



Mapineq

Parental income and the achievement of higher education in Sweden and Finland

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Executive summary

This study investigates how changes in parental economic resources during childhood influence children's educational attainment in Sweden and Finland. While previous research has emphasized the importance of parental education for academic success, recent debates highlight the significant role of economic resources, particularly family income, in shaping intergenerational educational mobility. However, few studies have rigorously examined how dynamic changes in these resources throughout childhood affect long-term educational outcomes.

Using high-quality administrative register data from 1987 to 2020, the study analyses regionally varying fluctuations in parental income, employment, and social benefits. It specifically incorporates the context of the economic recessions of the 1990s, providing a nuanced understanding of how economic shocks interact with family socioeconomic standing to influence educational trajectories. Two primary research questions guide the analysis:

1. How strong are the associations between childhood parental income and children's later educational attainment?
2. After addressing endogeneity concerns, does parental income still significantly predict children's educational outcomes?

To strengthen causal inference, the study employs both instrumental variables (IV) and sibling fixed effects approaches. Parental income endogeneity is addressed using local, age- and gender-specific employment rates as instruments, while sibling fixed effects control for unobserved family-level heterogeneity, such as shared environment and genetic factors. Educational attainment is measured by whether individuals achieved a university degree by ages 31–40.

The results reveal that naïve ordinary least squares (OLS) estimates substantially understate the influence of parental economic resources. IV estimates are generally larger, suggesting a stronger causal relationship between parental income and educational attainment than previously implied. Notably, maternal income appears in some specifications to be more influential than paternal income, although this varies across countries and definitions of income (labour vs. disposable income). The findings further suggest that parental labour market participation may exert a stronger influence on offspring education than disposable household income alone.

Despite these findings, the study acknowledges limitations regarding the validity of the identification strategy, particularly concerning the strength and exogeneity of the instruments used. Thus, the results should be interpreted as conditional on the underlying assumptions holding true. Overall, the study contributes to the understanding of how childhood economic conditions affect educational mobility, highlighting the importance of dynamic parental economic resources in shaping intergenerational inequality.



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Parental income and the achievement of higher education in Sweden and Finland

This study examines how parental income influences the likelihood that a child attains higher education in Sweden and Finland. Recognizing that both parental income and children's educational outcomes may be shaped by unobserved factors, we exploit variation in local labour market conditions—particularly during the economic recessions of the early 1990s—to identify the causal effects of childhood economic resources on later educational attainment. Using high-quality register data covering the years 1987 to 2020, we apply both instrumental variables and sibling fixed-effects approaches to address endogeneity concerns and account for family-level unobserved heterogeneity. Our findings suggest that parental economic resources play a significant role in shaping children's educational outcomes. However, the strength of the association varies depending on the measure of parental resources considered. Causal estimates derived from instrumental variables tend to be larger than naive ordinary least squares estimates, indicating that simple correlations may underestimate the true effects. Moreover, parental labour income appears to be more consistently associated with children's educational attainment than disposable household income, suggesting the importance of parental labour market attachment beyond financial resources alone. Some evidence also points to maternal income exerting a stronger influence than paternal income, although results differ by country and specification. Overall, our results highlight the critical role of dynamic changes in family economic conditions during childhood in shaping intergenerational educational mobility.

Higher parental income during childhood causally increases the likelihood of higher education attainment, with instrumental variable estimates indicating stronger effects than naive correlations.

Labour income, rather than disposable household income, shows the most consistent influence, suggesting that parental labour market participation matters beyond financial resources alone.

Maternal income appears more influential than paternal income in several cases, though the magnitude of this effect varies between Sweden and Finland.



1. Introduction

Education is an important determinant of social and economic success, serving as one of the primary mechanisms for the intergenerational transmission of socioeconomic status (Duncan, 1967; Haveman and Wolfe, 1995; Kane, 2004; Mare, 1992). In the context of social stratification, parental economic resources – particularly family income – have emerged as a focal point in the investigation of intergenerational educational mobility. While research often highlights parental education as a dominant factor in academic success, recent debates increasingly emphasise the role of economic resources such as family income in perpetuating inequality (Breen et al., 2009; Cooper and Stewart, 2021; Haveman and Wolfe, 1995). However, few studies have systematically examined the dynamic changes in these resources during childhood and the effect of economic fluctuations and their long-term educational consequences.

Despite the established correlation between parental economic resources and children's educational attainment, there remains a lack of consensus regarding the mechanisms that underlie this relationship. Evidence shows that limited economic resources constrain families' ability to invest in their children's development, including attaining higher education (Haveman and Wolfe, 1995; Kane, 2004). However, disagreements persist regarding the mechanisms through which these constraints operate. In contrast, other scholars argue that transient economic hardships, such as brief periods of unemployment or reduced income, may not leave lasting scars on educational attainment (Cameron and Heckman, 1998; Carneiro and Heckman, 2002). However, the disparities in educational outcomes between high- and low-income children are more accurately attributed to the long-term effects of parental resources on child development (Cameron and Heckman, 1998; Carneiro and Heckman, 2002). Clarifying this debate requires rigorous investigation into how changing economic conditions – such as regional recessions or policy-affect families differently depending on their baseline socioeconomic standing, which can lead to different educational outcomes for children.

This study contributes to the ongoing discussion by analysing how variations in parental economic resources during childhood influence educational mobility in Sweden and Finland. Using high-quality register data from both countries covering the years 1987 to 2020, we focus on regionally varying changes in parents' income, employment status, and shifts in family benefits, providing a nuanced understanding of how these dynamics affect educational outcomes in different contexts. Additionally, we account for regional employment patterns during the economic recession to capture labour market dynamics and opportunities that influence parents' economic resources. By employing a sibling fixed-effects model, this study controls for unobserved family-level heterogeneity, allowing us to isolate the effects of changing economic circumstances during early life on educational outcomes. First, we examine the strength of the association between parental income during childhood in Sweden and Finland and children's educational attainment. Second, after addressing the endogeneity of parental income in relation to children's educational outcomes, we assess whether parental income remains significant in shaping children's educational attainment. By exploring these relationships, we aim to clarify the mechanisms through which parental economic resources impact children's educational



trajectories, thereby enriching the existing literature on educational mobility and socioeconomic status.

Drawing on rich register data from Finland and Sweden covering the years 1987 to 2020, this research leverages the strengths of comprehensive administrative datasets. The Nordic context proves ideal for this inquiry due to its comprehensive administrative registers and geographically differentiated economic dynamics. Both Finland and Sweden provide unique opportunities to observe both regional variations in parental employment trends and the responsiveness of social safety nets during crises. Our analysis focuses on two key sources of change: shifts in mothers' and fathers' employment rates across regions, and changes in employment conditions and social benefit schemes over time. By linking variations in economic resources to educational attainment, this study contributes to the broader debate on equality of educational opportunity.

2. Literature review

Previous research has consistently demonstrated that family background plays a crucial role in shaping educational outcomes, with economic resources often serving as a key mediating factor. This literature review compiles existing findings, setting the stage for our investigation into how dynamic changes in these resources – specifically, variations in parental employment and social benefits – influence educational attainment.

2.1. Family background and educational attainment

Studies have shown that children from socioeconomically advantaged families tend to achieve higher educational levels than their less privileged peers (Blau and Duncan, 1967; Bourdieu and Passeron, 1977; Coleman, 1988; Featherman and Hauser, 1976; Hout, 1988; Reardon, 2014). Economic resources, such as parental income and wealth, are frequently cited as critical factors in facilitating access to quality education (Bowles and Gintis, 2002; Card, 2001). These resources also act as buffers against educational disruptions caused by adverse circumstances, such as unemployment or economic shocks (Duncan and Magnuson, 2005).

Parental influence on children's adult socioeconomic attainment is primarily mediated through two pathways: endowments and investments (Becker and Tomes, 1979; Behrman et al., 1994, 1994; Coleman, 1988; Erola and Jalovaara, 2017; Musick and Mare, 2006). Endowments refer to a broad range of resources that children inherit or benefit from, including economic assets, human capital, and genetic traits (Liu, 2018). Investments refer to intentional actions taken by parents aimed at enhancing their children's outcomes, such as expenditures on education and improvements in living conditions. While these constructs are often interwoven, they are commonly proxied by measures of family background – for example, parental income and employment status – which are assumed to capture different dimensions of family influence. In this context, parental income represents material resources, while parental education and employment status reflect human capital and social capital.

In Finland, research has consistently shown that economic hardship during childhood is associated with lower educational attainment. Previous studies have found that children



from low-income families are significantly more likely to underperform academically and attain lower qualifications compared to their peers from wealthier backgrounds (Ferguson et al., 2007). Furthermore, (Jensen, 2023) found that parental unemployment during a child's early years correlates with reduced educational aspirations and achievement. However, some studies suggest that the situation is more complex, as parental education and social status may play a more significant role than income alone (Erola et al., 2016). Sweden provides a contrasting yet comparable setting for studying these dynamics. Unlike Finland, Sweden experienced a significant expansion of its welfare state in the latter half of the 20th century, particularly with respect to employment guarantees and social security programs (Lundberg and Åmark, 2001; Stephens, 1996). This has resulted in lower income inequality and higher levels of economic security compared to Finland (OECD, 2024). In Sweden, particularly at the tertiary level, parental income has effects of similar magnitude as parental education, which also influences children's educational choices (Hällsten and Thaning, 2018). Overall, both parental education and income are important factors influencing children's educational attainment in Sweden.

2.2. Parental employment and social benefits

Parental employment is a pivotal determinant of familial economic stability. Research indicates that employed parents are more likely to invest in their children's education, both through financial contributions and by serving as role models (Duncan et al., 2011; Heinrich, 2014). Changes in parental employment, particularly during childhood, can significantly alter a family's economic landscape, affecting their ability to support educational aspirations.

The role of social benefits in mitigating economic shocks has also been extensively studied. Programs such as unemployment insurance, sick leave, and family allowances provide a safety net, reducing economic insecurity and fostering a stable environment for child development (Gassman-Pines and Hill, 2013; Lindemann and Gangl, 2020; Smeeding, 2005). The design and implementation of these programs, however, vary across regions, which is particularly relevant given our focus on Finland and Sweden.

Some argue that Finland's robust welfare policies, including unemployment benefits and child allowances, have mitigated some of the negative effects of economic adversity (Kangas and Palme, 2009). However, other studies highlight persistent inequalities linked to socioeconomic status, suggesting that while social protections may buffer against the worst outcomes, they do not fully eliminate disparities in educational attainment (Mackenbach, 2017).

Research in Sweden has shown that economic shocks during childhood, such as parental unemployment, are associated with reductions in educational attainment (Jensen et al., 2024; Lindemann and Gangl, 2019, 2020). In addition, compared to other countries (see Lindemann and Gangl, 2019), maternal job loss in Sweden has been found to have a particularly negative effect on children's outcomes (Mörk et al., 2020).

2.3. The context of economic shocks on employment and regional variation

The early 1990s marked a period of significant economic turbulence for both Finland and Sweden, influenced by broader global events such as the fall of the Soviet Union and the Gulf War. The recessions in these countries were largely precipitated by rising oil prices and increased real interest rates in Europe, particularly following the reunification of Germany. These economic events are crucial focal points because previous studies have demonstrated that local labour markets and welfare policies play a key role in influencing household economic stability, which, in turn, impacts educational outcomes (Mordechay, 2017; Schwandt and Wachter, 2019). Therefore, recessions provide a valuable opportunity to examine how childhood economic hardship affects educational attainment, while also considering regional variations in the severity of the economic downturn.

Finland's economy, which had experienced robust growth throughout the 1980s, began to show signs of overheating, with accelerated real income growth and surging asset prices. However, this economic boom ended abruptly in 1990 due to the implementation of tighter fiscal policies aimed at maintaining the fixed exchange rate of the national currency. This led to a financial crisis characterised by debt deflation and a significant decline in exports – particularly after the collapse of trade with the Soviet Union. Finland's economic downturn was marked by a severe devaluation of the national currency and a deep recession, with real income not returning to pre-crisis levels until 1994. During this period, the structure of the Finnish economy underwent a fundamental transformation, shifting from traditional industries to emerging high-tech sectors.

(Kangasharju and and, 2004) studied changes in regional economic disparities in Finland during the economic crisis of the 1990s and the subsequent recovery period. The key conclusion was that regional disparities in labour productivity and job availability significantly contributed to the divergence in per capita GDP from 1990 to 2000. Although population changes acted as a counterbalancing factor, their impact was insufficient to prevent overall divergence. A closer analysis of the two phases – recession (1990–1995) and recovery (1995–2000) – reveals that the primary sector experienced divergence during the recession. Subregions with a focus on agriculture suffered disproportionately from job losses, a consequence of the sector's adjustment to the European Union's Common Agricultural Policy, which Finland adopted in 1995.

During the recovery phase, the private services sector emerged as the most divergent, driven by significant disparities in labour productivity and job creation. The economic landscape had shifted after the crisis due to free trade agreements and the effects of globalization, resulting in heightened competition. Consequently, businesses increasingly concentrated in regional growth centers to leverage agglomeration economies. The labour market was characterised by an abundance of available workers, many of whom migrated to these prosperous centers.

Similarly, Sweden's economic trajectory mirrored that of Finland, with deregulation of the credit market in the 1980s leading to inflated asset prices. The introduction of tax reforms and rising international interest rates in 1990 caused a sharp increase in real interest rates, triggering a banking and currency crisis. This led to significant unemployment and



budget deficits, although Sweden experienced a somewhat less severe downturn than Finland. Both countries eventually began to recover, driven by export-led growth, but the crises of the early 1990s left lasting impacts on their economies.

Studies on Sweden from 1990 to 2010 found that, despite national employment growth, only metropolitan regions fully recovered from the 1990 recession, highlighting significant regional disparities (Eriksson and Hane-Weijman, 2017). High levels of job creation and destruction were observed across both expanding and declining regions. Job growth primarily stemmed from incumbent firms, while job losses were largely a result of business exits and closures of micro-plants (Eriksson and Hane-Weijman, 2017). Regions characterised by a cohesive mix of skill-intensive industries and diverse, unrelated industries exhibited greater resilience over time. This suggests that both economic cohesiveness and industrial diversity are critical factors for resisting economic shocks and fostering long-term stability (Boschma, 2015; Eriksson and Hane-Weijman, 2017)

3.Aims, Data, and Methods

This study employs both instrumental variables and sibling fixed effects approaches to analyse how changes in familial economic resources during childhood are related to educational attainment. We first focus on the endogeneity of parental income in relation to offspring education, which we address by using variation in local, age- and gender-specific employment rates. In subsequent analyses, we also examine within-family variation across siblings and control for unobserved heterogeneity shared among them, such as genetic predispositions and early-life family environments. These methodological choices enable us to isolate the impact of dynamic changes in parental employment and social benefits on educational outcomes. The regional data on variations in labour market conditions are specifically timed to incorporate the economic recession of the 1990s in both countries.

Our research questions are the following:

- How strong are the associations between parental incomes in childhood in Sweden and Finland with children's educational attainment?
- Once the endogeneity of parental incomes for children's educational outcomes is addressed, are parental incomes still important?

3.1. Data

The analysis utilises register data from Finland and Sweden, which provide comprehensive information on individual-level educational outcomes, parental employment histories, and social benefit receipt. These datasets include detailed records of both mothers' and fathers' employment status over time, including sector-specific information, as well as data on the receipt of various family benefits, unemployment insurance, and other social welfare payments. Regional contextual data on labour market conditions and policy variations are also incorporated.

For Sweden, we use population data that covers all individuals living in the country, along with register information on their parents, children, and siblings. Our focus is on individuals born between 1978 and 1987, who were 31 to 40 years old in 2018, the year when we



measure their educational attainment. These individuals were 10 to 14 years old between 1988 and 2001, the period during which we measure their parental income. Information on income and education is sourced from registers held by Statistics Sweden.¹

For Finland, we use registers maintained by Statistics Finland that cover the total population, sampling approximately 4.4 million individuals from 1987 to 2020. Each individual was tracked throughout the entire data period, with new family members added and also tracked over time. This information is combined with data from the population register, the tax register, and several other official registers (see Statistics Finland, 2001). The dataset also tracks income trajectories by age and cohort. See Table A.1 in the appendix for details on the variables used.

3.2. Variables and Operationalization

Our dependent variable is an indicator for whether or not a child has at ages 31-40 completed a university education, i.e., obtained a university degree.

As key explanatory variables, we consider parental income, adjusted for family size, which serves as a measure of the economic resources available to the family. Additionally, we include an index of social benefits, which encompasses unemployment benefits, housing subsidies, and child allowances, to capture the extent of financial support provided by the welfare state. We also include regional employment levels, derived from local labour market statistics, to reflect the broader economic context that influences both educational opportunities and family economic status.

To facilitate cross-country comparisons, we convert Swedish crowns into euros using the purchasing power parity (PPP) for actual individual consumption in 2020, which is equivalent to 10.98 Swedish crowns per euro. Finally, to aid in the interpretation of coefficient estimates, we express incomes in increments of 100,000 euros.²

3.3. Methods

Our primary outcome variable is whether individuals attained a university degree (bachelor's level or higher) by ages 31–40 as of 2018. This outcome was chosen because university graduation typically occurs between ages 25 and 30, allowing additional years to account for delayed studies or career progression. We analyse cohorts born between 1978 and 1987, which corresponds to individuals who would have completed higher education by 2018. This timeframe also aligns with significant economic policy changes and regional disparities that we study here. To capture household financial conditions during children's adolescence (ages 10–14), we focus on the period from 1988 to 2001, depending on the individual's birth year. This window reflects critical developmental stages when educational investments and aspirations are heavily influenced, as emphasised in prior research. Within this framework, we examine both labour income and disposable income. Labour income refers to pre-tax earnings from employment and is considered both in raw monetary terms and in logarithmic form.

Disposable income, defined as income after taxes and government transfers, reflects the financial resources available to households. This measure is further decomposed into

¹ For further details on the data, see Jäntti and Roine (2021).

² See <https://data-explorer.oecd.org/>.

factor income and net transfers. Factor income includes earnings from labour (such as wages and salaries) and returns on assets (including dividends and interest). Net transfers, on the other hand, represent the balance between social benefits received (e.g., unemployment aid and child allowances) and taxes paid.³

While the estimated relationship between parental income and the likelihood that an offspring will earn a university degree is interesting, these estimates cannot simply be interpreted as measuring the direct cause-and-effect relationship. In other words, we cannot conclude that parental income directly causes a child to obtain higher education based solely on this analysis. There are several reasons why the initial estimates might not give an accurate picture. One key issue is that the factors influencing both parental income and a child's educational attainment may be closely linked – in economics terms, parental income may be endogenous. For example, parents with higher education levels tend to have higher incomes. As a result, parental income and the likelihood of a child attending university may both be influenced by underlying factors, such as the parent's education, that aren't captured in the analysis. This can lead to a situation where the relationship between parental income and a child's education is not fully explained by income alone, but by other factors that are correlated with both. Furthermore, parental and offspring education may both be affected by unobserved factors such as inherited ability, so merely controlling for parental income will not solve the endogeneity issue.

A core challenge in this analysis is distinguishing the causal effect of parental income on educational attainment from confounding influences such as inherited ability, or other family-level advantages. To address this, we employ an instrumental variables (IV) approach. This statistical strategy mimics the conditions of a randomised experiment by leveraging naturally occurring external variations that affect income independently of family background characteristics. To accurately measure the causal effect of parental income on a child's educational outcomes, we need to find instrumental variables that influence parental income but don't directly affect whether the child attends university.

Our instruments are derived from regional unemployment fluctuations during the early 1990s Nordic recessions. These regional disparities serve as the foundation for constructing a framework of economic shocks, which in turn drive income changes. Both Finland and Sweden went through major economic shocks in the early 1990s, resulting in a sharp rise in unemployment. However, this increase in unemployment wasn't the same across all regions or age and gender groups. In this study, we take advantage of these regional differences in unemployment rates – specifically, the rates of inactivity (people not working or looking for work) – to better understand how changes in parental income might causally affect a child's chances of pursuing higher education.⁴

Regional unemployment rates serve as proxies for income volatility because layoffs and wage reductions were more pronounced in regions hardest hit by recessionary forces.

³ As net transfers can be both positive and negative – and are mostly negative, as taxes paid in most cases are higher than transfers received – we only look at the level of disposable income, not also its natural logarithm. Note also that, as disposable income is identically equal to the sum of factor income and net transfers, the overall impact of disposable income is estimated by the sum of the coefficients on the two constituent income components.

⁴ For data availability reasons, we use one minus the employment-to-population or *inactivity* rate for broad age groups for men and women separately as our instruments, one for each year the child is aged 10 to 14.



These shocks were largely driven by macroeconomic conditions, rather than family-specific attributes, making them suitable for identifying causal relationships. For the IV approach to be valid, two conditions must hold: first, the instrument (regional unemployment) must significantly predict income changes – a condition we verify through statistical tests.⁵ Second, the exclusion restriction must be satisfied; that is, the instrument should affect educational attainment solely through its impact on income, not through other pathways.

Although this approach substantially improves causal inference, certain limitations persist. We must be cautious about assuming that the local unemployment rate has no direct effect on a child's likelihood of getting a university education. For example, if parental wealth was negatively impacted during the crisis in ways that aren't fully captured by changes in local unemployment rates, then our method for measuring the effect of parental income could be problematic. However, the exclusion restriction is strengthened by the instrument's geographic specificity: labour market disruptions in one region are unlikely to directly influence educational decisions in distant areas.

To capture variations in employment at the Swedish municipal level, we use register-based data from Statistics Sweden. To our knowledge, no consistent series of municipal unemployment rates exists for the period of interest, namely 1988 to 2001. Instead, we use the inactivity rate, defined as one minus the employment-to-population rate, as a proxy.

Because no single source covers the entire period during which the children in our study were between the ages of 10 and 14 – the window in which we measure parental income – we combine two employment data series: Statistics Sweden (2025b) and Statistics Sweden (2025a). Both datasets provide the number of employed individuals by municipality of residence, which is the level of geographic detail required for our analysis. To calculate employment-to-population rates, we use population data from Statistics Sweden (2025c). These employment and population statistics are disaggregated by gender and broad age groups for each municipality. In all regressions, we use the residual inactivity rate, obtained by regressing the raw inactivity rate on year and municipality fixed effects and using the residuals from this model.

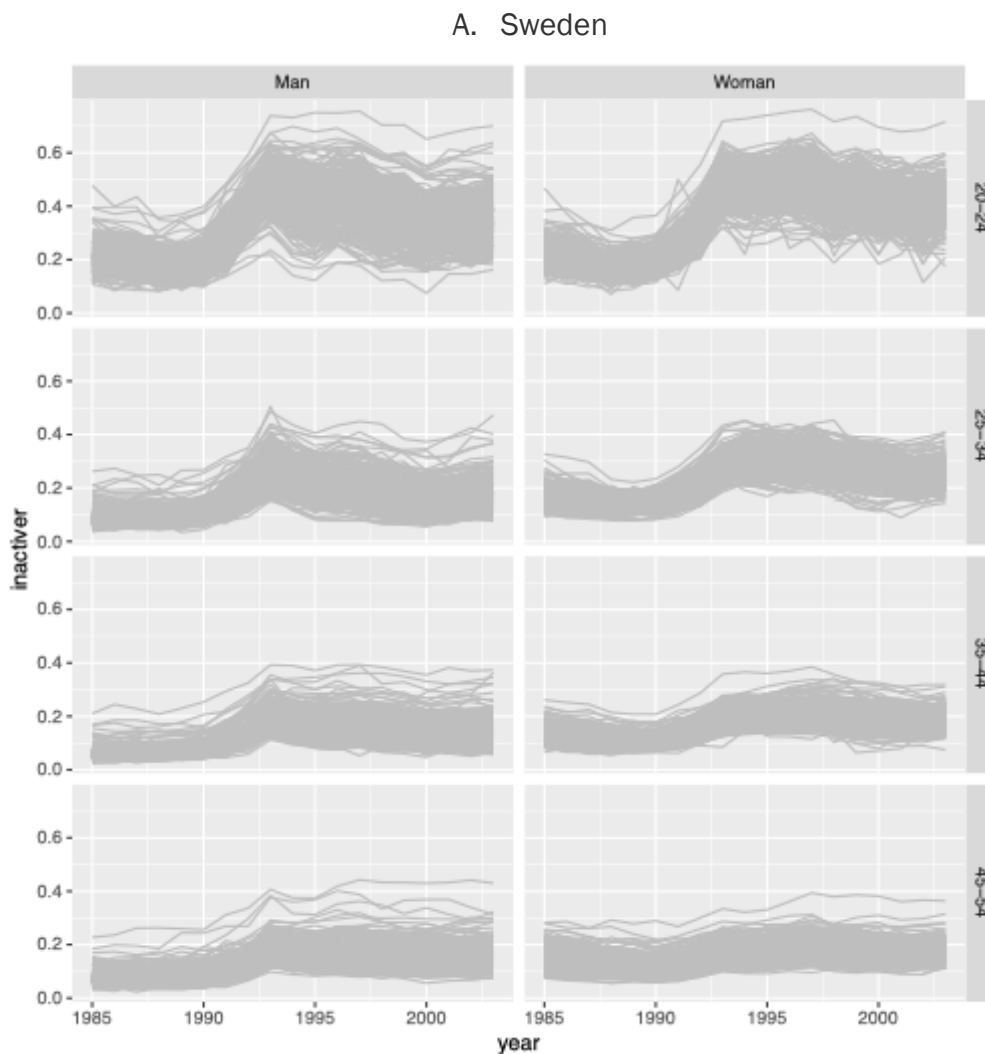
Administrative boundaries in Sweden have changed over time, which affects the comparability of employment and population data. To address this, we harmonise the data across time using resources from Statistics Sweden and the 1990 Census, which also underpins our individual-level microdata. This harmonization process primarily involved applying recoding procedures to reflect provincial reorganizations (Swed. *län*) and retrospectively undoing certain municipal splits that occurred after 1990, thereby creating a consistent set of municipalities for our analysis. We also analyse employment variation in Finland using register-based data from Statistics Finland.

Panels A and B in Figure 1 present the raw (i.e., unadjusted) inactivity rates by age group and gender across all municipalities in Sweden and Finland, respectively. The sharp increase in inactivity associated with the early 1990s recession is clearly visible, along with notable variation across age groups and between genders. It is precisely this type of

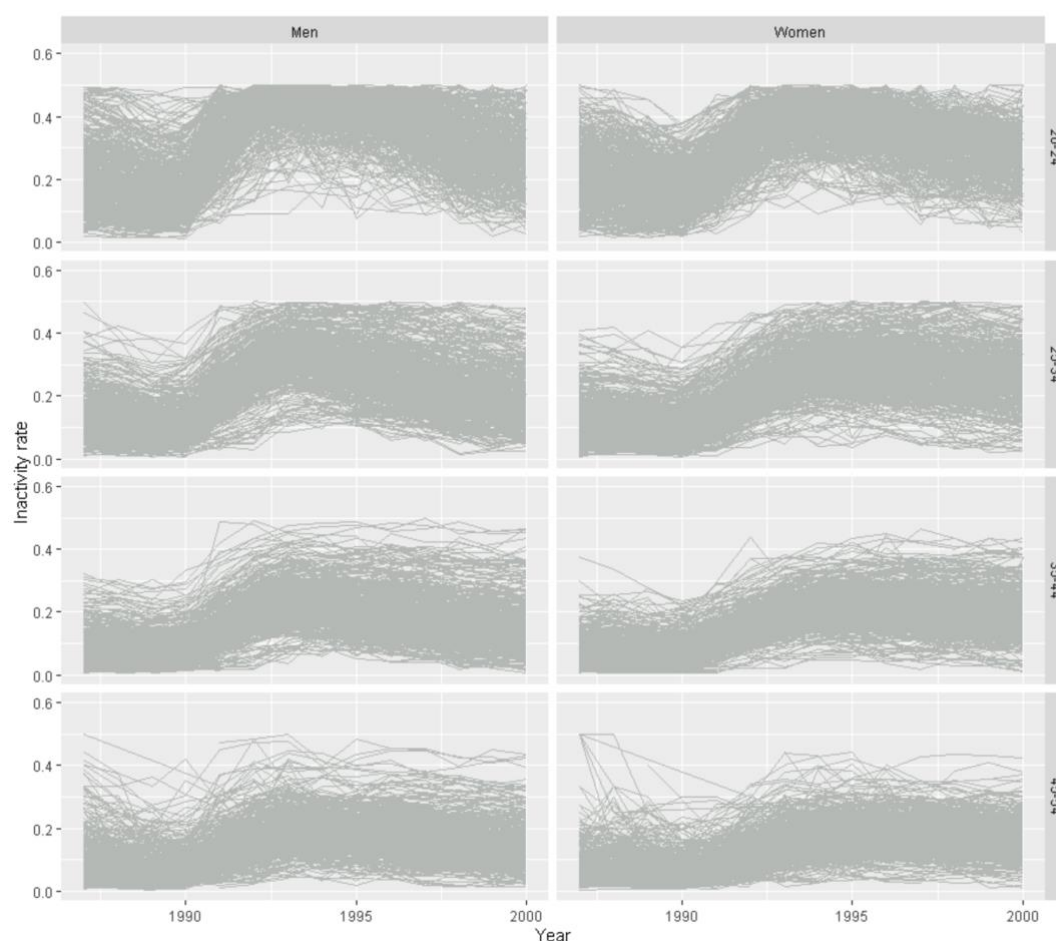
⁵ The F-statistics of the first stage, i.e., when we regress parental income on the inactivity rates, suggest we do not have a so-called weak instrument problem.

variation that we aim to exploit in identifying a more causal relationship between parental income and offspring educational outcomes.

Figure 1. Inactivity rates by age group and gender across all municipalities in Sweden and Finland.



B. Finland



We begin by estimating the effect of parental income on the probability that offspring attain a university degree, using ordinary least squares (OLS). This is often referred to as a “naive” estimate. Parental income is measured as the average annual income during the years when the child was aged 10 to 14. We examine three income definitions: labour income, disposable income, and disposable income further decomposed into factor income and net transfers.

To identify causal effects, we employ an instrumental variables (IV) strategy and estimate three sets of regressions. First, we estimate the *reduced form*, regressing the dependent variable, offspring’s attainment of a university degree directly on the instruments, that is the annual municipal inactivity rates experienced by their parents when the offspring were aged 10 to 14. Second, we estimate the *first stage* regression, in which the endogenous explanatory variable, average parental income over the same age window, is regressed on the municipal inactivity rates (the instruments). Finally, we estimate the *structural equation*, where the fitted values from the first stage (predicted parental income) are used as regressors in place of actual parental income in accounting for the dependent variable offspring’s attainment of a university degree.⁶ Under the identifying assumption that local

⁶ In other words, we estimate key coefficients in the structural equation using two-stage least squares (TSLS).

inactivity rates influence university attainment only through their effect on parental income, the coefficient from the structural equation provides a causal estimate.

Initially, we conduct the analysis using offspring-parent pairs, where one parent is observed per row in the data. We then extend the approach to include both parents on a single row of the dataset, either summing their incomes or including mother's and father's incomes as separate variables along with their interaction term.⁷

It is important to acknowledge potential threats to our identification strategy. Our structural equation identifies the causal effect of parental income during childhood on children's educational attainment only if local age- and gender-specific inactivity rates affect children's outcomes exclusively through their influence on parental income. This assumption may not hold in all cases. For example, if economic shocks – proxied by changes in inactivity rates – also affect local property values, the resulting negative wealth effects could independently influence the child's likelihood of attending university. While we cannot rule out such alternative channels with the available data, this possibility underscores the need for caution in interpreting our estimates as purely causal.

4. Results

Our research question concerns how parental resources during childhood – specifically parental income when the child is between ages 10 and 14 – affect the likelihood that the offspring obtains higher education, defined here as completing a university degree. As outlined above, we begin by estimating a series of regressions using parental labour income as the primary (endogenous) explanatory variable. We then proceed to analogous regressions using parental disposable income, followed by models that decompose disposable income into two components: factor income and net transfers (i.e., transfers received minus taxes paid). In all cases, we residualise both the dependent and independent variables by removing municipality fixed effects.

We first present results based on parental labour income. The estimates for Sweden are reported in Panel A of Table 1, and those for Finland appear in Panel B. These regressions include one parent at a time – either the mother or the father – as the income variable.⁸ The coefficient for the father is reported directly, while the coefficient for the mother is calculated as the sum of the parent coefficient and the interaction term for the parent being a mother. We estimate two specifications: one using the level of parental labour income, and another using the natural logarithm of income. For each of these specifications, we report naïve (OLS), first-stage, and structural estimates. Because the reduced form regression involves regressing the child's university attainment directly on local inactivity rates (which do not vary by parent), it is only estimated once per country.

⁷ We use the same first-stage regression when combining mother and father incomes. Therefore, we do not present separate reduced form and first stage results for this specification, as they are identical to those from the analysis based on individual offspring-parent pairs. (i.e. mothers and fathers on different rows in the data matrix).

⁸ Each offspring with both parents observed in the data appears twice in the regression dataset: once linked to the mother and once to the father.

To aid interpretation, note that income is measured in units of 100,000 euros. In Sweden, the naïve estimates indicate that a €10,000 increase in a father's average income during the child's ages 10–14 is associated with a 4.8 percentage point increase in the probability of the child completing a university degree. For mothers, the corresponding increase is 3.7 percentage points. In Finland, the naïve estimates are slightly smaller: 3.1 percentage points for fathers and 2.1 for mothers.

Reduced form regressions of university attainment on local inactivity rates generally yield large and mostly negative coefficients, with magnitudes that are substantial relative to their standard errors. Similarly, the first-stage regressions – where parental income is regressed on local inactivity rates – also produce substantial coefficients, although the associated R^2 values are low, indicating modest explanatory power.

The structural estimates, which aim to capture the causal effect of parental income, are notably larger in Sweden than the naïve ones. Specifically, a €10,000 increase in a father's income is associated with a 13.2 percentage point increase in the likelihood of the child obtaining a university degree, while the same increase in a mother's income corresponds to a 37.4 percentage point increase. In contrast, the structural estimates for Finland are closer to the naïve ones: 2.6 percentage points for fathers and 6.5 for mothers.

Turning to the specification where we use the natural logarithm of parental income, the naïve estimates suggest that a 10 log-point increase in a father's income is associated with a 1.3 percentage point increase in the probability of offspring attaining a university degree in Sweden and a 2.7 percentage point increase in Finland. In contrast, the point estimates for mothers are negative in both Sweden and Finland. This discrepancy – especially when compared to the consistently positive estimates based on income levels – may indicate non-linearities or differences in the effects of parental income across the income distribution.

In the initial set of bivariate regressions, where only one parent's labour income is included, the estimated coefficients may partially reflect the income of the other parent, due to correlation between the two. To address this, we report estimates in Table 2 that include either the sum of both parents' labour incomes or each parent's labour income separately, entered simultaneously in the same regression.⁹

The first column in Panels A and B of Table 2 reports the OLS coefficient from a regression of offspring university attainment on the sum of parental labour income. The estimates – 0.480 for Sweden (Panel A) and 0.324 for Finland (Panel B) – indicate a strong association: a €10,000 increase in combined parental income is associated with a 4.8 and 3.2 percentage point increase in the likelihood of university attainment in Sweden and Finland, respectively. The second column presents the corresponding structural estimates, obtained using two-stage least squares (TSLS). In Sweden, the TSLS coefficient rises sharply to 3.776, nearly eight times the OLS estimate. In Finland, the structural coefficient is also substantially higher than its OLS counterpart, though the difference is more modest. When parental incomes are entered in logarithmic form, the same qualitative patterns

⁹ For the structural regression estimates, we use the individual-level fitted values from the first-stage regressions reported in Table 1.

hold: TSLS estimates exceed OLS estimates, suggesting a stronger causal effect than implied by naïve associations.

When the incomes of mothers and fathers are included separately in the same regression, the OLS estimates continue to show a positive association with offspring education in both countries. However, the structural estimates paint a more nuanced picture, and in fact diverge between Sweden and Finland. In Sweden, the coefficient on mother's labour income is large and positive – around eight times larger than the OLS estimate – while the coefficient on father's income turns negative, though of similar magnitude to the OLS estimate in absolute terms. In Finland, by contrast, the structural estimate for mother's income is large and negative, whereas the estimate for father's income is large and positive. These patterns persist when parental incomes are expressed in logarithmic terms, though with one key difference: in the Swedish case, the structural estimate for father's income shifts from negative to positive.



Table 1. University degree and parental labour income – OLS and instrumental variable estimates.

A. Sweden

	Naive	Reduced form	1st stage (inc)	Struct eq	Naive	1st stage (log inc)	Struct eq
Mother	0.003 (0.000)	-0.312 (0.003)	-0.056 (0.000)	0.003 (0.000)	0.003 (0.000)	-0.348 (0.004)	0.003 (0.000)
Inactivity rate (age 10)		-0.084 (0.022)	-0.213 (0.007)			-0.524 (0.030)	
Inactivity rate (age 11)		-0.196 (0.028)	0.160 (0.010)			0.551 (0.038)	
Inactivity rate (age 12)		0.032 (0.026)	-0.020 (0.009)			-0.008 (0.036)	
Inactivity rate (age 13)		-0.042 (0.026)	0.025 (0.009)			0.021 (0.037)	
Inactivity rate (age 14)		0.227 (0.019)	0.028 (0.006)			-0.099 (0.026)	
Inactivity rate: age 10*Mother		-0.596 (0.030)	0.056 (0.008)			-0.267 (0.040)	
Inactivity rate: age 11*Mother		-0.041 (0.038)	-0.157 (0.010)			-0.540 (0.051)	
Inactivity rate: age 12*Mother		-0.180 (0.037)	-0.076 (0.010)			-0.646 (0.050)	
Inactivity rate: age 13*Mother		-0.177 (0.037)	-0.082 (0.010)			-0.421 (0.053)	
Inactivity rate: age 14*Mother		-0.529 (0.029)	-0.005 (0.007)			0.172 (0.042)	
Parent labour income	0.478 (0.015)			1.321 (0.091)			
Parent labour income (log)					0.133 (0.001)		0.251 (0.032)
Parent labour income*Mother	0.372 (0.018)			3.746 (0.101)			
Parent labour income (log)*Mother					-0.051 (0.001)		0.587 (0.033)
R2	0.025	0.008	0.004	0.007	0.020	0.006	0.007
Adj. R ²	0.025	0.008	0.004	0.007	0.020	0.006	0.007
Num. obs.	1764816	1764816	1764816	1764816	1764816	1764816	1764816
RMSE	0.466	0.470	0.132	0.470	0.467	0.608	0.470



B. Finland

	Naive	Reduced form	1st stage (inc)	Struct eq	Naive	1st stage (log inc)	Struct eq
Mother	0.011 (0.001)	0.009 (0.002)	0.006 (0.001)	0.009 (0.001)	0.012 (0.001)	-0.030 (0.004)	0.013 (0.001)
Inactivity rate (age 10)		0.270 (0.031)	0.041 (0.016)			1.760 (0.077)	
Inactivity rate (age 11)		-0.129 (0.057)	0.153 (0.030)			-0.872 (0.140)	
Inactivity rate (age 12)		-0.136 (0.062)	0.169 (0.032)			1.329 (0.162)	
Inactivity rate (age 13)		0.172 (0.069)	0.234 (0.035)			0.807 (0.179)	
Inactivity rate (age 14)		-0.162 (0.040)	-0.459 (0.021)			-2.870 (0.101)	
Inactivity rate: age 10*Mother		0.006 (0.043)	-0.083 (0.019)			-0.735 (0.105)	
Inactivity rate: age 11*Mother		-0.023 (0.080)	-0.037 (0.034)			0.312 (0.192)	
Inactivity rate: age 12*Mother		0.025 (0.087)	-0.157 (0.037)			-0.790 (0.218)	
Inactivity rate: age 13*Mother		-0.003 (0.096)	-0.192 (0.040)			-0.558 (0.240)	
Inactivity rate: age 14*Mother		-0.021 (0.056)	0.361 (0.024)			1.561 (0.137)	
Parent labour income	0.312 (0.009)			0.266 (0.026)			
Parent labour income (log)					0.044 (0.001)		0.061 (0.004)
Parent labour income*Mother	0.210 (0.018)			0.646 (0.110)			
Parent labour income (log)*Mother					-0.010 (0.001)		0.079 (0.010)
R2	0.029	0.002	0.011	0.001	0.011	0.009	0.002
Adj. R ²	0.029	0.002	0.011	0.001	0.011	0.008	0.001
Num. obs.	1262350	1262350	1262350	1262350	1262350	1262350	1262350
RMSE	0.395	0.401	0.179	0.401	0.399	0.989	0.401

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table 2. University degree and combined parental labour income – OLS and instrumental variable estimates.

A. Sweden

	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents labour income	0.480 (0.011)	3.776 (0.037)						
Parents labour income (log)					0.087 (0.001)	0.785 (0.007)		
Mother labour income			0.670 (0.012)	5.085 (0.044)				
Mother labour income (log)							0.056 (0.001)	0.833 (0.007)
Father labour income			0.424 (0.014)	-0.421 (0.093)				
Father labour income (log)							0.121 (0.001)	0.080 (0.032)
R2	0.041	0.011	0.042	0.014	0.030	0.013	0.033	0.014
Adj. R ²	0.041	0.011	0.042	0.014	0.030	0.013	0.033	0.014
Num. obs.	858408	858408	858408	858408	858408	858408	858408	858408
RMSE	0.462	0.470	0.462	0.469	0.465	0.469	0.464	0.469

B. Finland

	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents labour income	0.324 (0.005)	0.429 (0.016)						
Parents labour income (log)					0.021 (0.000)	0.034 (0.003)		
Mother labour income			0.447 (0.008)	-7.608 (0.456)				
Mother labour income (log)							0.026 (0.001)	0.986 (0.053)
Father labour income			0.207 (0.006)	2.148 (0.099)				
Father labour income (log)							0.042 (0.001)	-0.414 (0.026)
R2	0.048	0.001	0.049	0.002	0.018	0.000	0.019	0.001
Adj. R ²	0.048	0.001	0.049	0.002	0.018	0.000	0.019	0.001
Num. obs.	631175	631175	631175	631175	631175	631175	631175	631175
RMSE	0.393	0.402	0.392	0.402	0.399	0.402	0.399	0.402

Note: The structural equation estimates use a first stage regression estimated with individual parent income (regressed on municipal inactivity rate). All models include municipality fixed effects. Either both parents' incomes or their sum are used in the structural regressions.



We now turn to the association between parental disposable income and offspring attainment of higher education. The structure of the analysis mirrors that of parental labour income. We begin by presenting results that include only one parent's disposable income (Panels A and B in Table 3), followed by results that include either the sum of both parents' disposable incomes or both the mother's and father's disposable incomes entered separately within the same regression (Panels A and B in Table 4).

Focusing first on the regressions that include only one parent at a time (Table 3), the naïve point estimates are positive but relatively small. In Sweden, a =C10,000 increase in the father's disposable income is associated with a 0.4 percentage point increase in the likelihood that the offspring obtains a university degree. For mothers, the total effect is 1.9 percentage points (0.42 + 1.48). In Finland, a similar increase in disposable income is associated with a 1.4 percentage point increase for fathers and a 1.0 percentage point increase for mothers.

The two-stage least squares (TSLS) estimates of the structural coefficients tell a different story. In Sweden, these estimates suggest much larger causal effects of parental disposable income on offspring education. In contrast, the structural coefficients for Finland are small and, in some cases, even negative.

Table 4 reports results from regressions where parental disposable incomes are entered jointly – either as a sum or separately but simultaneously.¹⁰

In Sweden (Panel A), the OLS estimates show a small and statistically insignificant positive association between parental disposable income and the likelihood of offspring university attainment. In Finland (Panel B), the association is also small but statistically significant. However, the structural (TSLS) coefficient in Sweden is large, positive, and statistically significant, indicating a stronger causal effect. In Finland, the structural estimate is small in magnitude, statistically significant, and negative. When parental disposable incomes are entered separately but simultaneously, the Swedish OLS estimates are positive for both parents, with a stronger association observed for mothers. The structural estimates reinforce this difference: the mother's disposable income has a very large and statistically significant positive effect, whereas the father's effect is small, negative, and not statistically significant.

In Finland, the 'naive' OLS estimates are again small but statistically significant, negative for mothers and positive for fathers, though smaller in absolute magnitude for mothers. However, the structural estimates reverse these signs: the coefficient for mothers becomes positive and large, while that for the fathers becomes negative and large. These opposing effects nearly cancel each other out, indicating that if both parents were to experience a =C10,000 increase in disposable income, the net effect on the offspring's likelihood of obtaining a university degree would be close to zero.

¹⁰ As disposable income can be negative, we do not estimate these regressions in log form.

Table 3. University degree and parental disposable income – OLS and instrumental variable estimates.

A. Sweden				
	Naive	Reduced form	1st stage	Struct eq
Mother	0.003 (0.000)	-0.312 (0.003)	-0.006 (0.000)	0.003 (0.000)
Inactivity rate (age 10)		-0.084 (0.022)	-0.103 (0.012)	
Inactivity rate (age 10)		-0.196 (0.028)	0.068 (0.014)	
Inactivity rate (age 12)		0.032 (0.026)	-0.041 (0.019)	
Inactivity rate (age 13)		-0.042 (0.026)	0.027 (0.029)	
Inactivity rate (age 14)		0.227 (0.019)	0.036 (0.016)	
Inactivity rate (age 10)*Mother		-0.596 (0.030)	0.075 (0.012)	
Inactivity rate (age 11)*Mother		-0.041 (0.038)	-0.046 (0.015)	
Inactivity rate (age 12)*Mother		-0.180 (0.037)	-0.000 (0.020)	
Inactivity rate (age 13)*Mother		-0.177 (0.037)	-0.038 (0.030)	
Inactivity rate (age 14)*Mother		-0.529 (0.029)	-0.008 (0.016)	
Parent disposable income	0.042 (0.067)			2.915 (0.154)
Parent disposable income*Mother	0.148 (0.108)			23.037 (0.313)
R2	0.001	0.008	0.000	0.005
Adj. R ²	0.001	0.008	0.000	0.005
Num. obs.	1764816	1764816	1764816	1764816
RMSE	0.471	0.470	0.317	0.471



B. Finland

	Naive	Reduced form	1st stage	Struct eq
Mother	0.015 (0.001)	-0.021 (0.000)	0.009 (0.002)	0.010 (0.001)
Inactivity rate (age 10)		-2.909 (0.010)	0.270 (0.031)	
Inactivity rate (age 11)		1.624 (0.018)	-0.129 (0.057)	
Inactivity rate (age 12)		0.580 (0.018)	-0.136 (0.062)	
Inactivity rate (age 13)		-2.050 (0.020)	0.172 (0.069)	
Inactivity rate (age 14)		2.394 (0.012)	-0.162 (0.040)	
Inactivity rate (age 10)*Mother		0.398 (0.012)	0.006 (0.043)	
Inactivity rate (age 11)*Mother		-0.255 (0.022)	-0.023 (0.080)	
Inactivity rate (age 12)*Mother		-0.058 (0.022)	0.025 (0.087)	
Inactivity rate (age 13)*Mother		0.254 (0.026)	-0.003 (0.096)	
Inactivity rate (age 14)*Mother		-0.243 (0.015)	-0.021 (0.056)	
Parent disposable income	0.141 (0.006)			-0.080 (0.005)
Parent disposable income*Mother	-0.041 (0.008)			-0.013 (0.007)
R2	0.003	0.505	0.002	0.002
Adj. R ²	0.003	0.505	0.002	0.002
Num. obs.	1262350	1262350	1262350	1262350
RMSE	0.401	0.100	0.401	0.401

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1 ststage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table 4. University degree and combined parental disposable income – OLS and instrumental variable estimates.

	A. Sweden				B. Finland			
	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents disposable income	0.047 (0.068)	6.676 (0.126)			0.062 (0.003)	-0.056 (0.003)		
Mother disposable income			0.183 (0.086)	25.968 (0.286)			-0.021 (0.011)	1.586 (0.099)
Father disposable income			0.040 (0.067)	-0.299 (0.159)			0.111 (0.012)	-1.495 (0.087)
R2	0.002	0.003	0.003	0.009	0.002	0.001	0.002	0.001
Adj. R ²	0.002	0.003	0.003	0.009	0.002	0.001	0.002	0.001
Num. obs.	858408	858408	858408	858408	631175	631175	631175	631175
RMSE	0.472	0.472	0.472	0.470	0.400	0.400	0.400	0.400

Note: Dependent variable is the indicator for the offspring having a university education. The structural equation estimates use a first stage regression estimated with individual parent income (regressed on municipal inactivity rate). All models include municipality fixed effects. Either both parents' incomes or their sum are used in the structural regressions.

We have also estimated models that separate parental disposable income into its two primary components: market (or factor) income and net social transfers (i.e., transfers minus taxes). The corresponding results are presented in Tables A.1 to A.3 in the appendix. Our identification strategy assumes that variation in employment rates – intended to capture local labour market conditions experienced by parents when offspring were aged 10 to 14 – affects offspring education only through its impact on parental income. If employment shocks influence offspring education through other channels, such as local housing market fluctuations, then our structural coefficient would no longer represent a valid causal effect. For instance, if regional economic downturns depress housing values and these, in turn, influence educational attainment, our identification assumption would be violated.

To partially address this concern, we estimate models that include sibling fixed effects, which help control for unobserved family-level characteristics shared among siblings.¹¹

We present results that include either parental labour or disposable income, using both joint and separate specifications for mothers and fathers. Panels A and B in Table 5 show the results using labour income, while those in Table 6 present results using disposable income. Additional results – including models where one parent's income is included at a time, as well as corresponding reduced form and first-stage regressions – are reported in the appendix.

The naïve coefficient estimates (i.e., based on OLS with sibling fixed effects) for parental labour income in the first columns of Panels A and B of Table 5 suggest a negative

¹¹ We estimate sibling fixed effects by subtracting from all dependent and independent variables the average of those variables within each sibling group, restricted to our included birth cohorts – offspring born between 1978 and 1987.

association between parental income and offspring education once sibling fixed effects are included. In Sweden, this estimate is statistically significant, while in Finland it is not.¹² In both Sweden and Finland, the structural regression coefficients are large and positive, suggesting a stronger causal effect once endogeneity is addressed. When labour incomes for both parents are included separately, the sibling fixed-effect (naïve) estimates are negative in both countries, with larger absolute magnitudes for mothers. The structural estimates, however, are substantially larger and diverge by country: in Finland, both mother's and father's income show large positive effects; in Sweden, the coefficient is positive for the mother but negative for the father. Results using the natural logarithm of parental labour income follow a similar pattern. In Finland, the naïve estimates become positive but remain statistically insignificant, while the structural estimates continue to show the same directional differences between countries and parents.

Finally, we present estimates that examine the role of parental disposable income in shaping offspring university attainment, incorporating models that account for sibling fixed effects (Panels A and B in Table 6). In the case of Sweden, both the naïve and structural regression coefficient estimates are negative, with the two-stage least squares (TSLS) estimate substantially larger in absolute magnitude. When mother's and father's disposable incomes are entered separately, the sibling fixed-effect (naïve) estimates are statistically significant and negative for both parents. The structural regression coefficients, however, show a divergent pattern: they are large in absolute terms and statistically significant, but negative for mothers and positive for fathers. These results imply that if both parents experienced equal increases in disposable income, their effects on offspring university attainment would largely offset each other.

In contrast, the results for Finland indicate smaller associations when only sibling fixed effects are included, with two out of three estimates being statistically insignificant. However, when we use fitted values from the first-stage regressions as instruments for parental income, the structural estimates become substantial, positive, and statistically significant.

¹² Although we refer to these as naïve estimates, they are less naïve than standard OLS, as sibling fixed effects help address omitted variable bias related to shared family background.



Table 5. University degree and combined parental labour income – OLS and instrumental variable estimates.

A. Sweden

	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents labour income	-0.251 (0.016)	2.268 (0.207)						
Parents labour income (log)					-0.038 (0.002)	0.883 (0.028)		
Mother labour income			-0.654 (0.035)	11.417 (0.288)				
Mother labour income (log)							-0.055 (0.002)	0.978 (0.028)
Father labour income			-0.066 (0.029)	-3.887 (0.248)				
Father labour income (log)							-0.004 (0.002)	-2.418 (0.090)
R2	0.001	0.000	0.012	0.003	0.000	0.001	0.002	0.003
Adj. R ²	0.001	0.000	0.012	0.002	0.000	0.001	0.002	0.003
Num. obs.	858408	858408	858408	858408	858408	858408	858408	858408
RMSE	0.472	0.472	0.469	0.472	0.472	0.472	0.472	0.472

B. Finland

	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents labour income	-0.008 (0.005)	0.714 (0.026)						
Parents labour income (log)					-0.008 (0.005)	0.126 (0.004)		
Mother labour income			-0.014 (0.005)	0.690 (0.032)				
Mother labour income (log)							0.000 (0.001)	0.135 (0.006)
Father labour income			-0.006 (0.005)	0.720 (0.026)				
Father labour income (log)							0.002 (0.001)	0.122 (0.004)
R2	0.000	0.002	0.000	0.002	0.000	0.004	0.000	0.004
Adj. R ²	0.000	0.002	0.000	0.002	0.000	0.004	0.000	0.004
Num. obs.	631175	631175	631175	631175	631175	631175	631175	631175
RMSE	0.197	0.196	0.197	0.196	0.197	0.196	0.197	0.196

Note: The structural equation estimates use a first stage regression estimated with individual parent income (regressed on municipal inactivity rate). All models include municipality fixed effects. Either both parents' incomes or their sum are used in the structural regressions.

Table 6. University degree and combined parental disposable income – OLS and instrumental variable estimates.

	A. Sweden				B. Finland			
	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents disposable income	-0.033 (0.008)	-0.474 (0.390)			-0.008 (0.005)	0.714 (0.026)		
Mother disposable income			-0.077 (0.071)	-12.183 (0.444)			-0.014 (0.005)	0.690 (0.032)
Father disposable income			-0.012 (0.035)	12.308 (0.456)			-0.006 (0.005)	0.720 (0.026)
R2	0.000	0.000	0.001	0.004	0.000	0.002	0.000	0.002
Adj. R ²	0.000	0.000	0.001	0.004	0.000	0.002	0.000	0.002
Num. obs.	858408	858408	858408	858408	631175	631175	631175	631175
RMSE	0.472	0.472	0.472	0.471	0.197	0.196	0.197	0.196

Note: Dependent variable is the indicator for the offspring having a university education. The structural equation estimates use a first stage regression estimated with individual parent income (regressed on municipal inactivity rate). All models include municipality fixed effects. Either both parents' incomes or their sum are used in the structural regressions.

5. Concluding remarks

We have examined the relationship between childhood economic resources – specifically, parental income when offspring were aged 10 to 14 – and later-life educational attainment, measured by whether the offspring had obtained a university degree by ages 31 to 40. We compared 'naive' estimates, obtained through ordinary least squares regressions that control for municipality fixed effects, with estimates that attempt to address endogeneity in parental income. This was achieved by using municipality-level, age and gender-specific employment rates during the offspring's formative years as instruments for parental income, and by further incorporating sibling fixed effects.

The differences between the naïve and instrumental variable estimates are substantial, with the latter generally larger in absolute value. However, these differences vary across income definitions (e.g., labour vs. disposable income) and differ between Sweden and Finland. Our findings suggest that causal estimates indicate a stronger role for parental resources than what simple least-squares regressions imply. Moreover, there is some evidence that maternal income may be more influential than paternal income, though this varies by specification and country.

Importantly, the associations between parental labour income and offspring educational outcomes appear more robust and consistent than those involving disposable income. This may reflect behavioural mechanisms – children may be influenced by observing their parents' engagement in the labour market more than by abstract measures of household financial resources. If economic resources alone were driving the outcome, one would expect disposable income to be a more predictive measure.



What is clear is that there is substantial endogeneity in the observed relationships, and estimates derived from ordinary least squares regressions should not be interpreted as causal. Whether variation in municipality-age-gender employment rates provides a valid instrument – and whether the assumptions underlying our identification strategy fully hold – remains an open question. Therefore, our findings should be interpreted as conditional on the validity of our identification assumptions.



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Appendix

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Regressions with disposable income separated into market/factor income and net social transfers

Table A. 1. University degree and parental disposable income in Sweden – OLS and instrumental variable estimates.

	Naive	Reduced form	1st stage (fact inc)	1st stage (net tr)	Struct eq
Mother	0.003 (0.000)	-0.312 (0.003)	-0.063 (0.001)	0.058 (0.000)	0.003 (0.000)
Inactivity rate (age 10)		-0.084 (0.022)	-0.358 (0.019)	0.256 (0.008)	
Inactivity rate (age 10)		-0.196 (0.028)	0.248 (0.023)	-0.180 (0.009)	
Inactivity rate (age 12)		0.032 (0.026)	-0.018 (0.030)	-0.023 (0.011)	
Inactivity rate (age 13)		-0.042 (0.026)	0.049 (0.046)	-0.023 (0.017)	
Inactivity rate (age 14)		0.227 (0.019)	0.054 (0.024)	-0.018 (0.009)	
Inactivity rate (age 10)*Mother		-0.596 (0.030)	0.160 (0.019)	-0.086 (0.008)	
Inactivity rate (age 10)*Mother		-0.041 (0.038)	-0.237 (0.023)	0.191 (0.010)	
Inactivity rate (age 12)*Mother		-0.180 (0.037)	-0.067 (0.031)	0.067 (0.012)	
Inactivity rate (age 13)*Mother		-0.177 (0.037)	-0.108 (0.046)	0.069 (0.017)	
Inactivity rate (age 14)*Mother		-0.529 (0.029)	-0.046 (0.025)	0.038 (0.010)	
Parent factor income	-0.140 (0.091)				5.571 (0.279)
Parent net transfers	-0.475 (0.189)				7.291 (0.411)
Parent factor income*Mother	-0.132 (0.138)				-10.634 (0.567)
Parent net transfers*Mother	-0.910 (0.222)				-18.176 (0.695)
R ₂	0.013	0.008	0.000	0.002	0.008
Adj. R ²	0.013	0.008	0.000	0.002	0.008
Num. obs.	1764816	1764816	1764816	1764816	1764816
RMSE	0.469	0.470	0.493	0.186	0.470

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table A. 2. University degree and parental factor income in Finland – OLS and instrumental variable estimates.

	Naive	Reduced form	1st stage (fact inc)	1st stage (net tr)	Struct eq
Mother	0.011 (0.000)	0.009 (0.002)	-0.000 (0.001)	0.102 (0.005)	0.020 (0.007)
Inactivity rate (age 10)		0.270 (0.031)	-0.367 (0.016)	-0.970 (0.086)	
Inactivity rate (age 11)		-0.129 (0.057)	0.316 (0.028)	1.034 (0.160)	
Inactivity rate (age 12)		-0.136 (0.062)	0.217 (0.031)	0.884 (0.178)	
Inactivity rate (age 13)		0.172 (0.069)	-0.009 (0.033)	0.018 (0.194)	
Inactivity rate (age 14)		-0.162 (0.040)	-0.138 (0.020)	-0.434 (0.110)	
Inactivity rate (age 10)*Mother		0.006 (0.043)	0.170 (0.018)	-0.062 (0.120)	
Inactivity rate (age 11)*Mother		-0.023 (0.080)	-0.137 (0.033)	-0.114 (0.223)	
Inactivity rate (age 12) *Mother		0.025 (0.087)	-0.196 (0.036)	-0.715 (0.294)	
Inactivity rate (age 13)*Mother		-0.003 (0.096)	-0.032 (0.038)	-0.294 (0.267)	
Inactivity rate (age 14)*Mother		-0.021 (0.056)	0.171 (0.023)	-0.784 (0.153)	
Parent factor income	0.355 (0.007)				-1.421 (0.115)
Parent net transfers	-0.258 (0.013)				0.264 (0.025)
Parent factor income*Mother	0.221 (0.009)				0.275 (0.507)
Parent net transfers*Mother	-0.027 (0.016)				-0.384 (0.086)
R ₂	0.037	0.002	0.002	0.031	0.001
Adj. R ²	0.037	0.002	0.002	0.031	0.001
Num. obs.	1262350	1262350	1262350	1262350	1262350
RMSE	0.394	0.401	0.172	1.051	0.401

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table A. 3. University degree and combined parental disposable income in Sweden and Finland – OLS and instrumental variable estimates.

	A. Sweden				B. Finland			
	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq	Naive	Struct eq
Parents factor income	-0.228 (0.089)	-6.637 (0.193)			0.355 (0.005)	-0.591 (0.040)		
Parents net transfers	-0.733 (0.180)	-11.875 (0.239)			-0.202 (0.007)	0.048 (0.002)		
Mother factor income			-0.267 (0.097)	-4.807 (0.511)			0.407 (0.006)	5.317 (2.075)
Mother net transfers			-1.318 (0.118)	-10.588 (0.579)			-0.250 (0.010)	-1.049 (0.281)
Father factor income			-0.101 (0.075)	1.055 (0.283)			0.311 (0.006)	-1.767 (0.535)
Father net transfers			-0.346 (0.158)	2.000 (0.416)			-0.102 (0.014)	0.414 (0.098)
R ₂	0.016	0.012	0.023	0.014	0.058	0.002	0.060	0.002
Adj. R ²	0.016	0.012	0.023	0.014	0.058	0.002	0.060	0.002
Num. obs.	858408	858408	858408	858408	631175	631175	631175	631175
RMSE	0.469	0.469	0.467	0.469	0.390	0.402	0.390	0.402

Note: Dependent variable is the indicator for the offspring having a university education. The structural equation estimates use a first stage regression estimated with individual parent income (regressed on municipal inactivity rate). All models include municipality fixed effects. Either both parents' incomes or their sum are used in the structural regressions.

Regressions that control for sibling fixed effects

Table A. 4. University degree and parental labour income in Sweden – OLS and instrumental variable estimates with sibling fixed effects.

	Naive	Reduced form	1st stage (inc)	Struct eq	Naive	1st stage (log inc)	Struct eq
Mother	-0.000 (0.000)	0.002 (0.000)	-0.001 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.006 (0.000)	0.000 (0.000)
Inactivity rate (age 10)		0.302 (0.014)	-0.114 (0.005)			-0.272 (0.025)	
Inactivity rate (age 10)		-0.105 (0.018)	0.105 (0.006)			0.289 (0.031)	
Inactivity rate (age 12)		0.026 (0.017)	-0.002 (0.006)			-0.020 (0.031)	
Inactivity rate (age 13)		-0.052 (0.017)	0.008 (0.006)			-0.077 (0.032)	
Inactivity rate (age 14)		-0.088 (0.013)	-0.021 (0.005)			-0.029 (0.025)	
Inactivity rate (age 10)*Mother		-0.149 (0.020)	0.050 (0.006)			-0.183 (0.034)	
Inactivity rate (age 10)*Mother		0.124 (0.025)	-0.078 (0.008)			-0.266 (0.043)	
Inactivity rate (age 12)*Mother		0.069 (0.024)	-0.029 (0.008)			-0.287 (0.043)	
Inactivity rate (age 13)*Mother		0.058 (0.024)	-0.025 (0.008)			-0.130 (0.045)	
Inactivity rate (age 14)*Mother		-0.032 (0.018)	0.048 (0.006)			0.454 (0.036)	
Parent labour income	-0.026 (0.003)			-1.995 (0.118)			
Parent labour income (log)					-0.004 (0.001)		-0.551 (0.041)
Parent labour income*Mother	-0.010 (0.004)			-1.006 (0.177)			
Parent labour income (log)*Mother					-0.006 (0.001)		0.238 (0.044)
R2	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Adj. R ²	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Num. obs.	1764816	1764816	1764816	1764816	1764816	1764816	1764816
RMSE	0.217	0.217	0.088	0.217	0.217	0.390	0.217

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table A. 5. University degree and parental labour income in Finland – OLS and instrumental variable estimates with sibling fixed effects.

	Naive	Reduced form	1st stage (inc)	Struct eq	Naive	1st stage (log inc)	Struct eq
Mother	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.026 (0.002)	-0.007 (0.000)
Inactivity rate (age 10)		0.489 (0.036)	0.403 (0.022)			-0.110 (0.208)	
Inactivity rate (age 11)		-0.337 (0.062)	-0.054 (0.036)			0.593 (0.371)	
Inactivity rate (age 12)		0.087 (0.068)	0.146 (0.040)			0.711 (0.416)	
Inactivity rate (age 13)		0.345 (0.075)	0.224 (0.042)			-0.365 (0.450)	
Inactivity rate (age 14)		-0.676 (0.051)	-0.408 (0.030)			0.103 (0.295)	
Inactivity rate (age 10)*Mother		0.000 (0.051)	-0.418 (0.028)			-1.620 (0.278)	
Inactivity rate (age 10)*Mother		-0.000 (0.087)	0.165 (0.047)			1.121 (0.489)	
Inactivity rate (age 12)*Mother		-0.000 (0.096)	-0.234 (0.054)			-1.986 (0.546)	
Inactivity rate (age 13)*Mother		0.000 (0.106)	-0.265 (0.055)			-0.740 (0.592)	
Inactivity rate (age 14)*Mother		-0.000 (0.072)	0.590 (0.038)			2.657 (0.391)	
Parent labour income	0.005 (0.002)			0.768 (0.023)			
Parent labour income (log)					-0.000 (0.000)		0.253 (0.014)
Parent labour income*Mother	-0.009 (0.003)			-3.708 (0.175)			
Parent labour income (log)*Mother					-0.000 (0.000)		-0.516 (0.016)
R2	0.000	0.004	0.005	0.002	0.000	0.001	0.002
Adj. R ²	0.000	0.004	0.005	0.002	0.000	0.001	0.002
Num. obs.	1262350	1262350	1262350	1262350	1262350	1262350	1262350
RMSE	0.196	0.196	0.141	0.196	0.196	1.517	0.196

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table A. 6. University degree and parental disposable income in Sweden – OLS and instrumental variable estimates with sibling fixed effects.

	Naive	Reduced form	1st stage	Struct eq
Mother	-0.000 (0.000)	0.002 (0.000)	0.001 (0.000)	0.000 (0.000)
Inactivity rate (age 10)		0.302 (0.014)	-0.018 (0.013)	
Inactivity rate (age 11)		-0.105 (0.018)	0.060 (0.012)	
Inactivity rate (age 12)		0.026 (0.017)	-0.004 (0.009)	
Inactivity rate (age 13)		-0.052 (0.017)	0.006 (0.012)	
Inactivity rate (age 14)		-0.088 (0.013)	-0.010 (0.008)	
Inactivity rate (age 10)*Mother		-0.149 (0.020)	0.043 (0.017)	
Inactivity rate (age 10)*Mother		0.124 (0.025)	-0.033 (0.016)	
Inactivity rate (age 12)*Mother		0.069 (0.024)	-0.007 (0.011)	
Inactivity rate (age 13)*Mother		0.058 (0.024)	-0.003 (0.016)	
Inactivity rate (age 14)*Mother		-0.032 (0.018)	0.015 (0.011)	
Parent disposable income	-0.003 (0.003)			0.785 (0.174)
Parent disposable income*Mother	0.001 (0.004)			2.492 (0.239)
R2	0.000	0.001	0.000	0.000
Adj. R ²	0.000	0.001	0.000	0.000
Num. obs.	1764816	1764816	1764816	1764816
RMSE	0.217	0.217	0.225	0.217

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

Table A. 7. University degree and disposable income in Finland – OLS and instrumental variable estimates with sibling fixed effects.

	Naive	Reduced form	1st stage	Struct eq
Mother	-0.017 (0.001)	0.038 (0.001)	-0.009 (0.002)	-0.009 (0.001)
Inactivity rate (age 10)		-2.612 (0.009)	0.265 (0.030)	
Inactivity rate (age 11)		1.433 (0.016)	-0.141 (0.055)	
Inactivity rate (age 12)		0.523 (0.017)	-0.112 (0.060)	
Inactivity rate (age 13)		-1.834 (0.019)	0.160 (0.067)	
Inactivity rate (age 14)		2.231 (0.011)	-0.169 (0.039)	
Inactivity rate (age 10)*Mother		-0.107 (0.013)	-0.000 (0.042)	
Inactivity rate (age 10)*Mother		0.065 (0.025)	0.000 (0.078)	
Inactivity rate (age 12)*Mother		-0.001 (0.026)	0.000 (0.085)	
Inactivity rate (age 13)*Mother		-0.024 (0.028)	-0.000 (0.094)	
Inactivity rate (age 14)*Mother		-0.022 (0.016)	0.000 (0.055)	
Parent disposable income	0.067 (0.005)			-0.086 (0.005)
Parent disposable income*Mother	0.079 (0.010)			0.003 (0.007)
R2	0.003	0.394	0.001	0.001
Adj. R ²	0.003	0.394	0.001	0.001
Num. obs.	1262350	1262350	1262350	1262350
RMSE	0.399	0.124	0.400	0.400

Note: Dependent variable is the indicator for the offspring having a university education in all columns except the 1st stage, where it is parental income. All models include municipality fixed effects. These regressions include one parent at a time, i.e., either the mother's or the father's income is used.

