

SHRINKING MIDDLE CLASS AND CHANGING INCOME DISTRIBUTION OF KOREA: 1995-2005*

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This paper investigates the shrinking middle class hypothesis and reveals more details about recent trends in income distribution of Korea from 1995 to 2005. We find that the consensus view of a declining middle class is correct and the decline in the middle class splited equally into the lower class and the upper class in Korea. Furthermore, while the size and income share of the middle class declined, the share of the upper class increased rapidly and the share of the lower class remained stable over time. We then move beyond cross-sectional analyses to examine how the mobility of workers and families changed over this period. We present clues for who moved out of the middle class and the source of such changes using an ordered probit regression model.

JEL Classification: D31, D63

Keywords: Shrinking Middle Class, Polarization, Ordered Response Model

I. INTRODUCTION

Over the last three decades, the economy of South Korea (hereafter “Korea”) achieved a remarkable economic growth rate of 7 percent per year. This has rendered Korea to be labeled as a “miracle economy.” This

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exceptional economic growth has been accompanied by an even more exceptional fall in labor income inequality.

However, recently, analyses of income distribution trends of Korea have repeatedly reported increasing inequality of income distribution and included discussions of the “disappearing middle class.” This relatively new concept is typically equated with the concept of increased income inequality.

At the heart of the fear of increasing disparity is a speculation that the majority of the lost middle class fell to the lower part of the income distribution. However, little evidence has been generated beyond a mere speculation that the middle diminished because it slipped downward to the lower part of the income distribution.

The idea of the shrinking middle class over a period of economic development has struck a chord with the public. However, there has been no consensus about the appropriate definition of middle class, and empirical findings can be sensitive to the definition chosen.

This paper investigates the shrinking middle class hypothesis and reveals more details about recent trends in income distribution of Korea. This paper is descriptive in the sense that it presents the withering of the middle class in Korea during 1995-2005. Then, we move beyond cross-sectional analyses to examine how the mobility of workers and families changes over this period. We then search for clues as to who moved out of the middle class and the source of such changes using a regression model.

Second II presents the literature survey regarding the shrinking middle class. Section III describes the data and section IV discusses the measures of inequality and polarization and presents some stylized facts of income distribution of Korea during 1995-2005. In section V, the shrinking middle hypothesis is examined. In section VI, the transition probability of the middle class into upper or lower class is discussed and we analyze winners and losers in income distribution over a decade. Finally, the last section summarizes the main findings.

II. OVERVIEW OF THE LITERATURE

A brief review of a few examples from the literature demonstrates

some of the differences between studies, both in terms of the definition of the middle class and the conclusions drawn. Thurow (1984) defined the middle class by including households with income between 75 and 125 percent of median household income, and found that the middle shrank from 28 percent of all households in 1967 to 24 percent by 1982. The loss was almost evenly gained between the lower and upper classes. Lawrence (1984) set the middle class bracket at roughly two-thirds and four-thirds of men's median earnings of wage and salary in 1983 and found that the proportion of the middle class fell from 50 percent to 46 percent between 1969 and 1983. Most of the loss was accounted by an increase of the lower class. Both Thurow (1984) and Lawrence (1984) defined the middle class as a sampling unit with some fixed percentage of median income .

On the other hand, Bradbury (1986) defined the middle class in terms of the family income and found that the middle class declined from 53 percent to 48 percent by 1984. Duncan et al. (1991) showed the persistent shrinking middle class in the U.S. since 1980 and found that cyclical and demographic factors explain little of the declining middle class. For the U.K. income distribution data for the 1980s, Jenkins (1995) provided evidence of the shrinking middle class and demonstrated that a major cause of the aggregate changes was a moving apart of the income distributions for working and non-working households. These studies used the interval deflator approach in defining the middle class. In this method, they chose a base year and deflated each chosen middle class interval back to sample years. In deflating incomes, they often indicated different rates of inflation over any given period.

Burkhauser et al. (1996) examined changes in the distribution of real family income of the U.S. middle class over the 1980s and found that the shrinking of the U.S. middle class during the 1980s was primarily due to improvements, rather than to declines, in economic well being. In defining the middle class, Burkhauser et al. (1996) used intersection points of the two income density functions.

Horrigan and Haugen (1988), using both interval deflator approach and fixed percentage of median income approach, conducted a sensitivity analysis to alternative specifications of the middle class and to different

techniques for measuring the middle class over time. They found that the proportion of families in the middle class has declined substantially over 1969-1986 in the U.S. and concluded that the majority of the decline in the middle is offset by an increase in the upper class. However, the size of this effect varies with the method used to measure the middle class.

III. THE DATA

The data sets are from the Household Income and Expenditure Survey (HIES) for 1995-2005, produced by Korea National Statistical Office (KNSO). Data is collected each year from a representative national sample of non-farm households in cities excluding single households. This survey has been carried out every month for the civilian population of Korea. It contains individual data on monthly labor earnings, non-labor earnings, age, sex, educational level, occupational characteristics, and other relevant variables.

The HIES contains rich information of almost 7,500 households about their earnings and other relevant characteristics each year. The average number of households responding to the monthly survey was 7,366 in 2005, for example, of which 3,554 households were urban salary and wage earner's households. The survey is conducted monthly by using a diary. The diary is distributed to each sample household prior to the survey so that income source, types of expenditure, and their values can be recorded daily. They are the best sources of data to analyze the income distribution in Korea for this period. The main drawback is that the information about the income of the self-employed is limited.

We restrict our attention to households of urban salary and wage earners in which the households are observed in the sample for more than three months¹. From this sample, we compile a sample with annual income. The income information in the survey is, of course, subject to the well-known problems of non-response and under-reporting. Included in for this study's sample are those who are not self-employed with, their

¹ The survey is conducted monthly and released quarterly. The removal of observations with missing data at least in one quarter may cause selection problem and distort estimation of the parameters of interest. However, according to Sung (2002), it is reported that the sample selection bias for this case in HIES is very small and insignificant.

income and other characteristics not missing. Therefore, it should be borne in mind that the results in this paper are conditional on households with wage and salary earners. The final sample size varies each year, from a minimum of 1,208 in 1995 to a maximum 4,371 in 2005.

In asking how the middle class fared over the period of 1995-2005, four bench-mark years, 1995, 1998, 2002, and 2005, were chosen to study long-term changes. Although the pattern of changes in income distribution may be sensitive to the choice of bench-mark years, 1995 and 2002 represent business peak years whereas 1998 and 2005 are major trough years in the sample period. In particular, the year 1998 is marked as the year of financial crisis in Korea. The financial crisis at the end of 1997 had a devastating impact on the Korean economy. During the financial crisis, the economic indicator in 1998 showed devastating figures with a negative rate of economic growth (-6.7 percent), a high unemployment rate of 7 percent, and a high interest rate of 15.1 percent. The Korean economy was stabilized with various economic indicators during 1999, and it completely got out of the financial crisis in 2000. Therefore, our data for the study partly reflects the change of income distribution over the period of financial crisis.

IV. INEQUALITY AND POLARIZATION

1. Cross-Sectional Measures

For inequality measures, the Lorenz curve has been commonly used. Of strongly Lorenz-consistent inequality measures of income, the one that is used most often in empirical work is the Gini coefficient. It is defined to be a ratio with values between 0 and 1; the numerator is the area between the Lorenz curve of the distribution and the uniform distribution; and the denominator is the area under the uniform distribution line as follows:

$$G = 1 - 2 \int_0^1 L(X) dX, \quad (1)$$

where the Lorenz curve is represented by $L(X)$.

In this study, our special interest is the issue of disappearing middle class. The shrinking middle class is conceptualized as a polarization of income distribution. According to Wolfson (1994), the polarization of the earnings distribution means a decline in middle class jobs, hence, a polarization refers to observations move from the middle of the distribution to both tails. This leads to a more polarized income distribution that is more spread away the middle resulting in fewer families in the middle class. However, standard inequality measures such as the siri coefficient cannot distinguish this polarization from other kinds of inequality. Here, our interest is to see how bipolar our society is.

For a measure of polarization, standard inequality measures cannot distinguish this polarization from other kinds of inequality. Indeed, it is possible that a given population displaying little inequality is concentrated around a few mutually separating poles in the income space. For this concept of polarization, two independent strands of works have been done; one is Esteban and Ray (1984), Esteban et al. (1999) and Duclos et al. (2004) and the other is Wolfson (1994, 1997). While the former employs notions of intra-group identification and inter-group alienation, the latter is directly based on the Lorenz curve.

To measure how the distribution of income spreads out away the middle, we adopt the approach proposed by Wolfson (1994), which measures polarization as spreading out from median income². The indicator of polarization, P^* , measures the extent of polarization or the size of the middle class, which can be obtained as

$$P^* = \frac{4[0.5 - L(0.5)] - 2G}{m / \mu}, \quad (2)$$

where m denotes median income and μ mean income. When income is perfectly equally distributed, P^* has a minimum of zero and when income has a perfectly bimodal distribution with half the population at zero income and the other half at 2μ , P^* has a value of 1.

² Esteban and Ray (1984), Esteban et al. (1999) and Duclos et al. (2004)'s approach basically measures polarization as spreading out from mean income. However, in view of robustness criterion of Hampel (1971), the median income is more robust to extreme income observations than mean income as location measure.

2. The Overall Picture of Inequality and Polarization Trends

Table 1 reports the summary measures of inequality and polarization of household labor income in 1995-2005. Labor income is defined as the sum of wages and earnings over all family members. All monetary variables have been deflated using the consumer price index of 2005.

We have witnessed during the sample period a shift in the income distribution of Korea, which is summarized in Table 1. We found that inequality in Korea over the decade increased over the entire period. Mean income fell from 29.0 million Korean won in the peak year of 1995 to a low of 27.6 million (Korean) won in the recession year of 1998 but rose during the recovery. There were two noticeable features. First, over the decade, there was an increase in inequality according to all inequality indices. However, with the rise in inequality came an increase in average income, except in 1998 in which mean income decreased due to the financial crisis mentioned before. This indicates that there might have been losers in terms of redistribution, and gainers in terms of growth. Second, measures indicating the concepts of inequality and polarization moved in the same direction³ over the period. Thus, while inequality unquestionably increased and the income distribution was more polarized, the size of the middle class declined. Over the decade, the labor income was more polarized than the income was unequalized. The Gini index increased by 33 percent, from 0.246 to 0.328. In terms of polarization, we find that 2005 wage earners were 42 percent more polarized than in 1995. This increase in polarization was due to a big increase in the distance between extreme groups. The top 90 percentile income was 5.7 more times than the low 10 percentile income in 1995. The table also provides 95 percent confidence intervals estimated by bootstrap⁴. The values confirm that the increase in inequality and polarization is statistically significant, entailing non-overlapping confidence regions of 1995, 2002, and 2005 indices.

³ This does not necessarily hold for all cases. Wolfson (1994) demonstrated an example in which a bimodal density of income distribution is more polarized but more equal than a uniform distribution.

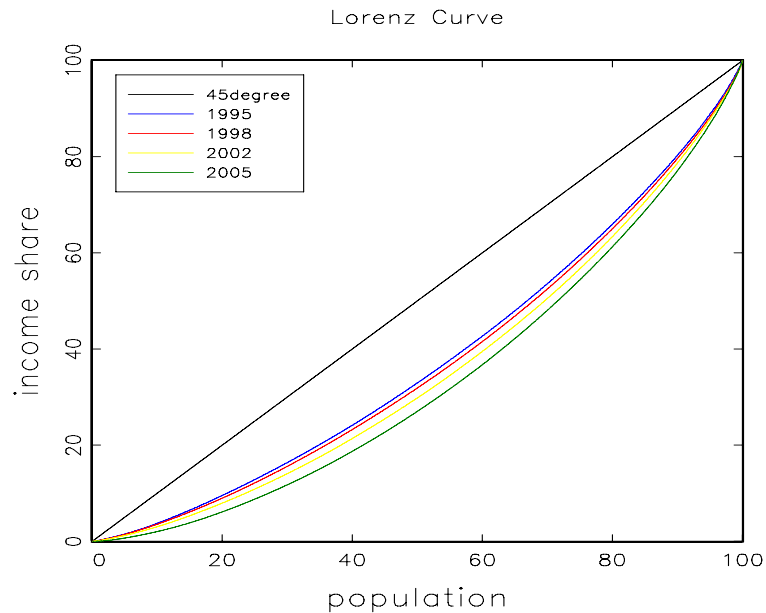
⁴ We repeated resampling of the original sample 1,000 times. This allowed us to obtain the distribution of the indices. We referred to Horowitz (1998) and Hall and Horowitz (1996).

[Table 1] Summary Measures of Labor Income: 1995-2005

	(Unit: million KRW for the top panel)			
	1995	1998	2002	2005
Mean	28.983	27.637	32.069	33.979
Median	26.874	24.192	28.745	30.596
Std. Dev.	13.222	13.564	17.442	20.587
Gini	0.246 (0.235, 0.256)	0.261 (0.252, 0.269)	0.288 (0.279, 0.297)	0.328 (0.321, 0.335)
90/10 ratio	3.130 (2.898, 3.361)	3.373 (3.185, 3.560)	4.117 (3.886, 4.347)	5.717 (5.369, 6.064)
Bipolarization	0.206 (0.194, 0.219)	0.222 (0.212, 0.232)	0.257 (0.245, 0.269)	0.292 (0.282, 0.302)
Sample size	1,208	2,171	2,134	4,371

* Bootstrap 95 percent confidence intervals are inside parentheses.

There are no distinctive features found before and after the financial crisis of 1998. Except the fact that the mean income in 1998 is the lowest of the decade, all the measures of inequality and bipolarization deteriorated continuously. However, we can not judge whether this phenomenon is inevitable in stages of economic growth or due to the aftermath of the deep recession of 1998.

[Figure 1] Lorenz Curve

The conclusion that inequality has increased is strengthened by the Lorenz curve comparisons. In Figure 1, the 1995 Lorenz curve lies above the 2005 curve everywhere, suggesting that the 1995 distribution Lorenz-dominates the 2005 distribution.

While inequality is demonstrated by the Lorenz curve graphically, the polarization of income can be illustrated by distribution of income. In order to analyze how the income distribution changed during the period, in a first stage we estimate densities for income. We then inspect how the whole distribution changed over time. These densities are estimated with a non-parametric technique, without any assumption about the shape of the distribution. It smoothes the density avoiding the noise by using a sample instead of the whole population.

Figure 2 shows how the income distribution changed between 1995 and 2005. The plotted distributions are kernel density estimates based on a Gaussian kernel⁵. As shown in Table 1, Figure 2-(a) shows that income inequality increased over the decade. However, the figure provides more insights into the movements underlying the increase in inequality than Table 1. A specific distributive change stands out in the figure showing a prominent shrinkage in the middle of the distribution and a mass shifting out from the center, while both extremes substantially increased in size as time passes. As the economy recovered from financial crisis of 1998, the distribution started to have longer right tails, which indicates a few very rich households were appearing. At the same time, a significant percentage of households fell from the middle class. The shift in concentration away from the middle in both directions is strong evidence that the middle class had shrunk⁶. In other words, the distribution became more polarized.

To investigate whether the shrinking middle class moved to the upper class or to the lower class, the distributions are expressed as deviations from the given year's median. In Figure 2-(b), the whole distributions shift to the left a little bit with the shrinking middle center, while a significant percentage of households fell from middle class to lower class,

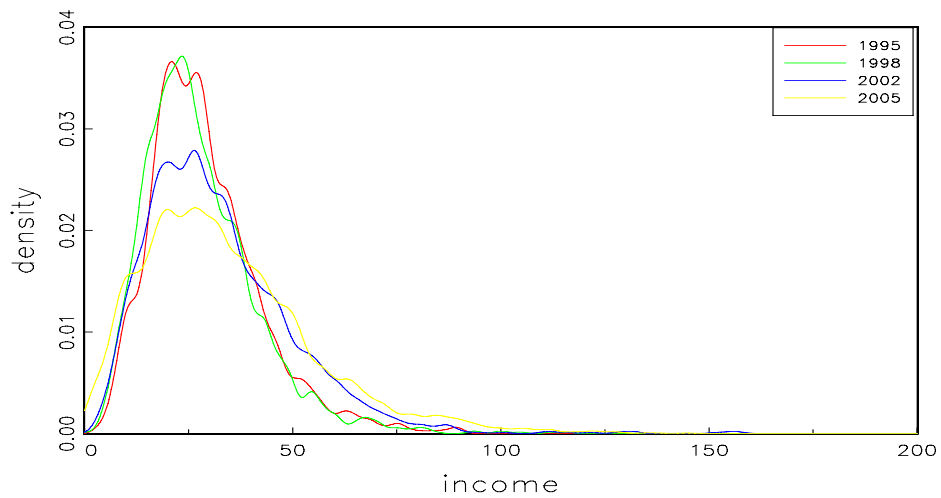
⁵ We use a bandwidth parameter given by $h = 0.6Sn^{-1/5}$, where S is the standard deviation of the data and n is the number of observations.

⁶ Other countries have a similar phenomenon: the U.S. in the second half of the eighties [see Burkhauser et al. (1996)] and the U.K. in the eighties [see Jenkins (1995)].

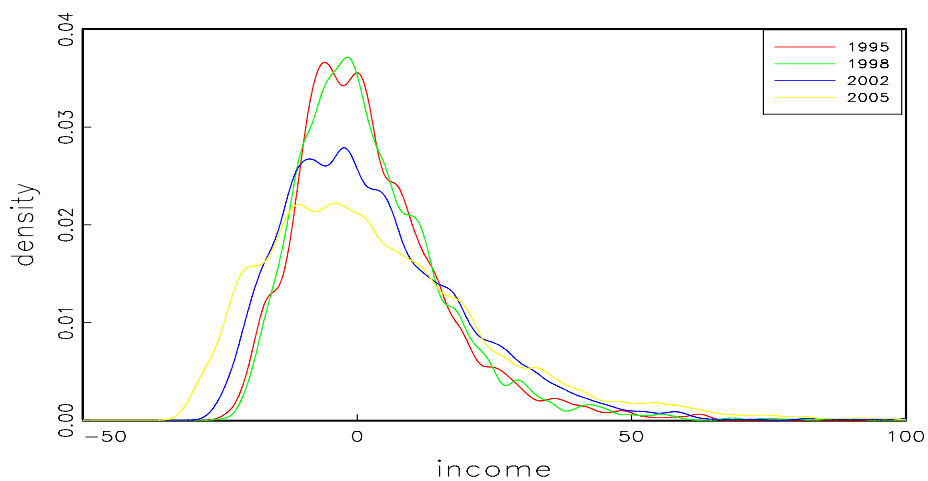
however, the right tail grew longer. This implies that the polarization develops, as a few households get a prominent amount of labor income while many households fell from middle to lower class.

[Figure 2] Income Distributions: 1995-2005

(a) Income Distributions Expressed as Raw Scale



(b) Income Distributions Expressed as Deviations from the Given Year's Median



V. SHRINKING MIDDLE CLASS

The shrinking middle class hypothesis has drawn considerable attention from several economists. The list of studies on this issue is quite extensive. In terms of shrinking middle class, there is a belief that the majority of the lost middle fell to the lower part of the income distribution. The exceptions are two independent works by Horrigan and Haugen (1988) and Burkhauser et al. (1996). Horrigan and Haugen (1988) found that the majority of the decline in the middle is offset by an increase in the upper class in the seventies and in the first half of eighties in the U.S. Burkhauser et al. (1996) found that the shrinking of the U.S. middle class during the 1980s was primarily due to improvements, rather than to declines, in economic well-being.

In deciding what percentage of persons and income lies in the lower, middle and upper class, we have to clarify the definitions of middle class and measure of income.

For the units of analysis, we consider individuals rather than households. It is widely accepted that individuals in households experience significant economies of scale in consumption. To derive distributions by individuals from households, we use the Organisation for Economic Co-operation and Development (OECD) equivalence scale to account for differences in household size and composition. The equivalence scale recommended by the OECD gives the first adult household member the weight of 1.0, the second adult member the weight of 0.7 and children the weight of 0.5. We define the middle income group to be all people whose labor income is 75-150 percent of the median labor income each year⁷.

The results of the approach over 1995-2005 are summarized in Table 2 with their respective 95 percent bootstrap confidence intervals. In Table 2, we report percentage of the three classes at panel (a) for per capita income. Also in Table 2, at panel (b), the shares of per capita income held by the three classes are presented. In Table 2, we additionally report the relative size of two more fixed extreme (per capita) income intervals: 'under

⁷ We conducted a sensitivity analysis to alternative specifications of the middle class and income: family income vs. per capita income, labor income vs. household income. The results are similar to the one reported here.

poverty line' and 'most affluent'. The 'under poverty line' measures the percentage of households whose per capita income is under 2005 poverty line⁸. The 'most affluent' measures the percentage of households whose per capita income is above 26.39 million won. The results support the declining middle class thesis. The argument of declining middle class is statistically significant because the 95 percent confidence intervals of 1995 are not overlapping with the ones of 2005. There are no distinctive features found across peak and trough years. The key question is, "Where did the middle go?" Over the decade, the relative size of the lower class and upper class has secularly increased. The size of middle group would have decreased slowly from the initial 56.3 percent of all households to

[Table 2] Shrinking Middle Class

	1995	1998	2002	2005
(a) Percentage of Persons				
Lower class	27.4 (25.4, 29.4)	27.3 (25.8, 28.9)	28.1 (26.6, 29.7)	31.8 (30.8, 32.8)
Middle class	56.3 (53.5, 59.1)	55.2 (53.1, 57.3)	50.6 (48.5, 52.7)	44.8 (43.3, 46.3)
Upper class	16.3 (14.3, 18.3)	17.5 (16.0, 19.0)	21.3 (19.6, 23.0)	23.4 (22.3, 24.5)
Under poverty line	3.3 (3.29, 3.31)	4.3 (4.29, 4.31)	2.4 (2.40, 2.40)	3.4 (3.40, 3.40)
Most affluent	3.1 (3.09, 3.11)	2.3 (2.29, 2.31)	6.2 (6.20, 6.20)	10.6 (10.58, 10.62)
(b) Share of Income				
Lower class	14.3 (13.1, 15.6)	13.9 (13.0, 14.8)	13.5 (12.6, 14.4)	13.4 (12.9, 14.0)
Middle class	55.8 (52.4, 59.2)	53.9 (51.5, 56.4)	47.9 (45.2, 50.5)	42.8 (41.0, 44.5)
Upper class	29.8 (26.4, 33.2)	32.2 (29.8, 34.6)	38.6 (35.9, 41.3)	43.8 (42.0, 45.6)
Under poverty line	1.0 (1.00, 1.00)	1.4 (1.40, 1.40)	0.7 (0.70, 0.70)	0.8 (0.76, 0.84)
Most affluent	8.0 (7.98, 8.02)	6.5 (6.48, 6.52)	14.7 (14.68, 14.72)	23.7 (23.30, 24.10)

* Bootstrap 95 percent confidence intervals are inside parentheses.

⁸ The single person poverty line was 4.82 million won (approximately USD5,125) in 2005.

⁹ The single person's income of 26.3 million won (approximately USD27,940) is about top three percent in 1995 labor income basis.

55.2 percent, however, after the financial crisis of 1998, it has decreased rapidly to 44.8 percent in 2005. The decrease of middle class has been accompanied by the increase of the lower and upper classes.

The phenomenon of disappearing middle class is not unique in Korea. According to Wolfson (1994), the size of middle class in Canada has continuously decreased from 42 percent in 1967 to 32 percent in 1991 using the same measure of middle class. However, the size of middle class in Korea is a little bit larger than the share of middle class in Canada. In a different setting, Gradin (2006) showed that the size of middle class in Uruguay has decreased from 31 percent in 1989 to 26 percent in 1997 using 75-125 percentage definition of middle class.

What has happened to the share of income held by the three classes, especially the income held by the lower class? At the bottom panel of Table 2, while the share of middle class secularly declined, the share of upper class increased rapidly and the share of lower class was stable over time. Thus, the middle class, while declining in size, has been receiving a reduced share of the pie over time. A big portion of income has slipped out of the middle class and into the upper class over the decade. While the size of 'under poverty line' is stable at around 3-4 percent, the size of the most affluent rapidly increased from 3.1 percent in 1995 to 10.6 percent in 2005 with a small decrease in the financial crisis of 1998. The most affluent income also suffered during the financial crisis of 1998. Since then, however, the share of the most affluent increased with a remarkable speed. With shrinking middle class in size, while the share of middle class decreased, the share of upper class increased, and especially the share of the most affluent class increased sharply.

VI. TRANSITION OF MIDDLE CLASS

1. Transitions

In the previous section, we argued that the middle class shrank over 1995-2005. This result was entirely based on cross-sectional data in which the population in 1995 was compared to the population in succeeding years. In this section, we use data that follow individuals in consecutive years so that we can say something about how the mobility of

specific individuals changed.

Table 3 uses data from HIES to trace the household labor income for consecutive years. Because KNSO changes the entire sample every five years, over the period of 1995-2005, we can trace the same households only over 1998-2002. We divide the sample in each transition year into three classes: lower, middle, and upper class. We then show the percentage of each class that remains in that class after one year¹⁰. The rows of the intertemporal transition matrix are the income classes of households in the base years, and the columns are the corresponding income classes in the subsequent year. The entries in the transition matrix indicate what fraction of individuals with a given base year income end up, and thus, each row sums to 100 percent.

[Table 3] Overall Markov Transition Probability

	Destination Year		
	Low	Middle	High
Low	0.777	0.220	0.003
Middle	0.096	0.822	0.082
High	0.002	0.213	0.785

In Table 3, I report all year-to-year comparisons¹¹ for all two consecutive years and calculate one year average mobility/immobility probabilities. I found that over all the one-year transition years of 1998-2002, the immobility rate is higher in the middle class and is about the same at the two ends; 82.2 percent of households in the middle class still remained in the class after one year. 17.8 percent moved to the lower or upper class, with the probability moving to the lower class being a little bit higher than that moving to the upper class. Together with the result in Table 2 this confirms that, in contrast to the findings of the U.K. and the U.S. over the eighties [see Burkhauser et al. (1996), Horrigan and Haugen (1988), and Jenkins (1995)], the disappearing middle class in our case is a result of moving to the lower and upper class equally.

¹⁰ Because HIES is not originally constructed for panel data, in order to construct the transition matrix over whole period of five years, the attrition rate in sample is very high being about 60 percent in five years period.

¹¹ Although the results are omitted, there were no big differences in transition when we chose any two consecutive years.

2. Explaining Transitions: Winners and Losers

To better understand how the transition probability of a middle class household moving to the lower or upper class or staying in the middle class differs across household characteristics, we partitioned the population according to several categories. The KNSO provides information about household types and the occupation of household head along with the head's education level. With this information, we can figure out what kinds of households are actually crossing the middle class boundaries. For household type, the information about whether the household is headed by an individual aged sixty or older ('elderly families'), the household head is a single mother ('single mom'), both the household head and spouse are working ('dual earners'), or rest of the families ('general households') is provided. For the occupation of household head, the population can be divided into 'government official', 'white collar' (excluding government official), 'skilled blue collar', and 'unskilled blue collar' by the information provided by KNSO.

Table 4 uses the same methodology but compares income transitions according to the categories. The result of Table 4 is based on the subpopulation whose status at the base year is the middle class.

[Table 4] Overall Markov Transition Probability according to Household Characteristics

	Low	Middle	High
Household Type			
Elderly	0.097	0.806	0.097
Single Mom	0.118	0.863	0.020
Double Earners	0.089	0.842	0.068
General	0.103	0.812	0.084
Education Level			
Elementary	0.127	0.753	0.120
Middle School	0.155	0.799	0.046
High School	0.099	0.835	0.066
Community College	0.073	0.862	0.065
College	0.091	0.856	0.054
Occupation			
Government Official	0.070	0.900	0.030
White Collar	0.100	0.826	0.074
Skilled Blue Collar	0.107	0.818	0.075
Unskilled Blue Collar	0.152	0.757	0.091

In Table 4, for household type, although we cannot find significant differences in probabilities of moving down to the lower class or moving up to the upper class across household characteristics, the households of ‘single mom’ in the middle class in the base year have higher probabilities of moving down to lower class in the following year. Also, the household whose head’s final education was middle school and the households with an unskilled blue collar head frequently moved down to the lower class.

The analysis in Table 4 is partial in the sense that it did not control all other household characteristics. To decide the winner and the loser in income mobility, we need to control for all other household characteristics in the regression analysis.

Conditional on the fact that a household is in the middle class in the base year, whether moving down to the lower class, moving up to the upper class, or staying in the same middle class can be modeled as follows. When the household income at t is $c_{1,t} < y_{i,t}^* \leq c_{2,t}$ at $t+1$, the household falls into the lower class if $y_{i,t+1}^* \leq c_{1,t+1}$, stays in the middle class if $c_{1,t+1} < y_{i,t+1}^* \leq c_{2,t+1}$, or moves into the upper class if $c_{2,t+1} < y_{i,t+1}^*$, where $y_{i,s}^*$ denotes income of household i at time s and $c_{1,s}$ and $c_{2,s}$ denotes 75 percent and 150 percent of median income at time s .

If we denote $y_{i,t+1} = 1, 2$, or 3 if household i is in the lower, middle or upper class, then

$$y_{i,t+1} = \begin{cases} 1 & \text{if } X_{i,t+1}\beta + \varepsilon_{i,t+1} \leq c_{1,t+1} \\ 2 & \text{if } c_{1,t+1} < X_{i,t+1}\beta + \varepsilon_{i,t+1} \leq c_{2,t+1} \\ 3 & \text{if } c_{2,t+1} < X_{i,t+1}\beta + \varepsilon_{i,t+1}. \end{cases} \quad (3)$$

This is an ordered response model, where $X_{i,t+1}$ denotes household’s characteristics such as household type, head’s educational level, head’s occupation and other household’s characteristics¹². Thus, we have

¹² Although income equation can be estimated using the same household characteristics, we seek to address households crossing-over to either the lower or the upper boundary of the middle class by estimating the ordered model.

$$\begin{aligned}
P_1 &= F(c_{1,t+1} - X_{i,t+1}\beta) \\
P_2 &= F(c_{2,t+1} - X_{i,t+1}\beta) - F(c_{1,t+1} - X_{i,t+1}\beta) \\
P_3 &= 1 - F(c_{2,t+1} - X_{i,t+1}\beta),
\end{aligned} \tag{4}$$

where P_1 , P_2 , and P_3 denote the probabilities of moving down to the lower class, staying in the middle class and moving up to the upper class. For the distribution function $F(\cdot)$, we assume cumulative normal, that is, we have an ordered probit model.

The parameter estimates, their standard errors and t-statistics are presented in Table 5. The explanatory variables include the number of household members (NUMH), age (AGE) and age square (AGESQ) of household head, an indicator whether spouse presents or not (ISPOUSE), and the sex of household head (SEX). To describe the effect of the choice of occupation on income class, three dummies are considered: government official (GOVT), white collar worker (WHITE), and skilled blue collar worker (SKILLED). The reference group is unskilled blue collar worker. There are four educational dummies: middle school (MIDDLE), high school (HIGH), community college (COMM), and college degree and above (COLLEGE). The reference group is elementary school or lower. Also, household type dummies [elderly (ELDERLY), single mom (SINGMOM), and dual earning families (DUAL EARNER)] are included. The reference group is general workers.

These ordered probit estimates are consistent with a priori expectations¹³. However, the dominant influence is the broad classification of occupation and education level and household type is the next. Government officials, white collar workers, and skilled blue collar workers are associated with higher probabilities of moving to the upper class in the next year. As the education level gets higher, the probability of moving to the upper class increases significantly. Dual earning households lead to higher probabilities moving to the upper class while elderly and single mother households are both associated with moving down to the lower class but insignificantly. The age variable has a quadratic shape to probabilities of moving to the upper class as usual

¹³ The null hypothesis that the parameters are the same across sample periods was rejected at the 5 percent significance level by using the Chow test.

income equation estimates. The younger and elderly households have higher probabilities of moving down to the lower class and the middle prime age households have higher probabilities of moving up to the upper class.

[Table 5] Regression Results of Ordered Response Model

(Regression coefficients, standard errors are in parentheses)					
	1998 ->1999	1999 ->2000	2000 ->2001	2001 ->2002	Total
# of Family	0.047 (0.051)	0.106** (0.049)	0.070 (0.051)	0.074 (0.056)	0.072** (0.025)
Spouse	-0.024 (0.226)	-0.256 (0.216)	0.196 (0.207)	-0.350 (0.220)	-0.086 (0.107)
Sex	0.282 (0.233)	0.343* (0.208)	-0.235 (0.196)	0.368* (0.215)	0.153 (0.104)
Age	0.077* (0.048)	0.155** (0.047)	0.119** (0.052)	0.127** (0.053)	0.120** (0.025)
Age Square	-0.001 (0.001)	-0.002** (0.001)	-0.001* (0.001)	-0.001** (0.001)	-0.001** (0.0003)
Gov't Official	0.760* (0.397)	1.195** (0.282)	0.960** (0.266)	1.084** (0.276)	0.992** (0.140)
White Collar	0.815** (0.387)	0.998** (0.264)	0.681** (0.246)	0.850** (0.247)	0.837** (0.131)
Skilled Blue Collar	0.402 (0.373)	0.675** (0.239)	0.521** (0.220)	0.521** (0.212)	0.540** (0.119)
Middle School	0.573** (0.251)	-0.340 (0.248)	0.666** (0.251)	0.467* (0.261)	0.325** (0.124)
High School	0.622** (0.226)	0.122 (0.239)	0.517** (0.230)	0.224 (0.241)	0.368** (0.116)
Comm.College	0.747** (0.276)	0.213 (0.288)	0.552** (0.273)	0.444 (0.294)	0.479** (0.140)
College	0.899** (0.259)	0.322 (0.272)	0.660** (0.261)	0.494* (0.278)	0.587** (0.132)
Elderly	-0.795 (0.735)	-0.056 (1.088)	0.230 (1.487)	0.414 (1.616)	-0.312 (0.514)
Single Mom	-0.570 (0.488)	-0.056 (0.515)	-0.192 (0.597)	0.043 (0.698)	-0.280 (0.272)
Dual Earner	0.228** (0.103)	0.164 (0.104)	0.067 (0.099)	0.216** (0.109)	0.170** (0.051)
Log-Likelihood	-492.6	-473.0	-511.5	-400.4	-1900.5
Pseudo R-Squared	0.070	0.083	0.052	0.069	0.059
Sample Size	865	864	872	811	3412

*: Statistically significant at the 5 percent level.

**: Statistically significant at the 1 percent level.

Note that moving to the upper class is recorded as 3 and we record 1 for moving to the lower class. According to the result in this section, government officials, white collar workers, and skilled blue collar workers are winners and unskilled blue collar workers are losers. The household head with higher education is the winner. While elderly and single mother households are losers, dual earning households are winners.

VI. SUMMARY AND CONCLUSION

This paper investigates the shrinking middle class hypothesis using the recent data in Korea and confirms the consensus view of a declining middle class is correct. However, unlike the earlier studies of the U.S and the U.K, the decline in the middle is split between the lower and upper classes equally in Korea. The decrease of the middle class has been accompanied by the increase of the lower and upper classes. However, during the sample period, while the size of the bottom low class was stable, the size of the top high class rapidly increased; thus, the income distribution of Korea become bi-polarized.

The analysis of Markov transition probabilities also confirms that disappearing middle class goes to the lower and upper class equally. Constructing the ordered probit model using the data of two consecutive years, it is explained that government officials, white collar workers, and skilled blue collar workers are winners and unskilled blue collar workers are losers. The household head with higher education is the winner. While elderly and single mother households are losers, dual earning households are winners.

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