Essays on Intergenerational Inequalities: Earnings, Marital Sorting and Health

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I, Nancy Aireth Daza Báez, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

Abstract

This thesis aims to study the intergenerational transmission of earnings and health inequalities in developing and developed countries.

The first chapter studies the intergenerational mobility of earnings in Mexico, using ESRU Survey on Social Mobility in Mexico 2011 (ESRU-EMOVI 2011). I utilise the Two-Sample Two-Stage Least Squares approach to estimate the intergenerational elasticity of earnings and the rank-rank coefficient at the national, urban and regional levels, accounting for the attenuation and life-cycle biases suffered by the estimators. The key results show less mobility than previous studies suggested. On average, 70.9% of the relative difference in fathers' earnings is transmitted to their children. Moreover, a 10 percentile point increase in the father's earnings rank is associated with a 3.15 percentile point increase in the son's earnings rank. At the regional level, strong intergenerational persistence is found in the South, the poorest region of Mexico, whilst the North, the wealthiest region, presents the highest intergenerational earnings mobility.

Using Mexican data from ESRU-EMOVI 2011, the second chapter studies intergenerational earnings mobility, focusing on the role of sex, marital status and marital sorting. I examine the implications of using family earnings rather than individual earnings to assess differences in intergenerational earnings mobility for daughters and sons. I find that the intergenerational persistence of earnings is higher for single daughters and married sons than for their counterparts. Additionally, married daughters present higher intergenerational earnings mobility than married sons for individual and family earnings. The sex differences in economic mobility are considerably more significant for combined earnings than individual earnings, sug-

gesting that marital sorting is more critical for daughters.

The final chapter studies the intergenerational transmission of health in the UK. Using the 1970 British Cohort Study (BCS70), I find that having a mother with comorbidity of physical and mental health problems during the offspring's early childhood or adolescence significantly increases the chance of offspring having mental health problems in early adulthood and comorbidity of physical and mental health problems during early and mid adulthood. Furthermore, if the mother presents poor mental health during early childhood, it is more likely that the offspring suffers from mental health problems in early adulthood, whilst if these problems arise during the offspring's adolescence, the likelihood of the offspring having poor mental health persists from early to mid adulthood.

Impact Statement

The perpetuation of inequalities within the family is a topic of considerable academic and policy concern. This thesis provides novel insights into the persistence of earnings and health inequalities across generations in developing and developed countries.

Despite the theoretical and pragmatic relevance of intergenerational earnings mobility, it has not been sufficiently explored in developing countries, mostly because earnings data cannot be directly linked across generations. The first chapter's findings expand the existing literature for developing countries and provide evidence for Mexico on the magnitude of intergenerational earnings mobility. It also provides evidence on the intranational differences in intergenerational earnings persistence. Besides its contribution to the academic literature, the results in this chapter are of great relevance for the government not just to understand the heterogeneity of social mobility within Mexico, but also to help design and implement social policies to pursue equality of opportunities in Mexico accounting for the stark differences across regions.

Research on social mobility to date has tended focus on males, to the exclusion of females. This is mostly due to the lack of availability of data on earnings for females, given the historical low rates of labour participation. The second chapter tackles this long overlooked issue and studies the role of gender, marital status and marital sorting in Mexico's intergenerational persistence of earnings. One key finding of this chapter is that married daughters present higher intergenerational earnings mobility than married sons for combined earnings, indicating that marital sorting is a significant channel in the low intergenerational transmission of earnings

for daughters. However, the selection into employment analysis shows that married women chances of further benefiting from intergenerational mobility gains are still heavily constrained by the barriers faced by them in terms of access to the labour market and gender biased intra-family decisions. It mainly implies that in order to allow access to the full benefits of social mobility to all females in Mexico, it is still necessary to implement policies that break this barriers.

The final chapter considers a different dimension of inequality, health inequality. In the context of rising health inequalities and the fact that health is strongly transmitted across generations, an important question is how the transmission of maternal health status differs between critical development periods in the offspring's life and how this affects their long-term health, during adulthood.

I find that offspring of a mother with poor physical and mental health during their early childhood and adolescence are much more likely to suffer from poor mental health during early adulthood and comorbidity of physical and mental health problems in early and mid adulthood. Furthermore, if the mother presents poor mental health during early childhood it is more likely that the offspring suffers from mental health problems in early adulthood, whilst if these problems arise during offspring's adolescence the likelihood of offspring having poor mental health persist from early to mid adulthood. In contrast, if the mother presents physical health problems during early childhood, the offspring are more likely to suffer from comorbidity of physical health problems in early and mid adulthood, whereas if those problems arise during the offspring's adolescence the likelihood of the offspring having comorbidity of physical and mental health problem emerges in mid adulthood.

The results in this chapter have direct policy implications. It essentially calls for providing preventive and support programs for offspring living in households where the mother suffers from poor physical and mental health to not only alleviate the impact on the offspring's health status during adulthood, but to offer them additional long-term benefits. Furthermore, early intervention through preventive action will reduce future cost pressure on the health system, which can be achieved

through a reduction in the fraction of the population in need of treatment.

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I am the first, but definitely not the last.

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Declaration

- The Introduction and Chapters 1 and 2 are single-authored by Nancy Aireth Daza Báez.
- Chapter 3 is a joint work with Emla Fitzsimons and George Ploubidis.
- Chapter 1 “Intergenerational earnings mobility in Mexico” is currently part of the *Quantitative Social Science - UCL Social Research Institute working papers series* (Working Paper No. 21-10) and of the *Documentos de trabajo - Centro de Estudios Espinosa Yglesias* (Documento de trabajo no. 03/2021).

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Introduction

Understanding how family background affects adult offspring prospects in life has been a subject of interest for a long time. This interest partly stems from the strong association between intergenerational mobility and equality of opportunities (Brunori et al., 2013). Circumstances beyond offspring control, such as parental education, occupation, health or income, are associated with offspring's outcomes in adulthood, perpetuating family inequalities (Andersen, 2021; Björklund and Jäntti, 1997; Black and Devereux, 2011; Blanden, 2013; Chetty et al., 2014b; Erikson and Goldthorpe, 2000; Gregg et al., 2017; Solon, 1992, 1999). Furthermore, there is a consensus that these inequalities are unfair. Hence, policymakers should pursue to minimise the adverse effects of this unfair initial circumstances.

The most common way to measure intergenerational mobility is through the association between incomes or earnings across generations. A low degree of intergenerational income mobility indicates a strong association between parents and offspring's incomes, and implies that offspring with disadvantaged backgrounds have fewer possibilities to climb the social ladder and improve their conditions; likely because opportunities for economic advancement are unequal among offspring.

To avoid the negative effects of transitory shocks in the estimation of intergenerational income mobility, it is necessary for the income variable considered to be a measure of permanent earnings. Otherwise, it is well established that if the parent's earnings are measured with error, the estimate of the intergenerational persistence will be biased. This requirement is challenging in terms of data availability, and a significant part of the literature in this area has focused not only on measuring the

extent of the intergenerational persistence of income but on improving the methodology to estimate it.

Some of this literature has focused on improving the measurement of parent's permanent earnings by reducing the attenuation bias through the average of parental earnings over 5 years or more (Mazumder, 2005; Solon, 1992; Zimmerman, 1992), and the life-cycle bias by trying to align the earnings measure to the most productive working life stage of both parents and offspring (Baker and Solon, 2003; Haider and Solon, 2006; Mazumder, 2005). As a direct consequence of these improvements, Solon (1992) finds, for the particular case of the US, an increment of 33% of the intergenerational elasticity of earnings when using five years average instead of one year of data. On the other hand, in the case of Norway, Nilsen et al. (2008) find a decrease of 1.1% of the same elasticity for each extra year of father's age.

These developments have been broadly implemented in the estimation methodology of intergenerational mobility to estimate the intergenerational correlation between fathers and sons (Björklund and Jäntti, 2009; Blanden, 2009; Chetty et al., 2014b; Nicoletti and Ermisch, 2007; Solon, 1999) and fathers and daughters (Choi et al., 2020; Jäntti et al., 2006; Raaum et al., 2007), using individual and family earnings (Chadwick and Solon, 2002; Choi et al., 2020; Ermisch et al., 2006; Raaum et al., 2007). In addition, the literature has focused on how intergenerational persistence changes across countries and over time (Björklund and Jäntti, 2009; Blanden, 2009; Chetty et al., 2014b; Corak, 2006; Jäntti et al., 2006; OECD, 2018; Solon, 2002).

It is also possible to measure intergenerational mobility through the identification of the intergenerational transmission of other related circumstances such as ability, education, occupations, health, attitudes and social behaviour, or consumption and wealth[1]. In the particular case of health, the health status is a critical component of human capital and a fundamental welfare dimension. Therefore, the transmission of health inequalities could also amplify inequalities in other dimensions. If the offspring of parents with poor health conditions are more likely to

[1] See Black and Devereux (2011) for an extended revision of the literature on these topics

have health problems in adulthood, it is then likely that parental health has a solid inter-temporal impact in other key socioeconomic dimensions such as earnings or education, for instance. Apart from the genetic component, the existence of this intergenerational channel of transmission of inequalities can be strongly related to factors such as less engaged parenting (Kiernan and Huerta, 2008), poor attachment, less investment in health, and worse child development, which are essentials for positive outcomes during adulthood (Conti and Heckman, 2012; Francesconi and Heckman, 2016).

It has also been well stablished that in order to understand the nature of the transmission of inequalities around the world, it is absolutely necessary to recognise the sometimes striking differences among countries (Black and Devereux, 2011; Blanden, 2013; Brunori et al., 2013; Corak, 2006; OECD, 2018). In the particular case of developing countries, the measure of intergenerational mobility has been hampered by severe data shortcomings, in particular the lack of surveys with information on earnings/incomes for both the offspring and their parents. To overcome these data limitations and avoid the attenuation and life-cycle biases, researchers have developed alternative methodologies to implement on panel data sets in which both parents and offspring are observed for at least two periods of time, and around the most productive stage of their working life (Björklund and Jäntti, 2009; Gregg et al., 2017; Haider and Solon, 2006), but even under these improvements, the data requirements still limit the possibility of measuring intergenerational mobility in many of these countries.

By focusing on earnings and health outcomes during offspring adulthood, this thesis contributes to the literature by providing new evidence on the intergenerational transmission of earnings and health inequalities in both developing and developed countries. In the case of developing countries, I take Mexico as a reference country. By using national representative samples with retrospective information in combination with robust econometric methods, I provide a measure of the association between economic resources of the household of origin and earnings of adult offspring. Furthermore, I study the role played by marriage and marital sorting in

producing differences in the intergenerational mobility of Mexican daughters and sons. Regarding developed countries, I study the UK context and using longitudinal, nationally representative samples, I implement a multinomial estimation of the intergenerational transmission of health based on a novel measure of the general health status of mothers and their offspring.

Specifically, in the first chapter I study the intergenerational persistence of earnings for Mexican sons. I rely on the Two-Sample Two-Stage Least Squares (TSTSLS) approach (Björklund and Jäntti, 1997) to estimate the intergenerational elasticity of earnings and the rank-rank coefficient at the national, urban and regional levels, considering the attenuation and life-cycle biases suffered by the estimators. This method allows me to estimate the association between parents' and offspring's earnings when parental income is not recorded. This is achieved by using repeated cross-sectional data sets where retrospective information of parent's characteristics is available. These characteristics are used to construct a closer measure of parental permanent earnings using a sample of "pseudo-parents", to link the socioeconomic circumstances during the childhood and the adult destination of the offspring.

Using the National Survey of Urban Employment (ENEU) for the period 1987-1991 as the base to predict parent's earnings from retrospective information provided by the sons in the ESRU Survey on Social Mobility in Mexico 2011 (ESRU-EMOVI 2011), I show that the intergenerational earnings persistence in Mexico (0.70) is higher compared to other countries which use the same methodology. At the regional level, strong intergenerational persistence (0.97) is found in the South, the poorest country's region, whereas the North, the wealthiest region, presents the highest intergenerational earnings mobility (0.37), showing an association between income inequality and intergenerational persistence of earnings among the Mexican regions. Furthermore, I find that children from a poor background (percentile 25th of the national earnings distribution) who grew up in the North region climbed 30.9 rungs on the ladder, whilst in the South region, children from the same background climbed just 6.2 rungs. Progress is similar to the national level in the Centre region

(15.2 rungs) and greater than the national average in the North-Centre region (19.5 rungs).

In this chapter I contribute to the analysis of intergenerational earnings mobility in developing countries and extend the evidence for Mexico in multiple new ways. First, I quantitatively illustrate the sensitivity of the IGE and the rank-rank coefficient to the attenuation bias, the life-cycle bias and alternative earnings definitions. I explicitly consider two different measures of earnings –father's and parents' earnings– to provide contrasting evidence regarding father's and family's resources in childhood. Second, for the first time in the case of Mexico, I estimate the earnings-based rank-rank coefficient which measures the correlation between the child's and the parents' earnings positions within their respective distribution of earnings. Third, I present new evidence for Mexico at the urban and regional level.

The second chapter studies the relationship between assortative mating and intergenerational persistence of earnings for the case of Mexico. I examine the implications of using family earnings rather than individual earnings to assess differences in intergenerational earnings mobility for daughters and sons. Then, I analyse how marriage and assortative mating contribute to intergenerational earnings persistence. Finally, I measure the effect of women's labour supply decisions on intergenerational mobility to understand the effect of selection into employment on intergenerational earnings mobility.

Unfortunately, research on social mobility to date has tended focus on males, to the exclusion of females. This is mostly due to the lack of availability of data on earnings for females, given the historical low rates of labour participation. By integrating mobility and marital sorting I contribute to tackle this largely overlooked issue by the literature to date. Specifically, I expand this literature by providing evidence of how marital status and marital sorting affect advantages and disadvantages passed from one generation to the next, in a country with a strong traditional culture regarding family dynamics and low rates of female labour participation.

In contrast to other countries, I show that in Mexico earnings persistence is stronger for both daughters and sons. The pattern persists regardless of the type of

earnings I look at (individual or family earnings). Nevertheless, intergenerational persistence is stronger among sons when considering family earnings, which implies that women experience higher levels of family mobility. When controlling for marital status, the results show that married daughters present higher intergenerational earnings mobility than married sons for both individual and combined earnings. The gender differences in economic mobility are considerably more significant for combined earnings than for individual earnings, indicating that assortative mating is more critical for daughters.

In a developed context, chapter three takes as reference the UK to study a different dimension of social circumstances, health. It is well known that individuals who grow up in households where their parents have poor health, tend to have poorer health during their lives (Bauldry et al., 2012; Halliday et al., 2021; Johnston et al., 2013; Propper et al., 2007). For instance, parents with health problems are more likely to spend less time with their children (Kiernan and Huerta, 2008), be unemployed an then invest less in offspring's health (Pelkowski and Berger, 2004; van Rijn et al., 2014). In this chapter I study the intergenerational transmission of health between mothers and adult offspring in the UK. I decompose the general health status of mothers and their offspring into four categories (no health problems, only physical health problems, only mental health problems and comorbidity of physical and mental health problems) to determine if the likelihood that an offspring falls into a specific category of the general health status differs among the different categories of the mother's health status, with a particular focus on the comorbidity of physical and mental health problems.

In this chapter, I contribute to the understanding of the intergenerational transmission of health, by specifically measuring the association between maternal health during offspring early childhood and adolescence (5 and 16 years), and offspring health during early and mid adulthood (Ages 26 and 46). Using the 1970 British Cohort Study (BCS70), I contribute to fill the gap in the literature in two complementary directions. First, although it is known that adult offspring health problems are associated either with poor maternal physical or mental health (Benc-

sik et al., 2021; Goodman et al., 2011; Halliday et al., 2021; Johnston et al., 2013), there is not much evidence regarding the role of the transmission of comorbidity of physical and mental health issues from the mother to her offspring. I provide a measure of such association by considering a direct measure of the comorbidity of physical and mental health. Second, our definition of general health status and the richness of the data set allow us to study the association between maternal general health over offspring's key developmental periods (offspring early childhood and adolescence) and offspring health during early and mid adulthood. Observations over this long period of time allow us to provide evidence on the inter-temporal impacts of maternal health on offspring health. Furthermore, I am able to explore heterogeneous patterns of intergenerational transmission in health not only by offspring ages but also by sex, controlling for a set of family background characteristics and offspring health during childhood.

I find that, regardless of the offspring's age at which maternal health is considered, having a mother with poor mental health, or with comorbidity of physical and mental health problems, significantly increases the chance of their offspring having mental health problems in early adulthood and comorbidity of physical and mental health problems during early and mid adulthood.

In the particular case of daughters, it seems that they develop mental health problems in early adulthood that turn into comorbidity of physical and mental health problems in mid adulthood. For sons, having a mother with poor mental health in ealry childhood is associated with them reporting mental health problems in mid adulthood and comorbidity of physical and mental health problems in early and mid adulthood. However, if maternal health is considered in son's adolescence, I find that having a mother with mental health problems or comorbidity of physical and mental health is associated with them having comorbidity of physical and mental health problems during early and mid adulthood.

This thesis therefore provides a thorough study of the intergenerational transmission of earnings and health inequalities in both developing and developed countries. I present new evidence on intergenerational earnings mobility for Mexico and

its regions, which overcomes important data limitations. In addition, I analyse the role of marital sorting in a context of low female labour participation, high gender wage gap and traditional family dynamics. Alongside this, I present a multinomial logit model to analyse the intergenerational transmission of health in the UK, by constructing a novel measure of health status, which explicitly considers the co-morbidity of physical and mental health problems.

Chapter 1

Intergenerational earnings mobility in Mexico

1.1 Introduction

During the last twenty years a vast amount of research has demonstrated that the way resources are allocated across parents generation influence social welfare for children generations. Children from disadvantaged backgrounds have less chances to climb the social ladder and improve their conditions. The parents' socioeconomic status has a significant effect on education, employment prospects, job quality, health outcomes, access to networks and other opportunities that matter for people's well-being. The combination of poor educational opportunities, low skills and limited employment possibilities usually increases inequality and traps people in vulnerable situations where they are more exposed to malnutrition, homelessness and violence (OECD, 2018).

One of the main aims of the empirical literature on intergenerational mobility has been to estimate the association between the social origin and the social destination of the individual. Different approaches to measure this association have been proposed using either ordered categorical variables such as social and economic class positions or continuous monetary variables, such as income or earnings.[1] Regarding intergenerational mobility of income, most of this literature has

[1] For a review on these approaches see Björklund and Jäntti (2000); Blanden (2013); Erikson and Goldthorpe (2000) and Torche (2013).

been focused on the analysis of developed countries given the wider availability of longitudinal datasets (e.g. Björklund and Jäntti, 1997; Chetty et al., 2014b; Nicoletti and Ermisch, 2007). Nevertheless, the pervasive consequences of the lack of social mobility are more notorious in poor and highly unequal developing countries (Corak, 2013), for which it might be even more relevant to measure the inequality of opportunities (Narayan et al., 2018; OECD, 2018). Unfortunately, the availability of long run longitudinal data is far more limited in these countries, a fact that imposes restrictions to achieve this goal.

This chapter contributes to filling the empirical gap in the literature by estimating the association between parents' and son's earnings in Mexico, its urban area, and its main geographical regions. As earnings data for two subsequent generations is unavailable, the Two Sample Two Stage Least Squares (TSTSLS)[2] methodology is employed (e.g. Björklund and Jäntti, 1997; Nicoletti and Ermisch, 2007). This approach utilises retrospective information to connect the socioeconomic status during childhood and the socioeconomic status of the adult offspring. It enables the estimation of intergenerational earnings persistence and provides a measure of intergenerational social mobility for Mexico. This chapter accounts for attenuation and life-cycle biases in the estimators of mobility, which arise when using point-in-time measures of earnings or earnings at extreme ages. These biases tend to result in underestimation of the measure of permanent income, which affects the consistency of the intergenerational persistence of earnings estimator (Solon, 1992; Zimmerman, 1992). In contrast to previous studies by Cuesta et al. (2011); Rojas (2012), and Campos-Vazquez et al. (2020), which also examine intergenerational mobility of earnings/income in Mexico using different data and income measures, this chapter's approach improves the accuracy of the intergenerational mobility measures.

I contribute to the analysis of intergenerational earnings mobility in developing countries and extend the evidence for Mexico in multiple new ways. First and foremost, I manage to construct a more comprehensive measure of the permanent

[2]The TSTSLS estimator is a variation of the Two Sample Instrumental Variables TSIV estimator presented by Angrist and Krueger (1992). Inoue and Solon (2010) state that despite both estimators (TSTSLS and TSIV) being consistent, the TSTSLS is the most efficient estimator.

income of parents through a sample of "pseudo-parents" using the National Survey of Urban Employment (ENEU) for the period 1987-1991 as the base to predict parents' earnings from retrospective information provided by the sons in the ESRU Survey on Social Mobility in Mexico 2011 (ESRU-EMOVI 2011), which allows me to provide a more accurate estimator of the intergenerational elasticity of earnings for Mexico. Second, for the first time in the case of Mexico, I estimate the earnings-based rank-rank coefficient which measures the correlation between the children's and the parents' earnings positions within their respective distribution of earnings, using the imputed parents' earnings from the first stage of the TSTSLS estimation approach.

I also enrich the analysis of the intergenerational persistence of earnings in Mexico in two new directions. First, I quantitatively illustrate the sensitivity of the IGE and the rank-rank coefficient to the attenuation bias, the life-cycle bias and alternative earnings definitions. I explicitly consider two different measures of earnings –father's and parents' earnings– to provide contrasting evidence regarding father's and family's resources in childhood. Second, I present new evidence for Mexico at the urban and regional level. The latter is built upon cross-regional comparisons of the estimated IGE and the rank-rank coefficient for four large geographical regions, which are aggregations of federate states as defined by Banco de México (2016).

The findings indicate that at the national level, intergenerational earnings persistence in Mexico is high, with an IGE of 0.709 and a rank-rank coefficient of 0.315. However, when using total parental earnings as the measure of permanent parental income, these figures are slightly lower, with an IGE of 0.638 and a rank-rank coefficient of 0.296, suggesting less intergenerational mobility in earnings than previously reported. The estimated IGE for the urban area is 0.661, and the value of the rank-rank coefficient is 0.291. These lower values suggest that intergenerational mobility of earnings is even lower in non-urban areas.

At the regional level, strong intergenerational persistence is found in the South, which is the poorest region in the country (0.974); meanwhile, the North, the

wealthiest region (0.371), presents the highest intergenerational earnings mobility, showing a positive association between income inequality and intergenerational persistence of earnings among the Mexican regions. Across regions, the expected rank of children with disadvantaged fathers varies more than the expected rank of children with wealthy fathers, which means that the region where children grow up is more important for those with disadvantaged fathers.

Both the attenuation bias and the life-cycle bias affect the estimation of the intergenerational earnings persistence in Mexico. In the case of the former, when point-in-time measures of parental income are considered, the IGE is reduced by approximately 10.3%, whilst the latter is evidenced in a decrease of 24.9% in the baseline estimated valued of the IGE computed from a subsample of sons aged 35 to 45. The observed pattern for the rank-rank coefficient is rather similar but less pronounced, which implies that these biases are driven mainly by a scale issue instead of a positional accuracy issue. This analysis remains valid when only the urban sample is used to generate the estimated values.

These findings presented here complement previous studies on intergenerational mobility in Mexico, including those by Behrman et al. (2001); Daham and Gaviria (2001) and Binder and Woodruff (2002), which analyse cohorts and provide evidence of a strong association between parents' and children's educational attainment. Our results are consistent with recent studies such as Behrman and Vélez-Grajales (2015); Torche (2015a) and Yalonetzky (2015), which also examine intergenerational mobility using data from the ESRU-EMOVI 2011 and report that children with less educated parents have similar chances of achieving their parents' educational level compared to children with more educated parents. Additionally, these studies report that younger generations exhibit lower intergenerational mobility in terms of economic wealth compared to older generations.

The regional findings align with those of Delajara and Graña (2017); Vélez-Grajales et al. (2017) and Delajara et al. (2020), who investigate intergenerational mobility at the regional level using a wealth index. Campos-Vazquez et al. (2020), use earnings to examine intergenerational mobility and also report heterogeneous

patterns among regions of Mexico, with a negative correlation between poverty and intergenerational social mobility. Notably, Delajara and Graña (2017) and Delajara et al. (2020) describe a "regional gradient" in intergenerational mobility of wealth index: South - Central - North Central - North (From lowest to highest intergenerational mobility), which is also present in the analysis of intergenerational mobility of earnings.

This paper now proceeds as follows. An overview of the empirical methodology is presented in section 2. Data sources, samples, and variables used in the empirical analysis are described in section 3. The main results and the consistency analysis of the estimators of relative intergenerational mobility, are presented and discussed in section 4. Conclusions are presented in section 5.

1.2 Methodology

I estimate social mobility based on earnings for the case of Mexico. Since most measures of earnings are directly related to the status of the individual in the labour market, and given the considerable number of women who are not employed in Mexico[3], I avoid selection issues regarding female labour market participation, in line with the vast majority of literature, by focusing the analysis on sons. The reference measure of permanent parental income will be the earnings of the father. However, since recent studies have emphasized the use of family resources as a measure of permanent earnings (Chetty et al., 2014a; Gregg et al., 2017; Jäntti and Jenkins, 2015), which provides a more complete view of the childhood circumstances and the family-level dynamics, such as assortative mating and intra-household division of labour, I also consider the total earnings of parents as an alternative measure of permanent parental income.

The degree of intergenerational mobility is measured as the association between the socio-economic status of the father/parents throughout an individual's childhood, and their socio-economic status as an adult. To estimate this association the empirical intergenerational mobility equation is defined as:

[3]In 2011, 40.6% of women and 74.4% of men in working age were employed in Mexico (ILO, 2019).

$$y_i^{son} = \alpha + \beta y_i^{parent} + u_i \tag{1.1}$$

where y_i^{son} is the logarithm of the permanent income of the male individual in adulthood and y_i^{parent} is the logarithm of the permanent income (earnings) of his father or parents[4] throughout the individual's childhood. If y_i^{son} and y_i^{parent} are observed for any random sample of son-parent pairs, the intergenerational elasticity (IGE) coefficient β could be estimated by applying ordinary least squares (OLS). However, in many countries, the lack of surveys with information on earnings for both the sons and their parents, prevents the use of a simple OLS regression to estimate the IGE.

The Two-Sample Two-Stage Least Squares (TSTSLS) procedure, initially presented in Björklund and Jäntti (1997), attempts to solve this problem using information from two different datasets to impute the unobserved parent's earnings. The "main dataset" is a random sample of son-parent pairs with information on the sons' earnings and retrospective information of the parents, such as education and occupation status. The "auxiliary dataset" is an independent random sample that contains earnings and a set of characteristics (e.g. age, education, occupation status) of "pseudo-parents", who are not the observed parents in the main dataset but individuals sharing the same characteristics. Based on these two independent random samples, the IGE can be estimated by making an imputation of the parent's earnings using the pseudo-parent's characteristics from the auxiliary dataset (Björklund and Jäntti, 1997; Jerrim et al., 2016; Nicoletti and Ermisch, 2007).

More precisely, the estimation of the IGE is carried out in two steps. In the first step, a log-earnings equation is estimated using the pseudo-parent's characteristics (e.g. education and occupation) as a vector Z of k imputer explanatory variables, following the equation:

$$y_i^{parent} = \delta_0 + \sum_{j=1}^{k} \delta_j Z_{ij} + v_i \tag{1.2}$$

In the second step, the equation (1.1) is estimated by using the main dataset and

[4] I define parents' earnings as the sum of the father's earnings and the mother's earnings.

replacing y_i^{parent} by its predictor ($\hat{y}_i^{parent}$), which is obtained as the combination of the coefficient vector estimated in the first step, and the set of parent's characteristics observed in the main sample ($Z\hat{\delta}$). The estimated parameter ($\hat{\beta}$) measures the IGE or the level of association between parental resources during childhood and the individual's lifetime adult earnings. Therefore, the higher the IGE, the lower the degree of intergenerational economic mobility.

The parameter also combines both components into which the joint distribution of parent and child earnings can be decomposed. The first is the copula or the joint distribution of parents' and children's percentile ranks, which captures the extent of the re-ordering among generations, and the second is the marginal distribution of parents' and children's earnings, which captures inequality within generations (Chetty et al., 2014b; Gregg et al., 2017). This estimate is quite sensitive to the regression specification. In particular, the way in which zero earnings are treated affect significantly the IGE.[5]

An alternative measure to the IGE is the correlation (ρ) between the child's and parent's "ranks" within their respective distribution of earnings (rank-rank coefficient):

$$Rank_i^{y^{son}} = c + \rho Rank_i^{\hat{y}^{parent}} + e_i \tag{1.3}$$

$Rank_i^{y_{son}}$ is the child's percentile rank in the distribution of earnings of sons and $Rank_i^{\hat{y}^{parent}}$ is the parent's percentile rank in the predicted distribution of earnings for parents. Following equation (1.3), the rank-rank coefficient ρ, is estimated by an OLS regression, and measures the association between the son's position and his parent's position within their own earnings distribution.

Both the IGE and the rank-rank coefficient are measures of relative mobility. Nevertheless, the latter depends purely on the joint distribution, which implies that differences between the two estimators are given by differences in inequality (Chetty et al., 2014a,b). Moreover, the rank-rank estimation provides a more robust estimator and is less sensitive to measurement issues (Barbieri et al., 2019; Olivetti

[5] See Chetty et al. (2014a) and Gregg et al. (2017), for a full discussion

and Paserman, 2015). By estimating these two measures of relative social mobility using the father's and the parents' earnings as measures of parental permanent income, I provide a more complete analysis of the intergenerational earnings mobility in Mexico.

1.3 Consistency of the estimators

By using the TSTSLS method, the intergenerational mobility measures (IGE or rank-rank coefficient) are estimated using the prediction of parent's earnings instead of a measure that has been directly observed. This procedure can be considered as a "cold-deck" linear regression imputation or a "generated regressor" approach (Jerrim et al., 2016; Nicoletti and Ermisch, 2007), instead of an instrumental variable (IV) method. Inoue and Solon (2010) state that in the two-sample context, unlike the single-sample framework, the estimators from TSLS and IV are different; and the TSTSLS approach is more efficient since it corrects for differences in the empirical distribution of the imputer variables between the "main" and the "auxiliary" samples.

According to the literature (Björklund and Jäntti, 1997; Jerrim et al., 2016; Nicoletti and Ermisch, 2007; Solon, 1992), the TSTSLS estimator is consistent if either: the son's earnings are not affected directly by the imputer variables, or the variance explained (R^2) in the equation used to predict parent's earnings (equation (1.2)) equals one. However, due to data restrictions, the choice of imputer variables and measurement error problems are two potential sources of inconsistency.

To obtain the best prediction of parent's earnings, most studies use parent's education and occupation as imputer variables. However, these are likely to be positively related to the son's earnings[6] and are not perfect predictors of parent's earnings (Nicoletti and Ermisch, 2007; Solon, 1992). As a result, the son's earnings are affected directly and indirectly (through parent's predicted earnings) by the parent's characteristics, generating an upward-bias in the TSTSLS estimator, i.e. If the

[6]This means that, if parent's education and social status have a positive effect on their son's labour market outcomes, children with less educated parents from lower social status are likely to earn less than children from a more advantaged background, even after controlling for parent's earnings.

parent's education and occupation characteristics (Z) affect directly and indirectly the son's earnings, the intergenerational mobility equation would be:

$$y_i^{son} = \alpha + \beta y_i^{parent} + \sum_{j=1}^{k} \delta_j Z_{ij} + w_i = \alpha + \beta y_i^{parent} + \lambda_2 \hat{y}_i^{parent} + \mu_i \qquad (1.4)$$

and the magnitude of the inconsistency of the estimator of the IGE is $\lambda_2(1-R^2)$.[7] This inconsistency is mainly driven by the incorrect estimation of the variability in parent's predicted earnings. Hence, the auxiliary variables chosen need to be those with less correlation with the error in the intergenerational mobility equation, and with the maximum multiple correlation with the parent's earnings (Jerrim et al., 2016; Nicoletti and Ermisch, 2007).

Different first stage specifications allow one to understand the magnitude of the TSTSLS estimator's inconsistency regarding imputer variables selection. For instance, when the number of imputer variables increases in the first stage, the value of R^2 increases and the upward inconsistency of the estimator will decrease. However, Jerrim et al. (2016) argue that including additional imputer variables in order to increase the variance explained (R^2) in the first stage regression does not necessarily reduce the inconsistency of the TSTSLS estimator.[8] The authors argue that despite the increase in the explained variance, the effect of parent's predicted earnings on son's earnings could increase too, generating the opposite effect (increase the upward inconsistency). Therefore, to reduce the inconsistency of the estimator, losses due to the latter effect have to be offset by gains from the former.

To overcome this potential problem, I follow Lefranc and Trannoy (2005); Nicoletti and Ermisch (2007) and Jerrim et al. (2016), and estimate different specifications using parent's education, occupation and age as imputer variables. However, it should be noticed that since there is no dataset where I can observe both sons' and parents' earnings for Mexico, it is not possible to test the potential bias of

[7] Nicoletti and Ermisch (2007); Solon (1992) and Jerrim et al. (2016) explain the process in more detail.

[8] The addition of variables which influence both; the direct effect of parents' earnings on son's earnings and the first stage R^2 can possibly have the opposite effect.

the TSTSLS estimator. In addition, it is worth noting that this is an issue common to the TSTSLS method, and I take several steps in order to address it.

1.3.0.1 Measurement errors

Regarding measurement error problems, the literature notes that the social mobility estimators could suffer from three potential biases: Attenuation bias, life-cycle bias and sample selection bias. The first two are related to the general method (OLS) to estimate the intergenerational elasticity (β), whilst the last is mostly related to the TSTSLS method. In contrast, the rank-rank coefficient is less likely to suffer from these biases. This measure captures remarkably well the rank order mobility, which means that the TSTSLS method does not present difficulties placing parents in the right location of the distribution of earnings, but in accurately capturing the variance of parent's earnings (Jerrim et al., 2016).

Attenuation bias. Solon (1992) and Zimmerman (1992) observed that the use of point-in-time measures (annual earnings) generates a downward bias of the estimators of social mobility due to transitory error in parental earnings. However, this bias can be reduced if observations of parental earnings are available for several years. More precisely, the inconsistency of the estimators is inversely related to the number of years over which parental earnings are averaged, due to a better approximation of the permanent parental resources during childhood (Björklund and Jäntti, 1997; Mazumder, 2005). In line with this, I construct five-year average measures of parental earnings using data from the ENEU household survey for the period 1987-1991.[9]

Life-cycle bias. The heterogeneity in earnings trajectories across individuals from different backgrounds causes the life-cycle bias (Jenkins, 1987). The direction and magnitude of this bias depends on the age at which the current earnings are observed. If earnings are measured at an early stage of the life-cycle, the cur-

[9]Solon (1992) finds a significant increment (33%) of the IGE when using five years average instead of one year of data. Five consecutive years of parent's earning is commonly used (Chetty et al., 2014a; Jerrim et al., 2016; Solon, 1992), however more than ten may be needed if there is autocorrelation in the transitory component of earnings over time (Mazumder, 2005). In the particular case of the rank-rank coefficient, Chetty et al. (2014a) find that the estimator remains practically unchanged when more than five years of data are used.

rent earnings will understate lifetime earnings of those from more wealthy families compared to those from more deprived families (Böhlmark and Lindquist, 2006; Grawe, 2006; Solon, 1992). To analyse the sensitivity of the results and to measure the impact of the life-cycle bias, I contrast the estimations from sons between ages 25 and 50 to those from sons between ages 35 and 45.

Sample selection bias. In the TSTSLS method, the consistency of the social mobility estimators also depend on two assumptions: i) the main and auxiliary datasets have to be random samples from the same population; and ii) the auxiliary variables have to be independent and identically distributed across the two datasets (Björklund and Jäntti, 1997; Jerrim et al., 2016; Nicoletti and Ermisch, 2007). In reality, these assumptions are difficult to meet. In the auxiliary dataset, the pseudo-parents (responder) report their own education and occupation, while in the main dataset the offspring reports parent's characteristics. The impact of how the information is collected on the consistency of the estimators will depend on the nature and magnitude of the measurement error (Jerrim et al., 2016).

To deal with this issue, I select pseudo-parents from the ENUE household survey for the period 1987-1991, with the same characteristics (age, education, occupation) as those reported retrospectively (by the time they were 14 years old) by sons in the ESRU-EMOVI 2011. To adjust the standard error in the second stage subject to sampling variation, I report bootstrapped standard errors as the literature suggests (Björklund and Jäntti, 1997; Jerrim et al., 2016; Nicoletti and Ermisch, 2007).[10]

1.3.1 Regional analysis

A characterisation by region is also provided to understand the dynamics of intergenerational earnings mobility within the country. I analyse four regions (North, North-Centre, Centre and South), to measure the association between geographical

[10]To calculate the asymptotic variances of the estimators, I first draw separated bootstrap samples of fathers and mothers, from which I estimate the parameters used to generate a son's father's and mother's predicted earnings. Then I draw a sample of sons, for whom I generate predicted father's and mother's earnings. I then estimate both the IGE (β) and the rank-rank coefficient (ρ) for both father's and parents' earnings (i.e the sum of the father's earnings and the mother's earnings) and save the estimates. After repeating these steps 1.000 times, I estimate the standard error of $\hat{\beta}$ and $\hat{\rho}$ as the standard deviation of the bootstrap estimates.

conditions during childhood and intergenerational earnings persistence. This helps to identify potential differences in the degree of equality of opportunities faced by children to climb the social ladder and improve their conditions.

The IGE for each region is estimated using the TSTSLS approach based on equations (1.1) and (1.2) and the same specification used for the national level. However, the cross-regional comparisons of this estimated elasticities are affected by the cross-regional differences in the distribution of earnings. Unlike the IGE measure, the rank-rank estimation ensures a better cross-regional analysis due to the fact that the ranks of children and parents are based on their positions within their respective national distribution of earnings.

Furthermore, the rank-rank coefficient allows to measure both relative and absolute social mobility. The relative mobility estimates the difference in outcomes between children from top-earnings parents and children from bottom-earnings parents within a region r, and is measured by ρ_r in equation (1.5):

$$Rank_{ir}^{y^{son}} = c_r + \rho_r Rank_{ir}^{\hat{y}^{parent}} + e_{ir} \tag{1.5}$$

The absolute mobility estimates the rank achieved by children from parents at any given rank p of the national parents' distribution of earnings, and it is measured by combining the intercept and slope in equation (1.5) for region r:

$$\hat{Rank}_{ir}^{y^{son}} = c_r + \rho_r p$$

A particular case is "absolute upward mobility", which measures the expected rank of a child who grew up in the region r with parents whose earnings' rank (p) is below the median in the national distribution of the parents' generation (Chetty et al., 2014a). More precisely, this measure describes how children from low-earnings parents, switch rungs on the ladder.

1.4 Data

I use data from the ESRU Survey on Social Mobility in Mexico 2011 (ESRU-EMOVI 2011), undertaken by the Mexican *Centro de Estudios Espinosa Yglesias*,

and from the National Survey of Urban Employment (ENEU) for the period 1987-1991, undertaken by the National Institute of Statistics and Geography (INEGI). The ESRU-EMOVI 2011 survey –main dataset– is based on a probabilistic, multistage and stratified sample design of 11,001 men and women aged 25-64 years, which is statistically representative of the country population. The survey collects information on respondents' demographic characteristics, education, employment and occupation, income and assets. It also includes retrospective information about family structure, education, occupation and assets of the respondents' parents.

The ENEU household survey –auxiliary dataset– employs a probabilistic, multistage and stratified sample design of men and women aged 12 years or more. This survey is one of the first instruments used to understand and measure the labour market indicators in Mexico and, unlike the ESRU-EMOVI; is only representative of the urban population.[11] Among other information, the ENEU collects information on demographic characteristics, education, employment and occupation, and earnings of the respondents. Despite the limitations in representativeness, the survey is a valuable resource for measuring the relationship between the pseudo-parents' earnings, education, and occupation across multiple periods.

1.4.1 Main dataset

The main dataset includes sons aged 25 to 50 (born between 1961 and 1986),[12] with employed or self-employed status, who reported earnings from their current job and who reported the age, education and, occupation of their parents at the time they were age 14.

In ESRU-EMOVI 2011, the son's earnings information is available at one point in time. If earnings are missing,[13] but earnings intervals are reported, I estimate

[11] For the period 1985-1991, the ENEU collected information from 16 cities: Ciudad de México, Guadalajara, Monterrey, Puebla, León, San Luis Potosí, Tampico, Torreón, Chihuahua, Orizaba, Veracruz and Mérida. In 1992 the sample increased to 32 cities and from then on it has been increasing gradually up to 44 cities in 1998.

[12] In contrast to previous literature, I include individuals between 25 and 29 years old to keep a bigger sample. This group represents a 13.64% of the main sample.

[13] The individuals earnings report falls in either of the following possibilities: (i) earnings greater than zero, (ii) do not know, (ii) do not answer or (iii) data is missing; therefore, zero earnings is not a problem to consider in this case.

earnings using interval regression as Davidson and Mackinnon (2013); Steward (1983); and Wooldridge (2016) suggest. This method fits continuous earnings based on information of the interval in which the earnings fall. This does not modify substantially the sons' earnings distribution and allows me to increase the final sample by 36%. Earnings are adjusted to PPP 2011 prices, reported in Pounds Sterling for each observation and its logarithm is taken as the measure of earnings at each point.

The final sample has 2,455 observations, which represent 41% of men and 22.3% of the total sample in the ESRU-EMOVI 2011 survey (Table 1.1). To evaluate the effect of the life-cycle bias, the sample is also restricted to a tighter age interval (e.g. 35 to 45 years old sons only). However, making such restriction results in a significant reduction of the sample size (686 observations, 29% of the main sample). A more detailed view of the effects of these restrictions on the different subsample sizes is presented in Table 1.A.1 in Appendix 1.A.

Table 1.1: Main Dataset Sample Selection

	Men	%
Original survey	6,011	100%
25-50 years old	4,886	81%
With parents' information (Age, Education, Occupation)	3,413	57%
With father aged 30 to 60 when the child was 14 years old	3,249	54%
With earnings/income data	2,455	41%

Source: ESRU-EMOVI 2011.

Regarding the cross-regional analysis, I use information at the level of four large geographical regions defined by Banco de México (2016), which are defined based on the shared economic characteristics of the different states inside each region.[14] The regions are aggregations of the states in which children lived at age 14 regardless of whether they left the region afterwards.[15] Since the ESRU-EMOVI

[14]The North region is characterised by a high presence of the manufacture sector, whilst the Centre region is characterised by a strong presence of the services sector, especially media and financial services industries located in Ciudad de Mexico. The agriculture and mining sectors are predominant in the North-Centre and South regions, respectively.

[15]Given the data restrictions from the ESRU-EMOVI 2011, I can only consider four aggregate regions of the country composed in the following way: North region: Tamaulipas, Nuevo León, Chihuahua, Coahuila, Sonora, and Baja California. South region: Guerrero, Oaxaca, Chiapas, Quintana Roo, Yucatán, Campeche, Tabasco, and Veracruz. Centre region: Morelos, Puebla, Tlaxcala, Hidalgo, Guanajuato, Querétaro, State of Mexico and Mexico City. North-Centre region: Michoacán, Colima, Jalisco, Baja California Sur, Nayarit, Aguascalientes, Zacatecas, San Luis Potosí, Sinaloa, and Durango.

2011 is representative at the national but not at the federative state level, aggregation in the large four geographical regions allows me to have a higher number of observations per region to obtain a better estimate.

1.4.2 Auxiliary dataset

The ENEU household survey is used to measure the relationship between earnings, and education and occupation for those identified as parents in the main dataset; to then predict parents' earnings using retrospective information provided by the offspring. According to the literature, the approximate point of prime earnings years, when annual earnings reach their peak, is around age 40 (Baker and Solon, 2003; Jerrim et al., 2016). Having parents' data at that age improves the estimation since parents' earnings are measured at their most productive age, reducing the life-cycle bias (Torche, 2015a). In the main dataset, the fathers' average age is 41.6 years when sons' age was 14 (Table 1.2). Considering this, to measure fathers' earnings around the prime earnings years and close to the fathers' average age when the offspring is 14 years old, the auxiliary dataset needs to include information from 1991 or around. In the case of Mexico, the ENEU provides annual information of education, occupation and earnings; and is the only survey with information available for more than one period in the early 1990's.

As I highlighted in the methodology section, to reduce the sample selection bias, the auxiliary dataset needs to be as similar as possible to the sample of parents in the main dataset. With this in mind and taking into consideration some data restrictions, I select pseudo-parents aged 30 to 60, who had at least one child younger than 16 years old; who were employed or self-employed; and who reported their education, occupation and earnings in the ENEU household survey. I extended this selection criteria to the period 1987-1991 to reduce the attenuation bias presented on the estimates when only one year is considered (Björklund and Jäntti, 1997; Solon, 1992; Zimmerman, 1992). A measure of pseudo-parent's permanent earnings is created for each profile by averaging across all available data during these five years. Earnings are adjusted to PPP 2011 prices, presented in Pounds Sterling and its log is taken as the measure of permanent parental income (Table 1.2).

Table 1.2: Descriptive Statistics for the Mexican Samples of Synthetic Pairs of Fathers and Sons

Variable	Main Dataset	Auxiliary Dataset	
		Father	*Parents*‡
Log earnings 1987		8.02	7.94
		(0.64)	(0.77)
Log earnings 1988		8.12	8.11
		(0.67)	(0.72)
Log earnings 1989		8.27	8.20
		(0.68)	(0.78)
Log earnings 1990		8.28	8.20
		(0.71)	(0.73)
Log earnings 1991		8.30	8.20
		(0.72)	(0.67)
Log earnings 2011	7.89		
	(0.69)		
Father's age in 1991*	41.59	40.13	
	(7.19)	(7.31)	
Father's age in 2011	64.12		
	(10.23)		
Son's age in 2011	36.53		
	(7.05)		
Observations**	2,455	54,313	2,455

Note: Standard deviations in parentheses. * Father's age when the son was 14 years old. ** Number of observations reported in 1991. In the previous years the observations were: 50,677 in 1987, 55,535 in 1988, 55,956 in 1989, and 55,537 in 1990. ‡ Father's and mother's earnings are predicted independently in the auxiliary dataset. However, parental resources are measure in the main dataset, as the sum of father's earnings and mother's earnings.

Among the two datasets the distribution of the parents and pseudo-parents by age, education and occupation are rather similar with the exception of the groups of parents working in an agriculture-related occupation. This is clearly explained by the fact that the ENEU survey is representative only for the urban area, and it might introduce some veil into the parents' earnings prediction of this particular group of individuals (See Table 1.A.2 in Appendix 1.A). Notwithstanding this possible issue, I predict parents' earnings at the national level using this urban representative survey to avoid further reducing the sample size of the main dataset. I provide an assessment of the possible bias brought by this measurement error issue.

To predict earnings I use the parent's age, nineteen occupational classes and four levels of education (variables included in the vector Z). Due to differences in

the information sources and the lag of time that exists between the ESRU-EMOVI 2011 and the ENEU surveys, the occupation has been recorded using distinct CMO codes.[16] To harmonize the occupational classes among the surveys I use the correspondence between CMO-80, CMO-90 and CMO-96 provided by INEGI (INEGI, 1998). After this process, nineteen occupations are defined using two digits CMO's classification, which allows me to compare the occupation reported by the parent's generation and that reported by offspring in the main dataset (See Table 1.A.2 in Appendix 1.A).

Education is recorded using the highest educational grade approved, which I use to form four different categories of education attainment: less than primary education completed, primary education completed, secondary education completed and tertiary education completed. The same classification is used for sons in 2011. To measure parental resources, father's and mother's predicted earnings are merged to the main dataset.

1.5 Results

As Mexican surveys do not gather data on both sons' and their parents' earnings, I employ the TSTSLS method to estimate intergenerational social mobility measures for Mexico. In the first stage, I estimate the pseudo-parent's log earnings equation (Equation (1.2)) using an auxiliary dataset. Next, I utilize the estimated coefficients to predict the earnings of the father/mother by utilizing the retrospective characteristics of the father/mother reported by "his/her son" in the primary dataset. Finally, I estimate the intergenerational earnings mobility coefficient (both the IGE and rank-rank coefficient) using these predicted earnings.

1.5.1 First stage

Taking into account the considerations mentioned in the methodology section and following key previous literature (Björklund and Jäntti, 1997; Jerrim et al., 2016;

[16]The Mexican Classification of Occupations (CMO, Spanish acronym) is a classification defined by INEGI, which organizes jobs into a defined set of groups according to the tasks and duties undertaken in the job. For international comparisons, this classification keeps the same structure as the ILO International Standard Classification of Occupations (ISCO). However, some changes are done to capture as best as possible the Mexican labour market dynamics.

Lefranc and Trannoy, 2005; Nicoletti and Ermisch, 2007), the explanatory variables used to estimate the earnings equation (1.2) are: the interaction between six dummies for five-years age bands, with four dummies for education and with nineteen dummies for occupations.[17]

It is important to emphasise that, since the auxiliary variables (father's education and occupation) are likely to be positively correlated with the son's earnings, even after controlling for father's earnings, the TSTSLS estimator could be overestimated due to endogeneity problems. Specifically, the upward bias of the estimator is proportional to the first stage factor $(1-R^2)$.[18] For the particular specification of equation (1.2) for the case of Mexico, the auxiliary variables explain on average about 32.5% of the variance of the five year average of father's log earnings, which implies a reduction of the potential upward inconsistency of the TSTSLS estimators of at least this magnitude.[19] Even though the R^2 seems to be low, it is in line with previous empirical studies on intergenerational mobility applying TSTSLS estimators (see, Jerrim et al. (2016)).

The empirical analysis of the intergenerational earnings mobility starts by characterising the relationship between father's and son's earnings at the national level. In the first part I present baseline estimates of the relative intergenerational elasticity of earnings and the rank-rank coefficient. Then I evaluate the consistency of the estimators to alternative specifications. Finally, I analyse the relationship between father's and son's earnings in the four Mexican regions. I also contrast the consistency of the estimations using a measure of parents' earnings.

1.5.2 Baseline estimates

After predicting fathers' earnings, I characterise the relationship between father's and son's earnings. In the baseline analysis, for a sample of sons aged between 25 and 50 years, I estimate the relationship between the log of son's earnings at 2011 and the log of the predicted father's earnings five-year average when his son was

[17] To predict parents' earnings (i.e. the sum of father's and mother's earnings) in the main dataset the earnings equation is estimated in levels, for fathers and mothers separately.

[18] See footnote 7.

[19] The equation was estimated by year and the figure corresponds to the average R^2 of the five years (See Appendix 1.B Table 1.B.3).

around 14 years old, using an approach similar to the one suggested by Lee and Solon (2009) to account for potential life-cycle bias arising from measuring son's earnings at different ages. More precisely, I include as controls the quadratic in the father's age at the time the son is 14 years old, the quadratic in the son's normalised age $(age - 40)$ at the time earnings are observed, and the interactions of the quadratic in the son's normalised age with predicted father's earnings.[20] The normalised age simplifies the interpretation of β, which measures how the intergenerational earnings elasticity at son's age 40 moves forward as successive cohorts pass through that age. A high β implies that people born in disadvantaged families have a smaller chance of placing themselves on higher socio-economic positions than people born in more advantaged families; a β closer to zero on the other hand indicates instead a high degree of mobility and more equal opportunities.

Table 1.3: Estimations of Intergenerational Elasticity of Earnings and Rank-Rank Coefficient - National

	Father	*Parents*
Parents' earnings 1987-1991 - Son's age 25-50		
$\hat{\beta}$	0.709	0.638
	(0.130)	(0.107)
Rank-rank Coefficient	0.315	0.296
	(0.048)	(0.046)
SD Son earnings	0.697	0.693
SD Father/Parents earnings	0.331	0.390
N	2,371	2,445

Note: Standard errors in parentheses have been obtained using bootstrap sampling.

The second column of Table 1.3 presents the baseline estimations of the IGE and the rank-rank coefficient for the case of Mexico, using the father's earnings as the measure of parental income. The value of the estimated IGE is 0.709, which means that, on average, 70.9% of the relative difference in father's earnings is transmitted to their children. In other words, if a father used to earn £100 less than the

[20] I also considered the quartic in the father's and the son's age, and in the interaction of the son's age with the father's earnings, but the additional terms were not significantly different from zero.

average fathers' earnings, his child will earn £70.9 less than the average sons' earnings. On the other hand, the value of 0.315 for the estimated rank-rank coefficient implies that, on average, a 10 percentile point increase in the father's earnings rank within the total fathers' distribution of earnings will be associated with just a 3.15 percentile point increase in the son's earnings rank within the corresponding distribution of earnings.[21]

When total parents' earnings are used as the measure of parental income, the second column of Table 1.3 shows a lower value for the estimated IGE. In other words, the relationship between parents' earnings and the son's earnings is weaker than the relationship between the father's and the son's earnings. Aside from the possible measurement error issue coming from the first stage, where parents' earnings are predicted, it is likely that in Mexico, the presence of mothers in the labour market, who receive positive earnings, helps to increase the equality of opportunities and the intergenerational earnings mobility of sons, even regardless of these mothers having a male partner.[22] In the same line of reasoning, the estimated rank-rank coefficient for parents' earnings is lower than the estimated coefficient based on father's earnings. However, this change in the value of the estimate is not substantial, since the rank-rank estimator attempts to remove scale measurement issues and is less sensitive to income fluctuations in the extremes of the distribution.

Both the baseline estimates and the ones depending on the total parents' earnings are strong evidence of a weak intergenerational earnings mobility in Mexico. These results contrast with previous evidence, which presents intergenerational persistence of earnings of 0.312 (Rojas, 2012) and 0.5 (Campos-Vazquez et al., 2020). However, it is necessary to analyse these dissimilarities with caution due to differences in data and methodology. Therefore, the estimates presented in this paper could be interpreted as an adequate upper bound of intergenerational earnings persitence.

When compared to other estimates for developing countries using similar

[21] Another way to interpret this estimated value of the rank-rank coefficient, is that the expected difference between the rank of earnings of sons of fathers at the top and the bottom of the distribution of earnings is 31.5 ($\hat{Rank}_{100}^{y^{son}} - \hat{Rank}_{0}^{y^{son}} = 100 * \rho$).

[22] Parents' earnings include single mothers who are employed and earn income.

methodologies, Mexico's intergenerational persistence is in line with that of highly unequal countries in the same region, such as Colombia (0.76; Zuluaga, 2016), Ecuador, Peru (1.13 and 0.67; Grawe, 2006), Chile (0.57; Nunez and Miranda, 2010) and Brazil (0.69; Dunn, 2010). Regarding the rank-rank coefficient of earnings, estimated for the first time in the case of Mexico using TSTSLS methodology, it seems to be higher than the one estimated for Italy (0.236; Barbieri et al., 2019) which, to the best of my knowledge, is the only other study that has estimated the rank-rank coefficient by using the TSTSLS approach to predict father's earnings.

1.5.3 Robustness

To assess the consistency of the estimators of intergenerational earnings mobility in Mexico, I conduct an analysis that examines the most commonly cited sources of bias: attenuation bias and life-cycle bias.

1.5.3.1 Attenuation bias

As Solon (1992) and Zimmerman (1992) argue, the use of point-in-time measures of father's earnings as an approximation of parental resources during childhood generates a downward bias in the estimate of intergenerational earnings mobility since it is not a direct measure of permanent income. I consider the impact of potential attenuation bias on the estimates of intergenerational mobility in Mexico, by estimating the IGE and the rank-rank coefficient using as parental income both a multi-year average, and a point-in-time father's earnings measure. *Panel A* in Table 1.4 presents the estimates using father's earnings in 1991, to measure the impact of attenuation bias driven by measurement error and transitory shocks.[23]

A comparison with the baseline estimates (Table 1.3), shows that the estimated IGE based on the five years earnings average is 11.5% larger than the estimated IGE based on one year of father's earnings. There seems to be a significant attenuation bias coming from measurement error of the permanent income of fathers. On the other hand, the rank-rank coefficient based on one year is almost similar to its baseline counterpart indicating that any issue of measurement error and transitory

[23]Table 1.C.1 in Appendix 1.C presents the estimates for different combinations of years used to measure average fathers' earnings.

Table 1.4: Consistency of the Estimations of Intergenerational Elasticity of Earnings and Rank-Rank Coefficient

	Father	*Parents*
Panel A:		
Parents' earnings 1991 - Son's age 25-50		
$\hat{\beta}$	0.636	0.577
	(0.137)	(0.114)
Rank-rank Coefficient	0.299	0.273
	(0.056)	(0.053)
SD Son earnings	0.696	0.693
SD Father/Parents earnings	0.336	0.390
N	2,364	2,439
Panel B:		
Parents' earnings 1987-1991 - Son's age 35-45		
$\hat{\beta}$	0.532	0.474
	(0.190)	(0.159)
Rank-rank Coefficient	0.269	0.273
	(0.074)	(0.070)
SD Son earnings	0.627	0.623
SD Father/Parents earnings	0.312	0.351
N	686	704

Note: Standard errors in parentheses have been obtained using bootstrap sampling.

shocks present in the measure of father's earnings in 1991 does not affect positional accuracy within the earnings' distribution, but causes scale mis-measurement issues.

When parents' earnings are used as the measure of parental resources, the conclusions about attenuation bias do not change. The baseline estimated IGE is 10.6% larger than the IGE using a single year measure and the rank-rank coefficient does change significantly when using parents' earnings instead.

The effect of attenuation bias on the estimates of intergenerational persistence of earnings could affect the way intergenerational mobility and inequality of opportunities are analysed. To estimate a lower intergenerational persistence of earnings entails an understatement of the intergenerational mobility problem from those responsible for the design and implementation of public policies. Therefore, it is

important to improve the measurement of intergenerational persistence for a better understanding of the social mobility problem.

For Mexico, there is no previous evidence of the magnitude of the attenuation bias from measurement error and transitory shocks on the intergenerational persistence of earnings and this is the first study to measure this source of bias. The only study that estimates the IGE of earnings (Rojas, 2012) using TSTSLS methodology, uses data from the ESRU-EMOVI 2006 and one-year father's earnings as an approximation to permanent parental resources. Therefore, it is likely that the intergenerational persistence (0.312) reported in that study is understated due, at least in part, to the presence of potential attenuation bias. In addition, Campos-Vazquez et al. (2020) present their results (0.5) as ¨an accurate lower bound" due the limitations in their data to fully address attenuation bias.

1.5.3.2 Life-cycle bias

The literature has shown that measuring son's earnings at early ages of the life-cycle can lead to a understatement of intergenerational persistence in lifetime earnings since children from more wealthy families have a steeper earnings profile when they are young, compared to those coming from more deprived families, because of differences in human capital investment (Chetty et al., 2014a; Haider and Solon, 2006). To help alleviate this concern, I use the quadratic in the son's normalised age at age 40, however to evaluate whether the baseline estimate suffers from life-cycle bias, I compare the intergenerational persistence of earnings between the baseline (sons aged 25-50) and that estimated from a subsample of sons aged 35-45.

When comparing the estimates from *Panel B* in Table 1.4 and the baseline, it is possible to see that the estimated IGE of sons based on earnings at 25-50 is 33.2% higher than the estimated IGE based on earnings at ages 35-45. This result suggests that the point at which children's earnings are measured affects considerably the intergenerational persistence of earnings due to a potential life-cycle bias. The rank-rank coefficient, which deals with measurement issues, shows a similar but less pronounced pattern between sons aged 25-50 and those aged 35-45, as expected. This indicates that the life-cycle bias is mainly determined by scale instead

of positional accuracy issues. When total parents' earnings are used as the measure of parental income, the comparison shows a similar result, and gives support to the likely presence of life-cycle bias in the estimation of the intergenerational earnings mobility in Mexico.

Children with high lifetime earnings tend to be those with high earnings growth rates due to differences in human capital investment. Consequently, the current earnings gap between children from wealthy families and those from more disadvantaged families at early ages (older ages) tends to understate (overstate) their gap in lifetime earnings and therefore the IGE (Haider and Solon, 2006). Alternatively, it could be that different mobility patterns across cohorts explain differences between the two samples with different age restrictions, rather than just life-cycle bias.

1.5.4 Urban vs national estimations

For Mexico, the ENEU provides annual information on the auxiliary variables and is the only survey with information available for more than one period in the early 1990's, a period that coincides with the time when, on average, the children were 14 years old. However, this survey is only representative of the urban population, which makes difficult the estimation of parents' earnings, especially for those who work on agriculture activities due to the few number of individuals working in this sector in the urban area. To measure the impact of using the ENEU as the auxiliary dataset on the estimation of the intergenerational earnings mobility in Mexico at the national level, I compare the estimates using the national sample (baseline) and the urban sample for sons aged 25-50.

The comparison of national (Table 1.3) and urban estimates (Table 1.5), shows that the baseline estimated IGE is 7.3% higher than the intergenerational persistence of sons estimated for the urban area. Although the rank-rank coefficient follows a similar pattern to that seen for the estimated IGE, its estimated value is just attenuated by 0.025 in the urban sample. When parents' earnings are used, the decrease in the estimated value of the IGE is much more modest (6.1%), whilst the rank-rank coefficient is slightly attenuated when using only the urban sample.

Table 1.5: Estimations of Intergenerational Elasticity of Earnings and Rank-Rank Coefficient - Urban

	Father	*Parents*
Parents' earnings 1987-1991 - Son's age 25-50		
$\hat{\beta}$	0.661	0.602
	(0.136)	(0.110)
Rank-rank Coefficient	0.291	0.271
	(0.052)	(0.049)
SD Son earnings	0.693	0.689
SD Father/Parents earnings	0.343	0.405
N	1,844	1,904

Note: Standard errors in parentheses have been obtained using bootstrap sampling.

Regarding the attenuation and life-cycle biases, a similar pattern to that described at the national level is observed when only the urban sample is used to generate the estimated values. In the first case, the size of the downward attenuation bias is just slightly stronger, whilst in the case of the life-cycle bias the effect is significantly stronger. For instance, the IGE estimated for sons aged 25-50 is approximately 60% higher than the one estimated for sons aged 35-45, regardless of the measure of parental earnings used (See Table 1.C.2 in Appendix 1.C).

It is important to highlight two different considerations. First, in a developing country like Mexico a higher IGE at the national level is expected regardless of the possible issue of measurement error of earnings: by including individuals from the non-urban area, who are more likely to be at the lower end of any distribution of income or earnings, the intergenerational persistence tends to be stronger. Second, the fact that parents' earnings in the non-urban area are predicted using information from parents in the urban area introduces a potential bias in the estimation of the intergenerational mobility of earnings, an issue that could reduce the reliability of the estimates. Nevertheless, the key takeaway message is that the intergenerational persistence of earnings in Mexico is very strong regardless of which sample I use to compute the estimates, making the high inequality of opportunities visible both in the urban and in the national context.

1.5.5 Regional analysis

In this section, I characterise intergenerational earnings mobility across regions in Mexico, by disaggregating the main sample at the national level into four subsamples associated with the four regions defined by Banco de México (2016), which are aggregations of the federate states where the sons used to live in at age 14.[24] Table 1.6 presents the estimated values of the relative (IGE and rank-rank coefficient) and the absolute (upward mobility) intergenerational mobility using the baseline specification disaggregated by region.

Table 1.6: Regional Estimates of Intergenerational Elasticity of Earnings and Rank-Rank Coefficient

	North		**North-Centre**		**Centre**		**South**	
	Father	*Parents*	*Father*	*Parents*	*Father*	*Parents*	*Father*	*Parents*
$\hat{\beta}$	0.371	0.239	0.377	0.541	0.627	0.553	0.974	0.802
	(0.255)	(0.196)	(0.328)	(0.244)	(0.173)	(0.130)	(0.303)	(0.196)
Rank-rank Coefficient	0.130	0.118	0.163	0.189	0.308	0.289	0.403	0.355
	(0.089)	(0.091)	(0.125)	(0.118)	(0.056)	(0.054)	(0.100)	(0.096)
Upward Mobility	55.848	55.465	44.542	43.697	40.223	41.133	31.233	32.063
SD Son earnings	0.666	0.668	0.645	0.644	0.608	0.604	0.776	0.773
SD Father/Parents earns	0.325	0.377	0.298	0.359	0.315	0.380	0.361	0.419
N	432	447	498	507	819	849	620	641

Note: Standard errors in parentheses have been obtained using bootstrap sampling.

The North, North-Centre and Centre regions present the lowest IGE of earnings. In contrast, the South region presents the highest IGE of earnings, and its estimated value is the only one above the IGE estimated for the national level. On average, the fraction of the relative difference in fathers' earnings that is transmitted to their sons vary between 37.1% and 97.4% and it depends on the region where the children grew up. The heterogeneity of this estimate across regions is largely explained by the fact that the IGE is a measure that captures both re-ordering among generations and inequality within generations. Consequently, the cross-regional comparison is affected by differences in the regional distribution of earnings.

[24] In order to not impose more restrictions to the sample size, I do not consider the urban-only subsample for the regional analysis.

The rank-rank coefficient ensures a better cross-regional analysis given that this measure is based on ranks of both parents' and sons' earnings within the national distribution of earnings. The baseline estimated values of the rank-rank coefficient show that the North region presents the lowest degree of intergenerational persistence of earnings, followed by the North-Centre region. On the other hand, the South region presents the highest degree of persistence, whilst the Centre region evidences a similar intergenerational mobility as the one estimated for the national level. In other words, the difference between the expected rank of sons' earnings, whose fathers are at the top and the bottom of the distribution of earnings ranges between 13.0 and 40.3 positions across regions in Mexico. Note that both the IGE and the rank-rank coefficient, measures of relative mobility, confirm the North region as the one with the highest intergenerational earnings mobility in Mexico, and the South region as the one where intergenerational mobility and equality of opportunities seem to be highly limited.

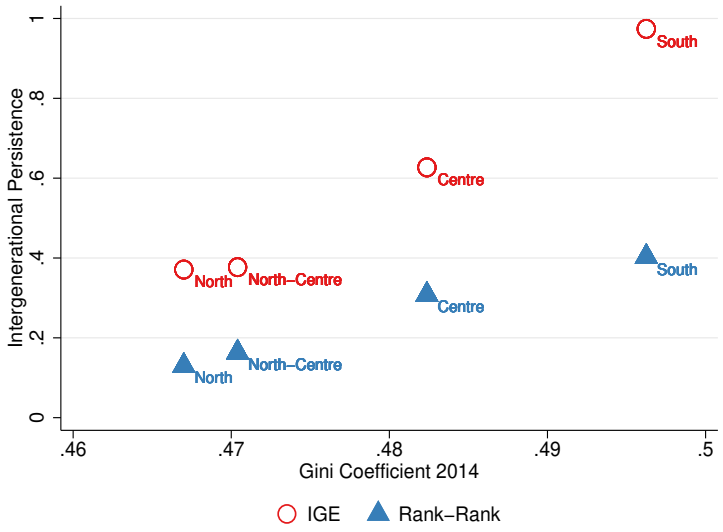

Figure 1.1: Great Gatsby Curve Across Regions: Relationship Between Intergenerational Earnings Persistence and Gini

Source: ESRU-EMOVI 2011 and INEGI 2014, author's calculations.

It could be possible to argue that in Mexico, high levels of economic inequality seem to be associated with low levels of social mobility, which might be evidence of the existence of a *Great Gatsby Curve* (Krueger, 2012). Figure 1.1 shows a

strong and statistically significant correlation between income inequality and intergenerational persistence among regions.[25] These results are much in line with those found in Delajara and Graña (2017), where intergenerational mobility in wealth and economic inequality were negatively associated across regions.

Since the rank-rank relationship is nearly linear, the "absolute upward mobility" could be measured as the expected rank of the earnings of a child who grew up in region r with a father who has a national earnings rank of 25 (Table 1.6). In Mexico, children who grew up with disadvantaged fathers are on average at the 40.2 percentile rank in their distribution of earnings, which means that these children experienced an upward mobility of 15.2 percentiles compared to their fathers' position. At the cross-regional level, children from a poor background who grew up in the North region switched 30.9 rungs on the ladder, whilst in the South region, children from the same background switched just 6.2 rungs. Progress is similar to the national level in the Centre region (15.2 rungs) and greater than the national average in the North-Centre region (19.5 rungs). That is, among fathers earning £2,800, which is the drop limit value of the 25th percentile of the national father's distribution of earnings, children who grew up in the North region are, on average, 24.6, 15.6 and 11.3 rungs above the earnings of children who grew up in the South, Centre and North-Centre regions within their respective distribution of earnings.

Absolute mobility of earnings is higher in the North region, not just for sons of below-median fathers, but for all sons of fathers within the fathers' distribution of earnings. The expected rank of children with disadvantaged fathers varies more across regions than the expected rank of children with wealthy fathers, which means that the region where children grow up is more important for those with disadvantaged fathers. In addition, regions with lower rank-rank coefficients tend to have better outcomes for children from disadvantaged fathers. This is, "absolute upward mobility" is highly correlated with relative mobility.

When the total earnings of parents are used as the measure of parental income, the North, North-Centre and Centre regions present once more the lowest intergen-

[25] See the economic inequality by federative state in Table 1.D.1 in Appendix 1.D.

erational persistence, whilst, the South region presents the highest level of intergenerational persistence. The rank-rank coefficient and "absolute upward mobility" estimates do not present substantial changes and keep the same cross-regional pattern shown in the analysis based on father's earnings.[26]

1.6 Final remarks

Intergenerational earnings mobility is a topic of considerable academic and policy concern. In spite of its theoretical and pragmatic relevance, it is not an issue that has been explored much in developing countries due to the fact that earnings data cannot be directly linked across generations. In the particular case of Mexico, most studies to date have been focused on the analysis of intergenerational mobility in education, occupation status and wealth and few have been focused on income or earnings. However, the multidimensionality of the inequality requires the study of intergenerational mobility in earnings for a better understanding of the intergenerational transmission of the socioeconomic status. To fill the gap I present compelling evidence on earnings mobility for Mexico using the ESRU-EMOVI 2011 survey.

Three significant contributions to the current literature on intergenerational economic mobility for Mexico are presented. First, I combine information from the ESRU-EMOVI and the ENEU surveys using the TSTSLS estimation procedure to measure intergenerational earnings mobility at the national, urban and regional levels. Second, I illustrate the sensitivity of the IGE and the rank-rank coefficient to attenuation bias, life-cycle bias and alternative earnings definitions. Finally, I perform a detailed analysis of intergenerational earnings mobility across regions in Mexico.

The results indicated that the IGE was 0.709, indicating that a 10% increase in a father's earnings was associated with a 7.09% increase in their children's earnings on average. The rank-rank coefficient was 0.315, meaning that a 10 percentile point increase in the father's earnings rank within the total distribution of fathers' earnings

[26]Early research for Mexico found a similar pattern for the intergenerational mobility of wealth (Delajara et al., 2020; Delajara and Graña, 2017; Vélez-Grajales et al., 2017), education and occupational status (Delajara and Graña, 2017) across regions: South - Centre - North-Centre - North (from lowest to highest mobility).

would only be associated with a 3.15 percentile point increase in the son's earnings rank within the corresponding distribution of earnings.

Furthermore, the analysis also found that intergenerational earnings mobility varied between urban and non-urban areas in Mexico. Specifically, the estimated IGE for the urban area was 0.661, while the rank-rank coefficient was 0.291. These findings suggest that while there is some degree of mobility in Mexico, there are also significant barriers to economic progress that are not easily overcome.

The analysis revealed that attenuation bias resulting from measurement error and transitory shocks, leads to an understatement of the IGE when permanent parental earnings are measured by point-in-time earnings, rather than by a five-years average of parental earnings. Moreover, the life-cycle bias seems to also be important, as evidenced by a notable decrease in the IGE estimator when a subsample of sons aged 35-45 is considered (0.532).

Although the estimates are not completely comparable, these findings suggest that previous estimates of intergenerational earnings mobility in Mexico have likely understated the true magnitude of the country's earnings mobility problem. Nevertheless, it is important to recognise the limitations of the TSTSLS method, and the measure presented here may serve as an adequate upper bound for the intergenerational persistence of earnings. Additionally, the exclusion of daughters from the analysis may result in an overstatement of the true levels of intergenerational persistence in earnings for Mexico. Nonetheless, this analysis provides an important starting point for understanding the persistence of earnings inequalities across generations in developing countries, and specifically in Mexico.

The rank-rank coefficient presents a similar pattern as the IGE, although it is less susceptible to measurement problems. The study findings suggest that attenuation bias and life-cycle bias affect substantially the scale measurement, rather than the positional accuracy within the earnings distribution. Therefore, the rank-rank coefficient may serve as a reliable indicator for time and cross-country comparisons, given data limitations. However, using only the rank-rank coefficient may miss the degree of inequality across generations captured by the scale measurement, which

is an essential aspect of analysing intergenerational mobility.

Moreover,when parents' earnings are considered, both the IGE and the rank-rank coefficient show changes in magnitude, but maintain the same pattern when compared to the use of only father's earnings as measure of parental earnings. This suggests that mothers who actively participate in the labour market increase the chances of their sons moving upward on the socio-economic ladder.

A cross-regional analysis of earnings mobility indicates that the South, the country's poorest region, presents the highest intergenerational persistence, while the North, the country's wealthiest region, evidences the highest intergenerational earnings mobility. Independent of the dimension used to measure intergenerational mobility, the South region is the one where children's social destination is more affected by their social origin. Consequently, children who grow up in the South region have less opportunity to climb the social ladder and improve their conditions. Across regions, the expected rank of children with disadvantaged fathers varies more than the expected rank of children with wealthy fathers, which means that the region where children grow up is more important for those with disadvantaged fathers.

It is essential to incorporate women to the analysis of social mobility, to determine the effects of the progressive increase in female labour market participation and the changes in family dynamics (e.g. assortative matting, distribution of responsibilities inside the household) over the last twenty years. Furthermore, to identify the impact of family structures (e.g. single mothers, number of siblings), access to the credit market and migration on intergenerational earnings mobility will allow to improve the mechanisms of redistribution to generate more equality of opportunities.

From a methodological point of view it is also possible to explore the use of the novel maching learning based technique proposed by Bloise et al. (2021) for the estimation of the intergenerational income mobility on sub-optimal data. This will be part of a future agenda of work.

Appendix

1.A Sample characteristics

Table 1.A.1: Main Sample Characterization

	In the sample		*Out of the sample*		*Total*	
	Individuals	*%*	*Individuals*	*%*	*Individuals*	*%*
Child						
Age						
25-29 years old	405	16.50	469	19.31	874	17.90
30-34 years old	626	25.49	540	22.20	1,165	23.85
35-39 years old	575	23.44	477	19.63	1,052	21.54
40-44 years old	435	17.73	491	20.22	927	18.97
45-50 years old	414	16.85	453	18.65	867	17.74
Education						
Less than primary completed	179	7.31	305	12.54	484	9.91
Primary completed	469	19.12	596	24.53	1,066	21.81
Secondary completed	1,393	56.76	1,170	48.15	2,564	52.47
University completed	413	16.82	359	14.79	772	15.81
Economic activity						
Employed	2,412	98.24	1,976	81.30	4,388	89.81
Unemployed	7	0.27	146	6.01	153	3.12
Other activity	37	1.49	291	11.96	327	6.71
Don't Know/Don't Answer			18	0.73	18	0.36
Income						
Missing			909	37.38	909	18.6
Greater than zero	2,455	100	1,522	62.62	3,977	81.4
Parents						
Father's age						
Younger than 30 years			53	2.19	53	1.09
30-60 years old	2,455	100	1,217	50.05	3,672	75.15
Older than 60 years			109	4.46	109	2.22
Missing			1,052	43.29	1,052	21.54
Mother's age						
Younger than 30 years			187	7.71	187	3.83
30-60 years old	2,455	100	1,481	60.92	3,855	78.91
Older than 60 years			32	1.32	32	0.66
Missing			843	34.70	843	17.26
Father's education						
Less than primary completed	1,176	47.92	1,563	64.28	2,739	56.06
Primary completed	663	27.01	438	18.03	1,101	22.54
Secondary completed	536	21.82	350	14.40	886	18.13
University completed	80	3.25	80	3.30	160	3.27
Mother's education						
Less than primary completed	1,213	49.42	1,468	60.39	2,681	54.88
Primary completed	724	29.47	544	22.38	1,268	25.94
Secondary completed	492	20.03	361	14.84	853	17.45
University completed	26	1.07	58	2.38	84	1.72
Parents work						
Both parents work	306	12.45	272	11.20	578	11.82
One parent works	2,149	87.55	1,472	60.56	3,622	74.12
No-one works			475	19.55	475	9.73
Don't Know/Don't Answer			211	8.70	211	4.33
Observations	2,455	100	2,431	100	4,886	100

Source: ESRU-EMOVI 2011.

Table 1.A.2: Descriptive Statistics for Mexican Samples of Parents and Synthetic Parent - 2011 and 1987-1991

	Main Dataset		*Auxiliary Dataset*									
			1987		*1988*		*1989*		*1990*		*1991*	
	Father	*Mother*	*Father*	*Mother*	*Father*	*Mother*	*Father*	*Mother*	*Father*	*Mother*	*Father*	*Mother*
Age												
30-34 years old	18.01	25.96	25.28	31.16	27.13	31.14	27.63	32.27	27.17	31.77	27.63	31.71
35-39 years old	29.16	26.63	25.40	29.22	25.38	29.23	24.55	28.14	25.81	30.28	25.97	30.83
40-44 years old	20.48	28.18	20.17	19.49	20.37	20.32	20.66	20.57	20.57	20.53	21.14	21.31
45-49 years old	16.92	11.36	14.29	12.45	13.89	12.03	13.98	12.00	13.83	10.77	13.60	10.51
50-54 years old	9.61	7.16	9.97	5.99	8.25	5.69	7.82	5.09	8.05	4.93	7.62	3.76
55-60 years old	5.82	0.72	4.88	1.69	4.99	1.59	5.37	1.93	4.56	1.72	4.05	1.88
Education												
Less than primary completed	47.97	34.75	27.54	31.11	24.94	27.76	24.24	26.83	21.58	24.80	19.52	24.03
Primary completed	26.89	31.67	35.40	32.55	34.49	32.06	32.98	32.48	32.77	31.06	32.81	30.18
Secondary completed	21.85	29.67	23.88	28.69	26.37	31.37	27.05	30.17	29.04	33.20	31.19	34.18
University completed	3.29	3.91	13.18	7.65	14.20	8.81	15.74	10.52	16.61	10.93	16.48	11.61
Occupation												
Professionals	2.11	2.71	4.75	2.37	4.97	2.87	5.57	3.44	5.88	3.68	6.14	3.47
Technicians	1.09	0.50	4.90	15.33	4.45	14.44	4.22	13.93	4.13	14.68	3.94	15.22
Working on Education	1.14	3.51	2.33	9.37	2.72	10.28	2.64	10.12	2.67	10.18	2.71	10.52
Working on Art, Shows and Sports	0.51		1.17	0.48	1.10	0.43	1.05	0.55	1.09	0.33	1.22	0.76
Officers and Directors on a Public, Private and Social Sectors	0.68	0.81	5.21	2.99	5.84	2.91	5.90	2.48	6.40	2.71	5.65	2.10
Working on Agriculture, Ranching, Foresting, and Hunting and Fishing Activities	29.77	5.93	1.83	0.30	1.60	0.28	1.33	0.36	1.33	0.14	1.16	0.10
Chiefs, Supervisors and other Control Workers in Artisan Manufacturing and Industrial Activities	1.00	0.56	2.89	0.83	3.26	0.89	3.15	0.84	3.22	0.70	2.79	0.83
Artisans and Workers on Transformation Industry and Repair and Maintenance Activities	26.38	9.42	23.03	8.39	22.77	8.51	23.05	6.98	22.68	6.35	21.51	5.39
Operators of Continuous Movement Fixed Machinery and Industrial Fabrication	1.01	0.24	6.84	3.18	6.69	3.30	7.01	3.61	6.24	3.92	6.93	4.66
Assistants and Labourers in the Artisanal and Industrial Fabrication Process	4.20	0.42	4.04	0.31	3.51	0.21	3.72	0.32	3.71	0.23	3.86	0.32
Drivers and Drivers assistants (Mobile Machinery and Transport)	9.64	0.03	9.71	0.21	10.51	0.06	9.43	0.06	9.65	0.05	10.78	0.06
Chiefs of Department, Coordinators and Supervisors in Administrative Activities	0.15	0.06	3.71	1.95	3.56	1.91	3.57	1.88	3.54	1.83	3.51	2.06
Administrative Activities Assistants	2.23	6.7	5.38	5.03	5.56	5.76	5.37	5.93	5.24	6.26	5.36	7.13
Shopkeepers, Shop employees and Sales Agents	12.16	23.13	11.01	15.53	11.18	16.33	11.52	16.92	11.61	15.83	11.21	13.63
Street Vendors	0.79	5.66	3.16	6.72	2.33	3.60	2.64	4.16	2.61	2.97	2.91	4.41
Personal Services Workers	3.71	14.31	5.70	14.99	6.05	16.35	5.79	16.69	5.96	18.57	6.18	16.33
Domestic Services Workers	0.44	12.73	0.52	11.90	0.50	11.74	0.46	11.63	0.51	11.41	0.42	12.72
Security Workers and Armed forces	2.51	0.26	3.84	0.10	3.37	0.12	3.57	0.09	3.50	0.17	3.70	0.26
Other Workers	0.46	13.02	0.01	0.01	0.01		0.02		0.01		0.03	0.01
Area												
Urban	81.03	86.89	100	100	100	100	100	100	100	100	100	100
Observations	2,373	421	50,677	15,223	55,535	16,742	55,956	16,639	55,537	16,931	54,313	17,462

Source: ESRU-EMOVI 2011 and ENEU 1987-1991.

1.B First stage parameter estimates

Table 1.B.1: Fathers' Earnings Equation using Auxiliary Sample (First Stage Regression)

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
30-34-Less than primary completed-Technicians	-1,477.00	-1,511.33	1,470.07	-5,035.40	-9,042.35
	(298.739)	(865.656)	(1,697.502)	(971.717)	(800.828)
30-34-Less than primary completed-Education		-3,846.81	-1,564.12		
		(1,018.865)	(1,895.137)		
30-34-Less than primary completed-Art, Shows & Sports	-682.21	-601.13	2,759.80	-2,560.22	-10,913.47
	(301.882)	(896.373)	(1,731.101)	(1,042.083)	(604.290)
30-34-Less than primary completed-Officers and Directors	687.15	595.78	3,287.94	-2,251.68	-231.17
	(303.669)	(882.622)	(1,701.124)	(1,010.404)	(720.907)
30-34-Less than primary completed-Agriculture	-2,599.25	-3,619.12	-696.15	-6,304.05	-11,378.65
	(288.399)	(849.789)	(1,698.840)	(968.930)	(532.624)
30-34-Less than primary completed-Chiefs, Supervisors & Control workers	-99.64	-2,282.16	669.79	-3,359.51	-7,963.74
	(294.427)	(868.714)	(1,704.703)	(990.601)	(603.622)
30-34-Less than primary completed-Transformation & Maintenance Activities	-827.38	-2,810.96	54.75	-4,390.12	-9,579.15
	(286.764)	(836.847)	(1,689.634)	(963.955)	(505.937)
30-34-Less than primary completed-Operators of Machinery	-740.88	-3,141.40	-114.73	-5,131.75	-10,478.17
	(287.439)	(840.088)	(1,690.678)	(966.202)	(512.288)
30-34-Less than primary completed-Artisanal and Industrial Fabrication	-1,495.04	-3,648.72	-1,020.51	-5,388.59	-10,828.64
	(287.673)	(840.579)	(1,690.870)	(966.190)	(510.288)
30-34-Less than primary completed-Drivers and Drivers assistants	-711.65	-2,451.03	318.01	-4,678.31	-9,735.76
	(287.633)	(839.659)	(1,690.391)	(965.230)	(510.170)
30-34-Less than primary completed-Administrative Activities	89.14	-3,486.31	403.71	-5,237.65	-10,749.50
	(294.049)	(862.705)	(1,740.396)	(1,040.076)	(612.271)
30-34-Less than primary completed-Administrative Activities Assistants	-1,186.21	-3,258.81	-430.41	-5,323.33	-10,610.52
	(290.287)	(853.189)	(1,696.346)	(981.887)	(530.772)
30-34-Less than primary completed-Shopkeepers & Sales Agents	-750.92	-3,005.74	356.06	-4,118.09	-9,603.13
	(287.875)	(841.261)	(1,690.852)	(967.180)	(513.972)
30-34-Less than primary completed-Street Vendors	-1,277.35	-2,999.35	737.80	-4,377.87	-10,025.77
	(288.295)	(853.141)	(1,695.298)	(970.432)	(517.349)
30-34-Less than primary completed-Personal Services	-270.37	-3,236.07	-409.09	-5,200.08	-10,281.28
	(287.859)	(839.250)	(1,690.858)	(966.705)	(509.981)
30-34-Less than primary completed-Domestic Services	-1,414.40	-2,662.74	-627.96	-5,000.89	-11,524.52
	(300.475)	(867.440)	(1,716.510)	(1,002.440)	(639.864)
30-34-Less than primary completed-Security and Armed forces	-1,274.92	-2,932.65	-522.17	-5,190.94	-10,135.83
	(290.183)	(848.161)	(1,695.673)	(980.150)	(532.106)
30-34-Less than primary completed-Other Workers	-1,144.89	-606.81	1,044.99		
	(632.557)	(2,221.377)	(2,388.956)		
30-34-Primary completed-Professionals	2,207.97	-2,890.62	-404.51	-5,003.79	-9,417.15
	(899.473)	(921.920)	(1,848.447)	(2,016.854)	(1,875.897)
30-34-Primary completed-Technicians	-228.70	-2,387.87	715.13	-4,223.05	-8,212.00
	(287.939)	(843.734)	(1,691.875)	(968.673)	(525.007)
30-34-Primary completed-Education	657.18	-3,114.69	157.58	-3,010.46	-10,030.78
	(306.770)	(1,332.400)	(1,747.447)	(1,142.664)	(754.449)
30-34-Primary completed-Art, Shows & Sports	-278.09	-1,708.74	1,067.81	-3,865.37	-8,704.33
	(292.073)	(849.131)	(1,698.396)	(979.347)	(535.068)
30-34-Primary completed-Officers and Directors	716.04	4,373.68	2,796.93	2,006.69	-1,757.83
	(294.087)	(855.596)	(1,696.505)	(977.152)	(536.153)
30-34-Primary completed-Agriculture	-1,699.73	-2,826.97	-637.84	-4,977.50	-10,668.38
	(291.819)	(894.218)	(1,693.931)	(973.048)	(518.020)
30-34-Primary completed-Chiefs, Supervisors & Control workers	-254.24	-2,066.77	1,438.99	-962.72	-8,744.68
	(288.766)	(844.737)	(1,691.792)	(969.393)	(514.786)
30-34-Primary completed-Transformation & Maintenance Activities	-858.58	-2,747.57	533.73	-4,441.27	-9,725.13
	(286.643)	(836.243)	(1,689.440)	(963.536)	(504.722)
30-34-Primary completed-Operators of Machinery	-903.65	-3,067.66	-251.95	-5,129.66	-10,109.39
	(286.944)	(837.308)	(1,689.786)	(964.116)	(505.705)
30-34-Primary completed-Artisanal and Industrial Fabrication	-1,084.34	-3,327.54	-907.39	-5,465.93	-10,440.79
	(287.404)	(840.009)	(1,690.274)	(964.864)	(508.130)
30-34-Primary completed-Drivers and Drivers assistants	-560.66	-2,457.06	694.53	-3,380.55	-9,454.33
	(286.811)	(836.683)	(1,689.799)	(963.922)	(505.474)
30-34-Primary completed-Administrative Activities	-343.95	-2,524.64	820.73	-3,941.08	-9,824.83
	(290.767)	(849.832)	(1,693.690)	(971.140)	(515.913)
30-34-Primary completed-Administrative Activities Assistants	-1,110.27	-2,964.70	151.56	-5,165.10	-10,072.59
	(287.594)	(841.141)	(1,690.661)	(965.713)	(512.919)
30-34-Primary completed-Shopkeepers & Sales Agents	-444.67	-2,444.17	704.09	-4,299.31	-9,606.70
	(286.928)	(837.624)	(1,689.825)	(964.275)	(506.215)
30-34-Primary completed-Street Vendors	114.14	-2,540.93	-159.32	-4,090.74	-9,889.43
	(288.469)	(845.107)	(1,691.356)	(967.543)	(511.142)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
30-34-Primary completed-Personal Services	-1,276.60	-3,101.89	-118.03	-5,169.62	-10,232.14
	(287.213)	(839.294)	(1,690.490)	(964.685)	(507.717)
30-34-Primary completed-Domestic Services	407.47	-2,249.76	200.92	-4,983.44	-10,295.21
	(299.492)	(869.876)	(1,701.733)	(984.633)	(593.329)
30-34-Primary completed-Security and Armed forces	-795.63	-3,113.89	-636.18	-5,202.62	-10,514.15
	(287.182)	(839.910)	(1,690.628)	(965.957)	(508.967)
30-34-Secondary completed-Professionals	588.42	3,323.41	5,713.12	-78.16	-3,733.32
	(295.646)	(867.844)	(1,695.548)	(990.216)	(526.643)
30-34-Secondary completed-Technicians	-135.28	-1,740.55	1,682.74	-2,967.47	-7,978.10
	(286.846)	(837.128)	(1,689.804)	(964.091)	(505.812)
30-34-Secondary completed-Education	-438.65	-2,668.40	536.94	-4,488.76	-8,821.94
	(288.483)	(842.344)	(1,691.463)	(966.297)	(512.769)
30-34-Secondary completed-Art, Shows & Sports	1,237.12	-1,847.11	3,249.20	-983.98	-7,182.35
	(289.611)	(848.505)	(1,692.962)	(970.746)	(516.689)
30-34-Secondary completed-Officers and Directors	2,291.96	1,774.36	6,405.97	4,107.79	-472.28
	(287.597)	(839.232)	(1,690.838)	(965.024)	(507.961)
30-34-Secondary completed-Agriculture	985.89	-2,072.24	173.00	-3,532.65	-9,806.41
	(289.709)	(849.296)	(1,700.602)	(988.966)	(543.988)
30-34-Secondary completed-Chiefs, Supervisors & Control workers	685.29	-452.94	1,806.22	-2,655.17	-7,852.85
	(288.128)	(839.431)	(1,690.626)	(965.123)	(508.644)
30-34-Secondary completed-Transformation & Maintenance Activities	-189.12	-2,071.43	991.94	-3,450.99	-9,148.48
	(286.777)	(836.838)	(1,689.567)	(963.773)	(504.998)
30-34-Secondary completed-Operators of Machinery	-641.47	-2,596.40	-256.82	-4,443.82	-9,729.57
	(287.365)	(838.813)	(1,690.155)	(964.722)	(506.215)
30-34-Secondary completed-Artisanal and Industrial Fabrication	-1,425.35	-2,965.97	-210.05	-5,355.61	-10,696.05
	(288.578)	(845.586)	(1,691.820)	(967.563)	(511.898)
30-34-Secondary completed-Drivers and Drivers assistants	307.73	-1,500.71	2,091.96	-2,775.22	-8,844.34
	(287.013)	(837.281)	(1,689.846)	(964.008)	(505.301)
30-34-Secondary completed-Administrative Activities	677.00	-1,177.72	1,505.98	-3,053.47	-8,597.19
	(287.488)	(838.596)	(1,690.179)	(965.048)	(507.005)
30-34-Secondary completed-Administrative Activities Assistants	-468.29	-2,321.92	384.20	-4,127.96	-9,443.38
	(286.962)	(837.264)	(1,689.824)	(964.092)	(505.689)
30-34-Secondary completed-Shopkeepers & Sales Agents	500.71	-818.19	2,706.07	-2,541.45	-7,846.04
	(286.860)	(836.721)	(1,689.609)	(963.719)	(505.171)
30-34-Secondary completed-Street Vendors	-217.92	-2,036.15	2,784.36	-4,170.60	-8,920.67
	(288.623)	(847.493)	(1,692.264)	(968.534)	(512.877)
30-34-Secondary completed-Personal Services	-683.78	-2,703.54	-40.87	-4,458.47	-9,673.76
	(287.973)	(839.106)	(1,690.448)	(965.067)	(507.998)
30-34-Secondary completed-Domestic Services	-1,196.69	-2,368.65	250.65	-5,371.10	-9,414.20
	(293.734)	(888.730)	(1,702.644)	(981.097)	(549.466)
30-34-Secondary completed-Security and Armed forces	-491.13	-2,733.90	36.94	-4,599.91	-9,911.26
	(288.398)	(842.084)	(1,690.762)	(965.016)	(508.456)
30-34-University completed-Professionals	2,859.77	908.81	4,989.12	1,531.28	-3,055.08
	(286.771)	(836.679)	(1,689.563)	(963.777)	(505.095)
30-34-University completed-Technicians	1,517.60	-549.80	2,932.83	-693.54	-3,256.09
	(288.002)	(841.754)	(1,691.261)	(967.944)	(514.794)
30-34-University completed-Education	691.05	-1,437.08	2,159.29	-3,209.23	-9,181.41
	(287.710)	(840.660)	(1,690.414)	(964.927)	(507.917)
30-34-University completed-Art, Shows & Sports	1,512.45	-95.04	2,747.59	-724.67	510.68
	(292.866)	(866.686)	(1,702.672)	(977.909)	(524.324)
30-34-University completed-Officers and Directors	3,652.94	5,364.49	9,469.02	9,637.33	2,468.14
	(287.230)	(837.847)	(1,689.881)	(964.191)	(505.966)
30-34-University completed-Agriculture	502.72	743.74	1,381.11	3,213.34	-3,310.12
	(316.937)	(969.008)	(1,725.579)	(1,118.788)	(689.037)
30-34-University completed-Chiefs, Supervisors & Control workers	2,970.18	1,711.31	5,924.86	1,552.30	-4,093.53
	(287.964)	(840.776)	(1,690.631)	(966.190)	(512.880)
30-34-University completed-Transformation & Maintenance Activities	1,372.12	-1,273.99	2,893.37	-1,718.76	-6,193.62
	(291.284)	(850.991)	(1,693.970)	(968.553)	(516.617)
30-34-University completed-Operators of Machinery	442.76	-881.19	1,299.47	-1,599.32	-4,112.03
	(307.742)	(898.903)	(1,708.867)	(1,011.481)	(565.270)
30-34-University completed-Artisanal and Industrial Fabrication	-708.32	-3,192.63	668.67	-4,786.83	-9,804.23
	(297.803)	(1,294.555)	(1,763.918)	(1,009.274)	(669.672)
30-34-University completed-Drivers and Drivers assistants	-184.85	-1,240.80	4,537.31	-251.37	-2,632.18
	(292.940)	(882.219)	(1,697.470)	(975.926)	(519.646)
30-34-University completed-Administrative Activities	2,479.59	1,488.25	4,127.58	-777.08	-5,093.27
	(287.442)	(839.288)	(1,690.393)	(965.724)	(509.876)
30-34-University completed-Administrative Activities Assistants	1,406.30	-540.54	2,452.03	-1,781.47	-8,683.01
	(289.382)	(844.748)	(1,691.591)	(968.400)	(516.195)
30-34-University completed-Shopkeepers & Sales Agents	802.31	419.80	5,162.83	1,109.76	-2,396.58
	(288.249)	(840.298)	(1,690.901)	(966.067)	(508.343)
30-34-University completed-Street Vendors	1,561.72	1,895.98	6,625.70	-1,637.94	-7,042.71
	(297.347)	(886.799)	(1,706.078)	(988.687)	(530.060)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
30-34-University completed-Personal Services	1,655.15	-1,139.46	630.39	-1,275.53	-8,240.13
	(323.105)	(909.346)	(1,722.179)	(1,001.447)	(600.210)
30-34-University completed-Security and Armed forces	1,349.68	-693.10	626.19	-3,968.70	-8,086.56
	(306.185)	(910.069)	(1,703.632)	(988.718)	(569.449)
30-34-University completed-Other Workers	445.90	-970.90		10,326.97	
	(383.822)	(2,448.178)		(2,080.713)	
35-39-Less than primary completed-Professionals	-2,313.51	-3,398.14	-2,460.79	-3,690.03	
	(444.671)	(1,968.618)	(2,190.699)	(1,600.160)	
35-39-Less than primary completed-Technicians	-1,652.94	-3,942.10	-136.18	-4,559.15	-9,730.28
	(293.391)	(990.937)	(1,706.681)	(998.868)	(694.623)
35-39-Less than primary completed-Art, Shows & Sports	128.31	-2,866.41	-377.18	-2,611.48	-9,509.17
	(302.016)	(895.606)	(1,772.785)	(1,026.503)	(666.640)
35-39-Less than primary completed-Officers and Directors	2,731.54	-1,711.87	2,563.36	2,014.85	-5,861.91
	(294.420)	(901.311)	(1,704.443)	(988.413)	(616.338)
35-39-Less than primary completed-Agriculture	-1,245.04	-2,916.24	-313.84	-5,232.15	-10,047.44
	(289.840)	(848.120)	(1,697.088)	(970.090)	(536.903)
35-39-Less than primary completed-Chiefs, Supervisors & Control workers	348.51	-1,672.11	1,040.64	-4,347.01	-6,828.97
	(295.580)	(852.949)	(1,694.639)	(974.174)	(547.038)
35-39-Less than primary completed-Transformation & Maintenance Activities	-942.57	-2,847.93	408.70	-4,579.71	-9,655.36
	(286.704)	(836.631)	(1,689.580)	(963.710)	(505.261)
35-39-Less than primary completed-Operators of Machinery	-1,014.86	-2,716.64	-26.32	-4,923.92	-10,291.18
	(287.283)	(839.517)	(1,691.002)	(966.404)	(511.919)
35-39-Less than primary completed-Artisanal and Industrial Fabrication	-1,443.35	-3,485.35	-870.23	-5,884.38	-10,725.04
	(287.535)	(839.895)	(1,690.571)	(965.055)	(511.107)
35-39-Less than primary completed-Drivers and Drivers assistants	-509.27	-2,525.79	1,454.13	-3,796.40	-9,373.94
	(287.199)	(838.533)	(1,690.360)	(965.403)	(510.643)
35-39-Less than primary completed-Administrative Activities	-187.09	-3,233.80	49.78	-5,097.28	-10,583.19
	(295.112)	(888.582)	(1,707.302)	(996.147)	(581.223)
35-39-Less than primary completed-Administrative Activities Assistants	-1,458.29	-3,039.92	-366.50	-5,296.40	-10,559.43
	(289.783)	(863.216)	(1,696.927)	(986.294)	(527.323)
35-39-Less than primary completed-Shopkeepers & Sales Agents	-285.31	-1,521.64	877.13	-3,365.50	-9,366.81
	(287.574)	(840.025)	(1,691.186)	(965.786)	(512.252)
35-39-Less than primary completed-Street Vendors	-718.68	-2,872.24	-667.21	-4,636.69	-9,746.63
	(287.797)	(845.037)	(1,691.940)	(971.031)	(517.959)
35-39-Less than primary completed-Personal Services	-963.44	-3,168.96	-291.47	-4,910.58	-10,796.87
	(288.206)	(840.475)	(1,690.797)	(966.098)	(510.140)
35-39-Less than primary completed-Domestic Services	-1,480.32	-3,729.78	-923.46	-5,529.16	-9,900.60
	(296.828)	(881.104)	(1,699.055)	(1,029.065)	(557.687)
35-39-Less than primary completed-Security and Armed forces	-1,195.55	-3,377.10	-492.29	-5,448.88	-9,864.36
	(288.353)	(852.973)	(1,694.580)	(974.191)	(528.148)
35-39-Primary completed-Professionals	1,008.52	-2,243.70		1,423.95	-8,929.95
	(359.439)	(1,000.434)		(1,128.562)	(929.205)
35-39-Primary completed-Technicians	-222.01	-2,401.65	992.84	-3,925.22	-8,856.88
	(287.871)	(842.466)	(1,691.808)	(970.371)	(518.929)
35-39-Primary completed-Education	-2,372.94	-3,079.18	-811.27	-5,351.18	-9,424.04
	(333.154)	(875.561)	(1,816.432)	(1,005.668)	(574.682)
35-39-Primary completed-Art, Shows & Sports	-844.59	-1,933.99	601.86	-3,949.50	-10,165.76
	(291.422)	(858.004)	(1,697.012)	(977.599)	(530.000)
35-39-Primary completed-Officers and Directors	783.18	697.55	4,404.89	-22.63	-2,570.73
	(289.453)	(847.218)	(1,693.067)	(968.855)	(521.435)
35-39-Primary completed-Agriculture	-2,281.39	-3,480.33	30.02	-4,405.76	-10,475.52
	(289.571)	(855.358)	(1,695.132)	(972.352)	(527.678)
35-39-Primary completed-Chiefs, Supervisors & Control workers	224.71	-2,418.42	1,484.13	-4,174.04	-8,063.95
	(288.390)	(842.006)	(1,692.303)	(966.758)	(516.487)
35-39-Primary completed-Transformation & Maintenance Activities	-584.59	-2,357.99	583.46	-4,211.71	-9,661.70
	(286.657)	(836.248)	(1,689.454)	(963.530)	(504.754)
35-39-Primary completed-Operators of Machinery	-722.77	-2,769.95	133.60	-4,662.08	-10,303.51
	(286.858)	(837.303)	(1,689.807)	(964.466)	(506.015)
35-39-Primary completed-Artisanal and Industrial Fabrication	-1,312.12	-2,989.25	-942.30	-5,548.37	-10,869.68
	(287.526)	(841.459)	(1,690.842)	(965.389)	(508.039)
35-39-Primary completed-Drivers and Drivers assistants	-463.46	-1,860.56	1,355.00	-3,687.08	-9,526.76
	(286.803)	(836.909)	(1,689.727)	(963.892)	(505.276)
35-39-Primary completed-Administrative Activities	-696.50	-2,392.10	798.71	-4,572.68	-8,627.21
	(288.618)	(846.855)	(1,695.235)	(971.393)	(526.609)
35-39-Primary completed-Administrative Activities Assistants	-511.50	-2,746.85	-156.01	-4,592.58	-10,029.71
	(287.190)	(838.424)	(1,692.000)	(966.895)	(509.210)
35-39-Primary completed-Shopkeepers & Sales Agents	-157.03	-1,815.26	1,277.32	-3,161.02	-9,351.54
	(286.853)	(837.229)	(1,689.820)	(964.249)	(505.884)
35-39-Primary completed-Street Vendors	-444.93	-2,121.11	1,168.57	-3,982.51	-9,944.83
	(288.441)	(843.395)	(1,691.675)	(967.576)	(513.053)
35-39-Primary completed-Personal Services	-1,156.50	-3,076.20	277.83	-4,848.02	-10,593.24
	(287.083)	(837.775)	(1,690.159)	(964.882)	(507.209)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
35-39-Primary completed-Domestic Services	356.95	-3,036.66	-482.99	-3,651.92	-10,934.99
	(299.647)	(908.919)	(1,729.763)	(970.452)	(542.852)
35-39-Primary completed-Security and Armed forces	-1,062.65	-3,071.89	-341.83	-5,213.80	-10,556.03
	(287.311)	(839.288)	(1,691.223)	(965.150)	(507.628)
35-39-Secondary completed-Professionals	867.70	1,634.08	3,846.71	1,433.24	-5,847.22
	(292.532)	(881.543)	(1,698.920)	(975.237)	(551.325)
35-39-Secondary completed-Technicians	775.53	-1,345.20	1,226.89	-2,500.11	-8,725.52
	(287.044)	(837.937)	(1,690.140)	(964.473)	(506.527)
35-39-Secondary completed-Education	-656.94	-2,892.44	202.14	-4,534.77	-9,089.30
	(287.783)	(840.046)	(1,692.161)	(969.463)	(514.043)
35-39-Secondary completed-Art, Shows & Sports	349.31	-1,447.96	6,822.86	4,446.33	-5,899.97
	(290.164)	(848.570)	(1,695.434)	(969.562)	(519.968)
35-39-Secondary completed-Officers and Directors	2,514.73	2,829.99	9,587.23	3,627.19	-1,530.12
	(287.425)	(839.963)	(1,690.546)	(964.989)	(509.149)
35-39-Secondary completed-Agriculture	-1,943.84	-1,432.69	875.62	-3,334.64	-7,184.14
	(294.462)	(872.041)	(1,719.577)	(976.715)	(532.497)
35-39-Secondary completed-Chiefs, Supervisors & Control workers	1,104.27	-399.57	2,010.63	-1,616.24	-6,180.70
	(288.023)	(841.782)	(1,690.907)	(966.026)	(511.688)
35-39-Secondary completed-Transformation & Maintenance Activities	4.64	-1,641.04	1,184.23	-3,689.63	-9,071.70
	(286.898)	(837.218)	(1,689.676)	(963.867)	(505.265)
35-39-Secondary completed-Operators of Machinery	827.32	-2,350.21	402.52	-4,174.65	-9,206.56
	(288.001)	(839.958)	(1,690.559)	(965.218)	(507.610)
35-39-Secondary completed-Artisanal and Industrial Fabrication	-861.37	-3,076.64	-77.43	-5,095.32	-10,326.93
	(290.739)	(860.738)	(1,696.513)	(971.889)	(514.732)
35-39-Secondary completed-Drivers and Drivers assistants	536.16	-664.94	2,308.99	-2,832.93	-8,007.93
	(287.328)	(838.114)	(1,689.916)	(964.237)	(505.622)
35-39-Secondary completed-Administrative Activities	1,974.98	-1,345.81	1,438.86	-2,210.15	-7,280.86
	(287.416)	(839.685)	(1,690.482)	(965.578)	(508.314)
35-39-Secondary completed-Administrative Activities Assistants	167.03	-2,123.42	209.19	-4,339.60	-8,629.03
	(287.016)	(837.773)	(1,690.009)	(964.548)	(505.946)
35-39-Secondary completed-Shopkeepers & Sales Agents	906.10	-894.56	2,562.93	-1,926.29	-7,323.32
	(286.884)	(837.247)	(1,689.749)	(963.851)	(505.510)
35-39-Secondary completed-Street Vendors	1,183.69	-2,040.26	1,863.01	-2,668.51	-9,179.24
	(289.783)	(848.362)	(1,694.132)	(968.589)	(511.485)
35-39-Secondary completed-Personal Services	120.43	-2,337.80	884.13	-4,451.49	-9,662.33
	(288.527)	(841.726)	(1,691.402)	(966.103)	(508.075)
35-39-Secondary completed-Domestic Services	69.35	-2,855.77	-699.51	-4,237.50	-11,631.48
	(311.103)	(942.018)	(1,701.014)	(1,019.586)	(750.202)
35-39-Secondary completed-Security and Armed forces	-677.43	-2,960.39	101.33	-4,174.34	-9,070.70
	(288.338)	(839.770)	(1,690.650)	(966.877)	(509.909)
35-39-Secondary completed-Other Workers		10,248.35	1,044.99		-10,354.53
		(1,678.213)	(2,211.744)		(794.809)
35-39-University completed-Professionals	2,716.14	2,765.36	6,218.78	1,443.46	-3,133.34
	(286.820)	(836.940)	(1,689.641)	(963.687)	(504.960)
35-39-University completed-Technicians	2,206.88	513.41	3,304.41	-837.73	-6,723.12
	(288.189)	(846.055)	(1,691.807)	(968.109)	(518.728)
35-39-University completed-Education	970.05	-945.48	1,549.04	-2,723.24	-7,770.66
	(287.610)	(839.613)	(1,690.266)	(965.361)	(509.331)
35-39-University completed-Art, Shows & Sports	2,692.82	1,979.26	7,917.21	4,868.39	-821.46
	(289.802)	(894.582)	(1,700.257)	(983.502)	(601.886)
35-39-University completed-Officers and Directors	4,141.29	6,176.82	13,587.72	9,057.31	4,364.49
	(286.958)	(837.421)	(1,689.844)	(964.114)	(506.276)
35-39-University completed-Agriculture	964.83	-500.75	5,428.02	23,730.32	-7,273.90
	(323.566)	(1,050.246)	(1,731.520)	(1,073.892)	(640.696)
35-39-University completed-Chiefs, Supervisors & Control workers	3,267.07	2,832.99	6,833.25	1,875.13	-2,393.06
	(287.932)	(842.292)	(1,691.281)	(966.272)	(513.544)
35-39-University completed-Transformation & Maintenance Activities	1,376.37	-240.52	3,438.62	-317.06	-6,841.86
	(294.713)	(862.590)	(1,693.930)	(969.375)	(521.078)
35-39-University completed-Operators of Machinery	5,638.16	267.09	1,471.12	-2,589.08	-6,131.18
	(298.722)	(894.399)	(1,725.066)	(1,165.076)	(576.153)
35-39-University completed-Artisanal and Industrial Fabrication	-1,310.65	3,406.75	1,097.29	1,734.13	-8,223.56
	(422.011)	(1,431.876)	(1,852.560)	(1,204.596)	(779.932)
35-39-University completed-Drivers and Drivers assistants	5,677.69	221.83	8,274.16	1,333.17	-7,683.13
	(312.322)	(879.376)	(1,697.667)	(981.188)	(541.590)
35-39-University completed-Administrative Activities	2,467.89	2,330.22	4,316.95	285.42	-4,473.28
	(287.560)	(840.462)	(1,690.970)	(965.124)	(509.126)
35-39-University completed-Administrative Activities Assistants	538.81	1,013.34	2,778.60	-2,142.85	-6,933.09
	(289.198)	(852.267)	(1,692.471)	(967.650)	(511.475)
35-39-University completed-Shopkeepers & Sales Agents	2,515.49	5,275.09	5,492.73	1,234.21	-4,536.94
	(288.042)	(840.044)	(1,690.741)	(966.256)	(507.836)
35-39-University completed-Street Vendors	1,014.32	870.26	3,262.55	165.11	-5,853.07
	(300.388)	(882.739)	(1,706.753)	(1,000.569)	(542.719)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
35-39-University completed-Personal Services	788.82	7,659.05	1,569.16	-1,806.65	-5,553.33
	(320.833)	(923.316)	(1,792.554)	(1,007.630)	(654.535)
35-39-University completed-Domestic Services	-1,002.98	-3,042.14			
	(329.728)	(1,018.865)			
35-39-University completed-Security and Armed forces	2,533.07	-1,619.39	1,386.05	-3,483.38	-8,242.46
	(348.170)	(1,178.546)	(1,695.316)	(973.090)	(562.112)
40-44-Less than primary completed-Technicians	-57.43	-3,579.25	-4.91	-4,781.98	-7,213.64
	(298.237)	(871.764)	(1,705.836)	(997.593)	(591.590)
40-44-Less than primary completed-Education	-751.97	-2,649.74	3,364.21		-9,438.85
	(319.427)	(974.904)	(1,994.984)		(893.377)
40-44-Less than primary completed-Art, Shows & Sports	-495.20	-3,414.61	216.79	-4,390.66	-8,574.21
	(298.084)	(890.574)	(1,715.013)	(1,000.372)	(555.016)
40-44-Less than primary completed-Officers and Directors	1,285.13	278.16	5,064.01	793.12	228.88
	(293.418)	(859.418)	(1,702.686)	(987.321)	(571.005)
40-44-Less than primary completed-Agriculture	-1,851.12	-2,247.08	-673.24	-4,927.06	-10,577.31
	(289.858)	(846.983)	(1,693.451)	(976.935)	(524.380)
40-44-Less than primary completed-Chiefs, Supervisors & Control workers	-627.37	-2,693.08	458.01	-4,603.56	-8,460.67
	(294.329)	(859.766)	(1,695.570)	(973.535)	(524.890)
40-44-Less than primary completed-Transformation & Maintenance Activities	-798.80	-2,879.24	331.49	-4,421.35	-9,784.68
	(286.691)	(836.695)	(1,689.589)	(963.727)	(505.271)
40-44-Less than primary completed-Operators of Machinery	-936.92	-2,829.77	-440.56	-4,790.54	-10,149.07
	(287.425)	(840.404)	(1,690.259)	(965.185)	(508.205)
40-44-Less than primary completed-Artisanal and Industrial Fabrication	-1,480.53	-3,721.24	-1,025.94	-5,643.16	-10,694.11
	(287.378)	(839.649)	(1,690.570)	(965.923)	(508.939)
40-44-Less than primary completed-Drivers and Drivers assistants	-115.50	-2,218.06	1,103.69	-3,977.82	-8,885.95
	(287.117)	(838.101)	(1,690.139)	(965.004)	(509.013)
40-44-Less than primary completed-Administrative Activities	616.06	-1,879.00	273.99	-4,477.48	-10,698.32
	(292.839)	(928.925)	(1,696.096)	(978.180)	(538.409)
40-44-Less than primary completed-Administrative Activities Assistants	-641.60	-3,127.85	-683.14	-4,858.18	-10,225.85
	(290.412)	(854.057)	(1,692.285)	(969.904)	(526.850)
40-44-Less than primary completed-Shopkeepers & Sales Agents	-927.14	-1,981.76	743.58	-4,183.74	-8,811.46
	(287.084)	(838.384)	(1,690.129)	(965.749)	(509.466)
40-44-Less than primary completed-Street Vendors	-1,065.67	-2,647.06	394.30	-5,063.59	-9,032.09
	(287.757)	(843.019)	(1,692.448)	(969.246)	(514.089)
40-44-Less than primary completed-Personal Services	-1,002.85	-3,236.00	-350.37	-5,254.97	-10,648.16
	(287.297)	(838.359)	(1,690.264)	(965.324)	(507.262)
40-44-Less than primary completed-Domestic Services	-873.92	-3,549.97	-703.85	-5,590.92	-10,611.16
	(305.510)	(864.736)	(1,706.657)	(1,008.006)	(528.174)
40-44-Less than primary completed-Security and Armed forces	-1,172.64	-3,522.67	-496.15	-3,947.72	-10,822.69
	(288.573)	(847.914)	(1,691.896)	(972.094)	(532.265)
40-44-Primary completed-Professionals	-542.59	-1,259.85	869.18	-2,444.73	-9,242.53
	(308.811)	(1,929.809)	(1,746.140)	(1,179.653)	(893.377)
40-44-Primary completed-Technicians	407.39	-2,112.70	364.33	-4,664.34	-8,475.61
	(287.652)	(840.892)	(1,691.200)	(966.681)	(515.439)
40-44-Primary completed-Education	-743.42	-2,630.68	609.22	-4,402.72	-10,333.09
	(297.000)	(905.161)	(1,729.505)	(1,008.876)	(559.469)
40-44-Primary completed-Art, Shows & Sports	1,960.40	-1,104.34	2,054.99	-4,105.19	-8,747.75
	(293.333)	(883.753)	(1,697.375)	(974.594)	(528.908)
40-44-Primary completed-Officers and Directors	1,307.95	7,748.88	4,832.28	5,782.96	-2,192.49
	(288.551)	(848.822)	(1,692.817)	(967.888)	(525.105)
40-44-Primary completed-Agriculture	-704.47	-3,349.41	292.67	-4,793.03	-10,103.87
	(289.740)	(846.786)	(1,695.392)	(991.980)	(525.916)
40-44-Primary completed-Chiefs, Supervisors & Control workers	329.63	-1,150.18	1,372.35	-2,327.07	-8,212.13
	(288.595)	(843.657)	(1,691.654)	(967.333)	(518.449)
40-44-Primary completed-Transformation & Maintenance Activities	-486.75	-2,667.71	653.06	-4,018.53	-9,491.12
	(286.698)	(836.430)	(1,689.534)	(963.634)	(504.905)
40-44-Primary completed-Operators of Machinery	-764.71	-2,691.59	-199.19	-4,771.10	-9,859.01
	(287.148)	(838.434)	(1,690.075)	(964.702)	(506.658)
40-44-Primary completed-Artisanal and Industrial Fabrication	-980.80	-3,222.88	-277.87	-5,642.45	-10,865.92
	(288.207)	(842.888)	(1,691.792)	(968.038)	(509.881)
40-44-Primary completed-Drivers and Drivers assistants	-42.12	-2,375.44	1,090.51	-3,497.84	-8,904.82
	(286.847)	(837.168)	(1,689.841)	(964.157)	(505.684)
40-44-Primary completed-Administrative Activities	1,464.05	-2,797.81	390.89	-4,200.12	-9,684.49
	(289.553)	(848.579)	(1,693.476)	(970.054)	(519.811)
40-44-Primary completed-Administrative Activities Assistants	-685.10	-2,689.25	295.45	-4,169.65	-9,721.85
	(287.589)	(838.933)	(1,690.510)	(965.563)	(509.080)
40-44-Primary completed-Shopkeepers & Sales Agents	-293.54	-1,827.56	1,311.25	-2,308.49	-8,675.70
	(287.032)	(837.993)	(1,690.012)	(964.350)	(506.041)
40-44-Primary completed-Street Vendors	-326.29	-1,896.19	656.27	-4,052.00	-9,186.27
	(288.381)	(846.352)	(1,691.925)	(966.588)	(513.269)
40-44-Primary completed-Personal Services	-1,066.86	-2,384.63	91.78	-5,047.65	-10,076.71
	(287.300)	(839.272)	(1,690.347)	(965.054)	(507.809)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
40-44-Primary completed-Domestic Services	-1,106.30	-2,267.61	1,184.50	-5,818.36	-10,642.58
	(296.336)	(920.000)	(1,741.024)	(977.777)	(552.495)
40-44-Primary completed-Security and Armed forces	-1,053.59	-3,148.66	-179.03	-4,763.87	-10,359.91
	(287.694)	(842.167)	(1,691.200)	(966.743)	(509.231)
40-44-Secondary completed-Professionals	1,851.55	1,363.09	4,283.96	1,455.57	-4,757.44
	(294.845)	(887.854)	(1,698.158)	(972.301)	(568.977)
40-44-Secondary completed-Technicians	632.07	-1,164.02	1,832.80	-2,550.20	-7,733.71
	(287.718)	(841.277)	(1,690.788)	(965.165)	(507.510)
40-44-Secondary completed-Education	524.52	-2,788.87	302.69	-3,928.24	-9,428.76
	(288.698)	(843.272)	(1,691.837)	(968.896)	(513.216)
40-44-Secondary completed-Art, Shows & Sports	1,214.04	-2,105.45	1,299.92	-3,387.77	-2,356.70
	(292.151)	(859.889)	(1,694.644)	(973.376)	(514.620)
40-44-Secondary completed-Officers and Directors	2,661.67	3,345.52	8,652.99	5,570.33	-1,377.55
	(287.660)	(838.860)	(1,690.505)	(965.615)	(507.930)
40-44-Secondary completed-Agriculture	637.72	54.03	5,711.65	-42.98	-7,486.29
	(313.421)	(895.136)	(1,713.164)	(993.990)	(546.471)
40-44-Secondary completed-Chiefs, Supervisors & Control workers	1,832.57	-552.12	3,469.54	-1,464.11	-6,856.71
	(288.432)	(840.673)	(1,691.401)	(968.201)	(516.326)
40-44-Secondary completed-Transformation & Maintenance Activities	-167.18	-1,788.40	1,167.46	-3,632.08	-8,719.25
	(287.359)	(838.085)	(1,690.078)	(964.461)	(505.953)
40-44-Secondary completed-Operators of Machinery	-178.99	-2,330.40	207.43	-4,158.47	-8,316.71
	(288.803)	(841.247)	(1,690.751)	(967.033)	(510.004)
40-44-Secondary completed-Artisanal and Industrial Fabrication	-1,245.87	-2,637.60	-1,111.57	-5,796.05	-10,632.96
	(294.759)	(909.061)	(1,698.247)	(980.917)	(516.841)
40-44-Secondary completed-Drivers and Drivers assistants	307.08	-1,230.72	1,823.84	-2,352.98	-8,780.29
	(287.264)	(838.907)	(1,690.344)	(965.201)	(508.363)
40-44-Secondary completed-Administrative Activities	554.75	-754.05	1,947.01	-3,199.99	-7,960.54
	(288.003)	(839.856)	(1,691.086)	(965.777)	(511.966)
40-44-Secondary completed-Administrative Activities Assistants	158.15	-1,990.34	318.64	-4,145.95	-8,865.98
	(287.658)	(839.888)	(1,690.330)	(964.732)	(507.921)
40-44-Secondary completed-Shopkeepers & Sales Agents	1,015.08	-805.91	4,772.17	-766.40	-7,316.15
	(287.080)	(837.854)	(1,689.873)	(964.088)	(506.404)
40-44-Secondary completed-Street Vendors	-286.08	-854.50	1,507.61	-990.66	-8,042.88
	(290.033)	(852.130)	(1,693.459)	(969.109)	(521.361)
40-44-Secondary completed-Personal Services	-478.01	-1,942.31	1,066.86	-4,935.01	-10,508.57
	(290.020)	(848.282)	(1,692.480)	(969.973)	(510.883)
40-44-Secondary completed-Domestic Services	-1,034.62	-3,310.54	2,674.57	-5,816.34	-11,885.96
	(315.350)	(956.250)	(1,800.744)	(1,098.776)	(618.343)
40-44-Secondary completed-Security and Armed forces	-416.78	-2,258.51	358.74	-4,301.04	-9,568.53
	(289.167)	(843.247)	(1,692.179)	(967.569)	(509.961)
40-44-University completed-Professionals	2,949.38	2,426.60	7,627.84	3,194.00	-1,784.65
	(286.920)	(837.255)	(1,689.753)	(963.941)	(505.416)
40-44-University completed-Technicians	1,028.64	29.22	4,086.31	-2,362.76	-4,441.90
	(289.812)	(854.440)	(1,696.899)	(974.197)	(531.473)
40-44-University completed-Education	536.64	-629.22	3,020.98	-2,613.92	-7,581.41
	(287.745)	(840.087)	(1,690.847)	(965.639)	(508.634)
40-44-University completed-Art, Shows & Sports	715.62	825.03	2,247.17	-591.35	-6,091.81
	(309.388)	(1,144.236)	(1,726.001)	(978.212)	(558.465)
40-44-University completed-Officers and Directors	3,449.45	9,053.05	11,702.84	11,955.56	7,656.58
	(287.129)	(837.775)	(1,689.913)	(964.209)	(506.265)
40-44-University completed-Agriculture	-1,491.23	642.27	4,730.00	-3,897.33	-1,728.49
	(454.087)	(1,030.236)	(1,707.484)	(1,026.693)	(769.769)
40-44-University completed-Chiefs, Supervisors & Control workers	2,037.56	1,981.58	6,187.35	2,785.12	-4,006.55
	(290.058)	(846.635)	(1,696.259)	(969.347)	(516.867)
40-44-University completed-Transformation & Maintenance Activities	3,789.18	369.25	3,030.52	-1,320.59	-6,605.86
	(299.231)	(863.935)	(1,696.202)	(977.292)	(526.508)
40-44-University completed-Operators of Machinery	1,499.27	-2,016.23	8,382.42	-8.38	-5,959.34
	(297.025)	(1,403.264)	(1,844.537)	(1,081.323)	(592.104)
40-44-University completed-Artisanal and Industrial Fabrication	16.04	-970.90	-337.09		-9,119.83
	(491.023)	(2,544.595)	(2,670.934)		(760.353)
40-44-University completed-Drivers and Drivers assistants	2,166.46	5,765.33	8,023.62	2,042.94	-6,560.18
	(345.286)	(920.000)	(1,708.747)	(1,012.039)	(623.528)
40-44-University completed-Administrative Activities	3,132.89	741.31	4,333.24	2,357.91	-4,912.93
	(287.848)	(842.979)	(1,691.637)	(966.670)	(514.132)
40-44-University completed-Administrative Activities Assistants	2,473.29	-1,040.59	3,047.54	-2,096.87	-7,171.39
	(293.434)	(852.504)	(1,693.633)	(972.368)	(535.111)
40-44-University completed-Shopkeepers & Sales Agents	1,665.19	7,950.38	4,033.02	2,192.26	-3,566.86
	(288.594)	(848.457)	(1,692.257)	(966.837)	(513.150)
40-44-University completed-Street Vendors	230.84	1,577.22	4,198.48	-480.75	-4,911.72
	(316.222)	(910.807)	(1,704.971)	(993.204)	(561.301)
40-44-University completed-Personal Services	158.45	-1,973.96	3,892.67	-2,201.31	-11,228.37
	(339.296)	(1,037.553)	(1,735.035)	(1,023.611)	(699.692)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
40-44-University completed-Security and Armed forces	966.25	181.08	2,082.72	-3,990.54	-1,993.71
	(309.626)	(1,306.487)	(1,809.198)	(995.347)	(798.793)
40-44-University completed-Other Workers		3,883.59	11,191.55		
		(2,221.377)	(2,171.306)		
45-49-Less than primary completed-Technicians	216.10	-3,599.44	-482.41	-5,779.28	-10,844.95
	(297.760)	(854.013)	(1,699.781)	(982.897)	(587.526)
45-49-Less than primary completed-Education		-3,732.07	877.31	-2,405.67	-8,657.70
		(1,893.838)	(1,940.172)	(1,090.590)	(1,034.509)
45-49-Less than primary completed-Art, Shows & Sports	-705.96	-1,930.60	734.59	-4,752.82	-9,919.51
	(302.293)	(865.775)	(1,698.443)	(987.239)	(579.667)
45-49-Less than primary completed-Officers and Directors	1,676.72	-814.44	5,758.64	3,800.63	-5,411.67
	(292.701)	(872.716)	(1,695.576)	(976.952)	(558.073)
45-49-Less than primary completed-Agriculture	-1,516.18	-3,320.88	-497.04	-5,329.67	-10,461.67
	(288.398)	(845.485)	(1,692.787)	(974.576)	(522.263)
45-49-Less than primary completed-Chiefs, Supervisors & Control workers	1,486.08	-2,657.78	1,541.04	-3,405.79	-8,536.16
	(293.011)	(865.212)	(1,702.087)	(978.584)	(532.533)
45-49-Less than primary completed-Transformation & Maintenance Activities	-666.35	-2,666.93	457.95	-4,318.74	-9,865.72
	(286.699)	(836.542)	(1,689.600)	(963.752)	(505.335)
45-49-Less than primary completed-Operators of Machinery	-1,111.99	-3,104.97	-106.19	-4,884.32	-10,568.97
	(287.323)	(840.557)	(1,691.100)	(966.035)	(510.230)
45-49-Less than primary completed-Artisanal and Industrial Fabrication	-1,511.56	-3,687.68	-837.62	-5,365.91	-10,880.65
	(287.566)	(839.656)	(1,690.963)	(968.677)	(511.014)
45-49-Less than primary completed-Drivers and Drivers assistants	-695.18	-2,418.18	499.84	-4,028.80	-9,341.75
	(287.257)	(839.381)	(1,690.676)	(965.756)	(508.326)
45-49-Less than primary completed-Administrative Activities	-443.63	-3,465.59	148.12	-3,153.89	-10,848.79
	(294.206)	(934.781)	(1,713.119)	(1,022.594)	(567.157)
45-49-Less than primary completed-Administrative Activities Assistants	-1,258.93	-3,415.35	-402.18	-4,849.45	-10,916.99
	(293.728)	(856.891)	(1,694.061)	(970.948)	(526.307)
45-49-Less than primary completed-Shopkeepers & Sales Agents	-488.76	-2,254.16	550.17	-4,030.12	-9,323.69
	(287.296)	(839.361)	(1,690.498)	(965.456)	(511.078)
45-49-Less than primary completed-Street Vendors	-1,073.52	-2,992.73	-139.23	-4,559.77	-10,312.25
	(287.968)	(844.705)	(1,692.000)	(972.124)	(514.064)
45-49-Less than primary completed-Personal Services	-1,330.76	-3,098.87	-823.57	-4,941.76	-10,687.48
	(287.199)	(839.833)	(1,690.594)	(965.564)	(508.913)
45-49-Less than primary completed-Domestic Services	-1,569.07	-3,530.03	-1,039.20	-5,225.44	-10,229.67
	(292.508)	(885.654)	(1,703.831)	(989.842)	(604.514)
45-49-Less than primary completed-Security and Armed forces	-1,162.44	-3,436.03	-897.19	-5,410.34	-10,934.50
	(288.580)	(851.173)	(1,692.296)	(969.834)	(517.485)
45-49-Primary completed-Professionals	778.16	-1,684.89	2,534.38	-5,740.09	-10,068.11
	(353.841)	(1,175.391)	(1,784.044)	(1,222.564)	(933.627)
45-49-Primary completed-Technicians	-538.63	-1,354.89	1,373.70	-3,867.33	-9,102.24
	(288.891)	(843.318)	(1,693.290)	(972.246)	(524.398)
45-49-Primary completed-Education	4,750.87	-606.81	1,578.04	-3,368.16	-7,980.05
	(298.998)	(1,722.699)	(1,756.754)	(983.251)	(575.016)
45-49-Primary completed-Art, Shows & Sports	-905.81	1,812.71	2,417.17	-2,605.55	-8,007.61
	(297.012)	(864.736)	(1,698.768)	(976.935)	(526.943)
45-49-Primary completed-Officers and Directors	1,927.01	9,736.51	6,965.67	2,184.20	-2,313.17
	(289.361)	(845.815)	(1,693.140)	(974.395)	(521.281)
45-49-Primary completed-Agriculture	-1,713.54	-3,138.70	-856.88	-5,864.79	-11,318.67
	(292.590)	(852.066)	(1,695.163)	(969.832)	(541.465)
45-49-Primary completed-Chiefs, Supervisors & Control workers	-168.90	-1,102.07	2,081.12	-2,842.38	-8,703.25
	(288.861)	(848.124)	(1,696.772)	(971.271)	(516.808)
45-49-Primary completed-Transformation & Maintenance Activities	-471.96	-1,830.37	690.35	-4,196.46	-8,895.32
	(286.821)	(836.879)	(1,689.653)	(963.900)	(505.724)
45-49-Primary completed-Operators of Machinery	-538.80	-2,158.37	-33.06	-4,846.69	-10,023.65
	(287.507)	(840.436)	(1,690.729)	(965.537)	(510.100)
45-49-Primary completed-Artisanal and Industrial Fabrication	-1,854.86	-3,342.79	-602.45	-5,556.60	-10,537.99
	(288.676)	(847.200)	(1,692.619)	(966.427)	(512.955)
45-49-Primary completed-Drivers and Drivers assistants	-421.38	-2,366.79	1,264.85	-3,428.25	-9,401.42
	(287.133)	(837.992)	(1,690.239)	(965.228)	(506.396)
45-49-Primary completed-Administrative Activities	-260.80	-1,636.47	1,770.68	-3,729.75	-9,892.71
	(291.860)	(850.776)	(1,697.867)	(973.250)	(536.831)
45-49-Primary completed-Administrative Activities Assistants	-1,024.52	-3,010.66	165.42	-4,822.08	-9,958.39
	(288.015)	(841.280)	(1,691.337)	(968.018)	(512.148)
45-49-Primary completed-Shopkeepers & Sales Agents	-50.99	-1,318.86	1,901.07	-2,559.74	-7,352.48
	(287.253)	(838.977)	(1,690.280)	(965.228)	(507.483)
45-49-Primary completed-Street Vendors	-973.22	-2,865.41	46.86	-5,045.12	-8,910.19
	(288.939)	(848.375)	(1,692.380)	(968.299)	(513.118)
45-49-Primary completed-Personal Services	-1,192.97	-176.16	-189.31	-5,246.75	-10,070.46
	(287.583)	(839.457)	(1,690.449)	(964.654)	(508.478)
45-49-Primary completed-Domestic Services	-488.52	-3,358.09	92.79	-5,650.48	-9,803.92
	(301.517)	(900.526)	(1,714.702)	(1,154.070)	(670.918)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
45-49-Primary completed-Security and Armed forces	-1,125.39	-2,815.27	-646.75	-5,398.57	-10,740.11
	(288.326)	(841.852)	(1,690.756)	(968.482)	(512.542)
45-49-Primary completed-Other Workers	1,237.63	-3,987.93	-1,537.15		
	(738.036)	(1,699.834)	(2,037.309)		
45-49-Secondary completed-Professionals	666.04	-1,571.49	6,217.38	-1,646.29	-8,053.13
	(294.759)	(961.464)	(1,702.903)	(1,096.211)	(621.337)
45-49-Secondary completed-Technicians	727.43	-1,392.38	1,147.15	-3,200.18	-7,001.83
	(287.704)	(844.405)	(1,691.705)	(966.784)	(515.055)
45-49-Secondary completed-Education	-698.42	-2,240.26	596.76	-4,282.27	-8,899.54
	(290.308)	(843.612)	(1,692.951)	(970.156)	(526.274)
45-49-Secondary completed-Art, Shows & Sports	1,952.07	-2,529.16	6,029.54	-3,665.76	-7,808.72
	(292.862)	(859.583)	(1,732.531)	(994.724)	(530.319)
45-49-Secondary completed-Officers and Directors	2,622.80	2,439.75	9,030.84	5,326.18	-1,199.61
	(287.561)	(841.640)	(1,691.172)	(965.775)	(512.555)
45-49-Secondary completed-Agriculture	827.17	-2,852.08	5,858.83	2,561.92	-6,525.65
	(305.469)	(985.989)	(1,734.063)	(1,041.210)	(716.706)
45-49-Secondary completed-Chiefs, Supervisors & Control workers	575.63	-1,300.43	1,892.61	-856.86	-6,637.89
	(289.780)	(852.989)	(1,693.592)	(970.538)	(517.955)
45-49-Secondary completed-Transformation & Maintenance Activities	663.62	-1,609.30	1,375.71	-3,110.69	-8,994.92
	(287.671)	(840.172)	(1,690.813)	(965.589)	(508.693)
45-49-Secondary completed-Operators of Machinery	125.93	-2,090.42	822.19	-4,647.71	-9,215.86
	(291.117)	(847.096)	(1,693.036)	(970.852)	(521.045)
45-49-Secondary completed-Artisanal and Industrial Fabrication	-755.15	-2,425.52	223.54	-4,727.79	-10,505.54
	(309.932)	(893.592)	(1,761.367)	(1,002.513)	(633.188)
45-49-Secondary completed-Drivers and Drivers assistants	-327.45	1,391.16	1,777.92	-3,393.38	-7,129.55
	(288.520)	(843.496)	(1,691.297)	(966.854)	(510.761)
45-49-Secondary completed-Administrative Activities	1,330.54	-406.54	2,110.23	-2,989.97	-5,139.00
	(289.197)	(848.401)	(1,692.858)	(967.951)	(512.209)
45-49-Secondary completed-Administrative Activities Assistants	122.54	-721.38	535.19	-3,928.43	-8,929.71
	(287.711)	(842.926)	(1,691.001)	(965.864)	(510.842)
45-49-Secondary completed-Shopkeepers & Sales Agents	1,085.97	-117.77	3,699.52	-433.69	-6,120.12
	(287.408)	(838.969)	(1,690.359)	(965.309)	(507.920)
45-49-Secondary completed-Street Vendors	-285.87	-27.69	2,704.50	224.56	-7,887.65
	(296.402)	(882.048)	(1,697.729)	(972.181)	(523.650)
45-49-Secondary completed-Personal Services	330.96	-2,725.37	927.40	-4,944.02	-7,574.72
	(291.966)	(850.191)	(1,695.679)	(972.984)	(520.962)
45-49-Secondary completed-Domestic Services		-3,875.50	-484.19	-4,923.67	-12,016.63
		(1,068.944)	(2,037.309)	(1,161.268)	(3,065.301)
45-49-Secondary completed-Security and Armed forces	-217.71	-1,250.30	341.93	-4,825.18	-9,682.24
	(292.582)	(870.762)	(1,694.605)	(970.410)	(517.955)
45-49-University completed-Professionals	2,304.26	1,681.80	8,520.86	3,257.93	1,665.51
	(287.457)	(839.429)	(1,690.130)	(964.549)	(506.759)
45-49-University completed-Technicians	1,661.72	-1,345.65	3,499.79	-2,803.07	-2,139.46
	(294.782)	(875.857)	(1,706.123)	(980.697)	(556.197)
45-49-University completed-Education	857.15	-361.45	1,430.23	-1,982.06	-7,364.06
	(290.154)	(846.119)	(1,691.736)	(966.047)	(508.407)
45-49-University completed-Art, Shows & Sports	2,059.14	-1,615.19	3,948.91	-74.02	-1,543.58
	(310.246)	(930.087)	(1,699.807)	(1,058.858)	(566.981)
45-49-University completed-Officers and Directors	5,151.50	22,028.16	14,785.42	10,265.94	4,428.14
	(287.921)	(839.931)	(1,690.450)	(964.937)	(508.987)
45-49-University completed-Agriculture	1,517.76	245.72	8,805.19	1,122.83	-668.31
	(390.840)	(1,217.690)	(1,761.780)	(1,086.858)	(3,935.838)
45-49-University completed-Chiefs, Supervisors & Control workers	2,197.48	3,294.73	5,373.84	1,844.66	-2,662.49
	(294.513)	(868.485)	(1,694.737)	(977.688)	(525.591)
45-49-University completed-Transformation & Maintenance Activities	5,888.50	-323.90	2,223.56	581.75	-4,410.82
	(461.043)	(902.704)	(1,718.391)	(1,011.262)	(559.333)
45-49-University completed-Operators of Machinery	5,247.39	645.48	4,554.97	-6,265.38	-5,846.98
	(311.734)	(1,016.228)	(1,754.661)	(1,643.926)	(995.598)
45-49-University completed-Artisanal and Industrial Fabrication	-869.82	-2,305.88			
	(390.840)	(1,487.018)			
45-49-University completed-Drivers and Drivers assistants	325.34	1,997.05	2,724.22	4,460.91	-6,994.84
	(319.925)	(971.892)	(1,737.111)	(1,002.807)	(643.689)
45-49-University completed-Administrative Activities	3,006.20	763.92	4,980.97	1,066.44	-4,695.87
	(291.990)	(851.405)	(1,693.475)	(969.811)	(517.286)
45-49-University completed-Administrative Activities Assistants	983.49	-566.73	1,063.50	1,782.40	-6,422.43
	(333.652)	(881.879)	(1,697.980)	(992.785)	(535.948)
45-49-University completed-Shopkeepers & Sales Agents	2,249.80	364.69	6,667.71	5,233.41	-1,314.52
	(292.210)	(848.312)	(1,693.111)	(967.521)	(516.146)
45-49-University completed-Street Vendors	2,196.99	-3,407.41	4,963.49	-1,360.97	-4,083.57
	(363.953)	(1,146.825)	(1,772.785)	(1,121.121)	(614.402)
45-49-University completed-Personal Services	246.86	-2,772.29	175.29	-4,299.37	-6,332.32
	(309.687)	(1,602.251)	(2,153.376)	(1,007.537)	(718.785)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
45-49-University completed-Security and Armed forces	-225.83	1,370.84	-1,064.86	24.21	-10,448.65
	(319.184)	(1,169.256)	(2,259.726)	(1,031.621)	(1,126.827)
50-54-Less than primary completed-Professionals	59.36	-3,883.59		-6,133.23	-12,020.97
	(738.036)	(2,363.524)		(1,643.926)	(2,015.729)
50-54-Less than primary completed-Technicians	-41.50	-3,119.58	-876.80	-4,855.25	-7,087.79
	(293.239)	(870.991)	(1,707.696)	(1,055.516)	(725.283)
50-54-Less than primary completed-Education	-221.61	-4,433.76			
	(461.043)	(1,024.378)			
50-54-Less than primary completed-Art, Shows & Sports	308.57	-1,296.53	1,420.57	-4,694.47	-10,115.52
	(299.069)	(887.146)	(1,707.969)	(986.810)	(604.966)
50-54-Less than primary completed-Officers and Directors	694.55	3,430.96	4,521.36	2,553.62	-5,520.63
	(295.561)	(872.076)	(1,701.386)	(984.291)	(556.257)
50-54-Less than primary completed-Agriculture	-2,711.72	-3,453.52	-619.85	-4,654.70	-10,380.66
	(288.031)	(842.277)	(1,693.512)	(971.900)	(523.173)
50-54-Less than primary completed-Chiefs, Supervisors & Control workers	1,919.11	-2,389.16	624.68	-4,234.52	-8,055.89
	(290.297)	(855.276)	(1,699.575)	(990.148)	(562.718)
50-54-Less than primary completed-Transformation & Maintenance Activities	-942.69	-2,939.50	21.89	-4,525.29	-9,635.96
	(286.781)	(836.904)	(1,689.700)	(963.978)	(505.841)
50-54-Less than primary completed-Operators of Machinery	-840.10	-2,508.19	-371.76	-5,272.65	-10,305.23
	(288.300)	(841.326)	(1,690.761)	(967.544)	(510.665)
50-54-Less than primary completed-Artisanal and Industrial Fabrication	-1,590.84	-3,718.41	-844.98	-5,364.01	-11,246.95
	(287.819)	(841.220)	(1,691.185)	(967.927)	(511.626)
50-54-Less than primary completed-Drivers and Drivers assistants	-338.90	-2,045.92	446.57	-3,134.64	-9,223.64
	(287.755)	(842.583)	(1,691.489)	(966.303)	(510.987)
50-54-Less than primary completed-Administrative Activities	43.54	-2,180.82	-195.05	-4,790.96	-8,014.23
	(307.293)	(880.941)	(1,699.241)	(1,145.781)	(584.108)
50-54-Less than primary completed-Administrative Activities Assistants	-1,271.54	-3,285.77	-808.73	-5,060.25	-9,959.65
	(292.162)	(854.619)	(1,699.977)	(973.515)	(527.396)
50-54-Less than primary completed-Shopkeepers & Sales Agents	-621.37	-1,885.00	920.34	-3,811.62	-9,253.00
	(287.541)	(840.150)	(1,690.788)	(965.885)	(511.886)
50-54-Less than primary completed-Street Vendors	-1,305.59	-3,187.23	131.35	-5,577.94	-10,501.10
	(288.234)	(845.261)	(1,694.778)	(969.465)	(517.219)
50-54-Less than primary completed-Personal Services	-1,326.71	-3,228.75	-328.70	-5,463.03	-10,671.94
	(287.263)	(840.874)	(1,690.570)	(965.975)	(508.809)
50-54-Less than primary completed-Domestic Services	-1,626.22	-3,313.42	-666.51	-4,742.22	-8,764.02
	(292.894)	(878.248)	(1,702.393)	(988.000)	(568.884)
50-54-Less than primary completed-Security and Armed forces	-1,453.80	-3,518.10	-699.67	-5,294.70	-10,758.18
	(289.642)	(848.244)	(1,695.511)	(970.724)	(521.202)
50-54-Primary completed-Professionals	-1,666.45	-641.74	826.08	-3,880.89	-3,614.97
	(447.686)	(1,213.755)	(1,778.686)	(1,425.117)	(1,559.052)
50-54-Primary completed-Technicians	-393.27	-2,397.88	-229.49	-4,320.67	-8,969.26
	(290.923)	(851.301)	(1,693.989)	(983.063)	(521.182)
50-54-Primary completed-Education	-227.32	-2,994.29	171.00	-3,460.07	-4,400.02
	(305.033)	(985.393)	(1,705.310)	(1,960.464)	(1,181.826)
50-54-Primary completed-Art, Shows & Sports	-130.77	-2,713.91	861.67	-4,194.98	-9,808.42
	(294.004)	(875.942)	(1,699.426)	(987.294)	(590.913)
50-54-Primary completed-Officers and Directors	1,012.55	6,928.96	17,743.00	1,283.24	-4,757.17
	(291.371)	(858.823)	(1,696.978)	(973.298)	(537.614)
50-54-Primary completed-Agriculture	-3,048.97	-757.39	-776.87	-5,803.82	-10,151.00
	(296.336)	(888.289)	(1,695.871)	(970.920)	(542.033)
50-54-Primary completed-Chiefs, Supervisors & Control workers	613.78	-1,777.60	1,305.25	-3,023.90	-8,635.41
	(292.834)	(855.195)	(1,708.898)	(984.482)	(552.704)
50-54-Primary completed-Transformation & Maintenance Activities	-839.16	-2,604.76	382.08	-4,172.45	-9,530.56
	(287.007)	(838.153)	(1,690.058)	(964.871)	(507.157)
50-54-Primary completed-Operators of Machinery	-596.73	-2,753.58	200.26	-4,811.47	-10,055.10
	(288.368)	(844.227)	(1,691.842)	(970.003)	(520.514)
50-54-Primary completed-Artisanal and Industrial Fabrication	-1,015.47	-3,676.91	-965.44	-5,475.59	-10,810.48
	(288.480)	(860.905)	(1,696.354)	(981.112)	(530.060)
50-54-Primary completed-Drivers and Drivers assistants	-452.50	-2,004.10	961.47	-3,662.54	-8,619.35
	(287.534)	(841.047)	(1,691.165)	(966.234)	(509.254)
50-54-Primary completed-Administrative Activities	814.89	-1,680.15	488.42	-3,438.31	-9,710.12
	(289.406)	(857.913)	(1,705.600)	(976.837)	(528.840)
50-54-Primary completed-Administrative Activities Assistants	-434.80	-3,006.48	360.69	-5,002.08	-9,672.33
	(288.259)	(845.807)	(1,692.952)	(968.773)	(518.714)
50-54-Primary completed-Shopkeepers & Sales Agents	-522.75	-449.82	2,832.75	-3,723.38	-9,207.52
	(287.219)	(840.425)	(1,690.642)	(965.460)	(510.345)
50-54-Primary completed-Street Vendors	-1,046.27	-1,353.21	-13.58	-4,381.48	-9,472.72
	(288.966)	(858.311)	(1,695.489)	(970.193)	(538.304)
50-54-Primary completed-Personal Services	-843.86	-3,140.88	-55.66	-5,294.12	-10,772.37
	(287.637)	(842.182)	(1,691.823)	(966.191)	(512.070)
50-54-Primary completed-Domestic Services	-632.28	1,371.88	-13.77	-4,782.43	-11,051.25
	(329.728)	(1,403.264)	(1,724.273)	(1,036.354)	(785.322)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
50-54-Primary completed-Security and Armed forces	-973.35	-3,399.78	-460.39	-5,177.09	-10,779.02
	(288.168)	(853.995)	(1,695.586)	(969.066)	(524.717)
50-54-Primary completed-Other Workers		-5,752.56		-3,193.91	
		(1,929.809)		(1,340.234)	
50-54-Secondary completed-Professionals	4,894.46	-2,038.05	5,362.47	-76.63	-2,837.43
	(296.325)	(985.989)	(1,708.052)	(1,025.023)	(645.013)
50-54-Secondary completed-Technicians	-323.67	-771.57	973.63	-363.70	-7,823.49
	(290.253)	(857.706)	(1,697.313)	(971.137)	(518.333)
50-54-Secondary completed-Education	-305.55	-3,014.49	1,707.22	-952.85	-9,090.09
	(290.643)	(851.490)	(1,716.746)	(997.316)	(543.121)
50-54-Secondary completed-Art, Shows & Sports	-218.10	-2,161.03	-73.43	20,021.46	-7,664.25
	(294.491)	(1,066.073)	(1,821.760)	(1,041.210)	(645.460)
50-54-Secondary completed-Officers and Directors	2,991.27	4,259.23	11,249.81	6,654.30	4,396.34
	(289.651)	(846.419)	(1,693.695)	(970.668)	(519.232)
50-54-Secondary completed-Agriculture	6,400.00	4,611.76	2,584.29	5,454.24	-9,543.53
	(403.550)	(1,860.388)	(1,803.770)	(1,095.378)	(1,020.814)
50-54-Secondary completed-Chiefs, Supervisors & Control workers	1,732.36	278.00	2,855.96	-1,992.10	-7,944.81
	(297.113)	(888.656)	(1,703.632)	(976.469)	(526.474)
50-54-Secondary completed-Transformation & Maintenance Activities	-356.09	-1,276.28	1,387.68	-3,771.76	-8,855.50
	(288.899)	(849.763)	(1,693.399)	(966.559)	(511.439)
50-54-Secondary completed-Operators of Machinery	-1,072.95	-1,495.09	2,030.34	-4,352.79	-9,715.28
	(297.934)	(867.601)	(1,709.052)	(971.907)	(541.126)
50-54-Secondary completed-Artisanal and Industrial Fabrication	-1,622.55	-3,650.48	-1,400.47	-5,102.77	-9,516.53
	(323.411)	(908.919)	(1,753.337)	(1,000.307)	(655.045)
50-54-Secondary completed-Drivers and Drivers assistants	-261.97	-1,614.19	2,171.33	-3,742.20	-5,611.63
	(292.180)	(855.851)	(1,693.300)	(971.037)	(522.197)
50-54-Secondary completed-Administrative Activities	1,145.65	519.66	1,699.39	-2,113.20	-8,289.86
	(289.153)	(858.725)	(1,694.634)	(972.576)	(523.788)
50-54-Secondary completed-Administrative Activities Assistants	-623.94	-2,971.95	-24.45	-4,485.56	-9,713.42
	(290.462)	(848.562)	(1,696.168)	(970.137)	(534.014)
50-54-Secondary completed-Shopkeepers & Sales Agents	230.00	-241.24	3,186.09	-2,582.44	-7,549.31
	(288.816)	(844.539)	(1,691.933)	(966.591)	(513.242)
50-54-Secondary completed-Street Vendors	1,166.01	-1,288.91	1,178.13	-985.07	-8,007.07
	(296.391)	(889.636)	(1,706.328)	(983.838)	(544.023)
50-54-Secondary completed-Personal Services	365.18	-373.95	957.41	-3,566.12	-9,032.98
	(295.655)	(873.008)	(1,724.864)	(977.024)	(526.508)
50-54-Secondary completed-Security and Armed forces	-1,159.42	-2,570.22	-17.12	-4,908.19	-9,149.48
	(290.936)	(891.380)	(1,718.594)	(977.033)	(526.045)
50-54-University completed-Professionals	3,562.81	2,997.34	6,294.44	2,857.41	-922.00
	(288.159)	(840.693)	(1,691.614)	(967.620)	(511.905)
50-54-University completed-Technicians	1,965.32	3,911.13	3,059.69	-540.84	-7,899.70
	(318.592)	(902.468)	(1,792.554)	(1,024.486)	(576.038)
50-54-University completed-Education	2,164.96	-1,433.59	4,107.85	-2,731.29	-8,335.95
	(290.784)	(860.266)	(1,702.672)	(974.249)	(523.548)
50-54-University completed-Art, Shows & Sports	-838.05	-2,867.33	403.16	11,736.39	-4,643.48
	(327.331)	(1,003.366)	(1,712.252)	(1,086.858)	(1,630.880)
50-54-University completed-Officers and Directors	4,398.79	7,536.11	12,044.98	9,843.41	7,802.36
	(290.200)	(847.037)	(1,692.983)	(969.104)	(515.457)
50-54-University completed-Agriculture	444.54	-46.23	732.32	-5,244.90	-10,719.06
	(381.691)	(1,722.699)	(1,837.266)	(1,127.273)	(1,941.687)
50-54-University completed-Chiefs, Supervisors & Control workers	3,945.97	2,503.36	6,733.25	5,210.29	-1,801.32
	(294.213)	(909.924)	(1,709.021)	(989.642)	(637.032)
50-54-University completed-Transformation & Maintenance Activities	803.79	542.59	2,120.09	-3,217.90	-7,224.13
	(321.651)	(1,067.499)	(1,763.048)	(982.138)	(628.514)
50-54-University completed-Operators of Machinery		-2,589.06	10,180.26	-4,805.06	
		(2,785.439)	(2,597.069)	(1,378.267)	
50-54-University completed-Drivers and Drivers assistants	-1,638.73	2,246.93		1,173.54	-7,884.11
	(444.671)	(948.686)		(1,141.146)	(938.147)
50-54-University completed-Administrative Activities	2,048.99	2,353.26	2,749.02	1,473.30	-5,436.91
	(292.616)	(879.680)	(1,700.757)	(985.801)	(549.882)
50-54-University completed-Administrative Activities Assistants	111.59	633.27	650.35	3,918.75	-9,066.77
	(297.633)	(1,061.899)	(1,764.809)	(1,029.271)	(588.784)
50-54-University completed-Shopkeepers & Sales Agents	2,384.43	4,536.84	7,671.81	2,055.44	-1,238.17
	(295.266)	(887.146)	(1,708.598)	(992.138)	(548.436)
50-54-University completed-Street Vendors	-1,153.56	1,132.71		-4,305.86	-2,880.74
	(617.592)	(2,363.524)		(1,100.542)	(830.233)
50-54-University completed-Personal Services		-196.99	8,831.88		-6,238.64
		(1,442.103)	(1,817.723)		(689.814)
50-54-University completed-Security and Armed forces	3,275.18	2,019.30	4,204.33	-4,820.09	-10,038.54
	(444.671)	(982.482)	(1,702.531)	(1,076.263)	(602.747)
55-60-Less than primary completed-Technicians	-1,294.97	-3,236.08	667.28	-4,068.39	-11,416.90
	(332.188)	(891.792)	(1,698.578)	(1,015.284)	(577.208)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
55-60-Less than primary completed-Art, Shows & Sports	-1,793.17	-2,734.42	1,324.28	-1,847.95	-10,499.02
	(298.790)	(862.647)	(1,700.613)	(997.762)	(792.859)
55-60-Less than primary completed-Officers and Directors	715.12	-847.42	3,436.21	6,050.07	-4,699.25
	(295.071)	(877.869)	(1,702.339)	(988.058)	(590.579)
55-60-Less than primary completed-Agriculture	-1,496.10	-3,342.65	-537.33	-4,972.43	-10,762.39
	(290.092)	(849.174)	(1,695.679)	(974.839)	(526.689)
55-60-Less than primary completed-Chiefs, Supervisors & Control workers	-616.35	-1,351.25	1,171.83	-4,479.42	-7,624.81
	(306.362)	(911.407)	(1,707.969)	(985.825)	(522.360)
55-60-Less than primary completed-Transformation & Maintenance Activities	-928.77	-2,866.94	-79.43	-4,568.37	-10,205.72
	(286.915)	(837.409)	(1,689.800)	(964.523)	(506.993)
55-60-Less than primary completed-Operators of Machinery	-1,000.97	-3,186.09	-322.67	-5,391.09	-10,301.19
	(288.240)	(845.552)	(1,692.827)	(969.861)	(523.060)
55-60-Less than primary completed-Artisanal and Industrial Fabrication	-1,736.96	-3,759.00	-953.78	-5,678.71	-10,967.16
	(288.055)	(844.240)	(1,692.789)	(967.932)	(521.599)
55-60-Less than primary completed-Drivers and Drivers assistants	-556.92	-2,291.28	811.55	-4,026.44	-9,582.52
	(288.923)	(846.113)	(1,693.257)	(968.150)	(513.491)
55-60-Less than primary completed-Administrative Activities	-1,695.75	-2,796.67	-977.77	-4,576.34	-8,449.76
	(295.515)	(1,003.366)	(1,704.740)	(1,055.114)	(632.816)
55-60-Less than primary completed-Administrative Activities Assistants	838.96	-3,873.78	-724.42	-5,612.25	-10,919.78
	(294.448)	(878.343)	(1,692.709)	(982.344)	(683.775)
55-60-Less than primary completed-Shopkeepers & Sales Agents	-594.72	-1,810.35	825.44	-4,693.62	-8,823.13
	(288.314)	(841.286)	(1,690.986)	(966.397)	(513.198)
55-60-Less than primary completed-Street Vendors	-1,621.96	-3,451.24	-671.84	-4,243.38	-10,667.87
	(289.248)	(847.620)	(1,692.461)	(972.009)	(518.139)
55-60-Less than primary completed-Personal Services	-1,539.86	-3,696.04	-649.50	-5,744.62	-10,648.91
	(288.481)	(842.890)	(1,691.253)	(966.725)	(513.810)
55-60-Less than primary completed-Domestic Services	-1,569.92	-4,031.39	-1,094.59	-6,133.51	-11,466.22
	(297.050)	(871.190)	(1,699.825)	(1,035.355)	(570.315)
55-60-Less than primary completed-Security and Armed forces	-1,375.02	-3,419.38	-1,046.92	-5,761.76	-11,090.29
	(288.322)	(843.684)	(1,692.644)	(969.232)	(523.625)
55-60-Primary completed-Professionals	-2,177.19	-1,909.43	-404.51	-4,258.54	
	(347.317)	(1,149.459)	(1,905.728)	(1,458.870)	
55-60-Primary completed-Technicians	-391.36	-1,374.58	134.19	-4,768.18	5,737.63
	(293.224)	(914.070)	(1,700.726)	(987.515)	(529.970)
55-60-Primary completed-Education		-3,737.21	838.91	-5,163.48	
		(907.942)	(1,706.899)	(1,722.994)	
55-60-Primary completed-Art, Shows & Sports	1,969.98	-2,543.26	47.08	-1,867.91	-9,660.29
	(313.921)	(1,131.922)	(1,760.555)	(983.580)	(553.724)
55-60-Primary completed-Officers and Directors	811.02	2,038.77	3,005.01	28,490.66	4,117.98
	(294.062)	(876.995)	(1,703.471)	(991.518)	(576.735)
55-60-Primary completed-Agriculture	-2,162.89	-2,413.76	-395.15	-5,380.83	-10,828.83
	(291.371)	(978.053)	(1,702.448)	(996.721)	(556.623)
55-60-Primary completed-Chiefs, Supervisors & Control workers	-201.86	-846.99	440.09	-3,804.12	-9,380.01
	(306.724)	(1,010.364)	(1,734.706)	(1,007.168)	(584.108)
55-60-Primary completed-Transformation & Maintenance Activities	-560.33	-2,825.82	30.83	-4,400.80	-9,468.72
	(287.946)	(840.404)	(1,690.489)	(965.359)	(509.521)
55-60-Primary completed-Operators of Machinery	-923.84	-3,087.40	-457.65	-5,274.44	-10,200.88
	(291.592)	(856.832)	(1,699.609)	(974.750)	(526.643)
55-60-Primary completed-Artisanal and Industrial Fabrication	-956.34	-3,472.65	-1,366.52	-6,071.82	-11,573.64
	(313.018)	(911.106)	(1,699.225)	(975.590)	(553.075)
55-60-Primary completed-Drivers and Drivers assistants	-361.99	-2,302.62	918.85	-2,742.42	-8,329.59
	(290.121)	(842.388)	(1,691.563)	(971.846)	(524.679)
55-60-Primary completed-Administrative Activities	291.08	-2,216.14	-384.51	-3,742.52	-9,748.04
	(298.053)	(889.868)	(1,702.366)	(997.152)	(551.375)
55-60-Primary completed-Administrative Activities Assistants	164.78	-2,818.85	206.86	-5,558.10	-10,286.82
	(290.261)	(844.129)	(1,697.088)	(979.843)	(569.259)
55-60-Primary completed-Shopkeepers & Sales Agents	94.97	-1,280.32	1,291.70	-3,849.14	-9,973.01
	(288.481)	(846.650)	(1,692.250)	(968.556)	(515.236)
55-60-Primary completed-Street Vendors	-1,536.79	-2,337.92	-584.54	-4,433.07	-9,928.45
	(293.306)	(884.122)	(1,696.402)	(976.961)	(547.705)
55-60-Primary completed-Personal Services	-941.69	-3,031.80	667.39	-5,604.84	-9,883.59
	(293.123)	(846.307)	(1,692.364)	(968.622)	(521.268)
55-60-Primary completed-Domestic Services	-865.32	-3,461.43	-727.04	-4,459.32	-10,921.69
	(315.731)	(868.428)	(1,752.066)	(1,076.263)	(962.373)
55-60-Primary completed-Security and Armed forces	-1,406.83	-3,441.49	-447.35	-5,176.23	-10,387.47
	(294.861)	(863.096)	(1,697.600)	(976.943)	(528.213)
55-60-Secondary completed-Professionals	632.02	647.26	12,425.26	7,984.77	-3,804.47
	(336.314)	(1,638.296)	(1,721.345)	(1,052.399)	(1,126.827)
55-60-Secondary completed-Technicians	-459.82	-303.21	3,884.38	-117.34	-8,794.18
	(308.263)	(896.471)	(1,697.002)	(1,004.267)	(537.341)
55-60-Secondary completed-Education	-350.65	-3,625.07	652.83	-4,308.20	-9,947.46
	(298.410)	(903.787)	(1,705.413)	(992.177)	(796.787)

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
55-60-Secondary completed-Art, Shows & Sports	3,539.44	1,815.02	1,453.55	-3,406.83	-6,755.96
	(308.755)	(907.805)	(1,724.566)	(1,119.946)	(683.775)
55-60-Secondary completed-Officers and Directors	3,036.09	3,399.04	10,035.07	3,247.22	7,955.97
	(292.794)	(871.090)	(1,695.272)	(972.392)	(529.144)
55-60-Secondary completed-Agriculture	-598.39	-2,773.75	-772.64	-77.24	-2,833.54
	(361.951)	(986.590)	(1,879.621)	(1,340.234)	(995.598)
55-60-Secondary completed-Chiefs, Supervisors & Control workers	676.54	-1,629.29	1,713.31	1,684.56	-3,586.38
	(299.550)	(961.884)	(1,714.908)	(1,040.357)	(677.442)
55-60-Secondary completed-Transformation & Maintenance Activities	456.21	-2,853.55	1,635.09	-3,191.18	-7,261.63
	(293.364)	(848.178)	(1,694.785)	(971.368)	(527.741)
55-60-Secondary completed-Operators of Machinery	-731.09	-1,630.46	2,571.46	-5,151.71	-5,796.07
	(325.529)	(975.938)	(1,837.266)	(1,075.065)	(679.502)
55-60-Secondary completed-Artisanal and Industrial Fabrication	579.19	-4,603.67	125.50		-10,523.77
	(688.132)	(2,544.595)	(1,874.052)		(737.059)
55-60-Secondary completed-Drivers and Drivers assistants	1,328.91	-284.57	1,474.51	-3,116.55	-9,664.29
	(302.265)	(859.858)	(1,697.885)	(985.586)	(536.665)
55-60-Secondary completed-Administrative Activities	1,020.94	-747.89	1,244.60	86.34	-9,402.20
	(295.938)	(982.482)	(1,728.265)	(995.994)	(549.696)
55-60-Secondary completed-Administrative Activities Assistants	350.31	-2,261.13	2,644.24	-3,866.72	-9,594.54
	(292.776)	(890.415)	(1,724.468)	(989.188)	(536.176)
55-60-Secondary completed-Shopkeepers & Sales Agents	708.29	162.91	2,818.61	-1,877.47	-6,544.91
	(291.326)	(870.537)	(1,694.819)	(973.332)	(522.367)
55-60-Secondary completed-Street Vendors	-191.24	-1,664.16	1,028.88	-5,861.75	-8,359.98
	(309.270)	(955.487)	(1,708.598)	(992.620)	(569.071)
55-60-Secondary completed-Personal Services	-1,346.95	-2,094.66	1,659.00	-5,230.37	-8,786.08
	(302.016)	(953.988)	(1,726.215)	(1,040.357)	(562.413)
55-60-Secondary completed-Domestic Services		-2,516.24	-404.51	-6,240.87	-11,256.82
		(1,539.636)	(1,994.984)	(998.808)	(600.831)
55-60-Secondary completed-Security and Armed forces	-64.47	-3,202.78	-764.94	-3,079.49	-10,929.67
	(305.884)	(953.252)	(1,763.481)	(998.868)	(579.922)
55-60-Secondary completed-Other Workers		1,456.34			
		(2,160.961)			
55-60-University completed-Professionals	4,340.56	4,045.61	7,543.80	8,222.45	-5,220.25
	(290.245)	(857.303)	(1,693.182)	(971.797)	(545.997)
55-60-University completed-Technicians	8,000.03	-2,391.95	2,694.43	-2,388.21	-9,811.67
	(299.417)	(907.260)	(1,895.137)	(1,020.194)	(1,280.280)
55-60-University completed-Education	-437.59	-1,283.32	853.43	-2,314.19	-7,162.48
	(320.833)	(875.064)	(1,700.726)	(999.542)	(579.794)
55-60-University completed-Officers and Directors	3,071.46	17,493.52	12,879.18	9,716.41	40,769.17
	(294.455)	(858.407)	(1,709.430)	(983.347)	(550.258)
55-60-University completed-Agriculture	5,430.87	2,246.39	5,793.00	28,638.71	
	(476.941)	(1,202.436)	(1,868.800)	(1,668.282)	
55-60-University completed-Chiefs, Supervisors & Control workers	971.16	3,216.56	2,113.24	-2,313.76	-5,234.16
	(326.773)	(969.955)	(1,895.137)	(1,008.101)	(942.771)
55-60-University completed-Transformation & Maintenance Activities	779.72	1,132.71		-6,168.79	-4,476.32
	(309.994)	(1,076.448)		(1,089.826)	(889.786)
55-60-University completed-Operators of Machinery		7,559.13	1,170.76	-5,891.38	-10,816.09
		(1,585.500)	(1,917.472)	(1,277.306)	(1,194.159)
55-60-University completed-Drivers and Drivers assistants	-460.46	1,051.81	-220.26	-3,193.91	-10,254.23
	(1,048.733)	(1,638.296)	(1,823.163)	(1,247.284)	(989.704)
55-60-University completed-Administrative Activities	893.44	-826.32	2,188.30	-2,414.76	30,363.44
	(298.129)	(971.402)	(1,714.151)	(1,089.826)	(972.899)
55-60-University completed-Administrative Activities Assistants	-291.05	-3,389.37	-606.77	-3,794.29	-8,837.50
	(300.323)	(1,039.746)	(2,234.664)	(1,263.684)	(1,137.025)
55-60-University completed-Shopkeepers & Sales Agents	-220.32	405.12	7,528.73	-118.00	-6,207.85
	(302.378)	(885.392)	(1,721.023)	(1,026.693)	(588.625)
55-60-University completed-Personal Services	-980.28	-4,692.67			
	(688.132)	(2,448.178)			
30-34-Primary completed-Other Workers	-2,188.01			-6,355.88	-10,802.85
	(667.506)			(1,498.161)	(624.170)
30-34-Secondary completed-Other Workers	4,486.88		5,650.15	16,736.07	-8,097.88
	(580.102)		(1,885.537)	(1,528.168)	(1,107.481)
35-39-Less than primary completed-Education	-1,083.05		1,076.78	-5,802.83	-9,851.12
	(331.490)		(2,019.037)	(1,414.894)	(1,875.897)
40-44-Less than primary completed-Professionals	-1,501.90		67.42	-5,695.80	-12,329.32
	(507.498)		(2,670.934)	(1,960.464)	(1,630.880)
45-49-Secondary completed-Other Workers	-287.19		10,011.72		-8,476.88
	(450.822)		(2,047.232)		(1,126.827)
50-54-Less than primary completed-Other Workers	-1,893.72				
	(397.530)				
50-54-Secondary completed-Domestic Services	-2,027.38		-404.51	-5,238.01	
	(311.103)		(1,786.222)	(1,116.524)	

Continued on next page

Table 1.B.1 Fathers' Earnings Equation (levels)– continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
35-39-Less than primary completed-Other Workers			4,692.36	958.17	-11,083.60
			(1,757.481)	(1,643.926)	(783.501)
35-39-Primary completed-Other Workers			-483.58	-3,340.23	-3,805.92
			(2,037.309)	(1,405.127)	(1,194.159)
40-44-Less than primary completed-Other Workers			-1,537.15	-4,497.06	
			(1,967.913)	(1,090.590)	
40-44-Primary completed-Other Workers			1,914.70		
			(1,882.534)		
40-44-University completed-Domestic Services			8,526.66		
			(1,956.108)		
45-49-Less than primary completed-Professionals			23,178.64		-12,203.24
			(1,987.732)		(718.785)
50-54-University completed-Artisanal and Industrial Fabrication			30,405.95	-2,661.59	
			(2,388.956)	(1,865.196)	
55-60-Less than primary completed-Professionals			2,764.18		
			(2,994.715)		
55-60-Less than primary completed-Education			-1,854.02		-7,724.67
			(2,010.606)		(1,158.575)
55-60-University completed-Security and Armed forces			359.35	15,742.77	
			(1,786.971)	(1,053.931)	
55-60-University completed-Street Vendors				13,307.95	-8,983.18
				(3,812.388)	(1,497.119)
30-34-University completed-Domestic Services					-9,393.53
					(912.449)
45-49-Less than primary completed-Other Workers					-10,150.56
					(2,015.729)
55-60-University completed-Art, Shows & Sports					-10,719.06
					(609.225)
55-60-University completed-Domestic Services					-11,760.59
					(1,875.897)
Constant	3,752.68	5,825.38	3,303.53	7,984.77	13,322.88
	(286.492)	(835.632)	(1,689.247)	(963.183)	(503.932)
Observations	50,677	55,535	55,956	55,537	54,313

Source: ENEU 1987-1991.

Note: Standard errors in parentheses. The reference group is 30-34-Less than primary completed-Professionals.

Table 1.B.2: Mothers' Earnings Equation using Auxiliary Sample (First Stage Regression)

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
30-34-Less than primary completed-Technicians	-3,460.38	-7,181.89	-2,684.62	626.10	-3,486.15
	(122.806)	(553.685)	(447.920)	(835.143)	(329.311)
30-34-Less than primary completed-Officers and Directors	-1,895.01	-7,621.54	-2,575.40	7,720.20	-4,122.72
	(236.260)	(806.116)	(552.481)	(966.624)	(862.535)
30-34-Less than primary completed-Agriculture	-5,653.65	-8,305.55	-6,097.12	-1,425.12	-5,337.22
	(157.584)	(565.404)	(381.678)	(857.544)	(425.538)
30-34-Less than primary completed-Chiefs, Supervisors & Control workers	-1,797.49	-6,636.48	-3,561.97	818.65	-4,281.29
	(117.702)	(568.226)	(436.865)	(872.448)	(337.143)
30-34-Less than primary completed-Transformation & Maintenance Activities	-4,486.28	-7,761.29	-4,443.74	-101.06	-4,039.57
	(85.932)	(526.371)	(284.436)	(811.281)	(304.358)
30-34-Less than primary completed-Operators of Machinery	-4,067.65	-7,639.68	-4,787.50	-114.74	-4,036.12
	(94.613)	(528.009)	(290.405)	(814.166)	(305.195)
30-34-Less than primary completed-Artisanal and Industrial Fabrication	-4,351.28	-7,369.76	-4,891.29	-387.01	-4,580.52
	(135.415)	(551.505)	(302.007)	(841.484)	(378.369)
30-34-Less than primary completed-Administrative Activities		-5,825.38			-1,501.54
		(728.187)			(410.518)
30-34-Less than primary completed-Administrative Activities Assistants	-4,234.60	-6,889.74	-3,445.59	187.36	-3,537.51
	(101.459)	(553.044)	(346.308)	(943.153)	(339.835)
30-34-Less than primary completed-Shopkeepers & Sales Agents	-4,673.12	-7,774.09	-4,663.74	698.45	-3,125.82
	(85.236)	(526.456)	(283.448)	(810.743)	(302.523)
30-34-Less than primary completed-Street Vendors	-4,894.67	-7,862.41	-4,909.13	218.07	-4,042.26
	(85.381)	(527.527)	(287.098)	(816.650)	(308.660)
30-34-Less than primary completed-Personal Services	-4,442.61	-7,810.89	-4,751.49	-426.83	-4,057.00
	(84.712)	(526.156)	(283.945)	(810.294)	(298.465)
30-34-Less than primary completed-Domestic Services	-5,256.23	-8,524.33	-5,308.09	-877.58	-4,385.10
	(84.100)	(526.090)	(282.336)	(810.306)	(298.564)
30-34-Primary completed-Technicians	-3,355.61	-6,657.34	-3,444.63	897.31	-2,322.34
	(84.685)	(526.298)	(283.462)	(810.806)	(300.903)
30-34-Primary completed-Education	-3,379.46	-6,978.28	-3,555.90	494.72	-3,143.55
	(110.682)	(537.498)	(344.152)	(818.266)	(346.021)
30-34-Primary completed-Art, Shows & Sports	-3,395.69	-1,087.09	1,493.94	1,641.16	-390.69
	(130.727)	(546.317)	(475.835)	(885.419)	(415.546)
30-34-Primary completed-Officers and Directors	-4,154.81	-6,927.80	-542.78	1,777.00	-1,420.47
	(112.699)	(537.941)	(334.715)	(832.472)	(370.874)
30-34-Primary completed-Agriculture	-4,012.56	-2,489.33	-5,129.45	-303.42	-4,919.03
	(566.122)	(587.553)	(368.251)	(979.953)	(472.531)
30-34-Primary completed-Chiefs, Supervisors & Control workers	-2,997.28	-6,010.88	-3,347.80	1,360.86	-2,899.46
	(93.863)	(531.364)	(294.870)	(817.005)	(310.067)
30-34-Primary completed-Transformation & Maintenance Activities	-4,238.16	-7,943.56	-4,871.25	-510.51	-4,288.02
	(85.015)	(526.130)	(283.016)	(810.627)	(300.112)
30-34-Primary completed-Operators of Machinery	-3,742.10	-7,314.83	-4,362.82	-154.44	-3,570.18
	(85.317)	(526.824)	(284.182)	(810.725)	(300.018)
30-34-Primary completed-Artisanal and Industrial Fabrication	-3,708.50	-6,877.19	-4,095.75	-826.14	-3,778.65
	(141.564)	(569.152)	(483.152)	(822.288)	(332.894)
30-34-Primary completed-Administrative Activities	-2,926.17	-5,194.45	-3,483.96	186.19	-4,327.34
	(100.920)	(532.561)	(318.962)	(821.791)	(356.330)
30-34-Primary completed-Administrative Activities Assistants	-2,857.72	-6,445.13	-3,866.61	343.63	-3,088.40
	(90.172)	(527.087)	(286.676)	(813.172)	(301.843)
30-34-Primary completed-Shopkeepers & Sales Agents	-3,811.48	-6,848.01	-4,092.69	84.34	-3,692.96
	(83.783)	(525.960)	(282.382)	(810.252)	(298.469)
30-34-Primary completed-Street Vendors	-4,595.21	-7,552.96	-4,872.38	153.14	-3,839.25
	(86.222)	(527.382)	(286.757)	(812.430)	(302.078)
30-34-Primary completed-Personal Services	-4,077.73	-7,375.81	-4,584.12	-362.03	-3,892.16
	(83.953)	(525.906)	(281.959)	(810.035)	(297.936)
30-34-Primary completed-Domestic Services	-4,857.55	-8,316.61	-5,051.68	-934.89	-4,748.09
	(85.127)	(526.484)	(284.594)	(810.607)	(298.645)
30-34-Primary completed-Security and Armed forces	-3,703.53	-6,083.80	-3,775.46	60.18	-2,310.71
	(273.858)	(609.082)	(1,137.858)	(862.916)	(430.369)
30-34-Secondary completed-Professionals	-2,767.25	-6,042.78	-2,701.26	6,882.97	-2,709.47
	(148.184)	(543.968)	(320.158)	(856.164)	(321.993)
30-34-Secondary completed-Technicians	-2,675.38	-5,956.85	-2,847.05	1,325.58	-2,243.02
	(83.136)	(525.705)	(281.744)	(809.845)	(297.336)
30-34-Secondary completed-Education	-3,262.53	-7,221.05	-3,592.76	974.70	-2,675.77
	(83.667)	(525.912)	(282.357)	(810.040)	(297.919)
30-34-Secondary completed-Art, Shows & Sports	-3,764.07	-4,077.36	-691.05	1,660.02	4,470.98
	(123.256)	(531.157)	(292.755)	(831.019)	(326.985)
30-34-Secondary completed-Officers and Directors	-1,759.59	-3,570.48	-1,543.02	3,195.24	2,798.93
	(90.786)	(527.769)	(287.672)	(813.843)	(305.327)
30-34-Secondary completed-Agriculture		-6,577.83		530.71	

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
		(760.692)		(913.796)	
30-34-Secondary completed-Chiefs, Supervisors & Control workers	-1,987.07	-4,135.92	-1,170.33	1,013.06	-2,261.61
	(115.976)	(533.294)	(289.664)	(820.734)	(326.656)
30-34-Secondary completed-Transformation & Maintenance Activities	-4,047.52	-7,552.46	-3,834.58	174.11	-4,027.81
	(95.836)	(527.426)	(287.324)	(812.251)	(302.463)
30-34-Secondary completed-Operators of Machinery	-3,399.62	-7,153.25	-4,489.35	22.35	-3,454.56
	(94.143)	(527.911)	(291.823)	(814.561)	(309.328)
30-34-Secondary completed-Artisanal and Industrial Fabrication	-4,174.86	-9,183.07	-2,966.43	-220.20	-3,021.97
	(194.584)	(669.217)	(943.135)	(895.044)	(375.137)
30-34-Secondary completed-Drivers and Drivers assistants	-4,501.73	-7,621.54			-3,199.18
	(175.882)	(637.031)			(370.623)
30-34-Secondary completed-Administrative Activities	-1,439.48	-4,974.55	-2,264.85	1,805.30	-728.02
	(87.211)	(527.384)	(286.052)	(811.599)	(303.730)
30-34-Secondary completed-Administrative Activities Assistants	-2,186.64	-6,371.53	-3,428.30	1,096.02	-2,633.04
	(84.545)	(526.125)	(282.629)	(810.220)	(298.074)
30-34-Secondary completed-Shopkeepers & Sales Agents	-3,746.93	-5,956.10	-3,650.58	695.71	-1,631.34
	(84.447)	(526.131)	(282.582)	(810.369)	(298.965)
30-34-Secondary completed-Street Vendors	-3,855.10	-8,012.61	-2,913.16	186.15	-3,102.42
	(91.045)	(529.724)	(297.084)	(816.190)	(303.906)
30-34-Secondary completed-Personal Services	-3,354.01	-7,117.06	-4,082.23	631.64	-3,136.31
	(88.779)	(526.893)	(284.797)	(810.617)	(299.550)
30-34-Secondary completed-Domestic Services	-4,603.97	-8,408.79	-3,681.16	-290.29	-4,079.72
	(110.345)	(537.691)	(296.187)	(818.914)	(321.427)
30-34-Secondary completed-Security and Armed forces	-2,089.22	-6,739.27	-3,155.21	1,903.44	-2,982.40
	(169.986)	(539.332)	(590.942)	(899.817)	(339.751)
30-34-University completed-Professionals	-747.04	-4,236.06	172.27	4,104.32	558.21
	(84.457)	(526.051)	(282.553)	(810.364)	(298.976)
30-34-University completed-Technicians	-2,398.61	-6,114.63	-1,570.08	2,258.09	-1,144.34
	(91.344)	(527.892)	(285.058)	(811.979)	(305.425)
30-34-University completed-Education	-2,727.71	-6,149.24	-3,067.66	1,348.52	-1,480.51
	(84.660)	(526.056)	(282.459)	(810.310)	(298.253)
30-34-University completed-Art, Shows & Sports	-789.16	-5,813.24	-1,607.67	5,397.03	2,467.22
	(395.197)	(605.738)	(304.861)	(827.085)	(314.676)
30-34-University completed-Officers and Directors	-1,505.28	-2,869.92	3,190.76	7,364.58	247.33
	(88.367)	(527.528)	(285.557)	(811.435)	(303.897)
30-34-University completed-Chiefs, Supervisors & Control workers	-464.62	-3,142.52	-207.62	3,065.52	-507.01
	(169.082)	(550.229)	(376.043)	(1,020.297)	(466.829)
30-34-University completed-Transformation & Maintenance Activities	-3,128.86	-8,139.04	-1,498.64	1,090.90	-5,702.37
	(363.704)	(553.950)	(352.266)	(861.215)	(927.210)
30-34-University completed-Administrative Activities	-888.51	-4,384.51	4,555.80	3,881.14	243.36
	(94.867)	(529.649)	(295.433)	(814.589)	(305.679)
30-34-University completed-Administrative Activities Assistants	-1,954.44	-5,285.67	-651.94	2,271.62	-669.98
	(109.575)	(535.737)	(294.220)	(812.958)	(308.660)
30-34-University completed-Shopkeepers & Sales Agents	-1,543.51	-5,928.60	-2,185.72	4,064.66	855.11
	(129.717)	(532.653)	(291.354)	(814.391)	(312.463)
30-34-University completed-Street Vendors	-1,665.51	-7,759.20	-2,618.60	602.20	-1,735.88
	(162.891)	(546.982)	(406.363)	(859.930)	(626.996)
30-34-University completed-Personal Services		-7,365.21	-3,248.92	904.94	621.14
		(562.702)	(447.920)	(1,076.865)	(343.011)
30-34-University completed-Security and Armed forces		-4,854.48	-2,022.57		
		(656.584)	(909.485)		
35-39-Less than primary completed-Technicians	-3,104.64	-8,252.38	-4,534.66	39.68	-2,710.63
	(144.252)	(568.226)	(298.262)	(819.259)	(374.857)
35-39-Less than primary completed-Education	-3,915.71	-6,463.21	-4,046.57	-958.17	
	(161.398)	(627.539)	(611.368)	(1,144.944)	
35-39-Less than primary completed-Art, Shows & Sports	-5,282.35	-4,838.30	-3,731.85	2,517.86	-850.58
	(225.801)	(669.217)	(534.777)	(1,514.618)	(431.211)
35-39-Less than primary completed-Officers and Directors	-4,851.21	-4,854.48	1,154.34	9,831.67	-2,725.19
	(298.922)	(820.473)	(344.384)	(829.790)	(363.817)
35-39-Less than primary completed-Agriculture	-4,802.15	-8,242.23	-5,348.71	-319.91	-4,610.89
	(221.800)	(565.938)	(356.335)	(902.947)	(377.461)
35-39-Less than primary completed-Chiefs, Supervisors & Control workers	-3,664.53	-4,940.36	-1,557.94	921.10	-3,133.30
	(128.989)	(542.051)	(328.914)	(866.280)	(433.802)
35-39-Less than primary completed-Transformation & Maintenance Activities	-4,611.72	-7,732.36	-4,739.72	-342.72	-4,215.81
	(84.651)	(526.312)	(286.252)	(811.688)	(303.133)
35-39-Less than primary completed-Operators of Machinery	-4,301.17	-7,542.81	-4,464.11	9.19	-4,116.71
	(90.540)	(528.099)	(291.206)	(813.832)	(303.680)
35-39-Less than primary completed-Artisanal and Industrial Fabrication	-4,394.08	-7,883.41	-3,404.66	1,728.68	-3,617.61
	(125.979)	(543.369)	(1,076.870)	(880.125)	(358.865)
35-39-Less than primary completed-Administrative Activities	-666.68	-4,854.48	-2,826.37	904.94	-4,081.39
	(133.028)	(672.770)	(367.807)	(1,118.620)	(532.768)
35-39-Less than primary completed-Administrative Activities Assistants	-3,387.75	-7,526.16	-4,524.73	192.88	-3,424.31

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(96.774)	(537.916)	(312.283)	(825.988)	(315.678)
35-39-Less than primary completed-Shopkeepers & Sales Agents	-3,743.33	-7,004.09	-4,694.06	-387.82	-4,154.75
	(84.412)	(526.246)	(283.834)	(810.665)	(299.142)
35-39-Less than primary completed-Street Vendors	-4,552.76	-8,182.87	-4,970.34	-530.80	-3,096.38
	(86.608)	(528.051)	(285.977)	(812.906)	(307.116)
35-39-Less than primary completed-Personal Services	-4,416.98	-7,658.03	-4,309.81	-98.30	-3,965.24
	(83.777)	(526.005)	(282.486)	(810.142)	(298.420)
35-39-Less than primary completed-Domestic Services	-5,145.06	-8,425.55	-5,378.61	-590.00	-4,383.98
	(83.968)	(525.846)	(282.107)	(810.084)	(298.157)
35-39-Less than primary completed-Security and Armed forces		-8,106.99	-3,842.88		
		(698.505)	(618.854)		
35-39-Primary completed-Professionals	-4,757.64	-6,546.17	-2,262.28		2,603.82
	(674.487)	(643.632)	(662.768)		(502.020)
35-39-Primary completed-Technicians	-3,168.85	-6,655.66	-3,394.67	1,671.19	-2,330.76
	(84.716)	(526.314)	(285.275)	(811.654)	(300.671)
35-39-Primary completed-Education	-3,739.61	-8,191.42	-5,064.62	22.74	-2,726.85
	(99.071)	(530.279)	(295.433)	(820.058)	(344.416)
35-39-Primary completed-Art, Shows & Sports	-498.60	-7,826.12	7,577.54	212.91	-3,497.65
	(112.120)	(536.558)	(405.433)	(822.348)	(338.210)
35-39-Primary completed-Officers and Directors	-3,446.77	-845.43	-166.75	3,675.44	3,867.73
	(99.802)	(533.138)	(309.807)	(818.066)	(380.894)
35-39-Primary completed-Agriculture	-4,892.22	-9,441.97	-4,764.06	-1,094.15	
	(184.613)	(1,087.937)	(293.197)	(848.356)	
35-39-Primary completed-Chiefs, Supervisors & Control workers	-2,992.57	-5,936.20	-3,184.85	1,261.37	-3,002.22
	(117.635)	(530.573)	(302.007)	(816.453)	(319.053)
35-39-Primary completed-Transformation & Maintenance Activities	-4,356.84	-7,944.73	-4,514.53	-171.29	-3,981.97
	(84.881)	(526.172)	(283.295)	(810.789)	(300.052)
35-39-Primary completed-Operators of Machinery	-3,803.29	-7,053.99	-4,491.76	89.95	-3,735.07
	(86.228)	(526.771)	(283.635)	(811.140)	(299.849)
35-39-Primary completed-Artisanal and Industrial Fabrication	-4,010.88	-7,757.78	-4,280.61	-66.01	-4,354.02
	(102.051)	(552.672)	(297.428)	(838.316)	(374.578)
35-39-Primary completed-Drivers and Drivers assistants	-1,708.01	-8,511.53	-4,085.59	-64.18	752.16
	(363.704)	(897.502)	(543.308)	(916.560)	(579.277)
35-39-Primary completed-Administrative Activities	-3,076.86	-6,451.03	-1,883.26	2,026.57	-2,226.57
	(95.523)	(546.462)	(295.259)	(828.126)	(319.514)
35-39-Primary completed-Administrative Activities Assistants	-3,020.14	-6,729.16	-3,213.49	1,426.52	-3,192.54
	(87.301)	(526.983)	(284.558)	(811.211)	(299.912)
35-39-Primary completed-Shopkeepers & Sales Agents	-3,794.69	-7,230.74	-4,074.42	732.96	-3,491.64
	(83.714)	(525.887)	(282.237)	(810.108)	(298.156)
35-39-Primary completed-Street Vendors	-4,827.14	-8,325.04	-4,960.55	-367.96	-4,145.51
	(86.717)	(527.599)	(288.096)	(812.012)	(302.938)
35-39-Primary completed-Personal Services	-4,319.27	-7,420.81	-4,271.07	-130.68	-3,356.53
	(83.678)	(525.872)	(282.183)	(809.940)	(297.893)
35-39-Primary completed-Domestic Services	-4,968.25	-8,339.42	-4,974.71	-546.72	-4,338.66
	(85.501)	(526.529)	(284.002)	(810.597)	(298.439)
35-39-Primary completed-Security and Armed forces	-4,918.41	33.87	-5,290.48	92.88	-4,083.78
	(174.328)	(651.073)	(327.375)	(837.427)	(351.975)
35-39-Primary completed-Other Workers		-2,750.87		1,144.48	-3,276.47
		(897.502)		(1,590.018)	(735.122)
35-39-Secondary completed-Professionals	-2,132.57	-8,268.73	-5,640.72	210.14	-1,144.25
	(140.979)	(551.065)	(379.344)	(850.930)	(365.940)
35-39-Secondary completed-Technicians	-2,636.69	-6,328.14	-3,121.42	1,271.40	-2,224.66
	(83.215)	(525.795)	(281.939)	(809.877)	(297.378)
35-39-Secondary completed-Education	-3,286.46	-6,961.86	-3,384.67	1,000.67	-2,520.21
	(84.294)	(525.908)	(282.377)	(810.261)	(298.449)
35-39-Secondary completed-Art, Shows & Sports	-1,077.61	-6,546.23	-1,158.71	686.69	-1,435.42
	(99.413)	(565.142)	(317.223)	(1,052.369)	(314.070)
35-39-Secondary completed-Officers and Directors	-927.10	-4,477.71	710.19	7,146.39	1,738.49
	(86.841)	(527.275)	(291.063)	(812.998)	(303.074)
35-39-Secondary completed-Chiefs, Supervisors & Control workers	-2,289.43	-5,599.46	-2,708.08	1,508.31	-3,122.19
	(103.262)	(543.912)	(327.006)	(857.544)	(325.827)
35-39-Secondary completed-Transformation & Maintenance Activities	-4,207.51	-8,108.89	-4,528.64	-235.27	-4,074.56
	(91.230)	(528.915)	(292.670)	(814.332)	(307.043)
35-39-Secondary completed-Operators of Machinery	-3,214.85	-7,390.89	-4,605.82	382.48	-3,828.06
	(102.967)	(539.556)	(295.906)	(821.230)	(308.160)
35-39-Secondary completed-Artisanal and Industrial Fabrication		-7,913.90	-5,141.99		-2,533.40
		(569.152)	(446.242)		(460.220)
35-39-Secondary completed-Drivers and Drivers assistants		-1,031.58	627.59	-530.75	1,976.66
		(624.183)	(471.259)	(858.708)	(547.386)
35-39-Secondary completed-Administrative Activities	-1,484.23	-5,571.74	-2,304.89	1,456.42	2,724.70
	(89.954)	(527.368)	(289.438)	(815.854)	(304.003)
35-39-Secondary completed-Administrative Activities Assistants	-2,701.64	-6,386.12	-3,436.74	1,381.15	-2,501.31

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(85.959)	(526.253)	(283.685)	(810.559)	(298.754)
35-39-Secondary completed-Shopkeepers & Sales Agents	-3,651.13	-6,602.98	-2,569.05	1,529.71	-2,396.85
	(86.579)	(526.328)	(282.846)	(810.202)	(299.638)
35-39-Secondary completed-Street Vendors	-4,400.61	-8,178.09	-3,343.33	3,214.26	-3,911.16
	(97.489)	(530.355)	(292.632)	(814.814)	(304.665)
35-39-Secondary completed-Personal Services	-4,185.32	-7,326.39	-4,623.92	767.70	-2,934.65
	(86.689)	(526.480)	(285.172)	(811.686)	(300.859)
35-39-Secondary completed-Domestic Services	-4,937.92	-7,566.72	-3,769.65	-347.41	-4,647.20
	(153.849)	(537.716)	(324.470)	(833.698)	(313.215)
35-39-Secondary completed-Security and Armed forces		-4,416.23		688.23	-3,525.47
		(735.420)		(841.865)	(362.407)
35-39-University completed-Professionals	-997.74	-3,496.84	247.40	4,337.25	4,555.31
	(87.412)	(526.838)	(283.998)	(810.433)	(299.357)
35-39-University completed-Technicians	-1,964.67	-4,927.03	-1,016.18	2,496.73	-1,583.21
	(99.644)	(528.224)	(290.515)	(813.078)	(306.074)
35-39-University completed-Education	-3,008.67	-6,276.65	-2,605.80	2,303.71	-1,792.71
	(85.532)	(526.414)	(283.371)	(810.555)	(298.613)
35-39-University completed-Art, Shows & Sports	683.17	5,283.39	-168.84	3,449.06	829.72
	(378.406)	(560.750)	(315.986)	(827.048)	(326.295)
35-39-University completed-Officers and Directors	3,584.09	-2,075.58	567.25	9,605.97	7,472.98
	(96.850)	(528.270)	(287.602)	(812.198)	(306.526)
35-39-University completed-Chiefs, Supervisors & Control workers	-2,522.40	-7,273.64	-1,740.19	2,810.27	-513.22
	(404.536)	(781.340)	(386.704)	(1,052.369)	(811.426)
35-39-University completed-Transformation & Maintenance Activities		-2,750.87		755.89	-2,250.13
		(751.600)		(1,261.667)	(827.247)
35-39-University completed-Administrative Activities	-84.71	-4,431.43	-1,409.95	5,078.29	1,174.56
	(132.606)	(533.694)	(294.112)	(826.501)	(306.689)
35-39-University completed-Administrative Activities Assistants	-2,240.47	-4,930.31	-1,694.60	5,365.42	946.42
	(104.953)	(531.569)	(299.868)	(813.436)	(311.406)
35-39-University completed-Shopkeepers & Sales Agents	-4,671.61	-5,593.27	-501.90	4,532.18	300.22
	(111.701)	(549.734)	(306.754)	(814.981)	(310.691)
35-39-University completed-Street Vendors		-7,588.20	-1,769.20	1,969.58	-5,010.93
		(569.470)	(396.858)	(1,076.865)	(550.546)
35-39-University completed-Personal Services		-6,796.28	-6,162.09	4,723.48	-1,209.08
		(751.600)	(879.617)	(855.116)	(364.862)
40-44-Less than primary completed-Technicians	-3,294.63	-6,459.36	-4,078.50	1,644.49	-2,337.18
	(119.030)	(532.324)	(360.166)	(829.395)	(398.691)
40-44-Less than primary completed-Education		-8,580.30			-2,715.70
		(735.420)			(415.546)
40-44-Less than primary completed-Officers and Directors		-8,586.59	-4,132.78	10,444.08	9,232.98
		(582.294)	(604.238)	(822.054)	(361.436)
40-44-Less than primary completed-Agriculture	-5,121.35	-8,940.92	-5,478.12	-1,457.84	-4,867.80
	(123.531)	(550.229)	(340.041)	(911.172)	(468.218)
40-44-Less than primary completed-Chiefs, Supervisors & Control workers	360.92	-6,367.46	-4,682.36	561.27	-3,421.69
	(140.786)	(542.661)	(351.971)	(860.245)	(397.269)
40-44-Less than primary completed-Transformation & Maintenance Activities	-4,552.16	-8,247.23	-5,020.21	-378.83	-4,219.85
	(85.542)	(526.734)	(284.710)	(811.993)	(302.514)
40-44-Less than primary completed-Operators of Machinery	-3,839.49	-7,565.25	-4,470.72	-18.75	-3,930.05
	(93.506)	(528.231)	(287.834)	(812.979)	(305.467)
40-44-Less than primary completed-Artisanal and Industrial Fabrication		-8,356.63	-5,099.57	-827.85	-4,434.15
		(606.822)	(523.041)	(848.171)	(404.812)
40-44-Less than primary completed-Administrative Activities		-7,789.33	-4,719.33	-1,229.98	-4,582.72
		(611.472)	(505.855)	(901.880)	(882.321)
40-44-Less than primary completed-Administrative Activities Assistants	-4,404.40	-7,351.01	-4,529.24	-35.94	-4,176.07
	(112.797)	(586.302)	(300.197)	(826.466)	(402.690)
40-44-Less than primary completed-Shopkeepers & Sales Agents	-4,336.07	-7,362.41	-3,597.96	-196.46	-2,748.22
	(85.128)	(526.303)	(283.114)	(810.770)	(300.811)
40-44-Less than primary completed-Street Vendors	-4,900.51	-7,673.61	-4,905.19	-384.59	-4,306.52
	(87.776)	(530.466)	(290.805)	(812.561)	(304.473)
40-44-Less than primary completed-Personal Services	-4,282.64	-7,853.82	-4,649.08	197.12	-3,861.66
	(84.464)	(526.165)	(282.572)	(810.310)	(298.404)
40-44-Less than primary completed-Domestic Services	-5,190.19	-8,613.43	-5,372.72	-745.47	-4,596.44
	(83.742)	(525.985)	(282.790)	(810.435)	(298.051)
40-44-Less than primary completed-Security and Armed forces		-8,079.24	-5,343.82		-2,716.65
		(573.298)	(378.778)		(1,835.119)
40-44-Primary completed-Technicians	-3,173.36	-5,998.56	-3,565.06	742.69	-2,701.89
	(85.273)	(526.564)	(284.043)	(811.228)	(302.010)
40-44-Primary completed-Education	-3,532.02	-6,626.73	-4,279.83	765.87	-2,220.88
	(94.318)	(529.036)	(312.116)	(828.428)	(336.272)
40-44-Primary completed-Art, Shows & Sports	-1,926.34	-7,217.99	-1,946.44	8,926.97	-2,165.09
	(631.598)	(548.105)	(400.138)	(1,261.667)	(638.754)
40-44-Primary completed-Officers and Directors	-1,924.47	-4,414.72	1,946.36	1,863.28	39,938.95

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(122.107)	(537.086)	(297.217)	(829.299)	(417.552)
40-44-Primary completed-Agriculture		-8,713.80	1,681.46	-915.59	-4,734.61
		(897.502)	(515.840)	(1,159.911)	(882.321)
40-44-Primary completed-Chiefs, Supervisors & Control workers	-2,809.87	-6,604.34	-3,995.68	621.00	-2,941.85
	(143.821)	(537.288)	(314.832)	(828.516)	(320.860)
40-44-Primary completed-Transformation & Maintenance Activities	-4,515.91	-7,641.69	-4,545.87	-185.97	-4,302.75
	(85.821)	(526.775)	(284.336)	(811.031)	(301.281)
40-44-Primary completed-Operators of Machinery	-3,376.60	-7,472.09	-4,313.54	301.16	-3,857.16
	(91.402)	(527.561)	(287.851)	(811.596)	(300.469)
40-44-Primary completed-Artisanal and Industrial Fabrication	-2,886.28	-7,246.67	-4,705.34	-357.65	-3,026.48
	(480.488)	(639.147)	(662.768)	(1,032.038)	(348.581)
40-44-Primary completed-Administrative Activities	-3,461.07	-6,603.79	-2,837.30	287.39	-2,182.41
	(122.280)	(539.053)	(297.489)	(838.316)	(331.359)
40-44-Primary completed-Administrative Activities Assistants	-3,169.74	-6,378.82	-3,395.02	666.17	-2,793.69
	(89.047)	(527.618)	(284.836)	(811.973)	(302.605)
40-44-Primary completed-Shopkeepers & Sales Agents	-4,068.47	-6,896.09	-3,948.31	126.01	-2,991.64
	(84.351)	(525.997)	(282.599)	(810.373)	(298.896)
40-44-Primary completed-Street Vendors	-4,558.49	-7,731.28	-3,966.40	44.68	-4,430.65
	(88.516)	(527.400)	(288.119)	(814.190)	(301.662)
40-44-Primary completed-Personal Services	-4,028.58	-7,051.37	-4,446.16	45.42	-3,863.32
	(83.827)	(525.915)	(282.443)	(810.170)	(298.517)
40-44-Primary completed-Domestic Services	-4,867.95	-8,177.64	-5,078.07	-538.54	-4,152.29
	(88.156)	(527.080)	(285.384)	(810.900)	(300.213)
40-44-Primary completed-Security and Armed forces	-4,248.58	-7,621.54	-4,045.14	-115.92	-4,163.36
	(339.077)	(662.606)	(562.377)	(871.963)	(325.225)
40-44-Primary completed-Other Workers		-7,621.54			-3,463.08
		(954.661)			(796.647)
40-44-Secondary completed-Professionals	-3,022.16	-6,885.16	5,933.65	9,965.60	3,749.56
	(135.415)	(534.840)	(305.257)	(822.092)	(342.720)
40-44-Secondary completed-Technicians	-2,742.69	-6,396.40	-2,708.09	992.47	-2,357.90
	(84.079)	(525.977)	(282.229)	(810.099)	(297.975)
40-44-Secondary completed-Education	-3,433.25	-6,763.84	-3,472.81	995.79	-2,552.04
	(84.470)	(526.166)	(282.969)	(810.466)	(299.112)
40-44-Secondary completed-Art, Shows & Sports	-3,863.08	-7,510.87	-2,393.14	1,883.23	-4,730.27
	(244.892)	(624.183)	(346.808)	(867.086)	(903.796)
40-44-Secondary completed-Officers and Directors	-852.64	-5,034.62	-1,151.69	4,022.94	1,515.59
	(90.630)	(527.289)	(290.741)	(814.329)	(312.374)
40-44-Secondary completed-Chiefs, Supervisors & Control workers	-1,610.43	-7,093.51		2,733.87	-1,671.93
	(298.922)	(536.132)		(876.617)	(372.680)
40-44-Secondary completed-Transformation & Maintenance Activities	-3,866.95	-7,502.94	-3,769.57	262.67	-3,871.58
	(99.691)	(528.452)	(296.939)	(814.629)	(311.026)
40-44-Secondary completed-Operators of Machinery	-3,401.67	-8,530.39	-3,944.86	986.31	-3,482.53
	(119.696)	(535.060)	(348.354)	(830.045)	(321.019)
40-44-Secondary completed-Artisanal and Industrial Fabrication	-2,678.35	-6,562.74	-3,269.68	2,076.04	-4,396.12
	(314.748)	(581.244)	(422.261)	(1,322.067)	(927.210)
40-44-Secondary completed-Drivers and Drivers assistants		-7,879.10	-1,339.67	1,144.48	-4,582.72
		(610.260)	(334.882)	(866.680)	(1,086.853)
40-44-Secondary completed-Administrative Activities	-1,220.92	-4,884.16	-1,331.48	1,901.18	-1,019.42
	(105.850)	(530.757)	(292.344)	(813.175)	(313.166)
40-44-Secondary completed-Administrative Activities Assistants	-2,114.90	-6,118.00	-3,009.73	1,082.48	-2,601.11
	(88.437)	(526.611)	(284.839)	(811.059)	(300.967)
40-44-Secondary completed-Shopkeepers & Sales Agents	-2,530.74	-6,797.64	-2,639.76	2,371.41	-1,178.88
	(88.890)	(526.929)	(284.712)	(810.776)	(300.085)
40-44-Secondary completed-Street Vendors	-3,690.81	-6,686.59	-3,850.65	2,042.13	-1,469.25
	(107.640)	(531.353)	(295.504)	(829.841)	(310.861)
40-44-Secondary completed-Personal Services	-3,790.11	-5,868.84	-4,040.15	916.35	-2,198.10
	(94.747)	(527.461)	(286.382)	(811.039)	(300.937)
40-44-Secondary completed-Domestic Services	-4,653.55	-7,897.02	-4,938.91	-66.42	-4,428.05
	(138.400)	(534.671)	(309.760)	(824.082)	(329.456)
40-44-Secondary completed-Security and Armed forces	-3,726.87	-7,281.73		1,969.58	
	(132.606)	(836.447)		(1,685.312)	
40-44-University completed-Professionals	-353.03	-3,195.43	-356.53	6,386.71	2,704.34
	(96.224)	(528.043)	(286.398)	(811.277)	(300.281)
40-44-University completed-Technicians	-3,664.99	-5,693.38	-2,024.01	1,688.09	-1,463.22
	(100.974)	(537.381)	(307.375)	(819.756)	(323.270)
40-44-University completed-Education	-2,057.96	-5,471.15	-2,656.78	2,466.23	-911.67
	(89.847)	(527.383)	(284.218)	(811.127)	(299.400)
40-44-University completed-Officers and Directors	-300.45	-1,652.01	3,800.29	5,093.81	2,682.15
	(111.473)	(529.894)	(292.174)	(816.074)	(312.553)
40-44-University completed-Chiefs, Supervisors & Control workers	-339.08	-4,854.48		1,373.38	
	(111.116)	(550.851)		(1,685.312)	
40-44-University completed-Transformation & Maintenance Activities	-5,502.73	-6,497.48			

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(631.598)	(559.179)			
40-44-University completed-Administrative Activities	5,315.61	-2,859.59	-2,212.55	4,766.83	-1,131.68
	(107.372)	(546.105)	(331.870)	(828.650)	(346.132)
40-44-University completed-Administrative Activities Assistants	-3,648.69	-7,728.45	4,693.94	535.26	-1,446.39
	(165.249)	(543.637)	(322.200)	(849.307)	(363.408)
40-44-University completed-Shopkeepers & Sales Agents	-2,294.74	-3,827.41	-2,089.99	4,516.39	-791.84
	(161.766)	(546.317)	(505.855)	(822.936)	(342.720)
40-44-University completed-Security and Armed forces		-2,980.43	1,651.76		
		(651.073)	(547.809)		
45-49-Less than primary completed-Technicians	-3,634.13	-6,472.65	-4,707.36	1,715.96	-2,464.95
	(99.013)	(954.661)	(355.678)	(865.496)	(439.308)
45-49-Less than primary completed-Art, Shows & Sports	2,311.96	-8,495.35		-1,373.38	-4,533.64
	(357.008)	(651.073)		(983.650)	(365.075)
45-49-Less than primary completed-Officers and Directors	-3,404.70	-7,414.83	-3,983.86	4,241.44	-1,680.11
	(117.501)	(604.682)	(389.414)	(829.841)	(431.211)
45-49-Less than primary completed-Agriculture	-5,719.35	-8,771.87	-5,560.55	-1,685.80	-5,083.33
	(124.865)	(531.794)	(355.678)	(900.837)	(458.962)
45-49-Less than primary completed-Chiefs, Supervisors & Control workers		-4,814.21	1,548.99	-116.58	-4,459.29
		(587.553)	(348.619)	(826.189)	(359.941)
45-49-Less than primary completed-Transformation & Maintenance Activities	-4,512.44	-8,069.67	-4,994.06	-137.88	-3,849.21
	(86.916)	(526.946)	(285.284)	(812.727)	(305.505)
45-49-Less than primary completed-Operators of Machinery	-4,020.01	-6,750.89	-4,333.51	-336.23	-3,972.09
	(104.793)	(537.992)	(303.173)	(816.201)	(311.485)
45-49-Less than primary completed-Administrative Activities Assistants	-3,657.50	-7,200.80	-4,572.83	-222.05	-4,753.00
	(111.886)	(538.149)	(354.087)	(917.997)	(386.082)
45-49-Less than primary completed-Shopkeepers & Sales Agents	-3,736.05	-6,538.96	-4,456.21	-525.44	-3,657.45
	(85.129)	(526.297)	(283.291)	(811.303)	(299.675)
45-49-Less than primary completed-Street Vendors	-4,485.81	-8,026.82	-4,758.20	7,182.24	-3,850.71
	(85.668)	(527.702)	(284.855)	(814.882)	(301.064)
45-49-Less than primary completed-Personal Services	-4,388.26	-7,367.12	-4,430.42	-379.78	-3,778.46
	(84.447)	(526.027)	(282.879)	(810.325)	(299.686)
45-49-Less than primary completed-Domestic Services	-5,044.45	-8,435.71	-5,354.27	-835.28	-4,506.38
	(84.207)	(526.053)	(282.685)	(810.407)	(299.215)
45-49-Less than primary completed-Security and Armed forces		-1,043.56			
		(633.028)			
45-49-Primary completed-Professionals	-4,757.64	-6,858.77			
	(276.610)	(703.712)			
45-49-Primary completed-Technicians	-3,975.77	-6,987.37	-3,600.74	847.08	-2,602.50
	(92.720)	(528.221)	(286.835)	(814.148)	(309.242)
45-49-Primary completed-Education	-3,426.51	-7,408.86	-3,094.91	488.48	-3,614.77
	(120.231)	(543.475)	(413.297)	(867.086)	(362.407)
45-49-Primary completed-Art, Shows & Sports	-4,011.66	-8,446.80	-930.68	-1,144.48	1,388.70
	(116.159)	(954.661)	(327.751)	(1,086.189)	(981.126)
45-49-Primary completed-Officers and Directors	-2,842.42	-5,348.22	-4,339.91	4,310.73	-2,585.30
	(114.361)	(536.639)	(362.041)	(825.759)	(616.089)
45-49-Primary completed-Agriculture		-7,164.41	2,359.66	457.79	-5,619.31
		(581.764)	(695.906)	(1,685.312)	(626.996)
45-49-Primary completed-Chiefs, Supervisors & Control workers	-3,130.04	-6,634.11	-3,711.96	640.72	-2,988.38
	(193.028)	(567.338)	(626.725)	(840.044)	(651.471)
45-49-Primary completed-Transformation & Maintenance Activities	-4,834.67	-8,137.15	-4,759.60	-484.22	-3,486.44
	(90.871)	(528.290)	(287.780)	(814.380)	(309.193)
45-49-Primary completed-Operators of Machinery	-4,454.11	-6,861.35	-3,737.77	-17.26	-3,771.63
	(116.721)	(534.363)	(291.655)	(817.784)	(314.418)
45-49-Primary completed-Artisanal and Industrial Fabrication	-4,233.63	-6,143.35	-3,749.96	9,805.54	1,388.70
	(165.656)	(634.992)	(505.855)	(979.953)	(601.120)
45-49-Primary completed-Drivers and Drivers assistants	-5,800.76	-7,748.63			4,773.67
	(116.849)	(589.530)			(672.641)
45-49-Primary completed-Administrative Activities	-3,653.47	-2,386.95	-2,022.57	1,173.45	-1,339.06
	(155.356)	(537.570)	(388.723)	(818.120)	(376.867)
45-49-Primary completed-Administrative Activities Assistants	-2,627.13	-6,397.06	-3,588.41	2,653.93	-1,042.65
	(92.579)	(528.703)	(290.318)	(819.951)	(319.120)
45-49-Primary completed-Shopkeepers & Sales Agents	-4,384.21	-6,749.90	-3,472.15	588.29	-3,582.45
	(85.134)	(526.351)	(283.804)	(810.768)	(300.658)
45-49-Primary completed-Street Vendors	-4,407.30	-7,271.08	-4,180.15	708.15	-3,976.92
	(88.131)	(533.062)	(288.160)	(824.817)	(316.744)
45-49-Primary completed-Personal Services	-3,789.18	-7,483.93	-4,209.84	118.84	-3,452.45
	(87.327)	(526.639)	(284.084)	(810.838)	(299.677)
45-49-Primary completed-Domestic Services	-4,971.53	-8,127.79	-5,133.34	-631.13	-4,385.37
	(89.159)	(527.525)	(286.348)	(812.321)	(302.900)
45-49-Secondary completed-Professionals	-1,212.14	-4,854.48		1,942.28	-3,124.58
	(126.083)	(641.346)		(995.779)	(903.796)
45-49-Secondary completed-Technicians	-2,294.15	-6,079.95	-3,206.74	1,059.37	-1,905.29

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(86.016)	(526.599)	(285.410)	(811.583)	(300.194)
45-49-Secondary completed-Education	-3,646.13	-6,916.41	-3,484.02	1,061.12	-2,606.22
	(87.329)	(526.691)	(284.378)	(810.706)	(302.174)
45-49-Secondary completed-Officers and Directors	-1,435.35	-4,743.70	-1,005.90	4,150.34	-44.20
	(95.089)	(529.347)	(307.819)	(821.049)	(336.130)
45-49-Secondary completed-Transformation & Maintenance Activities	-5,192.26	-8,687.69	-4,463.99	597.26	-4,473.49
	(117.905)	(533.081)	(294.968)	(816.769)	(337.367)
45-49-Secondary completed-Operators of Machinery	-4,087.07	-7,120.87	1,049.21	3,352.90	-4,032.19
	(271.196)	(619.545)	(502.724)	(861.215)	(397.738)
45-49-Secondary completed-Artisanal and Industrial Fabrication	-2,955.59	-8,090.81	-1,348.38		
	(540.349)	(954.661)	(1,025.471)		
45-49-Secondary completed-Drivers and Drivers assistants		-8,036.87			-1,410.40
		(553.555)			(672.641)
45-49-Secondary completed-Administrative Activities	-1,790.81	-4,484.82	-889.60	6,618.49	532.40
	(119.923)	(530.239)	(309.855)	(821.001)	(323.958)
45-49-Secondary completed-Administrative Activities Assistants	-2,564.58	-6,662.21	-1,931.13	3,545.25	-2,989.80
	(97.301)	(529.023)	(294.773)	(814.571)	(308.470)
45-49-Secondary completed-Shopkeepers & Sales Agents	-4,763.21	-5,639.29	-4,090.67	2,296.26	-1,614.28
	(92.083)	(527.674)	(287.499)	(812.512)	(305.640)
45-49-Secondary completed-Street Vendors	-4,500.78	-8,976.56	-4,570.51	272.09	-3,349.43
	(131.782)	(550.851)	(315.433)	(828.254)	(348.459)
45-49-Secondary completed-Personal Services	-3,619.35	-7,925.58	-2,878.48	1,775.70	-3,532.71
	(110.682)	(553.685)	(297.041)	(816.971)	(305.477)
45-49-Secondary completed-Domestic Services	2,929.36	2,931.83	-3,627.80	-1,495.69	-4,626.71
	(248.672)	(614.004)	(340.448)	(840.159)	(376.867)
45-49-University completed-Professionals	-2,062.50	-3,853.85	-687.06	4,081.44	1,122.04
	(109.975)	(531.907)	(288.194)	(814.146)	(311.026)
45-49-University completed-Technicians	-1,258.17	-5,561.23	-2,596.36	1,862.96	-1,643.04
	(104.479)	(565.669)	(458.791)	(825.536)	(333.683)
45-49-University completed-Education	-2,274.93	-4,586.06	-2,459.26	1,350.83	-810.10
	(93.642)	(528.650)	(293.452)	(814.586)	(307.058)
45-49-University completed-Officers and Directors	1,419.58	-2,199.26	1,482.56	5,270.47	3,443.02
	(92.776)	(551.730)	(310.789)	(829.347)	(330.252)
45-49-University completed-Chiefs, Supervisors & Control workers	683.17	-3,236.32	-2,224.83		
	(517.892)	(923.922)	(909.485)		
45-49-University completed-Administrative Activities	-1.86	-2,364.55	-1,197.98	6,148.72	-331.61
	(208.039)	(547.370)	(451.386)	(936.821)	(365.075)
45-49-University completed-Administrative Activities Assistants	-3,475.41	-4,045.40	4,045.14	947.53	2,333.29
	(279.460)	(836.447)	(852.887)	(1,014.884)	(416.207)
45-49-University completed-Shopkeepers & Sales Agents	-3,429.35	-2,908.42	-1,850.38	11,444.84	-3,260.67
	(288.642)	(542.564)	(319.212)	(1,144.944)	(389.519)
50-54-Less than primary completed-Technicians	-4,062.24	-7,473.48	-5,977.20		-4,048.96
	(285.469)	(540.168)	(460.749)		(338.525)
50-54-Less than primary completed-Art, Shows & Sports	-4,315.79	-7,937.40	-653.96	1,915.83	
	(163.274)	(542.374)	(398.475)	(863.270)	
50-54-Less than primary completed-Officers and Directors	-3,304.43	-849.53	-3,012.66	641.17	
	(181.509)	(698.505)	(597.437)	(888.377)	
50-54-Less than primary completed-Agriculture	-6,080.91	-7,865.40	-5,979.22	564.26	-5,904.69
	(104.635)	(555.063)	(366.076)	(991.550)	(616.089)
50-54-Less than primary completed-Chiefs, Supervisors & Control workers		-7,524.45		3,490.68	
		(535.601)		(841.111)	
50-54-Less than primary completed-Transformation & Maintenance Activities	-4,202.92	-8,271.33	-5,596.04	-206.78	-4,397.46
	(89.226)	(528.887)	(307.061)	(814.642)	(311.445)
50-54-Less than primary completed-Operators of Machinery	-4,167.21	-7,904.06	-4,700.16	-1.22	-4,051.06
	(169.531)	(561.808)	(358.028)	(832.408)	(312.760)
50-54-Less than primary completed-Artisanal and Industrial Fabrication		-7,976.85	-4,578.50	-692.01	-4,143.89
		(641.346)	(662.768)	(1,014.884)	(515.092)
50-54-Less than primary completed-Administrative Activities		-7,621.54	6,741.90		
		(550.331)	(534.777)		
50-54-Less than primary completed-Administrative Activities Assistants	-3,338.96	-6,897.63		-296.26	-3,780.69
	(323.779)	(588.198)		(820.643)	(333.254)
50-54-Less than primary completed-Shopkeepers & Sales Agents	-4,344.13	-6,508.93	-4,469.77	-357.42	-4,136.29
	(86.507)	(526.788)	(284.362)	(811.651)	(303.862)
50-54-Less than primary completed-Street Vendors	-4,529.66	-7,553.06	-3,850.24	-1,075.00	-4,435.10
	(86.465)	(529.804)	(290.213)	(819.668)	(320.192)
50-54-Less than primary completed-Personal Services	-3,515.85	-6,973.77	-4,807.16	-372.90	-3,941.54
	(87.662)	(526.887)	(284.608)	(811.201)	(304.185)
50-54-Less than primary completed-Domestic Services	-5,156.35	-8,700.37	-5,274.76	-581.94	-4,491.20
	(84.591)	(526.296)	(283.741)	(810.738)	(301.160)
50-54-Primary completed-Technicians	-3,633.66	-6,673.83	-3,524.15	805.31	-3,267.41
	(119.771)	(537.266)	(300.495)	(825.049)	(322.646)
50-54-Primary completed-Education	-5,127.83	-7,591.64	-4,359.33	2,171.86	-3,543.63

Continued on next page

Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(133.750)	(547.772)	(395.286)	(889.944)	(414.247)
50-54-Primary completed-Officers and Directors	-177.11	-6,297.26	43,098.67	6,344.86	
	(159.614)	(693.598)	(352.863)	(940.973)	
50-54-Primary completed-Chiefs, Supervisors & Control workers	-4,598.85	-7,621.54	4,608.84	1,969.58	
	(122.541)	(923.922)	(363.607)	(915.160)	
50-54-Primary completed-Transformation & Maintenance Activities	-5,092.79	-7,979.12	-4,549.05	-615.81	-4,499.33
	(93.925)	(530.503)	(300.669)	(815.967)	(360.493)
50-54-Primary completed-Operators of Machinery		-7,941.82	-4,276.90	109.05	-2,904.46
		(703.712)	(346.808)	(816.506)	(375.137)
50-54-Primary completed-Administrative Activities Assistants	-4,159.01	-7,148.78	-2,982.08	575.23	-3,330.19
	(128.633)	(534.698)	(311.465)	(849.503)	(365.289)
50-54-Primary completed-Shopkeepers & Sales Agents	-3,618.40	-4,475.25	-3,734.74	192.89	-3,526.10
	(91.630)	(526.738)	(285.483)	(813.072)	(304.958)
50-54-Primary completed-Street Vendors	-4,556.15	-5,604.96	-4,413.53	-452.97	-3,224.28
	(110.345)	(531.808)	(313.813)	(833.626)	(371.895)
50-54-Primary completed-Personal Services	-3,346.19	-6,953.90	-3,394.36	1,028.50	-3,978.24
	(93.512)	(527.862)	(285.671)	(812.723)	(311.435)
50-54-Primary completed-Domestic Services	-4,266.76	-7,477.52	-5,133.75	-292.89	-4,708.09
	(97.918)	(529.141)	(294.667)	(817.412)	(321.046)
50-54-Secondary completed-Technicians	-3,443.54	-6,729.42	-3,117.37	3,614.00	-1,909.67
	(93.429)	(530.789)	(293.638)	(813.210)	(306.034)
50-54-Secondary completed-Education	-3,068.13	-7,034.40	-3,118.41	1,272.93	-2,263.13
	(91.847)	(528.625)	(299.244)	(825.442)	(313.975)
50-54-Secondary completed-Officers and Directors	-2,769.85	-4,257.37	6,030.26	3,820.63	-2,130.04
	(108.810)	(534.376)	(336.438)	(821.001)	(399.174)
50-54-Secondary completed-Agriculture		-1,618.16			
		(648.490)			
50-54-Secondary completed-Transformation & Maintenance Activities	-5,350.57	-7,837.79	-4,786.64	1,131.10	-360.95
	(173.822)	(548.801)	(363.607)	(920.992)	(456.505)
50-54-Secondary completed-Administrative Activities Assistants	-3,595.27	-6,492.46	-5,210.84	857.61	-3,153.24
	(137.706)	(570.452)	(345.573)	(828.560)	(363.408)
50-54-Secondary completed-Shopkeepers & Sales Agents	-1,594.43	-7,379.29	-3,441.64	338.71	-3,290.90
	(110.179)	(534.927)	(302.574)	(813.925)	(312.877)
50-54-Secondary completed-Street Vendors	-3,564.85	-9,539.06	-4,381.43	640.71	-4,708.58
	(110.768)	(569.152)	(349.427)	(844.211)	(1,508.130)
50-54-Secondary completed-Personal Services	-4,408.99	-7,538.36	4,132.78	-551.00	-2,748.20
	(193.800)	(548.623)	(695.906)	(842.256)	(358.865)
50-54-Secondary completed-Domestic Services	-4,983.89	-7,295.25	-4,884.28	-699.97	-3,276.47
	(310.532)	(554.777)	(354.087)	(847.273)	(1,183.170)
50-54-University completed-Professionals	-2,217.05	-5,583.38	17,513.05	5,699.72	395.46
	(137.878)	(551.959)	(335.051)	(867.086)	(377.762)
50-54-University completed-Technicians		-5,597.63	-337.09	727.50	-1,405.44
		(537.941)	(604.238)	(940.973)	(407.590)
50-54-University completed-Education	-3,101.15	-6,679.02	-3,022.02	1,581.50	-2,446.05
	(139.843)	(542.758)	(340.861)	(852.013)	(474.019)
50-54-University completed-Art, Shows & Sports		-2,750.87			
		(560.750)			
50-54-University completed-Officers and Directors	3,365.89	85.69	-1,665.14	904.94	
	(120.231)	(563.402)	(395.286)	(1,514.618)	
50-54-University completed-Shopkeepers & Sales Agents		-7,490.52	-1,308.57	338.46	-1,735.88
		(586.921)	(425.955)	(922.553)	(672.641)
55-60-Less than primary completed-Technicians	-4,588.15	-8,090.81		-1,144.48	
	(674.487)	(854.336)		(862.567)	
55-60-Less than primary completed-Education		-7,177.81	-4,402.00		
		(547.610)	(321.622)		
55-60-Less than primary completed-Officers and Directors	-4,971.24	-0.00	-4,032.11	2,834.10	-477.37
	(170.912)	(760.692)	(433.981)	(960.717)	(1,131.650)
55-60-Less than primary completed-Agriculture	-5,613.08	-8,617.61	-5,793.36	-956.39	
	(181.509)	(578.783)	(673.138)	(840.868)	
55-60-Less than primary completed-Transformation & Maintenance Activities	-5,184.04	-8,112.90	-4,563.16	-463.72	-4,690.97
	(93.134)	(532.896)	(308.624)	(817.405)	(321.650)
55-60-Less than primary completed-Operators of Machinery	-4,509.61	-8,487.26	-2,658.23	-70.23	-4,271.98
	(165.656)	(1,155.355)	(483.152)	(820.583)	(331.856)
55-60-Less than primary completed-Artisanal and Industrial Fabrication		-7,759.08	-6,135.12		
		(565.669)	(909.485)		
55-60-Less than primary completed-Drivers and Drivers assistants	-4,107.87	-8,317.35			
	(566.122)	(854.336)			
55-60-Less than primary completed-Administrative Activities Assistants		-7,492.09		632.47	-1,410.40
		(565.938)		(979.953)	(384.994)
55-60-Less than primary completed-Shopkeepers & Sales Agents	-3,824.72	-7,449.67	-4,083.58	99.51	-4,130.43
	(90.747)	(528.004)	(286.876)	(813.943)	(309.207)
55-60-Less than primary completed-Street Vendors	-3,560.10	-7,918.42	-5,592.26	-922.22	-4,570.91

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Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(102.878)	(545.041)	(308.365)	(819.977)	(338.845)
55-60-Less than primary completed-Personal Services	-3,824.81	-6,366.99	-4,249.43	-228.27	-4,022.66
	(98.869)	(528.952)	(291.432)	(814.422)	(322.256)
55-60-Less than primary completed-Domestic Services	-4,897.56	-8,443.08	-5,356.81	-1,055.51	-4,547.60
	(92.083)	(527.929)	(286.786)	(812.388)	(300.404)
55-60-Primary completed-Professionals		-5,259.02			
		(760.692)			
55-60-Primary completed-Technicians	-2,452.02	-7,403.96	-4,393.56	570.72	-3,826.56
	(140.405)	(601.675)	(377.665)	(838.113)	(515.092)
55-60-Primary completed-Education	-4,704.09	-6,674.92	-3,775.46	266.16	-0.00
	(252.664)	(698.505)	(573.090)	(1,289.895)	(1,131.650)
55-60-Primary completed-Chiefs, Supervisors & Control workers		-7,484.00			
		(735.420)			
55-60-Primary completed-Transformation & Maintenance Activities	-3,303.11	-8,957.43	-4,309.09	-649.91	-5,499.37
	(138.932)	(537.716)	(314.251)	(1,026.007)	(346.468)
55-60-Primary completed-Drivers and Drivers assistants		-1,715.25			
		(806.116)			
55-60-Primary completed-Administrative Activities Assistants	-3,853.15	-6,601.73	-4,501.44	120.51	-3,481.80
	(131.381)	(589.530)	(347.572)	(856.164)	(496.082)
55-60-Primary completed-Shopkeepers & Sales Agents	-5,077.09	-7,676.30	-2,771.98	-656.96	-2,980.31
	(99.566)	(532.996)	(298.381)	(824.160)	(316.909)
55-60-Primary completed-Street Vendors	-4,737.10	-8,917.75	-5,247.90	-1,390.22	-3,889.25
	(310.532)	(629.305)	(304.959)	(836.236)	(339.334)
55-60-Primary completed-Personal Services	-4,048.21	-8,319.51	-3,507.00	374.14	-4,476.01
	(142.980)	(543.008)	(294.511)	(820.335)	(340.962)
55-60-Primary completed-Domestic Services	-5,639.77	-8,847.37	-5,169.31	-704.31	-4,819.48
	(125.263)	(574.461)	(347.315)	(820.509)	(423.254)
55-60-Secondary completed-Technicians	-3,546.94	-6,560.91	-4,105.81	-115.05	-3,473.99
	(200.439)	(610.260)	(909.485)	(1,038.421)	(340.005)
55-60-Secondary completed-Education	-4,073.77	-6,984.13	-3,731.56	648.85	-2,018.98
	(123.165)	(590.920)	(368.251)	(1,004.860)	(419.627)
55-60-Secondary completed-Officers and Directors	-3,089.44	-6,037.00			
	(172.829)	(560.545)			
55-60-Secondary completed-Shopkeepers & Sales Agents	-5,074.35	-8,385.83	-5,565.45	773.09	-5,316.98
	(165.249)	(624.183)	(327.877)	(835.890)	(391.548)
55-60-Secondary completed-Personal Services		-7,070.17			-3,529.62
		(566.487)			(696.831)
55-60-University completed-Professionals	-5,651.74	-7,043.01		1,969.58	17,967.25
	(414.614)	(545.104)		(1,144.944)	(394.543)
55-60-University completed-Education		-6,599.34			
		(540.458)			
30-34-Less than primary completed-Education	-3,267.48		-4,045.14		-3,276.47
	(498.101)		(695.906)		(638.754)
30-34-Less than primary completed-Art, Shows & Sports	-4,757.64			-915.59	-4,673.86
	(164.446)			(969.755)	(596.463)
30-34-Less than primary completed-Drivers and Drivers assistants	-5,130.19				
	(285.469)				
30-34-Less than primary completed-Security and Armed forces	-3,406.10		-4,449.65		-5,424.63
	(395.197)		(1,422.714)		(827.247)
30-34-Primary completed-Professionals	-4,798.42			638.78	
	(314.748)			(1,289.895)	
30-34-Primary completed-Drivers and Drivers assistants	-4,681.32		-3,708.04		
	(127.825)		(1,422.714)		
35-39-Less than primary completed-Drivers and Drivers assistants	-4,757.64				-2,156.83
	(169.531)				(705.688)
35-39-Secondary completed-Agriculture	-2,287.04		-5,582.29	9,155.87	643.39
	(158.248)		(736.324)	(1,131.231)	(626.996)
35-39-University completed-Security and Armed forces	-2,014.96		-2,696.76	891.63	
	(344.727)		(673.138)	(881.378)	
40-44-Less than primary completed-Art, Shows & Sports	-4,963.84		-3,956.64		-1,996.26
	(596.111)		(449.635)		(626.996)
40-44-Primary completed-Professionals	-3,128.86			798.48	
	(540.349)			(991.550)	
40-44-Primary completed-Drivers and Drivers assistants	-3,910.12		-3,842.88	3,034.21	
	(158.584)		(684.161)	(1,236.681)	
40-44-University completed-Art, Shows & Sports	-4,328.11			1,674.14	3,254.77
	(302.631)			(1,144.944)	(381.882)
40-44-University completed-Personal Services	2,415.92		-3,263.08	2,969.69	5,426.68
	(155.978)		(786.993)	(924.158)	(336.703)
45-49-Less than primary completed-Artisanal and Industrial Fabrication	-4,310.60		-4,854.16	-313.23	-4,209.51
	(328.626)		(371.494)	(940.973)	(471.068)
45-49-Primary completed-Security and Armed forces	-4,944.52			-798.48	-3,471.76

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Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
	(631.598)			(1,144.944)	(688.390)
45-49-Secondary completed-Art, Shows & Sports	-4,757.64			457.79	4,276.07
	(363.704)			(1,176.318)	(325.078)
45-49-Secondary completed-Chiefs, Supervisors & Control workers	-9.92		-3,851.75	519.01	202.76
	(498.101)		(402.727)	(1,076.865)	(550.546)
50-54-Less than primary completed-Other Workers	-5,800.76				
	(298.922)				
50-54-Primary completed-Art, Shows & Sports	-4,370.20				
	(517.892)				
50-54-Primary completed-Artisanal and Industrial Fabrication	-4,757.64				
	(175.882)				
50-54-Primary completed-Drivers and Drivers assistants	-4,012.56				
	(169.531)				
50-54-Primary completed-Administrative Activities	-2,560.27		-1,800.07	1,645.71	10,719.06
	(149.445)		(326.404)	(852.922)	(432.063)
50-54-Secondary completed-Operators of Machinery	-3,444.88			111.79	-3,709.95
	(285.469)			(1,096.200)	(474.019)
50-54-University completed-Administrative Activities	-3,430.77		-1,293.75		-1,182.34
	(124.475)		(496.733)		(348.459)
55-60-Primary completed-Officers and Directors	683.17		-4,080.14	1,719.39	-2,441.28
	(285.469)		(427.232)	(890.751)	(696.831)
55-60-Secondary completed-Transformation & Maintenance Activities	-1,239.98		-6,222.77	-228.90	-5,849.92
	(350.693)		(364.009)	(1,236.681)	(672.641)
55-60-Secondary completed-Administrative Activities Assistants	-4,515.06				
	(498.101)				
55-60-Secondary completed-Street Vendors	-5,819.82		-4,184.82	-1,373.38	-4,096.16
	(261.366)		(573.090)	(855.116)	(355.216)
55-60-University completed-Technicians	-4,757.64			479.09	
	(395.197)			(1,359.107)	
30-34-University completed-Domestic Services			-4,045.14		
			(852.887)		
30-34-University completed-Other Workers			-1,415.80		
			(909.485)		
45-49-Less than primary completed-Administrative Activities			505.64		
			(557.333)		
45-49-University completed-Personal Services			-3,842.88	4,577.93	
			(879.617)	(1,685.312)	
50-54-Less than primary completed-Education			-5,393.52	-228.90	
			(852.887)	(1,038.421)	
50-54-Primary completed-Security and Armed forces			-4,045.14	904.94	-2,473.63
			(393.758)	(1,261.667)	(1,012.461)
50-54-Secondary completed-Administrative Activities			-674.19	1,943.09	-3,276.47
			(340.244)	(829.203)	(927.210)
55-60-Less than primary completed-Chiefs, Supervisors & Control workers			566.32		-4,114.04
			(695.906)		(411.123)
55-60-Primary completed-Agriculture			-5,002.49		
			(943.135)		
55-60-Primary completed-Operators of Machinery			2,180.37		
			(584.732)		
55-60-Secondary completed-Domestic Services			-5,582.29		
			(643.755)		
30-34-University completed-Artisanal and Industrial Fabrication				1,437.26	
				(1,402.264)	
35-39-University completed-Agriculture				1,437.26	
				(1,214.396)	
45-49-Less than primary completed-Education				1,471.53	-4,465.03
				(856.164)	(591.957)
45-49-Secondary completed-Security and Armed forces				-1,064.64	
				(847.807)	
50-54-Less than primary completed-Security and Armed forces				-692.01	
				(1,194.388)	
50-54-University completed-Administrative Activities Assistants				904.94	-3,471.76
				(1,004.860)	(644.985)
55-60-University completed-Officers and Directors				22,648.27	19,962.62
				(849.113)	(400.154)
55-60-University completed-Shopkeepers & Sales Agents				-915.59	
				(1,214.396)	
35-39-University completed-Operators of Machinery					-4,396.12
					(811.426)
40-44-Less than primary completed-Drivers and Drivers assistants					-3,276.47
					(952.863)
40-44-University completed-Street Vendors					-3,988.67

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Table 1.B.2 Mothers' Earnings Equation (levels) – continued from previous page

Coefficients	*1987*	*1988*	*1989*	*1990*	*1991*
					(407.023)
45-49-University completed-Art, Shows & Sports					-1,735.88
					(862.535)
50-54-Secondary completed-Professionals					433.97
					(406.462)
55-60-Primary completed-Administrative Activities					-1,459.72
					(621.442)
55-60-Secondary completed-Administrative Activities					2,603.82
					(644.985)
Constant	6,247.81	9,708.97	6,741.90	2,288.97	6,075.58
	(82.490)	(525.523)	(281.188)	(809.598)	(296.721)
Observations	15,223	16,742	16,639	16,931	17,462

Source: ENEU 1987-1991.
Note: Standard errors in parentheses. The reference group is 30-34-Less than primary completed-Professionals.

Table 1.B.3: Log Earnings Equation (First Stage) R^2

	1987	*1988*	*1989*	*1990*	*1991*
Fathers	0.275	0.314	0.323	0.358	0.356
Mothers	0.339	0.321	0.340	0.348	0.360

Note: For comparative purposes the R^2 reported here is from the log specification, despite the coefficients used to predict the father's and mother's earnings are in level.

1.C Robustness of intergenerational earnings mobility estimates

1.C.1 Attenuation bias - National

Table 1.C.1: Intergenerational Elasticity and Rank-Rank Coefficient by Number of Years Used to Measure Father's Earnings

	Years Used to Compute Mean Father's Earnings				
	1991	*1990-1991*	*1989-1991*	*1987-1991*	*1987-1991*
$\hat{\beta}$	0.636	0.584	0.653	0.668	0.709
	(0.137)	(0.101)	(0.179)	(0.127)	(0.130)
Rank-rank Coefficient	0.299	0.305	0.310	0.304	0.316
	(0.056)	(0.059)	(0.034)	(0.064)	(0.048)
N	2,364	2,369	2,370	2,371	2,371

Note: Standard errors in parentheses have been obtained using bootstrap sampling.

1.C.2 Attenuation and life-cycle biases - Urban area

Table 1.C.2: Consistency of the Estimations of Intergenerational Elasticity of Earnings and Rank-Rank Coefficient - Urban Area

	Father	*Parents*
Panel A:		
Parents' earnings 1987-1991 - Son's age 25-50		
$\hat{\beta}$	0.661	0.602
	(0.136)	(0.110)
Rank-rank Coefficient	0.291	0.271
	(0.052)	(0.049)
SD Son earnings	0.693	0.689
SD Father/Parents earnings	0.343	0.405
N	1,844	1,904
Panel B:		
Parents' earnings 1991 - Son's age 25-50		
$\hat{\beta}$	0.570	0.514
	(0.131)	(0.111)
Rank-rank Coefficient	0.265	0.238
	(0.054)	(0.052)
SD Son earnings	0.693	0.689
SD Father/Parents earnings	0.348	0.406
N	1,838	1,898
Panel C:		
Parents' earnings 1987-1991 - Son's age 35-45		
$\hat{\beta}$	0.408	0.374
	(0.207)	(0.169)
Rank-rank Coefficient	0.220	0.231
	(0.084)	(0.081)
SD Son earnings	0.619	0.616
SD Father/Parents earnings	0.325	0.365
N	539	553

Note: Standard errors in parentheses have been obtained using bootstrap sampling. Parents' average earnings for the period 1987-1991.

1.D Economic inequality in Mexico

Table 1.D.1: Poverty Measure by Federate State

Federative States	*Region*	*Gini Coefficient*	
		1990	*2014*
Baja California	North	0.476	0.434
Chihuahua	North	0.509	0.458
Coahuila	North	0.510	0.503
Nuevo León	North	0.499	0.453
Sonora	North	0.497	0.476
Tamaulipas	North	0.522	0.478
Aguascalientes	North-Centre	0.488	0.486
Baja California Sur	North-Centre	0.458	0.454
Colima	North-Centre	0.500	0.457
Durango	North-Centre	0.486	0.446
Jalisco	North-Centre	0.560	0.468
Michoacán	North-Centre	0.543	0.452
Nayarit	North-Centre	0.501	0.471
San Luis Potosí	North-Centre	0.551	0.477
Sinaloa	North-Centre	0.515	0.486
Zacatecas	North-Centre	0.492	0.507
Ciudad de México	Centre	0.536	0.507
Guanajuato	Centre	0.519	0.449
Hidalgo	Centre	0.528	0.504
México	Centre	0.520	0.461
Morelos	Centre	0.532	0.467
Puebla	Centre	0.563	0.572
Querétaro	Centre	0.583	0.488
Tlaxcala	Centre	0.485	0.411
Campeche	South	0.504	0.500
Chiapas	South	0.543	0.517
Guerrero	South	0.542	0.489
Oaxaca	South	0.517	0.513
Quintana Roo	South	0.538	0.494
Tabasco	South	0.540	0.456
Veracruz	South	0.538	0.490
Yucatán	South	0.526	0.511

Source: Calculated by the National Council for the Evaluation of Social Development Policy (CONEVAL) from the INEGI. *Note:* The Gini coefficient has been sorted by year; the Lowest levels of economic inequity appear in blue and highest levels in red.

Chapter 2

Intergenerational Mobility and Assortative Mating in Mexico

2.1 Introduction

Identifying the factors that perpetuate disparities has become a topic of significant concern in the context of growing inequalities. Researchers have studied how family background influences offspring's success (i.e. education attainment, occupation, earnings and income) to comprehend how inequalities evolve over generations. However, these studies have been mainly focused on the association of earnings between fathers and sons, abstracting from the analysis of daughters.

Unfortunately, research on social mobility to date has tended to focus on males, to the exclusion of females. This is mostly due to the lack of availability of data on earnings for females, given the historical low rates of labour force participation. By integrating mobility and marital sorting I contribute to tackle this largely overlooked issue by the literature to date. Specifically, I expand this literature by providing evidence of how marital status and marital sorting affect advantages and disadvantages passed from one generation to the next, in a country with a strong traditional culture regarding family dynamics, high gender earnings gaps and low rates of female labour force participation.

During the last decade, some studies have considered the role of partnership formation in determining offspring's economic and social status. One of their main

conclusions is that sorting in the marriage market (individuals of the same or similar characteristics marrying each other) is an essential factor driving inequality besides human capital and income. For instance, if individuals choose partners with similar socio-economic characteristics to their parents, then the offspring's household income may be more strongly associated with parental income than individual earnings. In this way, marital sorting contributes to intergenerational persistence of income across households between generations (Breen and Salazar, 2011; Chiappori et al., 2020), and across generations (Blanden, 2005a,b; Chadwick and Solon, 2002; Choi et al., 2020; Ermisch et al., 2006), increasing inequality. Hence, how inequalities evolve over generations depends significantly on who marries whom.

In the case of developing countries, the limitations of these kinds of analyses are enhanced by low female labour participation and the exclusion of women in many mobility surveys (Torche, 2015b). Therefore, little research exists on the empirical association between assortative mating and intergenerational mobility. In this study, by using a data set that overcomes some of these limitations, I build a picture of the relationship between assortative mating and intergenerational persistence of earnings for the case of Mexico for the first time.

First, I examine the implications of using family earnings rather than individual earnings to assess differences in intergenerational earnings mobility for daughters and sons, overcoming the limitations of previous studies regarding sample selection issues due to low female participation.[1] Then I analyse how assortative mating contributes to intergenerational earnings persistence. Finally, I measure the effect of women's labour supply decision on intergenerational mobility to understand the effect of selection into employment on intergenerational earnings mobility.

Using data from the ESRU Mexican Social Mobility Survey (EMOVI-2011), I present the intergenerational earnings mobility for daughters and sons by partnership status. I show the intergenerational elasticity of various measures of offspring earnings with respect to their own parents' earnings. In contrast to Torche (2015b), I focus on intergenerational elasticity of own earnings, partner earnings and com-

[1] Unlike Choi et al. (2020), I include in the intergenerational mobility sample all women who live in a household with positive family income regardless of whether they join the labour market.

bined earnings with respect to own parents' earnings, instead of on an index of economic wellbeing. I show that earnings persistence is stronger for both daughters and sons in Mexico, compared to other countries. The pattern persists regardless of the type of earnings I look at (individual or family earnings). However, intergenerational persistence is stronger among sons than daughters for family earnings, which implies that women experience higher levels of mobility. For individual earnings, the intergenerational persistence is not significantly different between daughters and sons.

By marital status, married daughters present higher intergenerational earnings mobility than married sons for both individual and combined earnings. The sex differences in economic mobility are bigger for combined earnings than individual earnings, indicating that assortative mating is more critical for daughters than sons. I also find that the intergenerational persistence of earnings is higher for single daughters and married sons than for their counterparts. This difference is driven mainly by a strong association between their parents' earnings and their educational attainment. The intergenerational earnings mobility of partners' earnings with respect to daughters' parental earnings is lower than that of parents and their daughters, leading to mobility in combined earnings for married daughters. In the case of daughters-in-law, the intergenerational elasticity of earnings is low and not statistically different from zero. The results for combined earnings demonstrate that earnings persistence from parents to daughters-in-law does not crucially contribute to intergenerational persistence of earnings.

To explore assortative mating explicitly, I examine how individuals match conditional on their educational level. On average, the correlation between the educational level of offspring and their partners is greater than 0.56, which suggests a substantial match in education. However, the correlation has fallen between the parent's and offspring's generations. I also find that, especially for daughters, assortative mating is vital in driving intergenerational persistence in family earnings. There is also a strong correlation between the education of partners and the education of their parents-in-law. However, the correlation between their earnings is

less intense. The intergenerational elasticity of earnings of daughters-in-law is low and not significantly different from zero. This could be attributable to the fact that labour supply decisions inside the household offset the effects of assortative mating. Hence, for Mexico, marriage could be seen as a robust mechanism for securing economic and social advantages for women.

Finally, I study how patterns in intergenerational mobility reflect women's labour supply decisions. I find that own parents' and parents-in-law's earnings are positively associated with labour supply for daughters and daughters-in-law. However, sample selection bias affects only the intergenerational earnings mobility results of married daughters and daughters-in-law. This implies that intra-family decisions regarding the division of labour play a crucial role in the decision of daughters' and daughters-in-law's labour supply, reinforcing gender roles.

Few studies have considered the role of partnership formation in determining the socioeconomic status of the grown-up child. For instance Chadwick and Solon (2002), motivated by the difficulty in measuring women's intergenerational mobility, explore family income mobility and assortative mating in the US. They show that the relationship between intergenerational mobility and assortative mating is particularly important for women, whose earnings are frequently a minor contribution to family income. Furthermore, they find that the relationship between daughters' husbands' earnings and parental income is as strong as the relationship between parental income and daughters' earnings, which means that assortative mating plays an important role in the intergenerational transmission process. In the same line, Blanden (2005a,b) considerate the relationship between intergenerational mobility and assortative mating for daughters and sons in two British cohorts and Canada, finding a strong association between the daughter's partner's earnings and her parental income.

Ermisch et al. (2006) use data from Britain and Germany to analyse assortative mating, based on the relationship between own and spouses' occupation and recalled parents' occupation at age 14 for both countries, and correlations in earnings for Germany. In all cases, partner-parent relationships are substantial but smaller

than the intergenerational relationships between parents and their children. They find that the person to whom one is married is responsible on average for about $40-50\%$ of the covariance between parents' and own permanent family income.

More recently, Choi et al. (2020) use a decomposition method to incorporate marriage entry and marital sorting into the intergenerational transmission of family income using data from the United States. The authors account for differences by sex over the life course and across birth cohorts, and consider education as a central explanatory factor. They find that marriage affects intergenerational transmission of family income for women older than 34 mostly because of the stratifying role of parental income in marital status and marital sorting. However, marital sorting becomes more important over cohorts.

In the developing world, very little is known about marital sorting and its association with socioeconomic inequality.[2] Daham and Gaviria (2001), based on comparisons across 16 Latin American Countries, and Fernandez et al. (2005) which compares 34 countries using the Luxembourg Income Study (LIS) data, find an association between educational assortative mating and economic inequality. Meanwhile, Torche (2010) using data from Brazil, Chile, and Mexico provides a systematic comparison of the location and strength of barriers to intermarriage and evaluates the association between intermarriage barriers and economic distances across educational groups within each country. She suggests that consideration of the time pattern of inequality and marital sorting could enlighten changes in the univariate distribution over time or across countries and the association between them.

The analysis of the relationship between assortative mating and intergenerational inequality in the developing world is practically nonexistent. Chapter 1 and other studies have analysed intergenerational persistence (e.g. Delajara and Graña, 2017; Hoyos et al., 2010; OECD, 2018), but none have focused on the association between assortative mating and intergenerational inequality. Torche (2015b) studies intergenerational socioeconomic mobility in Mexico comparing men and

[2]Silva (2003) (Brazil), Esteve (2004); Esteve and McCaa (2007); Solís et al. (2007) (Mexico) and Pullum and Peri (1999) (Montevideo-Uruguay) studied educational marital sorting; however, none of them considered the potential association between socioeconomic inequality and assortative mating.

women. She uses data from EMOVI-2011 to construct an economic well-being index to measure family living standards. In general, her results are in line with the result in this paper; however, the analysis of the mechanisms that drive the results is different. She finds a stronger persistence for men than women and argues that the high persistence of men is not mediated by education. Although the paper does not look specifically into marital sorting, she argues that parents are more likely to transfer resources to their married sons than married daughters.

In contrast to the existing literature, I study intergenerational transmission of earnings for married daughters and sons at individual and family levels, differentiating between those who have positive earnings and those whose partners have positive earnings. This allows me to include employed and unemployed offspring and identify differences in intra-family decisions and family income composition. In addition, this study also intends to give light and contribute to the scarce literature on income/earnings mobility for daughters and sons in developed countries.

In the next section, I present the empirical model. Data sources, samples, and variables used in the empirical analysis are described in section 3. Results are presented and discussed in section 4, and conclusions are presented in section 5.

2.2 The empirical model

Marriage plays a crucial role in the intergenerational transmission of advantages and disadvantages to the extent that it provides an economic benefit. Unlike unmarried individuals, married people gain by pooling the couple's earnings. However, the gain in the family income differs among individuals as their spouse's earnings might differ.[3] Therefore, it is essential not only to determine if an adult offspring is in a marital union but, if so, to identify to whom the offspring is married (Choi et al., 2020).

[3]This differences also vary over the life-course depending on intra-family decisions about division of labour and the evolution of earnings.

2.2.1 Assortative mating

Following Becker (1973, 1974), all potential marriages have an output Z, which includes the earnings of both partners, the gains from the division of labour within marriage, and the utility of rearing children, companionship and love within the family. In a utility maximising framework with no frictions, Pareto efficiency implies that all men and women will sort themselves into partnerships which maximise total output, i.e., output is maximised either if 'likes' are matched when male and female traits (A_h and A_w) are complements in producing Z:

$$\frac{\partial^2 Z(A_h, A_w)}{\partial A_h \partial A_w} > 0$$

or if 'Unlikes' are matched when male and female traits are substitutes in producing Z:

$$\frac{\partial^2 Z(A_h, A_w)}{\partial A_h \partial A_w} < 0$$

Hence characteristics like education, family background and ability; complements in producing high-quality children, will determine positive assortative mating, whilst negative assortative mating will be associated with the gap between women's and men's wages, as these are substitutes in the production of market goods. The negative correlation between wages maximises total output because the gain from the division of labour is maximised.

To simplify the discussion above, I follow the models described in Ermisch et al. (2006) and Blanden (2005b), where assortative mating occurs based on human capital. The matching function links the child's (H_t) and potential partner's (H_t^p) human capital and is specified as:

$$H_t^p = \lambda + \alpha H_t + v_t^p \tag{2.1}$$

The error term v_t^p reflects the combined effects of factors orthogonal to the partner's human capital but relevant for mate selection, such as attractiveness and tastes. The parameter α captures how highly skilled individuals tend to match other highly

skilled individuals.

Individual permanent incomes are positively related to human capital and could differ across partners:

$$y_t = \tau + \gamma H_t + e_t \tag{2.2}$$

$$y_t^p = \tau^p + \gamma^p H_t^p + e_t^p \tag{2.3}$$

The intergenerational relationship is driven by a model of human capital investments in children, where besides their own consumption (C_{t-1}), parents are assumed to care about the expected child's household income ($E(y_t + y_t^p)$), so that their child's partner's income is also included. The coefficient π measures parents' relative preference for their child's future income. The child's parents' utility function is defined as:

$$U = (1-\pi)\ln C_{t-1} + \pi \ln E(y_t + y_t^p)) \tag{2.4}$$

Parents maximise their utility subject to (2.1)-(2.3) and their budget constraint, where each unit of human capital has a price of P_H.[4] The solution to this problem provides equation (2.5) where $\beta = \frac{\pi\gamma}{P_H}$ is the intergenerational elasticity of the child's income with respect to parental income, which is positively related to the altruism of parents and the child's returns to education but negatively related to the cost of investment,

$$\ln y_t = \omega + \beta \ln y_{t-1} + \varepsilon_t \tag{2.5}$$

and equation (2.6), where the relationship between the partner's income and the child's parental income, measured by $\delta = \frac{\alpha\pi\gamma^p}{P_H}$, is determined by the partner's returns to education and the degree of assortative mating, in addition to the preference for child's future and the cost of investment.

[4] In this model debt and bequest are not allowed, parents must spend all their available income on their own consumption and their children's education.

$$\ln y_t^p = \omega^p + \delta \ln y_{t-1} + \varepsilon_t^p \tag{2.6}$$

Analysing β and δ together enables us to understand the expected relationship between these two parameters. If the model is specified in terms of the child's parental income, the relationship is symmetric for daughters (d) and sons (s):

$$\frac{\delta^d}{\beta^d} = \frac{\alpha^d \gamma^{dp}}{\gamma^d} \tag{2.7}$$

$$\frac{\delta^s}{\beta^s} = \frac{\alpha^s \gamma^{sp}}{\gamma^s} \tag{2.8}$$

There is a strong relationship between β and δ. The similarity between these parameters is related to the extent of assortative mating and human capital returns. If the income returns to human capital are the same for children and their partners ($\gamma^{dp} = \gamma^d$ or $\gamma^{sp} = \gamma^s$), the ration $\frac{\delta}{\beta}$ is defined by the degree of marital sorting on human capital α.

On the other hand, under the assumption of permanent incomes, the female labour supply will influence the return to human capital throughout women's life cycle. If female participation increases due to increased returns to education of women (γ^d and γ^{sp}), the permanent income of women will rise, making daughters and daughters-in-law's intergenerational persistence stronger relative to their partners. This relationship illustrates how female labour supply decisions could affect earnings' intergenerational persistence regarding their own earnings and household incomes. However, it is essential to consider that it is difficult to observe the implications of labour supply decisions over a lifetime in real life since, in most cases, children's income is observed only at one point in time.

To understand the link between assortative mating and intergenerational mobility of family incomes, the model also considers the link between parents' income and their child's family income ($y_t + y_t^p$), which in this case is measured by the

elasticity μ in equation (2.9):[5]

$$\ln(y_t + y_t^p) = \omega^{+p} + \mu \ln y_{t-1} + \varepsilon_t^{+p} \tag{2.9}$$

Considering that education, as a proxy of human capital, plays an essential role in explaning the association between child's partner's earnings and child's parental earnings, an alternative to measure the extent of assortative mating is through the association between human capital and parental income (Blanden, 2005a; Choi et al., 2020). This link captures parent's investment in their children's education. In other words, parents produce human and cultural capital for their children that is valuable in the labour market and in the marriage market. Therefore,

$$H_t = \theta + \psi \ln y_{t-1} + \xi_t \tag{2.10}$$

$$H_t^p = \theta^p + \vartheta \ln y_{t-1} + \xi_t^p \tag{2.11}$$

where $\psi = \frac{\pi}{P_H}$ and $\vartheta = \alpha \frac{\pi}{P_H}$. The ratio $\frac{\vartheta}{\psi}$ will determine the extent of assortative mating, which will be strong if the relationship between parental income and human capital is similar for the children and their partner.

2.2.2 The selection problem and the role of female labour participation

The empirical work is focused on estimating three different elasticities with respect to own parental earnings[6] to assess the degree of intergenerational mobility and assortative mating: *i*) own earnings (β), *ii*) partner earnings (δ) and *iii*) combined family earnings (μ) for both sons and daughters. These elasticities are estimated

[5]Household income mobility will be the share-weighted average of the elasticity of the child's earnings with respect to parental income and the elasticity of the partner's income with respect to parental income (Chadwick and Solon, 2002). However, this paper does not present this precise relationship because β, δ, and μ can not be estimated on the same sample of couples. Nevertheless, it is essential to notice that changes in the shares of income will affect the relative importance of β and δ on μ, which means that, in the particular case of women, not only the intergenerational elasticities of individual income but also the elasticity of the household's income, might implicitly be affected by the women labour supply decision.

[6]The reference measure of permanent children's income and parents' income will be children's earnings and parental earnings.

from empirical specifications directly related to equations (2.5), (2.6) and (2.9) using earnings for children aged 25 to 50 and the earnings of parents when the child was 14. To account for potential life-cycle bias from measuring offspring's earnings at different ages, the quadratic in the father's age at the time the child is 14 years old, the quadratic in the child's normalised age (age-40) at the time earnings are observed, and the interactions of the quadratic in the child's normalised age with parents'earnings, are included as controls (Lee and Solon, 2009).

There are two issues regarding the estimation of intergenerational persistence. First, the OLS estimates of β, δ and μ are biased because of measurement errors inherent to the methodology. As in many studies of intergenerational mobility, the bias will be reduced by measuring permanent parental earnings using a multiyear average of parental earnings and evaluating child earnings around the "prime earning years" to account for the life cycle.

Since Mexico does not have surveys with information on both children's and their parents' earnings/incomes, I will use the Two Sample Two Stage Least Square (TSTSLS) methodology to estimate the intergenerational persistence of earnings (Angrist and Krueger, 1992; Inoue and Solon, 2010). In addition to the intergenerational elasticity, following the specification in equation (2.12), I will report the rank-rank coefficient (ρ) for each earnings relationship of interest. This measure provides a more robust estimator of intergenerational persistence, which is less sensitive to measurement issues than the intergenerational elasticity; this measure also allows me to account for changes in the earnings distribution within generations (Chetty et al., 2014b).

$$Rank_{wi} = c + \rho Rank_{wi}^{y_{parents}} + e_{wi} \tag{2.12}$$

Second, the estimation of the intergenerational parameters are also subject to selection bias, due to the fact that low female participation in the labour market generates additional difficulties in estimating intergenerational parameters when the independent variable is women's earnings. Following the classical analysis of Heckman (1979), I will use a two-equation model summarised by equations (2.13) and

(2.14). The first is an earnings equation for all women (y_t^w) with parental earnings as the explanatory variable. The second equation is a latent variable relationship governing the decision to participate.

$$\ln y_t^w = \omega^w + \beta^w \ln y_{t-1} + \varepsilon_t^w \tag{2.13}$$

$$z_t = \eta + \Phi Q_t + u_t \tag{2.14}$$

The participation decision is summarised by the latent variable z_t, which takes a value of 1 if the woman participates in the labour market. It depends on a set of identifying variables embedded in the vector Q_t, which includes the household size, the number of dependent children by age group, education, marital status and region of residence, among others. Initially, I assume that the OLS estimate of β^w in equation (2.13) will be biased because of the presence of an additional error term, similar to an omitted variable bias, due to the use of a non-randomly selected sample. This implies that β^d and δ^{sp} will be upward biased if, for instance, those with higher earnings are more likely to work and if parental earnings are positively correlated with daughters and daughters-in-law earnings.

From the system of equations (2.13) and (2.14), it is possible to infer that

$$E(\ln y_t^w | u_t > -\eta - \Phi Q_t) = \omega^w + \beta^w \ln y_{t-1} + E(\varepsilon_t^w | u_t > -\eta - \Phi Q_t) \tag{2.15}$$

and the correction to the sample selection problem implies that for the sample of the participating women, equation (2.13) can be rewritten as

$$\ln y_t^w = \omega^w + \beta^w \ln y_{t-1} + \frac{\sigma_{u\varepsilon}}{\sigma_u}\lambda_t + \zeta_t \tag{2.16}$$

where $\lambda_t = \frac{f(v_t)}{F(v_t)}$ and $v_t = -\eta - \Phi Q_t$. The bias will be more significant the strongest is the correlation between the unobserved determinants of female earnings and the labour supply decision. The inverse of the Mill's ratio (λ_t)[7], reveals that the selec-

[7]It is a monotone decreasing function of the probability that an observation is selected into the sample.

tion bias will be more substantial when female participation is low.

Due to the low level of female labour participation in Mexico (40.6% in 2011 (ILO, 2019)), it is possible to argue the existence of selection bias for daughters and daughters-in-law. Therefore it is essential to attempt to model the influence of endogenous selection. This study will account for the sample selection issue using the semiparametric two-steps procedure, which is based on exclusion restrictions, i.e. variables that affect female participation but not earnings, like children under 16 in the household, household income and partners income. For women, all regressions will include a polynomial of the single index function that determines the selection into employment (Blanden, 2005a; Ermisch et al., 2006). However, it is crucial to consider that the degree of identification is often weak and could affect the estimates of β and δ for women (Vella, 1998).

This research will present both uncorrected regression estimators for the sample of employed individuals and estimators corrected for selection. The uncorrected results will show how parental earnings are related to the earnings of daughters and daughters-in-law with the current employment pattern. Meanwhile, the corrected estimators allow separating the effect of changes in the selection into employment from family decisions in the household labour supply.

2.3 Data

I use data from the 2011 ESRU Mexican Social Mobility Survey (EMOVI-2011), undertaken by Centro de Estudios Espinosa Yglesias. The EMOVI-2011 survey is based on a probabilistic, multistage and stratified sample design of $11,001$ men and women aged 25-64 years, which is statistically representative of the country's population. The survey collects information on respondents' demographic characteristics, education, employment and occupation, income and assets. It also includes retrospective information about family structure, education, occupation and assets of the respondent's parents. For those respondents who are married or are living with a partner, the survey collects additional information about their partner's education, employment status, occupation and the length of the relationship.

The data for this study includes sons and daughters aged 25 to 50 (born between 1961 and 1986),[8] with employed, self-employed or unemployed status,[9] who reported positive household income and, conditional on they being 14 years old, retrospectively, reported the age, education and occupation of their parents.

For those who are married or cohabiting, I keep those who reported their partner's sex, age, education and occupation.[10] As the information on the partner's earnings is not available directly, I estimate this using the total household income, the number of members who contribute monetarily to the household, cash transfers received by the household (i.e. from public or private institutions, other people outside the household or rents) and the partner's occupational status (For more details on this measure, see Appendix 2.A.). This measure ensures that the reported total household income is not exceeded and considers the contributions of all household members.

The education variables available for partners are the higher level of attained education and years of education. The information about the partner was obtained as part of the main interview, so partners were not necessarily involved in answering questions about themselves. Additionally, it is not possible to know whether the interviewer's partner was present while the interview was conducted, which could lead to a bias regarding partners information (Blanden, 2005a).

The survey does not report parents' earnings or income, which makes it necessary to predict it using retrospective information provided by the offspring together with data from the National Survey of Urban Employment (ENEU). The different measures of intergenerational persistence will be estimated using the Two Sample Two Stage Least Squared (TSTSLS) method as in Chapter 1. Following the literature, I use the average parental earnings over five years (1987-1991) to reduce the error-in-variable issue from the noisy measurement of the permanent parental earnings. Parental earnings are computed as the sum of the father's and mother's

[8] In contrast to previous literature, I include individuals between 25 and 29 years old to keep a more significant sample. This group represents 14.1% of the main sample, with similar proportions for men and women.

[9] In 2011, 40.6% of women and 74.4% of men in working age were employed in Mexico (ILO, 2019).

[10] I drop a few same-sex couples in the sample.

earnings. All the earnings are adjusted to PPP 2011 prices, reported on Pounds Sterling for each observation, and its log is taken as the measure of earnings at each point. In order to measure intergenerational earnings mobility, I exclude individuals with zero earnings from individuals earnings regressions but not from the combined earnings analysis.

2.3.1 Descriptive statistics

The final sample includes 4,286 observations, which represent 36% of women and 41% of men of the total sample of EMOVI-2011 (See Table 2.A.3). Table 2.3.1 provides descriptive statistics of the main variables used from the samples by sex and partnership status. For married and cohabiting individuals (from now on I refer to this group as married), I also list statistics for their partners. The first feature to note is that 63.6% of daughters and 59.2% of sons have partners. Younger daughters (25-30 years old) present higher partnership rates than sons. However, after age 30 there seems to be a substantial shift in the trend (See Figure 2.3.1). On average, single daughters and sons are younger than those with a partner.

For daughters, there are few differences in years of schooling between those who are single and those who are married. Daughters without a partner are more likely to be employed[11] and on average earn more than married ones; 46.28% of them are head of the household. In the case of sons, the difference in years of schooling is minimal between those with and without a partner. Married sons are more likely to be employed and to have higher earnings; 84.57% of them are head of the household compared to 28.17% of those who are single. As daughters, married sons are more likely to have kids.

Fathers and mothers of single daughters and sons tend to be more educated and live in higher-income households.[12] However, there are differences in family earnings between offspring, with the earnings of the daughter's parents exceeding those of the sons. Regarding partners, on average, daughters have older partners than

[11] By definition, in the sample, all single offsprings have positive earnings, which means that all of them are employed. However, when I do not exclude those cases with zero or missing earnings, 71.95% of single daughters and 76.59% of single sons are employed.

[12] This could be explained by the fact that single offsprings, on average, are younger than married ones and have younger parents who had more access to education.

Table 2.3.1: Characteristic of Daughters and Sons Samples by Partnership Status

Variable	Daughters		Sons	
	Single	Married	Single	Married
Education (Years)				
Child	10.70	9.52	10.95	9.93
	(4.08)	(3.92)	(4.52)	(4.00)
Father	6.55	4.27	6.23	4.81
	(5.52)	(4.05)	(4.80)	(4.17)
Mother	5.84	3.99	5.57	4.32
	(4.53)	(3.80)	(4.17)	(3.81)
Partner		9.40		9.27
		(4.08)		(3.64)
Employed (%)				
Child	100.00	37.66	100.00	96.08
Father	97.49	96.27	97.51	98.02
Partner		85.13		15.63
Earnings/Incomes				
Child's Log earnings 2011	7.66	7.59	7.86	7.90
	(0.76)	(0.75)	(0.76)	(0.67)
Partner's Log earnings 2011		7.43		7.27
		(0.72)		(0.97)
Child's Log household earnings 2011*		7.70		7.93
		(0.71)		(0.71)
Parents' Log earnings **	8.34	8.18	8.32	8.15
	(0.51)	(0.37)	(0.45)	(0.37)
Head of the household (%)	46.28	16.88	28.17	84.57
Size of household	4.16	4.56	4.27	4.51
	(1.43)	(1.16)	(1.30)	(1.24)
Kids below 15 (%)ˆ	51.29	74.89	14.69	76.50
Age				
Child's age in 2011	35.10	37.60	33.01	37.61
	(7.08)	(6.90)	(6.88)	(6.78)
Father's age in 1991~	41.71	43.09	42.13	41.48
	(6.58)	(7.48)	(7.17)	(7.20)
Partner's age in 2011		40.15		35.07
		(8.04)		(7.50)
Observations	661	1,153	1,009	1,463

Source: EMOVI-2011.
Note: Standard deviations in parentheses. *Single* refers to those individuals who at the time of the survey were single, divorced or widowed, and *Married* refers to those who were married or cohabiting. * Household earnings refers to the earnings of the child and any partner. ** Father's and mother's earnings are predicted independently in the auxiliary dataset. However, parental resources are measured in the main dataset, as the sum of father's earnings and mother's earnings. The average is computed over all years from 1987 to 1991. ∧ These figure refers to offspring own kids. ∼ Father's age when the child was on average 14 years old.

sons. Daughters' partners tend to be as educated as daughters, whilst sons' partners are less educated. Son's partners are less likely to be employed, which seems to be related to the allocation of labour inside the household. Concerning offspring's earnings and partners' earnings, daughters and sons present similar patterns. On average, both of them earn more than their partners. In the particular case of daugh-

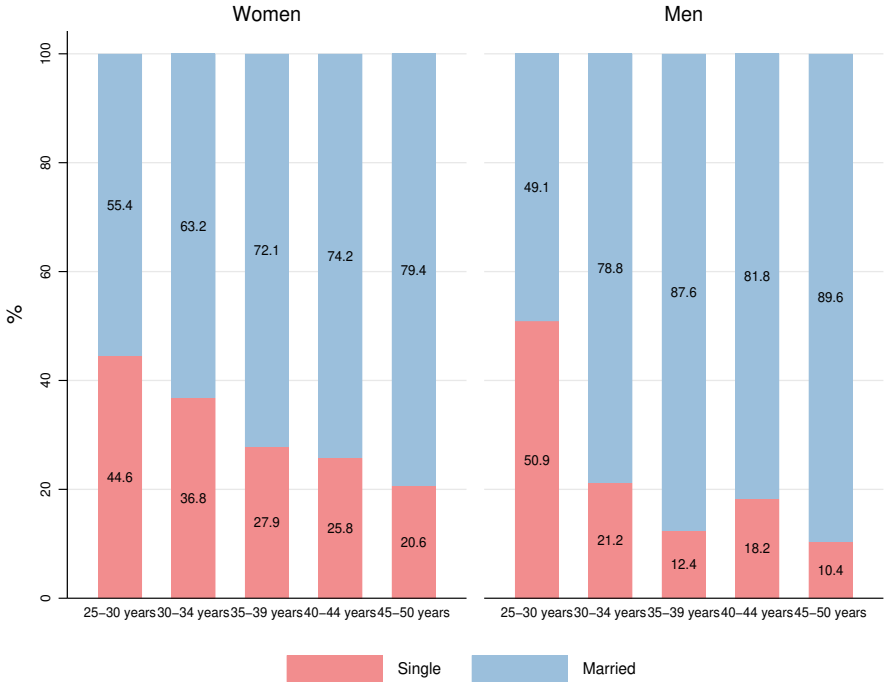

Figure 2.3.1: Marital Status by Sex and Age

Source: EMOVI-2011 and INEGI, author's calculations.
Note: This figure shows the proportion of single and married offsprings by sex and age range.

ters, this could be explained by the fact that the few joining the labour market have higher educational attainment than their partners.[13]

2.4 Results

2.4.1 Intergenerational earnings mobility

In this section, I present the intergenerational earnings mobility for daughters and sons in Mexico by partnership status. I show the intergenerational elasticity of various measures of offspring earnings with respect to own parents' earnings. I focus on intergenerational elasticity of own earnings, partner earnings and combined earnings with respect to own parents' earnings. The results regarding rank coefficients are presented in Appendix 2.C. In the particular case of married offspring, the elasticities are measured under two conditions; when their own earnings are positive and

[13] On average, 76,42% of daughters who are working have at least secondary completed compared to 70,96% of their partners.

when the partner's earnings are positive.[14] This differentiation allows me to study those daughters and daughters-in-law who join the labour market in more detail.

Table 2.4.1 shows that earnings persistence tends to be significantly strong for both daughters and sons in Mexico, and that the pattern persists regardless of the type of earnings (individual or combined earnings). In the case of own earnings, the intergenerational persistence ranges from 0.49 to 0.79 for daughters and from 0.59 to 0.64 for sons. By partnership status, the estimated intergenerational earnings elasticity is higher for single daughters, whilst in the case of sons the relationship goes in the opposite direction. These results suggest the existence of differences in the labour supply decision of daughters and sons by marital status, perhaps because the actual earnings of married daughters are less related to their capabilities than to the household distribution of labour or the difference in the association between social origins and education.

In the case of offspring with partners, married daughters present higher intergenerational earnings mobility than married sons for both individual and combined earnings (Column 3 Table 2.4.1). However, the pattern changes for the sample where individuals whose partner's earnings are positive are considered (Column 4 Table 2.4.1). The sex differences in economic mobility are more noticeable for the case of combined earnings, indicating that assortative mating is a more critical component of the intergenerational mobility of daughters. These results are in line with those presented in Torche (2015b) despite the metrics of the variables being different. The author finds that intergenerational persistence of economic well-being is stronger among Mexican men (0.66) than women (0.58). Among those who are married, men experience more substantial intergenerational persistence than women. The relationship is inverse for single individuals, as it is in this

[14] It is essential to notice the change in the sample size when these two conditions are considered (see Table 2.4.1). In the case of married daughters, 30.0% reported positive earnings, and 55.8% of them have a partner who has positive earnings (Column 3 - *Panel A*). Of the married daughters, 86.7% have a partner whose earnings are positive, and only 19.3% of them reported positive earnings (Column 4 -*Panel A*). On the other hand, of married sons, 95.1% reported positive earnings, but only 11.6% have a partner with positive earnings (Column 3 - *Panel B*). In the same line, of the total married sons, 15.9% have a partner with positive earnings and 69.1% of them have positive earnings (Column 4 - *Panel B*).

Table 2.4.1: Intergenerational Elasticity of Earnings Estimates

	All	*Single*	*Married*		
			Own earnings (positive)	*Partner's earnings (positive)*	*Combined earnings*
Panel A: Daughters					
0wn earnings wrt her parents' earnings (β^d)	0.635 (0.171)	0.794 (0.280)	**0.486 (0.255)**	0.538 (0.327)	
Partner's earnings wrt her parents' earnings (δ^d)			0.555 (0.192)	**0.368 (0.142)**	
Couple's combined earnings wrt her parents' earnings (μ^d)			0.596 (0.223)	0.422 (0.182)	**0.387 (0.170)**
Number of interviewees	1,007	661	346	193	1,153
Number of partners			193	1,000	1,000
Panel B: Sons					
0wn earnings wrt his parents' earnings (β^s)	0.653 (0.101)	0.595 (0.172)	**0.642 (0.126)**	0.415 (0.245)	
Partner's earnings wrt his parents' earnings (δ^s)			0.113 (0.320)	**0.072 (0.312)**	
Couple's combined earnings wrt his parents' earnings (μ^s)			0.687 (0.117)	0.318 (0.200)	**0.645 (0.117)**
Number of interviewees	2,400	1,009	1,391	161	1,463
Number of partners			161	233	233

Note: Standard errors in parenthesis have been obtained using bootstrap sampling. Regressions control for quadratic in the parents' age, the quadratic in the son's normalised age (age-40) at the time earnings are observed, and the interactions of the quadratic in the son's normalised age with parents' earnings. In *Own earnings (positive)* column, all the estimations are done using the sample of offspring with positive earnings only. In *Partner's earnings (positive)* column, all the estimations are done using the sample of offspring's partner with positive earnings only. In *Combined earnings* column, all the estimations are done using the sample of households with positive earnings regardless of who is the primary provider.

paper.[15]

The intergenerational persistence of partners' earnings with respect to daughters' parental earnings is positive and significant, which is evidence of strong assortative mating. However, the relationship between this elasticity and that of parents and their daughters varies depending on whether the sample is the one where the daughter's earnings are positive (0.56) or the one where the partner's earnings are positive (0.37). For the first sample, the elasticity between the daughter's parental earnings and her partner's earnings is the strongest, increasing intergenerational persistence in combined earnings. However, for the second sample, the most substan-

[15]Based on these results and on additional analysis, she concludes that parents may be more likely to make financial transfers or gifts to their sons than to their daughters when they marry.

tial elasticity is the one between the daughter's parental earnings and her own earnings, followed by the elasticities estimated using the couple's combined earnings and her husband's earnings. In the case of daughters-in-law, the intergenerational elasticity of earnings is low and not statistically different from zero. In fact, the results for combined earnings demonstrate that earnings persistence from parents to daughters-in-law does not crucially contribute to intergenerational persistence. This last result might be explained by the small proportion of son's partners with positive earnings. Nevertheless, it is important to notice that if the sample where the partner's earnings are positive is considered (Column 4 Table 2.4.1), the combined intergenerational persistence of earnings presents a considerable decrease.

Despite the fact that these results are not entirely comparable with those in the literature due to methodological reasons, the results presented in Blanden (2005a) for the 1958 cohort in the United Kingdom also show that assortative mating contributes only to the intergenerational mobility of daughters. In the same line, Choi et al. (2020) state that marriage affects intergenerational transmission of family income for women older than 34 mostly because of the stratifying role of parental income in marital status and marital sorting. In contrast, most of the literature argues that assortative mating is important for the intergenerational persistence of both daughters and sons, but comparatively more for daughters (Blanden, 2005a,b; Chadwick and Solon, 2002; Ermisch et al., 2006).

To understand the sex differences presented in Table 2.4.1, it is necessary to analyse the way in which own earnings elasticity (β) and partner's earnings elasticity (δ) are affected by the preference of parents regarding their child's future wellbeing (π), remuneration to human capital (γ) and the degree of marital sorting (α); and how these factors shape intergenerational persistence in combined earnings (μ) given the relative size of the two earnings.

2.4.2 Intergenerational transmission of human capital

Differences in earnings persistence between daughters and sons are tied to parents' preferences for a child's future wellbeing and human capital remuneration. Unfortunately, data on parents' altruism is not available in the dataset. However, both

factors are associated with family background. Becker (1973, 1974) emphasise complementarities in human capital production and show that, on average, wealthy parents invest relatively more in their offspring. Therefore, to analyse the intergenerational transmission of human capital, I examine the extent to which educational attainment depends on family background. This measure allows me to consider daughters and sons regardless of their earnings, given that educational attainment is measured for all the children and their partners in the sample. I look at the correlation between the years of schooling of offspring and parents (Table 2.4.2 panel A).

Table 2.4.2: Intergenerational Human Capital Transfers

	Daughters				**Sons**			
	All	*Single*	*Married*		*All*	*Single*	*Married*	
			Own	*Partner*			*Own*	*Partner*
Panel A: Intergenerational correlation in education attainment								
Own education vs. father's education	0.447 (0.040)	0.452 (0.047)	0.447 (0.064)	0.459 (0.053)	0.435 (0.049)	0.375 (0.092)	0.438 (0.057)	0.380 (0.044)
Own education vs. mother's education	0.466 (0.048)	0.532 (0.060)	0.419 (0.069)	0.421 (0.067)	0.438 (0.053)	0.359 (0.117)	0.452 (0.057)	0.373 (0.047)
Panel B: Parental earnings and years of schooling								
Own education wrt her/his parents' earnings	3.542 (0.455)	4.074 (0.627)	3.018 (0.653)	2.610 (0.650)	4.069 (0.478)	3.189 (0.744)	4.098 (0.621)	3.604 (0.568)
N of interviewees	1,814	661	1,153	1,153	2,472	1,009	1,463	1,463

Note: Standard errors in parenthesis. Each correlation results from a separate regression which controls for the parent's age, offspring's age and their square.

Daughters' years of schooling seem to be more strongly correlated with the educational attainment of their mothers than of their fathers, whilst for sons, the correlation does not evidence any difference between mother and father educational attainment. However, when controlling by marital status, there are significant differences between daughters and sons. Compared to married daughters and single sons, single daughters and married sons present stronger correlations with the educational attainment of their mothers and fathers. In addition, the former group

evidence a stronger correlation with the educational attainment of their fathers than of their mothers.

It turns out that the correlation between the educational attainment of the daughter's partner and that of his wife's parents is similar to that between his wife's educational attainment and her father's and mother's. Thus, in terms of overall opportunities, this similarity implies that the high earnings mobility of the daughter's partners presented in Table 2.4.1 must be driven by the rate of return of human capital, which can be affected by the labour supply decision or the gender wage gap in the Mexican labour market, among others. On the other hand, the correlation between the son's partner's educational attainment and that of his parents is lower than the one between her husband's educational attainment and his parents'. In other words, sons tend to get married to women whose educational attainment differs from that of their parents and their own level.

The sex and marital status differences could be better understood through the analysis of the origin and destination of the educational attainment structure presented in Table 2.4.3. The origin class structure of single, married daughters and sons is very similar. Approximately 34% of single and 47% of married offspring are from families where the highest educational attainment is less than primary complete, whilst around 3% of married offspring are from families where university completed is the highest level of education. In the case of single sons and daughters, these figures are 7% and 11%, respectively.

The destination class patterns show an increasing trend in educational attainment, which is reflected in the level of upward mobility in education for both daughters and sons. Married offspring present higher upward mobility than single ones. However, this measure is higher for sons (married 0.69 and single 0.62) than for daughters (married 0.64 and single 0.54), explained mainly by the fact that a higher proportion of sons from families with less than primary completed and secondary completed moved up to university completed compared to daughters with the same condition. In contrast, the level of downward mobility is higher for single daughters (0.11) compared to the married ones (0.04); and to single and married sons (0.07

and 0.04, respectively). The fact that more daughters from families where the highest educational attainment is less than primary completed remain in this educational level, could be related to factors such as adolescence pregnancy or care activities in the household.[16]

To see the effect of partners on the educational mobility of the household, I use the 'dominance method' to define the married offspring's educational level (highest educational attainment between the offspring and their partner (Erikson, 1984)) (Table 2.4.3 panel C). This measure shows evidence of a significant increment in the proportion of offspring with the highest educational attainment, increasing the upward mobility in education for married daughters and sons. There are two important points to consider here. First, the notable increase in the proportion of daughters with university completed (49.8%) and second, the significant reduction of daughters and sons with less than primary completed (44.5% and 71.6%, respectively). The climb into the educational ladder of married daughters helps to explain the difference of the intergenerational persistence of combined earnings between daughters and sons.

The distribution of parents' earnings varies more between unmarried and married daughters than among sons (See Table 2.3.1). For sons, the differences between married and unmarried regarding the mean and variance of parental earnings are minor. For daughters, these differences are more notable. However, both single sons and daughters tend, on average, to come from higher-earning families.

Panel B of Table 2.4.2 reports results from regressions of offspring years of schooling on the log of parental earnings. On average, a change of 100% in the parental earnings is associated with 3.54 additional years of schooling among daughters and 4.07 additional years among sons, contrasting with previous evidence where the association between parental resources and offspring educational attainment is stronger for daughters than sons (Torche, 2015b).

[16]In Mexico, in 2017, four out of 10 adolescents who got pregnant dropped out of school; those women are more likely to come from low socioeconomic backgrounds. In addition, adolescent pregnancy increases the inequality gap in employment between men and other women who were mothers at adult age.

Table 2.4.3: Origin and Destination Educational Attainment Structure (% of offsprings

Parents' education	***Daughter's education***					***Son's education***				
	Less than primary complete	Primary completed	Secondary completed	University completed	Total	Less than primary complete	Primary completed	Secondary completed	University completed	Total
Panel A: Single										
Less than primary complete	5.93	10.82	16.22	1.16	34.13	3.30	9.53	16.09	5.26	34.17
Primary completed	0.93	2.78	19.23	2.15	25.09	0.35	4.14	17.92	2.76	25.17
Secondary completed	0.57	1.82	22.28	4.62	29.29	2.84	1.50	19.54	9.96	33.84
University completed	0.00	0.07	7.41	4.00	11.49	0.00	0.00	2.42	4.40	6.82
Total	7.43	15.49	65.14	11.94	100	6.49	15.17	55.97	22.38	100
Panel B: Married										
Less than primary complete	7.95	13.90	24.80	0.73	47.39	6.40	14.11	22.19	3.93	46.63
Primary completed	0.28	7.58	17.46	4.01	29.34	0.45	5.93	19.10	3.09	28.58
Secondary completed	0.14	2.41	14.40	3.13	20.12	0.80	1.02	13.78	6.55	22.15
University completed	0.00	0.00	1.22	1.96	3.21	0.00	0.00	1.39	1.26	2.64
Total	8.38	23.90	57.89	9.83	100	7.65	21.07	56.45	14.83	100
Panel C: Married (Offspring and partner educational attainment)										
Less than primary complete	4.44	10.80	29.50	2.65	47.39	1.97	12.83	27.19	4.64	46.63
Primary completed	0.17	3.21	20.61	5.36	29.34	0.20	3.68	21.32	3.38	28.58
Secondary completed	0.05	0.58	14.83	4.63	20.08	0.00	0.31	14.40	7.44	22.15
University completed	0.00	0.00	1.09	2.09	3.18	0.00	0.00	1.32	1.33	2.64
Total	4.65	14.59	66.02	14.73	100	2.17	16.82	64.21	16.79	100

Source: EMOVI-2011, author's calculations.
Note: This table llustrates a transition matrix, showing the parents' (origin) education across the horizontal rows and the offspring's (destination) education in the vertical columns. Each cell therefore represents the percentage of people with that specific origin and destination educational attainment. Unweighted sample for daughters: single= 661 and married=1,153; and sons: single=1,009 and married=1,463.

Daughters and sons present different patterns. The relative importance of parental earnings for educational attainment is greater for single daughters and married sons, which indicates lower educational mobility, in terms of years of schooling, for these groups of offspring. Therefore, the high persistence of intergenerational earnings among single daughters and married sons seems to stem from an exceptionally high impact of family economic resources on the offspring's years of education.

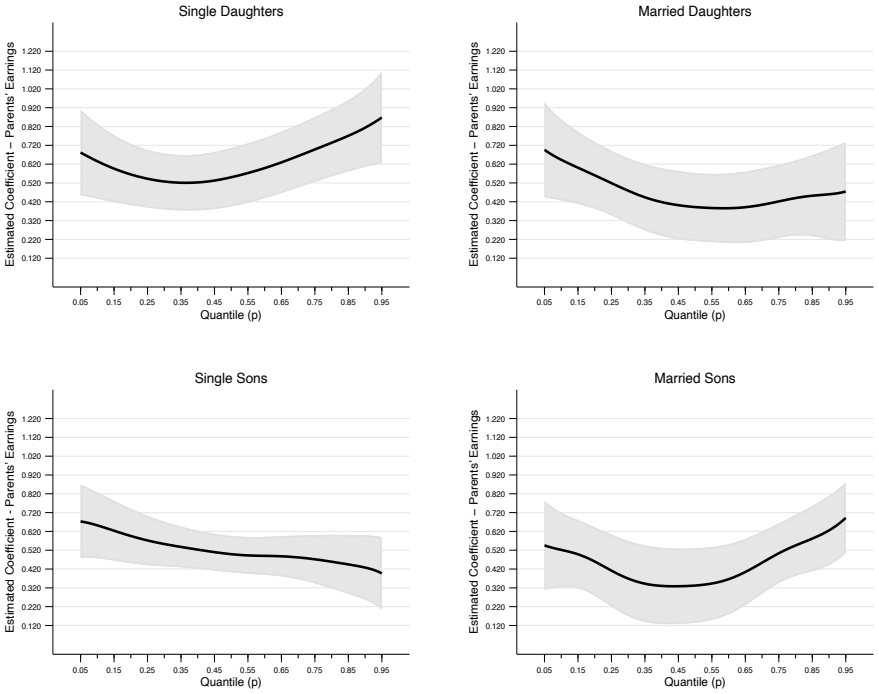

Figure 2.4.1: Parental's Earnings Effect by Quantile of Years of School

Note: This figure presents the estimates and 95% confidence bands for the regression coefficient of parental's earnings for quantiles of years of school. Regressions control for parent's age, offspring's age and their square. I use the logistic quantile regression to model the quantiles of school years, a variable that takes on values between a bounded interval, 0 to 21 years of school (Orsini and Bottai, 211).

As Figure 2.4.1 shows, the relationship between years of schooling and log parental earnings is not perfectly linear. For single daughters and married sons, the estimated effects are minor at lower levels of education and more prominent at higher levels. In contrast, for married daughters and single sons the pattern reverses. Hence, the results indicate that high educational attainment affects the intergener-

ational persistence of earnings for single daughters and married sons compared to married daughters and single sons. The relationship between partner's years of education and parents-in-law earnings is lower than that of their couples with their parents' earnings, specially for daughters' partners. This pattern is similar to the one presented in the observed earnings (Table 2.4.1).

2.4.3 Marital sorting

In this section, I examine marital sorting associated with similarities in educational attainment within couples (equation (2.1)). Table 2.4.4 reports correlation coefficients of years of schooling between the two partners for both parents and offspring generations. Significant marital sorting is prevalent in both generations. The correlations vary between 0.73 and 0.93 for parents and between 0.56 and 0.72 for offspring. A general finding is that educational attainment is more strongly correlated between couples than between parents and offspring (Table 2.4.2 Panel A), which is explained by the upward mobility in education experienced by offspring. Parents' generation presents a substantial higher degree of assortative mating compared to offspring generation; especially single daughters and married sons. In addition, daughters evidence a higher degree of assortative mating than sons.

Table 2.4.4: Marital Sorting - Correlation in Educational Attainment

	Daughters			**Sons**		
	All	*Single*	*Married*	*All*	*Single*	*Married*
Father's education vs. mother's education	0.831 (0.063)	0.932 (0.093)	0.733 (0.065)	0.891 (0.032)	0.850 (0.046)	0.889 (0.040)
Own education vs. partner's education			0.721 (0.048)			0.561 (0.066)
N of interviewees	1,814	661	1,153	2,472	1,009	1,463

Note: Standard errors in parentesis. Regressions control for parent's age, offspring's age and their square.

The proportion of individuals marrying someone in the same educational group (educational homogamy) decreased between generations. For daughters' parents, the level of educational homogamy is 69.08% and 75.83% for single and married

daughters, whereas for sons' parents these figures are 73.15% and 80.18% for single and married sons. For the offspring generation, there is no significant difference between daughters' and sons' educational homogamy. However, the distribution of educational attainment differs between married daughters, sons, and their partners (See Appendix 2.B). For instance, daughters tend to marry partners with less than primary complete (12.37%) and university complete (12.27%) in higher proportions than sons (7.47% and 8.86%, respectively).

An alternative measure of the degree of assortative mating is the estimate of the relationship between parental income and educational attainment for the offspring and their partners. If this relationship is similar for the offspring and their partner, then the degree of assortative mating is substantial (ratio between ϑ and ψ from equation 2.10 and 2.11.). As I explained in the previous subsection, Table 2.4.2-*Panel B* shows the relationship between years of schooling and parents'/parent's-in-law earnings. Sons and daughters-in-law evidence a slightly more robust relationship between parental earnings and educational attainment (0.88) than daughters and sons-in-law (0.86). These results and the evidence on educational homogamy indicate intense assortative mating for both daughters and sons, even though the degree of assortative mating has decreased across generations.

One of the aims of this chapter is to explore the role of assortative mating in the intergenerational mobility of married daughters and sons. As I previously mentioned, the results for family mobility evidence that the low persistence of earnings from parents to partners does contribute to reducing intergenerational persistence, especially in the case of daughters (See Table 2.4.1). These results could be explained by the fact that daughters' partners are on average more educated than daughters' parents; therefore, the human capital remuneration is higher for them, and because only a small fraction of married daughters join the labour force, most of the intergenerational persistence of family earnings is determined by the daughter's partner earnings. If I consider only the results from the sample where daughters' earnings are positive, the intergenerational persistence of family earnings for daughters is higher, but remains below the levels of the intergenerational persistence

of family earnings for sons.

On the other hand, there is no evidence of the effect of marital sorting on the intergenerational persistence of family earnings for sons. The high persistence of intergenerational earnings (individual and combined) is associated with a strong influence of parental earnings on sons' educational attainment but not with marital sorting. Even though sons tend to marry more educated women, these do not necesarilly join the labour market, especially those less educated. Therefore, investigating how selection bias influences these results through labour supply decisions is essential.

2.4.4 Female labour supply

The degree of combined earnings mobility is determined by the couple's joint labour supply decision, considering the intergenerational transmission of human capital and the process of marital sorting. Therefore, the barriers women face regarding their labour supply affect their own and their family's intergenerational earnings mobility.

The extent to which labour supply is affected by own and partner wages can indirectly be examined by looking at how labour supply relates to the earnings of own parents and parents-in-law. In contrast, no-wage related factors can be examined through family composition and care activities, among others.

Table 2.D.1 in Appendix presents the marginal effects of an increase in log parental earnings on the probability of women (daughters and daughters-in-law) labour participation, estimated from probit models, following equations 2.15 and 2.16. For all women, there is evidence that the labour supply decision is positively related to parental or parents-in-law earnings. However, for married daughters, this effect contrasts with a negative effect on the partner's earnings and the presence of children (below two years of age) in the household. Hence, the presence of partners with high earnings and children younger than two years of age in the household reduce the daughters' probability of participating in the labour market, because in these households it is likely that the allocation of time between the labour market and household care activities is made collectively.

For single daughters, the effect of parental earnings is strengthened by the presence of children aged 3 to 4 years old and the daughter's educational level equal to secondary completed and reduced by the level of household incomes. This means that single daughters with secondary completed living in a household with children between 3 and 4 years old, and lower household incomes, have a higher probability of participating in the labour market than single daughters in other conditions. The inverse effect caused by the presence of children in the household between single and married daughters could be explained by the fact that single daughters could also be single mothers who are head providers in the household. Therefore, their need for work is higher than that of married daughters.

The positive effect of the son's parental earnings on the daughters-in-law's labour supply could be understood in the light of marital sorting as a proxy for own earnings capacity. On the other hand, the son's earnings - *ceteris paribus* - cause a reduction in his partner's labour supply through an income effect and a within-family substitution effect (Raaum et al., 2007). However, this effect is lower than the one on married daughters. The probability of participation in the labour market for married daughters and daughters-in-law is strengthened considerably if their educational attainment is university completed. In other words, married women are more likely to participate in the labour market if they have a university degree.

The incentives for allocation of time account for the patterns of female labour supply evidenced in Table 2.D.1. In Mexico, women face two main barriers to join the labour market: the high hourly wage gap between men and women, and the availability of care services. According to the Mexican government, the wage gap in 2018 was 13.1% for formal workers. However, 57.2% of women were informal workers, which means this figure could be more prominent if informal workers were considered. Additionally, the care activity has been relegated to women due to the lack of a national care system, affecting female labour participation.[17]

Despite the fact that parental income affect positivelly the women's labour

[17] According to the CEEY, in 2017, female labour participation was 43%. However, this figure decreases to 36% for women with at least one child younger than six years old (Grajales and Orozco, 2021).

participation, selection into the intergenerational mobility sample is not completely endogenous. Table 2.4.5 presents the estimated intergenerational earnings mobility accounting by sample selection issues using the Heckman selection model. All regressions for daughters include a cubic index of the predicted probability of employment from the probit model in Table 2.D.1.

Table 2.4.5: Intergenerational Elasticity of Earnings Estimates Corrected by Sample Selection

	Single	*Married*		
		Own earnings (positive)	*Combined earnings (positive)*	*Combined earnings*
Panel A: Daughters				
0wn earnings wrt her parents' earnings	0.795 (0.280)	0.448 (0.248)	0.511 (0.324)	
Couple's combined earnings wrt her parents' earnings		0.665 (0.219)	0.552 (0.193)	0.457 (0.179)
Number of interviewees	661	346	193	1,153
Number of partners		193	1,000	1,000
Panel B: Sons				
Partner's earnings wrt his parents' earnings		0.029 (0.317)	0.051 (0.303)	
Couple's combined earnings wrt his parents' earnings		0.837 (0.139)	0.384 (0.209)	0.816 (0.135)
Number of interviewees		1,391	161	1,463
Number of partners		161	233	233

Note: Standard errors in parenthesis have been obtained using bootstrap sampling. Regressions control for quadratic in the parents' age, the quadratic in the son's normalised age (age-40) at the time earnings are observed, the interactions of the quadratic in the son's normalised age with parents' earnings, and the cubic polynomial of the single index function that determines the selection into employment. In *Own earnings (positive)* columns, all the estimations are done using the sample of daughters and daughters-in-law with positive earnings only. In *Combined earnings* columns, all the estimations are done using the sample of households with positive earnings regardless of who is the primary provider.

The effect of selection into employment varies among groups. For single daughters, there is no evidence of endogenous selection. Hence, the intergenerational persistence of earnings remains the same (0.79). In contrast, selection into the intergenerational mobility sample is endogenous for married daughters and

daughters-in-law. Therefore, the intergenerational persistence of earnings decreases for both sub-samples when the selection into employment is considered but is not significantly different from the estimation where selection bias was not considered. Finally, in the case of the son's partner, as in the primary analysis, the results are not statistically significant, possibly due to the small sample size.

Regarding the effect of endougenous selection on the relationship between the couple combined earings and the parental earnings, I find that the intergenerational persistence of family earnings increases for both daughters and daughters-in-law. This is expected due to the significant income effect and within-family substitution effect of parners' earnings on the reduction of the labour supply of daughters and daughters-in-law.

2.5 Final remarks

In this paper, I present how assortative mating and intergenerational persistence of earnings are related in Mexico. I analyse the implications of using family earnings rather than individual earnings to assess differences in intergenerational mobility for daughters and sons, overcoming some limitations of sample selection issues due to low female participation and capturing family dynamics.

In this research, I focus on the intergenerational elasticity of own earnings, partner earnings and combined earnings with respect to own parents' earnings. I show that earnings persistence is stronger for both daughters and sons in Mexico compared to other countries. The pattern persists regardless of the type of earnings I look at (individual or family earnings). However, the intergenerational persistence is similar between daughters and sons for individual earnings.

In the analysis by marital status, married daughters present higher intergenerational earnings mobility than married sons for both individual and combined earnings. The sex differences in economic mobility are more considerable for combined earnings than individual earnings, indicating that assortative mating is more critical for daughters than sons. I also find that the intergenerational persistence of earning is higher for single daughters and married sons than for their counterparts,

suggesting differences in the labour supply of daughters and sons by marital status.

The intergenerational earnings mobility of partners' earnings with respect to daughters' parental earnings is lower than that of parents and their daughters, leading to mobility in combined earnings for married daughters. In the case of daughters-in-law, the intergenerational elasticity of earnings is low and significantly not different from zero. The results for combined earnings demonstrate that earnings persistence from parents to daughters-in-law does not contribute to intergenerational persistence.

To explain the difference in the intergenerational persistence of earnings (individual and combined) between daughters and sons, I analyse how offspring's earnings elasticity and partners' earnings elasticity are affected by the preference of parents regarding their child's future wellbeing, remuneration to human capital and the degree of marital sorting; and how these factors shape intergenerational persistence in combined earnings given the relative size of the two earnings.

First, I look at how parents' concerns about their offspring's future contributed to the intergenerational persistence of earnings among daughters and sons. I find that lower intergenerational mobility among single daughters and married sons is driven mainly by a strong association between parents' earnings and offsprings' educational attainment. To explore assortative mating, I examine how individuals match on an educational level. On average, the correlation between the educational level of offspring and their partners is greater than 0.56, which suggests a substantial match in education. I also find that, for daughters, assortative mating is vital in driving intergenerational persistence in family earnings. Finally, I study how patterns in intergenerational mobility reflect women's labour supply decisions. I find that own parents' and parents-in-law's earnings are positively associated with labour supply for daughters and daughters-in-law. However, sample selection bias is significant only for married daughters and daughters-in-law, which means an upward bias in the original intergenerational earnings mobility results.

In general, this analysis suggests that in Mexico, parents are more likely to transfer socioeconomic advantages to single daughters and married sons than to

married daughters and single sons; and that marital sorting plays a significant role in the intergenerational transmission of family earnings for daughters but not for sons. Endogenous selection into employment affects only the intergenerational persistence of married women's earnings.

It is crucial to consider some limitations of this study. As in many developing countries, the study of intergenerational earnings/income mobility in Mexico is particularly challenging, given the lack of longitudinal or administrative data that provides information on earnings for both parents and offspring for a considerable period of time to implement alternative methodologies. That is why this study estimates the intergenerational persistence of earnings using the TSTSLS methodology as in chapter 1. However, this method is not exempt from shortcomings (Jerrim et al., 2016). In addition, the unavailability of a direct measure of partners' earnings could generate a measurement error bias in estimating the partner's intergenerational transmission of earnings with respect to the offspring's parental earnings. To deal with this, I estimate the persistence of family earnings.

Appendix

2.A Data

The 2011 ESRU Mexican Social Mobility Survey (EMOVI-2011) is the main dataset I use to estimate the intergenerational persistence of earnings. The EMOVI-2011 collects information about individuals born in Mexico and aged 25 to 64 years. In this section, I describe how partner's earnings and family earnings variables are constructed, as well as how I select the analytical sample.

2.A.1 Variable construction

2.A.1.1 Partner's earnings

Partner's earnings variables are not observed directly in the EMOVI-2011. However, there is information about the employment status of the partner and the total household income that jointly can be used as elements to construct this variable most suitably, minimising as much as possible the measurement error. I drop individuals that do not provide information about their partner's age, education and occupational status and those whose household total income is not positive.

To construct the partner's earnings variable, first, I categorise the household according to the following characteristics:

1. The offspring works.
2. The partner works.
3. The interviewer or any member of this household has received any transfer from the government (Oportunidades program, Pro-Campo program, Jornaleros Agrícolas program), other household or individual inside or outside

the country, rents or other non- labour incomes (insurance, inheritance, other). If so, how many transfers does the household receive?

4. How many members contribute income to the household?

Then, using these categories as a criterium, I define the partner's earnings as:

1. The total household income; if offspring does not work, the household does not receive any transfer and one individual contributes income to the household.

2. The total household income minus offspring' earnings; if offspring works, the household does not receive any transfer, and one individual different to the interviewer contributes income to the household.

3. The total household income divided by the number of members who contribute income to the household; if offspring does not work, the household does not receive any transfer, and more than one person contributes income to the household.

4. The total household income minus offspring' earnings, divided by the number of members who contribute income to the household minus one; if offspring works, the household does not receive any transfer, and more than one person different to the interviewer contributes income to the household.

5. The total household income divided by the number of members who contribute income to the household plus one; if offspring does not work, the household receives a transfer, and at least one person contributes income to the household.

6. The total household income minus offspring' earnings, divided by two; if offspring works, the household receives a transfer and only one person different to the interviewer contributes income to the household.

7. The total household income minus offspring' earnings, divided by the number of members who contribute income to the household plus one; if offspring

works, the household receives a transfer, and at least one person contributes income to the household.

Tables 2.A.1 and 2.A.2 present descriptive statistics for the household's transfers and members who contribute income to the household.

Table 2.A.1: Transfers and Members Who Contribute to the Household

Variable	*Daughters*		*Sons*	
	n	%	*n*	%
Transfers				
0	904	84.17	250	79.87
1	148	13.78	57	18.21
2	15	1.40	6	1.92
3	6	0.56	0	0
4	1	0.09	0	0
Members who contribute income				
1	693	64.53	73	23.32
2	302	28.12	178	56.87
3	59	5.49	45	14.38
4	15	1.40	13	4.15
5	3	0.28	1	0.32
6	2	0.19	3	0.96
Observations	1,074	100	313	100

Source: EMOVI-2011.
Note: This table presents the frequencies and percentage of the number of transfers received by the household and the number of memebers who contribute income to the household by sex.

Table 2.A.2: Interaction between Household's Transfers and Members Who Contribute to the Household

Variable	*Daughters*		*Sons*	
	n	%	*n*	%
Receives any transfer				
Two members contribute income	161	14.99	49	15.65
More than two members contribute income	9	0.84	14	4.47
Does not receive transfers				
Two members contribute income	834	77.65	202	64.54
More than two members contribute income	70	6.52	48	15.34
Observations	1074	100	313	100

Source: EMOVI-2011.
Note: This table represents the frequency and percentage of the interaction between transfers received by the household and members who contribute income to the household.

Graphs 2.A.1 and 2.A.2 present the distribution of the offspring, the partner and the family earnings.

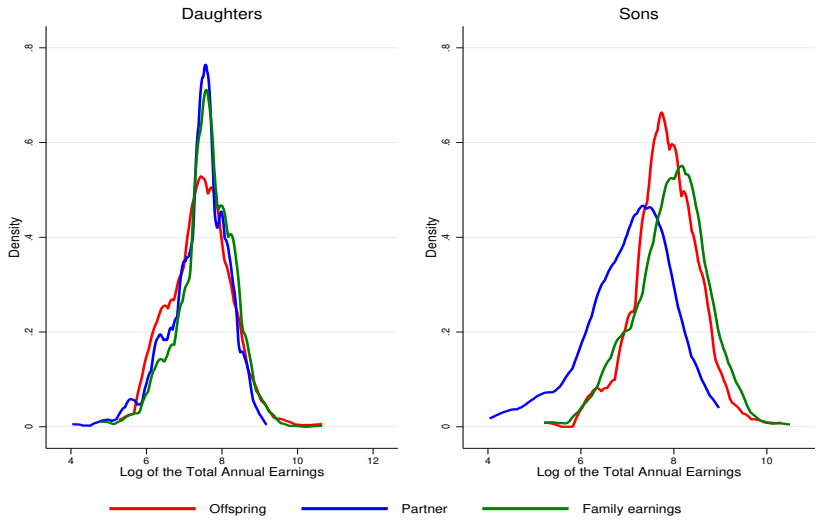

Figure 2.A.1: Distribution of Log Annual Earnings for Married Offspring and Partners Who Work

Source: EMOVI-2011, author's calculations. *Note:* This figure shows the distribution of the log annual earnings for offspring, partner and family earnings for the sub-sample of married offspring whose partner has positive earnings.

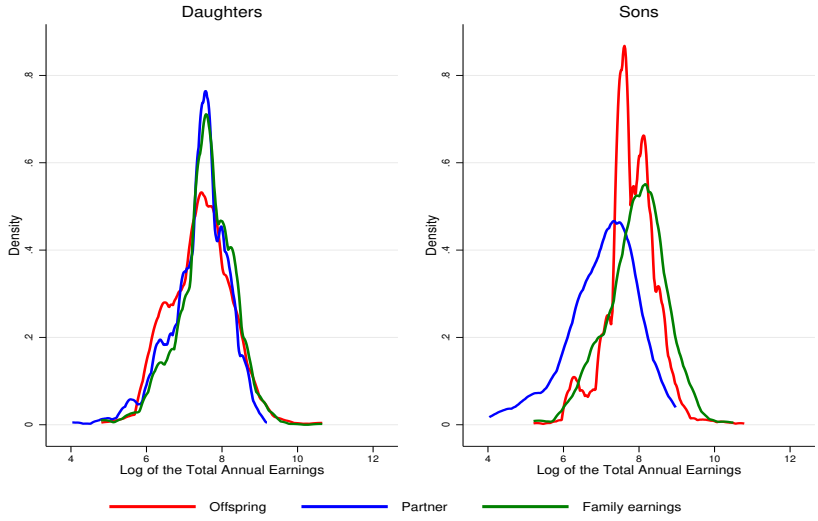

Figure 2.A.2: Distribution of Log Annual Earnings for Married Offspring and Partners

Source: EMOVI-2011, author's calculations. *Note:* This figure shows the distribution of the log annual earnings for offspring, partner and family earnings for the sub-sample of all married offspring.

2.A.2 Sample selection

Initially, the EMOVI-2011 consists of 11,001 individuals. I impose the following requirements for individuals to be in the analysis sample:

Table 2.A.3: Main Dataset Sample Selection

	Women	%	Men	%
Original survey	4,990	100%	6,011	100%
25-50 years old	3,873	78%	4,887	81%
With parents' information (Age, Education, Occupation)	2,538	51%	3,414	57%
With father aged 30 to 60 when the child was 14 years old	2,422	49%	3,250	54%
With earnings data	1,838	37%	2,509	42%
With partners' information	**1,814**	**36%**	**2,472**	**41%**

Source: EMOVI-2011.

2.B Education homogamy

Table 2.B.1: Joint Distribution of Daughters' Parents by Educational Attainment

Mother's education	*Father's education*				
	Less than primary complete	Primary completed	Secondary completed	University completed	Total
Panel A: Single Daughters					
Less than primary complete	**34.13**	3.10	1.63	0.00	38.87
Primary completed	3.87	**18.12**	5.23	0.00	27.22
Secondary completed	1.38	6.25	**14.79**	0.24	22.66
University completed	0.00	0.07	9.14	**2.04**	11.25
Total	39.38	27.55	30.79	2.28	100
Panel B: Married Daughters					
Less than primary complete	**47.39**	5.40	1.41	0.00	54.20
Primary completed	7.25	**16.70**	1.57	0.56	26.08
Secondary completed	1.47	4.03	**11.60**	0.05	17.15
University completed	0.72	0.41	1.31	**0.13**	2.57
Total	56.83	26.54	15.89	0.74	100

Source: EMOVI-2011. *Note:* This table llustrates the joint distribution of daughters' parents educational attainment, showing the mother's education across the horizontal rows and the father's education in the vertical columns. Each cell therefore represents the percentage of people with that specific mother and father educational attainment. Sample: single= 661 and married=1, 153.

Table 2.B.2: Joint Distribution of Sons' Parents by Educational Attainment

Mother's education	*Father's education*				
	Less than primary complete	Primary completed	Secondary completed	University completed	Total
Panel A: Single Sons					
Less than primary complete	**34.17**	4.60	1.51	0.00	40.29
Primary completed	3.82	**16.75**	3.48	0.00	24.05
Secondary completed	2.11	5.96	**20.78**	0.29	29.14
University completed	0.07	3.56	1.45	**1.45**	6.53
Total	40.18	30.86	27.22	1.74	100
Panel B: Married Sons					
Less than primary complete	**46.63**	3.57	0.55	0.01	50.76
Primary completed	4.86	**20.15**	2.75	0.07	27.83
Secondary completed	0.95	5.14	**12.75**	0.17	19.01
University completed	0.00	0.19	1.55	**0.65**	2.39
Total	52.44	29.05	17.61	0.90	100

Source: EMOVI-2011. *Note:* This table llustrates the joint distribution of sons' parents educational attainment, showing the mother's education across the horizontal rows and the father's education in the vertical columns. Each cell therefore represents the percentage of people with that specific mother and father educational attainment. Sample: single= 1, 153 and married=1, 463.

Table 2.B.3: Joint Distribution of Couples by Educational Attainment

Offspring's education	*Partner's education*				
	Less than primary complete	Primary completed	Secondary completed	University completed	Total
Panel A: Daughter					
Less than primary complete	**4.65**	2.14	1.59	0.00	8.38
Primary completed	2.37	**10.09**	11.45	0.00	23.90
Secondary completed	5.31	7.33	**40.35**	4.90	57.89
University completed	0.05	0.11	2.30	**7.37**	9.83
Total	12.37	19.67	55.68	12.27	100
Panel B: Son					
Less than primary complete	**2.17**	2.68	2.05	0.75	7.65
Primary completed	2.82	**11.32**	6.74	0.18	21.07
Secondary completed	2.48	10.50	**42.44**	1.03	56.45
University completed	0.00	0.60	7.33	**6.90**	14.83
Total	7.47	25.10	58.57	8.86	100

Source: EMOVI-2011. *Note:* This table llustrates the joint distribution of couples educational attainment, showing the offspring's education across the horizontal rows and the partner's education in the vertical columns. Each cell therefore represents the percentage of couples with that specific educational attainment. Sample: daughters= $1,009$ and sons=$1,463$.

2.C Rank-Rank results

Table 2.C.1: Rank-Rank Correlation of Earnings Estimates

	All	*Single*	*Married*		
			Own earnings (positive)	*Partner's earnings (positive)*	*Combined earnings*
Panel A: Daughters					
0wn earnings wrt her parents' earnings (β^d)	0.266 (0.075)	0.323 (0.0.120)	0.188 (0.088)	0.237 (0.110)	
Partner's earnings wrt her parents' earnings (δ^d)			0.166 (0.132)	0.146 (0.060)	
Couple's combined earnings wrt her parents' earnings (μ^d)			0.240 (0.089)	0.221 (0.060)	0.208 (0.055)
Number of interviewees	1,007	661	346	193	1,153
Number of partners			193	1,000	1,000
Panel B: Sons					
0wn earnings wrt his parents' earnings (β^s)	0.307 (0.043)	0.269 (0.071)	0.330 (0.050)	0.302 (0.143)	
Partner's earnings wrt his parents' earnings (δ^s)			0.150 (0.145)	0.150 (0.122)	
Couple's combined earnings wrt his parents' earnings (μ^s)			0.339 (0.050)	0.261 (0.133)	0.324 (0.050)
Number of interviewees	2,400	1,009	1,391	161	1,463
Number of partners			161	233	233

Note: Standard errors in parenthesis have been obtained using boostrap sampling. In *Own earnings (positive)* column, all the estimations are done using the sample of offspring with positive earnings only. In *Partner's earnings (positive)* column, all the estimations are done using the sample of offspring's partner with positive earnings only. In *Combined earnings* column, all the estimations are done using the sample of households with positive earnings regardless of who is the primary provider.

2.D Selection into employment

Table 2.D.1: Selection into Employment - Marginal effects

Pr(work)	***Daughters***		*Son's Partner*
	Single	*Married*	
ln Parental earnings	0.1314*	0.0960*	0.0766*
	(0.069)	(0.054)	(0.041)
Age	0.0731*	0.0665**	0.0204**
	(0.038)	(0.028)	(0.008)
Age2	-0.0009*	-0.0009**	-0.0002**
	(0.001)	(0.000)	(0.000)
Primary completed	0.0556	0.0187	0.0639**
	(0.070)	(0.059)	(0.029)
Secondary completed	0.1639**	0.1248**	0.1026***
	(0.066)	(0.058)	(0.023)
University completed	0.0400	0.4087***	0.4427***
	(0.101)	(0.109)	(0.101)
Children in household aged 0-2	0.0046	-0.1076**	-0.0151
	(0.072)	(0.050)	(0.036)
Children in household aged 3-4	0.1243*	-0.0542	-0.0216
	(0.075)	(0.043)	(0.035)
Children in household aged 5-11	0.0297	-0.0213	0.0114
	(0.035)	(0.025)	(0.018)
Children in household aged 12-15	-0.0438	-0.0484	0.0060
	(0.046)	(0.032)	(0.024)
ln household income excluding her own earnings	-0.1135***		
	(0.017)		
ln partner's earnings		-0.1029***	-0.0662***
		(0.009)	(0.006)
Observations	1,037	1,153	1,463

Note: This table presents the employment probability of daughters and daughters-in-law as a function of parents'/parents-in-law's earings, age, education, number of children in four age groups, and household income excluding daughters' earnings for single and partner's earnings for married. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Chapter 3

Intergenerational transmission of health in the UK

3.1 Introduction

It is well known that family conditions help to perpetuate inequalities through intergenerational transmission. Individuals' prospects in life are heavily influenced by their family backgrounds, amplifying inequality of opportunities. Original conditions regarding parental income, education, occupation and health are crucial components of offspring welfare during childhood and adulthood. A growing multidisciplinary literature has focused on the intergenerational mobility of income, education or occupation (Blanden, 2013; Chetty et al., 2014a; Erikson and Goldthorpe, 2000; Gregg et al., 2017; Lee and Solon, 2009). However, little research has been done to analyse the intergenerational transmission of general health status. This is a major gap as the health status is a critical component of human capital and a fundamental dimension of welfare. For instance, parental health problems might influence learning during childhood and parents' decisions on investments in children, which could affect earnings during adulthood (Goodman et al., 2011), parenting as adults or induce early retirement (Blundell et al., 2021; van Rijn et al., 2014).

Two key issues make the measurement of the intergenerational transmission of health challenging. First, it requires longitudinal data containing rich information on health (preferably during adulthood) and socio-economic circumstances for

two successive generations. Second, health is difficult to measure since it is a latent concept. The literature studying the association between parent and child health status has used different approaches, where the measurement of the health status has been specifically linked to different aspects of general health, such as body mass index (Dolton and Xiao, 2017), height (Galton, 1886; Venkataramani, 2011), weight (Classen, 2010), longevity (Parman, 2010; Piraino et al., 2014), mental health (Johnston et al., 2013; Thu Le and Nguyen, 2018), a principal component from self-reported disorders (Halliday and Mazumder, 2017), and to permanent (time-average) measures of self-reported health (Andersen, 2021; Bencsik et al., 2021; Graeber, 2021; Halliday et al., 2021; Mazumder, 2011).

In this chapter, we contribute to the understanding of the intergenerational transmission of health in the UK, by specifically measuring the association between maternal physical and mental health during their offspring's early childhood and adolescence (at 5 and 16 years), and offspring physical and mental health during early and mid adulthood (at 26 and 46 years). Using the 1970 British Cohort Study (BCS70), a longitudinal study following the lives of more than 17,000 people born in England, Scotland and Wales in one week of 1970, we contribute to filling the gap in the literature in two complementary ways. First, although it is known that adult offspring health problems in adulthood are associated either with poor physical or mental health of their mothers during childhood (Bencsik et al., 2021; Goodman et al., 2011; Halliday et al., 2021; Johnston et al., 2013), there is not much evidence regarding the transmission of comorbidity of physical and mental health issues from the mother to her offspring. We measure the association by considering a direct measure of the comorbidity of physical and mental health of mothers during childhood and their offspring 10, 21, 30 and 41 years later. Second, our definition of the general health status and the high quality of the data set allow us to study the association between maternal general health and offspring general health during adulthood, over offspring's key developmental periods (offspring early childhood and adolescence). In particular, we use mothers' information twice over the formative years of her child - at ages 5 and 16 - and offspring's information twice during

their adulthood, at ages 26 and 46 years. Observations over such a long period of time allow us to provide evidence on the inter-temporal impacts of maternal health on offspring health. Furthermore, the large sample sizes allow us challenging to explore heterogeneous patterns of intergenerational transmission in health not only by offspring ages but also by sex, controlling for a set of family background characteristics and offspring health during childhood.

To estimate the association between maternal and offspring health, we construct a categorical index to measure the general status of health, as a combination of either absence or presence of adverse physical and mental health conditions. Four different categories describe the possible health status of mothers and their offspring: no health problems, only physical health problems, only mental health problems and comorbidity of physical and health problems. The order of these categories neither implies a hierarchy of the health problem nor necessarily reflects the severity of the condition since they are considered independent outcomes. Therefore, we perform a multivariate multinomial logit to examine the association between all the different categories simultaneously. This methodology allows us to determine if the likelihood that an offspring falls into a specific category of the general health status differs among the different categories of the mother's health status.

We find that, regardless of the offspring's age at which maternal health is measured, having a mother with poor mental health, or with comorbidity of physical and mental health problems, significantly increases the chance of their offspring having mental health problems in early adulthood and comorbidity of physical and mental health problems during early and mid adulthood. For daughters, we find evidence that they are more likely to develop mental health problems in early adulthood if their mothers had comorbidity of physical and mental problems during daughter's early childhood, and then comorbidity of physical and mental health problems in mid adulthood. For sons, we find that having a mother with mental health problems or with comorbidity of physical and mental health during the adolescence is associated with them having comorbidity of physical and mental health problems during

both their early and mid adulthood.

When we focus on the effects of maternal health during offspring's early childhood, there is evidence of a "health status gradient" in the association between the maternal general health status and offspring having comorbidity of physical and mental health problems in mid adulthood. In particular, the probability of offspring showing poor physical and mental health increases if the health status of the mother, starting from physical problems, changes to mental health problems and then to comorbidity of physical and mental health problems. However, the gradient is no longer evident when we consider the effects of the maternal health status during offspring's adolescence.

The chapter proceeds as follows. The next section discusses the related literature. Section three describes the data and provides detail on the construction of our key measures, whereas section four discusses our methodological approach and describes our empirical model. Section five reports results from both the estimation of our empirical model, and the realisation of a sensitivity analysis. We conclude with some final remarks regarding the limitations of our analysis and future avenues of research.

3.2 Related literature

This chapter studies the intergenerational transmission of health between mothers and adult offspring. We categorise the general health status into four groups to determine if the likelihood that an offspring falls into a specific category of general health status varies depending on the mother's category of health status, with a particular focus on the comorbidity of physical and mental health problems. It is well known that coping with many challenges at once may affect individuals differently than if they face only one. We also examine if there are differences in the intergenerational transmission of health if the mother's health conditions occur during the offspring's early childhood compared to adolescence.

The increasing research on intergenerational transmission in health has examined correlations between various parental and offspring health measures at dif-

ferent age groups. Based on this, we can separate the literature into two major categories. First are the studies that focus on particular aspects of health status (e.g. height, BMI, asthma) or specific health-related behaviours (e.g. alcohol consumption, smoking, eating behaviour). Second, the studies based on a broader measure of general health status, which can be considered an aggregation of health outcomes (i.e. a single index).

Within the first category, several studies analyse the transmission of anthropometric measures. These measures are available in many data sets and are less prone to measurement error if they are taken objectively and not self-reported. However, it is less clear whether they reflect "health" status or risk factors. For example, Venkataramani (2011) investigate the transmission of height between parents and children younger than 6 years in Vietnam, whilst Bhalotra and Rawlings (2011, 2013) measure the correlation between maternal height and infant survival probability for a pool of 38 developing countries. Björklund and Jäntti (2012) and Mazumder (2008) estimate the sibling correlation of adult height for Sweden and the United Sates, respectively. Other studies document the association in body mass index between parents and children (Dolton and Xiao, 2017), weight between mothers and children (aged 16 to 24 years) (Classen, 2010), and body mass index and weight between adult siblings (Björklund and Jäntti, 2012; Mazumder, 2008).

Darden and Gilleskie (2016) and Bauldry et al. (2012) study the effects of parental health on self-rated health of offspring during adulthood, and from adolescence to young adulthood, respectively, employing data from the United States. For Germany, Coneus and Spiess (2012) measure correlations in health between parents and their 0- to 4-year-old children using different health measures, including anthropometric, health disorder, and self-related health measures, whilst Bügelmayer and Schnitzlein (2018) estimate the sibling correlation in physical health. Some papers examine the association of health between parents and children using measures of general health or physical difficulties during adulthood for Indonesia (Kim et al., 2015) and specific chronic health conditions during young adulthood for the United States (Thompson, 2014). Regardless of the data and empirical methods

employed, in general, these studies suggest a strong positive association between parental health and offspring health, in line with the results presented in this chapter.

Also in this category, and for the particular case of the UK, some studies have documented the association between maternal health and child health. Propper et al. (2007) measure the correlations between maternal physical and mental health and health measures of their children (aged less than seven years) including self-rated health, asthma, mental health, and anthropometric measures. Johnston et al. (2013) examine the intergenerational transmission of mental health over three generations. Whilst Parsons et al. (2021) study the association of mother's long-standing physical health problems and metal health with conduct, hyperactivity and emotional problems in mid-childhood. Overall, these studies find that poor maternal health has a stronger association with children having poor health outcomes during childhood.

In particular, Propper et al. (2007) find that children whose mothers suffered from depression have worse general health or mental health or a higher probability of having asthma. Whilst, Johnston et al. (2013) find that the probability of offspring having psychological distress is 63 percent higher if their mother suffered the same symptoms during the offspring's childhood and that the intergenerational correlation in mental health is around 0.2. Although these studies are connected with this research, none examine general maternal health or maternal comorbidity of physical and mental health as this study does. Instead, both studies focus mainly on the association between the mother's mental health and single health outcomes of the offspring.

Among the group of studies that use a broader measure of health, many based their analysis on Quality Adjusted Life Years (QALY) measures (Bencsik et al., 2021; Halliday et al., 2021; Mazumder, 2011) or continuous indexes of self-reported health status (Andersen, 2021; Fletche and Jajtner, 2021; Graeber, 2021; Halliday and Mazumder, 2017). These measures allow estimations of the Intergenerational Health Association (IHA) between parents and adult offspring, following the tradi-

tional methods in economic literature (i.e. elasticities, rank-rank slopes), and permit one to quantify the impact of health in economic terms by converting health into a financial metric and by implementing a more general welfare analysis which combines income and health. In general, they document relatively high mobility in health.[1]

Although these studies examine the persistence of general health between parents and offspring during adulthood, the methodology used to measure general health differs from the one employed in this study. In particular, our measure of health separates the effects of maternal physical health problems, mental health problems and comorbidity of physical and mental health problems during the offspring's early childhood and adolescence on the offspring's general health status. This approach not only helps to understand how maternal physical and mental health during offspring's critical development periods is transmitted to the offspring, but also provides a better understanding of how comorbidity of physical and mental health is amplified by intergenerational transmission. To the best of our knowledge, this is the first study that accounts directly for the effect of comorbidity of physical and mental health problems while examining the intergenerational transmission of general health status.

3.3 Data

We use data from the 1970 British Cohort Study (BCS70), which follows 17,198 people born in England, Scotland and Wales in a single week of April 1970. Since the first survey in 1970, there have been nine additional waves at ages 5, 10, 16, 26, 30, 34, 38, 42 and 46-48 where 8,581 study members participated. Along the life of the members of the cohort, the BCS70 has collected information on health, physical, educational and social development, and economic circumstances, among

[1]Using the Panel Study of Income Dynamics for the US, the rank-rank slope ranges between 0.20-0.29 (Halliday et al., 2021). The same measure ranges between 0.20-0.22 using the German Socio-Economic Panel (SOEP) (Graeber, 2021). Using Danish administrative data, the rank-rank slope ranges between 0.11-0.2 (Andersen, 2021). Using the British Household Panel Survey and the UK Household Longitudinal Survey, the intergenerational transmission of health using the same measure ranges between 0.16-0.23 (Bencsik et al., 2021). In addition, the former study measures the rank-rank slope for physical and mental health indices. The intergenerational transmission of mental health ranges between 0.14-0.22, and the physical health ranges between 0.13-0.17.

other factors. We use information from waves one, two and four (birth, ages 5 and 16) for mothers, and from waves five and ten (ages 26 and 46-48) for cohort members. The majority of information was collected from in-person interviews with the mother at early age of the individual, and with the cohort member after age 16 (For more details, see Appendix 3.A.2.).

Our sample includes those living in Great Britain in 1970 and those whose mother's average age during childhood was below 50[2] and excludes those who had migrated or died by age 42 (12%). The final sample has 16,417 observations (7,916 females and 8,501 males). We used multiple imputation to deal with attrition and item non-response, adopting a chained equations approach (White et al., 2010) under the assumption of 'missing at random' (MAR), which implies that the systematic differences between the missing values and the observed values are included in our models. In order to maximise the plausibility of the MAR assumption we also included a set of auxiliary variables in our imputation model. All reported analyses are averaged across 60 replicates based on Rubin's Rule for the efficiency of estimation (Little and Rubin, 2002).[3]

3.3.1 Measures of health status

3.3.1.1 Mental health

The mental health status is based on the Malaise Inventory, which assesses symptoms of mental health disorders such as anxiety and depression (Rutter et al., 1970). The 24-item version was recorded for mothers at offspring ages 5 and 16, and to adult offspring (the cohort member) at age 26. Then, the 9-item version was used to measure offspring psychological distress at age 46. To homogenise the measure among mothers and offspring, we consider 9 of the 24 items of the Malaise Inventory (see Appendix 3.A.1 for more details). These indicators were measured consistently during the offspring's adulthood using a set of 'yes-no' self-completion questions. However, the response options in the questions to mothers vary between

[2]This criterion helps us to compare offspring and mothers in the same age range, and to reduce life-cycle bias (due to the mother's health problems related to older ages).

[3]See Appendix 3.B for more details.

waves. At age 5 of offspring, mothers were asked a set of 'yes-no' questions, while at age 16, each question refers to an emotional state and response choices are determined by a three-point Likert-type scale: 0 (rarely or never), 0.5 (some of the time) and 1 (most of the time).[4] To make the mother's measure of psychological distress comparable between the two waves, we dichotomise the responses at age 16, by grouping the categories 'some of the time' and 'most of the time' into the category "yes", and the category 'rarely or never' into the category "no".

Overall psychological distress scores were calculated at each age by aggregating the item responses and creating an aggregate score, with higher scores indicating higher levels of psychological distress. These overall scores were dichotomised based on an established cut-off score of four or more symptoms for the Malaise inventory to identify individuals with a high risk of depressive or anxiety disorder (Gondek et al., 2021; Khanolkara and Patalaya, 2021). Those individuals above the threshold cut-off were coded as 1 (i.e. having high symptoms of mental health problems or psychological distress), whilst those with total scores below the threshold value were coded as 0 (i.e. having no or low psychological distress).

3.3.1.2 Physical health

The BCS70 collects a unique set of information about the health conditions and behaviours throughout the life of cohort members (e.g. alcohol use, eating disorders, self-reported general health, height, impairment, long-standing illness and disability, psychological wellbeing, smoking, substance use, weight, among others). However, the information related to parental health is less detailed and it is collected only for a few periods (in most cases only one period), limiting our measure of permanent parental health.

To avoid discrepancies in the definition of physical health, reduce measurement error, and to be able to use a variable as homogeneous as possible among both

[4]The Malaise inventory was also implemented at offspring age10, but in this case, parents were asked to indicate a score between 0 and 100 to each description, with 0 reflecting seldom or never and 100 most of the time. This structure of the response does not allow us to generate an objective measure of psychological distress, which could be comparable to the other measures in a structure of 'yes-no' questions, which impedes using the mother's psychological distress at this particular age of offspring.

generations; we concentrated on questions related to physical health recorded in at least two waves, and we defined physical health as a measure of long-standing illness and disability for mothers and offspring.

For mothers, the information was collected when their offspring was 5 and 16 years old. After the 24-items Malaise Inventory, mothers were asked whether they had had any other health problems.[5] Since this information was collected after the Malaise Inventory, we assume that this question provides information about aspects of the physical health with little or no significant psychological component.[6] In the case of offspring, many variables capture longstanding illness. However, to best match the measure of the mother's physical health, we use the question where they were asked whether they had suffered from any long-term illness, disability or infirmity at ages 26 and 46.

To measure physical health, we construct a binary variable which takes a value of 1 if the individual (mother or offspring) had any long-term physical health concern, and a value of 0 otherwise.

3.3.1.3 General health status

The aggregate health measure combines both the dichotomised mental and physical health indicators. This index evaluates four different health statuses: no health problems, only physical health problems, only mental health problems and comorbidity of physical and mental health problems.

The mother's general health status combines physical health and mental health when the offspring is 5 and 16 years old. Hence, we have two measures of general health for mothers: one during offspring's early childhood (age 5), and other during

[5]The specific questions were: "Other health problems of mother" at offspring ages 5 and 10, and "Any other health problems worrying you?" at offspring age 16. These questions do not list either particular health conditions or severity of the health problem.

[6]Unfortunately, apart from these complementary questions to the Malaise Inventory, the BCS70 only collected specific information about the mother's physical health for the wave in which offspring was 5 years old. The parent (mainly the mother) reported whether she, the offspring's father or other members of the household had any severe or prolonged illness, handicap or disability. However, the same question is not asked in any later wave. In the wave in which the offspring was 10 years old there is another question about parental health. However, this question does not list particular health conditions, only asks parents when cohort member was 10 years old whether they had had an illness since the study member was 5 years old. See Appendix 3.A.2 and Health (2018) for more details about available information.

offspring's adolescence (age 16). The offspring's general health index, which is our main outcome, reflects physical health and mental health during early adulthood (age 26) and mid adulthood (age 46).

3.3.2 Control variables

In contrast to the standard intergenerational approach, we use control variables to capture childhood circumstances that may have jointly affected maternal health during offspring's early childhood or adolescence and offspring health later in life (Halliday et al., 2021; Johnston et al., 2013). In particular, as previous literature has established, adult health has been found to be associated with childhood health and socio-economic circumstances (Gondek et al., 2021; Goodman et al., 2011; Haas, 2007, 2008; Peck, 1997; Rahkonen et al., 1997). Specifically, parents education and income are associated with higher levels of intergenerational persistence of health (Halliday et al., 2021; Thu Le and Nguyen, 2018).

Using information collected at birth and ages 5, 10 and 16, we control for early-life health and socio-economic background pertaining to the adult offspring. Apart from the mother's age and sex assigned at birth, the control variables are divided into two categories: *I*) Family socio-economic circumstances during childhood, and *II*) Childhood health indicators. In the first category, we consider if the mother or father were teenagers at birth, if the parents divorced during childhood, whether the child's parents stayed in school beyond the minimum leaving age and parents completed education level (either mother's or father's, whichever was higher if both were available)[7]; social class at ages 5 and 16 based on father's occupation (or mothers if missing).[8] We also consider housing tenure at ages 5 and 16, and region of residence at birth. In the second category, we included indicators for whether the child ever had a health problem during childhood (i.e. asthma, bronchitis, eczema, hay fever, hearing difficulties, heart conditions, hernia, meningitis, pleurisy, pneumonia, snoring, sore throat, urinary infections, vision problems or wheezing), and for whether the child ever had an accident during childhood (i.e. swallowing poison

[7]Categories include less than O-levels, O-levels or GCSEs, A levels and higher education.

[8]Low (Partly skilled, unskilled and other), medium (Skilled non-manual and skilled manual) and high (Professional and managerial or technical).

or medicine, burns, scalds, road traffic accident). These two indicators use information provided by parents (mainly the mother) at ages 5, 10 and 16.

3.3.3 Descriptive Statistics

Table 3.3.1 presents descriptive statistics by sex of the offspring's physical, mental, and general health status across adulthood. In our sample, the proportion of offspring with mental health problems (high psychological distress) increases from 15.6% in early adulthood to 18.9% in mid adulthood; the trend remains for both females and males. However, the proportion of females experiencing high psychological distress is higher than the proportion of males at each adulthood stage. On the other hand, the proportion of individuals with physical health problems moves from 16.3% in early adulthood to 36.3% in mid adulthood, which implies that approximately one of every three offspring in this cohort experienced any long-term illness, disability or infirmity at mid adulthood. The incidence of physical health problems is higher among females (38.9%) than males (33%), but the difference is significantly smaller compared to that related to the incidence of mental health problems.

The fraction of offspring without physical or mental health problems decreases progressively from 73.1% in early adulthood to 57.0% in mid adulthood. This trend is more pronounced for females (69.5% to 53.8%) than males. In contrast, the prevalence of comorbidity of physical and mental health problems increases from 4.1% in early adulthood to 11.3% when the offspring is in mid adulthood. Overall, more females experience comorbidity of physical and mental health problems across adulthood. The fraction of offspring with only mental health problems decreases with age shifting from 10.6% in early adulthood to 7.5% in mid adulthood. The proportion of females experiencing high psychological distress is higher than males at each adulthood stage. However, the gap between these figures diminishes with age. In the pooled sample, the proportion of individuals with only physical health problems increases from 12.2% in early adulthood to 24.2% in mid adulthood, which means that approximately one out of every four offspring in this cohort experienced a long-term illness, disability or infirmity in mid adulthood. This

Table 3.3.1: Descriptive Statistics of offspring health measures by sex

	Early adulthood		Mid adulthood	
	N	*%*	*N*	*%*
Panel A: Total				
Any physical problem				
No	6,506	83.7	5,015	63.7
Yes	1269	16.3	2862	36.3
Mental health				
Low Psych distress	6,947	84.4	5,875	81.1
High psych distress	1,282	15.6	1,365	18.9
General health status				
No problems	5,664	73.1	4,123	57.0
Physical health (Only)	942	12.2	1,749	24.2
Mental health (Only)	821	10.6	543	7.5
Physical and mental health	321	4.1	821	11.3
Panel B: Females				
Any physical problem				
No	3,555	82.9	2,505	61.1
Yes	735	17.1	1,593	38.9
Mental health				
Low Psych distress	3,646	80.7	2,988	78.5
High psych distress	874	19.3	818	21.5
General health status				
No problems	2,974	69.5	2,046	53.8
Physical health (Only)	515	12.0	940	24.7
Mental health (Only)	574	13.4	316	8.3
Physical and mental health	218	5.1	502	13.2
Panel C: Males				
Any physical problem				
No	2,951	84.7	2,510	66.4
Yes	534	15.3	1,269	33.6
Mental health				
Low Psych distress	3,301	89.0	2,887	84.1
High psych distress	408	11.0	547	15.9
General health status				
No problems	2,690	77.6	2,077	60.5
Physical health (Only)	427	12.3	809	23.6
Mental health (Only)	247	7.1	227	6.6
Physical and mental health	103	3.0	319	9.3

Note: The table shows the number of observations and frequency of the individual health status by sex and age of the sample used in the main analysis. Observations and percentages for mental health are based on symptoms of anxiety and depression measured by Malaise inventory. Higher levels of psychological distress when the individual experience four or more symptoms and Low levels when he/she does not experience symptoms or present up to three symptoms.

measure does not present a significant difference by sex.

In Table 3.3.2, we show the distribution of the mother's health status and family characteristics by the health status of offspring in early adulthood.[9] Compared to their healthier peers, a higher proportion of offspring in early adulthood showing

[9]Information about the mother's health status and family characteristics by offspring's health status for mid adulthood is presented in Appendix 3.C.

comorbidity of physical and mental health problems, grew up in a household where the mother suffered from the same condition. Similarly, a higher fraction of the offspring having this health condition comes from a household with a teenage mother (14.7% - 7.5%), divorced parents (19.6% - 14.0%) or a household where the father dropped out of school at age 16 or younger (85.2% - 82.1%).

Table 3.3.2: Distribution of the mother's health status and family characteristics by offspring's health status at early adulthood (Age 26)

	No problems		Physical health (only)		Mental health (only)		Physical and mental health	
	N	%	*N*	%	*N*	%	*N*	%
Maternal health status (age)								
Mother's physical problem (5)								
No	4,326	89.2%	695	87.6%	596	88.0%	220	82.7%
Yes	522	10.8%	98	12.4%	81	12.0%	46	17.3%
Mother's physical problem (16)								
No	3059	86.5%	533	86.9%	398	83.6%	146	78.5%
Yes	477	13.5%	80	13.1%	78	16.4%	40	21.5%
Mother's mental health (5)								
Low Psych distress	3,901	79.6%	646	79.8%	510	74.5%	185	68.0%
High psych distress	1,000	20.4%	164	20.2%	175	25.5%	87	32.0%
Mother's mental health (16)								
Low Psych distress	2,259	61.8%	357	56.8%	257	52.1%	101	52.9%
High psych distress	1,395	38.2%	272	43.2%	236	47.9%	90	47.1%
Mother's general health status (5)								
No problems	3531	72.8%	573	72.3%	460	67.9%	155	58.3%
Physical health (Only)	334	6.9%	63	7.9%	46	6.8%	27	10.2%
Mental health (Only)	795	16.4%	122	15.4%	136	20.1%	65	24.4%
Physical and mental health	187	3.9%	35	4.4%	35	5.2%	19	7.1%
Mother's general health status (16)								
No problems	2,012	56.9%	317	51.7%	225	47.3%	86	46.2%
Physical health (Only)	190	5.4%	35	5.7%	23	4.8%	14	7.5%
Mental health (Only)	1,047	29.6%	216	35.2%	173	36.3%	60	32.3%
Physical and mental health	287	8.1%	45	7.3%	55	11.6%	26	14.0%
Mother's age (0)	26.0	(5.2)	25.9	(5)	26.0	(5.3)	25.6	(5.6)
Family socio-economic background (age)								
Teenager mother (0)								
No	5,242	92.5%	867	92.0%	741	90.3%	274	85.4%
Yes	422	7.5%	75	8.0%	80	9.7%	47	14.6%
Teenager father (0)								
No	5,570	98.3%	925	98.2%	795	96.8%	316	98.4%
Yes	94	1.7%	17	1.8%	26	3.2%	5	1.6%
Parents divorced during childhood (0-16)								
Not divorced	4,490	86.0%	721	83.9%	603	81.6%	229	80.4%
Divorced	731	14.0%	138	16.1%	136	18.4%	56	19.6%
Highest parental educational level (0)								
Less than O levels	2283	47.5%	349	43.5%	370	54.7%	146	54.7%

Continued on next page

Table 3.3.2 Distribution of characteristics by offspring's health status at age 26 – Continued from previous page

	No problems		Physical health (only)		Mental health (only)		Physical and mental health	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
O levels/GCSEs	1122	23.3%	194	24.2%	138	20.4%	58	21.7%
A levels	418	8.7%	77	9.6%	57	8.4%	21	7.9%
Higher education	987	20.5%	183	22.8%	112	16.5%	42	15.7%
Age mother lefts education (5)								
Above 16	756	15.4%	142	17.5%	64	9.3%	44	16.1%
16 or younger	4149	84.6%	669	82.5%	624	90.7%	230	83.9%
Age father lefts education (5)								
Above 16	844	17.9%	132	17.0%	92	14.1%	38	14.8%
16 or younger	3867	82.1%	643	83.0%	561	85.9%	218	85.2%
Region of residence at birth (0)								
North	362	6.4%	66	7.0%	54	6.6%	22	6.9%
Yorks and Humberside	491	8.7%	78	8.3%	77	9.4%	39	12.1%
East Midlands	365	6.4%	56	5.9%	46	5.6%	16	5.0%
East Anglia	224	4.0%	35	3.7%	25	3.0%	11	3.4%
South East	1,696	29.9%	329	34.9%	238	29.0%	91	28.3%
South West	415	7.3%	58	6.2%	48	5.8%	21	6.5%
West Midlands	555	9.8%	93	9.9%	90	11.0%	35	10.9%
North West	694	12.3%	127	13.5%	119	14.5%	43	13.4%
Wales	313	5.5%	38	4.0%	56	6.8%	12	3.7%
Scotland	549	9.7%	62	6.6%	68	8.3%	31	9.7%
Parents' social class (5)								
Low	734	15.3%	121	15.2%	128	19.1%	54	20.5%
Medium	2,571	53.5%	434	54.7%	379	56.6%	151	57.2%
High	1,500	31.2%	239	30.1%	163	24.3%	59	22.3%
Housing tenure (5)								
Owned	3,128	63.6%	532	65.3%	393	56.6%	139	50.2%
Rented	1,570	31.9%	253	31.0%	265	38.2%	124	44.8%
Other	222	4.5%	30	3.7%	36	5.2%	14	5.1%
Parents' social class (16)								
Low	366	11.9%	66	12.3%	67	16.6%	27	17.9%
Medium	1,496	48.8%	255	47.4%	216	53.6%	81	53.6%
High	1,204	39.3%	217	40.3%	120	29.8%	43	28.5%
Housing tenure (16)								
Owned	3,018	79.4%	518	79.0%	375	71.8%	132	66.0%
Rented	690	18.2%	115	17.5%	135	25.9%	62	31.0%
Other	91	2.4%	23	3.5%	12	2.3%	6	3.0%
Health during childhood (age)								
Ever had a health problem (0-16)								
No	207	3.7%	23	2.5%	38	4.7%	11	3.5%
Yes	5,362	96.3%	901	97.5%	767	95.3%	305	96.5%
Ever had an accident (0-16)								
No	1,765	31.9%	292	31.8%	287	36.0%	82	25.9%
Yes	3,771	68.1%	626	68.2%	510	64.0%	234	74.1%

Note: The table shows the number of observations and frequency of the individual characteristics of the sample used in the main analysis for females and males. Observations and percentages for mental health are based on symptoms of anxiety and depression measured by Malaise inventory. Higher levels of psychological distress when the individual experience four or more symptoms and Low levels when he/she does not experience symptoms or present up to three symptoms. Number in parenthesis ( ) indicates offspring age when information collected.

In line with expectations, socio-economic disadvantages at age 5 and 16, measured by parental social class and homeownership, are associated with poor health status. This association seems to be stronger for offspring with comorbidity of physical and mental health problems. In addition, more than half of offspring with only mental health problems and comorbidity of physical and mental health problems have parents with the lowest educational qualification (less than O levels). Regarding health during childhood, a higher fraction of offspring with only physical health problems had a health problem or an accident at ages 5 to 16.

3.4 Methodology

Most studies on intergenerational income mobility focus on intergenerational elasticity (IGE) analysis, which measures the association between the parental income/earnings throughout an individual's childhood and their income/earnings as an adult, as was previously explained in chapters 1 and 3. The analogous measure to study intergenerational transmission of health is the intergenerational health association (IHA) (Bencsik et al., 2021; Graeber, 2021; Halliday et al., 2021) which is based on the following equation:

$$h_i^c = \alpha + \beta h_i^p + u_i$$

where h_i^c represents the lifetime health of the offspring, h_i^p is the lifetime health of one or both of the parents, and the parameter β provides a measure of intergenerational persistence in health. This literature usually summarises the health status in a single index, either by relying on a self-reported health status or by summarising the available health information in an index,[10] which allows estimation of the correlation using a standard OLS regression.

Following the economic mobility literature, previous studies have focused on permanent health using the time average of the health measures to reduce the atten-

[10] e.g. item respond theory or principal component analysis of a battery of health indicators (Andersen, 2021; Bencsik et al., 2021; Graeber, 2021; Halliday et al., 2021; Johnston et al., 2013).

uation bias (Haider and Solon, 2006; Solon, 1992), and on health status measures during mid-life to reduce the life-cycle bias (Haider and Solon, 2006). The first approach is motivated by the relevance of permanent health problems on the general health status and the individual's well-being, compared to transitory health shocks. For instance, there is evidence that supports the association of chronic diseases with both unemployment and early retirement (Blundell et al., 2021; Pelkowski and Berger, 2004; van Rijn et al., 2014); as well as the association of mental health problems with a significant reduction of household incomes (Blundell et al., 2016; Kawakami et al., 2004). Both scenarios lead to low consumption and reduced well-being and quality of life. In contrast, transitory shocks (e.g. a broken arm) induce minor employment effects that do not affect household incomes (Beckmannshagen and Koenig, 2022). The second approach is motivated by the recognition of the potential heterogenous changes of health over the life course. Early-in-life and late-in-life health measures could lead to bias since health inequalities tend to increase with age (Deaton and Paxson, 1998; Halliday, 2011; Halliday et al., 2021)

Since the status of health has many dimensions that could be affected by different circumstances over the course of life and since contemporaneous observations of health are not a complete measure of permanent health; we measure health at different stages of life, highlighting the potential mechanisms behind health transmission. Therefore, we define a general health index (GHI) as the combination of two self-reported indicators of adverse health conditions (physical and mental). More precisely, for a given type of individual $j \in \{o = offspring, p = parent\}$, his/her overall health status h_{it}^{j} at age t can be defined as:

$$h_{it}^{j} = f(ph_{it}^{j}, mh_{it}^{j}) \tag{3.1}$$

Where ph_{it}^{j} is the physical health status and mh_{it}^{j} is the mental health status. In our case, ph_{it}^{j} measures whether the individual had suffered from any long-standing illness or disability, and mh_{it}^{j} measures the presence of psychological distress (in the case of mothers, when offspring was 5 and 16 years old). The GHI is not a measure of permanent health. However, it allows us to measure and compare the general

health status at specific periods over the life course. In the case of mothers, health is measured during the offspring's early childhood and adolescence, which are critical periods in offspring development.

In particular, the indicators of adverse physical and mental health conditions take the value of 1 if the individual has the health condition and 0 otherwise. Consequently, the general health status can be constructed as a categorical outcome, such that:

$$h_{it}^{j} = \begin{cases} 0, & \text{if } ph_{it}^{j} = mh_{it}^{j} = 0 \text{ (no health problems).} \\ 1, & \text{if } ph_{it}^{j} = 1 \text{ and } mh_{it}^{j} = 0 \text{ (only physical health problem).} \\ 2, & \text{if } ph_{it}^{j} = 0 \text{ and } mh_{it}^{j} = 1 \text{ (only mental health problem).} \\ 3, & \text{if } ph_{it}^{j} = 1 \text{ and } mh_{it}^{j} = 1 \text{ (both physical and mental health problems).} \end{cases} \tag{3.2}$$

The order of the categories implies neither a hierarchy of the health problem nor necessarily reflects the severity of the condition since they are considered independent outcomes. As a result, an individual is assigned to only one of these categories. However, it is essential to realise that not having a health problem is the best possible health status, whilst having comorbidity of physical and mental health problems is the worst. Therefore, the ambiguity in the hierarchy of health problems emerges when we independently analyse physical and mental health problems. These health problems are intimately linked through a bidirectional relationship that does not allow for identifying a priority regarding their relevance. On one side, poor mental health illness is a risk factor that affects the incidence of chronic and long-standing illnesses (Cosgrove et al., 2008; Gonzalez et al., 2008). Conversely, chronic diseases such as type II diabetes or cancer are related to depression and anxiety (Massie, 2004).

Conceptually, the definition of general health status as an unordered categorical variable does not allow us to use traditional methods such as regression to the mean or ranks to study intergenerational relationships; or to use ordinal logistic regression, which is appropriate for ordered categorical data. Therefore, due to the

nature of our outcome, we perform a multivariate multinomial analysis to examine the association between all the different categories simultaneously (Hoffman and Duncan, 1988). Specifically, conditional on the parent's health status being equal to outcome k, the probability that the health status of the offspring is outcome k is given by:

$$Pr(h_{it}^{o} = h_{k}^{c} | h_{it-1}^{p} = h_{k'}^{p}) = \frac{\exp(h_{k'}^{p}\beta)}{\sum_{m=0}^{3}\exp(h_{m}^{p}\beta)} \tag{3.3}$$

for all k and $k' = \{0,1,2,3\}$.

Our main aim is not just to assess the intergenerational association of general health status but also to determine if the likelihood that an offspring falls into a specific category of the general health status differs among the different categories of the mother's health status. For instance, to establish if the probability of an offspring having mental health problems in mid adulthood vary if the mother had physical health problems compared to when the mother does not present any health problem during the offspring's early childhood.

We consider mothers with no health problems as our baseline group, and compare the relative marginal probability of the offspring showing any health problem given that the mother suffers from any medical condition compared to the mother not having health problems. This specification allows us to analyse the association between all the possible health statuses of mothers and their offspring simultaneously. As Figure 3.4.1 shows, the multinomial logistic regression provides a set of coefficients β, corresponding to each outcome. For instance, coefficient β_{13} provides the probability of the offspring having both physical and mental health problems compared to not having health problems, given that his/her mother had only physical health problems during the offspring's early childhood, whilst coefficient β_{31} provides the probability of offspring having only physical health problems compared to not having health problems, given that his/her mother had comorbidity of physical and mental health problems during the offspring's early childhood.

The multivariate multinomial analysis is not an established method for analysing the intergenerational transmission of inequalities. Hence, it is impos-

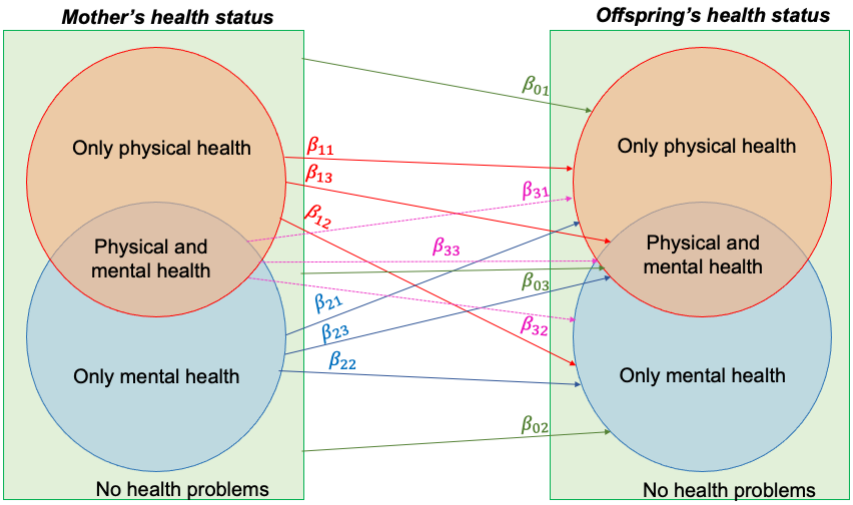

Figure 3.4.1: Structure of multivariate multinomial analysis

Note: This figure shows the set of coefficients provided by the multinomial logistic regression. Green arrows present the association of offspring having health problems, given that their mother had no health problems. Red arrows present the association of offspring having health problems, given that their mother had only physical health problems. Blue arrows present the association of offspring having health problems, given that their mother had only mental health problems. Pink arrows present the association of offspring having health problems, given that their mother had both physical and mental health problems. The baseline category is "no health problems", then coefficients β_{00}, β_{10}, β_{20} and β_{30} are equal to zero.

sible to directly compare our results to previous literature, which has defined health status as a continuous measure and studied the intergenerational persistence of health as a linear relationship. However, our approach contributes to understanding how certain circumstances in the maternal health status during the offspring's early childhood and adolescence shape the offspring's health status during early and mid adulthood; most importantly, it allows us to decompose the intergenerational transmission of mental and physical health problems.

3.4.1 Sensitivity analysis

To test the sensitivity of our results, we sequentially estimate richer variants of equation 3.3. We estimate the basic specification plus two additional models. *Model* 1 (basic specification) includes only a quadratic term in the age of the mother at the time health status is measured; *Model* 2 additionally controls for family background during childhood (i.e. teenage parenthood, parents divorce, parental education, parents social class, housing tenure and region of residence at birth), and *Model* 3 builds up from *Model* 2 and includes offspring health indicators during childhood

(i.e. health problems and accidents during childhood).

In the last two models we consider how childhood circumstances affect the intergenerational transmission of health. In the particular case of *Model* 3, these circumstances could be associated with contemporaneous effects of offspring health during childhood on mother's health and with the intertemporal effect of offspring health during childhood on offspring health in early and mid adulthood. It is important to consider that some of these cirumstances might be considered exogenous, but others are endogenous circumstances that are influenced by mother's and offspring's health.

Furthermore, we study the intergenerational transmission of health using a different specification of the mother's health status. This analysis provides a richer understanding of the unique roles of mothers' physical and mental health status during early childhood and adolescence in explaining the offspring's general health during early and mid adulthood. For example, does the mother's physical health play a different role from the mother's mental health when the comorbidity between both conditions is not explicitly considered to explain the offspring's general health? To address this question, we re-estimate a version of equation 3.3 by sex and for the pooled sample, where we include the mother's physical and mental health as dummy variables instead of an index to measure the mother's health status. More specifically, we measure the probability of the offspring been in a specific general health status given that her/his mother had any adverse physical or mental health condition during her/his early childhood and adolescence. All the different specifications are estimated separately by sex at each age, including as controls both family background and the health indicators of offspring during childhood.

3.5 Results

We now present the results of the estimation of the multinomial logistic regression in Equation 3.3 based on maternal health measured in two different life stages of offspring (early childhood and adolescence). For the purpose of making the description of findings more interpretable, from here on the terms "physical health

problems" and "mental health problems" will be used to denote only physical health problems (i.e. absence of mental health problems) and only mental health problems (i.e. absence of physical health problems).

3.5.1 Maternal health during offspring's early childhood and adult offspring health

In this section, we focus on estimation results from the multinomial logistic regression in Equation 3.3, using maternal health during early childhood of offspring as the dependent variable of interest.[11] For the three model specifications, Table 3.5.1 reports estimates of the association and the marginal change of the probability of realisation of each possible health status of offspring by age, conditional on the observed health status of the mother, using the pooled sample. In addition, Figure 3.5.1 reports estimates from *Model* 3 for the pooled sample, females and males.

Overall, regardless of age, offspring whose mothers suffered from any health problem during offspring's early childhood have lower probabilities of not being affected by any physical, mental or comorbidity of physical and mental health problems, and have higher probabilities of having both physical and mental health problems, especially in mid adulthood. For instance, compared to offspring of mothers with no health issues during offspring early childhood, the probability of offspring not having any health issues at mid adulthood is, on average, 11.8 percentage points lower for offspring of mothers who had comorbidity of physical and mental health problems. On the other hand, the probability of offspring having both physical and mental health problems during mid adulthood given that their mothers had the same health problems earlier in their lives, is on average 7.8 percentage points higher than for those whose mothers had no health problems.

Maternal physical health problems and offspring health

Having a mother with physical health problems during the offspring early childhood is positively associated with comorbidity of physical and mental health problems at early and mid adulthood; even when controlling for family background

[11] At this point, the mother's average age was 30 years old.

Table 3.5.1: Maternal health status during offspring's early childhood and offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health						
No problems	-0.040**	-0.056**	-0.041**	-0.060***	-0.040**	-0.059***
	(0.020)	(0.022)	(0.020)	(0.022)	(0.020)	(0.022)
Only physical health	0.013	0.030	0.011	0.029	0.010	0.029
	(0.014)	(0.021)	(0.013)	(0.022)	(0.013)	(0.022)
Only mental health	0.010	-0.004	0.013	-0.003	0.013	-0.003
	(0.015)	(0.011)	(0.015)	(0.012)	(0.015)	(0.012)
Physical and mental health	0.017*	0.029*	0.017*	0.034**	0.017*	0.033**
	(0.010)	(0.016)	(0.010)	(0.016)	(0.010)	(0.016)
Only mental health						
No problems	-0.050***	-0.077***	-0.034**	-0.057***	-0.034**	-0.056***
	(0.013)	(0.015)	(0.013)	(0.016)	(0.013)	(0.016)
Only physical health	-0.007	-0.002	-0.002	-0.003	-0.003	-0.003
	(0.009)	(0.012)	(0.009)	(0.013)	(0.009)	(0.013)
Only mental health	0.036***	0.015*	0.021*	0.012	0.021*	0.013
	(0.011)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)
Physical and mental health	0.021***	0.063***	0.015**	0.047***	0.015**	0.047***
	(0.006)	(0.013)	(0.006)	(0.012)	(0.006)	(0.012)
Physical and mental health						
No problems	-0.099***	-0.137***	-0.079***	-0.119***	-0.079***	-0.118***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Only physical health	0.005	0.032	0.007	0.030	0.007	0.030
	(0.017)	(0.025)	(0.017)	(0.026)	(0.017)	(0.026)
Only mental health	0.057***	0.011	0.042**	0.010	0.043**	0.010
	(0.020)	(0.015)	(0.019)	(0.015)	(0.019)	(0.015)
Physical and mental health	0.038***	0.094***	0.030**	0.079***	0.030**	0.078***
	(0.014)	(0.023)	(0.013)	(0.023)	(0.013)	(0.023)
Observations	16,417	16,417	16,417	16,417	16,417	16,417
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the pooled sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.047 in column 6 means that the probability of offspring having comorbidity of physical and health problems at mid adulthood after adjusting for all the controls is on average 4.7 percentage points higher for offspring whose mother had only mental health problems than for those whose mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

(*Model* 2) and health during childhood (*Model* 3). When we split the sample by sex (See Figure 3.5.1 and Appendix 3.D), we find that having a mother with physical health problems is associated with daughter's having physical health problems at mid adulthood under *Model* 1 specification. However, the association fades out

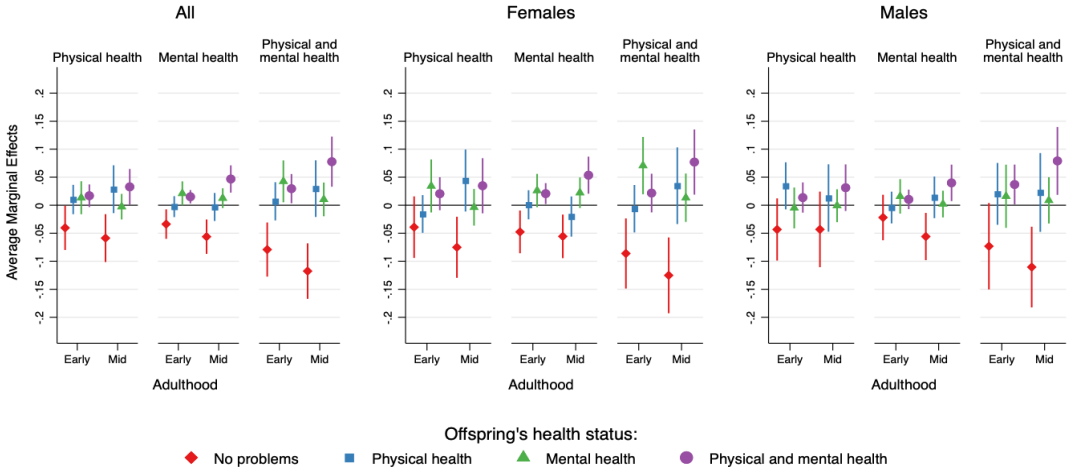

Figure 3.5.1: Association of mother's health during offspring's early childhood on offspring's health status across adulthood by sex (marginal changes)

Note: This figure shows the change in the average probability provided by the multinomial logistic regression for the pooled sample, females and males, using the *Model* 3 specification (adjusted for mother's age, offspring family background and offspring health during childhood). The baseline category for maternal health is no "health problems". The mother's health status is at the top of each figure, whilst the colourful symbols at the bottom represent the offspring's health status. For instance, the red diamonds represent the relative marginal change in the probability of offspring not having health problems, given that their mothers present physical health problems, mental health problems or both physical and mental health problems. Bars indicate 95% confidence intervals.

when we account for family background and health during childhood. In contrast, having a mother with physical health problems is not associated with sons having any health problems during early or mid adulthood.

Maternal mental health problems and offspring health

Having a mother with poor mental health in early childhood is strongly associated with offspring reporting comorbidity of physical and mental health problems in early and mid adulthood; even when family background and health during childhood are taken into account. Similarly, poor maternal health in early childhood is associated with offspring having mental health problems; however, the association is no longer significant in mid adulthood when we account for family background and health during childhood.

When we split the sample by sex, results show the same trend for the daughter's health status but some differences for the son's health status (See Figure 3.5.1 and Appendix 3.D for more details). Having a mother with high psychological distress in early childhood is associated with her son reporting comorbidity of physical and

mental health problems in early and mid adulthood. Nevertheless, after controlling for family background and health during childhood, this association emerges in mid adulthood only.

Maternal comorbidity of physical and mental health problems and offspring health

Having a mother who suffered from comorbidity of physical and mental health during the offspring's early childhood is significantly related to offspring having poor mental health in early adulthood, and comorbidity of physical and mental health in early and mid adulthood; even when family background and health during childhood are accounted for. An important observation to highlight is the increment in the probability change of having comorbidity of physical and mental health problems from early to mid adulthood.

In our analysis by sex, we find that daughters of mothers with comorbidity of physical and mental health during their early childhood are more likely to suffer from poor mental health in early adulthood and from comorbidity of physical and mental health in mid adulthood. In contrast, sons of mothers who suffered from comorbidity of physical and mental health are more likely to report the same health status as their mother in early and mid adulthood. These results slightly weaken when we account for the offspring's family background (*Model* 2) and health during childhood (*Model* 3).

In general, we find a strong relationship between maternal health status during offspring's early childhood and offspring health status in early and mid adulthood, which was slightly reduced for maternal mental health problems and comorbidity of physical and mental health problems, and marginally increased for maternal physical health once we controlled for a wide range of family socio-economic background information and offspring's health during childhood.[12] Additionally, for the pooled sample and sons, the relationship between maternal health and offspring's

[12]One of those confounders would be teenage parents. Adolescent mothers are more likely to suffer from truncated education, poor employment, depression and post-traumatic stress disorder, and hence worse mental health and less investment in their offspring's health (Baldwin and Cain, 1980; Harden et al., 2007; Siegel and Brandon, 2014).

health seems robust to the inclusion of health during childhood. The size of the respective coefficient barely changed, which can be interpreted as a lack of significant correlation between the son's health during childhood (i.e., health problems and accidents in childhood) and maternal general health status during the offspring's early childhood. Therefore, we can assume that this analysis rules out the possibility that the mother's health problems during the offspring's early childhood is associated with the offspring's poor health in that period.

Although the association between maternal health status and offspring comorbidity of physical and mental health problems presents an increasing trend by age for all the samples, the estimates are not statistically different from each other across ages. Overall, our results suggest that offspring whose mothers had poor mental health and comorbidity of physical and mental health problems during early childhood have a higher probability of having comorbidity of physical and mental health problems during mid adulthood regardless of sex.

In addition, there is evidence of a "health status gradient" in the association between the maternal general health status and offspring having comorbidity of physical and mental health problems in mid adulthood. In particular, the probability of offspring showing poor physical and mental health increases if the health status of the mother, starting from physical problems (3.3 percentage points), changes to mental health problems (4.7 percentage points) and then to comorbidity of physical and mental health problems (7.8 percentage points).

3.5.2 Maternal health during offspring's adolescence and adult offspring health

Mother's mental health can affect her offspring's health status through different pathways. Apart from the genetic component (Monaco, 2021; Thompson, 2014; Warner and Weissman, 2014), the likelihood that offspring develop any health problems is also related to less engaged parenting, poor attachment and worse child development, which is critical for positive lifelong outcomes, such as educational attainment, employment and adult health and wellbeing (Abel et al., 2019; Kiernan and Huerta, 2008; Lovejoy et al., 2000; Martins and Gaffan, 2000). Adverse ex-

periences in early childhood and adolescence, including being in poverty, domestic violence, or having a mother with health problems (physical or mental) are important contributors to offspring health status during adulthood (Siegel and Brandon, 2014; Thu Le and Nguyen, 2018; Wickham et al., 2017). Furthermore, sensitive periods of life such as early childhood or adolescence, where offspring are exposed to these adversities could exacerbate the negative effects on lifelong outcomes.

In this section, we will focus on estimation results using as exposure the maternal health status at offspring age 16 (adolescence). For the three model specifications, Table 3.5.2 reports estimates from the multinomial logistic regression (Equation 3.3) for the pooled sample at offspring early and mid adulthood. It shows the association and the marginal change of the probability of realisation of each possible health status of offspring by age, conditional on the observed health status of the mother. In addition, Figure 3.5.2 reports estimates from *Model* 3 for the pooled sample, females and males.

Overall, offspring whose mother suffered from mental health problems or comorbidity of physical and mental health problems during offspring's adolescence have lower probabilities of not being affected by any physical, mental or comorbidity of physical and mental health problems, and have higher probabilities of having both physical and mental health problems, especially in mid adulthood. At this age, compared to their peers whose mothers did not report any health problems, the probability of offspring having comorbidity of physical and mental health problems is 7.4 percentage points higher.

Maternal physical health problems and offspring health

Compared to the results presented in the previous section, estimates of the association between mother's physical health problems and offspring health status present a noticeable difference. Having a mother with poor physical health during adolescence is negatively associated with not being affected by any health problem (physical or mental) and positively associated with having comorbidity of physical and mental health problems, only at mid adulthood. When we split the sample by sex (See Figure 3.5.2 and Appendix 3.E for more details), we find that even when con-

Table 3.5.2: Maternal health status during offspring's adolescence and offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health						
No problems	-0.044*	-0.054*	-0.041	-0.054*	-0.041	-0.054*
	(0.026)	(0.028)	(0.025)	(0.029)	(0.025)	(0.028)
Only physical health	0.014	0.017	0.013	0.017	0.012	0.016
	(0.018)	(0.024)	(0.018)	(0.024)	(0.018)	(0.024)
Only mental health	0.011	-0.003	0.011	-0.003	0.012	-0.002
	(0.018)	(0.014)	(0.018)	(0.014)	(0.018)	(0.014)
Physical and mental health	0.018	0.040**	0.017	0.040**	0.017	0.040**
	(0.012)	(0.018)	(0.012)	(0.018)	(0.012)	(0.018)
Only mental health						
No problems	-0.060***	-0.051***	-0.055***	-0.045***	-0.055***	-0.044***
	(0.015)	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)
Only physical health	0.012	-0.009	0.013	-0.010	0.013	-0.010
	(0.009)	(0.013)	(0.009)	(0.014)	(0.009)	(0.014)
Only mental health	0.030***	0.016**	0.026**	0.016**	0.026**	0.016**
	(0.011)	(0.008)	(0.011)	(0.008)	(0.011)	(0.008)
Physical and mental health	0.018***	0.043***	0.017***	0.039***	0.016**	0.038***
	(0.006)	(0.011)	(0.006)	(0.010)	(0.006)	(0.010)
Physical and mental health						
No problems	-0.100***	-0.110***	-0.088***	-0.102***	-0.088***	-0.100***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Only physical health	0.007	0.010	0.006	0.009	0.005	0.008
	(0.015)	(0.021)	(0.015)	(0.021)	(0.015)	(0.021)
Only mental health	0.055***	0.018	0.049***	0.018	0.051***	0.019
	(0.017)	(0.012)	(0.016)	(0.013)	(0.016)	(0.013)
Physical and mental health	0.038***	0.082***	0.033***	0.075***	0.032***	0.074***
	(0.011)	(0.017)	(0.010)	(0.017)	(0.010)	(0.017)
Observations	16,417	16,417	16,417	16,417	16,417	16,417
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the pooled sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 16, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.038 in column 6 means that the probability of offspring having comorbidity of physical and health problems at mid adulthood after adjusting for all the controls is on average 3.8 percentage points higher for offspring whose mother had only mental health problems than for those whose mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

trolling for family background and health during childhood, having a mother with physical health problems during adolescence is associated with daughters reporting comorbidity of physical and mental health problems in early and mid adulthood. As in the previous section, the health status of sons is not associated with maternal poor health during their adolescence.

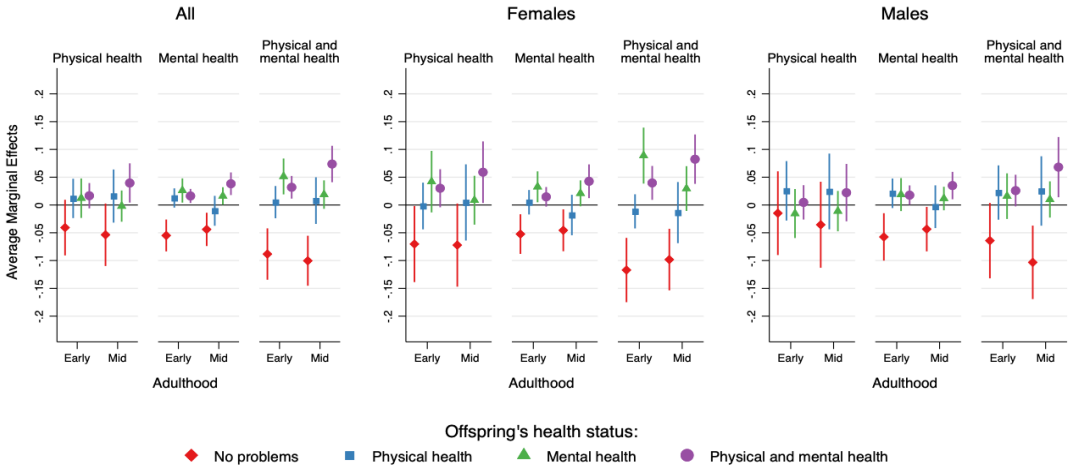

Figure 3.5.2: Association of mother's health during offspring's adolescence on offspring's health status across adulthood by sex (marginal changes)

Note: This figure shows the change in the average probability provided by the multinomial logistic regression for the pooled sample, females and males, using the *Model* 3 specification (adjusted for mother's age, offspring family background and offspring health during childhood). The baseline category for maternal health is "no health problems". The mother's health status is at the top of each figure, whilst the colourful symbols at the bottom represent the offspring's health status. For instance, the red diamonds represent the relative marginal change in the probability of offspring not having health problems, given that their mothers present only physical health problems, only mental health problems or both physical and mental health problems. Bars indicate 95% confidence intervals.

Maternal mental health problems and offspring health

Even when family background and health during childhood are considered, having a mother with high psychological distress during adolescence is associated with offspring reporting poor mental health and comorbidity of physical and mental health in early and mid adulthood. Contrary to the results reported in the previous section, these associations persist from early to mid adulthood. By sex, these trends present some differences. First, having a mother with poor mental health is associated with daughters having mental health problems and comorbidity of physical and mental health problems. Although in the case of poor mental health, the association still persists from early to mid adulthood, in the case of comorbidity the association emerges in mid adulthood only. Second, poor maternal mental health during adolescence is associated with sons having comorbidity of physical and mental health problems; this association persists from early to mid adulthood, in contrast to the findings in the previous section where the association was significant only in mid adulthood.

Maternal comorbidity of physical and mental health problems and offspring health

Having a mother who suffered from comorbidity of physical and mental health problems is still strongly associated with offspring having poor mental health in early adulthood, and comorbidity of physical and mental health problems from early to mid adulthood. However, there is a slight reduction in the probability change in early adulthood and a marginal increment in mid adulthood. These trends persist even when we account for family background and health during childhood.

When we split the sample by sex, we find that even when family background and health during childhood are considered, having a mother with comorbidity of physical and mental health problems is associated with daughters having poor mental health and comorbidity of physical and mental health problems. The association with poor mental health is still only present in early adulthood. In contrast to the results reported for maternal health in early childhood, the association with comorbidity of physical and mental health persists from early to mid adulthood. Regarding sons, as in previous estimations, the association with comorbidity of physical and mental health is presented in early and mid adulthood.

In general, we find a strong relationship between maternal health status during offspring's adolescence and offspring health status in adulthood, which was slightly reduced once we controlled for a wide range of family socio-economic background information and offspring's health during childhood. It also seems that daughters are not affected by mothers having poor physical health during their early childhood, but they might be affected if maternal physical health problems arise during their adolescence. This could be related to two elements that could affect daughters' health during adulthood: additional responsibilities and genetic vulnerability (Faulkner and Davey, 2010). First, if the mother has any physical health condition, adolescent daughters are more likely to assume care responsibilities not only with their mother but in some cases with their younger siblings. The allocation of additional roles and responsibilities at home make adolescent daughters more vulnerable to emotional distress. Second, it is well know that diseases such as can-

cer (Faulkner and Davey, 2010), chronic health conditions (Thompson, 2014) and cardiomyopathy are more likely to be transmitted from mother to daughter.

The "health status gradient" in the association between the maternal general health status and offspring having comorbidity of physical and mental health problems in mid adulthood, identified in the previous section, is no longer evident when we consider maternal health status during offspring's adolescence.

The results of this study are in line with those presented previously in the literature. Studies from different fields (e.g. economics, psychology) have found that children whose mothers experience health problems have worse health outcomes. Specifically, they have reported a positive association between maternal mental health and child mental health (Johnston et al., 2013; Propper et al., 2007; Thu Le and Nguyen, 2018), maternal mental health and child's physical conditions (e.g. asthma morbidity, food or digestive allergies, tonsillitis incidence) (Goodman et al., 2011; Propper et al., 2007; Thu Le and Nguyen, 2018), parents' and child's general health (Bauldry et al., 2012; Darden and Gilleskie, 2016; Halliday et al., 2021; Kim et al., 2015; Propper et al., 2007) and mother's physical health and child's physical health (e.g. anthropometric measures, BMI, chronic health conditions, weight) (Classen, 2010; Goodman et al., 2011; Propper et al., 2007; Thompson, 2014; Venkataramani, 2011).

3.5.3 Sensitivity analysis

We now use a different measure of maternal health to test the consistency of our results and the relevance of measuring the general health status as an index which considers the comorbidity of physical and mental health problems. Specifically, we measure the mother's physical and mental health statuses as dichotomous variables to analyse the unique roles of maternal physical and mental health in explaining the offspring's general health when comorbidity is not considered explicitly in the definition of mother's health.

Estimates reported in Table 3.5.3 and Figure 3.5.3 below show a similar pattern to those found when physical and mental health comorbidity was considered directly in the mother's health status during the offspring early childhood. However,

some differences need to be highlighted.

Table 3.5.3: Maternal physical and mental problems during offspring's early childhood and offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.043***	-0.057***	-0.042**	-0.060***	-0.042**	-0.060***
	(0.017)	(0.019)	(0.017)	(0.018)	(0.017)	(0.018)
Only physical health	0.013	0.032*	0.010	0.031*	0.010	0.031*
	(0.011)	(0.018)	(0.011)	(0.018)	(0.011)	(0.018)
Only mental health	0.014	-0.003	0.016	-0.002	0.017	-0.002
	(0.012)	(0.010)	(0.012)	(0.010)	(0.012)	(0.010)
Physical and mental health	0.016*	0.029**	0.016*	0.032**	0.015*	0.031**
	(0.009)	(0.013)	(0.009)	(0.013)	(0.009)	(0.013)
Mental health problems						
No problems	-0.052***	-0.078***	-0.035***	-0.057***	-0.034***	-0.057***
	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)
Only physical health	-0.007	-0.001	-0.002	-0.002	-0.003	-0.002
	(0.009)	(0.012)	(0.009)	(0.012)	(0.009)	(0.012)
Only mental health	0.038***	0.015*	0.022**	0.013	0.022**	0.013
	(0.011)	(0.008)	(0.011)	(0.008)	(0.011)	(0.008)
Physical and mental health	0.021***	0.063***	0.015***	0.047***	0.015**	0.046***
	(0.006)	(0.012)	(0.006)	(0.012)	(0.006)	(0.012)
Observations	16,417	16,417	16,417	16,417	16,417	16,417
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the pooled sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.038 in column 9 means that the probability of offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 3.8 percentage points higher for offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

First, even when controlling for family background (*Model* 2) and health during childhood (*Model* 3), having a mother with physical health problems during early childhood is now positively associated with offspring having poor physical health in mid adulthood. Since the mother's health status does not account for comorbidity of poor physical and mental health, the contrasting result must be driven by those mothers who, besides physical health problems, also have mental health problems. This only makes our approach of explicitly accounting for comorbidity stronger for the purpose of better identify the intergenerational transmission of

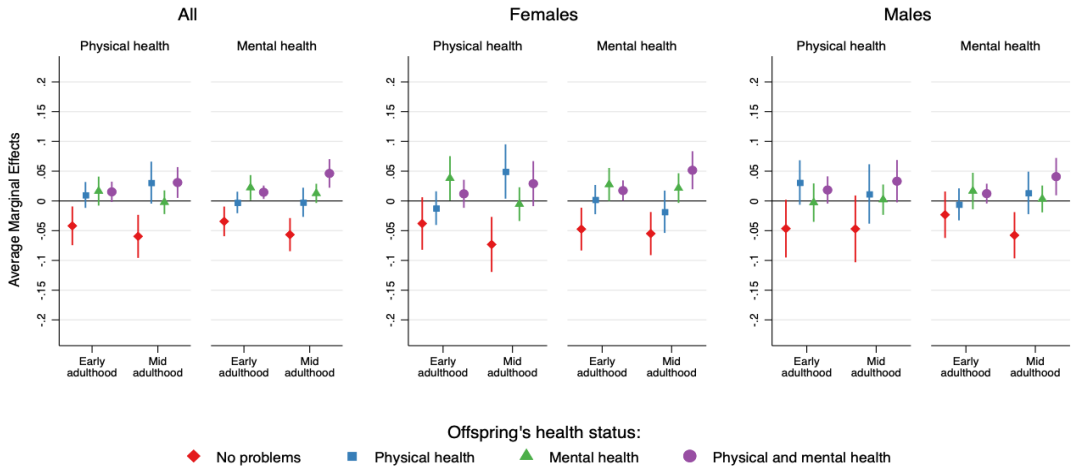

Figure 3.5.3: Association of mother's physical health and mental health during offspring's early childhood on offspring's health status across adulthood by sex (marginal changes)

Note: This figure shows the change in the average probability provided by the multinomial logistic regression for the pooled sample, females and males, using the *Model* 3 specification (adjusted for mother's age, offspring family background and offspring health during childhood). The baseline category for maternal health is "no health problems". The mother's health status is at the top of each figure, whilst the colourful symbols at the bottom represent the offspring's health status. For instance, the red diamonds represent the relative marginal change in the probability of offspring not having health problems, given that their mothers present only physical health problems, only mental health problems or both physical and mental health problems. Bars indicate 95% confidence intervals.

health.

When we split the sample by sex (See Figure 3.5.3 and Appendix 3.F.1 for more details), similar contrasting results arise. On one hand, having a mother with poor physical health during early childhood is now associated with daughters reporting poor physical health in mid adulthood and poor mental health in early adulthood. On the other hand, having a mother with physical health problems during early childhood is associated with sons having comorbidity of physical and mental health problems in mid adulthood. Once again, these results must be mostly driven by the absence of comorbidity of physical and mental health problems in the general health status measure of the mother.

Second, even when family background and health during childhood are considered, having a mother with high psychological distress during early childhood is associated with her daughter's poor mental health not only during early adulthood, but during mid adulthood as well. The significance of the association in mid adulthood must be driven by those mothers who, besides poor mental health, also have

physical health problems.

Regarding the effects of mother's health during the offspring's adolescence (See Table 3.5.4 and Figure 3.5.4), we find that, regardless of age, offspring whose mothers had poor physical health have a lower probability of not being affected by any physical, mental or comorbidity of physical and mental health problems, and have a higher probability of suffering from comorbidity of physical and mental health problems. These associations only emerged in mid adulthood when we accounted for comorbidity of physical and mental health problems as one possible health status of the mother.

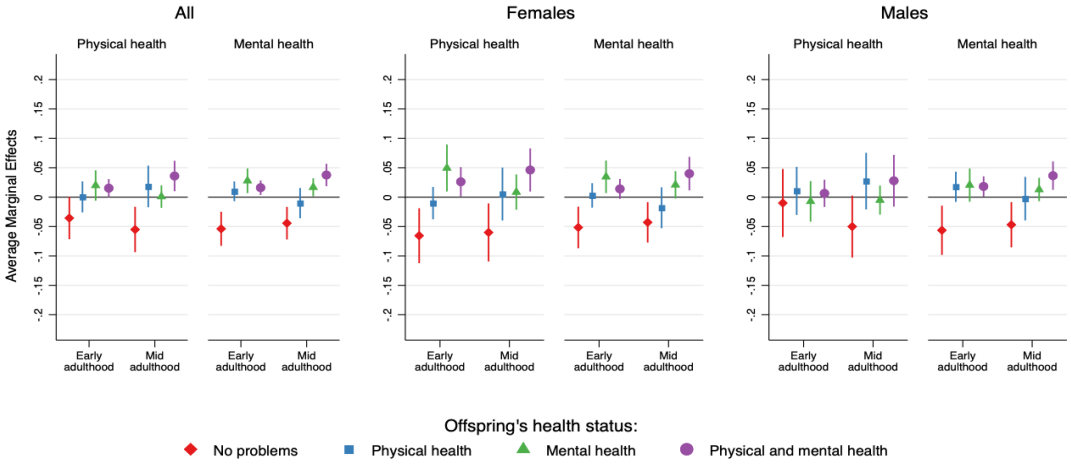

Figure 3.5.4: Association of mother's physical health and mental health during offspring's adolescence on offspring's health status across adulthood by sex (marginal changes)

Note: This figure shows the change in the average probability provided by the multinomial logistic regression for the pooled sample, females and males, using the *Model* 3 specification (adjusted for mother's age, offspring family background and offspring health during childhood). The baseline category for maternal health is "no health problems". The mother's health status is at the top of each figure, whilst the colourful symbols at the bottom represent the offspring's health status. For instance, the red diamonds represent the relative marginal change in the probability of offspring not having health problems, given that their mothers present only physical health problems, only mental health problems or both physical and mental health problems. Bars indicate 95% confidence intervals.

In our analysis by sex (See Figure 3.5.4 and Appendix 3.F.2 for more details), we find that having a mother with physical health problems is now associated with daughters having poor mental health in early adulthood. For sons, we now find that having a mother with poor physical health during adolescence is only associated with them not being affected by any physical, mental and comorbidity of physical and mental health problems in mid adulthood. All of these results are mainly driven

by those mothers with comorbidity of physical and mental health problems who are being accounted as suffering from physical health problems.

Table 3.5.4: Maternal physical and mental problems during offspring's adolescence and offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.040**	-0.057***	-0.036*	-0.056***	-0.036*	-0.055***
	(0.018)	(0.019)	(0.018)	(0.019)	(0.018)	(0.020)
Only physical health	0.003	0.019	0.001	0.019	0.000	0.018
	(0.013)	(0.018)	(0.013)	(0.018)	(0.013)	(0.018)
Only mental health	0.020	0.000	0.019	0.000	0.020	0.001
	(0.013)	(0.009)	(0.013)	(0.010)	(0.013)	(0.010)
Physical and mental health	0.018**	0.038***	0.016**	0.036***	0.015*	0.036***
	(0.008)	(0.013)	(0.008)	(0.013)	(0.008)	(0.013)
Mental health problems						
No problems	-0.060***	-0.051***	-0.054***	-0.045***	-0.054***	-0.044***
	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)
Only physical health	0.009	-0.009	0.010	-0.010	0.010	-0.010
	(0.008)	(0.013)	(0.008)	(0.013)	(0.009)	(0.013)
Only mental health	0.032***	0.017**	0.027***	0.017**	0.028***	0.017**
	(0.011)	(0.008)	(0.011)	(0.008)	(0.011)	(0.008)
Physical and mental health	0.019***	0.043***	0.017***	0.038***	0.016***	0.038***
	(0.006)	(0.010)	(0.006)	(0.010)	(0.006)	(0.010)
Observations	16,417	16,417	16,417	16,417	16,417	16,417
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the pooled sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 16, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.034 in column 9 means that the probability of offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 3.4 percentage points higher for offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

3.6 Final remarks

In this study, we have examined the association between maternal health status and offspring health status. Using the BCS70, we decompose the general health status of mothers and their offspring into four categories (no health problems, only physical health problems, only mental health problems and comorbidity of physical and health problems) to determine if the likelihood that an offspring falls into a spe-

cific category of the general health status differs among the different categories of the mother's health status, with a particular focus on the comorbidity of physical and mental health problems. We also compare the association between maternal health across two critical developmental periods of the offspring (early childhood and adolescence), and the offspring's health during early and mid adulthood.

Even after controlling for family background and offspring's health during childhood, we find a significant intergenerational association between maternal health and offspring health. Specifically, for the pooled sample and regardless of the offspring's age at which maternal health is considered, we find that having a mother with poor mental health, or with comorbidity of physical and mental health problems, significantly increases the chance of their offspring having mental health problems in early adulthood and comorbidity of physical and mental health problems during early and mid adulthood. The association of poor maternal mental health is extended to mid adulthood when mother has poor mental health during offspring's adolescence.

In the particular case of daughters, having a mother with poor mental health in their early childhood is associated with daughters having poor mental health in early adulthood and comorbidity of physical and mental health problems in early and mid adulthood. However, if the mother has mental health problems during her daughter's adolescence, the likelihood of daughters having poor mental health persists between early and mid adulthood, whilst the comorbidity of physical and mental health problems emerges in mid adulthood. Furthermore, having a mother with comorbidity of physical and mental health problems in early childhood is associated with daughters having poor mental health in early adulthood and comorbidity of physical and mental health problems in mid adulthood. Nevertheless, if maternal comorbidity arises during the daughter's adolescence, her comorbidity of physical and mental health problems persists between early and mid adulthood.

For sons, having a mother with poor mental health in early childhood is associated with them reporting mental health problems in mid adulthood and comorbidity of physical and mental health problems in early and mid adulthood. However, if

maternal health is considered in son's adolescence, we find that having a mother with mental health problems or comorbidity of physical and mental health is associated with them having comorbidity of physical and mental health problems during early and mid adulthood.

Concerning physical health, the associations are weaker. Regardless of the offspring's age at which maternal health is measured, poor maternal physical health is not associated with sons' health status at any stage during adulthood. However, this maternal health status is associated with daughters having comorbidity of physical and mental health problems from early to mid adulthood, when the mother's health status is measured during the offspring's adolescence.

When we focus on the effects of maternal health during offspring early childhood, there is evidence of a "health status gradient" in the association between the maternal general health status and offspring having comorbidity of physical and mental health problems in mid adulthood. In particular, the probability of offspring showing poor physical and mental health increases if the health status of the mother, starting from physical problems, counterfactually changes to mental health problems and then to comorbidity of physical and mental health problems. However, the gradient is no longer evident when we consider the effects of the maternal health status during offspring's adolescence.

Overall, the results from this study highlight the importance of explicitly accounting for comorbidity of physical health and mental health problems when estimating the intergenerational association of health between mothers and adult offspring. Failing to account for this particular health status could result in overestimation of the effect of poor maternal physical health on offspring's health status.

To the best of our knowledge, this is the first study that accounts directly for the comorbidity of physical and mental health problems in examining the intergenerational transmission of general health status. One major strength of our study lies in the prospective nature of the data coming from an observational longitudinal study, which is representative of the mid-life population born in Britain around fifty years ago. However, there are also limitations regarding selective attrition and

a large proportion of missing data. Hence, we used multiple imputation to reduce resulting biases. We enrich the model in the imputation phase with auxiliary variables to maximise the plausibility of the missing random assumption and to restore sample representativeness. These variables are not part of the substantive model of interest, but they are related to the probability of missingness and/or to the incomplete outcome. One further limitation is that the measure of maternal physical health is based on a question about general health that does not list particular health conditions, and which only asks mothers about other health problems besides those listed in the Malaise Inventory questionary. However, this is the only source of maternal physical health information available for at least two periods during offspring childhood.

Appendix

3.A Questionary

3.A.1 Malaise Inventory

Table 3.A.1: Items of the Malaise Inventory

How are you feeling generally...
1. Do you often have backache?
2. Do you feel tired most of the time?
3. Do you often feel miserable or depressed?
4. Do you often have bad headaches?
5. Do you often get worried about things?
6. Do you usually have great difficulty in falling or staying asleep?
7. Do you usually wake unnecessarily early in the morning?
8. Do you wear yourself out worrying about your health?
9. Do you often get in a violent rage?
10. Do people often annoy and irritate you?
11. Have you at times had twitching of the face, head or shoulders?
12. Do you often suddenly become scared for no good reason?
13. Are you scared to be alone when there are no friends near you?
14. Are you easily upset or irritated?
15. Are you frightened of going out alone or of meeting people?
16. Are you constantly keyed up and jittery?
17. Do you suffer from indigestion?
18. Do you suffer from an upset stomach?
19. Is your appetite poor?
20. Does every little thing get on your nerves and wear you out?
21. Does your heart often race like mad?
22. Do you often have bad pains in your eyes?
23. Are you troubled with rheumatism or fibrositis?
24. Have you ever had a nervous breakdown?

Note: In bold – nine items used to homogenise mother and child measures.

3.A.2 Health variables in the 1970 British Cohort Study

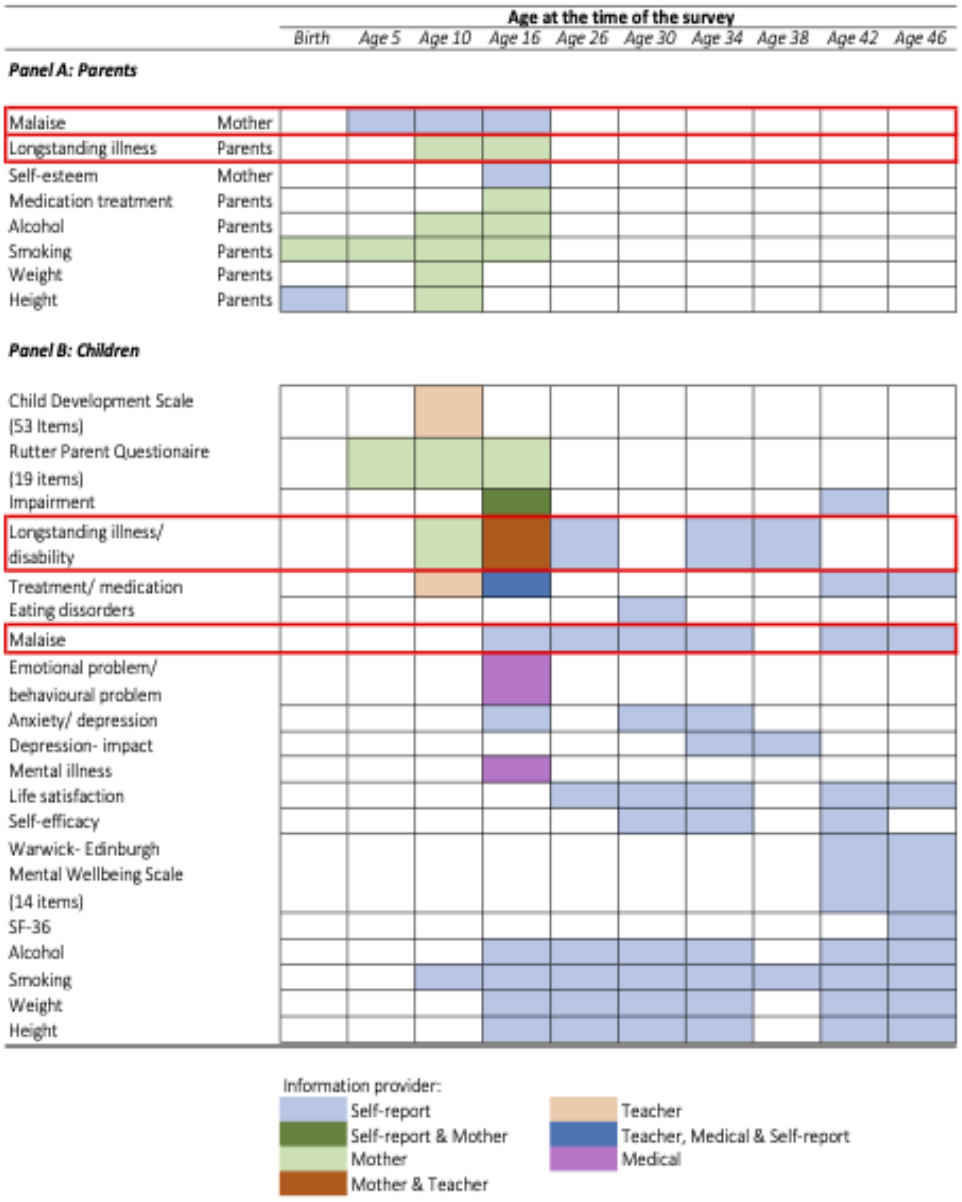

Figure 3.A.1: Health variables in the 1970 British Cohort Study

3.B Multiple Imputation

We performed Multiple Imputations (MI) with chained equations to minimise the bias due to attrition and non-response with 60 imputed datasets using all variables in the primary model and auxiliary variables in the imputation process. Auxiliary variables maximised the missing at random (MAR) assumption's plausibility, im-

proving the MI's accuracy and minimising non-random variation in the imputed variables. We performed a MI by sex for all the individuals whose mother's average age during childhood is below 50 except those who migrated or died by age 42 (n=16,417). We then performed our regression analysis only on those with non-missing outcomes. Variables included in the imputation:

- Child's health variables: physical health and mental health at age 26 and 46.
- Mother's health variables: physical health and mental health at offspring age 5 and 16.
- Controls: mother's age, teenage mother, teenage father, parents divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5 and 16, housing tenure at age 5 and 16, region of birth at birth, offspring's ever had health problems during childhood and offspring's ever had accidents during childhood.
- Auxiliary variables (These variables are associated with offspring's health and are predictors of missing data): propensity to response, low bird weight, childhood cognitive ability at age 10[13], ever has been admitted to hospital during childhood (Age 5, 10 or 16), voted in any of the general elections (1997, 2001, 2005, 2015 or 2017),member of Union/Staff Association any time during adulthood (Age 34, 42 or 42), ever has been member of a Organisation/Club (Age 16, 30, 34, 42 or 46), ever had own children.

We do not include the aggregate health measures in the imputed variable list because these variables are a function of imputed variables: physical health and mental health. Therefore, aggregate measures are registered as "passive variables" and generated with the imputed values of these variables. The following tables and figure show the missingness by waves (Table 3.B.1), the missing patterns of health

[13]Cognitive ability was assessed at age 10, using a verbal (word definition and word similarities) and non-verbal test (recall of digits and matrices). To establish the presence of a general cognitive ability factor, we carried out a principal component analysis (PCA) for each of the verbal and non-verbal sub-tests as in Schoon (2010); Silverwood et al. (2021).

status variable (Figure 3.B.1) and the frequency and proportion of missing data for each variable used in the MI process (Table 3.B.2).

Table 3.B.1: Missingness in BCS70 across waves

	Mother's health		***Offspring's health***	
Year	1975	1986	1996	2016
Age	5	16	26	46
Complete cases	12,302	7849	7,747	7,236
Missing due to incomplete scale*	344	2787	518	646
Missing due to non-participation	3,221	5181	7,463	7,601
Missing due to death	550	600	689	934
Total	16,417	16,417	16,417	16,417

Note: *Refers to those who participate in the survey but didn't provide complete information for physical and mental health.

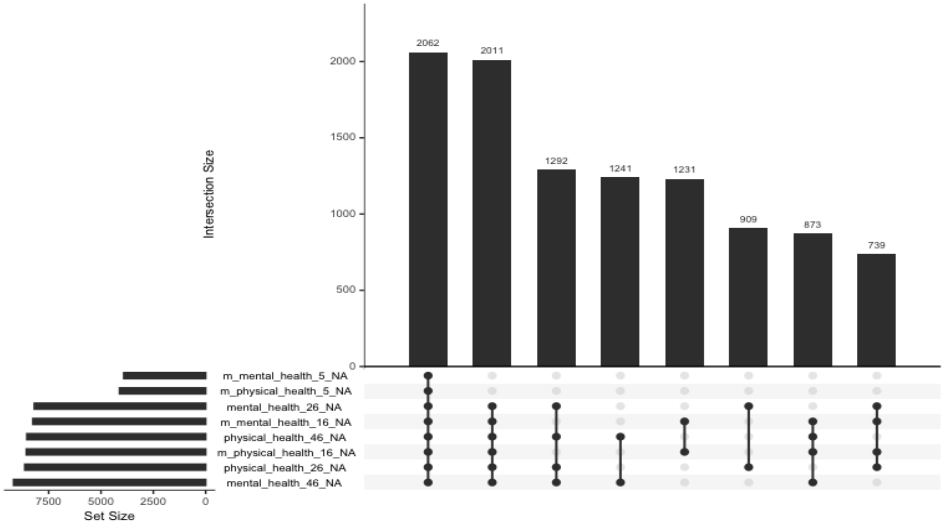

Figure 3.B.1: Missing data patterns of health status variables

Note: Left: Marginal distribution of missing observations per variable. Right: Combination of missingness across cases.

Table 3.B.2: Frequency and proportion of missing values for each variable used in the MI

Variable	Missing	Total observations	Percent missing
Health status (age)			
Offspring's general health status (26)	8,669	16,417	52.81
Offspring's general health status (46)	9,181	16,417	55.92
Offspring's mental health (26)	8,188	16,417	49.88
Offspring's mental health (46)	9,177	16,417	55.9
Offspring's physical problems (26)	8,642	16,417	52.64
Offspring's physical problems (46)	8,540	16,417	52.02
Mother's general health status (5)	4,115	16,417	25.07
Mother's general health status (16)	8,568	16,417	52.19
Mother's mental health (5)	3,909	16,417	23.81
Mother's mental health (16)	8,251	16,417	50.26
Mother's physical problem (5)	4,114	16,417	25.06
Mother's physical problem (16)	8,567	16,417	52.18
Family socio-economic background (age)			
female	0	16,417	0
Mother's age (0)	0	16,417	0
Teenager mother at birth (0)	0	16,417	0
Teenager father at birth (0)	0	16,417	0
Parents divorced during childhood (0-16)	1,656	16,417	10.09
Highest parental educational level (0)	4,151	16,417	25.28
Age mother lefts education (5)	3,885	16,417	23.66
Age father lefts education (5)	4,563	16,417	27.79
Region of residence at birth (0)	0	16,417	0
Parents' social class (5)	4,284	16,417	26.09
Parents' social class (16)	10,218	16,417	62.24
Housing tenure (5)	3,809	16,417	23.2
Housing tenure (16)	7,720	16,417	47.02
Health during childhood (age)			
Ever had a health problem (0-16)	1,811	16,417	11.03
Ever had an accident (0-16)	1,945	16,417	11.85
Auxiliary variables (age)			
Propensity to respond in 4 or more waves	0	16,417	0
Low birth weight (0)	29	16,417	0.18
Cognitive ability (10)	5,123	16,417	31.21
Ever has been admited to a hospital during childhood (5-16)	1,934	16,417	11.78
Voted in any of the elections (	4,557	16,417	27.76
Member of Union/Staff Association any time during adulthood (34, 42, 46)	4,851	16,417	29.55
Ever has been member of a Organisation/Club (16, 30, 34, 42, 46)	4,677	16,417	28.49
Ever had own children (26 -46)	6,921	16,417	42.16

3.C Descriptive statistics at mid adulthood

Table 3.C.1: Distribution of the mother's health status and family characteristics by offspring's health status at mid adulthood (Age 46)

	No problems		Physical health (only)		Mental health (only)		Physical and mental health	
	N	%	*N*	%	*N*	%	*N*	%
Maternal health status (age)								
Mother's physical problem (5)								
No	3135	89.4%	1256	86.3%	392	88.9%	592	85.7%
Yes	371	10.6%	199	13.7%	49	11.1%	99	14.3%
Mother's physical problem (16)								
No	2208	86.9%	948	85.4%	278	85.5%	397	81.5%
Yes	334	13.1%	162	14.6%	47	14.5%	90	18.5%
Mother's mental health (5)								
Low Psych distress	2,865	80.7%	1,151	78.1%	339	75.7%	498	70.2%
High psych distress	684	19.3%	323	21.9%	109	24.3%	211	29.8%
Mother's mental health (16)								
Low Psych distress	1,625	61.9%	683	59.2%	180	53.9%	264	52.8%
High psych distress	1,001	38.1%	471	40.8%	154	46.1%	236	47.2%
Mother's general health status (5)								
No problems	2595	74.0%	1015	69.8%	305	69.2%	427	61.8%
Physical health (Only)	244	7.0%	124	8.5%	29	6.6%	60	8.7%
Mental health (Only)	540	15.4%	241	16.6%	87	19.7%	165	23.9%
Physical and mental health	127	3.6%	75	5.2%	20	4.5%	39	5.6%
Mother's general health status (16)								
No problems	1,447	56.9%	603	54.3%	161	49.5%	223	45.8%
Physical health (Only)	140	5.5%	61	5.5%	13	4.0%	35	7.2%
Mental health (Only)	760	29.9%	345	31.1%	117	36.0%	174	35.7%
Physical and mental health	194	7.6%	101	9.1%	34	10.5%	55	11.3%
Mother's age (0)	26.0	(5.1)	25.8	(5.3)	25.8	(5.2)	26.0	(5.7)
Family socio-economic background (age)								
Teenager mother at birth (0)								
No	3819	92.6%	1583	90.5%	502	92.4%	731	89.0%
Yes	304	7.4%	166	9.5%	41	7.6%	90	11.0%
Teenager father at birth (0)								
No	4047	98.2%	1713	97.9%	533	98.2%	797	97.1%
Yes	76	1.8%	36	2.1%	10	1.8%	24	2.9%
Parents divorced during childhood (0-16)								
Not divorced	3247	85.1%	1323	82.9%	395	81.8%	584	79.9%
Divorced	568	14.9%	273	17.1%	88	18.2%	147	20.1%
Highest parental educational level (0)								
Less than O levels	1568	44.9%	697	48.1%	225	50.7%	373	53.4%
0 levels/GCSEs	844	24.1%	335	23.1%	95	21.4%	142	20.3%
A levels	317	9.1%	123	8.5%	43	9.7%	67	9.6%
Higher education	767	21.9%	295	20.3%	81	18.2%	117	16.7%
Age mother lefts education (5)								
Above 16	586	16.5%	226	15.3%	58	12.9%	98	13.7%
16 or younger	2,962	83.5%	1,253	84.7%	392	87.1%	615	86.3%
Age father lefts education (5)								
Above 16	631	18.6%	226	16.0%	74	17.2%	92	13.8%

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Table 3.C.1 Distribution of characteristics by offspring's health status at age 26 – Continued from previous page

	No problems		Physical health (only)		Mental health (only)		Physical and mental health	
	N	%	*N*	%	*N*	%	*N*	%
16 or younger	2,766	81.4%	1,188	84.0%	357	82.8%	576	86.2%
Region of residence at birth (0)								
North	250	6.1%	115	6.6%	37	6.8%	71	8.6%
Yorks and Humberside	363	8.8%	149	8.5%	51	9.4%	89	10.8%
East Midlands	276	6.7%	106	6.1%	36	6.6%	57	6.9%
East Anglia	151	3.7%	59	3.4%	19	3.5%	29	3.5%
South East	1,246	30.2%	564	32.2%	162	29.8%	229	27.9%
South West	299	7.3%	123	7.0%	31	5.7%	48	5.8%
West Midlands	442	10.7%	168	9.6%	62	11.4%	78	9.5%
North West	516	12.5%	246	14.1%	71	13.1%	122	14.9%
Wales	209	5.1%	96	5.5%	31	5.7%	36	4.4%
Scotland	371	9.0%	123	7.0%	43	7.9%	62	7.6%
Parents' social class (5)								
Low	545	15.7%	244	16.8%	63	14.2%	141	20.9%
Medium	1,791	51.7%	779	53.8%	246	55.4%	362	53.6%
High	1,128	32.6%	426	29.4%	135	30.4%	173	25.6%
Housing tenure(5)								
Owned	2297	64.4%	928	62.5%	279	61.5%	404	56.5%
Rented	1,106	31.0%	480	32.3%	157	34.6%	280	39.2%
Other	164	4.6%	76	5.1%	18	4.0%	31	4.3%
Parents' social class (16)								
Low	272	12.3%	129	13.5%	30	11.9%	60	16.1%
Medium	1,047	47.5%	459	48.1%	125	49.6%	188	50.4%
High	884	40.1%	367	38.4%	97	38.5%	125	33.5%
Housing tenure (16)								
Owned	2189	79.5%	930	77.6%	285	80.1%	370	69.8%
Rented	490	17.8%	239	19.9%	67	18.8%	150	28.3%
Other	76	2.8%	30	2.5%	4	1.1%	10	1.9%
Health during childhood (age)								
Ever had a health problem (0-16)								
No	148	3.6%	53	3.1%	20	3.7%	29	3.6%
Yes	3908	96.4%	1668	96.9%	518	96.3%	777	96.4%
Ever had an accident (0-16)								
No	1298	32.3%	530	31.1%	169	31.7%	228	28.5%
Yes	2725	67.7%	1175	68.9%	364	68.3%	572	71.5%

Note: The table shows the number of observations and frequency of the individual characteristics of the sample used in the main analysis for females and males. Observations and percentages for mental health are based on symptoms of anxiety and depression measured by Malaise inventory. Higher levels of psychological distress when the individual experience four or more symptoms and Low levels when he/she does not experience symptoms or present up to three symptoms. Number in parenthesis ( ) indicates offspring age when information collected.

3.D Maternal health during offspring's early childhood and adult offspring health by sex

Table 3.D.1: Maternal health status during offspring's early childhood and female offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health problems						
No problems	-0.037	-0.075***	-0.040	-0.078***	-0.039	-0.075***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Only physical health	-0.011	0.048*	-0.015	0.046	-0.016	0.044
	(0.018)	(0.028)	(0.017)	(0.028)	(0.017)	(0.028)
Only mental health	0.026	-0.005	0.032	-0.004	0.034	-0.004
	(0.023)	(0.016)	(0.024)	(0.017)	(0.024)	(0.017)
Physical and mental health	0.022	0.031	0.022	0.037	0.021	0.035
	(0.015)	(0.024)	(0.015)	(0.025)	(0.015)	(0.025)
Only mental health problems						
No problems	-0.062***	-0.076***	-0.048**	-0.057***	-0.048**	-0.056***
	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)
Only physical health	-0.008	-0.024	0.001	-0.020	0.001	-0.020
	(0.012)	(0.017)	(0.013)	(0.018)	(0.013)	(0.018)
Only mental health	0.044***	0.027**	0.025*	0.022	0.026*	0.022
	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)
Physical and mental health	0.025***	0.073***	0.021**	0.055***	0.021**	0.054***
	(0.010)	(0.018)	(0.009)	(0.017)	(0.009)	(0.017)
Physical and mental health problems						
No problems	-0.106***	-0.144***	-0.087***	-0.127***	-0.086***	-0.125***
	(0.032)	(0.034)	(0.032)	(0.034)	(0.032)	(0.034)
Only physical health	-0.010	0.033	-0.005	0.036	-0.006	0.035
	(0.021)	(0.034)	(0.022)	(0.035)	(0.022)	(0.035)
Only mental health	0.088***	0.016	0.069***	0.013	0.071***	0.013
	(0.027)	(0.022)	(0.026)	(0.022)	(0.026)	(0.022)
Physical and mental health	0.029	0.096***	0.023	0.079***	0.022	0.077***
	(0.019)	(0.030)	(0.018)	(0.030)	(0.018)	(0.030)
Observations	7,916	7,916	7,916	7,916	7,916	7,916
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the female sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.060 in column 9 means that the probability of female offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 6.0 percentage points higher for female offspring whose mother had only mental health problems than for those whose their mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3.D.2: Maternal health status during offspring's early childhood and male offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health problems						
No problems	-0.044	-0.040	-0.043	-0.043	-0.043	-0.043
	(0.028)	(0.034)	(0.028)	(0.034)	(0.028)	(0.034)
Only physical health	0.035	0.014	0.034	0.013	0.035	0.013
	(0.021)	(0.030)	(0.021)	(0.030)	(0.021)	(0.030)
Only mental health	-0.004	-0.002	-0.005	-0.001	-0.005	-0.001
	(0.018)	(0.015)	(0.019)	(0.015)	(0.018)	(0.015)
Physical and mental health	0.013	0.028	0.014	0.031	0.014	0.031
	(0.013)	(0.021)	(0.014)	(0.021)	(0.014)	(0.021)
Only mental health problems						
No problems	-0.037*	-0.075***	-0.022	-0.056***	-0.022	-0.056***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Only physical health	-0.005	0.021	-0.004	0.014	-0.004	0.014
	(0.014)	(0.019)	(0.014)	(0.019)	(0.014)	(0.019)
Only mental health	0.026	0.002	0.015	0.002	0.016	0.002
	(0.016)	(0.012)	(0.015)	(0.012)	(0.016)	(0.012)
Physical and mental health	0.016*	0.052***	0.010	0.040**	0.010	0.040**
	(0.009)	(0.017)	(0.009)	(0.016)	(0.009)	(0.016)
Physical and mental health problems						
No problems	-0.093**	-0.128***	-0.073*	-0.111***	-0.073*	-0.110***
	(0.040)	(0.037)	(0.039)	(0.037)	(0.039)	(0.037)
Only physical health	0.019	0.030	0.020	0.023	0.020	0.023
	(0.028)	(0.036)	(0.028)	(0.036)	(0.028)	(0.036)
Only mental health	0.027	0.007	0.016	0.009	0.016	0.009
	(0.030)	(0.020)	(0.029)	(0.021)	(0.028)	(0.021)
Physical and mental health	0.047**	0.091***	0.037**	0.079***	0.037**	0.079***
	(0.020)	(0.032)	(0.018)	(0.031)	(0.018)	(0.031)
Observations	8,501	8,501	8,501	8,501	8,501	8,501
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the male sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.031 in column 9 means that the probability of male offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 3.1 percentage points higher for male offspring whose mother had only mental health problems than for those whose their mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

3.E Maternal health during offspring's adolescence and adult offspring health by sex

Table 3.E.1: Maternal health status during offspring's adolescence and female offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health problems						
No problems	-0.074**	-0.075**	-0.071**	-0.074*	-0.070**	-0.072*
	-0.035	(0.038)	(0.035)	(0.038)	(0.035)	(0.038)
Only physical health	0.002	0.010	-0.000	0.007	-0.002	0.005
	(0.022)	(0.035)	(0.022)	(0.035)	(0.021)	(0.035)
Only mental health	0.041	0.006	0.040	0.007	0.042	0.009
	(0.028)	(0.022)	(0.028)	(0.022)	(0.028)	(0.022)
Physical and mental health	0.031*	0.059**	0.032*	0.060**	0.030*	0.059**
	(0.017)	(0.028)	(0.018)	(0.028)	(0.017)	(0.028)
Only mental health problems						
No problems	-0.060***	-0.055***	-0.053***	-0.047**	-0.052***	-0.046**
	(0.018)	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)
Only physical health	0.004	-0.017	0.006	-0.017	0.005	-0.018
	(0.011)	(0.018)	(0.011)	(0.018)	(0.011)	(0.018)
Only mental health	0.038***	0.022*	0.032**	0.021*	0.033**	0.021*
	(0.014)	(0.011)	(0.014)	(0.012)	(0.014)	(0.012)
Physical and mental health	0.017*	0.050***	0.015*	0.044***	0.015	0.043***
	(0.009)	(0.016)	(0.009)	(0.015)	(0.009)	(0.015)
Physical and mental health problems						
No problems	-0.132***	-0.111***	-0.118***	-0.101***	-0.117***	-0.098***
	(0.029)	(0.028)	(0.029)	(0.028)	(0.029)	(0.028)
Only physical health	-0.010	-0.010	-0.010	-0.012	-0.011	-0.014
	(0.016)	(0.027)	(0.016)	(0.028)	(0.016)	(0.028)
Only mental health	0.096***	0.028	0.086***	0.028	0.089***	0.030
	(0.025)	(0.020)	(0.025)	(0.020)	(0.026)	(0.020)
Physical and mental health	0.046***	0.093***	0.042***	0.085***	0.040**	0.082***
	(0.016)	(0.023)	(0.016)	(0.023)	(0.015)	(0.023)
Observations	7,916	7,916	7,916	7,916	7,916	7,916
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the female sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 16, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.047 in column 9 means that the probability of female offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 4.7 percentage points higher for female offspring whose mother had only mental health problems than for those whose their mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3.E.2: Maternal health status during offspring's adolescence and male offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Only physical health problems						
No problems	-0.017	-0.037	-0.014	-0.036	-0.015	-0.036
	(0.038)	(0.039)	(0.038)	(0.039)	(0.038)	(0.039)
Only physical health	0.027	0.025	0.026	0.025	0.025	0.024
	(0.027)	(0.035)	(0.027)	(0.034)	(0.027)	(0.035)
Only mental health	-0.016	-0.011	-0.016	-0.011	-0.015	-0.011
	(0.022)	(0.018)	(0.022)	(0.018)	(0.022)	(0.018)
Physical and mental health	0.006	0.023	0.005	0.022	0.005	0.022
	(0.016)	(0.026)	(0.016)	(0.026)	(0.016)	(0.026)
Only mental health problems						
No problems	-0.061***	-0.048**	-0.058***	-0.044**	-0.057***	-0.043**
	(0.022)	(0.020)	(0.021)	(0.020)	(0.021)	(0.020)
Only physical health	0.019	-0.001	0.021	-0.003	0.021	-0.003
	(0.013)	(0.019)	(0.013)	(0.019)	(0.013)	(0.019)
Only mental health	0.022	0.012	0.019	0.012	0.019	0.012
	(0.015)	(0.011)	(0.015)	(0.011)	(0.015)	(0.011)
Physical and mental health	0.020**	0.038***	0.018**	0.035***	0.018**	0.035***
	(0.009)	(0.013)	(0.009)	(0.012)	(0.009)	(0.012)
Physical and mental health problems						
No problems	-0.073**	-0.112***	-0.064*	-0.104***	-0.064*	-0.103***
	(0.035)	(0.033)	(0.034)	(0.033)	(0.034)	(0.033)
Only physical health	0.023	0.028	0.023	0.026	0.022	0.025
	(0.025)	(0.031)	(0.025)	(0.032)	(0.025)	(0.032)
Only mental health	0.019	0.010	0.015	0.010	0.016	0.010
	(0.021)	(0.016)	(0.021)	(0.016)	(0.021)	(0.016)
Physical and mental health	0.031**	0.074***	0.026*	0.068**	0.026*	0.068**
	(0.015)	(0.028)	(0.014)	(0.027)	(0.014)	(0.027)
Observations	8,501	8,501	8,501	8,501	8,501	8,501
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the male sample by offspring age. The baseline category for maternal health is "no health problems". The mother's health status is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 16, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.028 in column 9 means that the probability of male offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 2.8 percentage points higher for male offspring whose mother had only mental health problems than for those whose their mothers did not have any health problem. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

3.F Sensitivity analysis by sex

3.F.1 Maternal health during offspring's early childhood and adult offspring health by sex

Table 3.F.1: Maternal physical and mental problems during offspring's early childhood and female offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.039*	-0.073***	-0.039*	-0.075***	-0.038*	-0.073***
	(0.023)	(0.024)	(0.023)	(0.024)	(0.022)	(0.024)
Only physical health	-0.007	0.053**	-0.011	0.051**	-0.012	0.049**
	(0.015)	(0.023)	(0.014)	(0.023)	(0.014)	(0.023)
Only mental health	0.033*	-0.007	0.037*	-0.006	0.038**	-0.005
	(0.019)	(0.014)	(0.019)	(0.014)	(0.019)	(0.014)
Physical and mental health	0.014	0.027	0.013	0.030	0.012	0.029
	(0.012)	(0.019)	(0.012)	(0.019)	(0.012)	(0.019)
Mental health problems						
No problems	-0.063***	-0.075***	-0.048***	-0.056***	-0.047***	-0.055***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Only physical health	-0.007	-0.022	0.003	-0.018	0.002	-0.018
	(0.012)	(0.017)	(0.013)	(0.018)	(0.012)	(0.018)
Only mental health	0.047***	0.026**	0.027*	0.022*	0.028*	0.022*
	(0.014)	(0.012)	(0.014)	(0.013)	(0.014)	(0.013)
Physical and mental health	0.022**	0.071***	0.018**	0.053***	0.017**	0.052***
	(0.009)	(0.017)	(0.009)	(0.016)	(0.009)	(0.016)
Observations	7,916	7,916	7,916	7,916	7,916	7,916
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the female sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.050 in column 9 means that the probability of female offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 5.0 percentage points higher for female offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3.F.2: Maternal physical and mental problems during offspring's early childhood and male offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.048*	-0.044	-0.047*	-0.047*	-0.047*	-0.047*
	(0.025)	(0.029)	(0.025)	(0.028)	(0.025)	(0.028)
Only physical health	0.031*	0.013	0.031	0.012	0.031	0.012
	(0.019)	(0.025)	(0.019)	(0.025)	(0.019)	(0.025)
Only mental health	-0.002	0.000	-0.003	0.002	-0.003	0.002
	(0.016)	(0.013)	(0.016)	(0.013)	(0.016)	(0.013)
Physical and mental health	0.019	0.031*	0.018	0.033*	0.018	0.033*
	(0.012)	(0.018)	(0.012)	(0.018)	(0.012)	(0.018)
Mental health problems						
No problems	-0.039**	-0.077***	-0.023	-0.058***	-0.023	-0.058***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Only physical health	-0.007	0.021	-0.006	0.014	-0.006	0.014
	(0.013)	(0.018)	(0.014)	(0.018)	(0.014)	(0.018)
Only mental health	0.027*	0.003	0.016	0.003	0.017	0.003
	(0.016)	(0.011)	(0.015)	(0.011)	(0.015)	(0.011)
Physical and mental health	0.019**	0.053***	0.012	0.041**	0.012	0.041**
	(0.009)	(0.016)	(0.008)	(0.016)	(0.008)	(0.016)
Observations	8,501	8,501	8,501	8,501	8,501	8,501
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the male sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 5. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 5, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.028 in column 9 means that the probability of male offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 2.8 percentage points higher for male offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

3.F.2 Maternal health during offspring's adolescence and adult offspring health by sex

Table 3.F.3: Maternal physical and mental problems during offspring's adolescence and female offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.071***	-0.064**	-0.066***	-0.061**	-0.066***	-0.060**
	(0.023)	(0.025)	(0.024)	(0.025)	(0.024)	(0.025)
Only physical health	-0.007	0.009	-0.009	0.007	-0.010	0.005
	(0.014)	(0.023)	(0.014)	(0.023)	(0.014)	(0.023)
Only mental health	0.050**	0.006	0.047**	0.007	0.050**	0.009
	(0.020)	(0.015)	(0.020)	(0.015)	(0.020)	(0.015)
Physical and mental health	0.029**	0.048**	0.028**	0.047**	0.026**	0.046**
	(0.013)	(0.019)	(0.013)	(0.019)	(0.013)	(0.019)
Mental health problems						
No problems	-0.059***	-0.052***	-0.052***	-0.045**	-0.052***	-0.043**
	(0.018)	(0.017)	(0.018)	(0.018)	(0.018)	(0.017)
Only physical health	0.002	-0.017	0.003	-0.017	0.003	-0.018
	(0.010)	(0.017)	(0.011)	(0.018)	(0.011)	(0.018)
Only mental health	0.040***	0.022*	0.034**	0.021*	0.035**	0.021*
	(0.014)	(0.011)	(0.014)	(0.012)	(0.014)	(0.012)
Physical and mental health	0.017*	0.048***	0.015*	0.041***	0.014	0.040***
	(0.009)	(0.015)	(0.009)	(0.014)	(0.009)	(0.014)
Observations	7,916	7,916	7,916	7,916	7,916	7,916
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the female sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 5, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.041 in column 9 means that the probability of female offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 4.1 percentage points higher for female offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3.F.4: Maternal physical and mental problems during offspring's adolescence and male offspring's health status across adulthood (marginal changes)

	Model 1		Model 2		Model 3	
Mother health status	(1)	(2)	(3)	(4)	(5)	(6)
Offspring health status	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood	Early adulthood	Mid adulthood
Physical health problems						
No problems	-0.014	-0.053**	-0.010	-0.050*	-0.010	-0.050*
	(0.030)	(0.027)	(0.029)	(0.026)	(0.029)	(0.027)
Only physical health	0.013	0.028	0.011	0.028	0.011	0.027
	(0.021)	(0.024)	(0.021)	(0.024)	(0.021)	(0.024)
Only mental health	-0.007	-0.005	-0.008	-0.005	-0.007	-0.005
	(0.017)	(0.012)	(0.018)	(0.013)	(0.017)	(0.012)
Physical and mental health	0.009	0.030	0.007	0.028	0.007	0.028
	(0.012)	(0.022)	(0.012)	(0.022)	(0.012)	(0.022)
Mental health problems						
No problems	-0.060***	-0.052***	-0.056***	-0.047**	-0.056***	-0.047**
	(0.021)	(0.019)	(0.021)	(0.019)	(0.021)	(0.019)
Only physical health	0.016	-0.001	0.018	-0.002	0.018	-0.003
	(0.013)	(0.019)	(0.013)	(0.019)	(0.013)	(0.019)
Only mental health	0.024*	0.013	0.021	0.013	0.020	0.013
	(0.014)	(0.010)	(0.014)	(0.010)	(0.014)	(0.010)
Physical and mental health	0.020**	0.040***	0.018**	0.037***	0.018**	0.037***
	(0.009)	(0.012)	(0.009)	(0.012)	(0.009)	(0.012)
Observations	8,501	8,501	8,501	8,501	8,501	8,501
Age controls (mother)	YES	YES	YES	YES	YES	YES
Family background (offspring)			YES	YES	YES	YES
Health during childhood (offspring)					YES	YES

Note: This table presents the change in the average probability provided by the multinomial logistic regression for the male sample by offspring age. The baseline categories for maternal health are "no physical health problems" and "no mental health problems". Maternal health is in *italic*, whilst the offspring's health status is in regular font. All models control for quadratic of mother's age at offspring's age 16. *Model* 2 additionally controls for teenage mother, teenage father, parents have divorced during childhood, mother stayed in school beyond the minimum leaving age, father stayed in school beyond the minimum leaving age, parents' level of education, father's social class at age 16, housing tenure at age 16, region of birth at birth. *Model* 3 builds up from *Model* 2 adding controls for offspring's ever had health problems during childhood and ever had accidents during childhood. The coefficient 0.028 in column 9 means that the probability of male offspring having comorbidity of physical and health problems at age 46 after adjusting for all the controls is on average 2.8 percentage points higher for male offspring whose mother had mental health problems than for those whose their mothers did not have mental health problems. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Bibliography

Abel, K. M., Hope, H., Swift, E., Parisi, R., Ashcroft, D. M., Kosidou, K., Osam, C. S., Dalman, C., and Pierce, M. (2019). Prevalence of maternal mental illness among children and adolescents in the uk between 2005 and 2017: a national retrospective cohort analysis. *Lancet Public Health*, 4:e291–300.

Andersen, C. (2021). Intergenerational health mobility: Evidence from danish registers. *Health Economics*, 30(12):3186–3202.

Angrist, J. D. and Krueger, A. B. (1992). The Effect of Age at School Entry on Educational Attainment: An Application of Instrumental Variables with Moments from Two Samples. *Journal of the American Statistical Association*, 87(418):328–336.

Baker, M. and Solon, G. (2003). Earnings Dynamics and Inequality Among Canadian Men. *Journal of Labor Economics*, 21:289–321.

Baldwin, W. and Cain, V. S. (1980). The children of teenage parents. *Family Planning Perspectives*, 12(1):34–43.

Banco de México (2016). Reporte Sobre las Economías Regionales. Banco de México.

Barbieri, T., Bloise, F., and Raitano, M. (2019). Intergenerational Earnings Inequality: New Evidence From Italy. *Review of Income and Wealth*, 66(2).

Bauldry, S., Shanahan, M. J., D.Boardman, J., Miech, R. A., and Macmillan, R. (2012). A life course model of self-rated health through adolescence and young adulthood. *Social Science and Medicine*, 75(7):1311–20.

Becker, G. S. (1973). A Theory of Marriage: Part I. *The Journal of Political Economic*, 81(4):813–846.

Becker, G. S. (1974). A Theory of Marriage: Part II. *The Journal of Political Economic*, 82(2):11–26.

Beckmannshagen, M. and Koenig, J. (2022). Out for good: Labor market effects of transitory and persistent health shocks. Available at SSRN: https://ssrn.com/abstract=4036482 or http://dx.doi.org/10.2139/ssrn.4036482.

Behrman, J. R., Gaviria, A., Székely, M., Birdsall, N., and Galiani, S. (2001). Intergenerational Mobility in Latin America. *Economia*, 2(1):1–44.

Behrman, J. R. and Vélez-Grajales, V. (2015). Patrones de Movilidad Intergeneracional para Escolaridad, Ocupación y Riqueza en el Hogar: El Caso de México. In Roberto Vélez Grajales, J. E. H. W. and Vázquez, R. M. C., editors, *México, ¿El Motor Móbil?*, chapter 6, pages 299–346. Centro de Estudios Espinosa Yglesias, México.

Bencsik, P., Halliday, T. J., and Mazumder, B. (2021). The intergenerational transmission of mental and physical health in the united kingdom. IZA Discussion Paper Series, DP No. 14126.

Bhalotra, S. and Rawlings, S. B. (2011). Intergenerational persistence in health in developing countries: The penalty of gender inequality? *Journal of Public Economics*, 95(3-4):286–299.

Bhalotra, S. and Rawlings, S. B. (2013). Gradients of the intergenerational transmission of health in developing countries. *The Review of Economics and Statistics*, 95(2):660–672.

Binder, M. and Woodruff, C. (2002). Inequality and Intergenerational Mobility in Schooling: The Case of Mexico. *Economic Development and Cultural Change*, 50(2):249–267.

Björklund, A. and Jäntti, M. (1997). Intergenerational Income Mobility in Sweden Compared to the United States. *The American Economic Review*, 87(5):1009–1018.

Björklund, A. and Jäntti, M. (2000). Intergenerational Mobility of Socio-Economic Status in Comparative Perspective. *Nordic Journal of Political Economy*, 26:3–32.

Björklund, A. and Jäntti, M. (2009). Intergenerational income mobility and the role of family background. In Nolan, B., Salverda, W., and Smeeding, T. M., editors, *Handbook of Economic Inequality*, pages 491–521. Oxford University Press, Oxford.

Björklund, A. and Jäntti, M. (2012). How important is family background for labor-economic outcomes? *Labour Economics*, 19(4):465–474.

Black, S. E. and Devereux, P. J. (2011). Chapter 16 - recent developments in intergenerational mobility. volume 4 of *Handbook of Labor Economics*, pages 1487–1541. Elsevier.

Blanden, J. (2005a). Intergenerational Mobility and Assortative Mating in the UK. `http://zinc.zew.de/pub/zew-docs/div/lower/Blanden.pdf`. Center for Economic Performance, unpublished manuscript.

Blanden, J. (2005b). Love and Money: Intergenerational Mobility and Marital Matching onParental Income. Analytical Studies Branch Research Paper Series.

Blanden, J. (2009). How much can we learn from international comparisons of intergenerational mobility? Centre for the Economics of Education, LSE. CEEDP0111.

Blanden, J. (2013). Cross-Country Rankings in Intergenerational Mobility: A Comparison of Approaches from Economics and Sociology. *Journal of Economics Surveys*, 27(1):38–73.

Bloise, F., Brunori, P., and Piraino, P. (2021). Estimating intergenerational income mobility on sub-optimal data: a machine learning approach. *The Journal of Economic Inequality*, 19:643–665.

Blundell, R., Britton, J., Dias, M. C., and French, E. (2016). The dynamic effects of health on the employment of older workers. Michigan Retirement Research Center Research Paper. Paper No. 2016-348.

Blundell, R., Britton, J., Dias, M. C., and French, E. (2021). The impact of health on labor supply near retirement. *The Journal of Human Resources*.

Böhlmark, A. and Lindquist, M. J. (2006). Life-Cycle Variations in the Association between Current and Lifetime Income: Replication and Extension for Sweden. *Journal of Labor Economics*, 24(4):879–896.

Breen, R. and Salazar, L. (2011). Educational Assortative Mating and Earnings Inequality in the United States. *American Journal of Sociology*, 117(3):808–843.

Brunori, P., Ferreira, F. H. G., and Peragine, V. (2013). Inequality of opportunity, income inequality, and economic mobility: Some international comparisons. In Paus, E., editor, *Getting Development Right: Structural Transformation, Inclusion, and Sustainability in the Post-Crisis Era*, pages 85–115. Palgrave Macmillan.

Bügelmayer, E. and Schnitzlein, D. D. (2018). Is it the family or the neighborhood? evidence from sibling and neighbor correlations in youth education and health. *The Journal of Economic Inequality*, 16:369–388.

Campos-Vazquez, R. M., Barrera, V. H. D., and Velez-Grajales, R. (2020). Intergenerational Economic Mobility in Mexico. Centro de Estudios Espinosa Yglesias. Working paper 007-2020.

Chadwick, L. and Solon, G. (2002). Intergenerational Mobility Among Daughters. *American Economic Review*, 92(1):335–344.

Chetty, R., Hendren, N., Kline, P., and Saez, E. (2014a). Where is the Land of Opportunity? the Geography of Intergenerational Mobility in the United States. *The Quarterly Journal of Economics*, 129(4):1553–1623.

Chetty, R., Hendren, N., Kline, P., Saez, E., and Turner, N. (2014b). Is the United States Still a Land of Opportunity? Recent Trends in Intergenerational Mobility. *American Economic Review:Papers & Proceedings*, 104(5):141–147.

Chiappori, P.-A., Dias, M. C., Crossman, S., and Meghir, C. (2020). Changes in Assortative Matching and Inequality in Income: Evidence for the UK. NBER. Working paper No. 26933.

Choi, S., Chung, I., and Breenc, R. (2020). How marriage matters for the intergenerational mobility of family income: Heterogeneity by gender, life course, and birth cohort. *American Sociological Review*, 85:353–380.

Classen, T. J. (2010). Measures of the intergenerational transmission of body mass index between mothers and their children in the united states, 1981–2004. *Economics and Human Biology*, 8(1):30–43.

Coneus, K. and Spiess, C. K. (2012). The intergenerational transmission of health in early childhood–evidence from the german socio-economic panel study. *Economics and human biology*, 10(1):89–97.

Conti, G. and Heckman, J. J. (2012). The developmental approach to child and adult health. NBER. Working paper No. 18664.

Corak, M. (2006). Do poor children become poor adults? lessons from a cross-country comparison of generational earnings mobility. volume (Research on Economic Inequality, 13) of *Dynamics of Inequality and Poverty*, pages 143–188. Emerald Group Publishing Limited.

Corak, M. (2013). Income Inequality, Equality of Opportunity, and Intergenerational Mobility. *Journal of Economic Perspectives*, 27(3):79–102.

Cosgrove, M. P., Sargeant, L. A., and Griffin, S. J. (2008). Does depression increase the risk of developing type 2 diabetes? *Occupational Medicine*, 58(1):7–14.

Cuesta, J., Ñopo, H., and Pizzolitto, G. (2011). Using Pseudo Panels to Measure Income Mobility in Latin America. *Review of Income and Wealth*, 57(2):224–246.

Daham, M. and Gaviria, A. (2001). Sibling Correlation and Intergenerational Mobility in Latin America. *Economic Development and Cultural Change*, 49(3):537–554.

Darden, M. and Gilleskie, D. (2016). The effects of parental health shocks on adult offspring smoking behavior and self-assessed health. *Health Economics*, 25(8):939–54.

Davidson, R. and Mackinnon, J. G. (2013). *Estimation and Inference in Econometrics*. Oxford University Press, New York.

Deaton, A. S. and Paxson, C. H. (1998). Aging and inequality in income and health. *The American Economic Review*, 88(2):248–253.

Delajara, M., Campos-Vázquez, R. M., and Vélez-Grajales, R. (2020). Social mobility in Mexico. what can we learn from its regional variation? Centro de Estudios Espinosa Yglesias. Working paper 001-2020.

Delajara, M. and Graña, D. (2017). Intergenerational Social Mobility in Mexico and its Regions. Centro de Estudios Espinosa Yglesias. Working paper 006-2017.

Dolton, P. and Xiao, M. (2017). The intergenerational transmission of body mass index across countries. *Economics and Human Biology*, 24:140–152.

Dunn, C. E. (2010). The intergenerational transmission of lifetime earnings: Evidence from brazil. *The B.E. Journal of Economic Analysis & Policy,*, 7(2):1–42.

Erikson, R. (1984). Social Class of Men, Women and Families. *Sociology*, 18(4):500–514.

Erikson, R. and Goldthorpe, J. H. (2000). Intergenerational Inequality: A Sociological Perspective. *The Journal of Economics Perspective*, 16(3):31–44.

Ermisch, J., Francesconi, M., and Siedler, T. (2006). Intergenerational Mobility and Marital Sorting. *Economic Journal*, 116:659–679.

Esteve, A. (2004). Tendencias en homogamia educacional en Mexico: 1970–2000. *Estudios Demográficos y Urbanos*, 20:341–362.

Esteve, A. and McCaa, R. (2007). Homogamia Educacional en México y Brasil, 1970–2000: Pautas y Tendencias. *Latin American Research Review*, 42:56–88.

Faulkner, R. A. and Davey, M. (2010). Children and adolescents of cancer patients: The impact of cancer on the family. *The American Journal of Family Therapy*, 30(1):63–72.

Fernandez, R., Guner, N., and Knowles, J. (2005). Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality. *Quarterly Journal of Economic*, 120:273–344.

Fletche, J. and Jajtner, K. M. (2021). Intergenerational health mobility: Magnitudes and importance of schools and place. *Health Economics*, 30(7).

Francesconi, M. and Heckman, J. J. (2016). Child Development and Parental Investment: Introduction. *The Economic Journal*, 126(596):F1–F27.

Galton, F. (1886). Regression towards mediocrity in hereditary stature. *The Journal of the Anthropological Institute of Great Britain and Ireland*, 15:246–263.

Gondek, D., Lacey, R. E., Blanchflower, D. G., and Patalay, P. (2021). How is the distribution of psychological distress changing over time? who is driving these changes? analysis of the 1958 and 1970 british birth cohorts. *Social Psychiatry and Psychiatric Epidemiology*.

Gonzalez, J. S., Safren, S. A., Delahanty, L. M., Cagliero, E., Wexler, D. J., Meigs, J. B., and W.Grant, R. (2008). Symptoms of depression prospectively predict

poorer self-care in patients with type 2 diabetes. *Diabetic medicine : a Journal of the British Diabetic Association*, 25(9):1102–1107.

Goodman, A., Joycea, R., and Smithb, J. P. (2011). The long shadow cast by childhood physical and mental problems on adult life. *Proceedings of the National Accademy of Sciences*, 108:6032–6037.

Graeber, D. (2021). Intergenerational health mobility in germany. Working paper.

Grajales, R. V. and Orozco, M. (2021). Sistema de cuidado. `https://ceey.org.mx/sistema-de-cuidados/`. Revista REFORMA. Accessed: 2022-01-20.

Grawe, N. D. (2006). Lifecycle Bias in Estimates of Intergenerational Earnings Persistence. *Journal of Labor Economics*, 13(5):551–570.

Gregg, P., Macmillan, L., and Vittori, C. (2017). Moving Towards Estimating Son's Lifetime Intergenerational Economic Mobility in the UK. *Oxford Bulletin of Economics and Statistics*, 79(1):79–100.

Haas, S. A. (2007). The long-term effects of poor childhood health: an assessment and application of retrospective reports. *Demography*, 44(1):113–135.

Haas, S. A. (2008). Trajectories of functional health: The 'long arm' of childhood health and socioeconomic factors. *Social Science and Medicine*, 66(4):849–861.

Haider, S. and Solon, G. (2006). Life-Cycle Variation in the Association between Current and Lifetime Earnings. *The American Economic Review*, 96(4):1308–13020.

Halliday, T. (2011). Health inequality over the life-cycle. *he B.E. Journal of Economic Analysis and Policy*, 11(3).

Halliday, T., Mazumder, B., and Wongi, A. (2021). Intergenerational Mobility in Self-reported Health Status in the US. *Journal of Public Economics*, 193.

Halliday, T. J. and Mazumder, B. (2017). An analysis of sibling correlations in health using latent variable models. *Health Economics*, 26(12).

Harden, K. P., Lynch, S. K., Turkheimer, E., Emery, R. E., D'Onofrio, B. M., Slutske, W. S., Waldron, M. D., Heath, A. C., Statham, D. J., and Martin, N. G. (2007). A behavior genetic investigation of adolescent motherhood and offspring mental health problems. *Journal of Abnormal Psychology*, 116(4):667–683.

Health, C. M. (2018). Catalogue of mental health measures. `https://www.cataloguementalhealth.ac.uk`. Accessed: 2022-09-30.

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*, 47(1):153–162.

Hoffman, S. D. and Duncan, G. J. (1988). Multinomial and Conditional Logit Discrete-Choice Models in demography. *Demography*, 25.

Hoyos, R. D., de la Calle, J. M. M., and Székely, M. (2010). Educación y Movilidad Social en México. In Serrano, J. and Torche, F., editors, *Movilidad Social en México. Población, Desarrollo y Crecimiento*, chapter 3, pages 134–164. Centro de Estudios Espinosa Yglesias, México.

ILO (2019). Ilostat - International Labour Organization Statistics and Databases. `https://www.ilo.org/global/statistics-and-databases/lang--en/index.htm`.

INEGI (1998). Clasificacion mexicana de ocupaciones (CMO). Instituto Nacional de Estadistica, Geografica e Informatica.

Inoue, A. and Solon, G. (2010). Two-sample Instrumental Variables Estimators. *The Review of Economics and Statistics*, 92(3):557–561.

Jäntti, M. and Jenkins, S. P. (2015). Income Mobility. In Atkinson, A. B. and Bourguignon, F., editors, *Handbook of Income Distribution*, volume 2, chapter 10, pages 807–935. Elsevier, México.

Jenkins, S. (1987). Snapshots Versus Movies: 'Lifecycle Biases' and the Estimation of Intergenerational Earnings Inheritance. *European Economic Review*, 31(5):1149–1158.

Jerrim, J., Choi, A., and Rodriguez, R. S. (2016). Two-Sample Two-Stage Least Squares (TSTSLS) estimates of earnings mobility: how consistent are they? *Survey Research Methods*, 10(2):85–102.

Johnston, D. W., Schurer, S., and Shields, M. A. (2013). Exploring the intergenerational persistence of mental health: Evidence from three generations. *Journal of Health Economics*, 32(6):1077–1089.

Jäntti, M., Bratsberg, B., Røed, K., Raaum, O., Naylor, R., Österbacka, E., Björklund, A., and Eriksson, T. (2006). American exceptionalism in a new light: a comparison of intergenerational earnings mobility in the nordic countries, the united kingdom and the united states. Institute for the Study of Labor (IZA), Bonn. IZA DO No. 1938.

Kawakami, N., Abdulghani, E. A., Alonso, J., Bromet, E., Bruffaerts, R., de Almeida, J. M. C., Chiu, W. T., de Girolamo, G., de Graaf, R., Fayyad, J., Ferry, F., Florescu, S., Gureje, O., Hu, C., Lakoma, M. D., LeBlanc, W., Lee, S., Levinson, D., Malhotra, S., Matschinger, H., Medina-Mora, M. E., Nakamura, Y., Browne, M. A. O., Okoliyski, M., Posada-Villa, J., Sampson, N. A., Viana, M. C., and Kessler, R. C. (2004). Early-life mental disorders and adult household income in the world mental health surveys. *Biological psychiatry*, 72(3):228–237.

Khanolkara, A. R. and Patalaya, P. (2021). Socioeconomic inequalities in comorbidity of overweight, obesity and mental ill-health from adolescence to mid-adulthood in two national birth cohort studies. *The Lancet Regional Health - Europe*, 6.

Kiernan, K. E. and Huerta, M. C. (2008). Economic deprivation, maternal de-

pression, parenting and children's cognitive and emotional development in early childhood. *The British Journal of Sociology*, 59(4):783–806.

Kim, Y., Sikok, B., Strauss, J., and Witoelar, F. (2015). Intergenerational correlations of health among older adults: Empirical evidence from indonesia. *Journal of the Economics of Ageing*, 6(December):44–56.

Krueger, A. B. (2012). The Rise and Consequences of Inequality in the United States. `https://obamawhitehouse.archives.gov/sites/default/files/krueger_cap_speech_final_remarks.pdf`.

Lee, C.-I. and Solon, G. (2009). Trends in Intergenerational Income Mobility. *The Review of Economics and Statistics*, 91(4):766–772.

Lefranc, A. and Trannoy, A. (2005). Intergenerational Earnings Mobility in France: Is France More Mobile than the US? *Annales d'Économie et de Statistique*, 78:57–77.

Little, R. J. A. and Rubin, D. B. (2002). *Statistical Analysis with Missing Data*. Hoboken, NJ: Wiley Series in Probability and Statistics, United Kingdom.

Lovejoy, M. C., Graczyk, P. A., O'Hare, E., and Neuman, G. (2000). Effects of early maternal depression on patterns of infant-mother attachment: A meta-analytic investigation. *The Journal of Child Psychology and Psychiatry*, 41(6):561–592.

Martins, C. and Gaffan, E. A. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*, 20(5):561–592.

Massie, M. J. (2004). Prevalence of depression in patients with cancer. *JNCI Monographs*, 2004(32):57–71.

Mazumder, B. (2005). Fortunate Sons: New Estimates of Intergenerational Mobility in the United States Using Social Security Earnings Data. *The Review of Economics and Statistics*, 87(2):235–255.

Mazumder, B. (2008). Sibling similarities and economic inequality in the us. *Journal of Population Economics*, 21:685–701.

Mazumder, B. (2011). Family and community influences on health and socioeconomic status: Sibling correlations over the life course. *The B.E. Journal of Economic Analysis and Policy*, 11(3).

Monaco, A. P. (2021). An epigenetic, transgenerational model of increased mental health disorders in children, adolescents and young adults. *European Journal of Human Genetics volume*, 29:387–395.

Narayan, A., der Weide, R. V., Cojocaru, A., Lakner, C., Redaelli, S., Mahler, D. G., Ramasubbaiah, R. G. N., and Thewissen, S. (2018). *Fair Progress? Economic Mobility across Generations around the World.* World Bank Publication, Washington, DC: World Bank.

Nicoletti, C. and Ermisch, J. F. (2007). Intergenerational Earnings Mobility: Changes across Cohorts in Britain. *The B.E. Journal of Economic Analysis & Policy*, 7(2). Article 9.

Nilsen, O., Vaage, K., Aakvik, A., and Jacobsen, K. (2008). Estimates of intergenerational elasticities based on lifetime earnings. Institute for the Study of Labor (IZA), Bonn. IZA DO No. 3709.

Nunez, J. I. and Miranda, L. (2010). Intergenerational income mobility in a less-developed, high-inequality context: The case of chile. *The B.E. Journal of Economic Analysis & Policy,*, 10(1).

OECD (2018). *A Broken Social Elevator? How to Promote Social Mobility*. OECD Publishing, Paris.

Olivetti, C. and Paserman, M. D. (2015). In the name of the son (and the daughter): Intergenerational mobility in the united states, 1850-1940. *American Economic Review*, 105:2695–2724.

Orsini, N. and Bottai, M. (211). Logistic Quantile Regression in Stata. *The Stata Journal*, 11:327–344.

Parman, J. (2010). Gender and intergenerational mobility: Using health outcomes to compare intergenerational mobility across gender and over time. UC-Davis Working Paper.

Parsons, S., Sullivan, A., Fitzsimons, E., and Ploubidis, G. (2021). The Role of Parental and Child Physical and Mental Health on Behavioural and Emotional Adjustment in Mid-childhood: a Comparison of Two Generations of British Children Born 30 Years Apart. *Longitudinal and Life Course Studies*, 12(4):517–550.

Peck, M. (1997). The importance of childhood socio-economic group for adult health. *Social Science and Medicine*, 39(4):553–562.

Pelkowski, J. M. and Berger, M. C. (2004). The impact of health on employment, wages, and hours worked over the life cycle. *The Quarterly Review of Economics and Finance*, 44(1):102–121.

Piraino, P., Muller, S., Cilliers, J., and Fourie, J. (2014). The transmission of longevity across generations: The case of the settler cape colony. *Research in Social Stratification and Mobility*, 35:105–119.

Propper, C., Rigg, J., and Burguess, S. (2007). Childhealth: Evidence on the roles of family income and maternal mental health from a uk birth cohort. *Health Economics*, 16(11):1245–69.

Pullum, T. and Peri, A. (1999). A Multivariate Analysis of Homogamy in Montevideo, Uruguay. *Population Studies*, 53:361–377.

Raaum, O., Bratsberg, B., Roed, K., Osterbacka, E., Eriksson, T., Jantti, M., and Naylor, R. A. (2007). Marital Sorting, Household Labor Supply, and Intergenerational Earnings Mobility across Countries. *The B.E. Journal of Economic Analysis & Policy*, 7(2).

Rahkonen, O., Lahelma, E., and Huuhka, M. (1997). Past or present? childhood living conditions and current socioeconomic status as determinants of adult health. *Social Science and Medicine*, 44(3):327–336.

Rojas, I. (2012). Transmisión Intergeneracional del Ingreso. In Campos-Vázquez, Reymundo; Huerta-Wong, J. and Vélez-Grajales, R., editors, *Movilidad Social en México: Constantes de la Desigualdad*, chapter 7, pages 299–352. Centro de Estudios Espinosa Yglesias, México.

Rutter, M., Tizard, J., and Whitmore, K. (1970). *Education, Health and Behavior*. Longmans Publishing Group, London.

Schoon, I. (2010). Childhood cognitive ability and adult academic attainment: evidence from three british cohort studies. *Longitudinal and Life Course Studies*, 1(3):241–258.

Siegel, R. S. and Brandon, A. R. (2014). Adolescents, pregnancy, and mental health. *Journal of Pediatric and Adolescent Gynecology*, 27(3):138–150.

Silva, N. (2003). *Duas Décadas de Seletividade Marital Educacional no Brasil*, chapter 9. Topbooks, Rio de Janeiro.

Silverwood, R., Narayanan, M., Dodgeon, B., and Ploubidis, G. (2021). Handling missing data in the national child development study: User guide (version 2). Centre for Longitudinal Studies. London: UCL.

Solís, P., Pullum, T., and Bratter, J. (2007). Homogamy by education and migration status in Monterrey, Mexico: Changes and continuities over time. *Population Research and Policy Review*, 26(3):279–298.

Solon, G. (1992). Intergenerational Income Mobility in the United States. *The American Economic Review*, 82(3):393–408.

Solon, G. (1999). Chapter 29 - intergenerational mobility in the labor market. volume 3 of *Handbook of Labor Economics*, pages 1761–1800. Elsevier.

Solon, G. (2002). Cross-country differences in intergenerational earnings mobility. *Journal of Economic Perspectives*, 16(3):59–66.

Steward, M. B. (1983). On Least Squares Estimation when the Dependent Variable is Grouped. *The Review of Economic Studies*, 50(4):737–753.

Thompson, O. (2014). Genetic mechanisms in the intergenerational transmission of health. *Journal of Health Economics*, 35:132 – 146.

Thu Le, H. and Nguyen, H. T. (2018). The impact of maternal mental health shocks on child health estimates from fixed-effects instrumental variables models for two cohorts of australian children. *American Journal of Health Economics*, 4(2):185–225.

Torche, F. (2010). Cambio y Persistencia de la Movilidad Intergeneracional en México. In Serrano, J. and Torche, F., editors, *Movilidad Social en México. Población, Desarrollo y Crecimiento*, chapter 2, pages 71–134. Centro de Estudios Espinosa Yglesias, México.

Torche, F. (2013). How do We Characteristically Measure and Analyze Intergenerational Mobility? The Stanford Center on Poverty and Inequality Working Paper, Stanford, CA.

Torche, F. (2015a). Analyses of Intergenerational Mobility: An Interdisciplinary Review. *the ANNALS of the American Academy of Political and Social Science*, 657:37–62.

Torche, F. (2015b). Intergenerational Mobility and Gender in Mexico. *Social Forces*, 94:563–587.

van Rijn, R. M., Robroek, S. J. W., Brouwer, S., and Burdorf, A. (2014). Influence of poor health on exit from paid employment: a systematic review. *Occupational and environmental medicine*, 71(4):295–301.

Vélez-Grajales, R., Stabridis, O., and Minor-Campa, E. (2017). Still Looking for the Land of Opportunity: The Case of Mexico. Centro de Estudios Espinosa Yglesias. Working paper 001-2017.

Vella, F. (1998). Estimating Models with Sample Selection Bias: A Survey. *The Journal of Human Resources*, 33(1):127–169.

Venkataramani, A. S. (2011). The intergenerational transmission of height: Evidence from rural vietnam. *Health Economics*, 20(12):1448–67.

Warner, V. and Weissman, M. M. (2014). Intergenerational transmission. In Koenen, K. C., Rudenstine, S., Susser, E., and Galea, S., editors, *A Life Course Approach to Mental Disorders*, chapter 25, pages 273–290. Oxford Academic, Oxford. online edn.

White, I. R., Royston, P., and Wood, A. M. (2010). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, 30(4).

Wickham, S., Whitehead, M., Taylor-Robinson, D., and Barr, B. (2017). The effect of a transition into poverty on child and maternal mental health: a longitudinal analysis of the uk millennium cohort study. *Lancet Public Health*, 2:e141–148.

Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach*. Cengage, Boston, 6th edition.

Yalonetzky, G. (2015). Movilidad Intergeneracional de la Educación en México: un Análisis de Cohortes Filiales y Sexo. In Roberto Vélez Grajales, J. E. H. W. and Vázquez, R. M. C., editors, *México, ¿El Motor Móbil?*, chapter 5, pages 249–298. Centro de Estudios Espinosa Yglesias, México.

Zimmerman, D. J. (1992). Regression Toward Mediocrity in Economic Stature. *The American Economic Review*, 82(3):409–429.

Zuluaga, J. S. R. (2016). Movilidad Social Intergeneracional por Ingresos en Colombia. Master dissertation, Universidad Nacional de Colombia - Sede Bogotá, unpublished manuscript.