

Limited Income Mobility in Korea

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Abstract

Using the Korea Labor and Income Panel Study from 1998 to 2010, we measure income mobility and determinants of income ranks and mobility. Empirical outcomes reveal that income mobility is quite limited for both the poorest and the richest income group households. Moreover, a macro economic shock had heterogeneous impacts on each income group and the low-income class was highly vulnerable to it. Given the long-lasting impacts of early stage factors and initial endowment on income, and the existence of senior poverty, this paper calls for policies to support citizens suffering from illness, family breakdown, poor initial conditions, and aging.

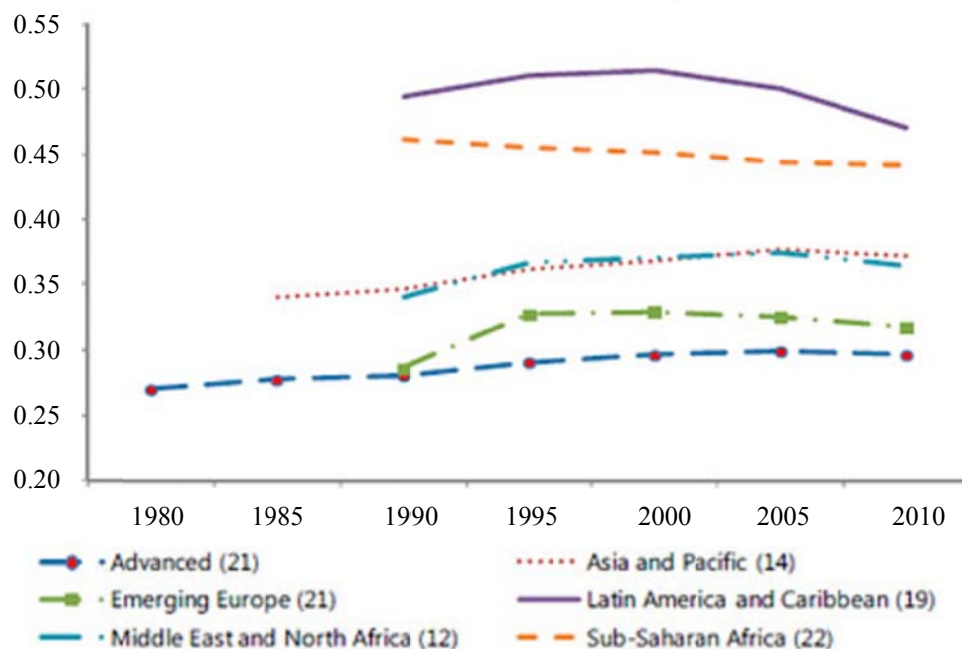
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Key Words: Intragenerational mobility, income elasticity, poverty, Korea

1. Introduction

Income inequality is a growing concern in many regions around the world (The Wall Street Journal, March 13, 2014). Using a standard measure of income inequality, the Gini coefficient, Figure 1 and Table 1 show trends in disposable income inequality in the period from 1980-2010. The average Gini coefficient for the OECD countries was relatively low but increased approximately 10 percent, from 0.29 in the mid-1980s to 0.316 in the late 2000s (OECD, 2011). A similar trend was observed in developing countries. The population-weighted mean Gini coefficient in developing countries increased by 11 percent between 1990 and 2010 (UNDP, 2013). However, when we take a closer look, different patterns are observed among developing economies. As depicted in Figure 1, income inequality in Latin America, Caribbean, and Sub-Saharan African nations is the greatest but has been narrowing since 2000. On the other hand, income inequality in Asian Pacific nations is higher than that of advanced economies, and has even been aggravated over the last two decades. Since rising inequality in this region was accompanied by remarkably fast economic growth and poverty reduction, the Asian Development Bank (ADB) described this as a contrast to the ‘growth with equity’ pattern that characterized the transformation of newly industrialized economies in the 1960s and 1970s, and to recent trends in Latin America countries where income inequality has eased off since the 1990s (UNDP, 2013).

Figure 1. Trends in Disposable Income Inequality, 1980-2012



Source: OECD; Luxembourg Income Study Database; Socio-Economic Database for Latin America and the Caribbean; World Bank; Eurostat (from the Wall Street Journal, March 13, 2014)

Table 1. Number of Countries with Rising and Falling Inequality by Income Status and Region
(1980-1999 and 2000-2010)

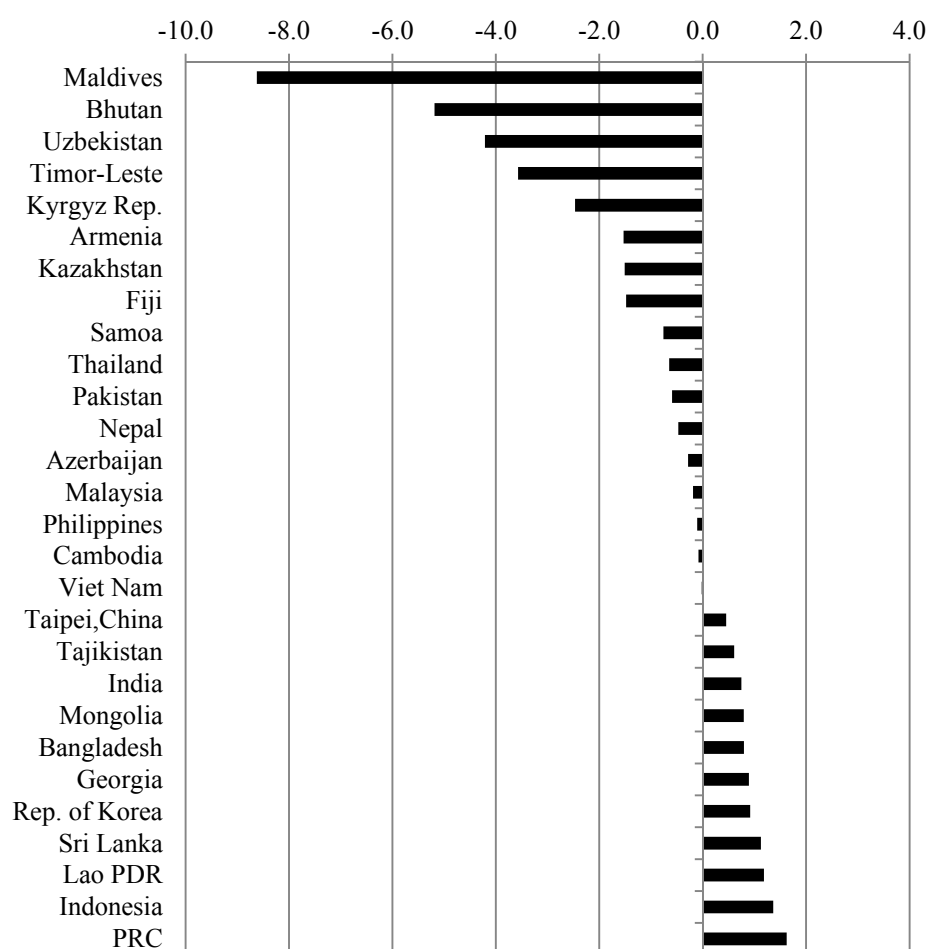
	High Income	Low & Middle Income					
	All	Africa	Arab S.	A&P	ECIS	LAC	Total
<i>1980-1999</i>							
Rising inequality	22	2	1	3	14	8	50
No change	0	3	1	0	0	1	5
Falling inequality	7	5	3	7	2	6	30
Total	29	10	5	10	16	15	85
<i>2000-2010</i>							
Rising inequality	14	3	1	6	11	3	38
No change	4	0	1	0	0	0	05
Falling inequality	11	7	3	4	5	12	42
Total	29	10	5	10	16	15	85

Note: A&P: Asia and the Pacific; ECIS: Europe and the Commonwealth of Independent States; LAC: Latin America and the Caribbean

Source: UNDP (2013)

When income inequality comes with social immobility, poor households find it difficult to escape from either the lowest income rank or poverty. As addressed in the UNDP report of 2013, severe income inequality harms growth and poverty reduction over the long term, the quality of relations in the public and political spheres of life and individuals' sense of fulfillment and self-worth. Thus, it is recommended that nations implement a wide range of policies, such as exploiting property taxes more fully and using higher minimum wages, to make society more equitable and cohesive (ADB, 2012; IMF Managing Director Christine Lagarde's speech in February, 2014).

Figure 2. Annualized change in inequality of expenditure or income, developing Asia, 1990s and 2000s



Note: Lao PDR = Lao People's Democratic Republic; PRC = People's Republic of China.
Source: ADB, Asia Development Outlook 2012.

Policy concerns are usually drawn on a low level of inter-generational income mobility rather than intra-generational income mobility, since a low level of inter-generational mobility implies that children of the poorest parents are very likely to be adults in the lowest income quintile. On the other hand, a low level of intra-generational mobility is not considered as a serious problem unless the possibility to change income ranks is significantly limited for the lowest and the highest income people. However, intra-generational income mobility not only affect income inequality during one person's life cycle, but also may affect the dynamics of income inequality through generation to generation. In other words, intragenerational mobility may reinforce the impacts of intergenerational income mobility on income inequality further.

Using the case of Korea that exhibits a rise in income inequality and a high growth rate, we attempt to identify determinants of income ranks and to measure and evaluate income mobility. We carry out the empirical

exercise of this paper using the data of the Korean Labor and Income Panel Study (KLIPS) during the period from 1998-2010. We use household income as a measurement of social ranking. In order to reduce the measurement error associated with income, we employ household wage earnings, as these are conceptually similar to permanent incomes.

The rest of this paper is organized as follows: Section 2 reviews the previous literature, Section 3 presents the empirical frameworks and describes the data, Section 4 provides estimation results and Section 5 includes the conclusion.

2. Literature Review

Social mobility refers to “movements by specific entities between periods in terms of socioeconomic status indicators” (Behrman, 2000). While sociologists have been interested in mobility between social classes or occupational groups, economists have focused primarily on mobility in terms of income. Intragenerational income mobility follows the movement of individuals’ earnings throughout their lives, while intergenerational income mobility follows the movement of one generation’s earnings to the next. Research interests concerning intragenerational mobility are associated with worries about income inequality. Lack or deterioration of income mobility, low upward income mobility on the lowest, and/or downward mobility on the highest ends of the income distribution scale are likely to worsen income inequality and further reduce equality of opportunity. On the other hand, an economy with higher mobility may mitigate income inequality, but, at the same time, increase income uncertainty. Therefore, much effort has been made to understand income mobility and to obtain policy implications of income inequality.

2.1 International Evidence on Intragenerational Income Mobility

There have been many empirical studies of intragenerational income mobility, but most have dealt with developed countries, such as the US and European countries, due to data availability.¹

The primary questions in the previous literature can be classified into the following three. The first question involves whether any relationship exists between cross-sectional levels of income inequality and

¹ For available databases and details of these empirical studies, refer to Atkinson, Bourguignon, and Morrison (1992) and Burkhauser and Crouch (2009).

intragenerational mobility. Researchers have asked whether or not greater cross-sectional inequality tends to be associated with greater intragenerational mobility and leads to less permanent income inequality (Burkhauser and Couch, 2009). However, many empirical studies using US data have found no significant relationship (Burkhauser et al, 1997; Gottschalk and Spolaore, 2002; Maasoumi and Trede, 2001; Jenkins and Van Kerm, 2006). Other empirical studies using the European countries' data as well as the US data did not find a positive relationship between inequality and mobility (Aaberge et al, 2002; Ayala and Sastre, 2002; Gangl, 2005). While cross-sectional inequality in most cases tends to be persistent over time, there is little mobility from the bottom level of income distribution to the top (Burkhauser and Couch, 2009). This leads to the third question which examines the dynamics of intragenerational mobility to take into account the dynamics of poverty and inequality.

The second question concerns the degree to which those who start in a specific group move up or down. This origin-specific mobility is of interest, because the ability of the poor to escape the bottom rungs of the income ladder and the stability of the top rungs are of concern (Burkhauser and Couch, 2009; Bradbury, 2011). Auten and Gee (2007) used a 10 year panel of US individual income tax returns to show high income mobility in which more than half of households moved to an upper or lower income quintile between 1987 and 1996. Roughly half of those who were in the bottom 20 percent moved upwards. Households with low income had the largest increase in real income and households with older people were likely to have more frequent downward mobility, possibly due to transitions to retirement. On the other hand, Bradbury (2011) used the Panel Study of Income Dynamics (PSID) from 1969 to 2006 to show that the poorest quintile is less likely to move up than the richest quintile is to move down.

The third question deals with whether mobility has changed over time. In case of the United States, Fields and Ok (1999), Sawhill and Condon (1992), Hungerford (1993), Gittleman and Joyce (1999), and Gottschalk and Danziger (2001) showed little difference in overall mobility during the 1970s and 1980s. Acs and Zimmerman (2008), Auten and Gee (2009), and Dahl et al. (2007) also showed little difference in overall mobility during the 1980s, 1990s, and 2000s. On the other hand, decreases in mobility over time in the US have been reported by Hugerford (2008, 2011), Bradbury (2011), Bradbury and Kats (2002), and Carroll, Joulfaian, and Rider (2006), while long term income has become more unequally distributed (Burkhauser and Crouch, 2009). Kopczuk et al. (2010) found that short term mobility has been stable since the 1950s. While long run mobility has increased for females, it has decreased for males. Bradbury (2011) suggested that the mixed results

of the previous literature on US trends might have resulted from differences in spans of investigation periods. On the other hand, Dickens (2002) used the New Earnings Survey and the British Household Panel Survey from 1975 to 1994 to show that mobility has declined since the 1970s, while income inequality has increased in Britain. Jenkins (2011) used the British Household Panel Survey for the period from 1991 to 2006 to find that mobility has not changed very much. For German mobility studies, Hauser and Fabig (1999) and Gernandt (2009) showed a decline in mobility over time.

Related to the second and third questions, Fields and Puerta (2010) examined changes in an individual's income mobility over the periods of positive and negative income growth in Argentina. They found that low income earners tended to do better than the higher earners, which supports convergent mobility. In addition, using the simulation method and event studies, they showed that income inequality can be widened despite a higher degree of mobility, which is consistent with Argentina's situation. Fields et al. (2006) also used the regression approach to find an income convergence between the rich and the poor in Latin American countries such as Argentina, Mexico, and Venezuela. In addition, correlates of intragenerational mobility such as gender, education, and employment status have been studied.

2.2 Korean Evidence on Intragenerational Income Mobility

The majority of empirical studies on Korea's intragenerational income mobility have shown that income mobility has declined since the late 1990s (An and Bosworth, 2013; Kang, 2011; Nam, 2013; Oh and Kim, 2011; Suk, 2009; Sung, 2011). A few studies have shown slight but increasing mobility (Kim, 2007; Yun and Hong, 2012). These mixed results may have resulted from the use of various income mobility measures and estimation methods (Yun and Hong, 2012).

Most studies have focused on mobility in the late 1990s. One of the primary reasons for this is that up until the mid-1990s, Korea's rapid economic growth has seemed to correspond with a decrease in income inequality and improvement in social welfare. However, after experiencing two financial crises in 1997 and 2008, the size of the middle class has decreased and income inequality, which dramatically increased, has remained continuously high. This has brought much attention to income mobility, as well as income inequality and poverty. In addition, data availability has expanded. The KLIPS, which started in 1998, has been a good source

for intragenerational mobility in addition to household income and expenditure surveys from Statistics Korea that started in 1963.

Nam (2007) used KLIPS data from 1998-2004 to show that in the short run, the probability of a household staying in the same income class is approximately 0.62-0.66, while in the long run, it lowers to approximately 0.50-0.57. Among those in the middle class that moved to other classes, approximately 60% showed downward mobility and 40% showed upward mobility in both the short and the long run. This result implies an increasing trend in the income polarization phenomenon. Using the ordered logit, he also showed that, generally, households with a male head, high education level, and residents of big cities are most likely to experience upward mobility.

Kang (2011) used the Household Income and Expenditure Survey from Statistics Korea for the period of 1990-2008 and calculated transition matrices in the income percentiles. He also divided households into four groups based on medium household incomes.² He found that Korean society's mobility had been decreasing. In particular, a comparison between the period of 1990-1997, before the financial crisis, and the period of 2003-2008 found that the lowest and the lower-middle income groups showed decreasing upward mobility, but increasing downward mobility, while the upper-middle income group showed an increasing upward mobility. These results imply that those in the poverty trap face a higher probability of staying there, which is consistent with the fact that the exit rate of poor people escaping poverty has declined since 2000. On the other hand, income mobility is greater with disposable income than with ordinary income or market income.³ This implies that income redistribution policies improve income mobility.

An and Bosworth (2013) used KLIPS data from 1999-2007 to confirm the results of Kang (2011). In addition, they also showed that mobility was lower for female headed households than for male headed households and that mobility rates across age groups were very uniform except for a marked decline in mobility for households whose head was age 70 and older. Sung (2011) used KLIPS data from 1999-2008 to also confirm results for declining mobility by using income mobility in the form variance.

Nam (2013) considered household expenditure as a proxy for permanent income rather than household earnings. Using KLIPS data from 1998-2010, he constructed a transition matrix in the income quintiles and

² Households with income lower than 50%, 50-75%, 75-150%, and higher than 150%, compared to the medium income, were stratified into the lowest, lower-middle, upper-middle and highest groups.

³ Market income consists of wages, salaries, property incomes, and private income transfers, while ordinary income adds public income transfers to market income.

found that those in the lowest and the highest income groups in 1997 showed a high probability of staying in the same income group. In both the short and long run, the lowest and second lowest quintile income groups showed low mobility, but the highest income group showed greater mobility in the long run. This result is consistent with those of Kang (2011). In addition, he compared the mean log difference index with the Theil index and confirmed that low income groups had lower income mobility.

On the other hand, Kim (2007) showed that, according to the Pearson and Spearman correlation coefficients, the impacts of the previous year's income on the following year's decreased between the period from 1999-2002 and the period from 2003-2006. Therefore, overall mobility increased, but while the 5th quintile's downward mobility increased, the 1st quintile's upward mobility decreased. She also showed that the probability of moving downward was higher for female-headed households, single-headed households, and households with a head of household with a low education level or blue collar job.

Yun and Hong (2012) used household earnings data from the KLIPS and estimated income mobility across ages and over time. Following the approach taken by Gottschalk and Moffitt (2008), they divided income determinants into two groups, including early stage factors and post stage factors and defined the income mobility measure that showed the relative importance of the post-entry condition on individual income disparities.⁴ They found that income disparities had increased since 2000, and this resulted from disparities across age groups, but not within each group. On the other hand, they found that in most age groups, income disparities based on early stage factors decreased, and concluded that income mobility increased. It was greater for the 31-50 age groups than for those 51-80. However, this research focused on mobility within age groups, but not in the pooled sample of all of ages. Since it also did not incorporate changes in age structure, which may worsen income mobility and/or income inequality, these results need to be interpreted cautiously.

3. Model and Data

3.1 Data

3.1.1. Korean Labor and Income Panel Study

⁴ Early stage factors or conditions, which include age, gender, and education, are mostly determined before people enter the labor market, and post stage factors or conditions, which include working experience or abilities learned while working, ex-post or after entering the labor market.

In our empirical study, the Korean Labor and Income Panel Study (KLIPS) for the period from 1998 to 2010 is used. The KLIPS is a longitudinal survey of the labor market conducted by the Korean Labor Institute.⁵ In the first wave of the KLIPS, during the year of 1998, it surveyed 5,000 sampled households in urban areas across the country, excluding Jeju Island, with members aged 15 or older. Every year, the KLIPS follows up on the original sampled households of the first wave, with their off-spring as well as the original household members. The retention rate of the original sampled households was quite high.⁶

The KLIPS surveyed wage earnings and non-wage earnings such as financial earnings, income transfer and supplemental security income at individual and household levels. Among these, household wage earnings, i.e., aggregate wage earnings of all household members, were used to construct income ranks since they are conceptually similar to the permanent income of a household, which is the most significant component of household income and social hierarchy.⁷ Aggregate wage earnings were deflated with GDP deflators reported by the Bank of Korea's Economic Statistics System. In order to reduce the measurement error associated with wage income, we excluded observations of the self-employed and non-active individuals who were younger than 20 years old in 1998 and older than 55 years old in 2010. In addition, the top and bottom 0.1 percent of wage incomes were also excluded in order to minimize outliers. Finally, we obtained 4,739 observations for the empirical analysis.

Table 2 summarizes descriptive statistics of the variables in years 1998, 2005, and 2010. Average yearly household wage earnings (*HYWage*) increased over time, from 17.92 million KRW in 1998 to 30.96 million KRW in 2010. Reflecting the financial crisis in 1998, the average annual growth rate for wage earnings was higher between 1998 and 2005 (8.49%) than between 2005-2010 (1.67%).

To demonstrate income gaps, average household wage earnings are computed based on the income quartiles. We first defined households belonging to the second and third quartiles of income as the middle group with a lower limit of the 25th percentile and an upper limit of the 75th percentile. Using the values of these two limits, the lowest income group was defined as a group of households whose wage income was lower by 50% than the lower limit of the middle group, while the highest income group was defined as a group of households

⁵ The design of the KLIPS is comparable to the US's Panel Study of Income Dynamics (PSID) and the UK's British Household Panel Study (BHPS).

⁶ In the 9th wave during 2006, the retention rate in the KLIPS was approximately 76.5%, while those of the PSID (in 1976) and BHPS (in 1999) in the 9th wave were 71.2% and 72.1%, respectively.

⁷ In practice, there are many missing values for other earnings.

whose wage income was higher by 150% than the upper limit of the middle group. The wage group in between the middle group and the lowest (highest) group was defined as the 2nd lowest (highest) group. Descriptive statistics by income groups are reported in Table 2. While *HYWage* increased over time for middle and upper middle income groups, it decreased between 2005 and 2010 for low income groups (the lowest and the 2nd lowest). As a consequence, income gaps were widened. Wage earnings of the highest income group were around 22.5 times that of the lowest income group in 2010. This ratio was only 2.32 in 1998 and 3.77 in 2005. In Table 1, average household earnings including other income sources (*HYIncome*) and average monthly household expenses (*HMExpense*) were reported for the year of 2010. When the ratio between the highest and the lowest was 17.91 for *HYIncome* and 4.60 for *HMExpense*. The average household head's age (*AGE*) in 1998 was 45.33, but this was considerably higher for lower income group: 53.51 for the lowest and 46.47 for the 2nd lowest. This implies that senior citizens are likely to be placed at the bottom of the income distribution.

Table 2. Social and Economic Status by Household Income Groups

Variables	(Unit)	Total	Household Income Groups				
			Lowest (bottom)	2 nd Lowest	Middle	2 nd Highest	Highest (top)
<i>HYWage</i> ₉₈	(10K KRW)	1,792.4	1,294.9	1,554.0	1,749.3	2,186.6	3,007.6
<i>HYWage</i> ₀₅		2,857.2	1,492.8	1,614.5	2,574.0	3,819.2	5,632.6
<i>HYWage</i> ₁₀		3,095.9	352.6	951.5	2,593.8	4,882.8	7,947.9
<i>HYIncome</i> ₁₀	(10K KRW)	3,205.6	459.6	998.9	2,665.3	5,067.8	8,231.4
<i>HMExpense</i> ₁₀	(10K KRW)	188.7	79.3	98.7	170.8	264.6	364.8
<i>Female</i> ₉₈	Female-Headed HH(%)	14.22	27.39	15.65	10.11	6.69	3.57
<i>AGE</i> ₉₈	HH Age (year)	45.33	53.51	46.47	38.28	38.64	38.60
<i>Edu1</i>	No Edu-Middle (%)	38.76	67.52	53.48	38.28	17.63	10.71
<i>Edu2</i>	High (%)	36.42	22.93	34.78	41.84	41.64	26.79
<i>Edu3</i>	Collg/Univ (%)	21.57	8.28	10.87	18.28	33.43	47.62
<i>Edu4</i>	Adv. Degrees (%)	3.25	1.27	0.87	1.61	7.29	14.88
<i>Illness</i> ₁₀	HH is sick (%)	13.36	41.24	25.16	10.85	5.76	4.13
<i>Job</i> ₁₀	HH has a job (%)	75.88	50.52	61.61	77.37	83.58	92.66
<i>HH_M2F</i> _{98→10}	HH Gender: M→F (%)	1.93	8.76	10.00	3.52	2.56	0.92
<i>Single</i> ₁₀	Single HH (%)	7.67	5.67	9.68	10.42	2.14	0.92
<i>Divorced</i> ₁₀	Divorced HH (%)	9.06	16.49	21.29	8.48	3.20	1.38
<i>Widow(er)</i> ₁₀	Widow(er) HH (%)	10.26	31.96	18.39	8.05	5.97	2.75
<i>Seoul</i> ₁₀	Residency in Seoul (%)	24.93	20.10	24.52	25.00	26.23	50.00

<i>HomeOwner</i> ₉₈	Home Ownership (%)	55.73	65.61	52.17	51.84	58.66	50.00
<i>HomeOwner</i> ₀₅		57.56	63.73	45.30	54.92	66.19	70.55
<i>HomeOwner</i> ₁₀		58.96	53.09	49.03	55.60	71.64	72.48
<i>DadEdu1</i>	No Edu.- Elementary (%)	35.89	53.50	41.30	32.07	20.36	23.81
<i>DadEdu2</i>	Middle (%)	41.80	31.85	40.43	47.24	50.76	38.69
<i>DadEdu3</i>	High (%)	8.38	2.55	4.78	9.08	13.98	17.26
<i>DadEdu4</i>	College-Adv.Degrees (%)	6.22	1.27	3.48	4.25	9.42	15.48
Nobs		4,739	157	230	870	329	168

Note: We classify the household into four group using the household income. We define households belonging to the second and third quartiles of the income as the middle group, i.e., the household is considered as middle class if its income lies between the 25 percentile and 75 percentile of the pooled household incomes. The lowest income group is defined as a group of households whose wage income was lower by 50% than the lower limit of the middle group, while the highest income group was defined as a group of households whose wage income was higher by 150% than the upper limit of the middle group. The wage group in between the middle group and the lowest (highest) group was defined as the 2nd lowest (highest) group.

It is worth noting the following: proportions of households whose head was female (*Female*), unmarried (*Single*), divorced (*Divorced*), or a widow/widower (*Widow(er)*) increased as income ranking changes from the highest to the lowest. It is also true for households whose was sick (*Illness*) or head's gender changed from male to female between 1998 and 2010 (*HH_M2F*). On the contrary, proportions of households whose head was highly educated (*Edu3* or *Edu4*), employed (*Job*) or a resident in Seoul (*Seoul*) were higher for upper income groups than for lower income groups.

The other variables, homeownership in 1998 and education of a household head's father were reported to show early stage factors of the household. Proportions of homeownership in 1998 were higher for the lowest income group than for the upper groups, reflecting the head's age, but the order reversed in 2005 and 2010. As inter-generational mobility studies reported, education seemed to function as a channel to transfer wealth between generations since the upper group household head's father was also highly educated.

3.1.2. A Trend in Korea's Income Inequality

As depicted in the top plot of Figure 3, income inequality, represented by the Gini coefficient, soared between 1998 and 1999 when the foreign exchange crisis hit and negative GDP growth rate was observed. As Korea recovered from the crisis, the Gini coefficient decreased and remained low until 2005. Then, it resumed an upward trend in 2006 and persistently stayed at a high level (approximately 0.31) as Korea's economic

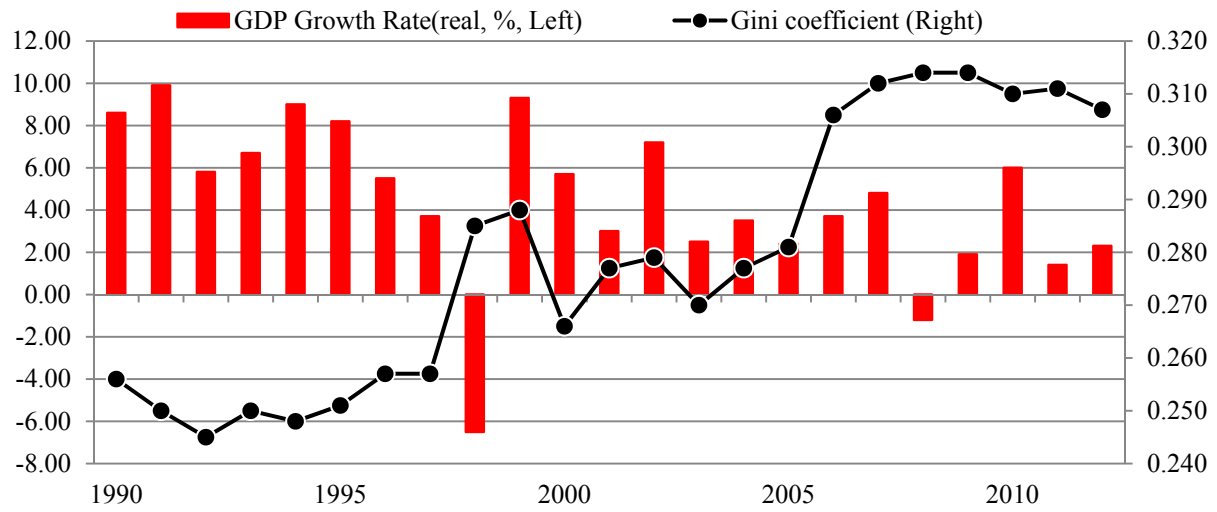
growth rate has slowed since the mid-2000s. To demonstrate a negative correlation between income inequality and the GDP growth rate, the same data are depicted using an X-Y plot at the bottom of Figure 3. This implies that negative macroeconomic shocks, which impede economic growth, may affect the poor more severely and aggravate income inequality.

3.1.3. Rank Mobility between Income Quintiles

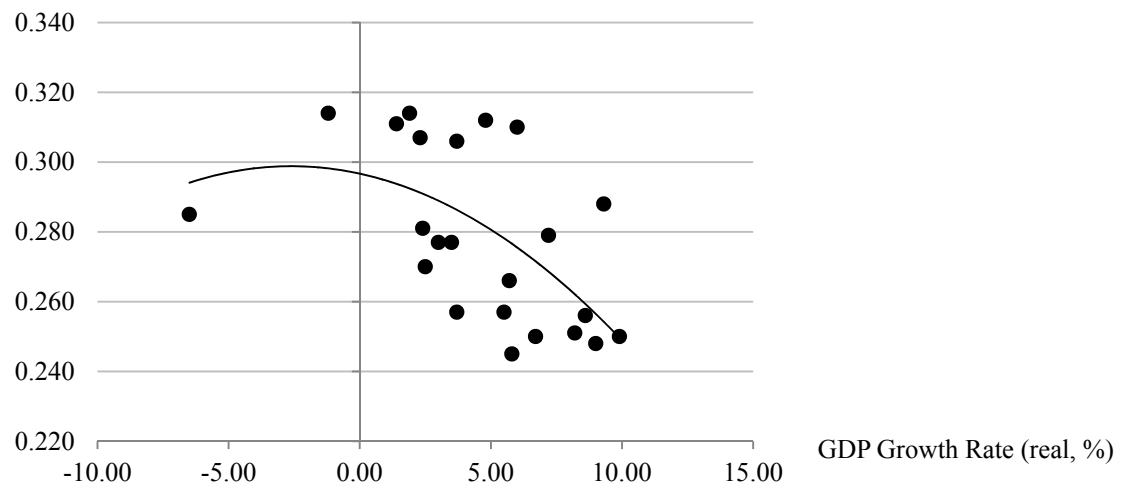
We examined transition probability based on income quintiles that show the income transition matrix from 1998 to 2005 and from 2005 to 2010 in Table 3. The diagonal entries show that persistence in wage income was greater in the bottom 0-20% and top 80-100% income quintiles. While 47.97% (55.48%) in the bottom group of households and 52.20% (59.61%) in the top group stayed in those groups in 2005 (in 2010), only 27.75-37.57% of those in the rest of the groups remained in their respective groups. This result shows that the persistency of the household income ranks was greater for those two extreme income groups, and was more pronounced in the late 2000s.

In addition, the lowest income group's upward mobility decreased over time, while the highest group's downward mobility stayed the same. This is observed by the following: the probability to stay below the middle increased from 68.9% between 1998 and 2005 to 75.6% between 2005 and 2010 for the lowest income group, while it stayed around at 16.2% for the highest income group. To the contrary, the lowest income group's probability to stay above the middle decreased from 17.2% between 1998 and 2005 to 11.7% between 2005 and 2010. The same probability slightly increased for the highest income group from 74.0% to 75.2%.

Figure 3. The Gini Coefficient and Real GDP Growth Rate in Korea (1990-2012)



Gini Coefficient (1990-2012)



Source: Economic Statistics System, Bank of Korea

Table 3. Income transitions between income quintiles
< 1998 → 2005 >

t=2005 t=1998	0~20% (bottom)	20~40%	40~60%	60~80%	80~100% (top)	Sum
0~20% (bottom)	165 (47.97)	72 (20.93)	48 (13.95)	34 (9.88)	25 (7.27)	344 (15.97)
20~40%	144 (32.58)	124 (28.05)	87 (19.68)	54 (12.22)	33 (7.47)	442 (20.52)
40~60%	59 (12.50)	105 (22.25)	131 (27.75)	121 (25.64)	56 (11.86)	472 (21.91)
60~80%	38 (8.17)	61 (13.12)	114 (24.52)	135 (29.03)	117 (25.16)	465 (21.59)
80~100% (top)	40 (9.28)	30 (6.96)	42 (9.74)	94 (21.81)	225 (52.20)	431 (20.01)
Sum	446 (20.71)	392 (18.20)	422 (19.59)	438 (20.33)	456 (21.17)	2154 (100)

< 2005 → 2010 >

t=2010 t=2005	0~20% (bottom)	20~40%	41~60%	60~80%	80~100% (top)	Sum
0~20% (bottom)	157 (55.48)	57 (20.14)	36 (12.72)	21 (7.42)	12 (4.24)	283 (16.63)
20~40%	70 (20.00)	103 (29.43)	95 (27.14)	55 (15.71)	27 (7.71)	350 (20.56)
40~60%	43 (12.36)	52 (14.94)	107 (30.75)	106 (30.46)	40 (11.49)	348 (20.45)
60~80%	27 (7.46)	36 (9.94)	61 (16.85)	136 (37.57)	102 (28.18)	362 (21.27)
80~100% (top)	28 (7.80)	30 (8.36)	31 (8.64)	56 (15.60)	214 (59.61)	359 (21.09)
Sum	325 (19.10)	278 (16.33)	330 (19.39)	374 (21.97)	395 (23.21)	1702 (100)

Note: Numbers in parentheses are the percentage of households in a certain income group during year 1998 (or 2005) that moved to a certain income group during year 2005 (or 2010), except for those in the last row and column. The numbers in the last row in parentheses show the percentage of households in an income group during year 2005 (or 2010), and those in the last column in parentheses show the percentage of households in an income group during year 1998 (or 2005).

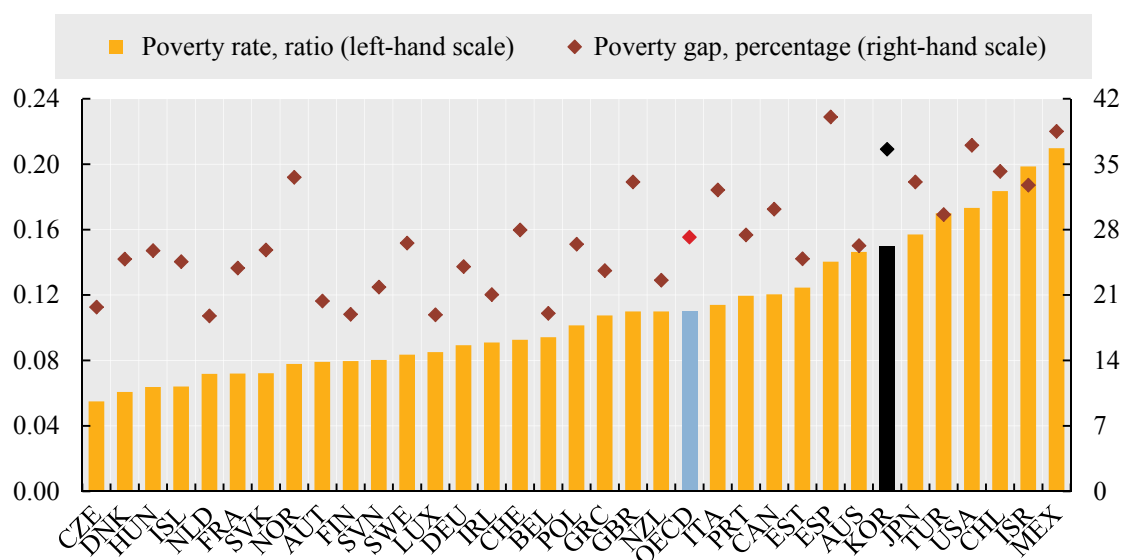
3.1.4. Rank Mobility between Income Groups and Income Poverty

Looking into quintile ranks in Table 3 has its own limitations in providing precise information concerning poverty status. In order to complement it, we re-calculated the transition matrices using income quartiles as in Table 2.

It is well known that no commonly agreed measure of absolute poverty exists and, therefore, a relative measure is used. For example, the OECD defines the poverty line as half of median household income. When the OECD measure is used, Korea's poverty rate in the late 2000s was 15 percent, and this was higher than that

for most OECD countries (see Figure 4). Meanwhile, in this paper, we assume that the lowest income group whose average wage earnings are lower than 50% of the low limit for the middle group represents the poverty group in Korea. The proportion of the lowest income group was around 6% in 2005 and 2010, which is less than the OECD-reporting poverty rate (15%). Note that we defined the lowest income group line as half the low limit (the 25th percentile of income distribution) of median household income. Since the low limit here is much lower than the median income, the proportion of the 1st income group was lower than the OECD's poverty rate.

Figure 4. Poverty rate of OECD countries in the late 2000s



Source: OECD Factbook 2011-2012: Economic, Environmental, and Social Statistics.

Using our measure of the poverty group, the degree of income mobility over the time, i.e., periods from 1998 to 2005 and from 2005 to 2010, is reported in Table 4. According to Table 4, the proportion of poverty households decreased by 5.05 percent points (11.14% → 6.09%) between 1998 and 2005, but increased slightly by 1.02 percent points (5.15% → 6.17%) between 2005 and 2010. However, the probability of a household in the lowest income group staying in the same lowest income group increased from 14.95% to 34.12% from 2005 to 2010. In other words, in terms of the existence of poverty traps, the ability of the poor to escape the poverty group has become weaker since the mid-2000s. This indicates the growing possibility of observing poverty traps in Korea.

Table 4. Income transition matrices between income groups

< 1998 → 2005 >

t=2005 t=1998	Lowest (0-50% of the 25 th percentile income)	2 nd Lowest	Middle (25 th -75 th percentile income)	2 nd Highest	Highest (150% or above of the 75 th percentile income)	Sum
Lowest (bottom)	32 (14.95)	47 (21.96)	107 (50.00)	24 (11.21)	4 (1.87)	214 (11.14)
2 nd Lowest	24 (30.38)	16 (20.25)	33 (41.77)	4 (5.06)	2 (2.53)	79 (4.11)
Middle	50 (4.45)	131 (11.67)	676 (60.20)	198 (17.63)	68 (6.06)	1123 (58.46)
2 nd Highest	7 (2.02)	26 (7.51)	139 (40.17)	100 (28.90)	74 (21.39)	346 (18.01)
Highest (top)	4 (2.52)	3 (1.89)	36 (22.64)	44 (27.67)	72 (45.28)	159 (8.28)
Sum	117 (6.09)	223 (11.61)	991 (51.59)	370 (19.26)	220 (11.45)	1921 (100)

< 2005 → 2010 >

t=2010 t=2004	Lowest (0-50% of the 25 th percentile income)	2 nd Lowest	Middle (25 th -75 th percentile income)	2 nd Highest	Highest (150% or above of the 75 th percentile income)	Sum
Lowest (bottom)	29 (34.12)	20 (23.53)	30 (35.29)	6 (7.06)	0 (0.00)	85 (5.15)
2 nd Lowest	31 (18.34)	55 (32.54)	70 (41.42)	9 (5.33)	4 (2.37)	169 (10.23)
Middle	32 (3.64)	98 (11.16)	590 (66.06)	145 (16.51)	23 (2.62)	878 (53.15)
2 nd Highest	9 (2.67)	6 (1.78)	138 (40.95)	136 (40.36)	48 (14.24)	337 (20.40)
Highest (top)	1 (0.55)	2 (1.09)	36 (19.67)	56 (30.60)	88 (48.09)	183 (11.08)
Sum	102 (6.17)	181 (10.96)	854 (51.69)	352 (21.31)	163 (9.87)	1652 (100)

Note: Numbers in parentheses are the percentage of households in a certain income group during year 1998 (or 2005) that moved to a certain income group during year 2005 (or 2010), except for those in the last row and column. The numbers in the last row in parentheses show the percentage of households in an income group during year 2005 (or 2010) and those in the last column in parentheses show the percentage of households in an income group during year 1998 (or 2005).

3.2. Empirical Framework

How can we measure intragenerational mobility? While some researchers have estimated transition probabilities, others have used an approach of regressing later period income (or expenditures) on the initial period income (or expenditures). We adopted the latter approach and estimated income elasticity. Following Kim et al. (2009) and Kim et al. (2012), we employed a log-linear model shown as follows:

$$(1) \ y_{it} - \bar{y}_t = \lambda + \rho(y_{it-1} - \bar{y}_{t-1}) + \theta'z_{it} + \varepsilon_{it},$$

$$y_{it} = (\lambda + \bar{y}_t - \bar{y}_{t-1}) + \rho y_{it-1} + \theta'z_{it} + \varepsilon_{it}, \text{ and}$$

$$y_{it} = \alpha + \rho y_{it-1} + \theta'z_{it} + \varepsilon_{it},$$

where y_{it} represents the natural logarithm of the wage earnings of a household i at time t . $\bar{y}_t$ is the natural logarithm of the average wage earnings of households at t and ε_i is an error term. The explanatory variable vector z_{it} controls the time-invariant social and demographic characteristics of household (or household head) i at time t , which include the following: a) gender, age, its squared term, and employment status, b) degree of inherited ability (instrumented by education levels, dummies representing illness, c) family background (marital status) and living place (dummy of living in the capital city), and d) macro shocks (recession and/or market failures in financial markets). Most of the characteristics that are determined before people enter the labor market are time-invariant. However, some characteristics such as marital status, education level, or macroeconomic variables are time variant. A vector θ is a set of parameters for z_{it} and α is an intercept related to average income changes across the two time periods. Lastly, ρ measures the average impacts of household i 's initial wage income on the later wage income, i.e., the fraction of household i 's initial economic advantage transmitted to later periods. Therefore, $(1 - \rho)$ is the measure of our interest, i.e., a measure of the degree of intragenerational mobility. A positive value of ρ implies intragenerational persistence of income advantages in which an higher than average income in the later period is associated with higher than average initial income. Therefore, the higher the association between initial and later period incomes (i.e., the higher the value of ρ), the lower intra-generation mobility is (i.e., lower value of $1 - \rho$). Henceforth, income will refer to aggregate household wage earnings, to simplify the expression.

4. Empirical Results

4.1 Intragenerational Income Elasticity

Using a regression approach, we estimated intragenerational income elasticity for the entire period in which the initial year was 1998 and the ending year was 2010. In addition, we estimated it for the two sub-periods: from 1998 to 2005, with decreasing Gini coefficients, and the period from 2005 to 2010, with increasing Gini coefficients. For each sub-period, the natural logarithms of household income in beginning and ending years

were used. Table 5 shows that intragenerational income elasticity was estimated to range from 0.348 to 0.480. This means that if a household makes 1% more than another household in the initial year, then that household earns approximately 0.348-0.480% more than the other household 12 years later. Lower income elasticity implies a society with higher mobility. The estimates in this paper were larger than those for Korea's intergenerational income elasticities in the previous literature, which ranged from 0.10 to 0.34 (Kim, 2009; Kim *et al.*, 2012; Ueda, 2013).⁸ In other words, the transmission or persistence of initial income tended to be greater in the same generation than intergenerationally in Korea. While Gini coefficients as a proxy for income inequality had a decreasing trend in the period from 1998 to 2005 and an increasing trend in the period from 2005 to 2010, income elasticities in these periods were almost the same. Overall, short run income elasticity in the two sub-periods was greater than long run income elasticity, as expected.

Table 5. Estimation of intra-generational income elasticity

	Ordinary least squares (OLS)			Two stage least squares (2SLS)		
	1998→2010	1998→2005	2005→2010	1998→2010	1998→2005	2005→2010
Intercept	5.621*** (0.365)	3.973*** (0.293)	4.406*** (0.238)	4.083*** (0.538)	1.922*** (0.444)	4.982*** (0.500)
y_{0i}	0.348*** (0.031)	0.469*** (0.026)	0.480*** (0.022)			
$LTexp_{y_{0i}}$				0.710*** (0.075)	0.848*** (0.062)	0.524*** (0.062)
$Female_i$	-0.002 (0.084)	0.030 (0.010)	-0.066 (0.059)	0.119 (0.087)	0.091 (0.075)	0.071 (0.081)
HH_M2F_i	-0.260** (0.097)	-0.364** (0.106)	-0.122 (0.108)	-0.242** (0.096)	-0.361** (0.104)	-0.084 (0.170)
AGE_i	0.008 (0.013)	0.023** (0.010)	0.003 (0.009)	-0.052*** (0.014)	-0.018* (0.011)	-0.0400*** (0.013)
AGE_i^2	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0002** (0.0001)	0.0003** (0.0001)	0.0001 (0.0001)	0.0003* (0.0001)
Job_i	0.149*** (0.049)	0.196*** (0.042)	0.094** (0.044)	0.174*** (0.048)	0.209*** (0.041)	0.164*** (0.043)
$Illness_{i1}$	-0.322*** (0.054)	-0.167*** (0.045)	-0.227*** (0.050)	-0.337*** (0.052)	-0.235*** (0.045)	-0.351*** (0.053)
$Single_i$	-0.624*** (0.110)	-0.473*** (0.086)	-0.380*** (0.081)	-0.674*** (0.111)	-0.473*** (0.087)	-0.629*** (0.111)
$Divorced_i$	-0.407*** (0.070)	-0.417*** (0.068)	-0.428*** (0.063)	-0.448*** (0.072)	-0.450** (0.070)	-0.443*** (0.072)
$Widow(er)_i$	-0.188** (0.090)	-0.105 (0.080)	-0.091** (0.044)	-0.176** (0.088)	-0.071 (0.079)	-0.199** (0.088)

⁸ This is the one of the first papers to estimate intragenerational income elasticity using a regression approach. Therefore, we could not find previous estimates for intragenerational income elasticity for the case of Korea.

Seoul	0.092** (0.044)	0.074** (0.036)	0.053 (0.037)	0.080* (0.043)	0.081** (0.037)	0.108** (0.043)
N of observation	1582	1737	1651	1751	1920	1751
R^2	0.3482	0.3568	0.4288	0.3042	0.3117	0.2966

Notes: 1. The dependent variable is the natural logarithm of household wage incomes. 2. Standard errors are shown in parentheses and *, **, and *** represent statistical significance levels of 0.1, 0.05, and 0.001, respectively.

Characteristics of households were controlled. The head of a household being female in the initial year did not affect the later period income. However, when a family's household changed from male to female-headed (represented by a variable, *HH_M2F*), wage income dropped by 0.26% in the long run.⁹ Change in gender of the head of a household, especially from male to female, in Korean society, tended to due to the death or loss of a job of a male household head, or divorce. This result explains why poor households were found largely among female-headed households. A concave relationship was found between age and changes in wage income. Family structures such as single, divorced, and married-single-parent families, relative to married parent families, had negative impacts on wage income. A household head's illness had a significantly negative impact on wage income. Having a job and living in the capital city, Seoul, were positively associated with wage income.

However, as Fields and Puerta (2010) pointed out, reported initial earnings may have a measurement error problem. In addition, they may suffer from the endogeneity problem. Therefore, we used predicted wage earnings of a household, as a proxy for expected lifetime earnings. Explanatory variables for predicted wage earnings include early stage factors that represent conditions that the household head had before participating in the labor market. Those are age, its squared term, gender, education level (three dummies for high school, college, and graduate school), homeownership in 1998, and education of head's father (three dummies for middle, high, and college). Shown in Table 5, when predicted earnings were used (2SLS), intragenerational income elasticity became greater, but the results were qualitatively the same as OLS outcomes.

4.2. The Role of Macro Shocks and Annual Income Elasticity

We investigated the impacts of macro shocks on intragenerational income mobility using annual data for the period from 1998 to 2010. Therefore, in this subsection, one-year intragenerational income elasticity is

⁹ The estimation results in both the short run and the long run were similar except for the case of the dummy variable, Seoul. Therefore, we focused on the long run estimation results.

estimated. In order to evaluate impacts of macro shocks on income mobility, we added a macro-economic variable, *Recession*, which was a continuous variable ranging from 0 to 1.¹⁰ As an economy falls during a recession, the value of the recession approaches 1. In order to incorporate heterogeneity in the impact of recessions across income groups, four interaction terms were added: $Recession_t \times Dk_{it}$, where Dk_{it} takes a value of 1 for household i in time t that belongs to the k^{th} income group and is 0 otherwise. The coefficient of $Recession_t$ captures the impact of the recession on wage earnings for the lowest income group, while the coefficient of each interaction term, $Recession_t \times Dk_{it}$, captures the impact for the k^{th} income group where $k = 2, 3, 4, 5$.

Estimation results in Table 6 show that when an OLS regression with reported initial income and a 2SLS approach with predicted income were used, one year intragenerational income elasticity was 0.523 and 0.484, respectively. Moreover, it indicates that negative macro shocks decreased income, but the negative shock became obscure for upper income groups. The former result that applies to the lowest income group was represented by statistically significant negative coefficients of $Recession_t$, -1.435 and -1.970, in the OLS and the 2SLS results. However, the statistically non-zero coefficients of the interaction terms, 0.887, 1.466, 1.880 and 1.206 in the OLS results or 1.184, 2.037, 2.681, and 3.182 in the 2SLS results, were added, respectively, to the negative coefficients of $Recession_t$, -1.441 or -1.970, for the upper income groups. Then the negative impacts of the recession became smaller. The impact of the recession even became positive for the upper two income groups. A series of nexuses between household income and social-economic conditions of the household head were found. First, a statistically positive coefficient of Job_t indicated that household income increased when the household head had a job. Second, a change in the head's gender from male to female also decreased household income (see the coefficient of HH_M2F_t , -0.165 or -0.255). Third, any type of broken family characteristics such as single, divorced, or married-single tended to decrease income. This result was shown by the statistically significant negative coefficients of corresponding variables. Fourth, household income decreased when the head became sick, and this result was supported by a negative coefficient of $Illness_{it1}$.

Table 6. Estimated annual income elasticity and probability to fall into poverty

¹⁰ Statistics Korea provides a monthly dummy variable that, based on the business cycle, takes a value of 1 for contraction periods and 0 for expansion periods. Therefore, we constructed a variable, *Recession*, by taking the average and converting it to yearly data, in order to match it with the annual data of the KLIPS.

Dependent variable /Estimation Method	Log-linear model		Probit	
	$y_{ti}(\text{OLS})$	$y_{ti}(\text{2SLS})$	$P(D1_{it} = 1)$	dF/dx
Intercept	-31.353*** (1.663)	-82.94*** (1.973)	11.346 (7.284)	
y_{0i}	0.523*** (0.004)			
$\hat{y}_{0i}$		0.484*** (0.014)		
$Female_i$	-0.002 (0.011)	0.116 (0.014)	0.014*** (0.004)	0.023*** (0.006)
HH_M2F_i	-0.165*** (0.034)	-0.255*** (0.041)	0.008 (0.008)	0.064*** (0.018)
AGE_i	0.010*** (0.002)	-0.005** (0.002)	-0.005 (0.001)	0.001 (0.001)
AGE_i^2	-0.0004*** (0.00002)	-0.0000 (0.00002)	0.0001*** (5.6e-6)	0.00002*** (6.7e-6)
Job_i	0.085*** (0.008)	0.119*** (0.009)	-0.030*** (0.003)	-0.071*** (0.004)
$Illness_{i1}$	-0.061*** (0.009)	-0.151*** (0.011)	0.026*** (0.005)	0.014*** (0.004)
$Single_i$	-0.151*** (0.012)	-0.296*** (0.015)	0.036*** (0.007)	0.091*** (0.012)
$Divorced_i$	-0.200*** (0.012)	-0.402*** (0.015)	0.034*** (0.006)	0.056*** (0.008)
$Widow(er)_i$	-0.086*** (0.014)	-0.187*** (0.016)	0.034 (0.008)	0.003 (0.005)
$Trend_t$	0.017*** (0.001)	0.044*** (0.001)	-0.001* (0.0002)	-0.001* (0.0004)
$Recession_t$	-1.435*** (0.022)	-1.970*** (0.026)	0.0007 (0.002)	0.002 (0.003)
$Recession_t \times D2_{it}$	0.887*** (0.026)	1.184*** (0.031)		
$Recession_t \times D3_{it}$	1.466*** (0.023)	2.037*** (0.027)		
$Recession_t \times D4_{it}$	1.880*** (0.026)	2.681*** (0.027)		
$Recession_t \times D5_{it}$	2.206*** (0.029)	3.182*** (0.033)		
$D1_{it-1}[\text{lowest}]$			1.585*** (0.028)	0.374*** (0.010)
N of obs.	27889	28578	30391	
R^2	0.6614	0.5089	0.4382	

Note: Standard errors are shown in parentheses and *, **, and *** represent statistical significant levels of 0.1, 0.05, and 0.001, respectively.

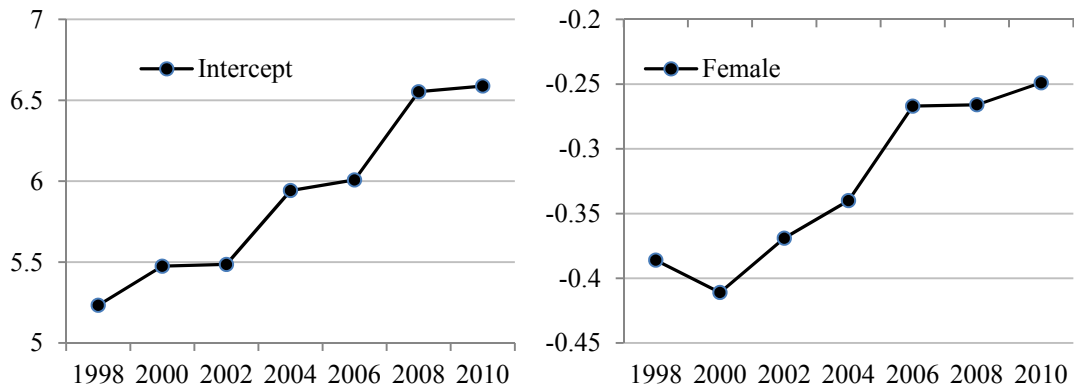
4.3. Inequality of Opportunity, Importance of Early Stage Factors and Endowment

In the 2SLS analysis, we used predicted household wage earnings in place of initial reported wage earnings. As described above, 1st-stage explanatory variables included early-stage factors or conditions, which were mostly determined before people entered the labor market. As in Gottshalk and Moffitt (2008), age, gender,

and education were included in the early-stage factors. In addition, we included the household head's homeownership in 1998, and education of head's father into the early stage factors to evaluate the impact of endowment or family background.¹¹ Using these explanatory variables, we estimated the household wage earnings from 1998 to 2010 and summarized the estimation result in Figure 5 and Appendix Table 1.¹²

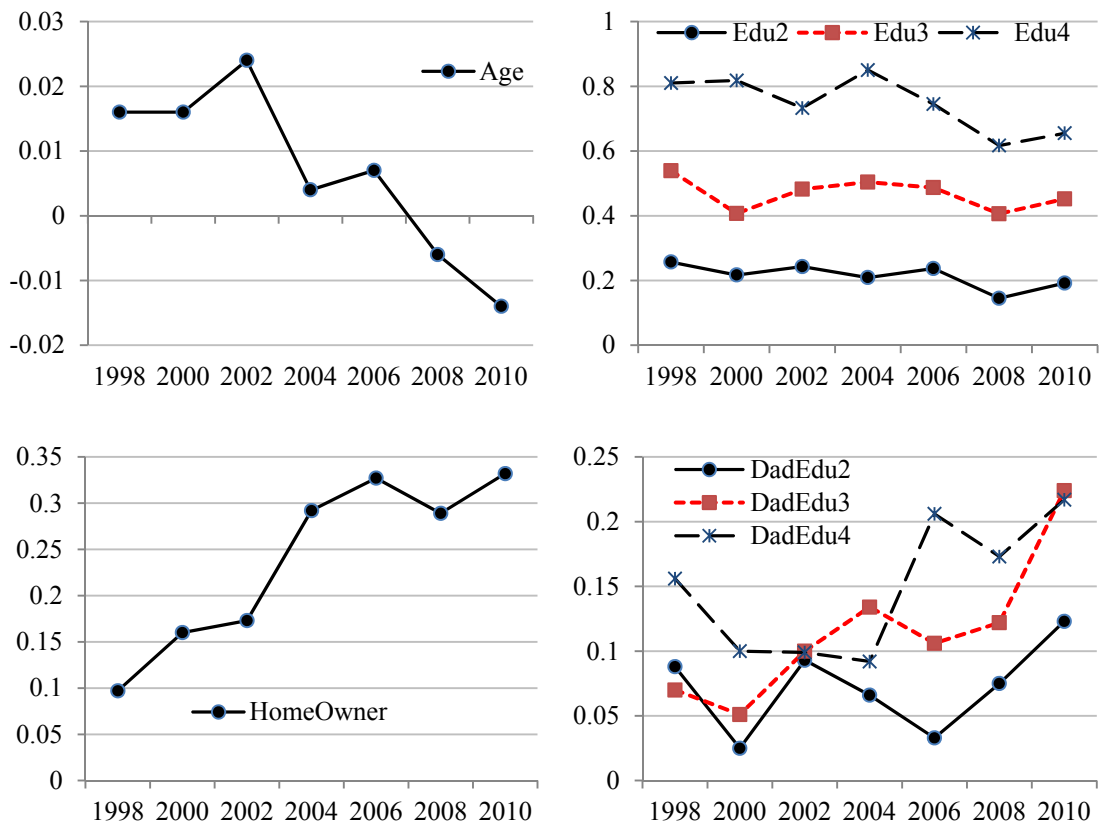
We found that all of the explanatory variables were statistically significant (negative for $Female_i$ and AGE_i^2 , and positive for the others), which means that they were influential in determining income every year. However, time-trends for this influence differ across variables, which is easy to compare in Figure 5. For $Female_i$ and three education dummies, parameter estimates were statistically non-zero but their absolute values decreased over time, which implies that income disparity based on these early stage factors decreased over time. This is consistent with Gottshalk and Moffitt (2008). On the other hand, the importance of endowment variables (father's education and the head's home-ownership, as proxies for the head's family background and parents' wealth level) show an upward tendency. This makes the household income ranking be more persistent over time.

Figure 5. The trends of the impacts of the determinants of the household wage earnings



¹¹ The Price to Income Ratio (PIR) is the ratio of median house price to median family disposable incomes (annual income). The higher the PIR is, the longer it takes to own a house. According to the Bank of Korea, as of the 1st quarter of year 2014, the PIR for Seoul, capital of Korea, is 13.45 and the PIR for Busan, second largest city of Korea is 17.02. These numbers are higher than 7.89 for Tokyo and 7.85 for New York City. Korea has experienced a dramatic price upheaval especially from 2001 to early 2007. In Korea's housing market situation, whether or not own a house is highly likely to be dependent on the financial assistance of parents.

¹² In Figure 5, the impact of age was evaluated as a sum of the parameter estimate for AGE_i and twice the parameter estimate for AGE_i^2 multiplied by the average age, 35, $\hat{\beta}_{Age} + 2\hat{\beta}_{Age^2} \cdot 35$.



4.4. Profile and Determinants of the Poorest Income Rank

A probit analysis was added to address the existence of a relative poverty trap. The dependent variable of the probit was $D1_{it}$, which takes a value of 1 if household i belongs to the lowest (bottom) income group in year t and is 0 otherwise. Therefore, we expected that the sign of the estimated coefficients from the probit analysis was going to be opposite to that from the OLS and 2SLS. As summarized in the third (estimated parameters and their standard errors) and fourth columns (marginal effects) of Table 6, we obtained the expected outcomes. The chance to be in the poorest group increased when the household head's condition fell into one or more of the following categories: sick, young, not in a couple-marital status, and/or female. It is worth emphasizing that being in the poorest income group considerably increased the probability of falling into the poorest income group again in the next year by 37.46 percentage points at the mean.

4.4. Limited Income Mobility

We examined the existence of income convergence. The procedure of examination is as follows: we dropped observations categorized in the k th income group; the OLS analysis was performed and income elasticity was measured; if the magnitude of income elasticity without the k th income group ($\hat{\rho}_{-k}$) was lower than $\hat{\rho}$, we interpreted it as a relatively large income elasticity for the k th income group ($\hat{\rho}_k > \hat{\rho} = 0.348$); and it also meant that income mobility would be smaller for the k th income group than others.

Table 7 summarizes the estimation results. F statistics (or Chow test) results, shown at the bottom of Table 7 demonstrate that the pattern of income dynamics without the k th income group could be different from for all households. Compared to $\hat{\rho}$, estimated income elasticity was low for the lowest and the highest extreme groups, which implies that income mobility was limited for the households in those extreme income groups, and the pattern of earnings change was mostly non-convergent. This is different from Fields and Puerta (2010). Using the micro panel from 1996 to 2003, they found that generally it was the lowest initial earners who experienced the largest earnings gain and supported convergent income mobility in Argentina.

Table 7. OLS Estimation Results without the k th Income Group Households

	Total	Exclude the corresponding income group.				
		$k = 1$ [Lowest]	$k = 2$ [2 nd Lowest]	$k = 3$ [Middle]	$k = 4$ [2 nd Highest]	$k = 5$ [Highest]
Intercept	5.621*** (0.365)	6.584*** (0.306)	5.016*** (0.384)	5.915*** (0.621)	5.678*** (0.414)	5.975*** (0.371)
$\hat{\rho}_{-k}$	0.348*** (0.031)	0.278*** (0.027)	0.362*** (0.033)	0.453*** (0.053)	0.355*** (0.034)	0.262*** (0.032)
Nobs	1,582	1,450	1,385	797	1,277	1,419
F(k, N1 + N2 - 2k)		91.1***	23.6***	35.8***	26.4***	28.2***

Note: Standard errors are shown in parentheses and *, **, and *** represent statistical significant levels of 0.1, 0.05, and 0.001, respectively.

4.5. Senior Poverty

As mentioned earlier, the average age was considerably high for the lowest and the 2nd lowest income groups (see Table 2). The estimation outcome also indicated that the income growth rate was negatively correlated with the household head's age, and that the chance of falling into the lowest income group, a relative poverty line, increased with age. To confirm the existence of elderly poverty, we divided households into three groups by their head's age in 1998 and estimated income elasticity. As summarized in Table 8, average wage earnings were considerably low for senior households and the estimated ρ was large for age groups: junior

households whose head was younger than 30 and senior households whose head was sixty years old or older. This result draws concerns on senior poverty since senior households' average income was less than a half of the active age (between 30 and 45) group's average income and their income mobility was considerably limited, which was indicated by a large income elasticity ($\hat{\rho}_{AgeGroup}=0.435$).

Given that the aging of the nation's population is the fastest in the world, this finding raises concerns about senior poverty. In terms of the poverty rate among senior citizens, Korea was ranked as the worst case among the OECD countries. In 2011, the proportion of citizens aged 65 and above living with less than 50% of median household income reached 45.1%, compared to the OECD average of 13.5% (Korea Times).¹³

Table 8. OLS Estimation Results by 3 Age Groups

	Total	<i>Age</i> < 30	30 ≤ <i>Age</i> < 45	45 ≤ <i>Age</i> < 60	<i>Age</i> ≥ 60
<i>Summary statistics</i>					
<i>HYWage</i> ₁₉₉₈	1,792.4 (1495.3)	1,355.5 (1314.5)	2,046.7 (1361.4)	2,043.7 (1556.8)	998.88 (1357.0)
<i>HYWage</i> ₂₀₁₀	3,095.9 (2108.4)	3,235.9 (1734.6)	3,523.3 (2194.7)	2,811.6 (2160.5)	1,651.99 (1680.7)
<i>Estimation Outcomes</i>					
Intercept	5.621*** (0.365)	5.898 (8.127)	3.485** (1.768)	-5.190 (4.928)	-0.096 (13.776)
$\hat{\rho}_{AgeGroup}$	0.348*** (0.031)	0.413*** (0.147)	0.346*** (0.037)	0.303*** (0.051)	0.435*** (0.118)
Nobs	1,582	59	744	624	155
<i>F statistics</i>	76.25***	2.31**	37.16***	20.97***	4.49***

Note: Standard errors are shown in parentheses and *, **, and *** represent statistical significant levels of 0.1, 0.05, and 0.001, respectively.

5. Conclusions

Income inequality in Korea, which had worsened following the financial crisis of the late 1990s, seemed to have improved as the economy started to recover, until the early 2000s. However, starting in the mid-2000s, it was aggravated again and remained stubbornly high as the economy continued a slow growth pattern.

In this paper, we investigated Korea's income mobility by applying both the transition matrix method and the regression approach to the KLIP's panel data. The transition matrices showed that the persistence of income in the lowest and highest income groups was greater than for the rest of groups. In addition, a poverty trap

¹³ Source: Elderly poverty (http://www.koreatimes.co.kr/www/news/opinion/2013/07/202_131283.html).

became exacerbated, in which poor people found it more difficult to escape from poverty than before the mid-2000s. In the regression analysis, we found that age, gender, health conditions, employment status (whether the head of a family had a job or not), previous income group, and marital status affect the income distribution. The regression results confirm high income elasticity and hence low income mobility for the poorest and the richest income group. In addition, reported wage earnings and estimated income elasticity by age groups showed that senior citizens were suffered from worsening poverty. In the first stage of the 2SLS regression, we also found that early stage factors largely influenced wage earnings and the impact of initial endowment increased over time. Moreover, a macro economic shock was found to have heterogeneous impacts across income groups. The incomes of the low-income class and non-regular employees were highly vulnerable to a negative macro-economic shock.

These results provide some policy implications. In order to mitigate the recent phenomenon of poverty fixation and strengthen social cohesion, some social nets or risk-hedging measures at an individual level, which could prevent people from falling into poverty due to disease or the death of spouse or aging, are needed. Moreover, there should be a policy that secures the income of the vulnerable whose income and social status are severely damaged, particularly a recession. In addition, promoting equal opportunity cannot be understated in that it mitigates the impact of the early stage factors and initial endowment on wage earnings.

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Appendix

Table 1. Estimation Results of Predicting Household Wage Earnings

	1998	2000	2002	2004	2006	2008	2010
intercept	5.233***	5.475***	5.486***	5.942***	6.008***	6.553***	6.588***
<i>Female_i</i>	-0.386***	-0.411***	-0.369***	-0.340***	-0.267***	-0.266***	-0.249***
<i>AGE_i</i>	0.086***	0.086***	0.094***	0.074***	0.077***	0.064***	0.056***
<i>AGE_i²</i>	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
<i>Edu2_i</i>	0.257***	0.217***	0.243***	0.209***	0.237***	0.145***	0.192***
<i>Edu3_i</i>	0.539***	0.407***	0.482***	0.504***	0.487***	0.406***	0.452***
<i>Edu4_i</i>	0.810***	0.818***	0.733***	0.850***	0.745***	0.617***	0.655***
<i>HomeOwner_{i98}</i>	0.097***	0.160***	0.173***	0.292***	0.327***	0.289***	0.332***
<i>DadEdu2_i</i>	0.088***	0.025	0.093***	0.066**	0.033	0.075***	0.123***
<i>DadEdu3_i</i>	0.070 *	0.051	0.100 **	0.134 *	0.106 **	0.122 **	0.224 ***
<i>DadEdu4_i</i>	0.156***	0.100*	0.099*	0.092	0.206***	0.173***	0.217***
Nobs	4029	3454	3396	3573	3708	3767	3874
<i>R</i> ²	0.2583	0.2501	0.2647	0.2449	0.2567	0.2586	0.2536

Note: *, **, and *** represent statistical significance levels of 0.1, 0.05, and 0.001, respectively.