

Trends in and Determinants of Income Distribution in Korea^{*}

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This paper shows that, contrary to the “official” statistics, the size distribution of income in Korea has not improved steadily since the late 1970s but deteriorated worst ever in the late 1980s. It argues that the high rise of real estate price, which causes prevalent sense of relative deprivation, is also a major root of worsened income distribution in the 1980s.

I. Introduction

It is well known that the Republic of Korea has enjoyed continued high economic growth since the 1960s with relatively equal income distribution. It is also known that Korea's income distribution, after a temporary deterioration in the early 1970s, has improved steadily since the late 1970s. The “growth with equity” in Korea has been proposed, among others, by studies of Choo and Kim (1978), Choo and Yoon (1984) and a series of surveys by the National Statistical Office, among others. Nevertheless, according to various surveys conducted nationwide through the early 1990s, majority of Korean people do not feel that income has been equitably distributed. Nor do they perceive that income distribution has steadily improved. In an effort to explain this discrepancy it has been often pointed out that Koreans have a low tolerance for perceived unequal income distribution and a high sense of relative deprivation due mainly to their egalitarian disposition and occasional real estate price hike.

The purpose of this paper is to demonstrate that the subjective distribution perception held by Koreans is far from oversensitivity and is a valid reflection of unequal and worsening income distribution at least until the 1980s.

There are no reliable data to infer the (size) distribution of income in Korea until the mid-1960s. Despite this, it has been suggested that income distribution until the early 1960s was very equitable in Korea compared with other developing countries (Adelman (1995), Choo (1977)). Relative income equity until the early 1960s can be attributed to various social and historical conditions leading to equality of poverty during and after the Japanese colonial period. Among them are widespread absolute poverty, control of a large share of firms in Korea by the Japanese, and extensive ownership of agricultural land by the Japanese or Japanese dominated agricultural farms during the colonial period, division of the South and North right after the liberation in 1945, land reforms in 1947 and 1949, slow disposal of vested properties, destruction of industries during the Korean War (1950-53), monetary reforms and cash distribution in 1950, 1953, and 1962, settlement of rural usurious loans in 1961, and confiscation of illegally accumulated wealth by the military government between 1961-65.¹ Korea started its development process with an initial

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distribution of real wealth and financial assets which was one of the most even in the capitalist world (Adelman (1995)).

There is a general agreement that the income distribution of Korea became somewhat more equitable from the mid-1960s through the early 1970s and then worsened significantly during the mid-1970s. Estimation results since the 1980s, however, have presented two contrasting pictures of the income distributional reality in Korea, one indicating a steady and substantial improvement and the other a rapid deterioration in the late 1980s but upturn in the early 1990s. Two contradictory estimation results for income distribution in Korea in the 1980s can be dubbed as “official estimates” and previous “unofficial estimates” of income distribution in Korea, respectively.² Recently, there appeared another “unofficial estimates” that income distribution tended to improve in the 1980s but neither improved nor deteriorated in the early 1990s. As one of the proponents of previous unofficial estimates of income distribution, I maintain my position that income distribution deteriorated in the 1980s. In this paper I present unofficial estimates of income distribution covering the early 1990s and claim that income distribution shows signs of improvement in the early 1990s. I argue that official estimates and another unofficial estimates are error-ridden and my estimates are close to the true distributional reality. I also study the determinants of income distribution in Korea.

The organization of this paper is as follows. In section II, I review the previous estimates of income distribution in Korea, broadly classifying them into the official and unofficial estimates. In section III, two different sets of new unofficial estimates are introduced: one by Ahn (1995) and the other by Whang and Lee (1996). Ahn (1995) presents previous unofficial estimates to cover until the early 1990s. According to these estimates, contrary to official estimates, income distribution had not improved but deteriorated in the 1980s. Unequal distribution reached its peak in 1989 before making a turning point toward improvement. Whang and Lee (1996) presents another estimates, showing that income distribution improved slightly in the 1980s but neither improved nor deteriorated in the early 1990s. In section IV, I compare the official estimates with two unofficial estimates and argue that Ahn (1995)’s estimates are closer to reality. In section V, using the time series of Ahn (1995)’s estimates, I study determinants of income distribution. I show that the high rise of real estate price, which causes prevalent sense of relative deprivation in Korea, is also a major root of worsened income distribution in the 1980s. I argue that in the 1980s the influence of rising land prices on income distribution negated the positive gains of narrowing wage differentials. Concluding remarks are in section VI.

II. Previous Estimates of Income Distribution in Korea

There are no reliable data to infer overall income distribution until the mid-1960s. Since the mid-1960s we have some estimates of household income distribution in Korea.³ According to these estimates, income distribution improved between the mid-1960s and the early 1970s,

1. See Choo (1977, 1978) and Adelman (1995) for more detailed discussion of historical sources of relative equity in Korea until the early 1960s.
2. I use the term “official” in the sense that it is the estimates that the Government utilize in government publications dealing with the size distribution of income in Korea.
3. There are no estimates of family income distribution or individual income distribution due to lack of relevant data.

but rapidly worsened in the mid-1970s. Regarding the income distribution in the 1980s, however, there has been considerable controversy. According to the “official estimates” adopted by the government, income distribution in the 1980s steadily improved. According to the “unofficial estimates,” income distribution remained stable during the mid-1980s but deteriorated significantly toward the end of the 1980s. The two differing views will be elaborated and evaluated below.

Estimations of income distribution between the mid-1960s and the mid-1970s were initially carried out by Oshima (1970), Adelman (1974), Chae (1972), Morrison (1972), Mizoguchi et al. (1976), and Renaud (1972). Their estimations did not consider the limitations and problems of reliability that Korean statistical data tended to have. Choo and Kim (1978) tried to take into consideration and overcome those limitations and problems, and produced systematic estimates of income distribution.

It was not until 1980 that the Korean government began to conduct periodic surveys of nationwide income distribution. Nor was there any reliable private survey of income distribution. For the estimation of income distribution before the 1980s, therefore, researchers had to use sectoral data on income distribution and, if they are not available, sectoral data on consumption and wealth distribution. Income, consumption and wealth distribution-related data are obtained mainly from two surveys. They are the City Household Income and Expenditure Survey (CHIES) and the Farm Household Economy Survey (FHES). The CHIES is published annually by the National Statistical Office⁴ (NSO) since 1963. The FHES is published annually by the Ministry of Agriculture, Forestry and Fisheries since 1961. Most studies prior to Choo and Kim (1978) utilized the CHIES and FHES in estimating income distribution for urban and rural households, respectively. However, these two surveys do not include all households in Korea. The CHIES excludes non-farm households in rural areas and single-person households, which are also excluded in the FHES. Moreover, in the CHIES there are data only on the size distribution of income of worker households but not those of urban self-employed and employer households. The share of these households excluded in the coverage of the two surveys amounted to 39.3% of all households as of 1980. In addition, by 1976 the CHIES set a household income ceiling and excluded high-income households above the ceiling from the survey. Previous studies utilized the CHIES without considering those limitations and problems.

1. Estimates of Income Distribution by Choo and Kim (1978), Choo and Yoon (1984), and Choo (1993)

Choo and Kim (1978) made great efforts to overcome most of those limitations and problems inherent in the CHIES and FHES. But their breakthrough contributions came mainly from the estimation of income distribution of the non-farm, non-fishery household sector.

In the FHES, farm-households with cultivated land of less than 0.1 ha, landless tenant-households, agricultural-worker households, single-person households, and fishery households are excluded. Choo and Kim (1978) estimated the income distribution of the farm and fishery household sector by utilizing data on the fishery households from the Statistical Yearbook of Agriculture, Forestry and Fisheries published by the Ministry of Agriculture, Forestry and Fisheries. They could not

4. It used to be called as the National Bureau of Statistics, Economic Planning Board until 1990.

include agricultural households which were excluded in the FHES as there were no statistical data on them. Choo and Yoon (1984) omitted fishery households in their estimation of income distribution of the farm and fishery sector stating that inclusion of fishery households did not make much difference in estimates of the income distribution of the farm and fishery sector. Accordingly, studies by Choo et al. differ from previous studies mainly in their estimation of the non-farm households. They divided non-farm households into urban salary and wage-earning households (worker households in short) and self-employed and employer households (non-worker households in short) and made separate estimations of their income distribution. Their studies are considered more reasonable and systematic than previous studies for the following four reasons.

Firstly, as there were no data on income distribution but only on consumption expenditure distribution of non-worker households, they estimated the income distribution of non-worker households from the consumption expenditure distribution by assuming that the average propensity to consume of non-worker households is the same as that of worker households. The CHIES reports the income distribution of worker households, but not that of all urban households including non-worker households. Instead, the consumption expenditure distribution of all urban households is reported. Accordingly, while for urban worker households there are data both on income and consumption expenditure distribution, for non-worker households there are data only on consumption expenditure distribution. Previous studies usually estimated the consumption function from the data on consumption expenditure of non-worker households, and then calculated income from the consumption function. However, the consumption function thus estimated had incredibly low reliability due to the limitations of the available data. Accordingly, Choo and Kim (1978) did not make a separate estimation of the consumption function but estimated the income distribution from the consumption expenditure distribution assuming that the average propensity to consume of non-worker households by income group is the same as that of worker households.

Secondly, they estimated the income distribution of non-farm and non-fishery households in rural areas, which accounted for more than 15% of the entire population as of 1980. Choo and Kim (1978) assumed that the income of each income class among rural non-farm, non-fishery households was proportionally less than the income of the corresponding class among urban non-farm, non-fishery households. They used the ratio of the average income of households in all cities other than Seoul to the average income of households in Seoul as the proportion factor. The operating assumption was that the pattern of income distribution of non-farm, non-fishery households was the same among rural and urban areas.

Thirdly, they estimated income distribution of high income households which earned more than the income-ceiling by utilizing national taxation data. From the Statistical Yearbook of National Taxation, they utilized the data on the number and income size of high income earners above the income ceiling set by the CHIES. Assuming taxpayers as household heads they estimated the income distribution of high income households by adding the income of other household members to that of household heads.

Fourthly, they made a separate estimation of the income of unemployed households as they judged that the number of unemployed households in the sampling households of the CHIES was under-represented. They augmented the unemployed households using the urban unemployment ratio in the Economically Active Population Survey conducted annually by NSO and estimated the income of these unemployed households by adding the income of household members other

than household heads and transfer income.

Incorporating these four characteristics, Choo and Kim (1978) made an estimation of the size distribution of income of the urban worker household sector, the urban non-worker household sector, the farm and fishery household sector in 1965, 1970, 1976, and the income distribution of all households covering these three sectors. Choo and Yoon (1984) made an estimation of the size distribution of income for 1982 with almost the same method as that of Choo and Kim (1978). A difference between them is that Choo and Yoon (1984) omitted the separate estimation of the unemployed households and fishery households as they thought this did not have much influence on the estimation of income distribution. In reality, since the 1970s the average number of employees in the sampling households of the CHIES has been smaller than average number of employees per non-farm household reported in the Economically Active Population Survey compiled by NSO. Accordingly, it can be assumed that the proper number of unemployed households were included in the CHIES. Omitting the usual process of estimating separately worker households and non-worker households, Choo (1993) made an estimation of income distribution for 1986 and 1990. He did not elaborate the estimation method. He appeared to follow the method used by Choo and Yoon (1984). The results of Choo et al.'s estimation are shown in Table 1.

According to the estimation by Choo et al., inequality of income distribution in Korea decreased in the latter part of the 1960s, but increased in the mid-1970s. After that, income inequality decreased again and continued to decrease in the 1980s. Improvement of income distribution in the 1960s when the economic development drive was initiated do not fit with Kuznets's inverted-U hypothesis. Kuznets's hypothesis, however, is applicable in the 1970s and reached its peak in the mid-1970s.

Table 1 Income Distribution in Korea by Choo et al. (Gini Coefficient⁵)

Year	National	Farm	Non-farm	Workers	Non-workers
1965	0.344	0.285	0.417	0.399	0.384
1970	0.332	0.295	0.346	0.304	0.353
1976	0.391	0.327	0.412	0.355	0.449
1982	0.357	0.306	0.371	0.309	0.445
1986	0.337	0.297	0.342	0.319	-
1990	0.323	0.299	0.324	0.305	-

2. Estimates of Income Distribution by the National Statistical Office

Since 1980, NSO has intermittently included a survey of income distribution in its annual Social Statistical Survey. Until now, it has carried out surveys on income distribution for each

5. The Gini coefficient is known to be a measure sensitive to changes occurring in the middle part of the distribution. But the decile distribution ratio (defined as the income share of the bottom four deciles divided by that of the top two), the mean log deviation (a bottom sensitive measure) and the coefficient of variation (a top sensitive inequality measure) show basically the same trend as in the Gini coefficient. Hence, I will use the Gini coefficient to summarize inequality in the distribution in the size distribution of household income.

of the years 1980, 1985, 1988 and 1993. The survey results were summarized and reported in the Social Index of Korea published annually by NSO. Estimation results of NSO are given in Table 2. According to the table, income distribution estimates by NSO show a steady improvement in the 1980s. This corresponds to the estimation results of Choo et al.

While Choo et al.'s research employed an indirect method utilizing income distribution related data, NSO used a direct survey method based on the sampling household interview data. The two estimates do not differ much. The latter strengthened the former's argument that income distribution had steadily improved in the 1980s. But there was an awkward statistical message. The Gini coefficient for 1985 was first presented as 0.361. This estimate together with 0.357 of Gini coefficient for 1982 given by that of Choo and Yoon (1984) could be interpreted as an indicator of a small deterioration of income distribution or at least stagnation during 1982-85. However, by omitting single-person households in the estimation, the Gini coefficient of 1985 was later modified to 0.344. Accordingly, incorporation of two statistical estimates showed that income distribution in the 1980s had steadily improved. This revision will be criticized below as tarnishing the reliability of the estimation by NSO. At any rate, with this revision it would appear that the large-scale direct survey method carried out by NSO confirmed and complemented the indirect method based on the income distribution data by Choo et al. This may be the reason why both statistical estimates are often used together and also why the Korean government often presents them as "official estimates" of income distribution of Korea.

Table 2 Income Distribution in Korea by the National Statistical Office (Gini Coefficient)

Year	National	Rural	Urban
1980	0.388	0.356	0.405
1985	0.363	0.320	0.385
	(0.344)	(0.297)	(0.369)
1988	0.336	0.290	0.350
1993	0.310	0.310	0.306

Note: Figures in parentheses are old estimates for 1985.

3. Estimates of Income Distribution by Kim and Ahn (1987)

Estimates by Choo and Kim (1978) and Choo and Yoon (1983) based on the income distribution related data were produced for the selected years 1965, 1970, 1976 and 1982. There is no guarantee that estimation results for those four years represent the distributional realities during the period 1965-1982. Moreover, until Choo (1993) estimated the income distribution for 1986 and 1990 in the early 1990s, there were no subsequent estimates for the years since 1982. Kim and Ahn (1987) filled this gap by estimating the income distribution annually during the period of 1965-1985.⁶ They basically followed Choo and Kim (1978)'s data processing and estimation method while attempting a partial correction and improvement. Their estimation

6. Although the CHIES has been published annually since 1963, both income distribution of worker households and consumption expenditure distribution of all urban households were not compiled in 1963 and 1964. That is why income distribution in Korea has been estimated starting from 1965.

method differed explicitly from that of Choo et al. in two respects.

Firstly, they did not subdivide the non-farm, non-fishery sector but lumped together to estimate income distribution of all urban households. As mentioned above, Choo et al. subdivided the urban sector into urban worker households and non-worker households. For income distribution of worker households they utilized the income distribution data of worker households in the City Household Income and Expenditure Survey. For income distribution of non-worker households, they utilized the consumption expenditure distribution of all urban households using the average propensity to consume of worker households as a conversion factor. Kim and Ahn (1987) judged that these methods tend to underestimate income inequality in non-worker households. Accordingly, Kim and Ahn (1987) just obtained income distribution of all urban households from the consumption expenditure distribution of all urban households through dividing urban household consumption expenditure by the average propensity to consume of worker households class by class.⁷

Secondly, while Choo et al. allegedly utilized the distribution of households by income class for farm households, Kim and Ahn (1987) utilized distribution of households by the size of landholding. Income distribution can be estimated directly from the distribution of households by income class. The data of the distribution of farm households by income class were publicly available for the period of 1967-1971. They have, however, not been publicly available since then. Hence, Kim and Ahn (1987) had to utilize the distribution of farm households by the size of landholding and that of fishery households by type of fishing. Landless agricultural households and fishery worker households were excluded from the farm and fishery sector and included in the non-farm, non-fishery sector since there were not any distribution-related data for them. This tends to make income equality in the farm and fishery sector overestimated.

Estimates of income distribution by Kim and Ahn (1987) are shown in Table 3. As can be seen in the comparison of Table 1 with Table 3, their estimation results show that while their Gini coefficients are higher than those of Choo et al. for all periods, the trend of income distribution is similar for both until the 1970s. However, as Choo et al.'s estimation and the Social Statistical Survey by NSO showed a steady and significant improvement of income distribution during 1982-85, Kim and Ahn (1987)'s estimation showed little improvement during these periods. Conflicting estimation results of income distribution starting from 1982 inspired subsequent research work.

4. Estimates of Income Distribution by Iwamoto (1989) and Kang (1990)

Iwamoto (1989) made a modified extension of Kim and Ahn (1987) for the period of 1976-1987 in three ways. First, he made a separate estimation of single person household income of the non-farm, non-fishery sector. Second, he employed other plausible method of estimating urban high income households than Kim and Ahn (1987)'s. Third, he did not make a separate estimation of the income of unemployed households. Due mainly to the first and second

7. The number of income class of worker households has been all the way the same as that of consumption (expenditure) class of all urban households although the number increased over time. Kim and Ahn (1987) applied the average propensity to consume (APC) of the lowest income class of worker households to the lowest consumption class of all urban households, the next lowest income class to the next lowest consumption class and so on.

Table 3 Income Distribution in Korea by Kim and Ahn (1987) (Gini Coefficient)

Year	National	Farm & Fishery	Non-Farm, Non-Fishery
1965	0.3652	0.2060	0.4935
1966	0.3542	0.2079	0.4386
1967	0.3687	0.1935	0.4255
1968	0.3608	0.1924	0.4044
1969	0.3597	0.1957	0.4075
1970	0.3457	0.1941	0.3861
1971	0.3377	0.2141	0.3835
1972	0.3570	0.2195	0.4130
1973	0.3929	0.2145	0.4563
1974	0.3944	0.2170	0.4675
1975	0.3905	0.1940	0.4708
1976	0.4084	0.2171	0.4813
1977	0.3964	0.2079	0.4713
1978	0.3828	0.1783	0.4490
1979	0.3919	0.1586	0.4460
1980	0.3860	0.1455	0.4437
1981	0.3734	0.1438	0.4293
1982	0.4056	0.1522	0.4688
1983	0.4005	0.1300	0.4631
1984	0.3937	0.1275	0.4348
1985	0.4105	0.1211	0.4676

characteristics, Gini coefficients computed by Iwamoto (1989) are generally higher than those by Kim and Ahn (1987). According to Iwamoto (1989), Gini coefficients in the 1980s are around 0.40 and have a tendency to rise.

Kang (1990) basically followed Iwamoto's approach in estimating income distribution over the period 1970-1988. Correcting Iwamoto's computational errors he found that although Gini coefficients were a little bit lower than those estimated by Iwamoto (1989), income distribution in the 1980s deteriorated.

Estimation by Iwamoto (1989) and Kang (1990) amplified the previous discrepancy between Choo et al. and Kim and Ahn (1987). Their estimations show that incorporation of single person households will make the Gini coefficient 0.01-0.02 higher and there can be various plausible ways to estimate urban high income households.

5. Estimates of Income Distribution by Ahn (1992)

As noted above, Choo and Yoon (1984) did not make a separate estimation of the income of unemployed households in the estimation of income distribution for 1982, unlike those for the years 1965, 1970, and 1976. Kim and Ahn (1987) made a separate estimation of the income of unemployed households. Accordingly, the differences between the two estimation results of income distribution for 1982 could be determined by whether or not they made a separate

estimation of the income of employed households. To confirm this point, Ahn (1992) did not make a separate estimation of the income of unemployed households and tried to correct minor problems involved in the estimation process by Kim and Ahn (1987). His estimation results are given in Table 4.

Table 4 Income Distribution in Korea by Ahn (1992) (Gini Coefficient)

Year	National	Farm & Fishery	Non-Farm, Non-Fishery
1965	0.3365	0.2060	0.4356
1966	0.3287	0.2079	0.3900
1967	0.3637	0.1935	0.3949
1968	0.3458	0.1924	0.3747
1969	0.3464	0.1957	0.3858
1970	0.3125	0.1941	0.3726
1971	0.3074	0.2141	0.3528
1972	0.3121	0.2195	0.3611
1973	0.3676	0.2145	0.4341
1974	0.3823	0.2170	0.4562
1975	0.3769	0.1940	0.4547
1976	0.3899	0.2171	0.4587
1977	0.3780	0.2108	0.4436
1978	0.3699	0.1804	0.4352
1979	0.3752	0.1613	0.4353
1980	0.3567	0.1462	0.4156
1981	0.3472	0.1459	0.4008
1982	0.3850	0.1541	0.4420
1983	0.3679	0.1320	0.4231
1984	0.3907	0.1295	0.4465
1985	0.3915	0.1229	0.4438
1986	0.3943	0.1179	0.4430
1987	0.3983	0.1311	0.4413
1988	0.4044	0.1149	0.4479
1989	0.4318	0.1093	0.4726

Comparison of Table 4 with Tables 1 and 3 reveals that until the 1970s Ahn (1992)'s Gini coefficients are lower than those of Choo and Kim (1978) as well as those of Kim and Ahn (1987). Since Ahn (1992) did not consider separately unemployed households it produced Gini coefficients 0.01-0.02 lower than those of Choo et al. If we take an average of the Gini coefficients that Kim and Ahn (1987) and Ahn (1992) have respectively produced, we have Gini coefficients similar to that of Choo et al. However, since 1982 we have estimates different from those of "official estimates" and the trend of income distribution between them conflicts. According to the former, in the late 1980s Gini coefficients exceeded 0.40. In 1989, income distribution was the most skewed. Kim and Ahn (1987) and Ahn (1992) argued that in the 1980s income distribution in Korea did not improve but deteriorated.

III. New Estimation of Income Distribution in Korea

1. Estimates of Income Distribution by Ahn (1995)

Can the gap between the official and unofficial estimates which produced maximum 0.07 Gini coefficient differentials in the 1980s be narrowed? Kim and Ahn (1987) and Ahn (1992) both made a separate estimation of urban high income households. As mentioned above, until 1976 the CHIES set an income ceiling and excluded high income households earning above the ceiling. This practice was abolished in 1977. However, believing that the CHIES does not properly represent high income households, Kim and Ahn (1987), Iwamoto (1989) and Ahn (1992) estimated income distribution by adding high income households from the Statistical Yearbook of the National Tax. If estimation is made without making a separate estimation of high income households, Gini coefficients will be lowered. To see how much Gini coefficients can be lowered in that case, an estimation is made again from 1977. Except for the treatment of high income bracket of the non-farm, non-fishery sector, Ahn (1992)'s estimation method is followed. Results of the estimation are given in Table 5.

Table 5 Income Distribution in Korea by Ahn (1995) (Gini Coefficient)

Year	National	Farm & Fishery	Non-Farm, Non-fishery
1977	0.3537	0.2108	0.4101
1978	0.3498	0.1804	0.4085
1979	0.3502	0.1613	0.4043
1980	0.3404	0.1462	0.3973
1981	0.3341	0.1459	0.3845
1982	0.3766	0.1541	0.4315
1983	0.3736	0.1320	0.4291
1984	0.3804	0.1295	0.4342
1985	0.3803	0.1229	0.4308
1986	0.3771	0.1175	0.4236
1987	0.3777	0.1311	0.4181
1988	0.3840	0.1149	0.4251
1989	0.4127	0.1093	0.4536
1990	0.4017	0.1052	0.4406
1991	0.4013	0.1041	0.4353
1992	0.3883	0.1114	0.4159
1993	0.3797	0.0931	0.4092
1994	0.3845	0.0879	0.4137

According to the table, this new estimation method lowered the Gini coefficients 0.01-0.02 compared with those of Ahn (1992)'s estimates. However, since 1982 Gini coefficients are still much higher than those of official estimates and the gap between the two widens. As in Ahn (1992)'s estimates, income distribution in the late 1980s showed a deterioration and reached its most skewed condition in 1989. Even when we change to an estimation method most favorable

to the official estimates, we still get estimation results similar to previously presented unofficial estimates. The Gini coefficient was highest at 0.41 in 1989 and began to fall slightly to 0.40 in 1990 and 1991, falling down to 0.38 by 1993 and 1994. In the mid-1980s, income distribution did not show any improvement. In the late 1980s, it rapidly deteriorated, contradicting the official estimates, which suggested a steady and substantial improvement of income distribution.

For reference, estimation of income distribution of the farm and fishery sector is presented in Appendix 1. Estimates starting from 1977 are taken from Ahn (1995), while those for the 1965-1976 from Ahn (1992). Gini coefficients of the farm and fishery sector are in the range of 0.09-0.22, which implies that the size distributions of income of the farm and fishery sector is highly equal. However, the estimates may overestimate the equality of income distribution of the rural sector. As explained in Section II, I used distribution of the farm sector by area of cultivated land and distribution of the fishery sector by type of fishing. Moreover, there are not many classes in each sector. If one does not use distribution of households by specific income class but by another criterion, income inequality will tend to become smaller. Thus, the absolute level of Gini coefficients and decile distribution ratios may not be conclusive. However, trends in Gini coefficients and decile distribution ratios will be conclusive since we employed a consistent estimation method over the period. Appendix 1 shows a persistent decline in income inequality of the farm and fishery sector since the mid-1970s.

Estimation of income distribution of the non-farm, non-fishery sector in Appendix 2 shows that Gini coefficients are in the range of 0.35-0.45, which is much higher than those of the farm and fishery sector. Income distribution of the non-farm, non-fishery sector worsened during the 1973-1976 period, as compared with the previous period and then improved steadily until 1981. But from 1982 to 1989, it shows a deterioration, a mild deterioration at the first stage and an abrupt deterioration at the last stage. Entering the 1990s, income distribution begins to show an improvement.

Estimation of income distribution of all households in Appendix 3 shows that the trend in Gini coefficients resembles closely that of the non-farm, non-fishery sector. The declining trend of Gini coefficients in the farm and fishery sector is overshadowed.

2. Estimates of Income Distribution by Whang and Lee (1996)

Recently there appeared a third line of research, which suggests that income distribution in Korea might improve in the 1980s but stay constant in the early 1990s. So far the tape data of the CHIES and FHES have not been available. Whang and Lee are the first researchers who could get access to the tape data of the CHIES after 1982. As mentioned above, income distribution of non-worker households is totally missing in the CHIES. Using the tape data of income and consumption expenditures of worker households Whang and Lee (1996) first estimated the consumption function of worker households. Assuming that the consumption function for non-worker households is the same as that for worker households, they then estimated income distribution of non-worker households by putting consumption expenditures of non-worker households in the consumption function. They also computed consumption expenditures distribution of the urban sector including both worker and non-worker households. Their results for selected five years are summarized in Table 6.

Table 6 Income and Consumption Distributions in the Urban Sector by Whang and Lee (1996) (Gini Coefficient)

Year	Income Distribution			Consumption Distribution		
	Urban	Worker Households	Non-worker Households	Urban	Worker Households	Non-worker Households
1982	0.393	0.317	0.478	0.330	0.311	0.351
1985	0.384	0.319	0.467	0.337	0.325	0.352
1988	0.365	0.311	0.442	0.332	0.322	0.344
1991	0.363	0.285	0.472	0.333	0.327	0.335
1994	0.363	0.277	0.485	0.316	0.312	0.320

According to the table, urban income distribution improved in the 1980s and stayed basically the same in the early 1990s. Since trends in the income distribution of all households are known to be dictated by income distribution of urban households, it can be inferred that national income distribution improved in the 1980s and stayed almost the same in the early 1990s.

Table 6 shows that consumption distribution in the 1980s stayed constant but improved in the early 1990s. This is in stark contrast with their finding that income distribution declined in the 1980s but stayed constant in the early 1990s. The authors perceive this conflict as a puzzle. From the conflicting results Whang and Lee (1996) suggest that income distribution does not appear to have worsened in the 1980s as long as the estimation is based on the households survey data of the CHIES.

IV. Comparison and Evaluation of Various Estimates of Income Distribution

The previous two sections presented three contrasting pictures of income distribution in Korea since the 1980s. Official estimates show that income distribution has steadily and significantly improved. Previous unofficial estimates represented by Ahn (1992, 1995) say that income distribution deteriorated worst ever in the late 1980s and began to improve in the early 1990s. New unofficial estimates by Whang and Lee (1996) say that income distribution tended to improve slightly in the 1980s but neither improved nor worsened in the early 1990s. These three estimates are shown in Table 7. Which represents the true distribution in Korea?

1. Comparison and Evaluation of Official and Previous Unofficial Estimates

One comes to wonder why the gap between Choo et al.'s estimates and previous unofficial estimates of the income distribution widens since 1982 when both of them used essentially the same statistical data and estimation methods. The reason is not clear. But one thing is clear. Choo and Yoon (1984)'s and Choo (1993)'s detailed estimation methods are not available for verification by others. Meanwhile, detailed estimation methods of unofficial statistics are open to, and await, verification by others. This difference makes one wonder whether estimates of Choo and Yoon (1984) and Choo (1993) might have come out of thin air.

As for the Social Statistical Survey conducted by NSO, it is hard to believe that its estimates reflect the income distributional reality better than the estimates based on the CHIES for the following three reasons.

Table 7 Trends in Income Distribution in Korea (Summary) (Gini Coefficient)

Year	Official Estimates [*]	Ahn (1992, 1995) ^{**}	Whang and Lee (1996) ^{***}
1965	0.3439	0.3365	
1966		0.3287	
1967		0.3637	
1968		0.3458	
1969		0.3464	
1970	0.3322	0.3125	
1971		0.3074	
1972		0.3121	
1973		0.3676	
1974		0.3823	
1975		0.3769	
1976	0.3908	0.3899	
1977		0.3780	
1978		0.3699	
1979		0.3752	
1980	0.3891	0.3567	
1981		0.3472	
1982	0.3574	0.3766	0.393
1983		0.3736	
1984		0.3804	
1985	0.3449	0.3803	0.384
1986	0.3368	0.3771	
1987		0.3777	
1988	0.3355	0.3840	0.365
1989		0.4127	
1990	0.3226	0.4017	
1991		0.4013	0.365
1992		0.3883	
1993	0.3097	0.3797	
1994		0.3845	0.363

Notes: * The figures of the years 1965, 1970, 1976, 1982, 1986, and 1990 are from Choo et al.; those of the years 1980, 1985, 1988 and 1993 are from the Social Statistical Survey.

** Ahn (1992)'s time series data until 1981 and Ahn (1995)'s since 1982.

*** Urban income distribution.

Firstly, in the Social Statistical Survey, sample households are asked to record in a survey format their income and expenditure of the previous year and are then interviewed in early June. There is simply too great a time lapse. The results depend upon the interviewees' memories. This is in sharp contrast to the CHIES. The CHIES is conducted monthly using an account-book method. An account-book is distributed to each sample household before the survey so that income sources, types of expenditure and amounts are recorded daily.

Secondly, the Social Statistical Survey includes non-worker households in its sample households, and there tends to be relatively more underreporting than is the case of worker households. As the economy expands, the size of underreported business income is likely to grow. The CHIES covers only worker households in collecting income data. Thus, it is quite possible that our estimation based on the CHIES can be relatively more accurate than the Social Statistical Survey estimates.

Thirdly, as mentioned above, there was an awkward statistical message of the 1985 estimates. The Gini coefficient for 1985 was revised from 0.361 to 0.345 by excluding single person households from the sample. But this revision was not made to the 1980 estimates since relevant raw data had been allegedly abolished by then.

For these three reasons, estimates of income distribution based on the Social Statistical Survey seem less reliable even though they are from a very large sample—at least more than 17,000 households. It should also be noted that a direct survey method usually disregards outliers in the sampling process and tends to produce estimates of the income distribution more equal than the reality.

Despite the non-verifiability and severe limitation of official estimates, there are several plausible factors which contributed to the improvement of income distribution in the 1980s. Among them are, as Oshima (1997) noted, narrowing wage differentials by skill, education and sex, continuing decline of the unemployment rate, the rising trend of the labor share, the increasing proportion of employment of married women and elderly workers, the spread of low fertility to lower income parents, the rising share of social security and welfare spending out of the total government spending, and so on. The question is: how large will be the combined effects? In my view, the magnitude of the combined effects will not be large. Among these factors narrowing wage differentials should be taken as the single most important factor since income distribution in the OECD countries is generally dictated by her earnings (especially labor income earnings) distribution.⁸ Although wage differentials by firm scale have recently been widened the overall narrowing trend in wage differential is undeniable. The next section, however, shows that the improving effect of the narrowing wage differential on income distribution is much less than the worsening effect of land price inflation.

The decline in the unemployment rate was not so large in the 1980s as in the 1970s. The labor share as represented by the ratio of compensation of employees of national income has shown a long-term rise since the 1960s. It has grown from the annual average of 0.32 during 1953-1959 and 0.34 in the 1960s to 0.43 in the 1970s, 0.54 in the 1980s and 0.61 during 1990-1995.⁹ The rising trend, however, cannot be used as a factor of improving income distribution for the following two reasons. First, the share shows the rising trend due partly to the continued decline of rural population. In the national income accounting, farmer's income is counted as capital income under the category of the proprietor's operating surplus. Hence, the ongoing massive outmigration from the agricultural sector to the non-agricultural sector itself generates the decrease in capital income and the increase in labor income. Second, rental income in the national account seems underestimated since the mid-1980s. During the period of 1987-1991, land price rose at

8. See, for example, Gottschalk and Smeeding (1996).

9. Bank of Korea, *National Accounts*, 1994 and 1996.

the annual average rate of 21.5%, while rent in the national account rose by only 9.2%. This is in sharp contrast with the period of 1980-1986. During 1980-1986, land price rose annually by 7.8% while rent in the national account rose by 28.2%. In 1987 and 1991, the absolute level of rent fell even though land price rose by 14.7% and 12.8%, respectively.

As for both demographic effects and the rising share of social security and welfare spending, it suffices to cite a major countervailing factor: the rising trend in the share of the single-person household. Its share out of the total households rose from 4.8% in 1980 to 9.0% in 1990.¹⁰

All in all, my view that the combined positive effects will not be large is supported by NSO. A significant combined effect, if any, should be shown in income distribution of urban worker households. However, NSO (1993) shows that income distribution of urban worker households remained virtually the same in the 1980s.

An excessive bubble which the Korean economy experienced seems to be a predominant factor in the overall determination of income distribution in the late 1980s. During the period of 1986-1989 the economy recorded an annual average of 10.8% real growth and a total of US\$ 33.7 billion current surplus. Stock prices rose at an annual average rate of 61% and land prices at 20%. The ratio of capital gains from land to GNP rose from 0.3 in 1985 and 1986 to 0.7 in 1987, 1.0 in 1988 and reached its peak to 1.3 in 1989.¹¹ As of 1988, the top 5% of land owners possessed 65.2% of total privately-owned land area, the top 10% 76.9%, and the top 25% 90.8%. The Gini coefficient of land distribution for 1989 was calculated as 0.85.¹² While the conspicuous consumption of the propertied class was salient the sense of relative deprivation prevailed among the majority of Koreans. The conspicuous consumption of the late 1980s was closely related to enormous capital gains from the skyrocketing price of real and financial assets. By using land price inflation as representing a bubble, the hypothesis that such a bubble as experienced in the late 1980s is a dominating factor of income distribution will be empirically tested and confirmed in the next section.

2. Comparison and Evaluation of the Two Unofficial Estimates

Previous unofficial estimates have been seriously challenged by Whang and Lee (1996). Their study is valuable in the sense that it is the first study to access and utilize computer tape of the CHIES, which has been prevented from using. Their estimates of income distribution of urban non-worker households, however, are not convincing. The conflicting trends between overall income distribution and consumption distribution¹³ suggest that the estimation of income distribution of non-worker households via estimation of a crude consumption function may be

10. The National Statistical Office, *Social Indicators in Korea*, 1980 and 1990.

11. See Lee (1990) and Leipziger et al. (1992).

12. Commission of Public Concept of Landownership (1989).

13. There is no annual consumption (defined as consumption expenditures less the purchase price of vehicles and major appliances and the costs of homeownership plus the rental equivalence of owned home and the service flows from vehicles and appliances) data in Korea. There exists only consumption expenditures (the amount that the household actually spends for current consumption) data. Johnson and Smeeding (1997) shows that in the US consumption and consumption expenditures are fairly close and trends in their distributions are the same. With these in mind this paper uses consumption and consumption expenditures in Korea interchangeably.

error-ridden. The adjusted R^2 in the estimated consumption function is between 0.22 and 0.45. The low R^2 indicates that some important explanatory variables are missing and the estimated consumption function remains very wanting. Thus, it is too crude to use the proposed consumption function in deriving income distribution of non-worker households. As Johnson and Smeeding (1997) suggested, consumption data produce a more accurate inequality measure for non-worker households where income is traditionally underreported on surveys. Whang and Lee (1996) should have placed more emphasis on consumption distribution than on their dubiously derived income distribution.

Whang and Lee (1996)'s valuable contribution lies in the estimation of both income distribution of worker households and consumption distribution of the urban sector. Since they have been estimated directly using the taped micro data of the CHIES, the trend and level of the estimates should be taken seriously. Income distribution of worker's households, however, is not new. NSO has already compiled the income distribution of worker households using the micro data of the CHIES. According to NSO, as mentioned above, income distribution of worker households stayed basically the same during the 1980s, which is what the study of Whang and Lee (1996) shows. As for the trend in the consumption distribution of the urban sector, Whang and Lee (1996) show that there is neither improvement nor deterioration in the sample years of the 1980s and improvement in the early 1990s. This looks at odds with Ahn's (1995) results, which show the deterioration in the 1980s and improvement in the early 1990s. But it turns out that, as shown in Table 8, Ahn's (1995) estimations have exactly the same pattern as in Whang and Lee (1996) for those five selective years. My conjecture is that if Whang and Lee (1996) estimated consumption distribution for 1989 and 1990, then, as in Ahn (1995), the Gini coefficients would be higher than any other year.

In short, contrary to Whang and Lee (1996)'s claim, I maintain that income distribution worsened in the late 1980s and the household survey data of the CHIES can support it. Adelman (1995), in her own rough estimates of decile distribution ratios for 1988 and 1992, presents her conjecture that the "true" distribution of income in Korea worsened during the 1980s.

As discussed in Section II, Ahn (1992, 1995), following Kim and Ahn (1987), utilized some crude and dubious assumptions similar to those of Whang and Lee (1996). The estimation results, however, are in accordance with subjective distribution perception. According to nationwide surveys conducted annually by the Dong-A Ilbo, one of the largest newspapers in Korea, majority of Korean people felt that worsened distribution of income and wealth is the most important economic issue to solve in 1987, 1989, 1990 and 1991. In 1988, the distribution issue was the second most important problem. During the period of 1992-1996, the distribution issue was not among the top three economic problems. During the period of 1987-1991, capital gains caused by the price hike of real estates and stocks were much larger than any other 5-year period. This is why people perceive that income and wealth distribution were worsening. In this regard, Ahn (1992, 1995)'s estimates happen to reflect unearned income distribution as well as earnings distribution.

As for the absolute level, my Gini estimates of the non-farm, non-fishery sector seem to be unduly high as compared with the corresponding figures of Whang and Lee (1996). A major reason is that Ahn (1995) excluded landless agricultural households, agricultural worker households and fishery worker households from the farm and fishery sector and included them in

Table 8 Comparison of Income and Consumption Distributions of the Urban (or the Non-farm, Non-fishery) Sector

Year	Whang and Lee (1996)		Ahn (1995)
	Income	Consumption	Income
1982	0.393	0.330	0.432
1985	0.384	0.337	0.434
1988	0.365	0.332	0.425
1991	0.365	0.333	0.435
1994	0.363	0.316	0.414

Note: The urban sector for Whang and Lee (1996) and the non-farm, non-fishery sector for Ahn (1995).

the non-farm, non-fishery sector. The farm and fishery households in Ahn (1995) are not the same as the rural households and the non-farm, non-fishery households are not the same as the urban households. Thus, what matters is the absolute level of inequality of *all* households. By focusing on income distribution estimates for 1988 and 1993 I now argue that my Gini estimates of all households are reliable.

According to the Social Statistical Survey, the Gini coefficient (for the income distribution of all households) was significantly lowered from 0.389 in 1980 to 0.345 in 1985. The CHIES (1993) reported that income distribution of urban worker households stayed almost the same during the period 1979-1985. As shown in Choo (1978) and Ahn (1992), the distribution of income in non-farm, non-fishery households determines to a very high degree the distribution of income of all households. Hence, in order for the income distribution to improve so much as shown in the Social Statistical Survey in five years, income distribution of urban non-worker households should improve remarkably in the early 1980s. There is no convincing evidence or reason to support this remarkable improvement.

Kwon et al. (1990) of Korea Development Institute conducted a survey of the national living standard and economic consciousness for 1988 by sampling 4,300 households nationwide. Through the interview method they surveyed the income level, composition of income, property, and debt of sampling households. Conducting a pilot study between late February and early March 1989 and the main study between April 3 and 24, they overcame the first problem that the Social Statistical Survey had. In this survey 1988 Gini coefficient of income distribution of all households was estimated to be 0.404. It is the same as Ahn (1992)'s estimate of 0.404 but differs markedly from the 0.336 of the Social Statistical Survey. Kwon et al.'s research showed that the Gini coefficient rose to 0.436 when the imputed rental income and capital gains were included. Choo (1993) criticized Kwon et al.'s estimates on the ground that the income distribution of farm households was worse than that of non-farm households. This problem, however, is not unique to Kwon et al. This is also the case for the 1993 estimates in the Social Statistical Survey.

Lee (1991) reported that when he estimated income distribution by adding capital gains in the transaction of real estate, Gini coefficients for 1988 rose from the official 0.336 to 0.386. This number is almost identical to that for 1988 in the estimates of Ahn (1995). Although the modified estimates are not based of disaggregated data they appear to produce more realistic Gini coefficients, which reflect the general public's perception of income distribution.

Daewoo Economic Research Institute in Seoul collected panel data for 3,600 households covering April 1992 through March 1993 and produced a Gini coefficient of 0.386, which is the same as my 1992 figure. They conducted panel survey again covering August 1993 through July 1994 and produced a Gini coefficient of 0.365. Their Gini coefficient is lower than the 0.3797 for 1993 in Ahn (1995). However, it is much higher than the 0.310 for 1993. Daewoo Economic Research Institute omitted outliers in the sampling process and tend to produce a bias toward estimating the Gini coefficient lower than the reality.

I think that combining time series data of income distribution shown in Ahn (1992) until 1981 with that of modified estimates since 1982 will make a reasonable and conservative time series data of income distribution which closely reflects reality.¹⁴ This proposed estimate is produced excluding single-person households and under the assumption that unemployed households and urban high income households were properly represented in the CHIES. If we include single-person households, Gini coefficients will become higher. They are expected to be 0.01-0.02 higher at least. In the CHIES of 1991, there are income distribution data of single-person households in urban areas. Utilizing this data, if we make a separate estimation of single-person households the Gini coefficient becomes 0.01 higher. When the Gini coefficient for 1985 was estimated in the Social Statistical Survey, inclusion of single-person households made the Gini coefficient 0.02 higher. If the global income tax data are used to more accurately represent high income households on the basis that high income households are not properly represented in CHIES in the 1980s due to the tradition of excluding the outliers, Gini coefficients will again be 0.01-0.02 higher, as reflected in the discrepancy between estimates of Ahn (1992) and Ahn (1995). Thus, although the Gini coefficients I propose are much higher than those in the official estimates, they still can underestimate the inequality of income distribution.

As mentioned above, the income distribution of the farm and fishery sector in unofficial estimates are too equitable to be true. However, their overall income distribution for 1980, 1988 and 1993 are more or less in line with those of the Social Statistical Survey for 1980, Kwon et al. (1990) for 1988, and Daewoo Economic Research Institute for 1993. And as discussed above, the income distribution in the non-farm, non-fishery sector determines to a very high degree the income distribution of the total households. Based on the discussion and proposal of time series data that I have made, I would make the following four points.

First, we should not accept as authoritative the "official estimates" of income distribution, since they are less reliable than my "unofficial estimates."

Second, income distribution in Korea in the 1980s did not improve. It stabilized in the mid-1980s and deteriorated markedly in the late 1980s.

Third, unequal income distribution reached its peak in 1989 before it began to improve in the 1990s. Yet, Gini coefficients in the mid-1990s should be around 0.38 at least.

Fourth, unlike in most other countries, in Korea income distribution is primarily determined not by earnings but by unearned income, especially capital gains from land.

14. In combining time series data, we can use Ahn (1992)'s estimates until 1976 when there was an income ceiling and Ahn (1995)'s estimates since 1977. In this case, income distribution in 1977 appears to be improving excessively without good reason. Also, in Ahn (1995)'s estimates, income distribution in 1982 is shown to get worsened excessively. In order to moderate these, I combined Ahn's (1992) time series data until 1981 and Ahn (1995)'s estimates since 1982.

V. Determinants of Income Distribution in Korea

It is difficult to isolate the determinants of a country's income distribution in a satisfactory way as income distribution is determined by a complex interaction of historical, socio-cultural, and politico-economic factors. Therefore, it may be over-ambitious to attempt an empirical analysis of finding all the relevant determinants of income distribution in Korea. In this paper, I limit my research to the empirical analysis of how major macroeconomic variables, along with wage differential variables, affect income distribution. The underlying presumption is that development performance unique to Korea contributed to worsening income distribution while narrowing wage differential contributed to improving income distribution, and that the former outperformed the latter in the late 1980s.

Korea has pursued an unbalanced economic development strategy concentrating on manufacturing industry since the 1960s. If economic growth has an inverse relationship with income distribution, we can easily infer that a rapid growth in the manufacturing industry will worsen income distribution. Accordingly, I use the real growth rate of the manufacturing industry as the economic growth rate variable.¹⁵ The unemployment rate of non-farm, non-fishery households has spectacularly been lowered from 13% in the mid-1960s to 4% in the early 1990s. The drastic change in the unemployment rate should have contributed to improving income distribution.

For the last 30 years, Korea experienced periodic upward swings in real estate prices in the course of economic growth. Rising real estate prices in Korea produced a prevalent sense of relative deprivation and lowered the tolerance level of inequitable income distribution. With the rise of real estate prices, capital gains and rental income of the propertied class become larger, while the "have-nots" use most of their increased income to pay higher rent. Accordingly, the price of real estate should be considered as one of the important macroeconomic variables influencing income distribution. In this paper land price rise is used to represent the real estate price rise. During the period 1965-1981 the Korean economy saw an annual average rate of 19% of inflation as measured by the consumer price index. Since 1982, the inflation rate dwindled to one-digit numbers. In order to check whether this changing trend in inflation affects income distribution, the inflation rate is used as another explanatory variable. As for a representative indicator of wage differentials, the ratio of college graduate worker wages to middle school graduate worker wages is employed. All the above-mentioned variables except for the wage differential variable are available since 1965. Wage differential variables are available since 1971. Hence, the wage differential variable will be used in the subsequent subsample analysis. These macroeconomic variables are shown in Appendix 4.

The regression equation for this paper to estimate is as follows:

$$\text{Gini} = a_0 + a_1 g + a_2 u + a_3 \pi + a_4 \pi^L + a_5 T + a_6 T^2 \quad (1)$$

15. As unbalanced economic growth has continued, concentration of economic power by a small number of business conglomeration (*chaebols*) has increased even though the market structure of overall industries has slowly become less concentrated. Concentration of economic power by *chaebols* and market concentration indexes are more appropriate variables which affect income distribution. But annual time series for these variables are not available. Hence, I use the real growth rate of the manufacturing industry.

where g is the real growth rate of the manufacturing industry, u is the non-farm household unemployment rate, π is the inflation rate in terms of the consumer price index, π^L is the rate of increase of land price, and T is time trend. Since the time trend of income distribution, if any, is not linear, I use T^2 as well as T as an explanatory variable. The estimation period is from 1965 to 1994. The ordinary least squares regression analysis using Gini time series of Ahn (1992, 1995) shown in Table 7 as dependent variables is shown by the following equation (t-statistics are in parentheses).¹⁶

$$\text{Gini} = 0.2393 + 0.0009g + 0.0034u + 0.0003\pi + 0.0004\pi^L + 0.0068T - 0.0001T^2 \quad (2)$$

(3.80) (1.17) (0.89) (0.46) (2.09) (2.41) (-1.30)

\bar{R}^2 : 0.541 D.W.: 1.480 S.E.E.: 0.008

According to the regression analysis, economic growth, unemployment rate, inflation and land price inflation all tend to make income distribution unequal. It turns out that the land price rise is the single most important macroeconomic variable which affects income distribution with statistical significance. An accelerating land price inflation increases Gini coefficients and lowers the decile distribution ratios with statistical significance. Unemployment rate shows an inverse relationship with income distribution though with little statistical significance. Accordingly, it supports the general assumption that the higher the unemployment rate the more inequitable the income distribution.

There may be a multicollinearity problem among major macroeconomic variables we consider. Thus, I conduct regression analysis by omitting one variable at a time from the explanatory variables. Estimation results using Gini coefficient as dependent variable are shown in Table 9.¹⁷ According to the table, the proposition that the land price inflation is the single most important macroeconomic variable affecting income distribution still holds. As for unemployment and inflation, the sign of the coefficients sometimes changes as I change the explanatory variables. However, in that case there is no statistical significance.

I carried out regression analysis by making combined deciles of the low 40% income bracket, the middle 40%, and the top 20% as dependent variables. As shown in Equations (3)-(5), if the land price inflation rises the income share of deciles 1 through 8 falls while that of deciles 9 and 10 rises. If the land price rises, it produces a loss on the part of the low-income class severely and on the part of middle-income class mildly. Only the upper 20% gains from the price rise. It turns out that more than 90% of the gain accrues to the upper 10% class.

If the unemployment rate rises the low income bracket hurts, while the middle-class and the top gain by increasing their income shares although its statistical significance is low. Inflation increases the income share of both the low and the top income brackets. It tends to improve the income distribution by hurting the middle income bracket. This contradicts the common sense

16. Regression analysis using Gini coefficients and decile distribution ratios until 1976 by Ahn (1992) in conjunction with my new estimates since 1977 as dependent variables produces the qualitatively same results as, and even stronger results than, the text of this paper.

17. The Cochrane-Orcutt procedure was tried for Equations (2) through (7) since their Durbin-Watson statistics are relatively low. The results were qualitatively the same as in the Table 11.

Table 9 Regression of Gini Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.2393 (3.80)	0.2920 (6.63)	0.2909 (12.16)	0.2530 (4.64)	0.2722 (4.18)	0.3676 (10.00)	0.2780 (4.89)
g	0.0009 (1.17)		0.0006 (0.84)	0.0007 (1.12)	0.0010 (1.19)	0.0001 (0.12)	0.0009 (1.05)
u	0.0034 (0.89)	0.0011 (0.35)		0.0029 (0.81)	0.0022 (0.54)	-0.0039 (-1.55)	0.0012 (0.34)
π	0.0003 (0.46)	-0.0001 (-0.27)	0.0001 (0.23)		0.0004 (0.53)	0.0001 (0.15)	0.0005 (0.74)
π^L	0.0004 (2.09)	0.0004 (2.13)	0.0004 (1.99)	0.0004 (2.15)		0.0003 (1.32)	0.0004 (1.83)
T	0.0068 (2.41)	0.0054 (2.10)	0.0048 (2.82)	0.0066 (2.41)	0.0051 (1.76)		0.0037 (2.47)
T^2	-0.0001 (-1.30)	-0.0001 (-1.21)	-0.0001 (-1.01)	-0.0001 (-1.45)	-0.0001 (-0.81)	0.00005 (1.34)	
\bar{R}^2	0.541	0.535	0.545	0.556	0.477	0.450	0.528
D.W.	1.480	1.298	1.340	1.371	1.118	1.028	1.371
S.E.E.	0.008	0.008	0.008	0.008	0.009	0.009	0.008

Note: Figures in parentheses are t-statistics.

wisdom that inflation usually has the most negative impact on the low income class and confirms the argument of Samuelson and Nordhaus (1995)¹⁸. Economic growth tends to affect the income share of both the low income and middle income brackets negatively and the top income bracket positively.

$$\text{Low 40} = 26.433 - 0.0252 g - 0.2592 u + 0.0376\pi - 0.0246\pi^L - 0.5132 T + 0.0073 T^2 \quad (3)$$

(9.42) (-0.69) (-1.52) (1.26) (-2.67) (-4.08) (2.70)

\bar{R}^2 : 0.803 D.W.: 1.502 S.E.E.: 15.001

$$\text{Mid 40} = 35.591 - 0.0630 g + 0.1707 u - 0.1081\pi - 0.0074\pi^L + 0.3622 T - 0.0097 T^2 \quad (4)$$

(10.76) (-1.47) (0.85) (-3.09) (-0.68) (2.44) (-3.05)

\bar{R}^2 : 0.524 D.W.: 1.822 S.E.E.: 20.851

$$\text{Top 20} = 34.870 + 0.0957 g + 0.4242 u + 0.0842\pi + 0.0371\pi^L + 0.1822 T + 0.0039 T^2 \quad (5)$$

(6.01) (1.28) (1.20) (1.37) (1.95) (0.70) (0.69)

\bar{R}^2 : 0.1352 D.W.: 1.334 S.E.E.: 64.128

18. Samuelson and Nordhaus (1995) states that "contrary to stereotypes, statistics indicate that poor families often gain from inflation at the expense of the affluent." (p. 581)

We can subdivide the whole period under study into the high inflation period of 1965-1981 and low inflation period of 1982-1994 and employ the above empirical analysis. The results of empirical analysis by using Gini coefficients as dependent variable are given by the following two equations.

$$\begin{aligned} \text{Gini 1} = & -0.0765 + 0.0034 g + 0.0208 u + 0.0011\pi + 0.0005\pi^L + 0.0306 T - 0.0009 T^2 \quad (6) \\ & (-0.54) \quad (2.56) \quad (2.43) \quad (0.91) \quad (1.93) \quad (2.41) \quad (-1.87) \\ & \bar{R}^2: 0.447 \quad \text{D.W.}: 2.276 \quad \text{S.E.E.}: 0.004 \end{aligned}$$

$$\begin{aligned} \text{Gini 2} = & 0.0756 - 0.0008 g + 0.0084 u + 0.0013\pi + 0.0007\pi^L + 0.0195 T - 0.0003 T^2 \quad (7) \\ & (0.25) \quad (-1.85) \quad (0.67) \quad (0.95) \quad (1.99) \quad (1.08) \quad (-1.03) \\ & \bar{R}^2: 0.661 \quad \text{D.W.}: 2.584 \quad \text{S.E.E.}: 0.0003 \end{aligned}$$

The above estimation results offer a clue to the determinants of the trend of income distribution in Korea. For the period of 1965-1981, economic growth, unemployment rate, and land price rise are major factors significantly influencing income distribution. Income distribution worsens as the unemployment rate, land price inflation, and economic growth increase. Among them the unemployment rate has the strongest impact. The improvement of income distribution during the mid-1960s to 1971 is attributable to the lowering of the unemployment rate of non-farm, non-fishery households from 13% to 7%. There was massive absorption of labor force from a relatively low productivity sector, agriculture, to a high productivity sector, manufacturing. The impact of the decrease of the unemployment rate on the income distribution more than compensates the deterioration of income distribution deriving from high economic growth and land price rise. In the 1970s the unemployment rate did not decrease as rapidly as in the late 1960s, while high economic growth centering around the manufacturing industry and high land price rise continued. Accordingly, the deterioration of income distribution deriving from high economic growth and land price rises cancels out the countertendency toward improved income distribution deriving from the mild decrease in the unemployment rate.

In the 1980s, the nature of determinants of income distribution greatly changes. The impact of the unemployment rate on the income distribution disappears and economic growth does not worsen, but rather improves income distribution, unlike in the previous periods. We cannot tell whether this result is due to the problem of a small sample size or the change in economic structure. In any case, inflation does not influence income distribution as before. Land inflation, however, still has a significantly negative impact on income distribution.

Since wage differential variables are available for the low inflation period we can now use it as another explanatory variable. Including the wage differential variable, we obtain the following regression equation for the period of 1971-1994.

$$\begin{aligned} \text{Gini 3} = & 0.2112 + 0.0005 g + 0.0002\pi + 0.0005\pi^L + 0.0003w + 0.0022 T + 0.0001 T^2 \quad (8) \\ & (3.85) \quad (0.68) \quad (0.29) \quad (1.44) \quad (1.26) \quad (0.42) \quad (0.41) \\ & \bar{R}^2: 0.4797 \quad \text{D.W.}: 1.334 \quad \text{S.E.E.}: 0.005 \end{aligned}$$

The above regression shows that, despite the relatively low statistical significance, both land price inflation and wage differential are major determinants of income distribution in the low inflation period, but land price inflation exerts much greater influence on income distribution than wage differential. Since the 1980s wage differential has narrowed contributing to the improvement of income distribution. However, this has been more than offset by the deterioration of income distribution in the late 1980s, which can be attributed to the rapidly rising price of real estate along with the slowdown of economic growth. The improvement of income distribution in the early 1990s is mainly due to the slowdown in land price rises, and even a decline of land price levels for the first time since the World War II, combined with underlying narrowed wage differential.

Besides real estate inflation, economic growth and wage differential, there should be other variables which will help to explain the variability of income distribution in the late 1980s. As shown in the above analysis, the adjusted R^2 is just 0.5. However, various other plausible determinants of income distribution turn out to be statistically insignificant. For instance, as the rural-urban terms of trade and the ratio of non-agricultural income to agricultural income of farm households improves, income distribution of farm households improves only marginally and that of the all households is hardly affected. An increase in the share of economically active population improves income distribution with statistical insignificance. A comprehensive study regarding determinants of income distribution remains to be done.

VI. Concluding Remarks

There is a dictum that one should not look closely into the process of making both sausages and statistics. We have been faithful to this dictum and accepted as given what Choo et al. and the Korean government produced as the estimate of Korean income distribution for selected years. But if the sausages taste funny, we have to determine what the sausages are made of. Likewise, if the official statistics are different from the perception of rational economic actors, we have to question the estimation process and rework it. In this paper I reworked the estimation of Korean income distribution and argued that this new estimation is in accordance with the perception of rational economic agents.

Gottschalk and Smeeding (1997) reports that almost all industrial economies experienced some increase in wage inequality and thus increase in household income inequality since the 1980s. They call this as a major stylized fact. This paper argued that, contrary to the stylized fact, although Korea experienced a decrease in wage inequality there was an increase in income inequality during the 1980s. Despite continued narrowing wage differentials by sex, skill and education, the skyrocketing rise in real estate prices and huge capital gains from skewed real estate ownership were dominating factors which worsened the overall income distribution in the late 1980s. The subjective distribution perception held by Korean people during the latter part of the 1980s was actually a valid reflection of unequal income distribution. Gini coefficients in the late 1980s exceeded 0.4, however conservatively we might estimate. Income distribution began to improve only in the 1990s. From our empirical analysis, we could clearly relate this to the rise in real estate prices.

Will the declining trend in wage differential continue in Korea in the future? I doubt it.

The declining trend in wage differential since the 1980s can be attributed to the worker's tendency to avoid 3 D-type works in a new labor shortage environment coupled with the initially very low level of unskilled wage and female wage and the government's strenuous arm-twisting to narrow the gap. Now both unskilled wage and female wage rose up to a level almost comparable to most developed countries relative to skilled wage and male age, respectively. Thus, the significantly declining trend in wage differential by sex and skill will be mitigated. Instead, in a globalization era, Korea is expected to experience a widening gap between skilled workers and unskilled workers, as experienced in almost all developed countries. The wage differential factor may cause income distribution to deteriorate in the future.

Demographic changes are another possible cause of income inequality. Population increase in Korea has been stabilized. Elderly households, single person households and single parent households will grow over time. Proportion of working age families sending more than one earner into the labor market will continue to increase. But the rising female participation and employment rate will no longer contribute to improving income distribution since increasingly larger proportion of additional workers will come from middle or upper income family in the form of white collar, double income households.

The implication of these developments is that it is all the more important to stabilize the price of real estate in order to reduce unequal income distribution. Rapidly rising real estate prices transfers the income of the "have-nots" to "haves" via a hike in rental rates, making income distribution deteriorate and making have-nots feel the sense of relative deprivation. The Korean government implemented almost every possible measure to curb the hike in the real estate price except for one. That is a drastic increase of the real estate tax rate. A drastic increase of the real estate tax rate up to such a level as found in most developed countries will contribute to both stabilizing the price of real estate and lessening very skewed real asset distribution. Various redistributive policies without achieving the stability of real estate prices will be inherently limited in their effects. Given the stability of real estate prices, redistributive policies, which has been nominal, should be substantially expanded. If Korean economy grows steadily with price stability and active redistribution her income distribution is expected to improve over time, as prematurely shown in official estimates.

Aside from what I have discussed in this paper there is a critical factor that could affect income distribution in Korea in a fundamental way. That is the possible reunification of both Koreas in the near future. The collapse of the shaky North Korean economy could bring a great burden to the Korean economy. The unification of the North and South Koreas will set up a new stage for the conduct of the nation's macroeconomy and development of income distribution. This will require another study.

Appendix 1

Income Distribution of the Farm and Fishery Sector by Ahn (1992, 1995)
(Decile and Gini)

Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Gini
1965	6.15	6.60	7.29	7.45	7.91	9.10	9.82	12.43	14.34	18.91	0.2060
1966	6.19	6.65	7.28	7.47	7.84	9.08	9.72	12.29	13.78	19.70	0.2079
1967	6.31	6.73	7.48	7.70	8.25	9.27	9.84	12.06	13.78	18.72	0.1935
1968	6.64	6.95	7.45	7.55	7.66	9.19	9.83	12.15	13.65	18.92	0.1924
1969	6.29	6.78	7.35	7.68	8.04	9.40	10.05	12.07	13.41	18.93	0.1957
1970	6.34	6.76	7.32	7.71	7.98	9.46	9.98	12.15	13.69	18.61	0.1941
1971	5.69	6.40	6.99	7.51	7.89	9.59	10.31	12.73	13.98	18.91	0.2141
1972	5.24	6.08	6.82	7.56	8.06	9.86	10.61	13.28	14.61	17.88	0.2195
1973	5.64	6.40	6.99	7.63	8.14	9.59	10.28	12.24	13.63	19.46	0.2145
1974	5.53	6.44	6.77	7.87	8.28	9.45	10.24	11.87	13.82	19.73	0.2170
1975	5.74	6.64	7.05	8.41	8.73	9.81	10.24	11.72	13.05	18.61	0.1940
1976	5.52	6.41	6.81	7.89	8.25	9.63	9.98	12.15	13.29	20.07	0.2171
1977	5.93	6.66	7.01	7.69	8.05	9.54	9.87	12.26	13.43	19.56	0.2079
1978	6.43	7.08	7.37	8.11	8.49	9.58	10.04	11.91	12.93	18.06	0.1783
1979	6.86	7.32	7.70	8.26	8.72	9.68	9.90	11.84	12.57	17.15	0.1586
1980	7.37	7.70	7.91	8.10	8.77	9.23	10.46	11.03	12.50	16.93	0.1455
1981	6.99	7.63	7.85	8.55	8.77	9.79	10.05	11.70	12.34	16.33	0.1438
1982	6.85	7.44	7.80	8.28	8.77	9.80	10.15	11.91	12.48	16.52	0.1522
1983	7.21	7.74	8.16	8.68	9.11	9.81	10.21	11.32	12.15	15.62	0.1300
1984	7.33	7.84	8.15	8.74	9.13	9.71	10.14	11.08	12.20	15.67	0.1275
1985	7.44	7.92	8.20	8.81	9.21	9.73	10.26	11.07	12.11	15.25	0.1211
1986	7.40	7.92	8.13	8.95	9.37	9.66	10.15	10.45	11.96	16.03	0.1231
1987	6.79	7.54	7.98	8.74	9.52	9.78	10.65	11.01	12.47	15.52	0.1357
1988	8.27	8.65	8.82	8.88	9.28	9.37	9.88	10.03	10.85	15.97	0.1149
1989	7.49	8.09	8.32	9.07	9.15	9.82	10.46	10.67	11.86	14.71	0.1093
1990	7.48	8.05	8.44	9.05	9.65	9.80	10.65	10.66	11.98	14.24	0.1052
1991	7.61	8.13	8.44	8.99	9.51	9.79	10.57	10.76	12.01	14.19	0.1041
1992	7.72	8.01	8.42	8.78	9.25	9.61	10.49	10.68	12.17	14.88	0.1114
1993	8.13	8.57	8.73	8.83	9.05	9.69	10.50	10.59	11.58	14.34	0.0931
1994	7.95	8.66	9.10	9.20	9.26	9.37	10.35	10.50	11.28	14.35	0.0879

Appendix 2

Income Distribution of the Non-Farm, Non-Fishery Sector by Ahn (1992, 1995)

Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Gini
1965	2.56	3.65	4.29	5.30	6.06	7.45	8.71	11.14	17.14	33.71	0.4356
1966	2.71	3.73	4.65	5.66	6.59	7.77	9.85	13.52	18.60	26.92	0.3900
1967	2.49	3.87	4.40	5.95	6.58	8.33	9.921	12.01	16.36	30.18	0.3949
1968	2.82	4.20	5.10	5.94	7.16	8.10	9.75	11.85	15.02	30.06	0.3747
1969	1.74	3.97	4.98	5.97	6.69	8.06	9.37	11.72	17.40	29.09	0.3858
1970	3.21	4.72	5.34	5.67	7.85	8.03	9.67	11.26	14.92	29.27	0.3726
1971	3.78	4.30	5.28	6.79	6.82	8.42	9.33	11.24	14.04	29.99	0.3528
1972	3.46	4.40	5.79	5.86	7.51	8.00	9.64	11.00	13.75	30.60	0.3611
1973	2.77	3.56	4.98	5.15	6.58	7.34	8.60	10.56	13.19	37.27	0.4341
1974	2.56	3.84	4.61	5.21	5.97	6.84	8.17	9.54	12.31	40.89	0.4562
1975	2.29	3.38	3.84	5.46	6.11	7.18	8.86	10.89	15.17	36.83	0.4547
1976	1.92	3.38	4.30	5.19	6.21	7.32	8.78	10.70	13.92	38.29	0.4587
1977	2.25	3.19	4.59	5.10	6.54	7.38	9.21	11.10	15.17	35.47	0.4436
1978	2.08	3.57	4.53	5.27	6.62	7.53	9.09	11.36	15.41	34.54	0.4352
1979	2.08	3.29	4.32	5.62	6.43	7.71	9.32	11.39	15.45	34.40	0.4353
1980	2.19	3.72	4.46	5.82	6.71	7.85	9.57	11.83	15.14	32.69	0.4156
1981	2.43	3.71	4.72	6.05	6.72	8.20	9.71	11.58	15.19	31.69	0.4008
1982	1.71	3.56	4.01	5.72	6.11	8.34	9.86	12.07	15.92	32.71	0.4315
1983	1.83	3.21	4.45	5.37	6.80	7.76	9.92	11.91	15.83	32.79	0.4291
1984	1.70	3.01	4.60	5.20	6.59	8.23	9.77	12.19	16.04	32.67	0.4342
1985	1.73	3.19	4.21	5.54	6.34	8.26	10.02	12.35	16.13	32.23	0.4342
1986	1.67	6.40	4.33	5.26	7.13	8.25	9.83	12.17	16.30	31.56	0.4236
1987	1.86	3.28	4.28	5.76	6.92	8.20	9.86	12.28	16.04	31.52	0.4181
1988	1.79	3.10	4.35	5.50	6.72	8.13	9.91	12.08	16.19	32.24	0.4251
1989	1.35	2.68	4.51	4.95	6.98	7.79	9.39	11.81	15.95	34.60	0.4536
1990	1.38	3.19	4.08	5.76	6.71	7.88	9.75	11.91	15.63	33.70	0.4406
1991	1.44	2.94	4.35	5.76	6.73	8.02	9.60	11.94	15.76	13.48	0.4353
1992	2.02	3.67	4.75	5.22	6.49	8.15	9.70	12.16	15.78	32.07	0.4159
1993	1.91	3.63	4.71	5.59	6.81	8.23	9.77	12.06	15.53	31.78	0.4092
1994	1.85	3.59	4.45	5.61	6.59	8.03	9.82	11.91	18.00	30.14	0.4137

Appendix 3

Income Distribution of All Households by Ahn (1992, 1995)

Year	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Gini
1965	3.59	5.12	5.97	6.60	6.93	8.11	9.31	11.17	17.88	28.32	0.3365
1966	3.89	5.29	5.82	6.22	6.97	7.95	9.61	11.47	17.64	27.15	0.3287
1967	3.86	4.71	5.30	5.72	6.50	7.95	8.90	11.40	14.97	30.70	0.3637
1968	4.16	5.04	5.32	5.77	6.86	8.12	9.39	11.36	14.66	29.34	0.3458
1969	3.95	4.88	5.582	6.11	6.81	8.29	9.14	11.02	14.57	29.71	0.3464
1970	4.24	5.42	6.12	6.29	7.13	8.80	9.54	11.37	14.24	26.85	0.3125
1971	4.44	5.02	5.95	6.75	7.60	8.22	10.33	11.15	14.00	26.55	0.3074
1972	4.01	5.09	6.16	6.45	7.71	8.73	9.99	11.53	14.09	26.23	0.3121
1973	3.35	4.83	5.61	5.96	7.12	7.73	9.49	10.61	13.28	32.00	0.3676
1974	3.22	4.69	5.43	6.03	6.94	7.79	8.81	10.36	12.76	33.97	0.3823
1975	2.67	4.06	5.57	6.28	7.28	8.47	9.39	10.93	13.44	33.90	0.3769
1976	2.38	4.27	5.28	6.18	7.08	8.10	9.29	11.16	13.49	32.76	0.3899
1977	2.55	4.08	5.21	6.62	7.24	8.31	9.46	11.58	14.48	30.47	0.3780
1978	2.52	4.15	5.48	6.68	7.38	8.25	9.69	11.50	14.38	29.98	0.3699
1979	2.49	4.08	5.71	6.46	7.20	8.37	9.43	10.03	14.47	30.75	0.3752
1980	2.68	4.19	5.96	6.81	7.59	8.23	9.80	11.29	14.09	29.36	0.3567
1981	2.61	4.41	5.78	6.78	7.98	8.64	9.89	11.53	14.27	28.11	0.3472
1982	2.08	3.56	5.34	6.19	8.08	8.45	10.59	12.00	14.73	28.97	0.3766
1983	2.10	3.52	5.23	6.64	7.75	9.22	10.21	11.81	14.67	28.85	0.3736
1984	1.91	3.65	4.82	6.44	8.10	8.94	10.30	11.85	14.95	29.03	0.3804
1985	1.89	3.71	4.91	6.30	8.08	8.88	10.25	11.89	15.07	29.02	0.3803
1986	1.94	3.62	5.17	6.79	7.72	8.94	10.02	11.57	15.09	29.16	0.3771
1987	2.10	3.75	5.21	6.42	7.57	8.84	9.95	11.65	15.21	29.30	0.3777
1988	1.94	3.53	4.95	6.46	7.75	8.70	10.12	11.67	15.09	29.80	0.3840
1989	1.60	3.16	5.01	6.36	7.28	8.53	9.36	11.28	14.95	32.47	0.4127
1990	1.51	3.69	5.03	6.20	7.62	8.47	9.63	11.65	14.63	31.57	0.4017
1991	1.66	3.48	5.01	6.30	7.44	8.48	9.57	11.41	14.89	31.77	0.4011
1992	2.18	4.04	5.21	5.66	7.46	8.33	9.56	11.59	15.22	30.74	0.3883
1993	2.14	3.97	5.14	6.30	7.68	8.45	9.71	11.57	14.90	30.14	0.3797
1994	2.06	3.64	5.19	6.22	7.56	8.72	9.70	11.56	14.45	30.91	0.3845

Appendix 4

Trends in Major Korean Macroeconomic Variables

Year	g	u	π	π^L	w
1965	20.5	13.5	7.6	33.9	-
1966	17.3	12.6	11.8	65.0	-
1967	21.6	10.9	10.5	33.3	-
1968	27.2	8.8	10.7	52.5	-
1969	21.6	7.7	11.8	84.1	-
1970	19.9	7.4	16.3	4.0	-
1971	18.6	7.2	13.2	28.7	261.1
1972	14.0	7.5	11.7	5.7	268.4
1973	29.5	6.8	3.2	1.6	290.5
1974	17.2	6.7	24.7	30.7	279.3
1975	12.4	6.6	24.9	27.0	331.3
1976	23.5	6.2	15.5	26.6	334.9
1977	15.3	5.8	10.2	33.5	336.5
1978	22.2	4.7	14.4	19.0	324.3
1979	10.1	5.6	18.2	16.6	300.0
1980	-1.6	7.5	28.8	11.7	299.1
1981	10.1	6.5	21.5	7.5	289.1
1982	6.9	6.0	7.1	5.4	288.5
1983	15.3	5.5	3.4	18.5	279.4
1984	16.9	4.9	2.3	13.2	270.5
1985	6.2	4.9	2.4	7.0	270.6
1986	19.5	4.7	2.7	7.3	255.6
1987	19.5	3.8	3.0	14.7	247.4
1988	13.8	3.0	7.1	27.5	222.8
1989	4.2	3.1	5.7	32.0	209.4
1990	9.7	2.9	8.6	20.6	199.0
1991	9.1	2.6	9.3	12.8	189.4
1992	5.1	2.7	6.2	-1.3	175.8
1993	5.0	3.1	4.8	-7.4	166.6
1994	10.5	2.7	6.2	-0.6	164.0

Notes: g : The real growth rate of the manufacturing industry.

u : The non-farm household unemployment rate.

π : The rate of increase of the consumer price index.

π^L : The rate of increase of land price.

w : The ratio of college graduate worker wages to middle school graduate worker wages.

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