

Intergenerational Mobility of Earnings and Income among Sons and Daughters in Vietnam

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Abstract. In this paper, I investigate intergenerational mobility of earnings and income among sons and daughters in Vietnam. In particular, my objective is to estimate intergenerational elasticity (IGE) of sons' and daughters' individual earnings and individual income with respect to their fathers' individual earnings. The two-sample two-stage least squares (TS2SLS) estimation is applied to achieve the research objective using two primary samples of son-father and daughter-father pairs from Vietnam Household Living Standard Surveys (VHLSS) of 2012, and one secondary sample from Vietnam Living Standard Surveys (VLSS) of 1997-98. My preferred results show that baseline IGE estimates of Vietnamese sons are 0.361 and 0.394 for individual earnings and individual income, respectively. For Vietnamese daughters, baseline IGE estimates are 0.284 and 0.333 for individual earnings and individual income, respectively. These IGE estimates explicitly reveal that Vietnam has intermediate degrees of both individual earnings and individual income mobility across generations for both sons and daughters by an international comparison.

Keywords: Intergenerational Mobility; Intergenerational Elasticity (IGE); Earnings; Income; Two-Sample Two-Stage Least Squares (TS2SLS); Vietnam

JEL Classifications: D31, J31, J62

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1 Introduction

Inequality has increasingly been viewed as a stylized problem facing a modern welfare state in the twenty-first century (Piketty, 2014a, 2014b, 2015). As social scientists and policy-makers have paid much attention to inequality, they have placed prominence to equality of opportunity in addition to how socio-economic outcome is equally distributed among social classes. The extent to which a child's socio-economic status in the current generation is determined by his or her parents' socio-economic outcome in the previous generation probably provides an in-depth understanding of the degree of opportunity equality. This has been a very important motivation for massive academic investigations of intergenerational mobility that has been witnessed over last three decades (Black and Devereux, 2011; Solon, 1999).

Intergenerational mobility formally provides an exploration of the relationship between parents' socio-economic outcome and that of their children as adults. This research topic has abundantly been investigated both by sociologists and economists (Blanden, 2013; Torche, 2015). The key difference in the approach to intergenerational mobility between sociologists and economists is mainly on how they define a measure of socio-economic outcome. From sociologists' perspective, an appropriate proxy for socio-economic outcome is usually related to social class or social status. Among them, occupation is predominantly chosen as a main indicator for socio-economic status in the realm of sociology (Hout, 1988; Mazumder and Acosta, 2015).¹ On the other manner, when economists explore economic mobility across generations, they place a lot of emphasis on earnings and income as key indicators of socio-economic outcome or socio-economic success (Black and Devereux, 2011; Solon, 1999).²

In this study, from an economic perspective, I examine the persistence of economic outcome between a father and a child, including both a son and a daughter as adults, in Vietnam. For the measurement of economic outcome, individual earnings is chosen as a father's economic outcome while there are two different measures of economic status for a child, including individual earnings, and individual income.

¹ In addition to occupation, education can be used as a socio-economic status in intergenerational social mobility studies (Bauer and Riphahn, 2009; Binder and Woodruff, 2002; OECD, 2003).

² In studies of intergenerational economic mobility, other measures of economic status can probably be used such as wealth (Asadullah, 2012; Charles and Hurst, 2003), and consumption expenditure (Aughinbaugh, 2000; Charles *et al.*, 2014; Waldkirch *et al.*, 2004).

Vietnam has been characterized by increased inequality along to recent impressive economic growth, and expansions of education that are typical characteristics of a transition economy (Haughton, 2001). Research on economic inequality has been vastly carried out in Vietnam (Adger, 1999; Nguyen *et al.*, 2007; van de Walle and Gunewardena, 2001). However, most studies of economic inequality primarily focus only how economic outcome is intragenerationally distributed among social classes, or social groups at a specific year or period. Such measuring inequality using cross-sectional data, therefore, cannot reveal the transmission of inequality from one generation to the next as well as the degree of opportunity equality in Vietnam. Studies of intergenerational mobility probably overcome this shortcoming. Such a context, therefore, makes Vietnam becomes an important case to investigate intergenerational mobility.

Research on intergenerational mobility in Vietnam is relatively rare. From the existing empirical literature, Emran and Shilpi (2011) is the only original paper of intergenerational mobility up until now in Vietnam. However, this study focuses on intergenerational mobility of occupation from sociologists' view rather than economists' perspective. There has been no empirical evidence on intergenerational economic mobility in Vietnam. Hence, this study significantly fulfills the gap.

From the existing literature, there is a stylized fact that most previous intergenerational economic mobility studies have been carried out in North American and European countries, especially the United States (Aaronson and Mazumder, 2008; Bhattacharya and Mazumder, 2011; Björklund and Jäntti, 1997; Chetty *et al.*, 2014a, 2014b; Mazumder, 2005; Solon, 1992; Zimmerman, 1992), Canada (Aydemir *et al.*, 2013; Corak and Heisz, 1999; Fortin and Lefebvre, 1998), Sweden (Björklund and Chadwick, 2003; Björklund and Jäntti, 1997; Gustafsson, 1994; Hirvonen, 2008; Österberg, 2000), United Kingdom (Atkinson, 1981; Atkinson *et al.*, 1983; Dearden *et al.*, 1997; Nicoletti and Ermisch, 2008), Norway (Bratberg *et al.*, 2005), France (Lefranc and Trannoy, 2005), and Italy (Mocetti, 2007; Piraino, 2007). Among these countries, the degree of intergenerational earnings or income mobility is highest in Scandinavian countries (Björklund and Jäntti, 2000; Corak, 2006; Solon, 2002).

In Asia, previous studies are mainly implemented in developed countries such as Japan (Lefranc *et al.*, 2014; Ueda, 2009), South Korea (Choi and Hong, 2011;

Lee, 2014; Ueda, 2013), Taiwan (Kan *et al.*, 2015; Ueda and Sun, 2013), and Singapore (Ng, 2007, 2013; Ng *et al.*, 2009).³

There are rarely such studies for developing countries, especially transition economies like Vietnam. The current study is first conducted in Vietnam. With this study, my objective is to contribute empirical evidence to the literature of intergenerational economic mobility. In doing this, I use Vietnamese data to estimate regressions of offspring's individual earnings, and individual income on fathers' individual earnings. Moreover, findings from this study are compared to results from other countries, especially for developing countries and Asian countries as well, in order to reveal whether Vietnamese society is relatively mobile.

In studies of intergenerational mobility, researchers' key objective is to estimate intergenerational elasticity (IGE) or correlation (IGC) of earnings or income. In this study, I focus on the former estimate rather than the latter one. IGE is a reasonable statistic that account for the degree of the intergenerational association between parental resource and economic status of children. In principle, a high IGE estimate between parents' and children's economic success explicitly provides an implication of a low mobile degree with a considerable magnitude of intergenerationally perpetuated inequality. In other words, a poor child is less likely to escape poverty and upwardly move on while the likelihood for a child who was born in a wealthy family to persist in the top position from the social ladder of economic outcome is substantial. In such a high IGE society, the degree of equality of opportunity is relatively low. In contrast, a modest IGE estimate indicates a high level of economic mobility across generations, and then a high degree of opportunity equality.

In order to obtain IGE estimates, researchers do conventionally use a typical sample in which there is information on permanent economic outcome for both parents and children as adults. Unfortunately, such data sets are rarely available in the world, especially in developing countries. Vietnamese data is not exceptionally a case so that I cannot apply this approach for this country. In this study, in order to surmount the problem of lack of data, I use the two-sample two-stage least squares (TS2SLS) estimator to estimate IGEs for sons and daughters as adults in Vietnam. TS2SLS is first applied in Björklund and Jäntti's (1997) paper on intergenerational economic mobility in Sweden and the United States.

³ For previous intensive surveys, see Björklund and Jäntti (2009), Black and Devereux (2011), Blanden (2013), Corak (2006), and Solon (2002).

In principle, TS2SLS employs two samples including a primary sample and a secondary one. The primary sample consists of observations on son-father or daughter-father pairs in which information on children's economic outcome and socio-economic characteristics, and fathers' socio-economic characteristics is available. Unfortunately, information on "true" fathers' economic outcome is not available in this sample. Therefore, the regression of children's economic status on that of true fathers cannot be done in such a primary sample. To overcome the problem of unavailability of "true" fathers' economic status variable, a secondary sample of "potential" fathers, i.e. male workers, from another source that includes both information on observations' economic outcome, and socio-economic characteristics classified as same as those in the primary sample is employed in order to generate the equation for predicting missing information on true fathers' economic outcome in the primary sample. The equation is basically a result of the regression of potential fathers' economic outcome on their socio-economic characteristics variables in the secondary sample. Missing values of true fathers' economic outcome in the primary sample are calculated by replacing variables of true fathers' socio-economic characteristics into the equation generated from the secondary sample.

In this study, two primary samples of son-father and daughter-father pairs are taken from the Vietnam Household Living Standards Survey (VHLSS) of 2012 (GSO, 2013) while a secondary sample of potential fathers is extracted from the Vietnam Living Standards Survey (VLSS) of 1997-1998 (GSO, 1999). Also, socio-economic characteristics used to predict true fathers' individual earnings in the present study include education, occupation, industry, and geographic region. With such a procedure, baseline IGE estimates for sons and daughters in Vietnam are yielded.

When the TS2SLS estimator is used to estimate IGEs, it is important to emphasize that using different choice sets of socio-economic characteristics to predict true fathers' economic outcome in the first stage probably produces different IGE results. Therefore, in addition to estimate baseline IGE estimates, the sensitivity of IGE estimates to various model specifications in the first stage is checked in this study.

Furthermore, the literature of intergenerational economic mobility shows that the choice of age interval for primary sample can affect the degree of IGE estimates. In this study, sub-samples with different age ranges are used to estimate IGEs, and then importantly show whether the age range choice of sample influences IGE results for Vietnamese data.

In addition to the estimation of IGE using the TS2SLS estimator, I use the transition mobility matrix approach to investigate intergenerational mobility of earnings and income in Vietnam. The transition mobility matrix is seen as a usefully complementary approach to a mean regression in the exploration of intergenerational mobility. Transition mobility matrix has been employed in some previous intergenerational mobility studies such as [Chetty *et al.* \(2014a\)](#), and [Peters \(1992\)](#) for the United States, and [Dearden *et al.* \(1997\)](#) for United Kingdom.

It is also important to remind that the literature I focus in this study is only on intergenerational mobility studies in the group of 99% people from the income distribution. The intergenerational mobility investigated within the 1% group can probably provide very different IGE results. For example, [Björklund *et al.* \(2012\)](#) use data from *Statistics Sweden* to find a son-father IGE estimate of approximately 0.9 for the top 0.1% group of income distribution in Sweden. Obviously, the persistent degree of income from one generation to the next for a group of richest Swedish people is really high. This result is substantially contrast to a very high intergenerational mobile position for the 99% group in Sweden as a conventional wisdom.

The remainder of this paper is organized as follows. Section 2 provides the research context that is connected to the present study. In section 3, data sources and samples are presented while section 4 discusses research methods. Section 5 shows empirical results, and section 6 presents robustness checks. Finally, conclusion is pointed out in section 7.

2 Research Context

Among transitional economies, Vietnam is a typical case for investigating intergenerational economic mobility because of its recent reforms to redirect the economy from centrally-planned towards market-oriented. In this section, I provide an intensive understanding of the context of development of Vietnam's economy that is crucially linked to the current study. Firstly, I introduce reforms and economic achievements that Vietnam has experienced in the renovation era. I then discuss expansions of education as an important consequence. Finally, I focus on the issue of inequality that has been importantly along with the transition process of this economy.

2.1 Reforms and Achievements

Vietnam has undergone a transition process of its economy since the event of *Đổi Mới* (“Renovation”) in 1986.⁴ The transition has been marked with important reforms of economic policies related to economic integrations, and achievements from impressive economic growth, increased GDP per capita, and considerable poverty reductions in Vietnam.

Firstly, Vietnam has integrated more deeply into the world economy through joining international organizations. For instance, Vietnam has been a member of international organizations and free trade areas such as Association of Southeast Asian Nations (ASEAN) since 1995, ASEAN Free Trade Area since 1996, and World Trade Organization (WTO) since 2007. Such international integrations provide profound backgrounds for the “openness” of Vietnam’s economy.

As a consequence, main activities related to foreign exchange including attracting foreign direct investment (FDI) and exports have been remarkably enhanced. FDI of Vietnam has increased from USD 0.5 billion by 1992 to nearly USD 11 billion by 2010 (World Bank, 2012a). Increased FDI contributes to economic growth through growth from private sector, increased exports, and the widespread of technological progress (Anwar and Nguyen, 2010; Ngoc, 2008; Nguyen and Xing, 2006; Vu, 2008). By 1999, FDI sector contributes about 13% to the total GDP growth and approximately 25% to the entire tax revenue (Freeman, 2002). Meanwhile, exporting activities of Vietnam have been boosted during the age of renovation (IMF, 2009).

Economic policy reforms promote Vietnam to become one of most remarkable emerging economies with highest economic growth rates in the Southeast Asia (Irvin, 1995). Illustratively, on average, annual GDP growth rate of Vietnam was approximately 8.6% between 1991 and 1998 (Nghiep and Quy, 2000), and especially reached an apex of about 9.5% in 1985 (WDI, 2014). Moreover, Vietnam has successively remained its high rates of economic growth since the 1997 Asian financial crisis. Specifically, from 2000 to prior to the 2008 global financial crisis, average annual economic growth rate of Vietnam was 7.5%, which was higher than corresponding figures of the world economy, ASEAN, Asia Pacific, and India with 3.9%, 5.4%, 5.9%, and 7.3%, respectively (IMF, 2009).

Economic growth, in turn, has enhanced GDP per capita for Vietnamese people compared to the period before the 1986 *Đổi Mới* (UNDP, 2011). In 1985,

⁴ The Sixth National Congress of the Vietnamese Communist Party in December 1986 had launched a new plan for changing the economy from a centrally-planned to a market-oriented system (Thayer, 1987).

Vietnam was still one of poorest countries in the world with low GDP per capita (Thayer, 1987). However, the country has become a lower middle-income one since 2009 (Welle-Strand *et al.*, 2013). Between 1993 and 2008, Vietnam achieved an average annual growth rate of approximately 6.1% in GDP per capita (World Bank, 2012b).

Increases in GDP per capita contribute to poverty reduction in Vietnam. Poverty rates have decreased from about 58% in 1993 to 20.7% in 2010 (World Bank, 2012b). Also, there were over 60% of rural households where there was approximately 70% of Vietnam's population escaped poverty (Inchauste, 2012). Poverty reduction is apparently another achievement for Vietnamese economy's reforms. In addition, there was an annual increase of approximately 7% in consumption expenditure between 1993 and 1998 (Glewwe and Jacoby, 2004).

2.2 Expansions of Education

During the era of renovation, expansions of education have been witnessed in both demand and supply sides. Education expansions, in turn, have contributed to economic growth as well as rises in returns to schooling in Vietnam during the same period.

Education demands have increased due to a fact that changes in the structure of the economy towards industry and service sectors have increased demand for skilled workers in Vietnam (Cai and Liu, 2014). Moreover, demand for education has gone up because of not only increased demand for skilled workers but also wealth effects stemming from substantial income growth among Vietnamese households (Glewwe and Jacoby, 2004).

From the supply side, education provisions have increased because investments in education have considerably enlarged from not only the government but also the private sector. The public budget for education investments has increased in the context of educational reforms. For example, this budget was over 13% of GDP in 2010 (GSO, 2011). In addition to developments of state-funded educational institutions, the private sector has increasingly contributed to the stocks of human capital in Vietnam (Ngo *et al.*, 2006; Mok, 2008). The growth of non-public sector of education, consequently, has advanced Vietnamese citizens' accessibility to education (Goyette, 2012). Enrollment rates have increased over time in Vietnam. For example, figures for lower secondary and upper secondary schools had gone up from 66% to 72%, and from 23% to 31% between 1993 and 1998, respectively (GSO, 1999).

An important contribution of education expansions to Vietnam's economy is to provide more educated workers for labor markets. For example, rates of workers with primary education qualification or non-diploma had gone down from 49% in 1993 to 51% in 2002 and 44% in 2006 (GSO, 1994, 2003, 2007). In contrast, rates of those hold tertiary qualifications had increased from 1.8% in 1993 to 3.3% in 2002 and 4.2% in 2006 (GSO, 1994, 2003, 2007). The patterns of secondary and high school had been the same with corresponding figures of 26% and 14% in 1993, 30% and 16% in 2002, and 33%, and 19% in 2006 (GSO, 1994, 2003, 2007). Having more skilled workers allows the shift from physical-capital-accumulation-based to productivity-based growth in Vietnam's economy (Saich *et al.*, 2008; Welle-Strand *et al.*, 2013; World Bank, 2013).

Also, the returns to schooling has increased in Vietnam. For instance, there have been increases from 4.2% in 1993 to 4.8% in 1998 for female workers (Liu, 2006), and from 2.9% in 1993 to 5% in 1998 for whole labor force (Gallup, 2004).⁵ Increases in returns to human capital can lead to wage differentials, and income inequality when educated workers have more advantages to reach opportunities of improve their income due to higher levels of education, especially in private and non-farming sectors (World Bank, 2013). Sakellariou and Fang (2014) implicitly reveal that labor market reforms along with the *Đổi Mới* leads to real wage growth and increases in labor earnings or income inequality. In this context, inequality in outcomes from labor markets is also paid much attention from researchers as well as public policies (Imbert, 2013).⁶

2.3 Inequality

During the period of reforms and renovation, inequality in Vietnam has constantly risen although its magnitude is not at the apex in Asia (World Bank, 2014). Demonstratively, Gini indices modestly increase from 33, 35.4 to 40.7 in the years of 1993, 1998, and 2000, respectively (Fritzen, 2002). In 2012, Vietnam's Gini index equals 0.39, which is lower than that of China, Thailand, and Indonesia, and larger than that of India, and Cambodia (World Bank, 2014).

⁵ Exceptionally, Liu (2006) provides an inverse result, which is a decrease in returns to education from 5.9% in 1993 to 3.5% in 1998 for male workers, respectively.

⁶ Inequality in labor market outcomes can be accepted in some extent because it helps create and retain innovation and hard working motivations (Acemoglu and Robinson, 2013). However, if inequality comes from other factors such as institutional weaknesses, or parental positions rather workers' human capital or efforts, it is probably disincentive. Inequality of opportunity, therefore, is a massive problem for a permanent innovative economy.

Inequality has publicly been concerned because it can undermine harmonious growth that is an important target of Vietnam's developments (World Bank, 2014). Moreover, whether poor citizens are marginalized from economic achievements of growth is much concerned by economists as well as social researchers (Fritzen, 2002).

There are a numerous amount of studies on inequality in socio-economic outcome in Vietnam over last decade. From the sociological perspective, there are studies of inequality in education (Glewwe, 2004), or inequality in health (Granlund *et al.*, 2010; Huong *et al.*, 2006; Khe *et al.*, 2004; Minh *et al.*, 2003, 2006; Wagstaff *et al.*, 2003). Meanwhile, from the economic literature, studies of economic inequality focus on economic outcome such as income (Liu, 2008; Milanovic, 1998), or consumption expenditures (Fesselmeier and Le, 2010; Le and Booth, 2014).

However, most studies in inequality in Vietnam focus on inequality at one time rather within a generation rather than the transmission of inequality from one generation to the next that shows inequality of opportunity. Also, inequality of opportunity is increasingly paid more attention in Vietnam (World Bank, 2014). There is apparently no solid evidence on inequality of opportunities in economic outcome in Vietnam. This study is the first study on intergenerational economic mobility in Vietnam.

3 Data Sources and Samples

In this paper, the two-sample two-stage least squares (TS2SLS) estimation is applied to estimate IGEs for Vietnam. The current study employs two primary samples of sons and daughters as adults from the Vietnam Household Living Standards Surveys (VHLSS) of 2012 (GSO, 2013) and one secondary sample of potential fathers from the Vietnam Living Standards Surveys (VLSS) of 1997-98 (GSO, 1999). This section aims, in general, to introduce sources of data and how samples are constructed for the present study.

3.1 Data Sources

There are two main sources of data used in this thesis including VLSS and VHLSS. The first source of data is from VLSS that was implemented between 1993 and 1998 by the General Statistical Office (GSO) of Vietnam as a main

census of Vietnamese households before the year of 2000.⁷ In this thesis, the secondary sample of “potential” fathers is extracted from VHLSS of 1997-1998. VLSS of 1997-98 has a representative sample of 6,000 households nationally surveyed (World Bank, 2001). In the survey, representative households from representative communes⁸ were randomly chosen from nationwide Vietnam. Households’ socio-economic information, including education, employment, health, activities of agricultural production, activities of non-agricultural production, housing, migration, fertility, and savings and credit in each household is elicited (Haughton and Nguyen, 2010; World Bank, 2001).

The second source of data is from VHLSS that is also the most important data source for basic socio-economic information of Vietnamese households since the year of 2000. VHLSS includes in a series of bi-annual surveys in which VHLSS of 2002 is the first round. VHLSS aims to make enquiries of representative households’ key socio-economic information of all members, including demographic information, expenditures, income, employment, education, health, housing, consumptions, and the programs of poverty reduction. The size of VHLSS is considerably larger than that of VLSS. VHLSS of 2012 totally composes of 23,235 households surveyed across Vietnam.

3.2 Samples

One sample of male workers from VLSS of 1997-98 and two samples of son-father and daughter-father pairs from VHLSS of 2012 are used to investigate the persistence between a father’s economic status and a child’s economic success in Vietnam. Among these three samples, two samples of son-father and daughter-father pairs from VHLSS of 2012 are seen as primary samples. A sample of male workers from VLSS of 1997-1998 is the secondary sample of “potential fathers”, which is used to predict the missing values of true fathers’ log of individual earnings in primary samples.

In all three samples, observations’ information on socio-economic characteristics including education, occupation of employment, industry of employment, and geographic region are coded in the unique method. Specifically, I employ the unique classifications for each group of socio-economic status to construct primary and secondary samples.

⁷ VLSSs were received financial supports from United Nations Development Program (UNDP) and the Swedish and International Development Agency (SIDA), and based on Living Standards Measurement Study (LSMS), the technical method from the World Bank (Haughton and Nguyen, 2010).

⁸ Communes are smallest units of the administrative management in Vietnam.

In the case of education, there are five dummy variables, including (1) *non-diploma or primary*, (2) *secondary*, (3) *vocational*, (4) *high school*, and (5) *tertiary*. In terms of occupation, there are seven categories, including (1) *very highly skilled professionals, supreme government officials and administrators, and high-class managers*, (2) *high-grade professionals, administrators, and government officials, high-grade technicians, and supervisors of non-manual workers*, (3) *typical non-manual workers, higher grade (administration and commerce) and lower grade (sales and services)*, (4) *lower-grade technicians, supervisors of manual workers*, (5) *skilled manual workers*, (6) *semi- and unskilled manual workers*, and (7) *farmers and farm workers in agricultural production*.

Regarding the classification of industry of employment, there are ten categories, including (1) *agriculture*, (2) *manufacturing*, (3) *public management*, (4) *health and education*, (5) *trade and finance*, (6) *utilities*, (7) *transportation and communication*, (8) *construction*, (9) *mining*, and (10) *community and social services*. On the classification of geographic region, there are six dummy variables. These include (1) *Red River Delta (RRD)*, (2) *Northern Midland and Mountain Areas (NMMA)*, (3) *North Central and Central Coastal Areas (NCCCA)*, (4) *Central Highlands (CH)*, (5) *South East (SE)*, and (6) *Mekong River Delta (MRD)*. Specific classifications for occupation, industry, and geographic region are respectively presented in Table A3, Table A4, and Table A5 of *Appendices*.

Descriptive statistics of these three samples are summarized in Table 1. For the primary sample of son-father pairs, the age of sons is restricted to a range from 25 to 54 at the time of 2012. Eventually, there are 1344 observations in this sample. The average age for sons and fathers in this sample are roughly 29 and 58, respectively. Therefore, their average ages at the time of 1998 are 15 and 44 year olds, respectively.

[Insert Table 1 here]

For the primary sample of daughter-father pairs, there are 632 observations. The age range of daughters is between 25 and 47. The average age for daughters is approximately 28 while the corresponding figure for their fathers is about 58 in this sample. At the time of 1998, average ages for daughters and fathers are 14 and 44 year olds, respectively.

For the secondary sample of “potential fathers,” male workers whose ages vary from 31 to 51 are included. The size of this sample is 1041 observations.

In empirical studies of intergenerational economic mobility, economists emphasize approaches to measurement errors that result in lifecycle bias and attenuation bias. Lifecycle bias of IGE estimates arises from measuring a child’s economic outcome at the early ages or older ages of his or her working life as an adult. In the environment of lifecycle bias, IGEs are underestimated. Hence, the classical assumption of simplifying measurement errors in the dependent variable, i.e. children’s economic outcome, is not accepted in such an environment.

In order to minimize lifecycle bias, therefore, an economic outcome should be imputed at ages at which workers’ economic outcome is in a stable status so that such a measure can better be a proxy for their lifetime economic outcome (Grawe, 2006; Solon 1992). In particular, Haider and Solon (2006) suggest using a measure of economic outcome at ages around the age of 40 in order to produce better IGE estimates with possible minimized bias.

In this study, I use a wider range of age for both sons and daughters in primary samples in order to estimate baseline IGEs compared to the rule of sample selection from Haider and Solon (2006). In particular, the primary sample of sons includes those aged between 25 and 54 while the age interval for the primary sample of daughters is from 25 to 47.

Moreover, most children in each sample are under the age of 30. Illustratively, there are 73.36% of sons aged from 25 to 30 while a corresponding figure for daughters is 77.85%. Meanwhile, common census statistics show that the proportion of young workers who are usually under the age of 30 is around 30% from 2007 to 2011 (GSO, 2012). Therefore, it is important to admittedly realize a problem that samples are not probably well representative for the population. Such samples with large proportion of young workers used in this study can be explained with a fact that the available data source only includes co-residential children with their fathers. The distribution of children’s age in primary samples of sons and daughters are respectively demonstrated in Figure A1 and Figure A2 of *Appendices*. Hence, according to Haider and Solon (2006) we can importantly assume that with available data, baseline IGE estimates for full samples of sons and daughters in this study are downwardly biased in some extent.

If I use the age interval based on the lifecycle bias-minimized assumption of Haider and Solon (2006) for constructing primary samples, I eventually attain a

sub-sample of 450 sons aged between 30 and 50 with 33.48% of the full sample, and a sub-sample of 182 daughters aged from 30 to 47 with 28.80% of the full sample. Although these sub-samples are small in size, they are also used to estimate IGEs in order to make comparisons with baseline IGE estimates achieved from regressions for full samples. Also, the aim is to check whether there are effects of age selection on IGE estimates for Vietnamese data.

For attenuation bias, using a current or short-run measure of economic outcome of “potential” fathers in the secondary sample may result in a substantial underestimation of true IGE estimates because temporary economic outcome is potentially a noisy proxy for long-run one (Solon, 1992; Zimmerman 1992). To overcome this source of bias, economists suggest a usage of multi-year average measure rather than a single-year measure of economic outcome because an average measure of multi-year data have been seen as an better capture of permanent economic status (Mazumder, 2005; Solon, 1992; Zimmerman, 1992).

Nevertheless, average measures of economic outcome from different numbers of years also tend to produce different magnitudes of IGE estimates. For instance, Solon (1992) finds that an IGE estimate from a five-year average of fathers’ income that is approximately 33% higher than an IGE estimate for a single year fathers’ income is a more reliable estimate. However, Mazumder (2005) evidently concludes that an average from a more-than-five-year period of economic outcome even does provide a better proxy of long-term income rather than a five-year average as suggested by Solon (1992). This strategy has widely been applied to minimize attenuation bias in empirical studies of intergenerational economic mobility; for example Hussein *et al.* (2008) for Danish data; Björklund and Chadwick (2003), Hirvonen (2008), and Österberg (2000) for Swedish data; Österbacka (2001) for Finnish data; or Corak and Heisz (1999) for Canadian data.

In addition to the usage of multi-year averages of fathers’ economic outcome, the application of a TS2SLS estimator can be viewed as an excellent approach in order to resolve attenuation bias. Kan *et al.* (2015), Piraino (2015), Cervini-Plá (2014), and Lefranc *et al.* (2014) are recent examples for applying the TS2SLS estimator. In this study, I also use the TS2SLS estimator as a useful approach to measurement errors stemming from using a one-year measure of fathers’ individual earnings. The TS2SLS is discussed in details in section 4.

Notably, there are inverse distributions of fathers’ socio-economic characteristics between the primary and secondary samples as shown in Table 1. For example, in the group of education, while *secondary* has the most frequent category for

fathers' education in the secondary sample with 33.7%, *non-diploma or primary* is the most frequent category for fathers' education in both the primary sample of son-father pairs with 40.1% and the primary sample of daughter-father pairs with 33.8%. For the group of occupation, *farmers and farm workers* only accounts for 9.3% among fathers' occupation categories in the secondary sample whereas it occupies up to 44.3% and 40.8% among fathers' occupation categories in son-father and daughter-father primary samples, respectively. Meanwhile, among categories of industry, while there is only 11.5% of *agriculture* in the secondary sample, the corresponding figures in the primary samples of son-father and daughter-father pairs are respectively 53.9% and 50.9%. Fortunately, the TS2SLS estimator can also overcome such a problem (Inoue and Solon, 2010).

4 Research Methods

4.1 Two-Sample Two-Stage Least Squares Estimation

Basically, in many studies of intergenerational mobility, IGE (β_1) is typically found out from the following regression function:

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \quad (1)$$

where Y_i is the log of the i^{th} children's permanent economic outcome, X_i correspondingly denotes the log of their father's long-run economic outcome, and ϵ_i is a random disturbance which is uncorrected with X_i . In this study, economic outcome for children (Y_i) is measured by two different variables including individual earnings, and individual income. For fathers, the proxy of economic outcome (X_i) is their personal earnings from labor markets.

The coefficient β_1 in equation (1) is the most important parameter of interest. The coefficient β_1 is directly a measure of IGE, and then a degree of $(1 - \beta_1)$ estimates the intergenerational mobility of earnings or income. Within such strategy, only one sample which consists of simultaneously both permanent children's economic outcome and that of their father is necessary for directly estimating IGE and intergenerational mobility alike.

If information on lifetime economic outcome for both children and fathers are available, ordinary least squares (OLS) estimator can be applied to consistently estimate β_1 . However, there are actually few datasets that can assuage this important requirement. In many datasets, only information on children's economic outcome (Y_i) is recorded while information on parents' economic outcome (X_i) such as earnings or income is commonly not available, especially

for data from developing countries like Vietnam. Importantly, parents' socio-economic characteristics such as education, occupation, and industry are available.

Fortunately, the problem of unavailable data is overcome by applying two-sample two-stage least squares (TS2SLS) estimation. In this study, TS2SLS is used to estimate β_1 as in (1) using Vietnamese data.

The TS2SLS estimator is based on the idea of the two-sample instrumental variable (TSIV) estimator invented by Angrist and Krueger (1992). Nevertheless, Inoue and Solon (2010) evidently show that in a two-sample environment, an estimator from TS2SLS is asymptotically efficient than that from TSIV. More importantly, the application of the TS2SLS estimator is viewed as an excellent approach in order to resolve possible attenuation bias stemming from a one-single-year measure of fathers' economic status.

The first application of the TS2SLS estimation is Björklund and Jäntti (1997). In this study, Björklund and Jäntti (1997) use a sample of 540 fathers from *Swedish Level of Living Survey (SLLS)* in 1968 and a sample of 327 son-father pairs from the 1991 *SLLS* to explore intergenerational mobility for Sweden.

Since then, numerous amounts of studies use TS2SLS to investigate intergenerational mobility. For instance, Fortin and Lefebvre (1998) is a study of Canadian intergenerational mobility for sons and daughters using two samples from *General Social Surveys* and *Canadian Censuses*. Lefranc and Trannoy (2005) use different samples from *French Education-Training-Employment* surveys and the procedure of TS2SLS estimation to estimate intergenerational elasticity for sons and daughter in France. Dunn (2007) applies the sample methods to examine intergenerational mobility in Brazil. Gong *et al.* (2012) use samples of from *Urban Household Education and Employment Survey* and *Urban Household Income and Expenditure Survey* to investigate intergenerational mobility for sons in urban China.

More recently, Piraino (2015) applies the same method to investigate intergenerational mobility using data from *National Income Dynamics Study* in South Africa. Lefranc *et al.* (2014) recently provide an analysis of intergenerational earnings mobility for both sons and daughters in Japan using two samples from *Social Stratification and Mobility* surveys. Cervini-Plá (2014) estimates intergenerational elasticity for Spain using TS2SLS estimation.

In using the TS2SLS estimation, two different samples and two stages are used to obtain β_1 . Let's first consider two samples. The first sample is the main or primary sample that consists of child-father pair observations. In this sample,

information on children’s long-run economic status is available. However, information on fathers’ lifetime economic outcome is not available. Fortunately, the availability of socio-economic characteristics of fathers Z_i such as education, occupation, industry of employment, geographic region, and others are available in the primary sample are used to impute their missing variable of permanent economic outcome. The second sample is called the secondary or supplemental sample that includes important information on male workers including economic outcome and their socio-economic characteristics like Z_i in the primary sample. Male workers in this sample are seen as “potential” fathers of children in the primary sample because all basic socio-economic variables of these male workers (Z_i) are employed to predict economic outcome of “true” fathers in the primary sample.

Regarding two stages to achieve the IGE, the first stage is to predict missing values of fathers’ permanent economic outcome in the primary sample. To do this, firstly we need to establish the relationship between fathers’ socio-economic status and fathers’ current individual earnings (X_i) using the secondary sample. In other words, \widehat{X}_i is the prediction of X_i , basically conducted based on Z_i .

In the primary sample, missing values of fathers’ permanent economic outcome are calculated by the following equation:

$$\widehat{X}_i = \widehat{\gamma} Z_i \quad (2)$$

where \widehat{X}_i is predicted of fathers’ economic outcome, and $\widehat{\gamma}$ is the corresponding coefficients of Z_i estimated in the first stage. Note that socio-economic characteristics of fathers in the primary sample are same as “potential” fathers in the secondary sample.

From the existing literature, predictors of fathers’ economic outcome can be education (Lefranc *et al.*, 2010); or occupation (Fortin and Lefebvre, 1998); or education and occupation (Björklund and Jantti, 1997; Núñez and Miranda, 2011; Ueda and Sun, 2013); or education, occupation, and industry (Gong *et al.*, 2012; Kim, 2013); or education, occupation, and geographic region (Lefranc *et al.*, 2014). In this paper, socio-economic characteristics of potential fathers (Z_i) that consist of *education*, *occupation*, *industry*, and *geographic region* are used to predict of fathers’ individual earnings.

In second stage, IGE for “true” fathers and children is estimated using the primary sample. In other words, children’s outcome is regressed on imputed economic outcome of “true” fathers’. In summary, β_1 which is estimated by the

TS2SLS estimator is the IGE of children's economic success with respect to their fathers' economic outcome in this study.

4.2 Transition Mobility Matrix Approach

Transition matrix approach that is usefully complementary to an estimation method such as the least squares regression is used to examine the pattern of intergenerational mobility. In particular, a transition matrix of mobility indicates the possibility that a son or a daughter as an adult can change his or her position in the distribution of economic outcome, i.e earnings or income, relative to the position of their parents. The distribution of earnings or income can be presented as quartiles or deciles. Such transition matrices of mobility are shown in contingency tables.

In this study, the quartile matrices of mobility are used to express mobility patterns of earnings and income for both sons and daughters in Vietnam. To do this, a father's and a child's economic outcome are divided into four equal-sized groups and ranked orderly. The quartile 1 is indexed for the bottom quartile of those who are arranged in the range from the 0th to 25th percentile while the quartile 4 is denoted for the top quartile of those who are in the range from the 75th to 100th percentile of the distribution of economic outcome.

There are two benchmark cases for mobility including "perfectly mobile" and "zero mobile." Perfect mobility is the case in which a father's economic success does not completely affect a child's economic outcome. In this case, therefore, there is a possibility of 25% for a child to be in each quartile regardless his or her father's position in the economic outcome distribution. In contrast, there is no chance for a child to change the position given his or her father's place from the distribution of economic outcome in the benchmark case of zero mobility. In this case, the transition matrix becomes an identity matrix with all elements of 1 in the main diagonal and 0 elsewhere. However, it is rarely to have such extreme cases in reality.

This approach is applied in some previous studies. For example, [Dearden *et al.* \(1997\)](#) find that the possibilities of upward or downward moving are low for children born to fathers whose places in extreme quartiles from the income distribution in United Kingdom. In particular, roughly 12.8% and 11.8% of sons and daughters born to bottom quartile fathers move up to the top quartile from the income distribution. In an opposite direction, approximately 6.4% and 12.9% of sons and daughters born to fathers in the top quartile move down to the bottom quartile from the income distribution. In addition, children born to

top quartile fathers are much likely to remain the same position as their fathers, particularly, with 52.2% and 47.6% for sons and daughters, respectively.

5 Empirical Results

5.1 First-Stage Results

A secondary sample of “potential” fathers from VLSS 1997-98 that consists of 1041 male workers aged from 31 to 54 is used to predict missing information on “true” fathers’ individual earnings in primary samples. Potential fathers’ average age is 39.97 in this secondary sample. The rationale for the choice of such an age range is based on an age-range-to-minimize-lifecycle-bias suggestion from Haider and Solon (2006).

In this first stage, the log of potential fathers’ individual earnings is regressed on age, age squared, and dummy variables for education, occupation, industry, and geographic region. The analysis preferably focuses on coefficients of socio-economic characteristics because these are parameters of interest in the first-stage model. Preferred results of the first stage are presented in Table 2. The first stage model can be explained by a R^2 of 0.186.

[Insert Table 2 here]

Observing coefficients for preferred variables, we can recognize that earnings differentials occur among categories within each group as well as across various groups of socio-economic characteristics for male workers in this secondary sample. For the group of education, *tertiary* generates a highest returns with a proportion of 56.7% higher than *non-diploma or primary* (the omitted variable) that produces the lowest returns. Meanwhile, in the group of occupation, *lower highly skilled* yields the highest returns, with 38.4% higher than *famers and farm workers* (the omitted variable) that has the lowest returns. For the group of industry, two categories *utilities* and *construction* yield highest and lowest returns with 19.7% higher and 28.6% lower than *mining* (the omitted variable), respectively. For the group of geographic location, regions *RRD* and *MRD* have highest and lowest returns with 50% higher and 4.2% lower than *CH* (the omitted variable), respectively.

In Table 2, we can also recognize that education and geographic region have larger impacts on individual earnings of male workers rather than occupation

and industry. This can be explained by increases in earnings differentials along with increased returns to education (Imbert, 2013; Liu, 2006), and increased gaps of earnings among different geographic regions (van de Walle and Gunewardena, 2001; World Bank, 2014) in Vietnam over two last decades.

Importantly, age and age-squared are included in independent variables in the first-stage model. However, estimated coefficients for age and age-squared variables are not used to generate missing values of log of true fathers' personal earnings in primary samples because true fathers' individual earnings is in principle imputed in permanent status rather than in a specific age from their working life.

Because there are two measures of children's economic outcome including individual earnings and individual income in primary samples, there are two types of IGE estimate in the second stage, including firstly an estimate of the elasticity between children's individual earnings and fathers' individual earnings, and secondly an estimate of the elasticity between children's individual income and fathers' individual earnings. Note that in all cases, the unique independent variable is the log of father's individual earnings, which is imputed from the first stage.

5.2 Empirical Results for Sons

Baseline Intergenerational Elasticity for Sons

Baseline IGE estimates for sons are reported for two different cases of economic outcomes as dependent variables are presented in Table 3. The sample size for these estimates is 1344 son-father pair observations.

In Table 3, we can see that baseline IGE estimates are all statistically significant at the level of 1%. In Column 1 of Table 3, a baseline IGE estimate of 0.361 is found for individual earnings. Meanwhile, a corresponding estimate for individual income is 0.394 as shown in Column 2. These degrees of intergenerational persistence in economic outcome point out that a 10% difference in fathers' individual earnings likely lead to roughly 3.61% and 3.94% differences in sons' individual earnings and individual income, respectively in Vietnam.

The result also indicates that the persistence of fathers' individual income on sons' individual income tend to be higher than that in case of individual earnings. Relatively, the baseline IGE estimate for individual income is 9.14% higher than that for individual earnings.

[Insert Table 3 here]

Internationally compared to estimates from other countries, baseline IGE estimates of Vietnamese sons are ranked as intermediate levels for both individual earnings and individual income. The intermediate IGE degrees for Vietnamese sons are relatively similar to previous IGE estimates in some countries such as 0.42 in Spain (Cervini-Plá, 2014), 0.40 in South Korea (Kim, 2013), 0.35 in Japan (Lefranc *et al.*, 2014), and 0.40 in French (Lefranc and Trannoy, 2005).

These IGE estimates for Vietnam are smaller than those in some other countries such as South Africa with an estimate of 0.62 (Piraino, 2015), Brazil with an estimate of 0.60 (Ferreira and Veloso, 2006), urban China with an estimate of 0.63 (Gong *et al.*, 2012), Chile with an estimate of 0.57 (Núñez and Miranda, 2010), and Italy with an estimate of 0.50 (Mocetti, 2007; Piraino, 2007).

Of course, many other countries are more mobile relatively compared to Vietnamese society when IGE estimates for sons are considered. For example, Björklund and Jäntti (1997) find an estimate of 0.28 for Sweden.

Transition Mobility Matrix for Sons

Next, I analyze results of transition mobility patterns across generations from the economic outcome distributions for sons. I have two cases of quartile transition matrix with two measures of economic outcome. In all these cases, the proxy for fathers' economic outcome is personal earnings which is predicted in the first stage using fathers' education, occupation, industry, and geographic region.

Table 4 shows estimates of father-to-son mobility between quartiles from the distribution of individual earnings in labor market. Focusing on main diagonal we can observe that proportions for a son to maintain his position from the distribution of individual earnings as same as his fathers' one is not considerably different among quartiles. For example, there are 39.76% of sons remaining in the top quartile as their fathers in the previous generation. From the opposite side, 37.08% of sons who have fathers' position in bottom quartile stay in the same place of their fathers. Meanwhile, 26.91% and 28.14% percent of sons respectively stay in second and third quartiles as their fathers. The

result also, therefore, indicates a nearly symmetric pattern of mobility between upward mobility from the bottom quartile and downward mobility from the top quartile.

[Insert Table 4 here]

The pattern of father-to-son mobility for individual income is same as individual earnings. The result is presented in Table A1 in *Appendices*.

5.3 Empirical Results for Daughters

Baseline Intergenerational Elasticity for Daughters

Similar to sons, there are two cases for estimating baseline IGEs for daughters corresponding to two measures for daughters' economic outcome, including individual earnings and individual income. Note that for these two cases, a unique measure for father's economic outcome is personal earnings.

Table 5 shows baseline IGE estimates for daughters found from a sample of 632 daughter-father pairs. As indicated in Column 1, a baseline IGE estimate of 0.284 is found for individual earnings. When the dependent variable is daughters' individual income, the baseline IGE estimate is 0.333 as shown in Column 2. These degrees of intergenerational economic mobility meaningfully implicates that a 10% difference in fathers' individual earnings is likely to result in approximately 2.84% and 3.33% differences in Vietnamese daughters' individual earnings and individual income, respectively.

Also, similar to sons' case, the baseline IGE estimate for Vietnamese daughters is higher for individual income than for individual earnings. Relatively, the baseline IGE estimate of individual income is 17.25% higher that of individual earnings.

[Insert Table 5 here]

These IGE estimates for Vietnamese daughters' individual earnings and individual income explicitly indicate average levels of intergenerational mobility compared to other countries. Such average degrees of intergenerational mobility for Vietnamese daughters are almost similar to Spanish daughters with an

estimate of around 0.386 (Cervini-Plá, 2014), or Japanese daughters with an estimate of nearby 0.35 (Lefranc *et al.*, 2014). Meanwhile, some countries occupy lower IGE estimates for daughters than that of Vietnam. For example, Sweden has an estimated IGE of approximately 0.25 (Hirvonen, 2008).

Generally, observing baseline IGE estimates for both Vietnamese sons and daughters, we can recognize that there is a same pattern for intergenerational mobility of earnings and income. Particularly, the degree of persistence of individual income is higher than that for individual earnings.

Nonetheless, daughters have smaller degrees of economic outcome persistence from fathers' background than sons for both two measures of economic outcome, although the gaps are not substantial. Specifically, baseline IGE estimates for sons and daughters are respectively 0.361 and 0.284 for individual earnings, and 0.394 and 0.333 for individual income. The gaps between sons' and daughters' baseline IGE estimates are 0.077 and 0.061 for individual earnings and individual income, respectively. This finding is similar to results in previous studies. For example, Chadwick and Solon (2002) find IGE estimates of 0.535 and 0.429 for American sons and daughters. Nilsen *et al.* (2012) obtain IGE estimates between 0.16 and 0.34 for sons, and between 0.12 and 0.23 for daughters in Norway. On the contrary, sons are more intergenerationally mobile than daughters in some other countries. For example, Lefranc *et al.* (2014) discover a baseline IGE estimate for sons of close to 0.34 while a corresponding figure for daughters of nearby 0.39 although the difference between these baseline estimates is inconsiderable.

Transition Mobility Matrix for Daughters

Regarding the transition mobility matrix for daughters, Table 6 presents the individual earnings mobility patterns of daughters relatively compared to their fathers' economic status. Accordingly, the transition matrix for individual earnings mobility is relatively symmetric, that is comparatively similar to that of sons. Approximately one third of daughters in the primary sample have top and bottom quartiles as their fathers. The corresponding figures are respectively 37.13% and 31.01%. In another manner, the proportion of daughters whose fathers are in top quartile downwardly moves to bottom quartile with 20.25% is larger than the proportion of daughters upwardly moves to top quartile from their fathers' bottom quartile with 15.57%.

[Insert Table 6 here]

The pattern of the transition mobility for individual income is also similar to that for individual earnings. The result is presented in Table A3 in *Appendices*.

6 Robustness Checks

Having presented baseline results of IGEs of individual earnings and individual income of sons and daughters with respect to their fathers' individual earnings in section 5, now I turn to analyze the robustness of these baseline IGE results along two dimensions. Firstly, the sensitivity of IGE estimates for full samples of sons and daughters to various first-stage model specifications is examined. Secondly, the sensitivity of IGE estimates to different age ranges of children in primary samples is specifically checked.

6.1 Robustness Checks of IGE Estimates to Different First-Stage Model Specifications

As shown in the existing literature, TS2SLS estimator may suffer from bias because socio-economic characteristics employed to predict fathers' economic outcome in the first stage probably have direct impacts on children's economic outcome. Moreover, the magnitude of bias due to this problem depends on the set of socio-economic characteristics used to predict fathers' economic outcome. Hence, it is significant to investigate the sensitivity of EGE estimates to different sets of predictors in order to shed light on whether there are effects of fathers' economic outcome predictor choices on IGE estimates.

In this paper, full samples of sons and daughters are used to estimate IGEs of individual earnings and individual income with respect to their fathers' own earnings for fifteen different cases of choices of socio-economic characteristics. In both son and daughter cases, IGE estimates from different models are compared to baseline IGE estimates to show how estimated IGEs vary.

Analysis for Sons

Table 7 presents IGE results for fifteen cases in which different sets of fathers' individual earnings predictors in the first stage are specified. The results are shown in Column 1 and Column 2 for individual earnings and individual

income, respectively. Estimated coefficients of IGE are all statistically significant at 1%.

[Insert Table 7 here]

For individual earnings, IGE estimates for different sets of fathers' economic outcome predictors relatively vary around the baseline IGE estimate of 0.361 in case 15 in which the set of fathers' individual earnings predictors include *education, occupation, industry, and geographic region*. Particularly, IGE estimates are between 0.264 in case 8 (*occupation and industry*) and 0.396 in case 9 (*occupation and geographic region*). The absolute difference between these two extreme estimates is 0.132. Compared to the baseline estimate, IGE estimates are smaller with a maximum proportion of 26.87% or higher with a maximum proportion of 9.70%.

Regarding the separate effect of a sole predictor on IGE estimates for individual earnings, results from case 1 to case 4 in Column 1 of Table 7 indicate that *education* (case 1) has the largest effect with an estimate of 0.371 while *industry* (case 3) has the smallest effect with an estimate of 0.274. The gap between two estimates is 0.097.

For individual income, the results indicate that when changing the set of socio-economic characteristics for predicting fathers' individual earnings, IGE estimates alter around the baseline value of 0.394 in case 15 (*education, occupation, industry, and geographic region*). Specifically, the minimum IGE estimate is 0.315 in case 4 (*geographic region*) that is 20.05% lower the baseline estimate. Meanwhile, the maximum IGE estimate is 0.430 in case 9 (*occupation and region*) that is 9.14% higher than the baseline estimate. The gap between these two estimates is about 0.115.

In terms of the separate effect of an individual predictor on IGE estimates for individual income, from case 1 to case 4 we can conclude that *education* (case 1) has the largest effect with an IGE estimate of 0.400 while *geographic region* (case 4) has the smallest effect with a degree of 0.315. However, the gap between these two extreme IGE estimates is relatively small with a value of 0.085.

Analysis for Daughters

In the same manner for sons, the robustness check for Vietnamese daughters' IGE estimates first-stage model specifications are implemented for individual earnings and individual income as presented in Table 8. All estimated coefficients are statistically significant at 1%. Also, there are also fifteen different sets of fathers' individual earnings predictors.

[Insert Table 8 here]

For individual earnings, the results in Column 1 of Table 8 show that IGE estimates from different sets of fathers' individual earnings predictors vary around the baseline IGE estimate of 0.284 in case 15 (*education, occupation, industry, and geographic region*). Specifically, IGE estimates alter from 0.237 in case 1 (*education*) to 0.406 in case 9 (*occupation, and geographic region*). Compared to the baseline estimate, IGE estimates can be smaller with a maximum proportion of 16.55%, or higher with a maximum proportion of 42.96%. The absolute difference between highest and lowest IGE estimates is 0.169. In comparison to sons, although IGE estimates for daughters are generally smaller than corresponding figures for sons, the range in which IGE estimates change is larger for daughters with a gap of 0.169 than for sons with a difference of 0.132.

Regarding the sole effect of individual socio-economic characteristic on IGE estimates for individual earnings, results from case 1 to case 4 indicate that *occupation* (case 2) has the largest impact on IGE estimate with a degree of 0.375 while *education* (case 1) has the smallest effect with a degree of 0.237. The result is obviously different with sons' case 1 in which *education* has the largest effect.

For individual income, as shown in Column 2 of Table 8, IGE estimates fluctuate around the baseline estimate of 0.333 in case 15 (*education, occupation, industry, and geographic region*). In particular, IGE estimates vary from a minimum estimate of 0.273 in case 1 (*education*) to a maximum one of 0.477 in case 9 (*occupation, and geographic region*). Hence, these IGE estimates are higher or smaller than the baseline one with a maximum proportion of 43.24% or 18.02%, respectively. The absolute gap between these upper- and lower- bounds is 0.204. This gap is larger than that for individual earnings with a difference of 0.169. Also, this difference is larger than a corresponding figure for sons with a gap of 0.115.

In terms of the sole effect of individual predictor on IGE estimate for individual income, *occupation* (case 2) has the largest impact with an IGE estimate of 0.433 while *education* (case 1) also has the smallest effect with an IGE estimate of 0.273. This also reveals an opposing result to sons' individual income where *education* (case 1) has the largest effect whereas *geographic region* (case 4) has the smallest effect.

6.2 Robustness Checks of IGE Estimates to Different Age Ranges

From the existing literature, there is a fact that different samples with different age range of children evidently provide various IGE estimates (Grawe, 2006; Haider and Solon, 2006). In this section, the sensitivity of IGE estimates to different sub-samples of various age intervals is analyzed for both sons and daughters. In addition, IGE results are compared to baseline IGE estimates from the previous section.

Moreover, economic outcome of both parents and children is ideally measured in long-term. However, if a measure of economic outcome is in short-term or current status, estimated IGE is biased. A biased estimate stemming from such cases is called lifecycle bias. In particular, if current economic outcome is measured in early years or at the end of a person's working life, IGE estimates are potentially underestimated. To overcome the problem of lifecycle bias, Haider and Solon (2006) importantly suggest that an economic outcome will be a reliable representative for a worker's lifetime outcome if it is measured around the age of 40. Moreover, they also indicate that an IGE estimate within this age interval is consistently obtained. IGE estimates achieved using a sample constructed by Haider and Solon's (2006) rule of sample selection are seen as most stable and reliable ones. In this section, IGE estimates for sub-samples of those aged around 40 are also produced and compared to the baseline ones.

Analysis for Sons

Table 9 presents IGE estimates for sons in various sub-samples of different age ranges, including 25-29 in Panel A, 30-34 in Panel B, and 35-54 in Panel C. IGE estimates for these three sub-samples are reported for individual earnings in Column 1 and individual income in Column 2. Accordingly, IGE coefficients are all statistically significant at 1%. Results explicitly indicate that there are considerable variations of IGE estimates across sub-samples of Vietnamese sons with different age intervals.

[Insert Table 9 here]

For individual earnings as shown in Column 1 of Table 9, IGE estimates span from 0.337 in a youngest son sample (25-29) in Panel A to 0.476 in an oldest son sample (35-54) in Panel C. The difference of these samples is 0.139. A similar pattern is shown for individual income with a range of IGE estimates between 0.358 in a sample of sons aged 25-29 and 0.491 in a 35-54 aged sample as presented in Column 2 of Table 9. The gap between two extreme estimates is 0.133. Obviously, IGE estimates are larger in son samples with older age intervals than in samples with younger sons for both individual earnings and individual income.

In addition, using a rule of age selection from [Haider and Solon \(2006\)](#), a sample of 450 sons aged from 30 to 50 is finally formed to achieve IGE estimates with minimized lifecycle bias. IGE estimates from this sample are given in Panel D. In particular, IGE estimates for individual earnings and individual income are 0.412 and 0.468, respectively. All these estimates are statistically significant at 1%. These estimates are respectively 14.13% and 18.78% higher than baseline IGE estimates in the full sample of those aged 25-54 as shown in section 5 for individual earnings and individual income. Therefore, the sample of sons aged around 40 is less mobile than the full sample of sons aged from 25 to 54. The result is consistent with the results in previous studies.

Analysis for Daughters

Table 10 reports the robustness check of IGE estimates to different sub-samples of different age ranges for daughters. Accordingly, IGE coefficients are all statistically significant at 1%. There are two main age intervals of daughters including 25-29 presented in Panel A, and 30-47 presented in Panel B used to achieve IGE estimates for individual earnings in Column 1 and individual income in Column 2. Admittedly, the small size of full sample does not allow generating more sub-samples, especially for sub-samples with age intervals at the end of career life.

[Insert Table 10 here]

Generally, the changing pattern of IGE estimates in accordance with changing age intervals of sub-samples are similar to sons' one. From 25-29 to 30-44 samples, IGE estimates increase from 0.240 to 0.437, and from 0.290 to 0.482 for individual earnings and individual income, respectively. Between these sub-samples, there is a substantial difference in IGE estimates. Specifically, the IGE estimate in the sub-sample of daughters aged 30-34 is 82.08% and 66.21% higher than estimates from the sample of daughters aged 25-29 individual earnings and individual income, respectively.

When applying Haider and Solon's (2006) rule of age selection, sample is limited to 182 daughters aged between 30 and 50. IGE results are 0.403 and 0.447 for individual earnings and individual income, respectively as shown in Panel C of Table 10. In comparison with baseline results as reported in section 5, these lifecycle-minimized IGE estimates are considerably higher. In particular, IGE estimates for individual earnings and individual income respectively increase from 0.284, and 0.333 to 0.403 and 0.447 with equivalently increased proportions of 41.90% and 43.23%.

7 Conclusion

In this paper, I empirically investigate the extent of intergenerational mobility of economic outcome for sons and daughters using Vietnamese data from VLSS of 1997-1998 and VHLSS of 2012. I employ the TS2SLS estimator to estimate the persistence of fathers' individual earnings on offspring's individual earnings, and individual income.

My preferred IGE estimates are suggestive of intermediate persistent degrees of fathers' individual earnings on their children's individual earnings, and individual income for both sons and daughters in Vietnam compared by a conventional international scale of intergenerational mobility as shown in Black and Devereux (2011), and Blanden (2013). Comparatively, the results in this study also reveal that Vietnam occupies the same mobile position as Japan (Lefranc *et al.*, 2014), Taiwan (Kan *et al.*, 2015), and South Korea (Kim, 2013) in Asia.

Especially, in comparison with a more similar development context country, China, IGE estimates for both sons and daughters in Vietnam are relatively similar to these for whole China (Fan *et al.*, 2013), but smaller than these for only urban China (Gong *et al.*, 2012). However, my baseline IGE estimates

indicate that Vietnam is less intergenerationally mobile than Singapore (Ng, 2007; Ng *et al.*, 2009), a country in Southeast Asia as Vietnam. Meanwhile, my baseline IGE estimates show that Vietnam is more mobile in economic outcome across generations than some other developing countries such as Brazil (Dunn, 2007), or South Africa (Hertz, 2001; Piraino, 2015).

Yet, it is necessary to be very canny in interpreting IGE results in this study because of some limitations about data issue facing it. One of data shortcomings is that economic outcome is measured in one single year. Hence, IGE estimates do not demonstrate a long-run trend of intergenerational economic mobility in Vietnam. Understanding the long-run trend of intergenerational mobility probably result in in-depth comprehensions of fundamental mechanisms of the transmission of economic outcome from one generation to the next (Aaronson and Mazumder, 2008; Lee and Solon, 2006). Moreover, using small samples admittedly provide less strictly reliable estimates, especially for estimating IGEs in specific age groups.

In addition, primary samples on this paper do include children and fathers who live together within families. Consequentially, bias IGE estimates potentially suffer from this data limitation. Furthermore, Haider and Solon (2006) show that IGE estimates tend to be downwardly biased if offspring outcome is measured at young or old ages. The primary samples of sons and daughters in this study have dominant proportions of young individual who aged from 25 to 30. This characteristic therefore likely produces downwardly biased IGE estimates. The potential downward bias is probably a reason to explain why IGE estimates for both sons and daughters in Vietnam is smaller than predictions for other countries which have the same context of development such as urban China (Gong *et al.*, 2012), Brazil (Dunn, 2007), or South Africa (Hertz, 2001; Piraino, 2015). Therefore, reliable estimates of intergenerational mobility can admittedly be questionable.

Regardless of possible problems as mentioned above, especially potential downward bias, findings from this study apparently provide significant and informative contributions to the existing literature on this line of research. From the literature of intergenerational mobility of socio-economic status, there are some studies are conducted for Vietnam. Specifically, Hertz *et al.* (2007) find an estimate of 0.58 for the correlation of education between parents and children in Vietnam using children aged from 20 to 69. In addition, in Emran and Shilpi (2011) the transmission of occupational status across generations in Vietnam is also investigated. In these studies, the proxies for socio-economic status focus on the social aspect of intergenerational mobility such as education

or occupation rather than an economic measure. In a different manner, the current study is the first one that employs key economic outcomes including earnings and income as main socio-economic status of fathers and children. Therefore, IGE estimates in this study provide helpful explanations for intergenerational mobility in Vietnam from economists' perspective, and importantly contribute to existing literature on intergenerational mobility, especially for developing countries.

When the TS2SLS is applied to estimate IGEs, the choice of predictors to predict fathers' economic outcome in the first stage can affect the degree of IGE estimate. In this paper I find that for both individual earnings, and individual income, different choices of socio-economic characteristics for predicting fathers' individual earnings provide various IGE estimates that in general alter around baseline ones. This finding is consistent with results from previous studies, for example Cervini-Plá (2014) for Spain, Kim (2013) in South Korea, Lefranc *et al.* (2014) for Japan, or Piraino (2015) for South Africa.

In addition, in this study I find that there is a variation of IGE estimates across sub-samples of children with different age ranges. Specifically, individuals from older groups tend to have larger IGEs than younger groups. The empirical finding in Vietnam again consolidates the existence of age effects on IGE estimates from the existing literature.

In Vietnam, along with positive achievements of economic growth for a typical transition economy, rising inequality is viewed as a massive problem facing this emerging economy. The literature on inequality in Vietnam has been abundantly conducted over the last decades. However, most previous studies on inequality in Vietnam are conducted within a generation. Measures of inequality from cross-sectional data traditionally give “snap-shots” at a moment in the timeline, and thus it does not provide information on inequality overtime. To overcome this drawback, measures of intergenerational elasticity of economic outcomes provide “dynamic pictures” of inequality across generations. Therefore, this study, in some extent, provides useful information for the study of inequality of opportunity from generation to generation in Vietnam, especially in its era of renovation.

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TABLES

Table 1: Descriptive statistics of samples

Variables	Secondary sample (VLSS 1997-98)		Primary sample of son-father pairs (VHLSS 2012)				Primary sample of daughter-father pairs (VHLSS 2012)			
	Potential fathers ^a		Fathers		Sons ^b		Fathers		Daughters ^c	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (years)	39.969	5.903	57.590	7.294	29.059	4.037	57.596	6.810	28.463	3.517
Education										
(1) non-diploma or primary (= 1 if yes, = 0 if no)	0.134	0.339	0.401	0.497	0.204	0.424	0.338	0.493	0.165	0.371
(2) secondary (= 1 if yes, = 0 if no)	0.337	0.473	0.324	0.467	0.202	0.407	0.293	0.455	0.161	0.368
(3) vocational (= 1 if yes, = 0 if no)	0.136	0.343	0.056	0.219	0.064	0.245	0.076	0.265	0.040	0.195
(4) high school (= 1 if yes, = 0 if no)	0.258	0.438	0.148	0.366	0.330	0.476	0.203	0.402	0.332	0.479
(5) tertiary (= 1 if yes, = 0 if no)	0.135	0.342	0.071	0.260	0.200	0.408	0.090	0.287	0.302	0.467
Occupation										
(1) very highly skilled (= 1 if yes, = 0 if no)	0.136	0.342	0.074	0.260	0.155	0.362	0.085	0.280	0.220	0.415

(2) lower highly skilled (= 1 if yes, = 0 if no)	0.093	0.291	0.032	0.172	0.089	0.284	0.041	0.179	0.188	0.391
(3) typical non-manual (= 1 if yes, = 0 if no)	0.205	0.404	0.137	0.344	0.119	0.324	0.165	0.371	0.177	0.382
(4) lower-grade (= 1 if yes, = 0 if no)	0.096	0.295	0.042	0.198	0.148	0.355	0.049	0.216	0.138	0.345
(5) skilled manual (= 1 if yes, = 0 if no)	0.207	0.406	0.158	0.364	0.009	0.094	0.157	0.364	0.005	0.069
(6) semi- and un-skilled manual (= 1 if yes, = 0 if no)	0.170	0.376	0.114	0.315	0.271	0.445	0.095	0.293	0.155	0.362
(7) farmers and farm workers (= 1 if yes, = 0 if no)	0.093	0.291	0.443	0.497	0.209	0.407	0.408	0.492	0.117	0.322
Industry										
(1) agriculture (= 1 if yes, = 0 if no)	0.115	0.320	0.539	0.499	0.097	0.296	0.509	0.500	0.086	0.195
(2) manufacturing (= 1 if yes, = 0 if no)	0.167	0.373	0.099	0.299	0.205	0.404	0.092	0.289	0.391	0.488
(3) public management (= 1 if yes, = 0 if no)	0.168	0.374	0.065	0.247	0.092	0.290	0.090	0.287	0.079	0.270
(4) health and education (= 1 if yes, = 0 if no)	0.206	0.404	0.026	0.159	0.068	0.251	0.032	0.175	0.226	0.419
(5) trade and finance (= 1 if yes, = 0 if no)	0.101	0.301	0.074	0.261	0.098	0.298	0.085	0.280	0.104	0.306

if yes, = 0 if no)										
(6) utilities (= 1 if yes, = 0 if no)	0.012	0.111	0.020	0.054	0.034	0.102	0.012	0.040	0.008	0.089
(7) transportation and communication (= 1 if yes, = 0 if no)	0.055	0.228	0.045	0.207	0.089	0.285	0.052	0.223	0.025	0.157
(8) construction (= 1 if yes, = 0 if no)	0.106	0.308	0.084	0.278	0.230	0.421	0.070	0.255	0.032	0.175
(9) mining (= 1 if yes, = 0 if no)	0.012	0.111	0.019	0.112	0.039	0.153	0.028	0.097	0.009	0.097
(10) community, and social services (= 1 if yes, = 0 if no)	0.058	0.233	0.029	0.168	0.048	0.178	0.030	0.171	0.040	0.195
Geographic Region										
(1) Red River Delta (RRD) (= 1 if yes, = 0 if no)	0.267	0.443	0.236	0.425	0.236	0.425	0.218	0.413	0.218	0.413
(2) Northern Midland and Mountain Areas (NMMA) (= 1 if yes, = 0 if no)	0.068	0.252	0.139	0.346	0.139	0.346	0.104	0.306	0.104	0.306
(3) North Central and Central Coastal Areas (NCCCA) (= 1 if yes, = 0 if no)	0.259	0.438	0.252	0.434	0.252	0.434	0.241	0.428	0.241	0.428
(4) Central Highlands (CH)	0.017	0.130	0.028	0.164	0.028	0.164	0.023	0.147	0.023	0.147

(= 1 if yes, = 0 if no)											
(5) South East (SE) (= 1 if yes, = 0 if no)	0.223	0.416	0.112	0.316	0.112	0.316	0.147	0.355	0.147	0.355	
(6) Mekong River Delta (MRD) (= 1 if yes, = 0 if no)	0.166	0.373	0.233	0.423	0.233	0.423	0.267	0.443	0.267	0.443	
Log of monthly individual earnings (VND 1000)	5.636	0.885	5.042	0.420	7.839	0.604	5.066	0.434	7.711	0.628	
Log of monthly individual income (VND 1000)					7.930	0.632			7.822	0.656	
Observations		1041			1344				632		

^a Potential fathers aged from 31 to 54

^b Sons in father-son sample aged from 25 to 54

^c Daughters in father-daughter sample aged from 25 to 47.

Table 2: Preferred first-stage regressions. Dependent variable: Individual earnings (monthly, VND 1,000, in log)

Preferred variable	Coefficient
Education	
(2) secondary	0.274** (0.118)
(3) vocational	0.304** (0.125)
(4) high school	0.445*** (0.113)
(5) tertiary	0.567*** (0.117)
Occupation	
(1) very highly skilled	0.251 (0.193)
(2) lower highly skilled	0.384** (0.182)
(3) typical non-manual	0.223 (0.192)
(4) lower-grade	0.292 (0.212)
(5) skilled manual	0.123 (0.205)
(6) semi- and un-skilled manual	0.060 (0.179)
Industry	
(1) agriculture	- 0.074 (0.266)
(2) manufacturing	0.109 (0.225)
(3) public management	- 0.180 (0.254)
(4) health and education	0.138 (0.255)
(5) trade, and finance	0.084 (0.259)
(6) utilities	0.197 (0.305)
(7) transportation and communication	0.192 (0.269)

(8) construction	– 0.286 (0.271)
(10) community and social services	– 0.274 (0.272)
Geographic Region	
(1) Red River Delta (RRD)	0.500** (0.207)
(2) Northern Midland and Mountain Areas (NMMA)	0.484** (0.220)
(3) North Central and Central Coastal Areas (NCCCA)	0.309 (0.212)
(5) South East (SE)	0.288 (0.240)
(6) Mekong River Delta (MRD)	– 0.042 (0.225)
R ²	0.186
Observations	1041

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Omitted variables: (1) *non-diploma or primary* in the education group; (7) *farmers, and farm workers* in the occupation group; (9) *mining* in the industry group; and (4) *Central Highlands (CH)* in the geographic region group.

Table 3: Baseline IGE estimates for sons (full sample)

	Dependent variable (monthly, VND 1000, in log): Sons'	
	individual earnings	individual income
	(1)	(2)
β_1	0.361*** (0.038)	0.394*** (0.041)
R ²	0.075	0.081
Observations	1344	1344

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Father's individual earnings is predicted by *education*, *occupation*, *industry*, and *geographic region*.

Table 4: Transition matrix – Probability of sons’ individual earnings quartile given fathers’ individual earnings quartile

Fathers’ individual earnings quartile (%) [*]	Sons’ individual earnings quartile (%)			
	Bottom	Second	Third	Top
Bottom	37.08	26.12	20.51	16.29
Second	26.61	26.91	26.61	19.88
Third	21.86	26.05	28.14	23.95
Top	13.76	20.49	25.99	39.76

^{*} Father’s individual earnings is predicted based on the set of socioeconomic characteristics including *education, occupation, industry, and geographic region*.

Table 5: Baseline IGE estimates for daughters (full sample)

	Dependent variable (monthly, VND 1000, in log): Daughters'	
	individual earnings	individual income
	(1)	(2)
β_1	0.284*** (0.058)	0.333*** (0.060)
R ²	0.061	0.068
Observations	632	632

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Father's individual earnings is predicted by *education*, *occupation*, *industry*, and *geographic region*.

Table 6: Transition matrix – Probability of daughter’s individual earnings quartile given father’s individual earnings quartile

Father’s individual earnings quartile (%) [*]	Daughter’s individual earnings quartile (%)			
	Bottom	Second	Third	Top
Bottom	37.13	27.54	19.76	15.57
Second	26.00	26.00	28.00	20.00
Third	20.38	30.57	23.57	25.48
Top	20.25	27.85	20.89	31.01

^{*} Father’s individual earnings is predicted based on the set of socioeconomic characteristics including *education, occupation, industry, and geographic region*.

Table 7: Robustness checks for sons to different first-stage model specifications

The set of fathers' earnings predictors in the first stage	Dependent variable (monthly, VND 1000, in log): Sons'			
	individual earnings		individual income	
	(1)		(2)	
	β_1	R ²	β_1	R ²
(1) education	0.371*** (0.045)	0.064	0.400*** (0.047)	0.067
(2) occupation	0.304*** (0.058)	0.034	0.356*** (0.061)	0.040
(3) industry	0.274*** (0.074)	0.024	0.340*** (0.078)	0.029
(4) geographic region	0.324*** (0.066)	0.030	0.315*** (0.070)	0.028
(5) education and occupation	0.384*** (0.044)	0.068	0.421*** (0.047)	0.074
(6) education and industry	0.346*** (0.043)	0.062	0.385*** (0.046)	0.069
(7) education and geographic region	0.346*** (0.039)	0.071	0.364*** (0.041)	0.072
(8) occupation and industry	0.264*** (0.056)	0.030	0.319*** (0.060)	0.037
(9) occupation and geographic region	0.396*** (0.050)	0.061	0.430*** (0.053)	0.066
(10) industry and geographic region	0.334*** (0.050)	0.045	0.364*** (0.054)	0.048
(11) education, occupation and industry	0.349*** (0.043)	0.063	0.391*** (0.046)	0.071
(12) education, occupation and geographic region	0.385*** (0.040)	0.080	0.412*** (0.042)	0.084
(13) education, industry and geographic region	0.343*** (0.038)	0.071	0.372*** (0.040)	0.075
(14) occupation, industry and geographic region	0.366*** (0.047)	0.057	0.406*** (0.051)	0.063
(15) education, occupation, industry and geographic region	0.361*** (0.038)	0.075	0.394*** (0.041)	0.081

Notes. * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Sample size is 1344 observations.

Table 8: Robustness checks for daughters to different first-stage specifications

The set of fathers' earnings predictors in the first stage	Dependent variable (monthly, VND 1000, in log): Daughters'			
	individual earnings		individual income	
	(1)		(2)	
	β_1	R ²	β_1	R ²
(1) education	0.237*** (0.065)	0.044	0.273*** (0.068)	0.046
(2) occupation	0.375*** (0.075)	0.054	0.433*** (0.080)	0.058
(3) industry	0.315*** (0.095)	0.038	0.387*** (0.099)	0.040
(4) geographic region	0.311*** (0.100)	0.038	0.367*** (0.105)	0.039
(5) education and occupation	0.303*** (0.068)	0.057	0.348*** (0.070)	0.061
(6) education and industry	0.248*** (0.066)	0.048	0.292*** (0.068)	0.051
(7) education and geographic region	0.265*** (0.056)	0.056	0.305*** (0.058)	0.061
(8) occupation and industry	0.286*** (0.075)	0.042	0.339*** (0.079)	0.045
(9) occupation and geographic region	0.406*** (0.068)	0.075	0.477*** (0.071)	0.086
(10) industry and geographic region	0.306*** (0.074)	0.050	0.370*** (0.078)	0.056
(11) education, occupation and industry	0.262*** (0.068)	0.050	0.307*** (0.070)	0.054
(12) education, occupation and geographic region	0.330*** (0.058)	0.072	0.382*** (0.060)	0.081
(13) education, industry and geographic region	0.263*** (0.057)	0.057	0.308*** (0.059)	0.063
(14) occupation, industry and geographic region	0.330*** (0.068)	0.059	0.393*** (0.071)	0.067
(15) education, occupation, industry and geographic region	0.284*** (0.058)	0.061	0.333*** (0.060)	0.068

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Sample size is 632 observations.

Table 9: IGE estimates by different age ranges for sons

	Dependent variable (monthly, VND 1000, in log): Sons'	
	individual earnings	individual income
	(1)	(2)
Panel A. Sons aged 25-29		
β_1	0.337*** (0.045)	0.358*** (0.049)
R ²	0.066	0.066
Observations	892	892
Panel B. Sons aged 30-34		
β_1	0.386*** (0.072)	0.456*** (0.071)
R ²	0.100	0.134
Observations	317	317
Panel C. Sons aged 35-54		
β_1	0.476*** (0.152)	0.491*** (0.168)
R ²	0.099	0.098
Observations	135	135
Panel D. Sons aged 30-50		
β_1	0.412*** (0.067)	0.468*** (0.068)
R ²	0.089	0.106
Observations	450	450

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Father's individual earnings is predicted by *education*, *occupation*, *industry*, and *geographic region*.

Table 10: IGE estimates by different age ranges for daughters

	Dependent variable (monthly, VND 1000, in log): Daughters'	
	individual earnings	individual income
	(1)	(2)
Panel A. Daughters aged 25-29		
β_1	0.240*** (0.068)	0.290*** (0.071)
R ²	0.044	0.054
Observations	450	450
Panel B. Daughters aged 30-34		
β_1	0.437*** (0.135)	0.482*** (0.141)
R ²	0.097	0.100
Observations	149	149
Panel C. Daughters aged 30-47		
β_1	0.403*** (0.114)	0.447*** (0.118)
R ²	0.096	0.095
Observations	182	182

Note: * significant at 10%, ** significant at 5%, *** significant at 1%. Bootstrapping standard errors (with 1000 replications) are in parentheses. Fathers' individual earnings is predicted by *education*, *occupation*, *industry*, and *geographic region*.

APPENDICES

Figure A1: The distribution of sons' age in the primary sample (VHLSS 2012)

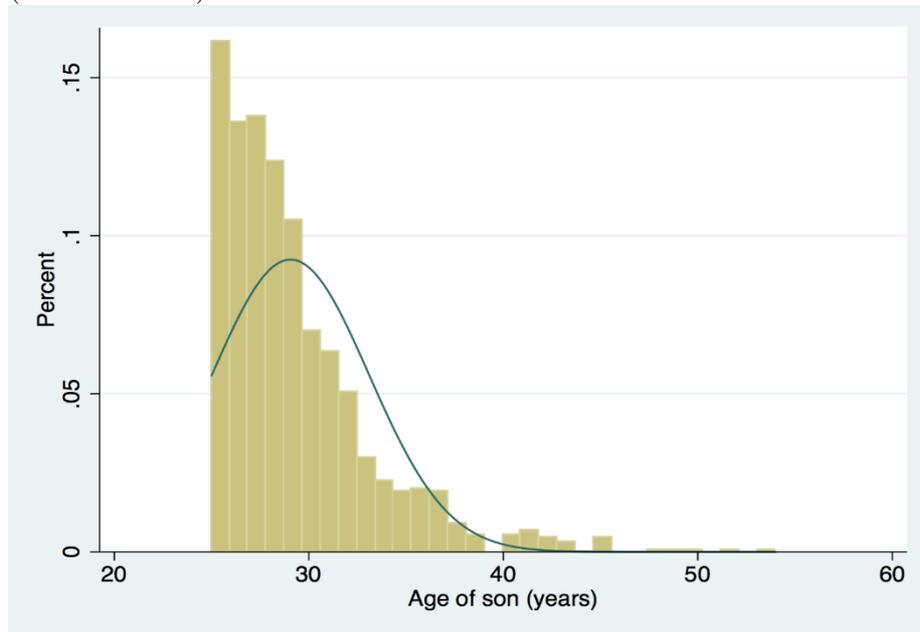


Figure A2: The distribution of daughters' age in the primary sample (VHLSS 2012)

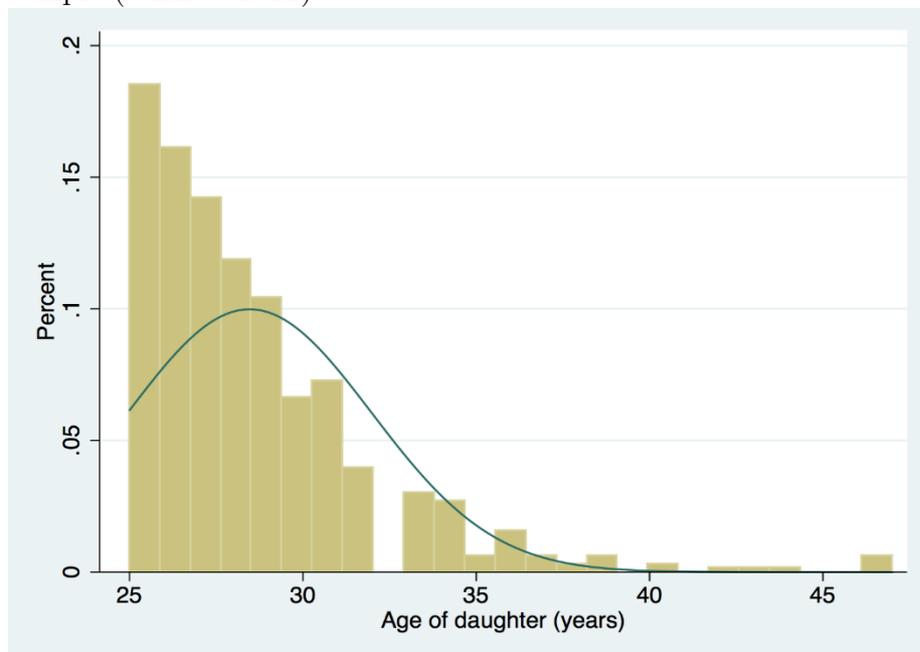


Table A1: Transition matrix – Probability of sons’ individual income quartile given fathers’ individual earnings quartile

Fathers’ individual earnings quartile (%) [*]	Sons’ individual income quartile (%)			
	Bottom	Second	Third	Top
Bottom	38.20	26.69	19.38	15.73
Second	28.44	29.05	22.32	20.18
Third	22.46	25.75	27.84	23.95
Top	14.37	21.41	23.24	40.98

^{*} Father’s individual earnings is predicted based on the set of socioeconomic characteristics including *education, occupation, industry, and geographic region*.

Table A2: Transition matrix – Probability of daughter’s income quartile given father’s individual earnings quartile

Father’s individual earnings quartile (%) [*]	Daughter’s individual income quartile (%)			
	Bottom	Second	Third	Top
Bottom	38.92	23.95	22.16	14.97
Second	22.00	26.00	31.33	20.67
Third	21.02	24.84	26.11	28.03
Top	17.72	24.68	21.52	36.08

^{*} Note: Father’s individual earnings is predicted based on the set of socioeconomic characteristics including *education, occupation, industry, and geographic region*.

Table A3: Classifications of occupation in Vietnam

Occupation Category	Occupation
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(1) very highly skilled	<ul style="list-style-type: none"> • Central government leaders and officials • Local government leaders • Officials in key socio-political organizations • Officials in key organizations (groups, general corporations, businesses, and schools) • Highly-skilled experts in key fields (technology, healthcare, education and training, IT and communication, legal, cultural and social affairs)
(2) lower highly skilled	<ul style="list-style-type: none"> • Technicians in science and technology • Technicians in healthcare • Specialists in business and management • Specialists in legal, cultural and social affairs • Technicians in IT and communication • Average-level teachers
(3) typical non-manual	<ul style="list-style-type: none"> • Members of the armed forces • General officers and desk-based officers • Data and input enumerators • Office assistants • Personal service staffs • Sales staffs • Personal care staffs • Security service staffs
(4) lower-grade	<ul style="list-style-type: none"> • Operators of fixed machines and equipment • Machine assembling workers • Vehicle drivers and operators of moving equipment
(5) skilled manual	<ul style="list-style-type: none"> • Workers with market-d demanded skills in agriculture • Workers with market-d demanded skills in forestry, fisheries and hunting • Workers in agriculture, fisheries, hunting and collection of farm produce for self-subsidy
(6) semi- and unskilled manual	<ul style="list-style-type: none"> • Construction-related workers (except electricians) • Metal smiths, mechanics and other workers related • Handcrafters, and printing-related workers • Electricians and electronics workers • Workers in food-processing, woodwork, garment making, and other handicrafts, and other workers

	related
(7) farmers, and farm workers	<ul style="list-style-type: none"> • Cleaners and domestic helps • Low-skilled workers in agriculture, forestry and fisheries • Workers in mining, construction, industry, and transport • Assistants in food preparation • Street-based and sales-related workers • Waste collectors and other low-skilled workers

Table A4: Classifications of industry in Vietnam

Industry Category	Specific Classifications of Industry
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-
- | | |
|-----------------------|--|
| (1) agriculture | <ul style="list-style-type: none">• Agriculture and related services (crop production, husbandry, and agricultural services)• Forestry and related services• Aquaculture production and exploitation |
| (2) manufacturing | <ul style="list-style-type: none">• Foodstuff production and processing• Beverages production• Production of cigarette products• Textiles• Costume production• Production of leather and related products• Wood-processing and making of wood and bamboo products (except beds, wardrobes, desks, chairs); making products from straw and plaiting materials• Producing paper and paper-based products• Printing and reproduction of recorded media• Production of coke coal and refined oil products• Production of chemicals and chemical products• Production of medicines, pharmaceutical chemicals and materials• Manufacturing of rubber and plastic products• Manufacturing of products from other non-metallic minerals• Production of metals• Manufacturing of products from cast metal (except machines and equipment)• Manufacturing of electronic products, PCs and optical products• Manufacturing of electrical equipment• Manufacturing of unclassified machines and equipment• Manufacturing of motorized vehicles and truck trailers• Manufacturing of other transport vehicles• Manufacturing of beds, cabinets, desks and chairs• Other processing and manufacturing industries• Repair, maintenance, and installation of machines and equipment |
| (3) public management | <ul style="list-style-type: none">• Government and state management• Political and socio-political organizations |

- Public security and defense
- (4) health and education
 - Education and training
 - Healthcare
 - Concentrated care and nursing
 - Non-concentrated social assistance
 - Professional, scientific and technological activities
- (5) trade and finance
 - Sales and repairs of automobiles, motorbikes, scooters, and other motorized vehicles
 - Wholesale (except automobiles, motorbikes, scooters, and other motorized vehicles)
 - Retail (except automobiles, motorbikes, scooters, and other motorized vehicles)
 - Financial services, except insurances and social insurance
 - Insurances, re-insurance, and social insurance, except compulsory social assurance
 - Other financial activities
- (6) utilities
 - Production and distribution of electricity, gas, hot water, steam and air conditioners
- (7) transportation and communication
 - Transport by railways, roads, and pipelines
 - Waterway transport
 - Airway transport
 - Warehouse and supporting activities for transport
 - Postal and delivery services
 - Publication activities
 - Cinematographic activities, production of TV programs, recording and musical publication
 - Broadcasting activities
 - Telecommunications
 - Computer programming, consulting services and other activities relating to computers
 - Information services
- (8) construction
 - Construction of houses of various kinds
 - Construction of technical civil works
 - Special-use construction activities
 - Business in real estates

(9) mining	<ul style="list-style-type: none"> • Exploitation of hard coal and lignite • Exploitation of crude oil and natural gas • Exploitation of metal ores • Other mining and quarrying • Mining supporting services
(10) community, and social services	<ul style="list-style-type: none"> • Legal, accounting and auditing activities • Activities of head offices; management consultancy • Architecture; technical check and analysis • Veterinary activities • Labor and employment services • Travel agency, tour operator and other supporting services relating to tour promotion and investigation for safety reasons organization • Investigation for safety reasons • Services of cleaning houses, works, and public spaces • Office administration and support, and other business-supporting activities • Creative, arts and entertainment activities • Library, archive, museum and other cultural activities • Lottery, betting and gambling • Sports, recreation and entertainment • Activities of other associations and organizations • Repair of computers and personal and household utensils • Other personal services • Household employment generated by households; • Household self-production and self-services; • Activities of international organizations and bodies

Table A5: Provinces in geographic regions in Vietnam

Geographic Region	Province			
(1) Red River Delta (RRD)	Ha Noi	Quang Ninh	Hung Yen	Nam Dinh
	Vinh Phuc	Hai Duong	Thai Binh	Ninh Binh
	Bac Ninh	Hai Phong	Ha Nam	
(2) Northern Midland and Mountain Areas (NMMA)	Ha Giang	Lao Cai	Bac Giang	Son La
	Cao Bang	Yen Bai	Phu Tho	Hoa Binh
	Bac Kan	Thai Nguyen	Dien Bien	
	Tuyen Quang	Lang Son	Lai Chau	
(3) North Central and Central Coastal Areas (NCCCA)	Thanh Hoa	Quang Tri	Quang Ngai	Ninh Thuan
	Nghe An	Thua Thien Hue	Binh Dinh	Binh Thuan
	Ha Tinh	Dang Nang	Phu Yen	Khanh Hoa
	Quang Binh	Quang Nam		
(4) Central Highlands (CH)	Kom Tum	Dac Lak	Lam Dong	Dac Nong
	Gia Lai			
(5) South East (SE)	Binh Phuoc	Binh Duong	Ba Ria – Vung Tau	Ho Chi Minh
	Tay Binh	Dong Nai		
(6) Mekong River Delta (MRD)	Long An	Vinh Long	Can Tho	Ca Mau
	Tien Giang	Dong Thap	Hau Giang	Kien Giang
	Ben Tre	An Giang	Soc Trang	Bac Lieu
	Tra Vinh			