Intergenerational earnings mobility of second-generation immigrants in Sweden

A summary of theoretical and empirical findings

Kunduozi Aniwaer
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Abstract

Intergenerational earnings mobility measures how children improve or deteriorate their labor market position relative to their parents. Low mobility indicates that the earnings of children depend heavily on their parents’ earnings and vis-versa. Empirical studies show that compared to natives, immigrants have lower intergenerational mobility in their earnings, and this is also the case in Sweden. Determinants of intergenerational earnings mobility for natives and immigrants are many. This study aimed to systematically summarize previous studies on earnings and intergenerational earnings mobility of natives and immigrants to find out what factors causes differences in labor market outcomes for different cohorts. The result shows that ethnicity, lack of human capital and market discrimination are main reasons why immigrants have lower mobility in their income across generations.

Key words:
Intergenerational earnings mobility, human capital, second-generation immigrants
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1. Introduction

There is an old saying in China, which says ‘rich but three generations, poor but three generations’, telling us the story that wealthy families will not be forever rich and poverty will not always persist in disadvantaged families. Translating into economic terms, it may turn out as the possibility of altering positions for families located in different quantiles of earnings distribution overtime. Intergenerational earnings mobility is exactly a measure of this type of possibility. It indicates to what extent a family can change their income level across generations. It is also an indicator of equality in opportunities. In a family, children’s lifetime earnings is related to their parents’ lifetime earnings, since parents subtract a portion of their earnings to invest in their children’s human capital. Here we borrow Solon’s (1999) definition for intergenerational earnings mobility to understand the concept better: if the son’s relative position in the earnings distribution is completely inherited from his father in a given society, then this society displays complete immobility in earnings. On the other hand, if the son’s position in the earnings distribution is totally independent of his father’s, then this society demonstrates complete intergenerational mobility of earnings.

Topics around intergenerational mobility become popular in recent two decades. Majority of the studies were conducted in United States using local data (Becker, et al. 1986, Borjas, 1992, Solon, 1989 and etc.). Relatively large portion of the studies analyzed mass data of mixed population without categorizing the sample into different cohorts, such as natives and immigrants. With Borjas (1993) adding ethnic capital as an effect of externality into the analysis of immigrants’ intergenerational earnings mobility, studies (Borjas, 1994; Hammarstedt, M., et al., 2006; Aydemir, A., et al., 2009) adopting this new method attained different results than before. They found that immigrants have relatively low intergenerational mobility in earnings than natives which indicates that second-generation immigrants have less advantage to change their labor market position compared to their
parents. However, less is known in Sweden and the studies conducted for immigrants in Sweden were scarce and this may due to data limitation and other possible aspects.

Originally, intergenerational mobility were studied by sociologists for the most (as Becker mentioned in their 1986 paper) by presenting and analyzing empirical evidence of the effect of family background on children’s labor market performance. Specifically, the correlation or the influence of parents’ education, occupation and other characteristics on their offspring. The earliest economic analysis for intergenerational mobility were made by Schumpeter in 1950’s. He found that the reasons for a given family’s rise and fall within a class or between can be concluded as ‘chance’ (the chance to born in a family with land and etc.) which is independent of the behavior of the family; ‘disposition to save’, ‘family aptitude’ (how hard-headed family members are and etc.) and other changes in the society (emergence of usurpers and etc.). His prospective analysis regarding intergenerational mobility were affirmed later by Becker (1986), Solon (1992) and others.

One way to measure intergenerational income mobility is to measure the elasticity of intergenerational earnings. A society which displays complete intergenerational mobility in earnings means that the elasticity of intergenerational earnings is zero, the son’s lifetime earnings would not depend on the earnings of his father, and therefore, every son has equal opportunity¹ (Corak, M, 2012). A higher degree of elasticity implies more difficulties for the son to move outside the income class he was born into. On the other hand, a society which displays complete immobility in intergenerational earnings has income elasticity equal to one and this means that all poor children will end up poor and all rich children will end up rich. Therefore, a rich family would like to stay in a society with low intergenerational earnings mobility to ensure their offspring inherit as much as

¹ As Corak (2012) described, in a society where the chances are equal, a son born in the top quantile should have as high as an opportunity of ending up in the top quantile as a son born in the bottom quantile does of rising there.
they can. For a poor family, move to a society with high level of intergenerational earnings mobility may help their offspring to have better outcome since that society provides relatively equal chances.

There exist two types of equality in labor market: equality in outcome and equality in opportunities (Corak, M, 2013). Equality in outcome suggests that labor market participants would have equal earnings, and equality in opportunities suggests that individuals in a society have equal chances to participate in labor market and equal opportunities to change their earnings positions. Some countries are more concerned with the equality of labor market outcomes by ensuring no large gap in incomes, while other countries pay more attention to the equality in opportunities. Distinct from income inequality, intergenerational income mobility is more of a reflection of the equality in opportunity. From the egalitarian policies on wages in Sweden we may observe that equal outcomes is the main concern of Sweden. However, Sweden still is one of the countries that is relatively mobile in intergenerational earnings (Corak, M, 2013).

Despite Sweden’s concern of equal outcomes, various population groups still display large differences in their earnings. Immigrants and their descendants living in Sweden earn relatively less than natives. For instance, immigrant children with parents from southern-Europe and non-European countries earn 9% and 16% less than natives in 2003 respectively (Nordin, M., & Rooth, D. O., 2009). Immigrant children who are born in Sweden and have at least one parent with foreign background are called second-generation immigrants. Native children and second-generation immigrants display different patterns on intergenerational earnings mobility in Sweden and those with different ethnic backgrounds varies a lot in their mobility. Some immigrant cohorts in their next generation performed even worse compare to their immigrant parents (Hammarstedt, et al., 2006). The reason for this disadvantage of immigrants may due to less equality in opportunities in Swedish labor market, less country-specific human
We claim that son’s lifetime earnings in a society are correlated to his father’s lifetime earnings since the father invest in the son’s “future”. The correlation of earnings between two generations can be expressed as a Markov relation\(^2\) as Becker and Tomes (1986) presented. By estimating the correlation coefficient \((\beta)\) of the regression model, one can detect the inequality in opportunities. To be specific, in this relation of parental and children’s earnings, regression towards the mean \((|\beta| < 1)\) indicate relatively small degree of inequality, and deviation from the mean \((\beta > 1)\) indicates opportunities are relatively unequal at a higher level in that society. This paper is based on Becker and Tomes’ (1986) study on the rise and fall of families and the extended models of Borjas (1991) and Solon (2004) along with other related studies. My research question is, therefore, what determines the differences in intergenerational earnings mobility for second-generational immigrants in Sweden compared to their native counterparts and how those factors influence the labor market outcome for them? This paper aimed at theoretically summarize factors that cause differences in intergenerational earnings mobility between natives and immigrants in Sweden and possibly contribute a little to the literature and the integration policy in Sweden to improve disadvantaged situation for immigrants. My summary will follow the steps and models developed by Becker and Tomes (1986) for intergenerational earnings mobility and several extensions of the model developed by others (Borjas 1992, 1994, Solon 1999) to see how those factors function differently on natives and immigrants.

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\(^2\)Markov model is a stochastic model used to model randomly changing systems where it is assumed that future states depend only on the present state and not on the sequence of events that preceded it.
The disposition of this paper is organized as follows: Section 2 reviews the theoretical models from previous studies on intergenerational mobility of earnings along with the summary on theoretical findings that we know until now; Section 3, on the other hand, reviews the empirical results from related researches and possible explanations why some authors reached various results; Section 4 is a discussion of Sweden-related studies and few ideas on how immigrants can possibly improve their own and their descendants’ labor market positions according to the causes led to divergence in intergenerational earnings mobility for them; Section 5 is the conclusion of whole paper and several suggestions on future studies needed in this field and possibly make petite contribution to the literature.

2. Theoretical models and findings

Intergenerational mobility mirrors the inequality in opportunities in a society by showing convergence or divergence to the mean in the relation of labor market outcomes across generations. However, what are the factors determining unequal chances? And what cause differences in intergenerational earnings mobility between natives and immigrants? These questions may worth investigate in order to help the integration policy works better in Sweden and possibly help improving the labor market positions for immigrants.

2.1 The general theoretical model

A general model applied the most in this field was developed by Becker and Tomes in their 1986’s research on human capital and the rise and fall of families. Moreover, the extended model by Borjas (1992, 1994) and Solon (1999) also provided techniques to test out the effect of different factors on intergenerational earnings mobility. As we have mentioned before, a child’s future earnings are somehow related to his or her parents’ lifetime earnings, since parents allocate part of their earnings on the investment of the child’s human capital. And this relationship can be expressed as a Markov relation. The amount allocated on the investment is decided by how willing parents are to invest and how capable (or promising) the child is. The Markov relation that captures the correlation
between parents’ and their offspring’s lifetime earnings can be expressed as a linear regression model:

\[ I_{i+1} = a + bI_i + \epsilon_{i+1} \]  

(1)

Where \( I \) is the income and \( i \) indicates the \( i \)th generation in a family, therefore the children’s income \( I_{i+1} \) equals to the average income common to the whole society (\( a \)) plus a portion (\( b \)) of parental income adding a stochastic term (\( \epsilon \)) which is assumed to be orthogonal to parental income. Intergenerational income mobility can be understood as the coefficient \( b \). When coefficient \( b \) is larger than unity (\( b \geq 1 \)), regression away from the mean in the relation of the income of parents and children will imply lower mobility, which in terms of inequality, that implies large and growing inequality, since children’s earnings depend heavily on parental earnings. While \( |b| < 1 \) (regression towards the mean) implies that the inequality is at a relatively small and constant level, which indicates a relatively high level of intergenerational mobility. When \( b \) is sufficiently small, parental earnings will have subtle influence on their children’s future earnings.

Before parents finance the investment on their children using their lifetime earnings, there exists another very important element that influences descendant generation – the family’s genetic and cultural inheritance, which is interpreted as “endowment” in the relevant literature. Endowments inherited from parents is one of the reasons that why some children are more capable than other children. Endowments are transmitted by a stochastic-linear equation (Markov equation) from parents to their children in the same fashion that income is transmitted inter-generationally:

\[ E_{i+1}^j = \alpha_{i+1} + hE_i^j + v_{i+1}^j \]  

(2)

where \( E_{i+1}^j \) is the endowment of the \( j \)th family in the \( i+1 \)th generation – the child’s generation. \( h \) is the degree of inheritability which indicates that to what extent a child inherited the family characteristics (both genetic and cultural). And the stochastic term \( v \) represents the luck in the process of transmitting the endowment (which indicates there
exists unpredictable possibilities in the transmission process of endowments). $\alpha_{i+1}$ is the social endowment that is equal for all the members in a given society. In Becker and Tomes’ argument, they assume that parents cannot invest in children’s endowment. However, from our point of view, it is possible to invest in the endowments a child will inherit. For instance, parents can invest in the family culture by increasing the collection of beneficial books and etc.

We say that parents influence their children’s future earnings by investing in their human capital, therefore, children’s human capital could be expressed as a functions of parents’ input. Also, endowment inherited from parents are also important in the human capital accumulation process which makes endowment another input of human capital. Moreover, public inputs are also crucial to a child’s human capital accumulation since intervention from public sectors on a child’s growth can be life changing, especially for children from disadvantaged families. Therefore, the adult human capital is determined by parental expenditure, endowments and public inputs:

$$H_{i+1} = f(x_i, s_i, E_{i+1}) \quad \text{with } f_j > 0, \quad j = x, s, E$$

(3)

where $H_{i+1}$ is child’s adult human capital, $x_i$ is the parental investment where $Y_i = c_i + x_i$, $s_i$ is the public input. Furthermore, the child’s adult earnings depend on the rate of return to the human capital, the amount of human capital and market luck which supposed to be independent with other variables:

$$Y_{i+1} = r_H H_{i+1} + l_{i+1}$$

(4)

Where $Y_{i+1}$ is the adult earning of a child, $r_H$ is the rate of return on human capital which depends on technological knowledge and the rate of forgone human capital that used to invest in new human capital. $l_{i+1}$ is the market luck the child faces in his or her generation. According to the egalitarian policy in Sweden, we assume that return on per capita human capital are the same for all members in the society.
Now we can use a function to express the relation between parental expenditure, public investment and endowment with the child’s adult earnings since they are linked via human capital:

\[
y_{i+1} = \psi(x_i, s_i, \alpha_{i+1}, h, E_i^j, r_H, v_{i+1}^j) + l_{i+1}
\]  

(5)

This equation relates endowments to earnings and other variables. Apparently, parents’ earnings can also be expressed using the relationship of human capital and endowments. Consequently, the earnings of the child and the earnings of his or her parents are now related using parents’ endowment as a channel. Therefore, we get:

\[
y_{i+1} = F(y_i, l_i, v_{i+1}^j, h, s_i, s_{i-1}, x_i, x_{i-1}, \alpha_{i+1}) + l_{i+1}
\]  

(6)

This expression tells us that the child’s future earnings depend not only on parental income but also depend on luck, inheritability of endowment, parental and social input, social endowment, etc. However, parents with different earnings may face different difficulties financing their investment. Parents with low earnings might need to borrow from capital market to finance their investment. Therefore, a child’s future earnings will also depend on the market interest rate.

If we dig in deeply we may find that a child’s future wellbeing is closely linked to the family characteristics. For example, educational background might influence child’s future income since well-educated parents may tend to invest more on child’s higher or more professional education than other parents. Return on education is one important part of parental income in a family, therefore, through the relation of income between two generations, one can see that education is also an important element deciding child’s future income. Also, the environment a child grow up, or to say, the ethnicity of a family also influence child’s future income since ethnicity influences parental income. All of these relations can be expressed using equation (6), and in next section, I will focus on how these contents influence the intergenerational earnings mobility of second-generation immigrant in Sweden.
2.2 Theoretical findings

The degree of intergenerational earnings mobility is determined by the interaction of three major activities in a family: family’s utility maximizing behavior; investment on children’s human capital in that family; consumption opportunities for parents. Additionally, various types of luck including: market luck faced by both parents and children; luck in the transmission process of endowments, assets and skills. Determinants of intergenerational earnings mobility are many. Immigrants tend to invest more in their own human capital in the host country when they are young since the opportunity cost is lower and the earnings growth is faster than natives (Duleep et al., 1999). However whether immigrant parents will invest more or less in their children’s human capital still depends on other factors. As Becker and Tomes (1986) first analyzed, whether parents have full or limited access to capital market to borrow assets to finance the investment on their children determines how mobile children’s adult earnings will be. When parents have full access to the capital market, the degree of intergenerational mobility is eventually equal to children’s inheritability of endowments from their parents and this means that the more the son inherited from the father, the more likely the son will inherit his father’s position in labor market when he became an adult. It is easy to understand that if the son is as able as his father, he might also turn out successful just like his father. However, families from particular background or with other characteristics, for instance, poor families or immigrant family that have lower income and less access to capital market due to discrimination, will feel short investing in their children. As a consequence, the intergenerational earnings mobility will depend also on the willingness of parents to invest in their children’s human capital by self-financing the investment.

Intergenerational earnings mobility is also determined by the market interest rate as parents borrow capital to invest in their children’s human capital (Solon, 1999). Further, the rate of return on human capital also matters. Children from poor families with restricted access to capital market can only rely on higher return to their skills in order to
change their relative positions in labor market compared to their parents (Hammarstedt, M., 2003). Moreover, parent’s level of education, occupational position in a labor market and etc., also affects children’s future performance, as those factors are all related to parents’ earnings and further related to children’s wellbeing (Becker et al. 1986, Solon 1999).

For immigrants in a host country, their intergenerational earnings mobility differ significantly than their native counterparts. Immigrants earn relatively less than natives (Borjas 1993; Hammarstedt, M., 2003; Rooth & Ekberg, J., 2003) and they are relatively immobile across generations in both United States and Sweden. The earnings differences may possibly due to the skill gap between immigrants and natives (Nordin, et al., 2007), labor discrimination in Swedish labor market (Carlsson et al., 2007) and etc. However, for immigrants from the countries which are geographically or culturally close to the receiving country have higher income than those immigrants who are from countries elsewhere. Ethnicity and the environment a child grow up has relatively important effect on the child’s development. Borjas (1993) argues that the environment a child grew up heavily affects the future labor outcome for the child. When the parents are from a cohort that performed good in destination country, the offspring may also perform well. Ethnic capital may play a role as externality on the earnings of second-generation immigrants. In Hammarstedt et al.’s (2006) study, they have proven that children of immigrants from a cohort adapted and performed well in Swedish labor market have parents who also performed well in their generation. However, for cohorts which performed less good, the children of these cohort performed even worse than their ascendants.

Nevertheless, there exists an unstable and unpredictable factor which is crucial on determining the earnings for both parents and children – luck. This luck includes the luck in the transmission process of endowments from parents to children, and the market luck both parents and children faced. Most importantly, it is irrelevant with family’s behavior
and beyond control. In Becker and Tomes’ (1986) argument, the unpredictable part of the model, or in the other way, the stochastic error term is presumed unrelated to the earnings of parents and child. Therefore, one might argue, the luck one faces may be the most influential factor affecting the income. This will be discussed later. Following subsections summarize the factors that decides and influences the intergenerational earnings mobility.

**Family characteristics**

When we reviewed the relevant literature, we found out that family characteristics will affect the child’s future earnings to some extent. Also, the environment the child was raised in also have some potential influence on the child’s future performance in a labor market. However, while we discuss the effect of parents’ characteristics or environment on their children’s future wellbeing, we cannot omit one important element that might also have important effects on child’s earnings--market luck. In this section we will discuss and theoretically summarize the influence brought by both family characteristics and market luck on natives and second-generation immigrants. To avoid complexity, we include the environment parents make their investments into family characteristics.

**Endowment, Human Capital and Earnings**

Endowments include both biology and culture in a family, transmitted from parents to their children. A child’s appearance, the family name he or she is carrying, the ability and aspiration to learn, the child’s personality, the communicational skills and social network inherited from parents and etc., are all endowments that transmitted from parents. We understand that the more a child inherits these characteristics from parents, the more alike the earnings pattern will be between parents and the child, and the closer is the correlation between two generations’ earnings, and this implies lower mobility in the child generation. Therefore, Becker et al. (1986) claim that inheritability ($h$) of endowments is one of the determinants of intergenerational income mobility. Endowments along with parental and
public inputs form the human capital the child accumulates. And the return on human capital adding other returns construct the earnings of the child. The difference on intergenerational earnings mobility now starts to appear since the endowment a native child inherit from his or her Swedish parents will have significant difference from a child who has foreign parents. However, what really matters here is not the content of the endowment, but it is the inheritability of endowment. To see this, we still follow Becker et al.’s (1986) arguments for inheritability. According to equation (3) and (4), we know that the earnings of a child is related to endowment and etc., we consider the marginal rate of return on parental input ($r_p$):

$$
\frac{\partial y_{i+1}}{\partial x_i} = \frac{\partial H_{i+1}}{\partial x_i} = \psi_x = 1 + r_p(x_i, s_i, E_{i+1})
$$

(7)

When parents have full excess to capital market, parents can borrow at the interest rate to finance their investment on their children. We assume that parents maximize the wellbeing of children with no reduction in their own consumption, therefore, to maximize the net income, the marginal return on parental income must equal the interest rate in the market, and then we may know the optimal level of parental input:

$$
r_p = r_{i+1} \text{ or } x_{i}^* = g(E_{i+1}, s_i, r_{i+1}) \text{ with } g_E > 0, g_r < 0 \text{ and } g_s < 0
$$

(8)

Therefore, when parents have full excess to capital market and borrow what is needed to the investment, equation (5) becomes:

$$
Y_{i+1} = \psi[g(E_{i+1}, s_i, r_{i+1}), s_i, E_{i+1}] + l_{i+1} = \phi(E_{i+1}, s_i, r_{i+1}) + l_{i+1}
$$

(9)

with the total effect of endowment on earnings $\phi_E = \psi g E + \psi E > 0$ and then the relation between parental income and the child’s income (6) will become:

$$
Y_{i+1} = F(Y_i, l_i, v_{i+1}^j, h, s_i, s_{i-1}, r_i, r_{i+1}, \alpha_{i+1}) + l_{i+1}
$$

(10)

Becker et al. (1986) argues that the earnings relation of the child and parents also depends on the total effect of endowment $\phi_E$, therefore, the relation between parental earnings and child will become:

$$
Y_{i+1} = c_{i+1} + \alpha_{i+1} \phi_E + hY_i + l'_{i+1}
$$

(11)

where $l'_{i+1} = l_i - h l_i + \phi_E v_{i+1}^j$
and the intercept $c_{i+1}$ is a function include public expenditure for both parents and child, inheritability of endowment for the child, the market interest faced by parents and child. The expected value of the correlation coefficient in (1) is:

$$b_{i+1,i} = h \left( 1 - \frac{\text{var}(l_{i+1})}{\text{var}(Y_{i+1})} \right)$$

(12)

We see from this expression that the greater the inheritability of endowment for a child, the lifetime earnings of parent and child are more closely related to each other.

We can assume that, native parents would not face limitation to capital market to borrow what is needed to finance the investment on their children’s human capital, therefore, the intergenerational earnings mobility is manipulated by the degree of inheritability. However, for immigrant parents, especially for those who are disadvantaged, to finance their investment they may face more difficulties than native parents. Immigrant parents may finance their investment by reducing the consumption of the family, selling assets that they own and probably by raising the labor-force activity of children. And for parents who do not own assets to sell may consider reducing the expenditure on their child investment, and this expenditure not only depend on the earnings of the parents and the endowment the child inherited and the public expenditure as native parents face, it also depends on how generous are their parents towards them ($\omega$), and on the uncertainty about the luck of their child ($\varepsilon_i$) where we can express as:

$$x_i^* = g^*[E_{i+1}, s_i, Y_{i-1}, \varepsilon_i, \omega] \text{ with } g^*_i > 0$$

(13)

which we can see is different from equation (8) with the enter of parental earnings, their generosity and uncertain luck. Further, equation (9) is now adjusted for immigrant parents as:

$$Y_{i+1} = \psi[g^*(E_{i+1}, Y_i, k_i), s_i, E_{i+1}] + l_{i+1} = \phi^*(E_{i+1}, Y_i, k_i) + l_{i+1}$$

(14)

where $k_i$ includes the public expenditure, the uncertainty of market luck and parents generosity. This illustrates that now the earnings of two generations are directly link together. Also, the earnings of two generations are indirectly associated through
endowment transmission. Using same mechanism as equation (10), the indirect correlation via endowment transmission can be state as:

\[ Y_{i+1} = F(Y_i, Y_{i-1}, l, v_{i+1}^j, h, k, k_{i-1}, \alpha_{i+1}) + l_{i+1} \]  

(15)

With the effect of parents’ earnings and grandparents’ earnings on child’s earnings:

\[
\frac{\partial Y_{i+1}}{\partial Y_i} > 0 \quad \text{and} \quad \frac{\partial Y_{i+1}}{\partial Y_{i-1}} < 0
\]

We may know that, parental earnings have a positive effect on their children’s earnings while the earnings of grandparents have a negative effect on grandchild’s earnings. And Becker et al. (1986) assume that when the earnings of the child is linearly related to endowment and parental earnings, the relation between these two earnings can be expressed as:

\[ Y_{i+1} = c' + (\beta + h)Y_i - \beta h Y_{i-1} + l^* \text{ with } \beta = \phi_Y^* \]  

(16)

which is in similar fashion with (11). \( \beta \) is defined as marginal propensity to invest in the human capital to children. We can understand this as the willingness parents self-finance the investment on their child rather to dispose their income on their own consumption. Therefore, for families which cannot readily borrow to finance their investment on their children’s human capital, the intergenerational income mobility not only depend on the degree of inheritability of endowments but also on the degree of willingness to self-finance the investment. Higher inheritability and willingness to invest on their children leads to closer relation between earnings of two generations.

On the other hand, human capital investment on parents themselves also affects children’s potential earnings in a long run. Let’s imagine there is an immigrant father moved from his home country to Sweden at his early age. We assume that human capital investment requires a certain proportion of human capital the father already has to produce new skills, and the total earnings of the father contains two components of return on human capital, one is the return on the net human capital (the human capital the father has when he enters Swedish labor market subtracts the forgone human capital), and the other one is the return
on new human capital produces by the investment. However, unlike his native counterpart, the immigrant father’s skills will not fully valued in the Swedish labor market, therefore, a concept of skill-transferability is introduced by Duleep et al. (1999) and can be interpret as the model below:

\[ Y_t = w\tau_1 H_i (1 - \theta) + w[\tau_2 H_i + \gamma f(H_i, \theta)] \]  

(17)

where \( H_i \) is the initial stock of human capital that the immigrant father has when entering Swedish labor market, and \( \theta \) is the proportion of human capital forgone to produce new human capital in Sweden, \( \gamma f(H_i, \theta) \) is the human capital production function, \( \tau_1, \tau_2 \) are the initial skill-transferability later skill-transferability respectively. For natives, \( \tau_1 = \tau_2 = 1 \), since native father’s human capital is fully valued in Swedish labor market. For immigrant father \( \tau_1 < 1 \) and \( \tau_2 < 1 \). Therefore, hold other conditions constant, immigrant father earn less than his native counterpart. However, to corporate with this disadvantage, immigrant father will invest more on his human capital since the opportunity cost is less and the return is higher (Duleep et al. 1999). We have stated earlier that the earnings are partially transmitted from parents to the children, therefore, the effect the skill-transferability brings will also last to the child. Therefore, we may expect that the more has invested on the immigrants father’s human capital, the more valuable human capital (human capital that is highly valued in Swedish labor market) is produced and transmitted to the child, the earnings for the child may be more promising.

Studies on unemployment, earnings and income gap between natives and second-generation immigrants in Sweden (Nordin, et al., 2007, 2009; Rooth et al., 2003) confirm the importance of human capital transmission on the labor market outcome of children. For instance, compared to an immigrant child with both parents foreign born, a child who has one Swedish parent narrows the income gap with their native counterparts. Nordin and Rooth (2007) use the Swedish Military Enlistment Test results\(^3\) to see what really

\(^3\) In principle, every male Swedish citizen takes the test when turning 18. This premarket data contain test results to provide differences in quality of skills and helps avoid market discrimination.

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causes the income gap between those two cohorts and find out that when the test results are controlled for, the differences in income almost vanishes and this is a firm evidence showing that skill differences are what that cause the gap. Moreover, they found out that language proficiency is especially important part of skills explaining the income gap. Apparently, endowment and human capital, spatially “country-specific” human capital, transmitted from a parent with Swedish background do paved the way to a better outcome for an immigrant child relative to those who have both parents foreign born.

Furthermore, it is not hard to imagine the educational influence on the correlation between parent and children since parents dispose their earnings on child’s education. Parents with different earnings may have different taste for educational investment. The following model explains how education relates earnings of two generations:

\[ Ed_{i+1} = \alpha_0 + \psi Y_i + e_{i+1} \]  \hspace{1cm} (18)

Education of the child depends on parental earnings. Further, education contributes to the child’s future earnings:

\[ Y_{i+1} = \alpha_1 + \phi Ed_{i+1} + u_{i+1} \]  \hspace{1cm} (19)

where \( \phi \) is the return on education of the child. Now we can tell that the earnings of parent and child is correlated through education. Substitute equation (18) into (19) we get:

\[ Y_{i+1} = \alpha + \phi \psi Y_i + \nu \]  \hspace{1cm} (20)

This simplified expression indicates that now the intergenerational earnings mobility not only depends on the relation between parental income and education but also depends on the return on education and other effect irrelevant to education:

\[ \beta = \phi \psi + \frac{cov(u, Y_i)}{var(Y_i)} \]  \hspace{1cm} (21)

The intergenerational earnings mobility depends on the relation between parental earnings and education along with return on education plus an unexplained persistence in income which is not transmitted via education. Increase in the sensitivity of education to parental income and education attainment of the child will increase the intergenerational earnings mobility. Therefore, disadvantaged immigrant parents tend to invest more on
their children’s education to improve the potential outcome. However, education in Sweden is State-financed, which may weaken the impact of parental expenditure on investing in education. Besides, education of parents also have some impact on children’s future wellbeing especially education obtained in Sweden since Nordin (2009) founds that the amount of education obtained in Sweden is the most important factor explaining differences in returns to education for different immigrant cohorts. Now we can imagine that an immigrant parent moved to Sweden in his or her early age and obtained education in Sweden, the more the amount of education obtained in Sweden, the higher the income will be relative to other immigrant parents who did not or obtained less education in Sweden. And this may cause differences in socioeconomic outcome of their offspring and influence the intergenerational earnings mobility.

Environment

One the other hand, ethnicity or to say, ethnic capital, might be another factor which causes differences in income and earnings mobility between generations. As Borjas has shown by extending Becker et al.’s model, ethnic capital, as the average skill level of the ethnic group of the father’s generation, has crucial influence on intergenerational income mobility. Borjas claims ethnicity as an externality since the skills of the next generation depend also on the average quality of the ethnic environment where parents make their investments. If the external effect of ethnicity is sufficiently strong, ethnic differences in skills in father’s generation are likely to persist for next generation. The correlation (1) between parent and child now can be extended and interpreted as:

\[ Y_{j,t+1} = \alpha + \beta_1 Y_{j,t} + \beta_2 Y_{j} + \epsilon_{j,t} \]  

(22)

where \( Y_{j,t+1} \) is the earnings of j family in child generation, and \( Y_{j} \) is the average earnings of father’s ethnic group. Now the correlation between parental income and child’s income depends on \( \beta = \beta_1 + \beta_2 \). If the effect of ethnic capital on child’s income is sufficiently strong, the intergenerational earning mobility will be relatively low and child’s future
earnings strongly correlate to parental earnings, this is to say that children of poor families will also turn out poor.

Study by Hammarstedt et al. (2006) finds that the intergenerational earnings mobility is lower for immigrants (0.207) than for natives (0.140), however, there exists an overall convergence between natives and immigrants but there also exists divergence between different ethnic groups. These results suggest that ethnic capital do affect intergenerational earnings mobility and the degree of the ethnical effect decides the extent of the mobility of earnings between generations.

Moreover, Solon (1999) emphasized that not only family origins will influence the outcome of children but neighborhood origins also have important impact on the performance of children. For instance, neighborhood affect children in several ways, through peer influence, role-modeling, enforcement of social norms and neighborhood institutions. Following Solon, the future outcome of a child from a certain family in a certain neighborhood depends on combined effect of all factors, including family and neighborhood characteristics, common to the children in that family and a component of combined effect of all factors idiosyncratic to that certain child. Neighborhoods determine some degree of the earnings the child makes, and, to improve the potential outcome, changing neighborhood would make a big difference on earnings and earnings mobility of the child.

**Family consumption and composition**

As mentioned before, the family’s consumption also determines the intergenerational earning mobility of their offspring. Relatively wealthy families leave assets or bequests to offset the disadvantages their children may face in labor market, therefore, compared to those families, poorer families are at inferior positions. Assortative marriage will also help improving children’s potential positions in labor market as both parents effectively
contribute to the investment on their children. This is proved by Hirvonen, L. H. (2008) for the overall Swedish population, and for the immigrant population in Sweden (Nordin et al., 2011). The study demonstrated that immigrant children with at least one Swedish-born parent earn more in the future and have relatively higher intergenerational earnings mobility than immigrant children who’s both parents are foreign born.

Parent allocate their earnings between consumption of their own and investment on their children to achieve maximum utility for the family. Wealthier parents are able to leave bequests to ensure a better outcome for their offspring, and poorer parents may have to finance the investment on their children by reducing their own consumption. Study by Björklund et al., (2012) found that intergenerational transmission persists strongly in the very top of the earnings distribution in Sweden and that assets are the most likely channel of transmission. Parents with lower income primarily invest in their children’s human capital to compensate the disadvantages passed down from them. And for relatively successful families, bequeathed assets will offset the regressing towards the mean in earnings for their children.

Another decisive factor for the degree of intergenerational mobility in earnings is the number of children in various families. When the family size increases, the amount allocated to each member of the family from parents’ earnings will decrease, therefore, investment on each child will be reduced and cause low degree of intergenerational earnings mobility. Conventionally, fertility rate is higher in less developed countries due to the demand for labor force, traditional religious beliefs, and less participation in both education and labor market for females. A study by Statistics Sweden finds that immigrant women reproduced 2.21 children per woman, while Swedish-born women had a fertility rate of 1.82 children per woman, also the group with the highest fertility rate are those born in less-developed countries (Landes, David. 2008). When immigrant parents’ earnings are hard to cover the cost for the investment and with limitation
borrowing capital to invest in their children, the parents may tend to reduce the investment on each child to balance the consumption for the whole family. Therefore, there is a negative correlation between family size and the intergenerational earnings mobility, since for an additional child, the investment will be reduced by a certain amount. Therefore, parents will have to choose between investing in all of their children equally or invest more in able or gifted child. Rich families could compensate the reduction in investment for relatively less promising children using bequeathed assets, however, poorer families may need to deal with the conflict between the efficiency and the equality of investment.

Parental composition plays important roles on intergenerational earnings mobility. And this is readily proven by the differences in earnings, skills and etc., between immigrant children having one and both parents foreign born. Having a Swedish parent is helpful for the transmission of some “country-specific” human capital, such as language proficiency (Rooth et al., 2003).

**Public investment**

The accumulation of human capital for a child not only depends on endowments he or she inherited from the family and the parental investment but also on public expenditure. Public expenditure is decided according to various policies. However, children living in the same district may share similar public inputs. Since education is State-financed in Sweden, and infrastructural institutions are common in different districts, we may assume that the public input for both native and immigrant children are similar.

Previously, we have talked about how human capital transmission correlate earnings between parents and children, therefore, public expenditure is also related to intergenerational earnings mobility. When Solon (2004) extends the model to see how intergenerational earnings mobility varies over time and place, he found that
Intergenerational income mobility will increase if the public investment is more progressive\(^4\). Therefore, second-generation immigrants with disadvantaged conditions compared to others may improve their future outcomes when the government’s policy for public investments in children’s human capital are more progressive.

**Uncertainty**

Uncertainty is the stochastic term in the regression model of parental and child earnings. Almost all of the studies make assumption about uncertainty saying that it is orthogonal with parental earnings. Here, uncertainty includes all kinds of luck, for instance, the luck in transmission process of endowment, human capital and earnings. It also includes the market luck faced by both parents and their children. However, in reality, we cannot ignore the influence of market luck on someone’s earnings. When Schumpeter (1955) investigated in the rise and fall of families within and between classes, the first factor he stated was chance. In his case, chance to be born in a family with land will effectively influence the position of the family in a social class. When it comes to Sweden, market discrimination may be a major factor causes differences in earnings and mobility for immigrants since when other variables (such as education) are controlled for, the expected effect may not show significance (Nordin et al., 2007, 2009). This indicates that the earnings gap remained in natives and immigrants cannot completely explained by the skill gap between those two cohorts. Market discrimination do exist in Swedish labor market and immigrants face relatively more disadvantages in Swedish labor market (Carlsson et al., 2007).

\(^4\) When Solon (2004) extended the model of intergenerational earnings mobility over time and space, the government’s policy for public investments in children’s human capital is characterized as the ratio of public investment to parental after-tax income where a positive value for \(\gamma\) signifies a sort of relative progressivity:

\[
\frac{G_{j,l}}{(1 - \tau) y_{j,l}} = \varphi - \gamma \log y_{j,l}
\]
3. Empirical findings

Empirical evidences tell us that a child’s future earnings are related to his or her parents’ lifetime earnings, since parents allocate part of their earnings to invest in their children’s human capital. Becker and Tomes’ study (1986) about the rise and fall of families in terms of intergenerational earnings mobility has been the cornerstone for the related researches. However, the difficulties in gathering all the data needed blocked their way to reach a perfectly persuasive result for intergenerational earnings mobility of United States. Nonetheless, they have reviewed dozens of other studies on the correlation of income, earnings, wealth between parents and children and found out that most of the studies have shown that a 10% increase in father’s earnings raises son’s earnings by less than 2%. They concluded a correlation coefficient of 0.2 as intergenerational mobility of earnings. They also claimed that all earnings advantages and disadvantages of ancestors are faded in three generations, which indicates that poverty will not persist longer than three generations.

Solon (1989, 1992) and Zimmerman (1992) also reanalyzed the intergenerational earnings mobility of United States using refined data and extended models of Becker et al., and reached the result that the correlation lies between 0.4 and 0.5. This result claims that United States is relatively mobile in changing positions in earnings distribution for parents and children which means there exists high level of equality. This is a very interesting result since United States is ranked top in terms of inequality of outcomes among OECD countries.

Sweden is another extreme compared to United States in terms of equality due to the egalitarian wage policies, therefore, the returns to schooling, work experience, gender and etc. were similar during the 1970s. The study conducted by Björklund and Jäntti (1997) compared the intergenerational income mobility in Sweden and United States using as close data as Solon have used. They have analyzed data from independent father and son samples from The Swedish Level of Living Survey in 1987, and found out that the comparable estimates using sons’ actual and fathers’ predicted income are 0.226 for
Sweden and for United States it is 0.329. When using techniques based on observable characteristics, for instance, using father’s education as an instrument, the correlation decrease to 0.173 for Sweden and 0.232 for United States. These results illustrates that Sweden has relatively lower correlation between fathers’ and sons’ earnings and higher intergenerational mobility than United States. According to the estimates they made, 40 percent of United States sons will end up poor as their fathers did, and 40 percent of those who had well-performed fathers also performed well. For Sweden, this percentage falls to 25 percent. It seems that Sweden has both less income inequality and Swedish children have higher possibility to change their labor market position compared to their parents.

Also, in Blanden et al.’s (2005) report for intergenerational income mobility in Europe and North America summarized that the intergenerational partial correlation is 0.143 for Sweden and 0.289 for United States which affirmed the argument that the intergenerational earnings mobility in Sweden is higher than United States. With the help of ‘The Great Gatsby Curve’, we may understand these facts better. The Great Gatsby curve is a chart illustrating the relationship between inequality and intergenerational mobility in several countries around the world. From the chart we may observe that Sweden has relatively low intergenerational earnings elasticity (around 0.27) which indicates higher mobility and more equality in earnings compared to United States. However, compared to other Nordic countries, Sweden has less mobility in earnings across generations which indicate that compared to those countries, Sweden has lower level of equality in opportunities.

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5 The partial correlation is equal to the beta coefficient scaled to adjust for changes in inequality across generations (Blanden et al.,2005).

6 The curve was introduced in a 2012 speech by chairman of the Council of Economic Advisers Alan Krueger and the President’s Economic Report to Congress, using data from labor economist Miles Corak.
Moreover, daughters and sons in Sweden performed differently in the labor market and drawn different patterns in intergenerational mobility of earnings (Hirvonen 2008). Daughters tend to be slightly more mobile than sons, and the difference between their elasticity estimates is small but statistically significant. Hirvonen found that intergenerational earnings mobility for daughters is ranged from 0.231 to 0.250 and it is from 0.257 to 0.297 for sons. Relatively higher mobility in daughters may due to the increasing number of labor participation for females in Sweden.

When it comes to immigrants, the pattern changes a bit. Borjas (1992) estimated the intergenerational correlation for different cohort immigrants using 1940-1970 census of United States and found out that, although there exists an overall regression towards the
mean for second-generation immigrants, they are strongly affected by variables describing economic characteristics in the source country of their parents. When estimating immigrant’s intergenerational mobility of earnings using country of origin as an instrumental variable, Borjas reached the result that immigrants from countries that are well-developed have similar degree of mobility with natives and even some cohorts have relatively higher mobility than natives. For instance, the correlation coefficient for second-generation immigrants who have at least one Swedish parent in 1970 is 0.178 and they have become more mobile during 1940s to 1970s. For native children and second-generation immigrants with both parents foreign born, the regression estimate is 0.140 and 0.207 respectively (Hammarstedt, 2006). Moreover, the skill gap that transmitted from their foreign parents account for differences in intergenerational earnings mobility for second-generation immigrants from various cohorts.

Borjas (1992) also claims that the factors lead to this deviation from natives for second-generation immigrants in United States are ethnic differences in skills (or human capital) and earnings transmission across generations. The human capital of the next generation not only depends on parental investment, it also depends on the quality of the ethnic environment the parents made their investment in and the overall performance of the ethnic group of the parents, which Borjas stated as “ethnic capital”. Ethnic capital works as an externality on children’s intergenerational mobility of earnings and the better the quality of this type of capital the better the outcome for descendants who have foreign-born parents. Furthermore, the ethnical differences in human capital may persist longer if this external effect is sufficiently strong.

On the other hand, although studies conducted on second-generation immigrants’ earnings mobility in Sweden is relatively scarce, Mats and Mårten (2006) conducted an analysis on Swedish data using “ethnic capital externality” theory and found that there appears an overall convergence in average earnings between immigrants and natives and
immigrants have lower intergenerational earnings mobility than natives. First-generation immigrants in Sweden, on average, earned 5 percent less than natives, yet for their Swedish-born children, the situation is improved. The 5 percent disadvantage has turn into 1.6 percent advantage for the second-generation immigrants overall. However, intergenerational mobility of earnings diverse a lot within different immigrant groups, for instance, immigrant children who have parents from Middle east, Africa and Turkey showed lowest intergenerational earnings mobility and children who have parents from Eastern Europe and other Nordic countries demonstrated the highest mobility in income. Overall, second-generation immigrants with parents from Southern-Europe or Non-European countries performed worse in Swedish labor market compared to their parents and both their native and none-native counterparts. For instance, first-generation immigrants from countries like Turkey, Greece, the Middle East and Africa earned 20 to 25 percent less than natives on average. Nevertheless, their children earned 30 to 35 percent less than natives (Hammarstedt et al.,2006).

Nordin and Rooth (2011) tried to find out the causes to the disadvantages for immigrant children in their income compared to natives. By analyzing a special set of data where the outcomes were not affected by labor market discrimination, they found that the differences in labor market performance between natives and second-generation immigrants were generated by the skill gap between them. And immigrant children with a Swedish mother performed significantly better than those who have both parents foreign born. And this indicates that a Swedish mother transfer more “valuable” or “efficient” endowment and human capital to their offspring.

4. Discussion

We may observe from above that different researchers reached different results by applying a common method on various data sets. It is reasonable to assume that the findings based on data from other countries, for instance, Northern Europe and United
States, will also apply for Sweden. However, most of the studies consider only natives or complex population samples, only few studies considered immigrants and their descendants. The scarcity of studies on immigrants may due to data limitation. Even though Sweden is a relatively open country which welcomes and willing to help immigrants, the data collected to study the degree of intergenerational earnings mobility is unabundant. It seems common for immigrants to have relatively lower mobility in their earnings across generations in different countries overall. And it also seems true for immigrants to be less advantaged in Swedish labor market according to the studies conducted both inside and outside Sweden (Björklund et al., 1997; Hammarstedt et al., 2006; Corak, 2013; etc.). However, this is limited for immigrants from less developed countries and for immigrants who are from countries that are geographically and culturally close to Sweden or relatively more developed, both them and their children end up well in Swedish labor market. Also, second-generation immigrants with at least one parent Swedish born, especially whom with a Swedish mother, have the best outcome among all second-generation immigrants (Rooth et al., 2003). This result gives out a hint on how important the transmission of country-specific human capital is for second-generation immigrants.

To possibly improve their labor market positions for immigrants in Sweden, one way is to accumulate valuable human capital, for sure. Common human capital, as long as country-specific human capital are crucial. Neither endowment nor human capital transmits at a random rate (which is referred to “inheritability”) from parents to children is under control. Another factor affects intergenerational earnings mobility for immigrants is uncertain luck, or in other words, discrimination. No object can avoid the influence of various types of luck and there is minor ways to predict or estimate the luck one might face. Therefore, in order to promise the descendant a “better future”, disadvantaged immigrants can only try to improve their own conditions by investing more in human capital both on their children and themselves.
5. Conclusion

Intergenerational earnings mobility tells us whether the offspring from a rich family could maintain their position in higher quantile of earnings distribution like their parents and whether offspring from poor family could improve their socioeconomic status. In previous sections we have discussed about the determinants of intergenerational earnings mobility of both natives and second-generation immigrants in Sweden. We observed that there are many factors lead to differences in earnings of various cohorts. Endowments, including biologic and cultural characteristics idiosyncratic to the family, are transmitted at a rate which called inheritability, from parents to their children within a family. Along with their endowment, public and parental expenditure construct a child’s human capital, and human capital contributes to the future earnings of children in that family. Parents aim at maximizing the welfare of the family by allocating their income on their own consumption and investment on human capital of their children (which is the parental expenditure in human capital production function). By investing on their children’s human capital, the earnings of children and their parents are linked together. When parents can readily borrow capital to finance their investment, under the effect of endowment, the intergenerational earnings mobility depends on the inheritability of endowment. High inheritability indicates that the earnings of two generations are more closely linked. On the other hand, when parents need to self-finance their investment on their offspring, intergenerational earnings mobility also depends on the willingness to invest on their children’s human capital. Compared to native parents, immigrant parents in Sweden will face difficulty borrowing assets to finance their investment.

Further, the number of siblings and parental composition also have different impacts on intergenerational earnings mobility. There exists a negative correlation between family size and intergenerational earnings mobility and having a parent with Swedish background is more favorable. Ethnic capital is another determinant of intergenerational earnings mobility. If ethnicity has a lasting effect on second generation immigrants, the
future earnings of children will strongly depend on their parents’ earnings, therefore, they will experience difficulties changing their positions in the earnings distribution which indicate a low intergenerational mobility of earnings. Progressivity of public expenditure also influence intergenerational earnings mobility to some extent. The mobility will increase if the public investment is more progressive.

However, uncertainty in a labor market may actually be the most important factor which affects immigrant children’s outcome and it is hard to estimate or predict. Market discrimination does exist in Swedish labor market, so that immigrants can only offset the disadvantages brought by discrimination through the accumulation of more human capital that will be highly valued in Swedish labor market.

The degree of intergenerational earnings mobility for a given society can only be estimated by empirical data. Moreover, it requires both parental and children’s lifetime earnings for the estimation. Therefore, the estimation of mobility is mostly conducted on earnings of two generations in a given year, or their annual income. Lifetime earnings are estimated using annual income which will cause bias in the estimation of intergenerational income mobility. Further, studies conducted in Sweden for immigrants uses relatively old data (most of the data was collected during 1970s-1980s) and intergenerational income mobility may change overtime. Immigrants may have improved their lives during recent decades, therefore, to see to what extent immigrants have changed their labor market position for themselves and for their descendants, more explicit data is needed.

Immigrant population has increased during the last few years, especially refugees and asylum seekers increased rapidly. Those immigrants with relatively low human capital and assets compared to natives face more disadvantages, therefore, they may need to invest more in their own and their children’s human capital to improve their outcomes.
Moreover, those immigrant parents need to make their investment on their children as early as possible and early investments must be followed up by later investment to insure the outcome is consistent and long-lasting.

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