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Abstract.

The purpose of this study is to estimate the degree of intergenerational persistence of income in case of Japan, using microdata from the *Japan Household Panel Survey* (JHPS). The analysis applies the two-stage approach by predicting parents' income from their education and occupation. Suggested estimate of the intergenerational elasticity of children's income with respect to parents' income is around 0.3 in the case of sons, and 0.2 in the case of daughters. Focusing on sons in the thirties with the relation to fathers, the elasticity is estimated as 0.32-0.34. The result suggests that intergenerational persistence in Japan is intermediate or moderately low from an international perspective. The analysis also finds that education for children accounts for one third or more of the intergenerational persistence.

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1. Introduction

Japanese society has increasingly paid attention to income inequality in the last two decades when the society face stagnant state of its economic growth. Now that allocation matters for people in a matured economy more than before, while people more or less receive fruits of growth in the period of rapid economic growth. Recent concern of the society also goes toward immobilization of social class that transmits income inequality from parents to children. As a channel of the transmission, financial conditions of parents are likely to affect economic opportunities for children through better education and home environment.

The purpose of this study is to estimate the degree of intergenerational persistence of income in the case of Japan. Recent literature in line of intergenerational mobility has revealed the degree of economic immobilization in various countries. Intergenerational persistence of income is measured by estimating the elasticity of a child's income with respect to its parent's income. The elasticity is considered to take a value between 0 and 1, and higher elasticity is interpreted as higher intergenerational persistence, or lower mobility in terms of income in a society.

International comparisons suggest that the degree of the intergenerational persistence differ across societies (Solon, 2002; Torche, 2015, as surveyed for Western countries). As the seminal studies that address the measurement error problem, Solon (1992) and Zimmerman (1992) report the elasticity of 0.4 to 0.5 for father-son relation in the United States. The estimate indicates that an expected income of a son increases by 4 to 5%, with a 10% increase in his father's income. Similar estimates are reported in the case of Britain (Dearden et al. 1997) and Italy (Mocetti 2007; Piraino 2007). Meanwhile, high-mobility societies with the elasticity in the order of 0.2 include Scandinavian countries (Björklund and Jäntti 1997), Canada (Corak and Heisz 1999), and Australia (Leigh 2007).

Recent research also investigates in non-Western societies. Research on Latin American countries reports considerably high persistence as the elasticity of 0.6 or even higher (Dunn 2007; Nunez and Miranda 2010). In cases of Asia, Korea (Ueda, 2013) and Taiwan (Kahn, 2015; Sun and Ueda, 2015) show intermediate or relatively low persistence, Singapore is similar to the united States (Ng et al., 2009), and China shows relatively high persistence from 0.4 to 0.7 (Gong et al., 2012; Li et al., 2014; Qin et al., 2014). In case of Japan, Ueda (2009) estimates the elasticity of 0.41-0.46 for married sons and 0.3-0.38 for daughters, and Lefranc et al. (2013) estimates 0.35 for both sons and daughters.

It has been recognized that an estimate of the elasticity differs according to data sources, sample selection, ages at the time of income observation, choice of variables, and estimation methods. As reviewed by Torche (2015), the estimates range from 0.3 to 0.6 in the case of the United States as a repeatedly examined society. Accumulation of research is indispensable for the better understanding of the intergenerational persistence in a society.

This study aims to provide further evidence on the intergenerational mobility in Japan, by using the *Japan Household Panel Survey* (JHPS), which is a different household survey from previous studies. The analysis follows the two-stage approach (Björklund and Jäntti, 1997) that uses predicted parent's income from their education and occupation, as many other studies when parent's incomes are not observed. The estimation result suggests the elasticity of around 0.3 in the case of sons, and 0.2 in the case of daughters. The persistence seems to be intermediate or moderately low from an international perspective. Focusing on sons in the thirties with the relation to fathers as a most common case in the relevant literature, the elasticity is estimated as 0.32-0.34.

Some of recent studies have also investigated transmission channels of income inequality through education for children. Previous findings suggest that education explains the elasticity of 0.1, or 30-50% of intergenerational transmission in the USA and the UK (Bowles and Gintis, 2002; Restuccia and Urrutia, 2004; Blanden et al., 2007; Blanden and Wilson, 2014). This analysis also finds that education contributes one third or more of the intergenerational transmission in the case of Japan.

The rest of this paper is structured as follows. Section 2 explains the empirical framework widely used to estimate the intergenerational elasticity. Section 3 describes the data used in the analysis. Section 4 provides the estimation result for sons and daughters, and Section 5 provides sensitivity analysis to confirm the result. Then, Section 6 measures the degree of transmission through education. Section 7 gives concluding remarks.

2. Analysis Framework

Empirical analysis follows the framework widely used in the relevant literature, as in the seminal work by Solon (1992), in estimating the degree of intergenerational mobility. Let y_{0i} denote the lifetime economic status of the parent and y_{1i} that of the child in family i. Suppose that the relation between y_{0i} and y_{1i} is linear as follows:

$$y_{1i} = a_0 + \rho \cdot y_{0i} + \varepsilon_i \qquad (1)$$

where a_0 is a constant, ρ is a coefficient, and ε_i is an unobserved error term. When economic status is measured by the logarithm of income, the coefficient ρ is interpreted as the elasticity of the child's income with respect to its parent's income.

However, lifetime incomes are seldom obtained from household surveys. Instead, short-time economic status (e.g., annual income) may be available as a proxy for lifetime income. Assume that the logarithm of the child's annual income y_{1it} at time t for family i is expressed as

$$y_{1it} = y_{1i} + a_1 A_{1it} + a_2 A_{1it}^{\ 2} + u_{1it} \tag{2}$$

where A_{1it} denotes the age of child i at time t, a_1 and a_2 are coefficients, and u_{1it} denotes other temporal factors. By substituting equation (2) into equation (1), we obtain

$$y_{1it} = a_0 + \rho \cdot y_{0i} + a_1 A_{1it} + a_2 A_{1it}^{\ 2} + \{\varepsilon_i + u_{1it}\} \tag{3}$$

When short-time incomes are observed for both generations, parent's income is also adjusted by parent's age at the time of observation. However, another fairly common limitation is that the parent's income is not observed from a one-time or longitudinal survey with a relatively short history. Therefore, Björklund and Jäntti (1997) propose a two-sample two-stage approach without parent's actual income provided parent's characteristics are observed. At the first stage of the two-stage approach, following income equation is estimated as:

$$y_j = \beta_0 + \beta_1 A_j + \beta_2 A_j^{\ 2} + \delta \cdot q_j + u_j \tag{4}$$

where y_j denotes log earnings; A_j denotes age; β_0, β_1, and β_2 are coefficients; q_j denotes a set of education and occupation; δ is a vector of coefficients; and u_j is the error term for individual *j*. The parent's income is predicted as $\hat{y}_{0i} = \hat{\delta} \cdot q_{0i}$ from the estimated coefficients of $\hat{\delta}$. At the second stage, the elasticity is estimated equation (3) using predicted parent's income.

3. Data

3.1 Data source and income measures

The microdata are obtained from the *Japan Household Panel Survey* (JHPS) 2009-11, conducted by the Keio University Joint Research Center for Panel Studies.[2] JHPS is a longitudinal household survey carried out in every January from 2009. The survey includes 4000 households, with 6000 men and women as respondents and their spouses, covering all areas in Japan.

In the studies of estimating the mobility, it has been widely recognized that ages at the point of observation affects estimates. When children's generation is still in the early twenties, incomes are not fully diversified to reflect life-time economic status. Therefore, majority of previous studies focuses on children in the thirties or even later if possible. The selected sample includes children in the thirties (born in 1970s) and also the forties (born in 1960s) considering that income diversifies rather slower than Western countries in the case of Japan where seniority wage system has been widely practiced.

Regarding income data of the child, two different incomes are obtained. One is annual income from main job ("labor income" henceforth) during the previous year. The first round of JHPS in 2009 asks labor incomes in the last three years. Thus, annual labor incomes are observed from 2006. The other is the "total income" including labor and other incomes. However, the total income is available only from 2008.[3]

Table 1 reports sample characteristics of incomes. Labor income is an average of 5 years during 2006-10, and total income is an average of 3 years during 2008-10. Ages are reported at the end of the Japanese fiscal year of 2009. Respondents with zero incomes are excluded. Selected sample includes sons and daughters in their thirties and forties. According to the table, son's personal incomes are about 5 million yen, and couple's incomes are about 6 to 6.5 million yen on average that suggest wife's income is only 1-1.5 million yen on average.

3.2 Prediction of parent's income

The JHPS in 2011 asks parent's information both of the respondent and the spouse, including birth year, education, and occupation of the father and the mother when the

[2] Ueda (2009) uses Japan Panel Survey of Consumers (JPSC) conducted by the Institute for Research on Household Economics. Lefranc et al. (2013) uses Japanese Social Stratification and Mobility Survey (SSM) conducted by the SSM society.

[3] Incomes are not adjusted by price levels, because they look pretty stable from 100.7 in 2006 to 100.0 in 2010.

respondent was around age 15. Job information covers 6 job types and 12 occupations.[4] Job type is classified into: employed, independent professional, self-employed, family business, domestic piecework, and independent contract worker. The employed are further classified into public servant and 5 classes of private firm size and, and also 5 employment types including regular, contract, temporary, part-time, and non-regular special-duties employment.

Parent's income equation is estimated using the sample of initial round of JHPS in 2009, applying these educational levels and occupations for workers. The sample includes men ages 35-59 with 3-year average labor income during 2006-8, or total income in 2008 from the initial round, in order to obtain the largest number of observation. R-squared of income equation estimation ranges 0.40-0.43 for the labor income, and 0.25-0.39 for the total income. Incomes for sons are averaged over 2006-10 for labor income, and 2008-10 for total income. Standard errors at the second stage are adjusted because of using predicted parent's income.

4. Estimation result

4.1 Father-son relation

Throughout the analysis, low-income observations with one million yen or less are excluded, because estimates seem to be sensitive to be low-income outliers. The minimum amount is selected after examining various cut-off points.[5] Excluded observations are less than 2% of the sample.

Table 2 reports selected results of sons in the thirties and forties, with father-son relation. The elasticity is estimated as 0.321 (0.267) with labor (total) income for the whole sample, Using the subsample according to age group, estimates are 0.340 (0.321) for thirties and 0.329 (0.236) for forties with labor (total) income. Estimates are similar between thirties and forties in case of labor income, while estimates look a little higher for sons in the thirties than in the forties in case of total income. Focusing on sons in the thirties as often reported in relevant literature, suggested elasticity is 032 – 0.34.

[4] Regarding occupations, mining workers are included in primary industry workers because of very small number of observations in estimating parent's income.

[5] Annual income of one million yen is almost equivalent to eight thousand US dollars. It is less than an annual income from legal minimum hourly wage of 630 yen in 2009, with a work of 35 hours a week for 48 weeks a year. This level of annual income is subject to income tax exemption, and equivalent to the minimum amount of public assistance when living alone.

4.2 Parents-son relation

In analyzing the father-son relation, the sample includes sons and fathers with observing minimum incomes. However, mother's income is likely to affect family's income status; as in Table 1, average couple's income is around 20% higher than man's income alone. Therefore, the analysis also considers predicted income for parents. Income equation (4) is estimated using men's and also women's characteristics as explanatory variables, and total income in case of couple and individual income for singles as the dependent variable. It should be noted that JHPS includes education and 6 job types, but not other detailed job characteristics for the mother. Moreover, women in Japan might not continuously work during the course of the motherhood. Irrespective of these limitations, R-squared of estimating income equation for the parents reaches 0.56.

Table 3 reports an estimation result for parents-son relation. The elasticity is estimated as 0.336 (0.226) using the labor (total) income for sons in the thirties, and around 0.2 including sons in the forties.

The table also reports intergenerational relation using couple's income for sons. In this case, the sample includes only married sons. The elasticity is estimated around 0.2 for sons in the thirties. The elasticity looks similar between son's income and couple's income in case of the total income, while it is estimated lower with couple's income than with son's income alone in case of the labor income.

4.3 Parents-daughter relation

The elasticity for the daughter is first estimated by Chadwick and Solon (2002) in the case of the United States. They investigate the relation in family income between the daughter and the parents, because income earned by women may not necessarily represent their economic statuses.

In the case of Japan, income earned by the daughter is likely to change over time during the course of life stage; women in Japan often live with parents before marriages, quit full-time work across childbirth, and return to job market after several years gap as low-paid part-time workers. In the analysis, I focus on couple's income for married women with the relation to their parents.[6]

Table 4 reports estimates using family income for married women and their parents.

[6] Income for daughters herself has been also examined, but number of observations with positive incomes decrease as ages go up, and estimates do not seem to be robust depending on the choice of minimum income.

The elasticity is estimated as slightly more than 0.2 using the labor income, and less than 0.2 using the total income. However, the estimate for the daughter seems to look alike to parent-married son relation in Table 3. The result might be interpreted that the degree of mobility might be similar between sons and daughters.

5. Sensitivity analysis

5.1 Alternative estimate using father's income from national surveys

One possible shortcoming of the estimation is to predict parental income using income data for son's generation at the first stage. Age differences between fathers and children are 30 years on average in the sample. Children ages 30-49 in 2009 are born in the 1960s and 70s, and thus, fathers are likely to be born in the 1930s and 40s, and age 40 in the 1970s and 1980s.

Therefore, as an alternative estimate, father's incomes are predicted using national surveys in their working days. The analysis refers *Basic survey on wage structure* that annually offers average wages by education, age group, firm size, and management classification for the regularly employed in private companies. In order for estimating other job types such as non-regular-employed, self-employed, or employed in the public sector, the analysis refers *Employment status survey* conducted by every 5 years.

Because of the availability of the latter survey, the analysis applies average incomes in 1987 and 1982. In the 2009 survey round, an average age of the father is 62 for the son ages from 30 to 34. Assuming an average of 30-year age difference for the father-son relation, father's ages are from 38 (33) to 58 (53) in 1987 (1982) for sons in the thirties in 2009. A shortcoming of this estimation is that job classifications are not exactly matched between the microdata and national surveys, as detailed described in Appendix.

Table 5 reports representative cases with using 5-year averaged labor income for the son. The minimum income is set to be 1 million yen both for the father and the son for a comparison purpose; thus, observations with a father not working, working only domestic piece-work, and those without the father are excluded. The estimates range from 0.23 to 0.27, falling in the range of 0.2 to 0.34 in the previous section.

5.2 Labor income and total income

Overall, the estimated elasticity looks to be a little lower with total income than those

with labor income. If this is the case, additional children's income such as financial income plays a role to compensate the intergenerational transmission of income inequality. However, labor incomes are measured as a 5-year average in 2006-10, while total incomes are 3-year average in 2008-10, and thus two samples are not entirely the same.

Table 6 employs the 3-year average on labor income, and applies a common sample between two types of income. The result suggests that the elasticity is similar or slightly higher using the total income, suggesting that additional incomes such as financial or second-job incomes are likely to increase the degree of persistence.

5.3 Marital status

In the previous work, the sample includes only marries sons in Ueda (2009) due to data limitation. Table 7 reports estimates using subsamples consisting of married sons with the relation to the father. The estimates look slightly higher for married sons than those using all sons in the thirties, but not in the forties. Using the labor income in the thirties, the elasticity is estimated as 0.386 (0.340) for married (all) sons. The sample restriction with married sons in Ueda (2009) might lead an estimate upper biased slightly.

5.4 Discussion in comparison to previous studies

Overall, estimates range in the order of 0.2 to the lower half of the order 0.3. Focusing on father-son relation with sons in the thirties, the elasticity is estimated as 0.32 to 0.34. The elasticity of around 0.2 for daughters looks to be a little low, but might be comparable to sons in parents-couple relation. These estimates look mostly similar to, albeit slightly lower than, those in previous studies.[7] In an international comparison, intergenerational persistence in Japan is at least intermediate or moderately low.

6. The role of education through transmission

Investment in education has been most frequently mentioned as a channel of intergenerational transmission of economics status. It is possible that high-income parents are able to provide better educational opportunities to their children, and thus,

[7] Previous literature has tried to apply additional estimation technique such as nonlinear estimation, or quantile regression. The analysis focuses on linear regression to obtain average elasticity, due to limitation of data and robustness in results.

children are likely to attain higher incomes. Some studies investigate what mediate the intergenerational transmission, and find that, education explains the elasticity of 0.1, or 30-50% of the intergenerational transmission in cases of the US and the UK (Bowles and Gintis, 2002; Restuccia and Urrutia, 2004; Blanden et al., 2007; and Blanden and Wilson, 2014).

The analysis follow Blanden and Wilson (2014) to estimate to what degree education contributes to the intergenerational transmission in the case of Japan. The estimation equation (3) is written as

$$y_{1it} = a_0 + \tilde{\rho} \cdot \hat{y}_{0i} + a_1 A_{1it} + a_2 A_{1it}^{\ 2} + \gamma \cdot educ_{1i} + \{\varepsilon_i + u_{1it}\} \tag{5}$$

where $educ_{1i}$ indicates education for the child, and γ is a coefficient. Then, $1-(\tilde{\rho}/\rho)$ is attributed to the transfer attributed to education. In the estimation, dummy variables of educational level are introduced for high school, junior college, university, and graduate school as referenced to middle school.

Table 8 reports transition of education for father-son pairs. Percentages indicate the distribution of son's educational levels, conditioned on father's educational level. Sons are better educated than fathers on average. Tertiary educated fathers are below 20%, while more than half of sons are tertiary educated. From the table, positive intergenerational relation in education is clearly observed. Nearly 80% of sons are university educated when fathers are university educated, while more than 60% of sons are only high school educated when fathers are junior high school educated.

Table 9 reports the decomposition result using educational level for the son-father relation. The intergenerational elasticity is considerably reduced with introducing son's education in the estimation. The result suggests that education mediates 32-41% of the transmission in the thirties and forties, similar to previous studies in Western countries. In case of Japan, it is noted that the degree of mediation through education decrease in the forties; an effect of education is 37% (23%) in the thirties (forties) using labor income, and 49% (29%) in the thirties (forties) using total income. The reason of the difference might be sought to the difference in generation, and also the reduction of importance in education in higher ages.

7. Concluding remarks

The analysis using the JHPS suggests that the degree of intergenerational persistence of economic status, namely income, seems to be intermediate or moderately low from an

international perspective. Overall, the intergenerational elasticity of income seems to be around 0.3 in case of sons, and 0.32-0.34 for the relation of father and sons in the thirties. Relation in parents and daughter's couple is similar to that of sons. The result is similar to previous studies using different surveys. The analysis also estimates that education contributes one third or more of the intergenerational transmission, as similar to the studies in Western countries.

A concern is noted that estimated elasticity seems to be higher for sons in the thirties than those in the forties in general. The result might suggest the possibility that intergenerational persistence becomes increasing for younger generation in Japan. Recent cross-country studies suggest that high intergenerational income persistence is related to low governmental spending on education, high income inequality, and high premium on tertiary education (Blanden, 2013; Corak, 2013). The accumulation of the research is required to show the mechanism of transmission that contributes to provide policy implecations for disadvantageous children.

Appendix: Details in prediction of father's income using national surveys

Basic survey on wage structure 1987, 1982 (the ministry of health, labour and welfare, the government of Japan)

Annual incomes are calculated from monthly salary and annual bonus, according to educational levels, managers or not, and firm sizes for age group of 35-49, for regular male employees in private sectors. Firm size is considered because incomes are considerably varied according to firm size in Japan.

	JHPS microdata	*Basic survey on wage structure*
Education	Middle school Senior high school or professional school Technical or junior college University or graduate school	Middle school Senior high school Technical or junior college University
Occupation	Manager All other occupations	Section manager Non-manager
Firm size (Number of employees)	1-4 5-29 30-99	(1-9)* (10-29)* (30-99)*

	100-499 500 or more Public sector	100-499 Weighted average of 500-999 and 1000 or more (Public sector)*

Notes: Classification of firm size varies across surveys, and incomes are not always available in detail for small size firms. Therefore, in estimating predicted income of firm sizes as well as public servants in parentheses with *, average incomes according to education and occupation for the size of 100-499 are used by reducing with an income ratio compared to firms with 1000 employees or more referring to *Employment status survey*.

Employment status survey 1987, 1982 (Statistical bureau, the ministry of internal affairs and communications, the government of Japan)

Incomes are surveyed and reported according to income group. Therefore, average incomes are predicted as a weighted average of middle value in each income group and number of workers according to classified firm size and public servants, type of employment such as regularly employed, part-time workers, and contract workers. Regarding regularly employed, income ratio across firm size alone is referred to estimate small firms and public servants using *Basic survey on wage structure* as described above. Regarding self-employed, incomes according to occupation are predicted using average income by industry in the survey such as; agriculture and mining, sales, services and related industry, transportation and communication, manufacturing and construction, and security and others. Incomes for family workers and independent professionals of the JHPS are treated as self-employed.

References

Björklund, Anders, and Markus Jäntti (1997) "Intergenerational Income Mobility in Sweden Compared to the United States," *American Economic Review* 87-5, 1009-1018.

Blanden, Jo (2013) "Cross-country rankings in integenerational mobility: A comparison of approaches from economics and sociology," *Journal of Economic Surveys* 27-1, 38-73 [doi: 10.1111/j.1467-6419.2011.00690.x].

Blanden, Jo, and Kathryn Wilson (2014) "Intergenerational Mobility in the United State and Great Britain: A Comparative Study of Parent-Child Pathways," *Review of Income and Wealth* 60-3, 425-449 [doi: 10.1111/roiw.12032].

Blanden, Jo, Paul Gregg, and Lindsey Macmillan (2007) “Accounting for Intergenerational Income Persistence: Noncognitive Skills, Ability and Education,” *Economic Journal* 117, C43-C60.

Bowles, S. and Gintis, H. (2002) “The inheritance of inequality,” *Journal of Economic Perspectives*, 16, 3-30.

Chadwick, Laura, and Gary Solon (2002), “Intergenerational Income Mobility among Daughters,” *American Economic Review* 92-1, 335-344.

Corak, Miles (2013) “Income Inequality, Equality of Opportunity, and Intergenerational Mobility,” *Journal of Economic Perspectives* 27-3, 79-102 [doi: 10.1257/jep.27.3.79].

Corak, Miles, and Andrew Heisz (1999) “The Intergenerational Earnings and Income Mobility of Canadian Men: Evidence from Longitudinal Income Tax Data” *Journal of Human Resources* 34-3, 504-533.

Dearden, Lorraine, Stephen Machin, and Howard Reed (1997) “Intergenerational Mobility in Britain” *Economic Journal* 107, 47-66.

Dunn, Christopher (2007) “The Intergenerational Transmission of Lifetime Earnings: Evidence from Brazil” *The B.E. Journal of Economic Analysis & Policy* 7-2, Article 2.

Kan, K.a, I.-H.b Li, and R.-H.c Wang (2015) “Intergenerational income mobility in Taiwan: Evidence from TS2SLS and structural quantile regression,” *B.E. Journal of Economic Analysis and Policy* 15-1, 257-284

Lefranc, Arnaud, Fumiaki Ojima, and Takashi Yoshida (2014) “Intergenerational earnings mobility in Japan among sons and daughters: levels and trends,” *Journal of Population Economics* 27-1, 91-134 [DOI 10.1007/s00148-012-0464-2].

Leigh, Andrew (2007) “Intergenerational Mobility in Australia” *The B.E. Journal of Economic Analysis & Policy* 7-2, Article 6.

Li, Z.a , L.b Liu, and M.a Wang (2014) “Intergenerational income mobility and public education spending: Evidence from China,” *Children and Youth Services Review* 40, 89-97

Mocetti, Sauro (2007) “Intergenerational Earnings Mobility in Italy” *The B.E. Journal of Economic Analysis & Policy* 7-2, Article 5.

Nunez, Javier, and Leslie Miranda (2010) “Intergenerational Income Mobility in a Less-Developed, High-Inequality Context: The Case of Chile” *The B.E. Journal of Economic Analysis & Policy* 10-1, preceding p.1-15.

Piraino, Pastrizio (2007) “Comparable Estimates of Intergenerational Income Mobility in Italy” *The B.E. Journal of Economic Analysis & Policy* 7-2, Article 1.

Qin, Xuezheng, Tianyu Wang, and Castiel Cehn Zhuang (2014), “Intergenerational Transfer of Human Capital and its Impact on Income Mobility: Evidence from China,” *China Economic Review* in press

Restuccia, D. and Urrutia, C. (2004) Intergenerational persistence of earnings: the role of early and college education, *American Economic Review*, 94, 1354-1378.

Solon, Gary (2002) “Cross-Country Differences in Intergenerational Earnings Mobility” *Journal of Economic Perspectives* 16-3, 59-66.

Solon, Gary (1992), “Intergenerational Income Mobility in the United States,” *American Economic Review* 82-3, 393-408.

Sun, Fengye and Atsuko Ueda (2015) “Intergenerational Earnings Mobility in Taiwan,” *Economics Bulletin* 35-1, 187-197.

Torche, Florencia (2015) “Analyses of Intergenerational Mobility: An Interdisciplinary Review,” *Annals of the American Academy of Political and Social Science* 657-1, 37-62.

Ueda, Atsuko (2013) “Intergenerational Mobility of Earnings in South Korea,” *Journal of Asian Economics* 27, 33-41.

Ueda, Atsuko (2009), “Intergenerational Mobility of Earnings and Income in Japan,” *B.E. Journal of Economic Analysis & Policy* 9-1, Article 54.

Zimmerman, David (1992), “Regression toward Mediocrity in Economic Stature,” *American Economic Review* 82-3, 409-429.

Table 1: Sample characteristics

Child's income	Income type	Year	Mean	(S.D.)	Minimum	Maximum	N
Son	Labor income	2006-10	524.5	(255.9)	16.0	3143.6	659
	Total income	2008-10	505.7	(248.3)	4.0	3045.3	764
Son's couple	Labor income	2006-10	653.3	(295.4)	62.0	3275.6	536
	Total income	2008-10	642.0	(291.9)	4.0	3046.0	678
Daughter's couple	Labor income	2006-10	618.3	(298.3)	0.6	3275.6	670
	Total income	2008-10	614.6	(307.1)	2.7	2166.7	869
Notes: Income is in ten thousand yen. Ages of children are 30-49. "N" indicates sample size.							

Table 2: Estimated elasticity for father-son relation by age group

Income	Age 30-49			Age 30-39			Age 40-49		
	Estimate (st.err.)		N	Estimate (st.err.)		N	Estimate (st.err.)		N
Labor income	0.321	(0.057)	648	0.340	(0.078)	302	0.329	(0.078)	346
Total income	0.267	(0.061)	746	0.321	(0.088)	352	0.236	(0.082)	394
Note: "N" indicates sample size.									

Table 3: Estimated elasticity for parents-son relation

Son's income		Age 30-49			Age 30-39		
		Estimate (st.err.)		N	Estimate (st.err.)		N
Son	Labor income	0.247	(0.050)	672	0.336	(0.073)	307
	Total income	0.151	(0.053)	774	0.226	(0.082)	359
Son's	Labor income	0.194	(0.053)	533	0.202	(0.087)	233
couple	Total income	0.122	(0.056)	673	0.210	(0.091)	298
Note: "N" indicates sample size.							

Table 4: Estimated elasticity for parents-daughter relation

Daughter couple's income	Age 30-49			Age 30-39		
	Estimate (st.err.)		N	Estimate (st.err.)		N
Labor income	0.232	(0.060)	656	0.223	(0.087)	307
Total income	0.199	(0.066)	854	0.146	(0.094)	403
Note: "N" indicates sample size.						

Table 5: Father-son relation using national surveys for father's income

Father		Son's	Estimate (st.err.)		Sample
Income	Age	age			size
1987	30-49	30-49	0.231	(0.049)	674
1987	40-44	30-49	0.231	(0.049)	674
1982	30-49	30-49	0.244	(0.052)	674
1987	30-49	30-39	0.268	(0.078)	324
1982	30-49	40-49	0.233	(0.075)	357
Notes: Son's incomes are more than one million yen.					

Table 6: Father-son relation using a common sample

Son's income	Age 30-49			Age 30-39		
	Estimate (st.err.)		N	Estimate (st.err.)		N
Labor income	0.304	(0.059)	648	0.286	(0.083)	304
Total income	0.312	(0.061)	648	0.359	(0.083)	304
Note: "N" indicates sample size.						

Table 7: Estimated elasticity for married sons

Son's income	Age 30-49			Age 30-39		
	Estimate (st.err.)		N	Estimate (st.err.)		N
Labor income	0.312	(0.058)	561	0.386	(0.082)	251
Total income	0.259	(0.062)	646	0.353	(0.094)	289
Note: Incomes are more than one million yen. "N" indicates sample size.						

Table 8: Transition of education for father-son pairs

		Son's education					
Father's education		Junior high school	Senior high school	Junior college	University	Graduate school	Total
		(1.7%)	(42.0%)	(10.5%)	(41.6%)	(4.3%)	
Junior high school	(33.8%)	2.9%	58.2%	9.0%	26.6%	3.3%	100.0%
Senior high school	(47.0%)	1.5%	41.9%	12.1%	41.3%	3.2%	100.0%
Junior college	(1.9%)	0.0%	42.9%	0.0%	50.0%	7.1%	100.0%
University and more	(17.3%)	0.0%	10.4%	10.4%	70.4%	8.8%	100.0%
Notes: Senior high scool includes vocational school. Junior college includes technical college.							
Marginal distributions are in parentheses. Sample size is 722.							

Table 9: Transmission through education

		Estimate on father's income				Effect of	Sampe
	age	Without education		With education		Education	size
Labor	30-49	0.321	(0.057)	0.218	(0.056)	67.8%	648
income	30-39	0.340	(0.078)	0.214	(0.079)	62.9%	302
	40-49	0.329	(0.078)	0.253	(0.078)	76.8%	346
Total	30-49	0.267	(0.061)	0.157	(0.059)	58.9%	746
income	30-39	0.321	(0.088)	0.163	(0.088)	50.8%	352
	40-49	0.236	(0.082)	0.167	(0.081)	70.6%	394
Note: Standard errors are in parentheses.							