5
Choongbug	.173	1
Choongnam	.204	7
Chonbuk	.187	3
Chon nam	.180	2
Kyongbug	.226	8
Kyongnam	.190	4
Cheju	.195	6

for nationwide wages and salaries from .241 in 1968 to .250 would suggest a small but significant deterioration in the direction of greater inequality.<sup>5</sup>

### 3.2 Regional Differences in Earnings Inequality

One of the advantages of using the census returns on the distribution of occupations is that it allows us to explore the degree of inequality by level of urbanization and by province. The Gini coefficients are presented in Table 4, they show that inequality is associated with the degree of urbanization when the G-coefficients rise from .124 Myons to .307 for Sis. It must be noted, however, that the low value for Myons reflects the small number of occupations present in these rural places and the fact that the computations are based on observed mean values for each occupation: the Gini coefficients reflect variations between occupations with no dispersion within occupation. This lack of dispersion within occupation does not have a significant influence at the provincial levels where dispersion between occupation dominates because of the relative uniformity of farm earnings at a low level compared to other occupations. The results of Table 4 show very significant variations in the degree of earnings inequality among province with Choongbug scoring best and Seoul worst.

To test the sources of inequality across provinces we hypothesize that earnings dispersion within each province is a function of the level of urbanization, the level of education of its population and its industrial structure:

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<sup>5</sup> It must be noted that our estimate of the Gini coefficient is very close to its true value because of the use of 80 income classes. It is well known that G is underestimated when the number of income classes is small. Chae does not report the procedures used in the 1968 survey.



$$G_i = f(U_i, E, M_i)$$

where:

$U_i$  = the relative share of the Si population in the total population of province i.

$E_i$  = the share of population with secondary education or better.

$M_i$  = the share of mining and manufacturing employment.

The results are remarkably good; we have:

$$G = .116 - .092 U + .299 E + .324 M$$

$$(-2.23) \quad (4.74) \quad (4.11)$$

with  $R^2 = .980$  and the level of significance of the t-value  $t_{.05} = 1.895$  and  $t_{.005} = 3.49$  for the present degrees of freedom. The value of the intercept .116 is very close to that found for Myons which represent the lowest level of income inequality.

The elasticities of the Gini coefficient with respect to these three factors are:

$$\eta_U = -.1537$$

$$\eta_E = .4268$$

$$\eta_M = .1938$$

They indicate that both the level of education and the industrial structure contribute to an increase in inequality with education having the stronger effect. This result is not surprising considering the stage of development where Korea was in 1970. What is more striking is the fact that urbanization per se contributes to more equality not less, a fact hidden by the strong collinearity typically observed between urbanization, education and industrialization and the dominant influence of the latter two factors. The partial correlation coefficients between G and each factor net of the influence of the two others are:

$$r_{GU \cdot EM} = -.645$$

$$r_{GE \cdot UM} = .873$$

$$r_{GM \cdot UE} = .841$$

The beneficial impact of urbanization per se on earnings inequality obtained in this analysis is quite consistent with the repeated findings of Lee and Barringer that the distribution of rural-urban migrants according to status improves after migration to cities (see for instance [20], particularly Figures 1, 2, 3).

The effect of education is quite consistent with the recent findings of Chiswick who has investigated the relationship between earnings inequality and economic development. He shows that the dispersion of earnings measured by the variance of their log value increases with the number of years of education and the rate of return to that education.<sup>6</sup> He found that "relative earnings inequality is larger, the larger the absolute inequality of schooling and the larger the level and inequality of rates of return from schooling" ([11], p. 38).

The inequality introduced by new manufacturing industries is due to the introduction of new technologies, larger levels of capital per worker and higher levels of productivity per worker, which tend to increase the

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<sup>6</sup> An individual could earn  $Y_0$  in year  $t_0$  and all following years without training. He could also invest a proportion of his earnings  $kY_0$  for more training which will yield a rate of return  $r$ . His earnings in year  $t_1$  would be  $Y_1 = Y_0 + r(kY_0) = Y_0(1+rk)$ . After  $n$  years of education:  $Y_n = Y_0(1+rk)^n$ . In logarithm this yields the approximation  $\ln Y_n \approx \ln Y_0 + nk r$ . Since  $\ln(1+a) \approx a$  when  $a$  is small. With  $\ln Y_0$  and  $k$  uniform for all individuals, the following results obtain: ([11], p. 22):

$$V(\ln Y) = k^2 \text{Var}(N_i r_i)$$

gap between the earnings of new modern occupation and those of the more traditional activities.

### 3.3 The Significance of Rural-Urban Inequality

Lacking the detailed information available in genuine income distribution surveys we cannot use the Theil index of inequality to measure the separate contribution of rural-urban inequality to the value of the comprehensive national coefficients. But the evolution of rural-urban inequalities is easy to document with the help of the quarterly income and expenditures surveys performed by the Economic Planning Board since 1963. While these surveys are somewhat too small for income distribution analysis and cannot be disaggregated, they can still be used to trace the evolution of consumer expenditures in urban areas. Similarly the annual Farm Household Surveys performed by the Ministry of Agriculture and Forestry document the situation of the rural sector in a very detailed fashion.

In Table 5 we report the level of total consumption expenditures per household and their allocation among major categories for farm and non-farm households. The data show that the level of consumption expenditures in real terms has practically doubled over the last ten years for city households while it has progressed very slowly for farm households.<sup>7</sup> Per capita expenditures which adjust for the declining average household size are not significantly different. In Table 6 we have calculated countrywide per capita consumption expenditures between 1953 and 1971 on the basis of total personal income reported in the national accounts. This series

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<sup>7</sup> There is no contradiction between the existence of a rural-urban income gap and the previous finding that the partial effect of urbanization is toward income equality, other factors like education and industrial composition being equal. As we know, higher education and industry are found in cities and other things are not equal.

TABLE 5. ANNUAL CONSUMPTION EXPENDITURES PER HOUSEHOLD  
(A) In All Cities, (B) For Farm Households

		Total Expenditures (Current W)	Total Expenditures (1970 W)	Household Size	Per Capita Expenditures (1970 W)	Food (% of total)	Housing (%)	Fuel & Light (%)	Clothing (%)	Education (%)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(A)	<u>All Cities</u>									
	1964	103,440	201,245	5.56	36,195	59	13	5	5	5
	1965	117,360	200,959	5.56	36,143	34	14	6	6	4
	1966	162,720	248,807	5.56	44,750	48	18	6	8	5
	1967	247,440	341,296	5.55	61,495	44	18	6	10	5
	1968	278,280	345,260	5.54	62,321	42	17	5	11	7
	1969	312,840	352,694	5.53	63,778	41	18	5	11	6
	1970	359,400	359,400	5.48	65,585	40	18	5	10	7
	1971	419,640	373,677	5.40	69,200	41	19	5	9	7
(B)	<u>Farm Households</u>									
	1964	101,118	196,727	6.35	30,980	59	3	7	4	4
	1965	100,492	172,075	6.31	27,270	53	4	8	4	4
	1966	109,878	168,009	6.21	27,050	50	4	8	6	6
	1967	127,667	176,092	6.22	28,310	49	4	8	6	6
	1968	143,104	177,548	6.17	28,776	47	5	8	7	7
	1969	171,371	193,203	6.12	31,570	46	4	8	7	7
	1970	207,766	207,766	*5.92	35,095	46	4	8	7	7
	1971	242,280	215,743	5.93	36,380	48	3	8	7	7

(2.A) Deflated by Seoul Consumer Price Index 1970.

(2.B) Deflated by the average index of prices paid for farm household goods.

(3.A) E.P.B. Statistical Yearbook.

(3.B) Farm Household Surveys.

\*The 1970 Agricultural Census reports a household size of only 5.80.

Source: Bank of Korea, Statistical Yearbooks.

TABLE 6. ANNUAL PER CAPITA PRIVATE CONSUMPTION IN KOREA

	(1) Private Consumption Expenditure in Current 1 bill W	(2) Private Consumption Expenditures (1 bill W) at 1970 Prices	(3) Population Unit:1,000	(4) Per Capita Consumption (Current W) Unit:1W (1)÷(3)	(5) Per Capita Consumption in 1970 W (2)÷(3)	(6) Per Capita Consumption in 1970 U.S. Dollars (1\$ = 320 W)
1953	39.86	658.15				
1954	55.84	710.10				
1955	100.28	775.09	21,502,000	4,663.75	36,047.34	112.65
1956	140.63	809.52	22,307,000	6,304.30	36,288.35	113.41
1957	165.50	840.36	22,949,000	7,211.64	36,618.59	114.43
1958	170.77	882.43	23,611,000	7,232.65	37,373.68	116.79
1959	181.49	924.72	24,291,000	7,471.49	38,068.42	118.36
1960	207.26	942.62	24,989,000	8,294.05	37,721.39	117.88
1961	245.44	950.65	25,700,000	9,550.19	36,990.27	115.59
1962	293.79	1,017.73	26,432,000	11,114.94	38,503.71	120.32
1963	403.31	1,055.51	27,184,000	14,836.30	38,828.35	121.34
1964	586.31	1,124.20	27,958,000	20,971.10	40,210.32	125.66
1965	668.30	1,201.12	28,754,000	23,241.98	41,772.28	130.54
1966	805.18	1,282.37	29,375,000	27,410.38	43,655.15	136.42
1967	985.97	1,396.87	30,067,000	32,782.43	46,458.58	145.18
1968	1,204.44	1,545.55	30,747,000	39,172.60	50,266.09	157.08
1969	1,493.65	1,705.63	31,410,000	47,553.33	54,302.13	169.69
1970	1,884.25	1,884.25	32,056,000	58,779.95	58,779.95	183.69
1971	2,337.32	2,080.12	32,429,000	72,074.99	64,143.82	200.45

Sources: (1)-(2) National Accounts, Expenditures on CNP, BOK National Income Statistical Yearbooks.  
 (3) Population at the end of the year.  
 (6) Exchange rate in 1970: 320 Won for one U.S. Dollar.

covers groups which are typically not reached by household surveys such as various non-profit institutions, persons living in military housing,

hospitals, factory dormitories and other similar types of institutions.

A blow-up of income survey data typically gives a level of total income and expenditures 70 to 80% of the national accounts data (see Oshima [25]), the bias is heavier on the urban side than on the farm side.

The rural-urban gap in terms of consumption expenditures can be evaluated by taking the ratio of farm to non-farm consumption, either on the basis of the urban surveys or using the national accounts data (which are biased downward for that comparison since they include farm households).

The two series of ratios are as follows:

	<u>Survey Ratio</u>	<u>National Account Ratio</u>	<u>Farm Price Parity Ratio</u>
1964	.98	.84	112.1
1965	.86	.76	100.8
1966	.68	.60	95.4
1967	.52	.47	96.5
1968	.51	.47	94.3
1969	.55	.51	97.7
1970	.58	.54	100.0
1971	.58	.53	106.1

These two ratios show that since 1964 the rural sector has been losing ground and that rural-urban inequalities have increased. In 1964 the degree of equality was fairly good but the situation has deteriorated rapidly, differences being at their worst in 1967-68 partly due to government pricing policies of low farm prices which favor the urban population and of discriminatory low levels of investments in agriculture compared to other sectors. With more favorable policies as indicated by

the Farm Price Parity Ratio--which measures the relative movements of prices received and prices paid by farmers--the rural sector has been regaining ground. The contribution of rural-urban migration to this upturn is also very significant.<sup>8</sup>

Because of the bias involved in the use of the rural-urban ratio based on national average consumption according to the national accounts we have adjusted this ratio in Table 7. There is evidence that the farm household consumption and expenditures surveys reflect accurately the level of consumption of farm households. Based on the survey figures we have estimated total farm consumption (Table 7, Column 3) and deducted it from total national consumption, leaving urban consumption as the balance (Table 7, Column 5). Then it is easy to derive the new estimate of per capita urban consumption (Table 7, Column 7) and the adjusted rural-urban ratio.

The time pattern of rural-urban inequality remains the same but its variation is less strong than in the two earlier ratios (with the exception of 1964-65). The standard of living in terms of consumption in the rural sector is 40 percent below the urban sector, and is relatively stable at that level since 1966. A by-product of this calculation is the estimate of the downward bias of the urban income and expenditures surveys. Comparing Table 5, Column 4-A with Table 7, Column 7, we can see that the downward bias for urban expenditures in the first three years is quite high (the 1965 figure is very questionable). Later on, there appears to be a downward bias between 20 and 30% in the reported survey figures.

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<sup>8</sup>As shown in Table 7, almost 1.4 million people moved to cities between 1967 and 1971 and the farm population declined by exactly 8.5 percent in four years; this is an uncommonly high rate of rural-urban migration.

### 3.4 Inequality Within the Agricultural Sector

While the gap between the farm and non-farm level of consumption expenditures is an important source of inequality, inequality within the rural sector is very low as indicated by the Gini coefficients in all surveys (see Table 1, Column 4). In addition, these coefficients indicate an improvement of inequality within the sector.

The reasons for this situation are two-fold. First, the land reform from 1947 to 1949 has limited the ownership of agricultural land to three chongbo (or hectares), thus preventing large inequality of rural income in the upper-tail of the distribution. To quote Brown: "Land reform in Korea came in two stages, distribution of land formally owned by Japanese landlords in 1947 during the period of military government, and holdings by individual owners of more than 7.5 acres (3 chongbos, or approximately 3 hectares) in 1949. Approximately 970,000 tenant farmers and landless farm laborers became landowners, and approximately 570,000 small farmers were able to extend the size of their holdings. Thus about 62 percent of Korea's then 2.5 million farm families benefited from the land reform ([5], pp. 38-39).

Second, on the lower-tail of the income distribution rural-urban migration is rapidly depleting the ranks of landowners with extremely small landholdings and larger holdings (by Korean standards) have increased slightly. The annual farm household surveys show very clearly the strong relationship between the size of land holding and income received. The heavy concentration of landowners between 0.3 and 1.5 chongbos explains the very egalitarian nature of the Korean society at low levels of income.<sup>9</sup> In 1970, the farm household owning 0.5 to 1.0 chongbos has 5.66 family

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<sup>9</sup> Off-farm work does not compensate very significantly for the influence of land ownership in the comparison of farm household incomes.



members (half of them only working on the farm) with a total combined income of 211,730 won per year which is equivalent to about 120 U.S. dollars per capita<sup>10</sup>.

### 3.5 Inequality Within the Urban Sector

We have already shown in Section 3.2 that on a cross-sectional basis inequality in wages and salaries increases with the degree of urbanization of a population place. We have noted that this happens because of the correlation between city size, the average level of education of the residents and the greater share of modern activities with high wages and salaries. Following John Friedmann one could make an attempt to implement empirically the concept of "core-periphery" to describe relationships of inequality and economic dependence within the urban hierarchy. One could try to see the extent to which larger cities have dominant relationships with their hinterland and whether Seoul really benefits from excessive transfers from provincial areas. Unfortunately, the format of our analysis does not permit the discussion of the internal structure of the urban system defined by the Shis.

Looking at the urban sector at the aggregate level we can take advantage of the quarterly surveys of income and expenditures by urban households which have been collected since 1963 by the Bureau of Statistics of the Economic Planning Board across all cities with samples of approximately 1,500 households. The results are presented in Table 7, where we report alternative indices of inequalities for all the surveys which we could

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For more details concerning land ownership refer to the tabulations of "Number of Farms Households and Area by Size of Farm Land Under Cultivation" in the yearbooks of the Ministry of Agriculture and Forestry.

analyze. They are rather striking because they do not agree with the conventional wisdom of sharply rising inequality within the urban sector over time. While the inequality status of different cities varies, the situation across all city sizes does not seem to have changed. In any case, our calculations of the Gini coefficients show an unmistakable and very significant downward trend from 1963 to 1972. This result is confirmed by the coefficient of variation. The third moment around the mean which describes the skewness of a frequency distribution is positive as one should expect; it does not show a significant trend over the entire period: first it declines then it returns to its previous level.

Admittedly, this result is somewhat surprising but the length of time covered and the homogeneity of the information base would not leave much choice: one would have to conclude that the urban distribution of income has improved during the past decade. If one were willing to criticize the survey procedures underlying the data he is still left with the weaker but still very unexpected finding of non-increasing income inequality in the urban households of Korea. In our opinion the Income and Expenditures Surveys are weak in quality and we are left for the time being with the lesser finding of non-deterioration of income distribution.

### 3.6 The Functional Distribution of Income

The evidence discussed so far suggests that there has been no worsening of the size distribution of income in Korea during the last decade of rapid economic growth, and, possibly, a mild improvement; since the data base for this interpretation is heterogeneous and the results go against expectations we must introduce as much indirect evidence as possible. For that purpose, it is useful to

TABLE 8. INEQUALITY IN THE INCOME DISTRIBUTION OF URBAN HOUSEHOLD 1963-1972

	Current Average Income	Standard Duration	Coefficient of Variation	Gini Coefficient	Skewness	Sample Size
1963	6,000	3,899	.649	.2682	1.178	355
1964	7,340	4,338	.591	----	1.092	---
1965	8,450	4,659	.551	----	1.034	---
1966	11,750	6,322	.538	.2583	.938	1,005
1967	18,180	11,315	.622	.2563	1.168	996
1968	21,270	12,447	.585	.2549	1.148	1,272
1969	24,650	13,216	.536	.2515	1.174	1,079
1970	28,180	----	---	----	-----	---
1971	----	----	---	----	-----	---
1972	38,080	----	---	.2304	-----	881

Source: Annual Reports on the Family Income and Expenditures Surveys, Bureau of Statistics,  
Economic Planning Board.

investigate the functional distribution of income for the period. There has been a running argument that during periods of rapid growth there might be a redistribution of income from labor to capital. However, there is nothing necessary about this situation in a structural sense when looking at the long-term. When looking at the short-term, it has been the experience of advanced industrialized countries that the share of wages tends to rise during recession and to lose grounds to profits during booms. But it is not possible to generalize results concerning these labor markets to the case of Korea which has a completely different labor market structure.

Empirically, we can establish the direction of trends in functional distribution by considering the share of wages in value-added based on information collected for 10 major sectors of the economy between 1953 which marks the end of the Korean War and 1966. The basic model is very simple:

$$\log E = \alpha + \beta \log VA$$

when E represents total earnings in the sector and VA the total value added in the same sector during the same year. The values of the elasticity coefficients  $\beta$  for the 10 sectors are all smaller than one except for services with the degree of deviation being closely related to the capital intensity of the sector. The aggregate value for all sectors is exactly equal to one, indicating that changes in the share of earnings are exactly proportional to changes in value added. These findings are consistent with a stable functional income distribution of income during the period irrespective of internal changes in industrial structure. It is regrettable that this series is not available beyond 1966 because of the accelerating growth of the economy after this period. Using different

TABLE 9. ELASTICITY OF THE SHARE OF EARNINGS WITH RESPECT TO  
VALUE ADDED BY SECTOR, 1953-1966

Sector	Elasticity	Standard Error	R <sup>2</sup>
1. Agriculture	.9397	.0405	.9782
2. Mining Quarrying	.9289	.0168	.9961
3. Manufacturing	.9573	.0083	.9991
4. Construction	.9355	.0208	.9941
5. Electricity, Water, Sanitation	.8517	.0427	.9707
6. Transportation, Storage, Communications	.9387	.0136	.9975
7. Wholesale and Retail Trade	.9415	.0667	.9430
8. Banking, Insurance, Real Estate	.9605	.0185	.9956
9. Services	1.0440	.0175	.9963
10. Foreign Sector	.9972	.0225	.9939
ALL SECTORS	1.0004	.0324	.9876
3.a Manufacturing (1957-1972)(Lim[28])	.88	.07	.92

sources for the manufacturing sector between 1957 and 1972 Lim finds a significantly lower elasticity coefficient of .88. If similar results were obtained for the other 9 sectors they would indicate a redistribution away from wages to profits and business owners in the later part of the period.

These results are once again consistent with a non-deteriorating income distribution during the period 1960-1968. After 1968 as Lim shows, there has been a rapid increase of the wage level in the mining and manufacturing sector which is likely to have increased wage disparities between modern manufacturing activities and the more traditional ones. This would be consistent with the increase in dispersion in wages and salaries ( $G = .241$ ) reported for 1968 and in wages and salaries by occupation estimated for 1970 ( $G = .250$ ).

One possible way to corroborate these findings at the industry level and the unit elasticity of total earnings with respect to total value added for all sectors is to look at the changing composition of National Income and at the share of compensation for employees over time. The Korean data show that the share of compensation for employees has been increasing steadily since 1953 from 25% to 39% of National Income in 1972. But this apparently favorable result for labor has more to do with structural changes in business organization and the rapid growth of large corporations than to a favorable redistribution of income from profits to wages. One must also note that a great deal of profits may be underreported and that on the other hand employers have strong incentives to overstate the amount of wages paid to their employees.

### 3.7 Dispersion of Wages in Mining and Manufacturing

The first extensive survey of wages and salaries has been done by the Bank of Korea in 1967. In 1970 a comprehensive survey covering activities other than mining and manufacturing was sponsored by EPB [31]. Their results confirm our earlier expectations that a rapid increase in manufacturing would be accompanied by greater dispersion of compensation because of industrial diversification. The comparison of the two surveys shows that during the period mining and manufacturing wages have increased much faster than the price index and labor productivity. "However the gains were not uniform, the wage level of low and average wage earners rose less rapidly than for the top wage earners. The proportion of employees found below the average wage increased from 53.5 to 73.2 percent between 1967 and 1970 in mining and from 65.2 to 66.9 percent in manufacturing industries" ([31], p. 121).

The surveys documents these shifts according to sex, type of job, industry, size of firm, length of experience, educational level and region. It is interesting to note that across all industries the wage level for non-supervisory workers increased faster than for supervisory workers. On the other hand, the gap in wages between male and female workers increased during the period (see Table 10). The shifts in wage levels by size of firm and educational levels were such that the groups with lower levels of education in total gained at least as much or more than the better educated groups. The average wage level for employees with a college and university education was 3.15 times that of employees with primary education or less in 1967. The same ratio declined to 2.91 in 1970. (See Table 11). It is of course an almost impossible task to summarize so briefly the changes in

TABLE 10. CHANGES OF WAGE LEVEL BY TYPE OF WORKER

		Average	Production				Non-production			
			Total	Male		Total	Male		Female	
				Male	Female		Supervisory	Non-supervisory	Supervisory	Non-supervisory
Mining and Manufacturing	1967 wage	8.3	7.1	8.4	4.3	13.8	21.9	11.1	----	6.8
	1970 wage	21.6	18.4	21.2	9.7	30.6	44.0	26.3	18.0	14.6
	Annual average increasing rate	37.6	37.4	36.2	31.2	36.6	26.2	33.3	----	29.0
Mining	1967 wage	10.2	9.3	9.5	4.2	14.9	23.5	12.2	----	8.0
	1970 wage	26.2	25.5	26.4	12.0	27.2	44.1	26.3	----	15.4
	Annual average increasing rate	37.0	40.0	40.6	41.9	22.2	23.4	29.2	----	24.4
Manufacturing	1967 wage	8.1	6.8	8.1	4.3	13.7	21.7	11.0	----	6.7
	1970 wage	21.5	18.3	21.0	9.7	30.8	44.0	26.3	18.0	14.5
	Annual average increasing rate	38.5	39.1	37.4	31.2	31.0	26.6	33.7	----	29.4

Source: [31], p. 139.



TABLE 11. CHANGES OF WAGE LEVEL BY SIZE OF ESTABLISHMENT AND LEVEL OF EDUCATION

		(Unit:1,000 Won)						
		Total	5-9	10-29 <sup>1</sup>	30-99 <sup>2</sup>	100-199	200-499	500 & over
Primary	1967	6.1	5.1	6.2	5.5	5.7	6.7	9.0
School	1970	13.9	11.2	11.8	13.9	14.0	16.6	18.4
	Annual average increasing rate	31.6	30.0	31.4	36.2	34.9	35.3	26.9
Middle	1967	7.6	6.4	6.8	7.0	7.3	8.3	8.7
School	1970	17.4	14.2	14.8	18.0	17.5	18.6	20.7
	Annual average increasing rate	31.8	30.4	29.6	37.0	33.8	30.8	33.5
High School	1967	10.9	7.9	9.3	10.5	10.3	12.3	12.0
	1970	24.7	15.5	20.5	25.7	24.7	26.1	28.3
	Annual average increasing rate	31.4	25.2	30.1	34.8	24.0	26.8	33.1
College &	1967	19.2	11.2	14.6	17.0	19.3	21.6	23.0
University	1970	40.5	21.0	31.5	37.3	41.2	42.0	47.8
	Annual average increasing rate	28.3	23.3	29.2	29.9	28.8	24.8	27.6

<sup>1</sup> 10-49 Employees in 1970.<sup>2</sup> 50-99 Employees in 1970.

Source: [31], p. 140.

such a complex system as the wage structure of an economy. Once again, however, we are observing shifts in factor payments which reflect the relative scarcity of certain skills or the relative productivity of different jobs but we cannot report a significant deterioration of the situation of the less privileged compared to the most privileged. The only notable exception being female workers (see Table 10).

### 3.8 The Role of Savings and Wealth

A major source of inequality in the long run is the unequal distribution of wealth and the different levels of savings according to current income. The evidence on the distribution of wealth in Korea was collected by the Bank of Korea for 1968 but its results have not been released even in summary tables. We are left to speculate both on the extent of inequality in the control of wealth and on its evolution over time.

In terms of savings, we present in Table 12 the results of the 1969 Urban Survey by the Bureau of Statistics of EPB and of the 1970 Farm Household Survey. The details of the 1970 Urban Survey were not available to us but we believe that the comparison of the two sectors one year apart is not too distorted for our purpose. Two facts emerge from Table 12. First, on a per capita basis the level of consumption of all farm households is below the average level of consumption in the urban sector a year earlier (figures undeflated). This confirms our earlier findings on rural-urban inequality. Second, we find that a substantial share of the population is dissaving in any given year: approximately 30% of the urban households were dissaving and getting into debt. About 26% of the farm households were also dissaving.<sup>11</sup>

<sup>11</sup> A substantial amount of dissavings in lower income brackets is the general finding in income distribution surveys in a large variety of countries. It reflects a variety of factors such as poverty, young households dependent on their relatives, etc..

TABLE 12. HOUSEHOLD CONSUMPTION EXPENDITURE SURVEYS OF 1969 AND 1970

Monthly Income	(1) Average Consumption	(2) Number of Household	(3) Size of Household	(4) Per Capita Expenditures*	(5) Percentage of Sample	(6) Cumulative Distribution	(7) Annual Savings	(8) Monthly Savings	(9) Per Capita Monthly Savings
A. URBAN HOUSEHOLD (1969 MONTHLY)									
Less than 7,999	7,910*	32	4.04	1,960	2.96	2.96		-2,000	-495
8,000 to 11,999	10,600*	112	4.75	2,240	10.38	13.34		- 970	-204
12,000 to 15,999	13,780*	178	4.92	2,800	16.50	29.39		- 380	- 77
16,000 to 19,999	17,000	163	5.24	3,248	15.10	44.94		120	23
20,000 to 23,999	19,750	152	5.47	3,611	14.09	59.03		570	104
24,000 to 27,999	23,710	105	5.65	4,020	9.73	68.76		840	149
28,000 to 31,999	26,610	107	5.60	4,752	9.92	78.68		1,350	241
32,000 to 35,999	29,720	51	5.77	5,150	4.73	83.41		1,720	298
36,000 to 39,999	32,880	31	5.81	5,660	2.87	86.28		1,970	339
40,000 and over	43,510	148	6.52	6,674	13.72	100.00		3,900	3,906
Average	22,110	1,079	5.42	4,079	100.00	100.00			
B. FARM HOUSEHOLD (1970)									
Less than 80,000	117,667*	31	3.65	2,686	3.20	3.20	-85,016	-7,084	-1,941
80 - 120,000	122,631*	76	4.25	2,404	7.84	11.04	-19,267	-1,606	- 378
120 - 160,000	143,193*	142	5.46	2,185	14.65	25.69	- 2,174	- 181	- 34
160 - 200,000	161,088	146	5.53	2,427	15.07	40.76	20,539	1,711	309
200 - 240,000	174,045	135	5.87	2,470	13.93	54.69	42,744	3,562	607
240 - 280,000	212,033	96	6.14	2,878	9.91	64.60	45,369	3,780	616
280 - 320,000	232,915	89	6.72	2,888	9.18	73.78	66,595	5,549	826
320 - 360,000	273,011	51	6.47	3,516	5.26	79.04	67,965	5,633	877
360 - 400,000	285,573	53	6.90	3,449	5.47	84.51	92,439	7,703	1,116
400,000 and over	338,156	150	7.09	3,974	15.49	100.00	210,743	17,562	2,477

\*Expenditures higher than income, annual total.

\*\*Per capita expenditures on a monthly basis.

Sources: [8], p. 35; [23], p. 57.

Obviously this situation is not a permanent one for any given household and one should not assume that the same 30 percent of the population find themselves dissaving year after year. This dissaving is possible because households rely on loans and transfers from their relatives or on their assets after migration to the city to maintain their level of expenditures. In Korea, as in any other country, the distribution of expenditures is more equal than that of savings. What is worrisome in the present is that such a large segment of the population is facing severe economic difficulties in 1970, even when it is so likely that the proportion of dissavers has been overstated in that year's sample.<sup>12</sup>

In the long run, inequality in the distribution of savings can be expected to have accumulative effects and lead to an increasing concentration of income-yielding assets in the hands of the upper-income groups. However, there are counteracting forces correcting for the concentration of savings in the hands of a smaller upper income group. First, inflation reduced the value of wealth accumulated in the form of "fixed price securities or properties not fully responsive to price changes; or by legal restrictions of the yield of accumulated property in the form of rent controls..." ([18], p. 9). In Korea, inflation has been serious but not too severe (by international standards) during the last decade and the government has regulated the land market to a very great extent: it has tried to recapture much of the appreciation of land values in urban areas, one of the more traditional forms of wealth which keeps up with inflation.

Technological change has been extremely rapid and property assets in the older industries have had less and less weight in the economy. In addition, many of the new industries have been closely controlled by the government, directly and indirectly. This certainly has and will continue to have a strong impact on the use and allocation of corporate savings and

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<sup>12</sup> There are marked fluctuations in the reported proportion of dissavers in the different annual surveys.

on the distribution of wealth.

Some of the other forces which Kuznets indicates have a counteracting effect to the role of savings on the secular distribution of income, do not have much significance for the period of time we are considering. One possible exception is demographic change which can have an immediate bearing on per capita consumption and the level of welfare of lower income households, if young low income households are able to keep their size small.

### 3.9 Demographic Factors Influencing Economic Inequality

We find in Korea important differentials in fertility and family planning behavior according to age, area of residence, socio-economic status and level of education. As elsewhere the poor have higher levels of fertility which contribute to lower per capita income levels for a given household income. However, the results reported in Table 13 show that in 1970 awareness of the significance of family planning for the long-term welfare of each household had already reached the greatest majority of the population with no difference according to area of residences and very little according to social status except for the lowest status group which still registered 78% of awareness of the problem. Fertility differentials still influences per capita income inequality and the ability to save of low income households. It can be stated that success in bringing down the population growth rate since 1960 is a positive force in favor of income equality, because a smaller household size will improve the chances a poor family has to raise itself out of the trap of bare subsistence living.

TABLE 13. FERTILITY INDICES BY SOCIO-ECONOMIC STATUS AND RESIDENCE IN 1970

	Number of Pregnancies	Number of Live Births	Age at First Marriage	Heard of at Least One F.P. Method (percent)	Ever Used Contraception or Abortion (percent)
A. Socio-Economic Status					
Low-Upper & Upper-Middle	4.3	3.0	22.1	94	62
Low-Middle	3.8	3.0	21.3	90	46
Upper-Low	4.2	3.5	20.2	87	47
Low-Low	4.7	4.3	18.9	78	39
B. Residence					
Seoul	3.8	2.7	21.6	85	51
Other Cities	4.1	3.2	20.6	84	45
Rural	4.5	4.2	19.5	85	44

Source: Chung et al. [12], Tables 5-1, 5-3, 5-7, 5-9.

#### 4. ALTERNATIVE INTERPRETATIONS OF GREATER EQUALITY

Remaining within the confines of our findings on the structure and sources of income distribution it is possible to reach different opinions of the Korean situation depending on the "working" definition of equality that one has implicitly chosen. The definition of a "just polity" and criteria for standards of income redistribution require that one specifies the "proper shape" of the income distribution curve. Some of the criteria for income redistribution which we examine are more compelling than others, and we are presenting them in what we believe is a decreasing order of significance in the Korean context. It should be understood that the objective here is to be suggestive, not exhaustive, and to indicate how discussion of equality may become difficult because different concepts are used as starting points without having been clearly stated.

##### 4.1 The Social Minimum and Absolute Poverty

The criterion here is that no one should fall below some minimum level of income and the basic objective is the elimination of absolute poverty. This is a very important problem in most countries but it does not relate to inequality as such. In addition, the standards and practices of a given society change over time: the social minimum may mean the biological minimum for survival or it may be defined by access to socially determined necessities. Two basic groups which are internally quite heterogeneous come under this income redistribution criterion: the rural poor and the urban poor.

As is the case in every country, the extent of poverty is much greater in Korea among the rural population than in the cities. The comparison of the urban and farm households surveys in Table 12 shows that all farm households had expenditures per capita below the mean value for urban households. The question then becomes one of defining the income floor below which nobody should be found. On the basis of the surveys summarized in the same Table, one can estimate that approximately 30% of the non-farm population and 55% of the farm population had an annual level of per capita consumption expenditures below 100 U.S. dollars per in 1970. Applying these ratios to the 1970 population yields the approximate total of 13.24 million of individuals (7.95 farm and 5.29 non-farm) or 41% of the total population.

While this crude choice of a desirable level of income is informative it cannot be expected to lead to selective policies for the group which has not yet reached that level because it encompasses too large a share of the total population. In their international comparisons of poverty, Chenery et al. have used the two somewhat arbitrary figures of 50 and 75 U.S. dollars of income per capita per year [10]. Applying these figures to 1970 expenditures data in Korea we find that less than 3 percent of the total population would fall below this level of misery and destitution. This is less than 960,000 for the 1970 population, the true size of this group can only be conjectured considering the limitations of the survey information.

By virtue of the rural-urban migration process the poverty problem may become more and more urbanized in Korea. Whether the worst cases of poverty are found in the cities is a difficult question to answer. The aggregate evidence would lead us to say that they are not, they may simply

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<sup>13</sup> There are good reasons to believe that very generally monetary estimates of rural-urban income differentials overstate the advantages of cities. Similarly, international per capita income comparisons based on exchange rates overstate the advantages of developed countries.



be more conspicuous. How to reach these people is a frustrating problem. One must be aware of the counterproductive effects of minimum wage legislation on the level of unemployment (see for instance Reynolds [30])<sup>14</sup>. In addition, it is a well established fact that many of those who find themselves below the poverty floor cannot be reached through the regulation of labor markets; direct action programs are necessary and they tend to weigh heavily on public resources. The rapid gains in employment in Korea during the decade have certainly contributed a great deal to the improvement of the situation.

#### 4.2 Income Shares Criteria

This class of criteria relates to the view that the lowest percentage of the income distribution should improve its position. For instance a policy objective would be that the bottom decile ( $D_1$ ) or quintile ( $D_1+D_2$ ) double its current share of the national income over a certain period of time. In the case of the 1968 survey such an objective would mean that the lowest 20 percent of the Korean households raise their share of income from 7% to 14% within say 20 years. The question then becomes one of deciding the deciles which should be losing and/or are more likely to lose from this distributional shift.

There is nothing necessary in the expectation that when the bottom quintile gains it is at the expense of the top quintile. Reciprocally, a policy focussing on the top quintile and requiring that it reduces its share from 45% to 30% of national income will not necessarily favor the

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<sup>14</sup> Obviously we are not saying that labor legislation to improve working conditions for the workers are not in order.

lowest groups. In the United States the effect of tax reforms (income taxes, wealth taxes, inheritance taxes, etc.) has led to a reduction of the share of the top decile but redistribution appears to have been in favor of the next highest groups or the middle income groups.[7]

#### 4.3 Criteria Relating to the Structure of Earnings

There are at least two forms of equality which relate to the distribution of earnings. One criterion is the narrowing of income differentials among occupational groups. The other is more complex conceptually, it requires the equalization of lifetime income profiles (not levels).

There are several ways of stating the objective of narrower income differentials among occupations. First, one might say that occupational groups should progress together so that traditional differences remain unchanged (the concept of equal sharing). Second, one could say that income differences among occupations should decline (the concept of equality). A third way is to compare the bottom fifth to the top fifth of wage earners, which brings us back to the Lorenz curves measured earlier. What this concept does is to question the structure of relative earnings in different regions, firms, and occupations. It opens up the discussion of labor markets in developing countries with heterogenous groups of (1) self-employed workers in agriculture, (2) self-employed workers in traditional occupations, (3) low-skilled workers in modern private enterprises and in government, and (4) white collars with formal training. The policy implications of the criterion are so numerous that they deserve separate analyses (see Bruton [6], and Reynolds [27]). Our previous

findings indicate that in recent years relative wages for low wage earners have gained slightly faster than high wage earners in the modern sector (see Table 10).

The equalization of lifetime income profiles focuses on the pattern of growth of a group's income over a life-time rather than on differences among groups. What is considered important is that an improvement be felt by everyone. In most societies some groups enjoy rising incomes over their working lives when others, mostly low-level male workers and women workers, reach a plateau at a low level while they are still young. This criterion challenges the structure of labor markets where some can climb a career ladder while others are caught early in dead-end jobs. In Korea, rapid economic growth has certainly contributed to the absorption of unemployed people but the elimination of dead-end jobs and the equalization of life-time income profiles does not seem to be an easily workable objective. The results of Table 10 show that the flat profile for female workers is a particularly significant problem if life-time income profiles were to be equalized. Because of the process of labor transfer from traditional to modern activities which is still under way, this criterion is not likely to be given immediate consideration.

Another criteria relating to the structure of earnings is "concerned with horizontal equality: people in the same situation should be treated similarly. Factors extraneous to quality and level of work should not contribute to pay differentials"[28]. This is reflected by the slogan "equal pay for equal work." When there is serious discrimination on the basis of sex in Korea, discrimination by social class is strongly mitigated by the extensive practice of competitive examinations for job openings in

large public and private organizations. Within the government sector there are serious efforts to reduce the extent of wage dispersion within and between occupations and access to specific positions is strongly predicated on educational level and specific school background.

#### 4.4 Choosing a Criterion

The choice of an income distribution policy criterion is very different in practice and in theory. In theory, Rawls defines what he calls the "original position" of each member of society before the negotiation of a "social contract." In his words:

"In order to define the original position...we imagine that everyone is deprived of certain morally irrelevant information. They do not know their place in society, their class position, their social status, their place in the distribution of natural assets and abilities, their deeper aims and interests, or their particular psychological make-up. Excluding this information insures that no one is advantaged or disadvantaged in the choice of principles by natural chance or social contingencies" ([26], p. 141). In practice, the negotiation process among different groups is certainly difficult to predict and the present state of opinion concerning income distribution in Korea is not clear. Or, better, there is no consensus and it would be easier to associate a particular opinion with the personal circumstances of the individual who holds it.

#### 5. CONCLUSIONS

When we began our research for the preparation of this paper we were open to believing that income distribution had seriously deteriorated during the last decade of extremely rapid growth in Korea. We have

presented an extensive amount of evidence which gives cause for more optimism in the current debate on growth versus income equality. We have found the following for Korea:

1. Income inequality in Korea does not appear to be greater than in developed countries; in fact inequality appears to be much less.

Compared to countries with similar levels of per capita income Korea has certainly much less inequality.

2. We tried to produce as much evidence as we could to show that inequalities during this period of rapid growth became more pronounced but except for the deterioration of the distribution of wages we found that all major indicators within sectors were, if anything, moving in the direction of more equality.

3. Despite the relatively low level of per capita income in Korea we found that less than three percent of the population was likely to be found below the somewhat arbitrary international poverty line.

4. There is no necessary relationship between higher growth rate and greater inequality nationwide as is often assumed. Since 1963, Korea has been one of the top economic performers with Taiwan and both countries rank well in terms of inequality. For Korea, the available data does not provide any evidence that serious deterioration of income distribution has taken place on a nationwide basis.

The major reasons for the low level of inequality observed for Korea may be difficult to reproduce in other areas. First, Korea is not very well endowed in natural resources and the very thorough land reform of 1947-49 has been a major element of equality before the rapid growth of the 1960's.

Second, the demand and the supply of educational services are at very high level in Korea. The expenditures surveys confirm what is otherwise

well known: the share of expenditures on education is both significant and rising for all segments of the population rural or urban. Through the extensive use of competitive examinations in all phases of life, individuals have greater chances of rising on their own merits.

Third, the rapid growth of employment in urban areas has contributed significantly to the increase of the real wage level and the rapid reduction of absolute poverty during the decade, especially when compared with the end of the war in 1953. During the sixties wage gains have been fairly distributed according to educational levels and job status.

Fourth, the demographic threat of high population growth rates has been significantly reduced during the decade, but not yet eliminated. A reduction of household size can only help low income families escape self-perpetuating poverty.

It seems important to restate at this stage what has been said throughout the paper: the data base available is not of the best quality and every individual piece of evidence taken in isolation cannot permit a conclusion as to the direction of change in income distribution. However, one has to accept the fact that the various times series with supposedly similar biases from year to year, collected in different ways by different agencies or researchers do not give any strong support for a belief in a rapid deterioration of the income distribution over the decade of the sixties. Despite the fact that some of the indicators have even moved in the direction of greater equality we have chosen to say that the variety of evidence based on tax data, income surveys, national accounts data, consumer expenditures surveys, wage surveys, leads to a finding of non-deterioration of the Korean income distribution for the period.

We have been able to identify two significant sources of inequality: rural-urban disparities and the growing dispersion of manufacturing wages. The net result is a strong tendency for inequality in Korea to be related to the place of residence. Inequality between farm and non-farm income has been rising early in the sixties and appeared to be moderating by the end of the decade. The reason why its effect has not been more conspicuous

on nationwide inequality is the very heavy rural out-migration at the end of the decade when 8.5 percent of the farm population moved to cities in four years. While the richer urban sector was gaining ground rapidly the size of the farm sector was decreasing in absolute numbers. As we have seen in Table 8, the EPB data shows a trend toward greater equality within the urban sector; on the other hand the cross-sectional analysis for provincial data in 1970 shows that income distribution is more unequal in Shis than in other areas that year. While the cross-sectional results for 1970 are based on much firmer data they cannot negate the times series outright: another cross-sectional analysis would be needed to show that the interprovincial situation was better before 1970.

The same pattern of employment mobility and migration appears to explain the mild impact of rising wage differentials between traditional and modern manufacturing activities on total income distribution at the same time that the dispersion of capital per worker has been increasing.

In the appendix the alternative measures which have been used in the paper are explained in sufficient detail for a proper understanding of their analytical power. These are the techniques which have been used so far in all studies of income distribution everywhere and one must note their common characteristics of focusing on large sections of population: none measures the gap between the poorest individual and the richest. The question is, how rich any single individual would have to be to affect significantly the value of a Gini coefficient. To what extent would a small number of very wealthy people make a difference. One should keep in mind also that data coverage ends in 1970, only two years after the acceleration of economic growth began in earnest. Given the extremely high annual growth rate above 10 percent since that time it becomes very important to know whether the current experience in 1975, fresh in the mind of observers, is significantly different from the experience of the 1960s.

The evidence gathered raises a number of very significant issues which could only be answered by systematic analysis. There remains one meaningful data base which could not be analyzed here. A comprehensive decomposition analysis of the 20,000 observations contained in the 1968 survey based on Theil's index of inequality would provide invaluable

information on the contribution to inequality of the different factors which we could analyze only in a piecemeal fashion. This, however, would leave unanswered the question of whether income inequality had indeed not deteriorated in the 1960s as the present evidence indicates. It can only be hoped that the questions raised in this review paper will not be left unaddressed by Korean economists, nor casually dismissed.

Such an analysis would not close the door on the unending debate on the nature and sources of inequality. As Streeter has pointed out recently: "Inequality of income distribution touches only a small portion of the vast multidimensional problem of inequality. There is inequality of assets, of access to earning opportunities, of satisfaction from work, of recognition, of ability to enjoy consumption, of power, of participation in decision-making. The call for greater equality, for a genuine community of equals cannot be answered simply by measures that reduce to the Gini coefficient or any other simple measure of inequality. It is possible to envisage a technocratic society, where decisions are highly centralized and in which a few enjoy the satisfaction from power and creativity while the many carry out boring and disagreeable tasks in a hierarchic structure and in which the Gini coefficient was zero" ([32], p. 48).



## APPENDIX

## ALTERNATIVE REPRESENTATIONS OF INCOME INEQUALITY

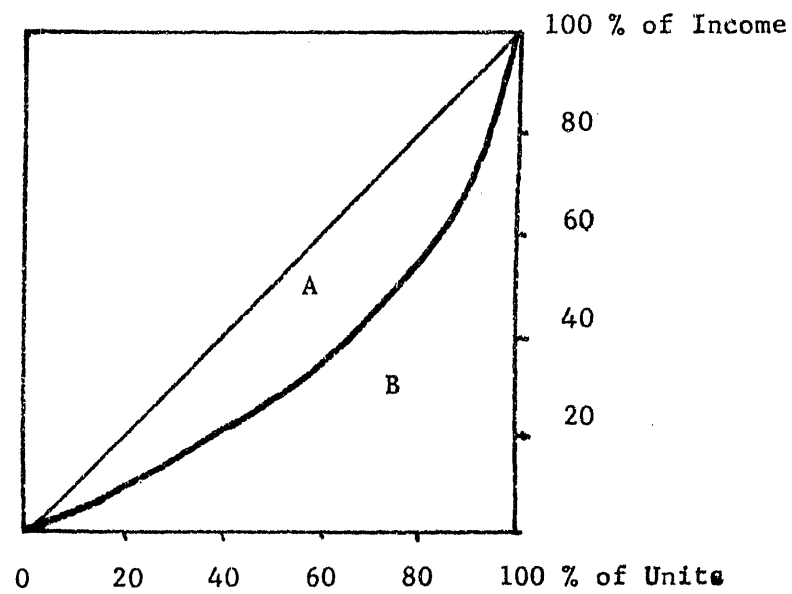
There is a variety of ways to measure the size distribution of income and most of them are derived from the Lorenz curve. It should prove helpful to review these measures to clarify the nature of the results presented in the discussion.

1. The Lorenz Curve

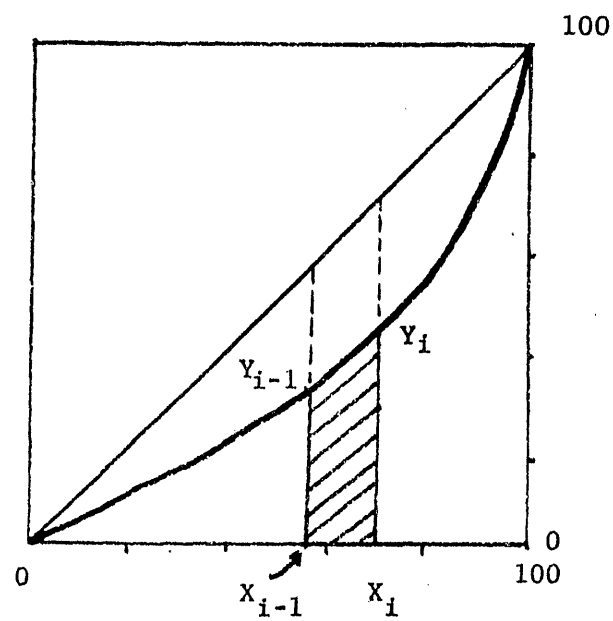
The Lorenz curve is a graphical representation of the cumulative proportion of units arrayed in order from the smallest income (or any alternative measurement unit employed) against the cumulative share of aggregate income accounted for by these units (see Figure 1). In the case of perfect equality all observations will be on the 45° degree line. In the case of perfect inequality, if one person had all the income the bottom line and the right hand side vertical axis would represent the distribution.

2. The Gini Coefficient

The Gini coefficient compares shares of income actually held by each percentage of recipient to the share of income that would be held under conditions of perfect equality. This ratio is found by comparing the area A of Figure 1, which is between the 45° line and the Lorenz curve and the actual Lorenz distribution to the area under the diagonal (A+B). It is clear that the value of the Gini coefficient varies between zero (perfect equality) and one (absolute inequality).



1.A



1.B

APPENDIX FIGURE 1: THE LORENZ CURVE

In actual measurements, the Lorenz curve is a series of straight lines connecting the different income class observations and the Gini coefficient which is:

$$(1) \quad G = \frac{\text{area between diagonal and curve}}{\text{area under diagonal}}$$

can also be read as:

$$(2) \quad G = \frac{.5 - \text{area under curve}}{.5} = 1 - (2 \times \text{area under curve})$$

The area under the diagonal is always equal to .5 because both sides of the diagram are measured in percentage terms and are independent of measurement units. The measurement of the Gini coefficient really consist in measuring the shaded area under the curve which is equal to:

$$(3) \quad A_i = (X_i - X_{i-1}) (Y_{i-1} + Y_i) / 2$$

and the Gini coefficient is measured as:

$$(4.a) \quad G^* = 1 - 2 \sum A_i$$

$$(4.b) \quad G^* = 1 - \sum (X_i - X_{i-1}) (Y_{i-1} + Y_i)$$

It is clear that this measured value underestimate the true value of the coefficient because of the linear approximation to the curve. The greater the number  $k$  of income groups the better will be the measurement of the actual Gini coefficient which is:

$$(5) \quad 0 \leq G \leq 1 - \sum_{i=0}^k (X_i - X_{i-1}) (Y_{i-1} + Y_i)$$

### 3. The Kuznets Coefficient

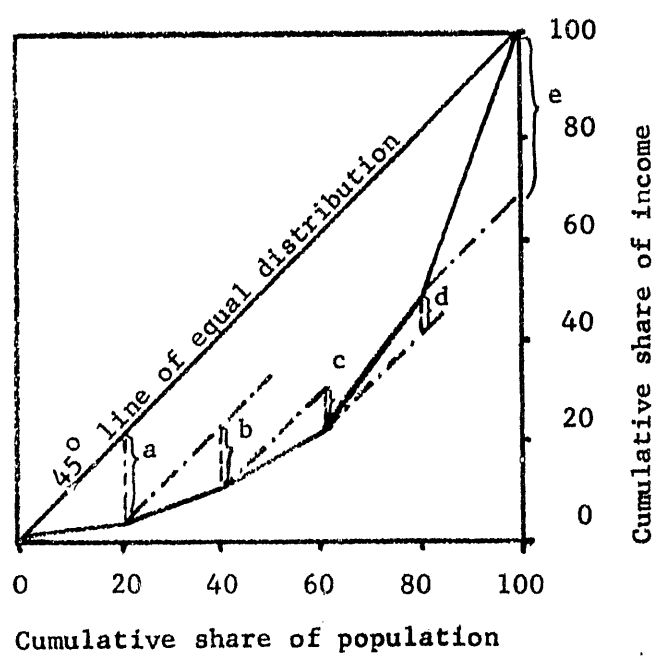
The Kuznets coefficient is also based on the Lorenz curve. Its objective is to remedy some of the insensitivity of the Gini coefficient to changing shapes of the income distribution when at two different time periods the same Gini coefficient might hide the fact that some income groups have lost ground more than they should have, i.e. the two curves intersect twice.

The Kuznets coefficient is an additive measure of how much individual group per capita incomes deviate from the mean per capita incomes for all groups independent of ordering. It is the summation of absolute differences between the percentage of total income in particular groups and the percentage of total members of these groups. The Kuznets coefficient is more sensitive to concentration at the extreme ends of the distribution than the Gini coefficient. In terms of range we have:

$$(6) \quad 0 \leq \kappa \leq 200$$

With reference to the Lorenz curve the Kuznets coefficient is equal to the sum of the absolute values of segments a, b, c, d, e in Appendix Figure 2 which are the distance between separate 45° lines and points on the Lorenz curve. Note: the curve itself need not be estimated to calculate the coefficient.

In his 1970 paper, Oshima has used the related Index of decile inequality. In his own words: "...under conditions of perfect equality each decile share will be equal to 10%. Accordingly, the deviation of each decile share from 10% measures inequality; the arithmetic sum of all such deviations (ignoring the signs) measures aggregate inequality, and the latter divided by 10 measures the mean decile inequality.... An index of



APPENDIX FIGURE 2: CALCULATION OF THE KUZNETS COEFFICIENT

inequality may be obtained by dividing the mean deviation of the decile shares by 18, with the limits of this index ranging from 0 to 1..." ([25], pp. 8-9). This index is identical to the Kuznets index except that it is restricted to deciles and is normalized by a factor of 18 instead of 20 as implied by the range of the Kuznets coefficient.

#### 4. Other Measurements of Income Inequality

In his 1960 study Kravis [17] has used in addition to the Gini concentration ratio other measures of dispersion such as the coefficient of variation and the standard deviation of the logarithms of income.

- a) The coefficient of variation is a very standard statistical measure which takes the ratio of the standard deviation of a sample to its mean.
- b) The standard deviation of the logs of income is also a very convenient measure to manipulate. It consists in calculating the standard deviation of the logarithm of incomes over the k classes of the data either in their actual values or normalized on a scale based on the lowest income level to allow comparisons on a cross-sectional or time-series basis.
- c) The third moment around the mean is yet another indicator of skewness. When it is positive it means that the distribution is concentrated to the left (the median is smaller than the mean). It is calculated as:

$$S = \sqrt[3]{\frac{1}{n} \sum f_i (X_i - \bar{X})^3}$$

Its value is zero for symmetrical distributions.

As Oshima has pointed out when reviewing the Kravis study, the results of the Gini coefficient (which he labels concentration ratio CR), the coefficient of Variation CV and the standard deviation of logs  $S(\log)$  are not consistent with respect to the amount and direction of inequality. He explains that "the reason for the ambiguity in these different measures is that they are too sensitive to the position and shape of the frequency curves of families distributed according to income sizes..." ([24], p. 439). What he is really discussing is the fact that one cannot completely describe a statistical distribution simply on the basis of its mean and variance which measure only location and dispersion; higher moments are required to capture the degree of assymetry in a curve.

- d) In practice, the calculation of higher moments is rarely performed, if ever. It is much simpler to report the basic information contained in the Lorenz curve directly and to tabulate the shares of the lowest quintile and highest quintile.

## 5. Distribution Functions Generating Lorenz Curves

It is clear that an important element of the estimation of inequality is the identification of the distribution function which underlies the observed Lorenz curve. Two of the most interesting functions which have been empirically used are the Pareto distribution and the  $\beta$ -distribution. In a recent paper Gastwirth has considered other distributions which we shall not discuss here because of their limited empirical significance (see [15], p. 307).

### a) The Pareto Distribution

The Pareto distribution is the best known statistical representation of income distribution data and is closely

related to the log-normal distribution. Before discussing its characteristics the Pareto distribution is written

$$(8) \quad G(a) = A x^{-\alpha}$$

it is more commonly stated as:

$$(9) \quad N(x) = A x^{-\alpha}$$

where A and  $\alpha$  are constant. Income x remains above a minimum h, the corresponding value of N being:  $N(h) = A h^{-\alpha}$ .

In terms of the Pareto distribution, inequality diminishes with an increase in the ratio of the number of people with income below x to the number of those with income above x.

This ratio is:

$$(10) \quad R(n) = \frac{N(h) - N(x)}{N(x)} = \frac{N(h)}{N(x)} - 1 = \left( \frac{h}{x} \right)^{\alpha} - 1$$

Inequality decreases when R(n) increase, that is to say when  $\alpha$  rises since  $x > h$ .

Another illuminating interpretation of the Pareto distribution derives from the fact that if  $m(x)$  represents the mean income of the group with income above, the following relation hold:

$$(11) \quad \frac{m(x)}{x} = \frac{\alpha}{\alpha-1}$$

The coefficient:

$$(12) \quad \beta = \frac{\alpha}{\alpha-1}$$

is another index of inequality. Note that  $\alpha$  is greater than one.



The value of the intercept  $A$  is not of significant interest, it reflects the size of  $N$  and of the lowest income  $h$ .

b) The Beta-Distribution

While the Pareto distribution has much historical significance it often does not fit empirical income distributions very well as shown by Gastwirth for the United States [15], and by the data presented by Chae for Korea [9, p. 6]. Thurow has recently suggested the use of the Beta distribution which fits the observed income distribution in the U.S. well and has only two parameters [34]. After normalizing incomes on a scale between 0 and 1, he calculates the proportion of the population  $p$  with a given income level. The Beta-distribution is based on the complete Beta function which is:

$$(13) \quad \beta(\rho, \sigma) = \int_0^1 t^{\rho-1} (1-t)^{\sigma-1} dt$$

$$\rho > 0$$

$$\sigma > 0$$

and the Beta distribution has for frequency distribution (see [34]):

$$(14) \quad f\beta(p/e, u) = \frac{1}{\beta(e, \sigma)} p^{e-1} (1-p)^{\sigma-1}$$

with

$$0 \leq p \leq 1$$

$$\sigma = u - \rho$$

$$e, \sigma > 0$$

The impacts of the two parameters are opposite. Increasing values for  $\rho$  have a dispersing effect and "result in lower median incomes and ~~larger~~ relative income differences in the income distribution." On the other hand,  $\sigma$  has a concentrating effect: higher values of  $\sigma$  "result in higher median incomes and smaller relative income differences between the top and bottom of the income distribution" ([34] p. 262). Changes in the value of the two parameters  $\rho$  and  $\sigma$  can be analyzed by economic models for cross-section and time series data very effectively. The same distribution should prove very productive for Korea when using a good information base such as the unreleased 1968 and 1972 surveys. It has not been used for this paper because the data does not warrant it.

#### 6. The Theil Index Measure of Inequality

Theil has proposed an alternative index measure of inequality which is distribution-free like the Gini coefficient and can be decomposed and tested for alternative sources of income inequalities when stratified samples of income distribution are available. This measure is based on the concept of information theory which states that the more unlikely an event is before receiving the message that it has indeed taken place, the larger the information content of this message which can be called  $h(x)$ . This function is usually defined as the logarithm of the reciprocal of the probability  $x$ :

$$(15) \quad h(x) = \log \frac{1}{x} = -\log x$$

In the case of  $N$  income recipients which earn a non-negative fraction  $y_i$ ,  $i = 1, \dots, N$  of total income with

$$\sum_{i=1}^N y_i = 1 \quad y_i \geq 0 \quad i=1, \dots, N$$

Perfect income equality results when all recipients receive the amount  $y_i = 1/N$ .

The expected information content which is defined by the entropy function:

$$(16) \quad H(n) = \sum_{i=1}^n x_i h(x_i) = - \sum_{i=1}^n x_i \log x_i$$

will be in the case of an income distribution

$$(17) \quad H(y) = \sum_{i=1}^N y_i \log \frac{1}{y_i}$$

In the case of perfect income equality  $y_i = 1/N$  and the entropy function is equal to  $\log N$ . There is complete inequality when one individual enjoys all the income and  $y_i = 1$  for some  $i$  and is equal to zero otherwise and  $H(y) = 0$ .

The degree of income inequality is obtained by subtracting  $H(y)$  from its maximum value:

$$(18) \quad T = \log N - H(y) = \sum_{i=1}^N y_i \log N y_i$$

which varies between zero (complete equality) and  $\log N$  (complete inequality).

When working with income classes rather than individuals, the inequality index  $T$  is simply redefined as:

$$(19) \quad T = \sum_i y_i \log \frac{y_i}{x_i}, \quad \log N > T > 0$$

where  $y_i$  is the income share of class  $i$  and  $x_i$  the corresponding population shares.

The main attraction of the Theil index is its decomposability into different dimensions defining sources of variations over the survey sample (such as education level, region, age, industry where employed, etc.). Theil himself has provided an example of this disaggregation of income inequality according to its sources (see [33], chapter IV) and more recently Fishlow has used the same model for Brazil [14].

The decomposition procedure can be applied to more than one characteristic. Here, as an example, we assume that we are only interested and the impact of location on income inequality. Looking at Korean provinces the aggregate index of inequality can be decomposed into two parts, the between-set inequality among provinces  $T_1$  and the within-set inequality which deals with inequality among individuals  $T_2$ . We have:  $T = T_1 + T_2$ , with:

$$(20.a) \quad T = \sum_i y_i \log \frac{y_i}{x_i}$$

$$(20.b) \quad T_1 = \sum_p y_p \log \frac{y_p}{x_p}$$

where  $y_p$  and  $x_p$  are the income share and the population share of each province respectively. The total within-set inequality (the variation among income class groups) is:

$$(20.c) \quad T_2 = \sum_p y_p \left[ \sum_i \frac{y_i}{y_p} \log \frac{y_i/y_p}{x_i/x_p} \right]$$

We have noted earlier that the Theil index of inequality is distribution free. Nonetheless, if the underlying distribution function for an observed population is known to be a Pareto distribution, the numerical correspondence between values of the  $\alpha$  parameter and of the Theil index can be easily established. Theil has shown that the general relationship is:

$$T = \frac{1}{\alpha-1} - \log \frac{\alpha}{\alpha-1}$$

For frequently found values of  $\alpha$  we have:

$\alpha$	1.2	1.4	1.6	1.8	2.0	2.2	2.4
T	3.21	1.25	.69	.44	.31	.23	.16

(T measured in natural logarithm, values are in nits. For easy computations refer to Theil's tables of  $\log_2 n$  and  $\log_e n$  in [33], p. 428).

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