

## Intergenerational Mobility as a Determinant of Socio-economic Status: A Theoretical Discussion

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**Abstract:** *Intergenerational mobility describes how the socio-economic status of a child is influenced by his/her parent's status. Having equal abilities children from different families don't have the equal options in leading their lives. This paper articulates two estimating model namely, OLS and Quintile Regression and interestingly neither of these models is exempted from biases. The unavailability of data from two separate generations lead to measurement error and life-cycle bias. These problems can be address by considering measurement error model and taking control of parent's and child's age (in homogeneous sample). Meanwhile, the result also suffers from sample selection problem because in most of the cases the represented samples that characterize the children's and parents' statuses are not random. To mitigate the problem of sample selection a combination of Heckman-type correction method and weighted least squares is used as it produces better result(s). This paper is not a primary works rather the whole discussion is based on secondary evidences.*

### Introduction

The economic status of a person is supposed to be strongly related with his/her family background. The socio-economic statuses are usually transmitted from one generation to another. The family under poverty level has nothing to invest for its offspring as is also true for even a middle income family. So it can be argued that the intergenerational mobility over the years plays a dominant role to depict the status of the next generation. The important reason is that different families have different wealth endowments which create unequal opportunities. Reasonable number of models have been developed to explain this relationship between parent's and children's status such as income, earnings, social class, occupational prestige scores or occupational classes (Ermisch and Francesconi, 2002; Nicoletti, 2008).

In a rough terminology it is not difficult to define intergenerational mobility. It is nothing but the difference between children's positions in their generation's distribution of economic status and what their parents did in their generation's distribution (Dearden, et al., 1997). If the correlation is high then it implies that people who are born in disadvantaged families have a smaller chance to possess high socio-economic positions than people born in privileged families. On the other hand, zero (or low) correlation implies more equal opportunities (Ermisch and Nicoletti, 2005; Björklund and Jäntti, (2000)).

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This is a literature review and thus the paper attempts to deal with secondary evidences. I paid attention particularly on modeling the equation, measurement error, life cycle bias, sample selection problems and how to solve those problems. The required data in such a study should be generated from the Panel Survey of different waves (longitudinal data), for example, in Bangladesh it is the Household Income and Expenditure Survey (HIES) and in UK it is British Household Panel Survey (BHPS). This paper is expected to provide some valuable information for the researchers to conduct further research and help the policy makers to set the strategies in terms of improving the socio-economic indicators of the country.

The paper proceeds as follows: in Section one there is an introductory discussion which also covers the background of literature, Section two develops the methodology of the study and Section three analyzes how the model is considered while Section four critically evaluates the concepts and issues. Section five has the paramount importance because it is perhaps the core section of our discussion. The next section contains the concluding remarks of this paper.

### **Background**

The intergenerational mobility was earlier considered as a matter for sociologists though in the last couple of decades economists have paid interest because one of the significant indicators of social success is income (Mocetti, 2007 and Blanden et al., 2002). Family background and status play a vital role in a person's achievement(s). The degree of intergenerational mobility may vary from family to family but there is an existence of intergenerational mobility. A good number of studies, such as Becker (1981), Becker and Tomes (1979, 1986) and Loury (1981) have been covered by the researcher to illustrate why parent's and children's status are correlated;. It is interesting that all of these above mentioned works found the existence of relationship between the son's or daughter's socio-economic status or other socio-economic measure with his/her parents' (Ermisch and Francesconi, 2002).

One of the major works articulated by Becker and Tomes (1986) which links the distinction of constrained and unconstrained families to the existence of financial assets transfers from parents to children. Other than income if we consider the other socio economic indicators e.g. educational attainment, then the result is also the same for the parents' level of education. There exists a strong association between parental education and the educational outcomes of their children which is positive for all nations across the 20<sup>th</sup> century. It shows a persistent inequality in educational opportunities (Pfeffer, 2007-09).

The measurement needs to be based on the permanent income but due to the unavailability of data it is not possible. The works of Solon (1992) and Zimmerman (1992) are a reassessment of

the degree of intergenerational mobility in the United States and the results show less mobility than previously thought. Solon (1992) in his "Intergenerational Income Mobility in the United States" argued that, "*Previous estimates of intergenerational income mobility have been based on error-ridden data, unrepresentative samples, or both.*"

The findings of different researches focus on the extent of intergenerational mobility which is measured by the estimate  $\beta$  (see Equation no – 01 below). Here, the estimates of some studies are illustrated. The consensus estimate of 0.2 suggested by Becker and Tomes is based upon studies subject to this measurement error bias. Behrman and Taubman (1990), Lillard and Reville (1998), Mulligan (1997) and Solon (1992) made correction of this problem and estimate this about 0.4 to 0.5. It is interesting that Zimmerman (1992) also obtained an estimate of 0.4, while Peters's (1992) estimated result varies between 0.1 and 0.2 using the same data. The difference may be justified by comparing the difference in the survey and the sample sizes because Solon (1992) used 348 father-son pairs from the PSID (Panel Study of Income Dynamics) while Zimmerman (1992) considered 876 from the NLS (National Longitudinal Survey). Atkinson, et al. (1983) provided evidence of about 0.4 to 0.45 based on data from a single British city, Dearden, et al. (1997) offered an estimate of about 0.4 to 0.6 using a more representative sample, Gustafsson (1994) and Björklund and Jäntti (1997) studying Swedish data obtain an estimate of about 0.2 to 0.25 (Corak and Heisz, 1999). There is a list of different results in Appendix-A for readers' information.

Solon (1992) and Zimmerman (1992) results are twice larger than what articulated by Becker and Tomes (1986). A study conducted by Mozumdar (2005) found it even 50% higher than what was found by Solon and Zimmerman (Francesconi and Nicoletti, 2006).

Nevertheless it needs to be mentioned that Behrman and Taubman (1985), Jenkins (1987), Angrist and Krueger (1992), Arellano and Meghir (1992), Björklund (1993), Atkinson et al. (1995), Reville (1995), Couch and Dunn (1997), Fortin and Lefebvre (1998), Solon (1999), Carmichael (2000), Breen and Goldthorpe (2001), Osterbacka (2001), Mayer and Lopoo (2001), Fertig (2001), Chadwick (2002), Chadwick and Solon (2002), Haider and Solon (2005), Grawe (2005), Goldthorpe and Jackson (2007) made significant contributions assessing the intergenerational mobility over time (Blanden et al., 2002; Bratberg, et al., 2003; Ermisch and Nicoletti, 2005 and Grawe, 2006).

### **Methodology**

This paper is completely based on theoretical arguments of different books, journals, websites and writings (published & unpublished) of different authors. Here I tried to illustrate the definition of the technical terms, analyze the findings and comments of scholars. In this paper no data are

used and no testing of hypothesis is considered. So this is just a theoretical elaboration of the arguments on intergenerational mobility. The whole discussion is based on the secondary evidences.

### Measurement of Econometric Model

#### *Model under consideration*

Here, we are using a log-linear regression model where the log of a child's<sup>1</sup> permanent socio-economic status in family  $i$ , denoted by,  $y_i^{child}$  and his/her father's log permanent socio-economic status<sup>2</sup>, denoted by  $x_i^{father}$ . The model can be expressed as:

$$y_i^{child} = \alpha + \beta x_i^{father} + \varepsilon_i \quad \text{[Equation no - 01]}$$

where,  $\beta$  = parameter of interest that denotes the intergenerational elasticity of son's status with respect to father's status

$\alpha$  = intercept term that represents the change in status common to the son's generation, and

$\varepsilon_i$  = random disturbance (Francesconi and Nicoletti, 2006)

Here,  $y_i$  describes the life time measure or the permanent income in logs. The intergenerational mobility actually depends on the value of  $\beta$ . When  $\beta$  is positive children's average log earnings depend on their father's earnings or otherwise speaking the daughters' expected occupational prestige depends on their fathers' occupational prestige. We can characterise the by two extreme cases:

- (i)  $\beta=0$  ensures the complete mobility to the mean and a completely independent distribution of child than that of his/her parents.
- (ii)  $\beta=1$  refers complete immobility, where (abstracting from the random disturbance  $\varepsilon_i$ ) the distribution of child is completely generated by the father's status.  
(Dearden, et al., 1997)

A higher value of  $\beta$  in a lower income family refers a less access to resources whilst growing up or facing credit constraints which may cause stopping them from attending university (Blanden et al., 2002).

### Estimation Method

#### *Ordinary Least Square (OLS) Method*

The OLS method simply estimates the elasticity of son's earnings with respect to that of father's and thus it also calculates the intergenerational correlation between them. It is in fact an easy and

<sup>1</sup> The child can be referred as a son or a daughter and I use the term interchangeably without any gender discrimination.

<sup>2</sup> For simplicity, I assume father's status but it doesn't matter if it refers his/her parent's status.

effective measure to summarize their status by simple statistic. This will produce a consistent estimate when both  $y_i^{child}$  and  $x_i^{father}$  are normally distributed. By definition, the intergenerational elasticity,

$$\beta_{OLS} = \{cov(y_i^{child}, x_i^{father})\} / var(x_i^{father})$$

And similarly, intergenerational correlation,

$$\rho = \{cov(y_i^{child}, x_i^{father})\} / \sqrt{[var(x_i^{father}) var(y_i^{child})]}$$

But keep in mind that we observe only some pairs due to the selection procedure so the data would be censored and consequently the OLS estimate of  $\beta$  (generated from those data) would be inconsistent (Fertig 2001 and Nicoletti, 2008). I will explain this in section four.

### *Quintile Regression*

We can observe a comprehensive picture of child's and father's status by considering quintile regression. Unlike the OLS (the conditionality on mean describing how  $y_i^{child}$  depends on  $x_i^{father}$ ), it shows how  $y_i^{child}$  depends on  $x_i^{father}$  at each specific quintile on the conditional distribution of the children's earnings for each cohort. It allows us to differentiate the mobility levels of different types of children.

If we slightly manipulate the equation no-01 and have a model like  $y_i^{child} = \alpha + \beta_{\theta} x_i^{father} + \varepsilon_i$  then  $\beta_{\theta}$  is the estimated elasticity at the  $\theta^{th}$  quintile of the child's conditional earnings distribution (Fertig, 2001 and Nicoletti, 2008).

## **Concepts and Issues to be considered**

### *Measurement Error in Earnings*

Theoretically, we are interested in considering the intergenerational elasticity in long run permanent earnings but it is not an easy task to get the data. Typically, the permanent incomes for both are generally unobservable whether only a single or a few observations for each generation is available.

So the earnings can be calculated for a single or few specific years. To obtain the estimate of permanent income is one of the major obstacles in estimating Equation no - 01. The bias can be characterized by assuming that the short-run proxy for child's long-run status is his/her measured status in the whole period.

To get rid of this problem John Ermisch and Cheti Nicoletti (2005) suggested the most common approach to assume the following classical measurement error model:

$$w_{it} = w_i + u_{it} \quad \text{[Equation no - 02]}$$

where,

$w_{it}$  = the log earnings for the i-th individual (son or father) at age (time, year)  $t$ ,

- $w_i$  = the long run permanent log earnings, and  
 $u_{it}$  = a transitory component or random error *i.i.d.*<sup>3</sup> across the life cycle and across individuals and independent of  $w_i$ .

The measurement error can be split into two approaches:

- a) The error (measurement) in father's earnings that causes bias named, an 'attenuation bias' which can be misleadingly inflating social mobility across generations. Solon (1992) and Zimmerman (1992) empirically documented that in the previous studies those were considerably downwards biased. The argument behind the reason is that the variance of observed status is greater than the variance of permanent status.
- b) Unlike the father's case the error in child's earnings doesn't cause bias.

The bias can be mitigated by either using multi-year averages of earnings as the dependent variable or employing instrumental variables (IV) estimation (Grawe, 2006 and Blanden et al., 2002).

### Life-cycle Bias

Attenuation bias can be reduced by taking average of fathers' earnings for several years. But the correction procedure remains under question because measuring the parameter at different stages in the generations also induced bias. The parent's earnings which is taken later in life compare to that one for children leads a 'life-cycle bias'.

The annual permanent component of earnings does not necessarily equal to the lifetime permanent earnings. In a continuous time framework variance of earnings goes up with age which results in a biased estimate compared to when both measures are taken at the same point of the lifecycle. This is undoubtedly a downward bias because average earnings are a bad proxy for permanent earnings when people are too old or too young (Blanden et al., 2002 and Ermisch and Nicoletti, 2005).

The intergenerational elasticity,  $\beta_{OLS}$  is supposed to be underestimated when children are young and overestimated when their age is observed at higher stage, whereas the correlation coefficient,  $\rho$  is always underestimated and the bias is decreasing in son's age. Controlling for sons and fathers age (such as, polynomial in age for sons and fathers) in the intergenerational mobility equation is a conditional measure in reducing this bias. The condition requires that the growth of earnings should be homogeneous across the individuals because heterogeneous

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<sup>3</sup> Independently and Identically Distributed

individuals means different wealth endowments which leads to different sizes of investment in human capital (Ermisch and Nicoletti, 2005).

### **Sample Selection Problem**

Both cases of regressions would generate biased results when using the samples extracted from a short panel. By the definition of 'random sample'<sup>4</sup> the sample selected for the regression are not random because the selected samples are mediated by some other variables. Cheti Nicoletti (2008) in her "Multiple Sample Selection in the Estimation of Intergenerational Occupational Mobility"<sup>5</sup> identified the problems of sample selection which are affected by two different sources of sample selection:

- A. Father-daughter co-residence, and
- B. Daughter employment selection.

I intentionally ruled out the difference between son's earnings with that of daughter's because this is not our interest.

#### *Co-residence Problem of Sample Selection*

Our target is to observe the children's occupational prestige with their fathers but if they (children) don't live with their parents for at least one wave then it becomes impossible to do that. There may be some unobserved factors affecting children's later socio-economic status which are also influencing factors of children's chances of living (co-residing) with their parents. If we ignore those variables then the OLS estimate of  $\beta$  will suffer from sample selection bias (Francesconi and Nicoletti, 2006).

The study based on short panel has a greater problem than that of long panel. Nicoletti (2008) argued that the co-residence problem<sup>6</sup> in the short panel for USA (Panel Study of Income Dynamics) and Germany (Socio-economic Panel) are less significant than the survey conducted in Belgium, Hungary, Luxembourg, Poland and UK.

The problem of co-residence still exists even when we observe a long panel. Because in a 10-year-long panel, a 35 years old (now) child is 25 years old (at the beginning) in the last wave of the panel and by that age the child is supposed to leave her/his parental home. Considering instead a 25 years long panel, a child 35 years old (now) in the last wave is 10 years old at the beginning of the panel and at that age s/he is probably still living with her/his parents (Nicoletti, 2008).

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<sup>4</sup> By definition, it ensures that every unit in the population has a known and non-zero probability.

<sup>5</sup> This is an extended work of Francesconi and Nicoletti (2006) paying particular interest in sample selection problem.

<sup>6</sup> Here attrition and employment selection problems are not included.

Francesconi and Nicoletti (2006) observed that older sons are less likely to be a co-residence with fathers while young black (Caribbean or African) men (though statistically insignificant), men of Indian ethnic origin, religious services (except non-Christians), and the people who live in Greater London are more likely to co-reside with their fathers. So the variables that affect the sample selection are the ethnicity, social norms and customs and in the later case (Greater London) the high price of buying a separate house.

#### *Employment Selection Problem*

The intergenerational occupational mobility can be estimated only for people who are employed. Because if we want to estimate how the earnings of a child is related with her/his father then we should consider the employment model. But the people who are working or employed are not a random sample so the data generated from the sample is a sub-sample of people who are employed. There may be some unobserved factors (potential variables) affecting the status of a child to be employed. Like the co-residence problem of sample selection this will definitely lead to a selection bias and particularly more relevant when we are interested in estimating the association between earnings of daughters and fathers because women generally face more hindrances to occupy themselves in jobs.

Out of the two problems the first one is large both in terms of size and bias, while the employment selection issue seems a bit insignificant. To address this problem Heckman-type correction method (Francesconi and Nicoletti, 2006) can be used. This is a two-step estimation procedure and it is the first solution for sample selection bias (Vella, 1998). This type of correction attempts to correct the selection bias on unobserved variables. For example, a cognitive skill of a person is likely to affect the probability of employment and earnings. But it also produces bad result due to the biasness because of the omitted variable problems still exist there. Nicoletti (2008) proposed a weighted least squares with weights given by the inverse of the propensity score. In an extension, Nicoletti (2008) suggested a method of the combination of the regression adjustment and the weighting methods. This is more robust in terms of consistency because if one of the methods is consistent then it will produce a consistent estimator.

#### **Conclusion**

Intergenerational mobility is an indicator of describing the society's happiness. The degree of mobility may vary from society to society and country to country due to the sharp differences of different societies but there is a clear evidence of correlation between parent's socio-economic characteristics and that of their children. This paper is a literature review and thus makes an attempt to define the technical terms, analyse the consequences of intergenerational mobility and



propose the measures to solve the potential difficulties. No doubt the degree of mobility can be an issue to formulate the public policies because compared to an advanced society it allows us to describe how a backward society is deprived from material wellbeing. Measurement error and life-cycle bias cause problem in estimation but we can solve this by considering specific model(s). On the other hand sample selection problem also creates biased estimate which can be eliminated by applying a combination of Heckman-type correction method and weighted least squares. Despite all sorts of difficulties this paper reflects the significance of studying intergenerational mobility over time.

## References

- Björklund, A. and Jäntti M. (2000), "Intergenerational Mobility of Socio-economic Status in Comparative Perspective", *Nordic Journal of Political Economy*, Vol. 26 pp. 3-32.
- Blanden, J., Goodman, A., Gregg, P. and Machin, S. (2002), "Changes in Intergenerational Mobility in Britain", Centre for the Economics of Education, London School of Economics and Political Science, UK
- Bratberg, E., Nilsen, Oivind A. and Vaage, K. (2003), "Assessing Changes in Intergenerational Earnings Mobility", Institute for the Study of Labour (IZA), Bonn, Germany Discussion Paper No. 797, June 2003.
- Corak, M. and Heisz, A. (1999), "The Intergenerational Earnings and Income Mobility of Canadian Men: Evidence from Longitudinal Income Tax Data", *The Journal of Human Resources*, Vol. 34, No. 3, pp. 504-533.
- Dearden, L., Machin, S., Reed, H. (1997), "Intergenerational Mobility in Britain", *The Economic Journal*, Vol. 107, No. 440, pp. 47-66.
- Ermisch, J. and Francesconi, M. (2002), "Intergenerational Mobility in Britain: New Evidence from the BPHS", Online at <<http://www.essex.ac.uk/ilr/discussion/ILRdps74.pdf>>, Accessed on April 18, 2010.
- Ermisch, J. and Nicoletti, C. (2005), "Intergenerational Earnings Mobility: Changes Across Cohorts in Britain", ISER, University of Essex, UK Working Paper No. 19, October 2005.
- Fertig, A. R. (2001), "Trends in Intergenerational Earnings Mobility", Online at <<http://repec.org/res2002/Fertig.pdf>>, Accessed on April 26, 2010.
- Francesconi, M. and Nicoletti, C. (2006), "Intergenerational Mobility and Sample Selection in Short Panels", *Journal of Applied Econometrics*, vol. 21, No. 8, pp. 1265-1293.
- Grawe, N. D. (2006), "Lifecycle bias in Estimates of Intergenerational Earnings Persistence", *Labour Economics*, Vol. 13, Issue 5, Pages 551-570.
- Guo, Sheng (2009), "Rich Dad, Rich Kid? Switching Regression Estimates of Intergenerational Mobility of Consumption", Online at <<http://www2.fiu.edu/orgs/economics/wp2009/09-04.pdf>>
- Mocetti, S. (2007), "Intergenerational Income Mobility in Italy", Online at <<http://www-3.unipv.it/websiep/wp/200703.pdf>>
- Nicoletti, C. (2008), "Multiple Sample Selection in the Estimation of Intergenerational Occupational Mobility", ISER, University of Essex, UK Working Paper No. 20, May 2008.
- Pfeffer, F. T. (2007), "Intergenerational Educational Mobility in Comparative Perspective: Persistent Inequality in Educational Attainment and its Institutional Context", CDE Working Paper No. 2007-09, Online at <<http://www.ssc.wisc.edu/cde/cdewp/2007-09.pdf>>
- Solon, G. (1992), "Intergenerational Income Mobility in the United States", *The American Economic Review*, Vol. 82, No. 3, pp. 393-408.
- Vella, F. (1998), "Estimating Models with Sample Selection Bias: A Survey", *The Journal of Human Resources*, Vol. 3, No. 1, pp. 127-169.

**Appendix - A**

This table is taken (without any modification) from “Lifecycle bias in estimates of intergenerational earnings persistence (page 554)”<sup>Ω</sup> by Nathan D. Grawe, Department of Economics, Carleton College, One North College St., Northfield, MN 55057, USA. In column-4 the estimate is the regression coefficient which regress the intergenerational earnings of father’s age.

Table 1: Estimates of intergenerational earnings persistence organized by mean age of father

Author	Mean age of father	Mean year of father observation	Estimate	Location
Lefranc and Trannoy (forthcoming) * @	34	1964.0	0.41	France
Lillard and Kilburn (1995)	30–40 <sup>?</sup>	1975.5	0.27	Malaysia
Björklund and Chadwick (2003)	40.5	1972.5	0.24	Sweden
Corak and Heisz (1999)	40–45	1980.0	0.23	Canada
Mulligan (1997)	40–45	1969.0	0.33	US
Björklund and Jäntti (1997) *#	43	1970.2	0.28	Sweden
Shea (2000) **	44	1969.0	0.36	US
Solon (1992)	44	1969.0	0.41	US
Björklund and Jäntti (1997) *#	45	1969.0	0.42	US
Mazumder (forthcoming) <sup>a</sup>	46	1982.0	0.39	US
Peters (1992)	47	1969.5	0.14	US
Bratberg et al. (forthcoming) <sup>b</sup>	47	1978.0	0.12	Norway
Dearden et al. (1997) *	45–50	1974.0	0.58	UK
Tsai (1983)	45–50 <sup>?</sup>	1958.5	0.28	Wisconsin
Österbacka (2001)	48.5	1972.5	0.13	Finland
Couch and Dunn (1997) #	51	1986.5	0.11	Germany
Wiegand (1997) *	51	1984.0	0.20	Germany
Altonji and Dunn (1991)	52	1967.3	0.18	US
Couch and Dunn (1997) #	53	1986.5	0.13	US
Österberg (2000)	53	1979.0	0.13	Sweden

<sup>Ω</sup> This is available online at <[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6VFD-4GMJ925-1&\\_user=520547&\\_coverDate=10%2F31%2F2006&\\_rdoc=1&\\_fmt=high&\\_orig=search&\\_sort=d&\\_docanchor=&view=c&\\_rerunOrigin=scholar.google&\\_acct=C000025998&\\_version=1&\\_urlVersion=0&\\_userid=520547&\\_md5=ce50b0717c2184698031163e0af1a57](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VFD-4GMJ925-1&_user=520547&_coverDate=10%2F31%2F2006&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_rerunOrigin=scholar.google&_acct=C000025998&_version=1&_urlVersion=0&_userid=520547&_md5=ce50b0717c2184698031163e0af1a57)> from 14 July 2005.

<sup>a</sup> Mazumder's estimate using three years of father's data is chosen in order to most closely match the methodology of the other studies in the table. When he uses six years of father's earnings data, his estimate is 0.47. His estimates resulting from ten and fifteen years of data are avoided since these estimates were found to be very sensitive to the treatment of top-coded earnings reports.

<sup>b</sup> The 1960 cohort is chosen from the Bratberg et al. study since it is twice as large as the 1950 cohort sample.

\* Studies using IV estimation.

\*\* Because Shea does not include the same number of earnings observations for each father, the precise years of observation and the average year of observation are clear from the study. However, the data are intended to be very similar to that of Solon.

? The range attributed to Mean Age of Father is particularly difficult to infer from information in the paper.

# Studies which are expressly cross-country comparisons.

@ The estimate found is that when sons are measured in 1993 and fathers in 1964. Average age of fathers taken from personal correspondence with authors.