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INTERGENERATIONAL MOBILITY OF EARNINGS AND INCOME AMONG SONS AND DAUGHTERS IN VIETNAM

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This paper empirically examines intergenerational economic mobility in Vietnam. The two-sample two-stage least squares estimation is employed to achieve the research objective using two primary samples of father-son pairs and father-daughter pairs from Vietnam Household Living Standards Survey of 2012, and one secondary sample from Vietnam Living Standards Survey of 1997-1998. The baseline intergenerational elasticity estimates show that Vietnam occupies the intermediate degrees of intergenerational mobility of earnings and income for both sons and daughters. In particular, a rise of 10% in fathers' individual earnings is on average associated with an increase of 3.61% and 3.94% for sons' individual earnings and individual income, respectively. The corresponding figures for daughters' individual earnings and individual income are 2.84% and 3.33%, respectively. This paper also provides evidence on the average degree of inequality of opportunity in Vietnam during its transition from a central planning economy to a market-oriented system.

Keywords: Intergenerational mobility; Intergenerational elasticity; Two-sample two-stage least squares; Vietnam
JEL classification: D31, J31, J62

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I. INTRODUCTION

Inequality has increasingly been viewed as a stylized problem facing a modern state in the twenty-first century (Piketty 2014, 2015). As social scientists and policy-makers have paid considerable attention to inequality, they have placed prominence to equality of opportunity in addition to how socio-economic outcomes are equally distributed among social classes (Corak 2013, Krueger 2012). 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 antecedent generation probably gives an in-depth understanding of the degree of equality of opportunity (Corak 2013). 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 provides an exploration of the relationship between the parents' socio-economic status and that of their children as adults. This research topic has been investigated by both sociologists and economists (Blanden 2013, Torche 2015). The main difference in the approach to intergenerational mobility between sociologists and economists is how they define a measure of socio-economic status or outcome.

From sociologists' perspective, a proxy for socio-economic status is usually related to social classes such as occupation (Hout 1988; Mazumder and Acosta 2015).[1] In a

[1] In addition to occupation, education can be used as another measure of socio-economic status in intergenerational social mobility studies (Bauer and Riphahn 2009; Binder and Woodruff 2002; Organization for Economic Co-operation and Development 2003).

different manner, economists predominantly emphasise earnings and income as key indicators of socio-economic success (Black and Devereu 2011; Solon 1999).[2] From the economic perspective, this paper examines the persistence of earnings and income between fathers and offspring in Vietnam. In particular, this study uses the Vietnamese household survey data to estimate the regressions of offspring's individual earnings and individual income on their fathers' individual earnings. Moreover, the findings are compared to the results from other countries to reveal if the Vietnamese society is relatively mobile.

Vietnam has been characterized by increasing inequality parallel to recent economic reforms and achievements (Haughton 2001). Extensive research on economic inequality has been carried out for Vietnam (Adger 1999; Nguyen et al. 2007; van de Walle and Gunewardena 2001). However, most studies primarily focus on the measure of how economic outcome is distributed among social classes at a specific year or a period within one generation. Such measure, therefore, cannot reveal the transmission of inequality across generations as well as the degree of equality of opportunity in Vietnam. Hence, Vietnam is an important case to investigate intergenerational mobility.

From the existing literature in economics, previous research studies have been predominantly implemented in Northern American and European countries such as the United States (Aaronson and Mazumder 2008; Bhattacharya and Mazumder 2011; Björklund and Jäntti 1997; Chetty et al. 2014a, 2014b; Mazumder 2005; Solon 1992;

[2] Other measures of economic status used in the literature include wealth (Asadullah 2012; Charles and Hurst 2003), and consumption expenditure (Aughinbaugh 2000; Charles et al. 2014; Waldkirch et al. 2004).

Zimmerman 1992), Canada (Aydemir et al. 2009; Corak and Heisz 1999; Fortin and Lefebvre 1998), the United Kingdom (Atkinson 1981; Atkinson et al. 1983; Dearden et al. 1997; Nicoletti and Ermisch 2008), Sweden (Björklund and Chadwick 2003; Björklund and Jäntti 1997; Gustafsson 1994; Hirvonen 2008; Österberg 2000), Norway (Bratberg et al. 2005), France (Lefranc and Trannoy 2005), and Italy (Mocetti 2007, Piraino 2007). In Asia, few analogous studies are mainly conducted in developed countries such as Japan (Lefranc et al. 2014; Ueda 2009), South Korea (Lee 2014; Ueda 2013), Taiwan (Kan et al. 2015; Sun and Ueda 2015), and Singapore (Ng 2007, 2013; Ng et al. 2009).[3]

In intergenerational mobility studies, researchers' main objectives are to estimate intergenerational elasticity (IGE) or correlation (IGC) of earnings or income between fathers and children. This study focuses on the former estimate. IGE is a reasonable statistic that accounts for the degree of the intergenerational association between parental economic resources and children's economic status. In principle, a high IGE estimate explicitly provides an implication of a low degree of mobility with a measurable magnitude of intergenerationally perpetuated inequality. In other words, a poor child is less likely to escape poverty and move upwardly while the likelihood for a child who was born in a wealthy family to remain at the top position from the social ladder of economic outcome as his or her parents is comparatively high. In such a society with high IGE, the degree of equality of opportunity is relatively modest. In

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

contrast, a modest IGE estimate indicates a high level of economic mobility across generations, and therefore a high degree of the equality of opportunity.

To obtain IGE estimates, researchers ideally demand a representative sample in which information on permanent economic outcome for both parents and children as adults is available. Unfortunately, such data sets are rarely available, especially in developing countries including Vietnam. To surmount the problem of lack of data, this study uses the two-sample two-stage least squares (TS2SLS) estimator to estimate IGEs.[4] In particular, two primary samples of father-son pairs and father-daughter pairs are taken from Vietnam Household Living Standards Survey (VHLSS) of 2012, and one secondary sample of 'potential' fathers is extracted from Vietnam Living Standards Survey (VLSS) of 1997-1998.

In addition to using the TS2SLS estimator, this paper employs the transition mobility matrix approach to investigate intergenerational mobility of earnings and income in Vietnam. The transition mobility matrix is seen as a complementary approach to a mean regression in the exploration of intergenerational mobility. The transition mobility matrix has been employed in some preceding studies such as Chetty et al. (2014a), and Peters (1992) for the United States, and Dearden et al. (1997) for the United Kingdom.

This paper finds that the baseline IGE estimates of Vietnamese sons are 0.36 and 0.39 for individual earnings and individual income, respectively. Meanwhile, the baseline IGE estimates of Vietnamese daughters are 0.28 and 0.33 for individual

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[4] The TS2SLS is first developed by Björklund and Jäntti (1997) to estimate intergenerational earnings mobility in Sweden and the United States.

earnings and individual income, respectively. These IGE estimates explicitly reveal that Vietnam has the intermediate degrees of individual earnings and individual income mobility across generations for both sons and daughters by an international comparison.

II. DATA SOURCES AND SAMPLES

A. *Data Sources*

The sources of data used in this study include VLSS and VHLSS. The first source is VLSS, that elicits households' socio-economic information, including education, employment, health, agricultural production, non-agricultural production, housing, migration, fertility, and savings and credit (World Bank 2001). The secondary sample of 'potential' fathers used in this study is extracted from VHLSS of 1997-1998, that includes 6,000 households from the representative communes across the country (World Bank 2001).

The second source is VHLSS, which make the enquiries of representative households' key socio-economic information, including demographic information, expenditure, income, employment, education, health, housing, consumptions, and the programs of poverty reduction. In this paper, two primary samples of father-son pairs and father-daughter pairs are extracted from VHLSS of 2012, which comprises 23,235 households surveyed across Vietnam.

B. *Samples*

Descriptive statistics of three samples are summarized in Table 1. Firstly, the primary sample of son-father pairs consists of 1344 observations, and sons' age are restricted to 25–54 in 2012. The average ages of sons and fathers are 29 and 58, respectively. Therefore, their average ages were respectively 15 and 44 in 1998. Secondly, the primary sample of daughter-father pairs includes 632 observations with daughters aged 25–47. The average ages of daughters is 28 while their fathers' corresponding figure is 58. Hence, the average ages for daughters and fathers were 14 and 44 in 1998, respectively. Thirdly, for the secondary sample of 'potential' fathers, 1041 male workers aged 31–51 are included.

Observations' essential socio-economic variables including education, employment occupation, employment industry, and geographical region are uniformly coded in three samples. For education, there are five dummy variables, including (1) non-diploma or primary, (2) secondary, (3) vocational, (4) high school, and (5) tertiary. For occupation, there are seven variables, 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 un-skilled manual workers, and (7) farmers and farm workers in agricultural production. Meanwhile, industry group consists of (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. For geographical region, there are six dummy variables, including (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).

Empirically, economists often concern the sources of measurement errors that likely cause lifecycle bias and attenuation bias. Referring to lifecycle bias, Haider and Solon (2006) show that when a child's short-run economic outcome potentially generates lifecycle bias in IGE estimates. Specifically, economic outcome measured in early or late ages of a child's working life probably produces underestimated IGE estimates. They also suggest that a sample with children aged around 40 is an apropos choice because economic outcome is the most apposite proxy for permanent status, and then potential lifecycle bias is minimized.

In this study, due to the small size of available dataset, this paper employs a wider range of ages for sons and daughters In particular, sons' age range is 25–54 while the age interval for daughters is 25–47. However, Haider and Solon's (2006) rule of age selection is also applied to achieve sub-samples for estimating IGEs and comparing them with the baseline results from full samples although the sizes of these sub-samples are relatively small. Eventually, there are a sub-sample of 450 sons aged 30–50, equivalent to 33% of the full sample, and a sub-sample of 182 daughters aged 30–47, equivalent to 29% of the full sample.

Individuals in these two primary samples in this paper are relatively young. Illustratively, there are 73.36% of sons aged 25–30 while the corresponding figure for daughters is 77.85%. The distribution of sons' and daughters' ages are respectively demonstrated in Figure A1 and Figure A2 of Appendices. It can be explained by a fact that Vietnam has a relative young labor force.

The literature also records that using a short-run measure of economic outcome for 'potential' fathers in the secondary sample probably generates substantial underestimations for the IGE estimates because temporary economic outcome is a 'noisy' proxy for long-run one (Solon 1992; Zimmerman 1992). This bias is called attenuation bias. This study employs the TS2SLS estimator to solve the problem of measurement error stemming from using a one-year measure of 'potential' fathers' individual earnings. The reason is because when transitory shocks are not correlated with predictors of fathers' economic outcome, the estimates from the TS2SLS estimator are consistent (Inoue and Solon 2010).

When comparing the distributions of fathers' socio-economic groups between the primary and secondary samples in Table 1, it can be recognized that these two samples are relatively matched in some groups. For example, in the education group, secondary amounts to 34% in the secondary sample, 32% in the primary sample of father-son pairs, and 29% in the primary sample of father-daughter pairs. However, there are also less matched distributions for some variables. For example, non-diploma or primary is the most frequent group for fathers' education in both the primary sample of son-father pairs with 40% and the primary sample of daughter-father pairs with 34% but it only has 13% in the secondary sample.

III. RESEARCH METHODS

A. *Two-Sample Two-Stage Least Squares Estimation*

In the study of intergenerational mobility, IGE is typically estimated from the following regression:

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

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 error term. In this study, children' economic outcome is measured by two variables including individual earnings and individual income; and the proxy for fathers' economic outcome is their individual earnings.[5]

The coefficient β_1 in equation (1) is the parameter of interest, that is a measure of IGE, and then $(1-\beta_1)$ measures intergenerational economic mobility. If information on lifetime economic outcome for both children and fathers is available, ordinary least squares (OLS) estimator can consistently estimate β_1. However, in many available data sets, children's economic outcome (Y_i) is reported while parental economic outcome (X_i) is not recorded. Fortunately, parents' socio-economic characteristic variables are available, and these variables are used to predict fathers' economic outcome. Vietnamese data used in this study is not an exception.

This paper uses the two-sample two-stage least squares (TS2SLS) estimation to overcome the problem of unavailable data. The TS2SLS estimator, based on the idea of the two-sample instrumental variable (TSIV) estimator invented by Angrist and Krueger (1992), is first applied by Björklund and Jäntti (1997). Inoue and Solon (2010) show that in the two-sample environment, TS2SLS is asymptotically more

[5] This paper uses the terms *individual earnings* and *individual income* rather than earnings and income in general to distinguish these from *family earnings* and *family income*.

efficient than TSIV. Numerous studies have used TS2SLS to investigate intergenerational mobility such as Fortin and Lefebvre (1998) for Canada, Lefranc and Trannoy (2005) for France, Dunn (2007) for Brazil, Gong et al. (2012) for urban China, Piraino (2015) for South Africa, Lefranc et al. (2014) for Japan, or Cervini-Plá (2014) for Spain.

TS2SLS uses two samples to estimate β_1 with two regression stages. 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, denoted by Z_i, are available.

However, because information on fathers' real economic outcome is not available in this sample, the regression of children's economic status on that of fathers cannot be done. Therefore, in the first stage a secondary sample of 'potential' fathers, that are male workers from another sample that includes both observations' economic outcome and same socio-economic characteristics classified and coded as in the primary sample, is employed to generate a regression of 'potential' fathers' economic outcome on their socio-economic characteristics variables. To predict 'true' fathers' economic status in the primary sample, 'true' fathers' socio-economic characteristics, Z_i , are plugged into the regression presented as the following equation:

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

where $\widehat{X}_i$ represents fathers' predicted economic outcome, and $\widehat{\gamma}$ is the corresponding coefficients of Z_i estimated in the first stage.

Empirically, the predictor set of fathers' economic outcome is probably education (Lefranc et al. 2010), or occupation (Fortin and Lefebvre 1998), or education and occupation (Björklund and Jantti 1997; Núñez and Miranda 2010; Ueda and Sun 2013), or education, occupation, and industry (Gong et al. 2012; Kim 2013), or education, occupation, and geographical region (Lefranc et al. 2014). This study uses the set of education, occupation, industry, and geographical region to predict fathers' individual earnings.

In the second stage, children's economic outcome is regressed on fathers' imputed economic outcome. From this regression, β_1 that is IGE of children's economic status with respect to their fathers' economic success is obtained in this study.

B. *Transition Mobility Matrix Approach*

The transition matrix approach is a complementary method to the least squares regression approach, and it is also useful to examine the pattern of intergenerational mobility. A transition matrix of mobility indicates the possibility that an adult son or daughter changes his or her position from the economic outcome distribution relative to the position of their parents. The distribution is often presented in quartiles or deciles.

This study uses the quartile matrices of mobility to express the mobility patterns of earnings and income across generations. To do this, a father's and a child's economic outcome are divided into four equal-sized groups and ranked orderly. The first quartile is indexed for the bottom quartile of those who are in the range from the 0^{th} to

25^{th} percentile while the fourth quartile is denoted for the top quartile of those who are in the range between the 75^{th} and 100^{th} percentile.

IV. EMPIRICAL RESULTS

A. *First-Stage Results*

The analysis of the first-stage regression focuses on the estimates for these socio-economic characteristics because these are parameters of interest. The results are presented in Table 2. Accordingly, the model has a R^2 of 0.19, which suggests that about 19% of the variation in the log of individual earnings of 'potential' fathers can be explained by these socio-economic characteristics.

In Table 2, it can be seen that wage differentials occur among categories within each group as well as across groups. For example, tertiary generates the highest returns with 56.7% compared to non-diploma or primary (the omitted variable) from education group while two categories utilities and construction yield the highest and the lowest returns with 19.7% higher and 28.6% lower than mining (the omitted variable) respectively from industry group. Moreover, education and geographical region groups have larger variations on male workers' individual earnings rather than occupation and industry. This can be explained by the accretion of wage differentials along with increasing returns to education (Imbert 2013, Liu 2006), and aggrandized earnings gaps among different geographical areas (van de Walle and Gunewardena 2001; World Bank 2014) in Vietnam over last two decades.

It is important to note that age and age-squared are included in the group of independent variables in the first-stage model. However, its estimated coefficients are not used to generate missing values of the log of 'true' fathers' individual earnings in the primary samples because 'true' fathers' individual earnings imputed must be a proxy for permanent rather than short-run outcome.

B. *Empirical Results for Sons*

Baseline Intergenerational Elasticity for Sons

In Table 3, it can be seen that the baseline IGE estimates for sons are all statistically significant at the level of 1% for both individual earnings and individual income. In Column 1, an IGE estimate of 0.36 is found for individual earnings. Meanwhile, an IGE estimate of 0.39 is found for individual income in Column 2. These IGE estimates meaningfully point out that a 10% difference in fathers' individual earnings likely leads to roughly 3.6% and 3.9% differences in sons' individual earnings and individual income, respectively.

These results also indicate that the baseline IGE estimate for individual income is higher than that for individual earnings. This is reasonable because a son's individual income equals his individual earnings plus other adjunct incomes, the marginal effect of his father's individual earnings on his individual income equals the sum of the marginal effect of his father's individual earnings on his individual earnings and the marginal effect of his fathers' individual earnings on his other additional income.

Compared to other countries, these baseline IGE estimates for Vietnamese sons are ranked as the intermediate levels. These findings are relatively similar to the previous findings 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 results are apprently lower than those in some other countries such as 0.62 in South Africa (Piraino 2015), 0.60 in Brazil (Ferreira and Veloso 2006), 0.63 in urban China (Gong et al. 2012), 0.57 in Chile (Núñez and Miranda 2010), and 0.50 in Italy (Mocetti 2007, Piraino 2007).

Transition Mobility Matrix for Sons

Table 4 shows the father-to-son mobility of the quartiles from their individual earnings distributions. Focusing on the diagonal terms, it can be observed that the proportions for sons to be in the top and bottom as same as their fathers' positions are nearly equal. For example, 39.76% of sons remain in the top quartile as their fathers, and 37.08% of sons have the same position as their fathers' in the bottom quartile.

The figures also indicate an almost symmetric pattern of mobility between the upward mobility from the bottom quartile to the top one, and the downward mobility from the top quartile to the bottom one. These figures evidently affirm the intermediate degree of mobility across generations for sons' individual earnings as shown in the baseline IGE estimates. The pattern is the same for individual income and presented in Table A1 of Appendices.

C. *Empirical Results for Daughters*

Baseline Intergenerational Elasticity for Daughters

Table 5 shows the baseline IGE estimates for daughters. The baseline IGE estimate of 0.28 is found for individual earnings in Column 1. This IGE degree manifests that a

10% difference in fathers' individual earnings is likely to result in a 2.8% variation in daughters' individual earnings.

When the dependent variable is individual income, the IGE estimate is 0.33 as in Column 2. This figure implicates that a 10% variation in fathers' individual earnings is likely to lead to a 3.3% difference in daughters' individual income in Vietnam. The baseline IGE estimate for individual income is relatively 17.25% higher than that for individual earnings.

These IGE estimates for Vietnamese daughters' individual earnings and individual income explicitly demonstrate the average levels of intergenerational mobility compared to other countries. These average degrees of intergenerational mobility in Vietnam are nearly analogous to the estimates of around 0.39 in Spain (Cervini-Plá 2014), 0.35 in Japan (Lefranc et al. 2014), and 0.4 in South Korea (Ueda 2013). Meanwhile, some countries have lower IGE estimates for daughters than that of Vietnam such as 0.25 from Sweden (Hirvonen 2008).

Also, it can be recognized that the patterns of intergenerational mobility of earnings and income are same for both Vietnamese sons and daughters. Particularly, the degree of persistence between children's individual income and fathers' individual earnings is higher than that between children's individual earnings and fathers' individual earnings. Importantly, daughters have the smaller degrees of economic outcome persistence from fathers' background than sons for all two measures of economic outcome although these gaps are not considerable. Specifically, the baseline IGE estimates for sons and daughters are respectively 0.36 and 0.28 for individual earnings, and 0.39 and 0.33 for individual income.

This finding is similar to estimates from previous studies. For example, Chadwick and Solon (2002) find the estimates of 0.54 and 0.43 for American sons and daughters. Nilsen et al. (2012) conclude the IGE coefficients are between 0.16 and 0.34 for sons, and between 0.12 and 0.23 for daughter in Norway. On the contrary, sons is more mobile than daughters in some other countries. For example, Lefranc et al. (2014) find the baseline IGE estimates for sons are close to 0.34 while the corresponding figures for daughters are nearly 0.39 although the difference between these baseline estimates is small in Japan.

Transition Mobility Matrix for Daughters

Regarding the transition mobility matrix for daughters, Table 6 presents the changing mobility patterns of daughters' position on individual earnings compared to their fathers' individual earnings. In general, the transition matrix for individual earnings mobility for daughters is relatively symmetric, and it is analogously similar to that for sons. This transition matrix also provides evidence on the modest difference of degree of mobility across generations between sons and daughters as shown from the baseline IGE estimates.

Nearly one third of daughters in the primary sample have the same top and bottom quartiles as their fathers with 37.13% and 31.01%, respectively. Moreover, the proportion of daughters whose fathers in the top quartile moves downwardly to the bottom quartile is 20.25%, and the rate of upwardly mobile daughters to the top quartile from their fathers' bottom quartile is 15.57%. The result of the transition mobility for individual income is the same as that for individual earnings and presented in Table A2 of Appendices.

V. ROBUSTNESS CHECKS

A. Robustness Check of IGE Estimates to Different First-Stage Model Specifications

As noted from the literature, the TS2SLS estimator may endogenously biased because the socio-economic characteristics employed to predict fathers' economic outcome probably have a direct impact on children's economic outcome. Moreover, the magnitude of the bias depends on the set of socio-economic characteristics used to predict fathers' economic outcome. Therefore, it is necessary to investigate the robustness of the baseline IGE estimates to the different sets of first-stage predictors.

Analysis for Sons

The full sample of sons is used to estimate the IGEs. Table 7 presents the results for fifteen cases in which different sets of fathers' individual earnings predictors are used in the first stage model.

Firstly, Column 1 reports the results of robustness checks for the IGE estimates of sons' individual earnings with respect to their fathers' individual earnings. The estimated coefficients of IGE are all statistically significant at 1%. The IGE estimates using the different sets of fathers' economic outcome predictors modestly vary around the baseline IGE estimate of 0.36 (education, occupation, industry, and geographical region). In particular, the IGE estimates are between 0.26 (occupation and industry) and 0.40 (occupation and geographical region). These extreme IGE estimates are smaller with a maximum proportion of 26.87% or higher with a maximum proportion of 9.70% than the baseline IGE estimate.

When using an individual predictor in the first-stage model, the results from cases 1–4 in Column 1 indicate that the estimator with education generates the largest IGE with an estimate of 0.37 while that with industry produces the smallest IGE with an estimate of 0.27.

Secondly, the robustness check for sons' individual income is shown in Column 2. The coefficients of the IGE estimates in all cases are statistically significant at 1%. The results demonstrate that when changing the set of socio-economic characteristics for predicting fathers' individual earnings, the IGE estimates insignificantly alter around the baseline value of 0.39 (education, occupation, industry, and geographical region). Specifically, the minimum IGE estimate is 0.32 (geographical region), and the maximum IGE estimate is 0.43 (occupation and region).

When using an individual predictor in the first stage model as shown in cases 1–4, the estimator with education produces the largest IGE of 0.40 while that with geographical region creates the smallest IGE estimate of 0.32. However, the gap between these two extreme IGE estimates is relatively small with a degree of 0.08.

The above analysis shows that the baseline IGE estimates for sons are highly robust. The degrees of the IGE estimates when changing the set of fathers' individual earnings predictors is varied insignificantly for both sons' individual earnings and individual income.

Analysis for Daughters

The full sample of daughters is used to check the robustness for the IGE estimates to the first-stage model specifications. The results are presented in Table 8.

Firstly, Column 1 shows that the IGE estimates for individual earnings in different cases vary around the baseline IGE estimate of 0.28 (education, occupation, industry, and geographical region). Specifically, the estimates span from 0.24 (education) to 0.41 (occupation, and geographical region). All estimated coefficients are statistically significant at 1%. Compared to the baseline estimate, the IGE estimates can be smaller with a maximum proportion of 16.55%, or higher with a maximum proportion of 42.96%.

When using only one sole socio-economic characteristic in the first stage model, the results from cases 1–4 indicate that the estimator with occupation produces the largest IGE estimate of 0.38 while that with education yields the smallest IGE of 0.24. The result is different with the finding for in which education produces the largest IGE estimate.

Secondly, the robustness check for daughters' individual income is provided in Column 2. Accordingly, all IGE estimates are statistically significant at 1%. The IGE estimates from the various first-stage specifications fluctuate around the baseline estimate of 0.33 (education, occupation, industry, and geographical region). In particular, the IGE estimates vary from 0.27 (education) to 0.48 (occupation, and geographical region). Hence, these IGE estimates are higher or smaller than the baseline estimate with a maximum proportion of 43.24% or 18.02%, respectively.

When using the sole predictor, the specification with occupation produces the largest IGE estimate of 0.43 while the estimator with education yields the smallest IGE estimate of 0.27. This result is different for sons' individual income where the estimator with education produces the largest IGE and the estimate with geographical region is the smallest one.

B. *Robustness Check of IGE Estimates to Different Age Ranges*

From the existing literature, changes in children's age ranges in the primary sample may lead to the variation of the IGE estimates (Grawe 2006; Haider and Solon 2006). In this section, the sensitivity of the IGE estimates to different sub-samples of various age intervals is analyzed for both sons and daughters.

Analysis for Sons

Table 9 presents the IGE estimates for sons in various sub-samples of different age ranges. The IGE estimates are reported for two measures of sons' economic outcome including individual earnings in Column 1, and individual income in Column 2. There are three age intervals considered including 25–29 in Panel A, 30–34 in Panel B, and 35–54 in Panel C. The IGE coefficients are all statistically significant at 1%.

The results explicitly provide evidence on the variation of IGE estimates across sub-samples. In Column 1, the IGE estimates span from 0.34 in the 25–29 sub-sample in Panel A to 0.48 in the 35–54 sub-sample in Panel C for individual earnings. The result in Column 2 gives an analogous pattern with a range of the IGE estimates between 0.36 in the 25–29 sub-sample and 0.49 in the 35–54 sub-sample for individual income. The IGE estimates are generally larger in the older sub-samples than the younger sub-samples.

In addition, using a rule of age selection from Haider and Solon (2006), a sub-sample of 450 sons aged 30–50 is formed to achieve the IGE estimates with the minimized lifecycle bias as shown in Panel D. In particular, the IGE estimates for individual earnings and individual income are respectively 0.41 and 0.47. These estimates are all statistically significant at 1%. These estimates are 14.13% and 18.78% higher than the baseline IGE estimates, respectively for individual earnings and individual income. Therefore, a sub-sample of sons aged around 40 is less intergenerationally mobile than the full sample of sons aged 25–54 for both individual earnings and individual income.

Analysis for Daughters

Table 10 reports the IGE estimates using sub-samples of daughters with different age ranges, including 25–29 in Panel A, and 30–47 in Panel B. The IGE coefficients are all statistically significant at 1%.

The results show that changes in the IGE estimates of the different age intervals for daughters are same as the results for sons. The IGE estimates rise from 0.24 to 0.44 for individual earnings, and from 0.29 to 0.48 for individual income. There are differences among the IGE estimates from these two sub-samples. Specifically, the increased percentages of the IGE estimates in the 30–34 sub-sample compared to the 25–29 sub-sample are 82.08% and 66.21% for individual earnings and individual income.

When applying Haider and Solon's (2006) rule of age selection, there is a sample limited to 182 daughters aged 30–50. The corresponding IGE estimates are found to be 0.40 and 0.45 for individual earnings and individual income as shown in Panel C. In comparison with the baseline results, these lifecycle-minimized IGE estimates are higher. In particular, the IGE estimates increase from 0.28 to 0.40 for individual earnings, and from 0.33 to 0.45 for individual income, equivalent to the increased proportions of 41.90% and 43.23%, respectively.

VI. CONCLUDING REMARKS

This paper uses household survey data to investigate intergenerational mobility of earnings and income for sons and daughters in Vietnam. The baseline IGE estimates explicitly reveal that Vietnam has the intermediate degrees of individual earnings and individual income mobility across generations for both sons and daughters by the conventional international scale of intergenerational mobility as shown in Black and Devereux (2011), and Blanden (2013). These results indicate that Vietnam has comparetively the same mobile position as Japan (Lefranc et al. 2014), Taiwan (Kan et al. 2015), and South Korea (Kim 2013) in Asia. Meanwhile, the results indicate that Vietnam is more mobile than other developing countries such as Brazil (Dunn 2007), and South Africa (Hertz 2001, Piraino 2015).

The baseline results is highly robust when using various specifications of the first-stage model. The paper also finds the existence of age effects on the IGE estimates and this result is consistent with the literature. Apparently, this paper provides more empirical evidence for the literature of intergenerational mobility in developing countries and Vietnam as well.

Last three decades have witnessed the impressive transition of Vietnam's economy from the planning system to the market-oriented one with the increasing integration into international economy (Irvin 1995). During this period, Vietnamese labor markets also have reformed and more actively functioned in the context of the emergence of other economic sectors including the private and the foreign investment sectors in addition to the state sector. The transition has created more jobs and economic opportunities for many Vietnamese workers (Nghiep and Quy 2000) to improve their earnings and income and escape poverty (Sakellariou and Fang 2014) relatively compared to their previous generations who had lived in an isolated economy.

Therefore, many Vietnamse laborers have upwardly moved in the ladder of income compared to their parents' economic status, and then the relative degree inequality of opportunity in Vietnam is not low compared to other developing countries which have the similar context of development like Vietnam. This is likely an appropriate explanation for the intermediate positions of intergenerational mobility for Vietnam found from this paper.

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APPENDICES

Fig. A1. The distribution of sons' age in the primary sample

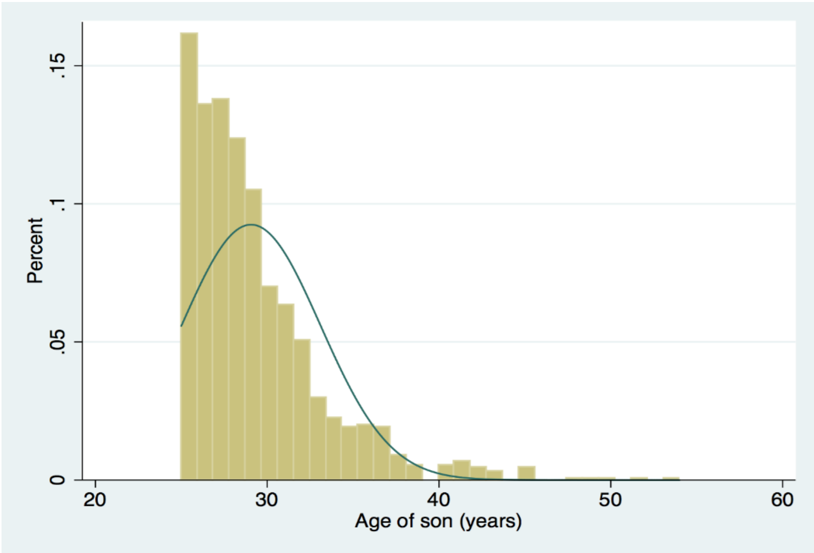

Fig. A2. The distribution of daughters' age in the primary sample

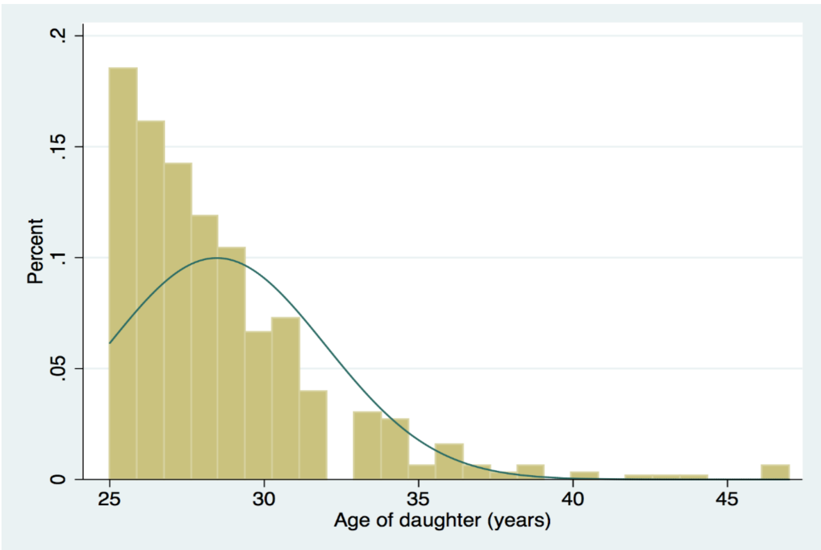

TABLE A1

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

Notes:

1. Father's individual earnings is predicted based on the set of socio-economic characteristics including education, occupation, industry, and geographical 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

Notes:

1. Father's individual earnings is predicted based on the set of socio-economic characteristics including education, occupation, industry, and geographical region.

TABLES

TABLE 1

Descriptive statistics of samples

Variables	Secondary sample (VLSS 1997–1998)		Primary sample of son-father pairs (VHLSS 2012)				Primary sample of daughter-father pairs (VHLSS 2012)			
	Potential fathers		Fathers		Sons		Fathers		Daughters	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (years)	39.97	5.90	57.59	7.29	29.06	4.04	57.60	6.81	28.46	3.52
Education										
(1) non-diploma or primary (= 1 if yes, = 0 if no)	0.13	0.34	0.40	0.50	0.20	0.42	0.34	0.49	0.17	0.37
(2) secondary (= 1 if yes, = 0 if no)	0.34	0.47	0.32	0.47	0.20	0.41	0.29	0.46	0.16	0.37
(3) vocational (= 1 if yes, = 0 if no)	0.14	0.34	0.06	0.22	0.07	0.25	0.08	0.27	0.04	0.20
(4) high school (= 1 if yes, = 0 if no)	0.26	0.44	0.15	0.37	0.33	0.48	0.20	0.40	0.33	0.48
(5) tertiary (= 1 if yes, = 0 if no)	0.13	0.34	0.07	0.26	0.20	0.41	0.09	0.29	0.30	0.47
Occupation										
(1) very highly skilled (= 1 if yes, = 0 if no)	0.14	0.34	0.07	0.26	0.16	0.36	0.09	0.28	0.21	0.42
(2) lower highly skilled (= 1 if yes, = 0 if no)	0.09	0.29	0.04	0.17	0.09	0.28	0.05	0.18	0.18	0.39
(3) typical non-manual (= 1 if yes, = 0 if no)	0.21	0.40	0.14	0.34	0.12	0.32	0.17	0.37	0.18	0.38
(4) lower-grade (= 1 if yes, = 0 if	0.10	0.30	0.04	0.20	0.15	0.36	0.05	0.22	0.14	0.35

no)										
(5) skilled manual (= 1 if yes, = 0 if no)	0.21	0.41	0.16	0.36	0.01	0.09	0.16	0.36	0.01	0.07
(6) semi- and un-skilled manual (= 1 if yes, = 0 if no)	0.17	0.38	0.11	0.32	0.27	0.45	0.10	0.29	0.16	0.36
(7) farmers and farm workers (= 1 if yes, = 0 if no)	0.08	0.29	0.44	0.50	0.20	0.41	0.40	0.49	0.12	0.32
Industry										
(1) agriculture (= 1 if yes, = 0 if no)	0.12	0.32	0.53	0.50	0.10	0.30	0.51	0.50	0.09	0.20
(2) manufacturing (= 1 if yes, = 0 if no)	0.17	0.37	0.10	0.30	0.20	0.40	0.09	0.29	0.38	0.49
(3) public management (= 1 if yes, = 0 if no)	0.16	0.37	0.07	0.25	0.09	0.29	0.09	0.29	0.08	0.27
(4) health and education (= 1 if yes, = 0 if no)	0.20	0.40	0.03	0.16	0.07	0.25	0.03	0.18	0.23	0.42
(5) trade and finance (= 1 if yes, = 0 if no)	0.10	0.30	0.07	0.26	0.10	0.30	0.09	0.28	0.10	0.31
(6) utilities (= 1 if yes, = 0 if no)	0.01	0.11	0.02	0.05	0.03	0.10	0.01	0.04	0.01	0.09
(7) transportation and communication (= 1 if yes, = 0 if no)	0.06	0.23	0.05	0.21	0.09	0.29	0.05	0.22	0.03	0.16
(8) construction (= 1 if yes, = 0 if no)	0.11	0.31	0.08	0.28	0.23	0.42	0.07	0.26	0.03	0.18
(9) mining (= 1 if yes, = 0 if no)	0.01	0.11	0.02	0.11	0.04	0.15	0.03	0.10	0.01	0.10
(10) community, and social services (= 1 if yes, = 0 if no)	0.06	0.23	0.03	0.17	0.05	0.18	0.03	0.17	0.04	0.20
Geographical Region										

(1) Red River Delta (RRD) (= 1 if yes, = 0 if no)	0.27	0.44	0.24	0.43	0.24	0.43	0.22	0.41	0.22	0.41
(2) Northern Midland and Mountain Areas (NMMA) (= 1 if yes, = 0 if no)	0.07	0.25	0.14	0.35	0.14	0.35	0.10	0.31	0.10	0.31
(3) North Central and Central Coastal Areas (NCCCA) (= 1 if yes, = 0 if no)	0.26	0.44	0.25	0.43	0.25	0.43	0.24	0.43	0.24	0.43
(4) Central Highlands (CH) (= 1 if yes, = 0 if no)	0.02	0.13	0.03	0.16	0.03	0.16	0.02	0.15	0.02	0.15
(5) South East (SE) (= 1 if yes, = 0 if no)	0.21	0.42	0.11	0.32	0.11	0.32	0.15	0.36	0.15	0.36
(6) Mekong River Delta (MRD) (= 1 if yes, = 0 if no)	0.17	0.37	0.23	0.42	0.23	0.42	0.27	0.44	0.27	0.44
Log of monthly individual earnings (VND 1000)	5.64	0.89	5.04	0.42	7.84	0.60	5.07	0.43	7.71	0.63
Log of monthly individual income (VND 1000)					7.93	0.63			7.82	0.66
Observations	1041		1344				632			

Notes:

1. Potential fathers' age are 31–54 in the secondary sample.
2. Sons' age are 25–54 in the primary father-son sample.
3. Daughters' age are 25–47 in the primary father-daughter sample.

TABLE 2

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

Preferred variable	Coefficient
Education	
(2) secondary	0.27**
	(0.12)
(3) vocational	0.30**
	(0.13)
(4) high school	0.45***
	(0.11)
(5) tertiary	0.57***
	(0.12)
Occupation	
(1) very highly skilled	0.25
	(0.19)
(2) lower highly skilled	0.38**
	(0.18)
(3) typical non-manual	0.22
	(0.19)
(4) lower-grade	0.29
	(0.21)
(5) skilled manual	0.12
	(0.21)
(6) semi- and un-skilled manual	0.06
	(0.18)
Industry	
(1) agriculture	– 0.07
	(0.27)
(2) manufacturing	0.11
	(0.23)
(3) public management	– 0.18
	(0.25)
(4) health and education	0.14
	(0.26)
(5) trade, and finance	0.08
	(0.26)
(6) utilities	0.20
	(0.31)
(7) transportation and communication	0.19
	(0.27)
(8) construction	– 0.29
	(0.27)

(10) community and social services	– 0.27
	(0.27)
Geographical Region	
(1) Red River Delta (RRD)	0.50**
	(0.21)
(2) Northern Midland and Mountain Areas (NMMA)	0.48**
	(0.22)
(3) North Central and Central Coastal Areas (NCCCA)	0.31
	(0.21)
(5) South East (SE)	0.29
	(0.24)
(6) Mekong River Delta (MRD)	– 0.04
	(0.23)
R^2	0.19
Observations	104

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. 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 geographical region group.

TABLE 3

Baseline IGE estimates for sons (full sample)

	Dependent variable (monthly, VND 1000, in log): Sons'	
	individual earnings (1)	individual income (2)
β_1	0.36***	0.39***
	(0.04)	(0.04)
R^2	0.08	0.08
Observations	1344	1344

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Father's individual earnings is predicted using education, occupation, industry, and geographical 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

Notes:

1. Father's individual earnings is predicted using education, occupation, industry, and geographical region.

TABLE 5

Baseline IGE estimates for daughters (full sample)

	Dependent variable (monthly, VND 1000, in log): Daughters'	
	individual earnings (1)	individual income (2)
β_1	0.28***	0.33***
	(0.06)	(0.06)
R^2	0.06	0.07
Observations	632	632

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Father's individual earnings is predicted using education, occupation, industry, and geographical 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

Notes:

1. Father's individual earnings is predicted using education, occupation, industry, and geographical region.

TABLE 7

Robustness check 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 (1)		individual income (2)	
	β_1	R^2	β_1	R^2
(1) education	0.37*** (0.05)	0.06	0.40*** (0.05)	0.07
(2) occupation	0.30*** (0.06)	0.03	0.36*** (0.06)	0.04
(3) industry	0.27*** (0.07)	0.02	0.34*** (0.08)	0.03
(4) geographical region	0.32*** (0.07)	0.03	0.32*** (0.07)	0.03
(5) education and occupation	0.38*** (0.04)	0.07	0.42*** (0.05)	0.07
(6) education and industry	0.35*** (0.04)	0.06	0.39*** (0.05)	0.07
(7) education and geographical region	0.35*** (0.04)	0.07	0.36*** (0.04)	0.07
(8) occupation and industry	0.26*** (0.06)	0.03	0.32*** (0.06)	0.04
(9) occupation and geographical region	0.40*** (0.05)	0.06	0.43*** (0.05)	0.07
(10) industry and geographical region	0.33*** (0.05)	0.05	0.36*** (0.05)	0.05
(11) education, occupation and industry	0.35*** (0.04)	0.06	0.39*** (0.05)	0.07
(12) education, occupation and geographical region	0.39*** (0.04)	0.08	0.41*** (0.04)	0.08
(13) education, industry and geographical region	0.34*** (0.04)	0.07	0.37*** (0.04)	0.08
(14) occupation, industry and geographical region	0.37*** (0.05)	0.06	0.41*** (0.05)	0.06
(15) education, occupation, industry and geographical region	0.36*** (0.04)	0.08	0.39*** (0.04)	0.08

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Sample size is 1344 observations.

TABLE 8

Robustness check 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 (1)		individual income (2)	
	β_1	R^2	β_1	R^2
(1) education	0.24*** (0.06)	0.04	0.27*** (0.07)	0.05
(2) occupation	0.38*** (0.08)	0.05	0.43*** (0.08)	0.06
(3) industry	0.32*** (0.10)	0.04	0.39*** (0.10)	0.04
(4) geographical region	0.31*** (0.10)	0.04	0.37*** (0.11)	0.04
(5) education and occupation	0.30*** (0.07)	0.06	0.35*** (0.07)	0.06
(6) education and industry	0.25*** (0.07)	0.05	0.29*** (0.07)	0.05
(7) education and geographical region	0.27*** (0.06)	0.06	0.31*** (0.06)	0.06
(8) occupation and industry	0.29*** (0.08)	0.04	0.34*** (0.08)	0.05
(9) occupation and geographical region	0.41*** (0.07)	0.08	0.48*** (0.07)	0.09
(10) industry and geographical region	0.31*** (0.07)	0.05	0.37*** (0.08)	0.06
(11) education, occupation and industry	0.26*** (0.07)	0.05	0.31*** (0.07)	0.05
(12) education, occupation and geographical region	0.33*** (0.06)	0.07	0.38*** (0.06)	0.08
(13) education, industry and geographical region	0.26*** (0.06)	0.06	0.31*** (0.059)	0.06
(14) occupation, industry and geographical region	0.33*** (0.07)	0.06	0.39*** (0.07)	0.07
(15) education, occupation, industry and geographical region	0.28*** (0.06)	0.06	0.33*** (0.06)	0.07

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Sample size is 632 observations.

TABLE 9

IGE estimates by the different age ranges for sons

	Dependent variable (monthly, VND 1000, in log): Sons'	
	individual earnings (1)	individual income (2)
	Panel A. Sons aged 25–29	
β_1	0.34***	0.36***
	(0.05)	(0.05)
R^2	0.07	0.07
Observations	892	892
	Panel B. Sons aged 30–34	
β_1	0.39***	0.46***
	(0.07)	(0.07)
R^2	0.10	0.13
Observations	317	317
	Panel C. Sons aged 35–54	
β_1	0.48***	0.49***
	(0.15)	(0.17)
R^2	0.10	0.10
Observations	135	135
	Panel D. Sons aged 30–50	
β_1	0.41***	0.47***
	(0.07)	(0.07)
R^2	0.09	0.11
Observations	450	450

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Father's individual earnings is predicted using education, occupation, industry, and geographical region.

TABLE 10

IGE estimates by different age ranges for daughters

	Dependent variable (monthly, VND 1000, in log): Daughters'	
	individual earnings (1)	individual income (2)
	Panel A. Daughters aged 25–29	
β_1	0.24***	0.29***
	(0.07)	(0.07)
R^2	0.04	0.05
Observations	450	450
	Panel B. Daughters aged 30–34	
β_1	0.44***	0.48***
	(0.14)	(0.14)
R^2	0.10	0.10
Observations	149	149
	Panel C. Daughters aged 30–47	
β_1	0.40***	0.45***
	(0.11)	(0.12)
R^2	0.10	0.10
Observations	182	182

Notes:

1. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.
2. Bootstrapping standard errors (with 1000 replications) are in parentheses.
3. Fathers' individual earnings is predicted using education, occupation, industry, and geographical region.