Labor Market Transformation in the Wake of Recession: How the Swedish Banking Crisis Affected Career Choices*

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Abstract

This paper examines how major economic recessions contribute to shaping the long-run development of labor markets by studying the sorting of students into high school programs which map into industries and occupations. The context is the massive recession that hit Sweden in 1990, which disproportionally affected the manufacturing and construction sectors. Our analysis shows that students who directly face the economic shock by experiencing paternal job loss in exposed sectors before making their high school program choices select into programs less exposed to the crisis. They also achieve better labor market outcomes, such as higher employment rates and lifetime earnings, than students who chose their occupation before experiencing the crisis. In contrast, students are less responsive to aggregate conditions in their labor market. Our results are consistent with informational frictions being a key obstacle to structural adjustments on the labor market.

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1. Introduction

Economic crises are massive shocks to the economy that affect workers and their families regardless of whether they face unemployment.[1] A common feature of these relatively frequent events is that they often are more heavily concentrated in different industries and geographic areas. For instance, while the Great Recession hit many Americans hard, its impact did not spread equally across the U.S. The employment losses were relatively more severe in the construction and manufacturing sectors, and states like Florida, Arizona, Nevada, and much of California were hit harder (e.g. Hoynes et al., 2012). While there is plenty of evidence documenting immediate and intermediate adverse effects of economic crisis on both labor demand and labor supply (e.g. Chodorow-Reich, 2014; Huber, 2018; Yagan, 2019; Lachowska et al., 2020), there is less evidence of how young individuals respond to economic shocks, and how these responses transform labor markets in the long-run. Economic crises may, according to theory, permanently affect the composition of the labor force by accelerating structural change (Howes, 2021), or altering career trajectories by changing perceived employment opportunities and economic preferences (e.g. Giuliano & Spilimbergo, 2014).[2] While recent evidence indeed shows that labor market polarization accelerates in recessions and leads to jobless recoveries (e.g. Autor, 2010; Jaimovich & Siu, 2020), potentially due to an increased skill mismatch (Zago, 2020), the exact mechanisms producing these effects are not well understood.

We contribute to the knowledge by investigating how economic recessions shape the long-run development of labor markets through altering the career choices of the next generation of workers. We focus on Swedish compulsory school students about to select into high school educational programs. These programs, which closely map into industries and occupations through job-specific apprenticeship programs and occupational licensing, are strong predictors of long-run educational and labor market outcomes.[3] The context of our study is the unexpected and massive economic recession that hit Sweden during the early 1990s. The recession, among the five most severe financial

[1] Effects on those who remain employed could for instance operate through reduced wages either due to less rent-sharing or because few vacancies makes it less optimal for firms to pay efficiency wages. Alternatively, housing prices, tax revenues, and school spending may be lower during severe economic crises.

[2] For instance, during the Great Recession, adolescents reported more collectivist attitudes, increased support for government redistribution, and increased belief in luck versus work in determining success (e.g. Giuliano & Spilimbergo, 2014).

[3] For instance, 53.6 percent of the students born in 1980 who graduated from the high school construction program were working in the construction sector at age 35.

crises in history (Reinhart & Rogoff, 2008), involved a sudden tightening of lending standards as well as sharp increases in the cost of external finance. The ensuing recession, which caused a five-fold increase in the aggregate unemployment rate, ended a period of overheated labor markets and marked the onset of a period of persistently higher levels of unemployment (Englund, 1999).

Economic crises typically coincide with other macroeconomic changes in society, which makes separating crisis effects from confounding factors a difficult task. We are able to sidestep many of the methodological problems by exploiting individual-level differences (within-cohort) in exposure to the crisis based on the sector of employment and timing of job loss of the father. Similarly to the Great Recession, the 1990s crisis in Sweden disproportionally affected certain blue-collar sectors, such as manufacturing and construction, while it left most white-collar sectors and some other blue-collar sectors relatively unscathed. Many of the jobs in the heavily-hit sectors were lost permanently, triggering persisting changes in the sectoral composition of the Swedish economy. [4]

The fact that high school program choices are made when the students turn age 16 helps us to disentangle crisis exposure from correlated unobservables. Specifically, we use the timing of paternal job loss from the heavily-hit sectors to generate variation in the age at which students are exposed to the crisis. Children who experience paternal job loss just *before* the age at which high school programs are chosen may be discouraged from selecting into a program linked to the paternal sector of employment. Children who experience paternal job loss just *after* program choices are made are otherwise comparable, but cannot alter their career choices as easily. Our research design therefore compares children who are similarly exposed to the aggregate consequences of the recession (such as sectoral or regional shifts in labor demand) and who also experience similar individual-level shocks (such as paternal job loss), but who face different options to respond to the latter.

Our analysis draws on administrative data covering the entire Swedish population aged 16 and above during the period 1985–2017, as well as the full population every five years from the censuses 1960–1990. The registers are connected at the individual, family, and firm level and contain rich information on labor market and educational outcomes as well as demographics. The main analysis focuses on the 175,000 students who were on the verge of making, or had just made, their high school program choices at age 16 when they experienced paternal job loss during the economic crisis

[4] See Figure A1 for a graphical illustration of the employment rate by sector before, during, and after the 1990s crisis in Sweden.

1991–1995.

We first provide descriptive evidence indicating that the economic crisis deterred students from entering high school programs linked to the heavily hit manufacturing and construction sectors.[5] We then proceed with the causal analysis. We show that experiencing paternal job loss deters students from entering the same sector of employment, both among students whose fathers lost their job in the manufacturing or in the construction sector. Specifically, we show that experiencing paternal job loss from the heavily affected sectors before age 16 has a detrimental effect on completing high school programs linked to these sectors, relative to experiencing paternal job loss after age 16. The students affected by early paternal job loss during the economic crisis also exhibit higher lifetime earnings, are more likely to be employed later in life, and steer clear of the crisis sectors in the very long run. The results are robust to placebo checks of experiencing later paternal job loss, experiencing paternal job loss from any other sector, and adding sibling fixed effects to the specifications. Our findings are further consistent with an information signal stemming from paternal job loss in heavily-hit sectors during economic crises can cause substantial behavioral responses in early career choice, even if abstracting from the aggregate effects of the crisis on sectoral or local labor demand. This suggests that information advantages, along with educational choice flexibility, can be key in parrying the adverse effects of economic downturn. The rich data allow us to investigate several mechanisms related to the aforementioned informational frictions. To start with, we find that exposure to a more severe economic downturn in the municipality of residence serves to attenuate the observed treatment effects from experiencing early paternal job loss on career choices. We interpret this as evidence that the informational advantages about the economic conditions of the crisis sectors for youth experiencing job loss in the family are nullified when the economic recession is sufficiently salient. Conversely, we find that the treatment effects are strengthened with an increase in very local information shocks, which we proxy using the share of school peers who also experienced early paternal job loss. This indicates that students can be influenced by their close peers, and that events in the very local (school) environment can give rise to informational advantages while more aggregate shocks can serve to even out the playing field. Consistent with this interpretation, we also find statistically significant treatment effects stemming from experiencing early job loss

[5]For instance, the share of students graduating from a manufacturing-linked high school program at age 20 declines by more than 50% during a 10-year period around the time of the crisis.

by other family members in the crisis sectors, specifically from maternal job loss and job loss of a maternal uncle. Finally, we investigate the extent to which youth experiencing early paternal job loss follow their fathers into working in the same company or establishment and find negative treatment effects, indicating a further weakening of the intergenerational link between students and their fathers following economic crisis.

Our results connect to several strands of the literature. Most importantly, they are related to the literature on the effect of recessions on labor markets and worker careers. While there has been a long-standing interest in the contemporaneous and long-term consequences of economic crises,[6] there still exists only limited evidence on how workers adapt to such shocks. Our results also shed light on the adaption processes underlying one of the most fundamental long-run developments in the labor market, job polarization, whereby new technologies substitute for middle-skill jobs and are in turn complementary to high-skill jobs (e.g. Goos & Manning, 2007; Acemoglu & Autor, 2011). Recent work suggests that the Great Recession accelerated firm-level adoption of technologies that replace routine labor (Hershbein & Kahn, 2018). We contribute to these literatures by showing that economic crises can have long-lasting effects on the composition of the labor force by discouraging the next generation of workers to select into the most exposed sectors when making their early career choices.

A second contribution is that our results highlight information frictions as a potentially important obstacle to how workers adapt to structural change. While previous studies find relatively small responses of students' college major choice to earnings differences across fields of study (J. Altonji et al., 2012; Baker et al., 2018; Hastings et al., 2015; Baker et al., 2015), the information on career opportunities in our setting stems from parental exposure to the crisis, which is potentially

[6]For instance, recent firm-level studies combine micro data with novel research designs to estimate the effects of the Great Recession on labor demand (e.g. Chodorow-Reich, 2014; Mian & Sufi, 2014; Giroud & Mueller, 2015; Bentolila et al., 2018; Huber, 2018; Greenstone et al., 2020). Although the evidence is mixed, most of these studies conclude that economic crises adversely affect labor demand and that financial constraints is a key mechanism producing these effects. A few studies also provide worker-level evidence. Lachowska et al. (2020) use matched employer-employee data from administrative wage and unemployment insurance records in Washington State to estimate the earnings losses of workers displaced during the Great Recession. Five years after job loss, the earnings of displaced workers were 16 percent lower than those of non-displaced workers. The earnings losses are explained by a combination of reduced working hours and lost employer-specific premiums. Leveraging regional variation in the severity of the Great Recession, Yagan (2019) shows that a one percentage-point increase in the local unemployment rate during the economic downturn reduces individual employment propensity seven years later by 0.3 percentage points and also leads to lower earnings. These studies mainly estimate immediate and intermediate effects on employment-related outcomes.

more salient to the students. Indeed, our results show that this family-level source of information has strong effects on career choices, even compared to – and in addition to – the signal provided by local labor markets. However, private signals interact with public signals in shaping career choices. Parental exposure has a greater effect in regions that were less strongly affected by the recession, i.e. when shifts in labor demand across different sectors are less easily observed. In contrast, children's career choices respond little to parental exposure in the most heavily hit regions, i.e. when structural changes in labor demand are sufficiently salient.

We also add to the literature on the effects of graduating in a recession. Several studies show that adverse conditions at labor market entry negatively affects short-term wages for high school students, but that the effects fade after a few years (Genda et al., 2010; Hershbein, 2012; Kawaguchi & Murao, 2014; Schwandt & Von Wachter, 2019; Engdahl et al., 2022).[7] College students graduating during a recession suffer a modest reduction in employment, but a larger and longer-lasting earnings loss (Oreopoulos et al., 2012; J. G. Altonji et al., 2016). Liu et al. (2016) show that this negative effect on earnings is partially explained by recessions inducing a mismatch between the skills supplied by college graduates and those demanded by the labor market. While these studies focus on the net effect of macroeconomic shocks at the cohort level, our research design relying on within-cohort variation in crisis exposure allows us to separately study the role of information advantages about the uncertainty and risks in different sectors. Moreover, while existing studies examine the outcomes of students who happened to graduate when a recession had begun, we provide novel evidence of how incumbent students change their behavior in response to economic crisis. While economic theory suggests that workers may respond to recessions by moving away from exposed sectors, such behavioral adjustments are difficult to examine because worker mobility is a slowly moving process that typically involves high opportunity costs of switching.[8] By studying incumbent students about to select their high school program, we can more easily identify immediate behavioral responses in an environment in which there are no switching costs.

Our results also feed into a large literature on the effects of job displacement for affected workers and their children. Displaced workers are found to suffer persistent and substantial earnings

[7] Raaum & Røed (2006) also document negative effects on employment.

[8] A recent example is the study by Aalto et al. (2023), which investigates high school program choices in response to the COVID-19 pandemic, finding evidence that students adjust their program choices in response to the crisis.

losses (Jacobson et al., 1993), and job losses from routine occupations during mass layoffs have been shown to be more persistent and severe than job losses for other occupations (Blien et al., 2021). Technological progress and structural change in the labor market are the two prime candidate explanations for these findings. Displaced workers often resort to switching occupations resulting in skill mismatch, which leads to persistent drops in earnings following displacement (Nedelkoska et al., 2015). Previous research has shown that displacement of the father following plant closure leads to significantly lower earnings for the affected sons (Oreopoulos et al., 2008). There is also evidence that children with displaced fathers in the manufacturing sector perform worse in school and have lower early-career earnings (Gregg et al., 2012).[9]. In contrast to this literature, we shed light on the underlying behavioral adjustments of children facing parental job loss during large economic recessions.

More loosely, the empirical approach of this paper is connected to the literature on intergenerational mobility. It is well known that occupations are commonly passed down from parents to their children, sometimes over multiple generations (Adermon et al., 2021).[10] This parent-child coupling likely contributes to the intergenerational persistence in labor market outcomes, and understanding the mechanisms behind this is of first-order importance to learn more about the role of the family environment in affecting social mobility.[11] Importantly, there are signs that this labor market coupling has weakened during the past century (e.g. Emran & Sun, 1988; Jarvis & Song, 2017; Modalsli, 2017).[12] Structural demand changes on the labor market, such as the decline of the agricultural sector, the later decline of the manufacturing sector in many Western countries, and the expansion of education opportunities have often been put forward to explain this trend.[13] While structural change tends to be gradual and slow, the role of economic crisis in

[9]Parental job loss has also been shown to affect other outcomes such as school grades, income and mental health (e.g. Coelli, 2011; Rege et al., 2011).

[10]There are several possible reasons for this: inherited genetic predispositions to the specific tasks, lower barriers to entry, learning the trade directly from the parent, but also informational advantages related to the short- and long-term prospects of the occupation learned from the parent.

[11]The previous literature on intergenerational occupational mobility has documented a strong link between occupational mobility and earnings mobility (Bachmann et al., 2020).

[12]In Figure A4, we estimate the probability of sons age 30 working in the same sector as their fathers around age 50 by birth cohort. This figure indicates that the intergenerational occupational mobility (persistence) has been increasing (decreasing) from the cohort born from 1932 in Sweden, with the trend accelerating for the cohorts who were young and about to enter the labor market (around age 20) when the 90s crisis hit. A similar pattern has previously been shown for intergenerational earnings mobility in (Brandén & Nybom, 2020).

[13]Expansions of schooling have previously been shown to affect intergenerational mobility positively, with the

accelerating the decoupling is largely unexplored. The only study we are aware of that examines the intergenerational consequences of economic crisis is by Feigenbaum (2015), who shows that exposure to the Great Depression has reduced earnings mobility in the United States. The focus of that study is, however, not on the early career choices of young workers.

The following structure outlines the paper: Section 2 presents a background to the institutional context, the educational system in Sweden, and the 1990s economic crisis. Section 3 outlines the data sources and empirical strategy. Section 4 presents estimation results, and Section 5 discusses the findings. Section 6 concludes.

2. Background

2.1 The pre-Crisis Years

The late 1980s, the time period leading up to the crisis, were characterized by economic expansion in Sweden with the unemployment rate being as low as 1.6%. Inflation was high, and the credit market was expanding. By 1990, the employment rate had reached record levels of around 85% of the working-age population. Simultaneously, the deregulation of credit market in the mid 1980s and the expansive monetary policy regime led to an appreciation of asset prices, which peaked before the crisis. The expanding credit market meant that banks were engaged in riskier lending than before, and the increased borrowing on the household side coincided with an increase in consumption. An expanding economy during the late 1980s suggests that the ensuing crisis was not predicted or expected, at least until the fall of 1989 (Englund, 1999).

The Swedish labor market is characterized by a large public sector, which at the start of the crisis in 1990 comprised nearly one third of total employment. Other major sectors at the time include manufacturing and mining (19% of total employment), the private service sector (17%), retail and trade (12%), construction (8%), and transportation (6%). Men tend to dominate employment in blue-collar work such as the manufacturing, construction, and transportation sectors, but are a minority of workers in the retail sector.[14] The general trend in the years leading up to

1972–1977 expansion of upper secondary school in Finland leading to more income mobility among the affected students (Pekkarinen et al., 2009).

[14] In 1990, men constituted approximately 72% of the workforce in the manufacturing sector and 78% in the construction sector.

1990 was a slow shift away from manufacturing, mining, and agricultural work toward a greater share of the workforce working in private services.

2.2 The 1990s Economic Crisis

The massive economic crisis, which unexpectedly hit Sweden in late 1990, led to a sharp drop in overall employment by more than 10 pp. and triggered the worst recession the country had seen since the Great Depression. As noted above, the years leading up to the crisis had given few indications of the imminent economic downturn, making the suddenness and depth of the crisis widely unexpected. The crisis originated in the banking sector after the burst of a housing bubble, and quickly spread to other sectors. The stock market fell rapidly from its peak in August 1989, with the construction and real estate market stock index falling sharply (Englund, 1999).

The crisis strained public finances, and prompted austerity measures and extreme monetary policy reactions to defend the fixed exchange rate. The crisis also triggered a credit crunch which, combined with the increased interest rates, impaired the activities of the most indebted firms, led to more bankruptcies, and reduced investments (Englund, 1999). Almost 500,000 jobs were lost during the first half of the 1990s, with roughly 60% of these jobs being concentrated in the heavily hit manufacturing and construction sector (Perbo, 1999).[15] For a relatively small country as Sweden, this constituted a massive blow to the aggregate employment rate which dropped from 86% to around 76% in just a few years.[16]

The economic recovery started in the late 1992, when the Swedish currency (SEK) was allowed to fall, which served to boost exports and to aid the heavily hit manufacturing sector. While the drop in output between 1990 and 1993 had been substantial, the fall had been recovered by 1995 with a 20% increase in output over the period 1990–1995. Since residential investments, which had fallen by 72% during that period, did not rebound as quickly, the construction sector recovered more slowly than the manufacturing sector. By 1994, the construction sector had started recovering and by 1999, the previous peak level in 1990 had been surpassed (Perbo, 1999).[17] The drop in

[15] 200,000 of the job losses were linked to the manufacturing sector, 100,000 jobs were lost in the construction sector, 100,000 jobs were cut in the public sector, and the remaining 100,000 jobs lost were in the service sector.

[16] The recession induced by the crisis was substantial, with GDP falling for three consecutive years. Between 1991 and 1993, GDP fell by -5.1%, while private investment fell by 35%.

[17] Residential construction, however, still remained 75% below its 1990 level in 1998.

employment proved to be long-lasting and was followed by permanently lower employment rates than before the crisis.

2.3 High School Education in Sweden in the 1990s

Swedish high school education is voluntary, but almost 90% of the cohort graduating from compulsory school in 1988 went on to start high school directly after graduation.[18] Students generally attend a school within their own municipality, but may in some cases attend one in a neighboring municipality. The high school system at the time consisted of many different programs belonging to one of two tracks (vocational and academic). The choice of high school program was made at the end of the Spring term of grade nine, which is usually the year in which students turn 16. Switching programs or quitting high school altogether is relatively rare. [19] Students are then assigned to programs based on their preferences and their compulsory school grades (Hall, 2012).

The high school system in Sweden underwent a major reform in the early 1990s, which extended the duration of the vocational school track from two years to three years (the same as the academic track).[20] This reform also made some changes to the high school programs within each track. The previous system consisted of 27 different programs, with many of them being closely linked to a specific occupation or sector of employment. Following the reform, the existing 27 programs were replaced by 16 programs (two theoretical and 14 vocational), all of which provided general eligibility for university studies (Hall, 2012).[21] Importantly for our identification strategy, there existed vocational programs tightly linked to the manufacturing sector or construction sector both before and after this reform.[22] The reform is, however, likely to have affected the time trend in

[18] Around 85% of the children in the cohort set to graduate from high school in 1990 did so. All students graduating from compulsory school are eligible for high school studies. However, students who start high school after age 20 must enter the adult education system instead of attending a regular high school.

[19] A study from 2006 followed all the students starting high school for the first time that year and found that 10% of the students in vocational programs had switched program of study over the two following years. The share of switchers were roughly 9% for the manufacturing program and 5% for the construction program, and 3% had dropped out of high school or taken a break from their studies.

[20] Engdahl et al. (2022) study the effect of graduating during the crisis on females' earnings, employment, and family formation by using variation in graduation years induced by the reform. The results show that graduating straight into the recession had negative labor market consequences during the first few years but there is no evidence of significant adverse effects on women's labor market outcomes.

[21] The changes were mainly motivated by the benefits of broadening the vocational education programs, and to grant all high school students some degree of university eligibility.

[22] However, a larger mass of students decided to pursue the two theoretical programs following the reform, with fewer students completing a vocational high school program.

pursuing different high school programs. We address this issue in the estimation by including cohort fixed effects to rely exclusively on variation in crisis exposure within a given birth cohort.

3. Data and Empirical Strategy

3.1 Data

We leverage rich Swedish register data to investigate how economic crisis affects early career choice. Our main data source is administrative data from Statistics Sweden in the IFAU database covering the entire Swedish population aged 16 and above during the period 1985–2017.[23] The data span various registers that are connected through anonymized identification codes at the personal, family, and firm level. The main register is the employment register (RAMS), which contains information from the national taxation authorities. We use this register to collect information on the sector of occupation for the main source of earnings for all working-age individuals. A wide array of standard characteristics are added for all individuals: various income sources including earnings, educational attainment, schooling outcomes, demographics, and county or municipality of residence.[24] Parent-child linkages are retrieved from the Multi-Generation Register (MGR), which covers the universe of Swedish parents and children from 1932 to 2014. The main analysis focuses on the roughly 232,500 students who were born between 1970 and 1988 and experienced paternal job loss around the time of the crisis, who were on the verge of making, or had just made, their high school education choices at age 16. In the main specification, we restrict the sample to those who experienced paternal job loss between the ages of 10 and 21.[25]

The data on sector of employment is based on the yearly SNI sector code during the period 1981–2017. The code provides information on the sector of the main source of employment for each individual. This information allows us to map fathers experiencing job loss during the 1990s crisis to a specific sector, and is thereby key in the identification strategy presented below. We proxy for job loss as the father being employed in the previous year but not in the current year, and we map

[23] We also use data on the full population every five years from the censuses 1960–1990 in order to get information on the earnings and employment history on older workers.

[24] Municipalities are smaller geographic units contained within counties. There are 21 counties in Sweden, and at the time there were roughly 284 municipalities.

[25] We also show results using a tighter bandwidth for those experiencing job loss around age 16 when the high school program choice is made.

the job loss to a specific sector using the aforementioned data on sector of employment.[26] This approach provides us with a measure of job loss assigned to a specific sector of the economy. If a child experiences multiple instances of paternal job loss, we limit our attention to the first event.

Students' high school program choice is inferred from the educational attainment codes around age 20, when most of the students would have graduated from high school without yet having obtained a higher education degree.[27] We classify the 238 program codes and group them into 17 categories according to the sector of employment the program is geared toward.[28] As an example, the "Industry and Workshop Technician" program is coded as a manufacturing-linked education, while the "Broad and General Education" programs are coded as theoretical-linked programs leading to university studies, and the "General Construction" program is coded as a construction-linked education. This classification is then converted into indicator variables, which are used as the main outcomes in the analysis of students' career choices.[29]

We further investigate the specific effects linked to the economic crisis by characterizing the severity of the economic crisis in each of the 284 Swedish municipalities. Specifically, we define crisis severity as the local drop in the employment rate between the peak of the crisis (1990) and its trough (1993). We also define an alternative measure of crisis exposure based on the increase in the local unemployment rate. For ease of interpretation, the measures are standardized to have mean zero and unit variance across municipalities. To capture potential non-linear effects of crisis

[26]Missing employment information in combination with zero earnings for a given year is also coded as not being in employment. To link the job loss to a specific sector, we use the sector of occupation for the year of the job loss, or the sector from the previous year if the father had a stable employment in the previous year's sector (for the two previous years) in order to get more accurate employment information and not risk mismatching sectors due to the father finding a temporary or minor employment in another sector following the job loss.

[27]The outcome variable for the (very few) individuals who have university credits from a free-standing course at age 20 is based on information on the highest education at age 19, in order to capture their high school education. Likewise, we also include students' high school education information at age 21 if they graduate late.

[28]Roughly 60% of all individuals have either one of the seven largest education codes, while the remainder have one of the smaller 231 codes.

[29]The classification is shown to predict future employment well for the manufacturing and construction-linked programs. 53.6% of the students born in 1980 who graduated from a construction program were working in the construction sector by age 35, compared to 6.5% in the entire cohort. For students born the same year who graduated from the manufacturing program, 41.8% were working in the broad manufacturing sector by age 35 (compared to 10% in the entire cohort). The outcomes for other programs are harder to evaluate given that the employment opportunities are more dispersed across the different sectors. For instance, individuals who graduate from the general theoretical programs are well equipped to work both in the public sector and in parts of the manufacturing sector. However, 18.3% of the graduates from the transportation program work in the transportation sector, compared to 4.2% in the entire cohort. Also, 15.7% of the graduates from the retail programs work in the retail sector, compared to 6.1% in the cohort.

exposure, we further consider non-parametric estimates by splitting the crisis severity into quartiles. These measures allow us to investigate different heterogeneous treatment effects with respect to the local severity of the crisis.

3.2 Descriptive Statistics

Descriptive statistics of the sample of students experiencing paternal job are provided in Table 1. The average characteristics of paternal job losses are very similar, although fathers who lost their jobs in the construction sector are a year younger than those who lost their jobs in the manufacturing sector. A graphical representation of the number of students experiencing paternal job loss, sorted by the year of experiencing job loss, is shown in Figure A2a. This figure shows a marked increase in the number of children experiencing paternal job loss during the crisis years.

3.3 Empirical Strategy

We investigate the effects of economic crisis on high school program choice by restricting attention to the sample of students who experienced paternal job loss during the crisis.[30] The estimation strategy consists of comparing career program outcomes for the sample of students experiencing paternal job before and after the high school program choice around age 16, specifically focusing on the effects of paternal job loss in the crisis sectors. This approach thus relies on cross-sectional variation, stemming from the timing of paternal job loss from sectors heavily hit by the Swedish economic crisis of the early 1990s. The starting point where we compare the effects of experiencing paternal job loss in the crisis sectors before and after age 16 is the following empirical specification with outcomes defined for an individual student i, from cohort j, residing in county k:

$$y_{i,j,k} = \phi_0 + \phi_1 JL_i^{Cr} \times Early_i + \phi_2 JL_i^{Cr} + \theta_{j,k} + \boldsymbol{X_i'}\delta + \varepsilon_{i,j,k} \quad (1)$$

where JL_i^{Cr} is an indicator taking the value one if the student experienced paternal job loss in the sectors most affected by the crisis (manufacturing or construction), and zero if the job loss occurs in

[30]The education program outcome is defined as the highest realized level of education attained by age 20 for each individual in the sample. This is the age when most young adults have finished high school, but very few have a completed higher education from university (which would override the high school education choice).

any other sector.[31] $Early_i$ is an indicator taking the value one if the student experienced paternal job loss in any sector before age 16 (ages 10–15), and zero if the job loss occurred between ages 16–21. $\theta_{j,k}$ denotes cohort-by-county (of residence at age 16) fixed effects. $\boldsymbol{X_i'}$ is a vector of controls containing information on paternal and maternal characteristics from the 1990 census, which is added to test the robustness of the estimates and to potentially increase their precision.

This specification captures the effect on program choice of experiencing paternal job loss in the most affected sectors from age 16 (ϕ_2), compared to those experiencing job loss in any other sector at age 10–21. We then identify the effect of experiencing early paternal job loss in the crisis sectors before age 16 (ϕ_1), which is the coefficient of interest. The cohort-by-county fixed effects isolate cross-county and cohort disparities for those living in different regions with potential differences in labor market structure, meaning that we estimate the within-county-cohort difference in outcome.[32] This helps to mitigate the concern that supply-side could affect the outcomes of interest. Standard errors are clustered at the level of the students' municipality of residence around age 16.[33]

A key concern with the aforementioned approach is that we risk capturing the effects of experiencing job loss before and after age 16 in general, and not effects specific to job loss in the heavily-hit sectors. We account for this in our main empirical specification:

$$y_{i,j,k} = \beta_0 + \beta_1 JL_i^{Cr} \times Early_i + \beta_2 JL_i^{Cr} + \beta_3 Early_i + \theta_{j,k} + \boldsymbol{X_i'\delta} + \varepsilon_{i,j,k} \tag{2}$$

which flexibly captures the general effect of experiencing paternal job loss in the crisis sector from age 16 (β_2) and job loss before age 16 in any other sector (β_3), allowing us to estimate the added effect of experiencing early paternal job loss before age 16 in the crisis sectors (β_1).[34] Since this method also relies on an outcome measured at a single point in time and avoids the use of staggered variation, we do not require the use of the adjustments suggested by Callaway & Sant'Anna (2021).

The identification strategy exploits the fact that the choice of high school program in Sweden occurs during the spring of the year in which students turn 16. This discontinuity, along with the

[31] An observation of zero earnings is also coded as being not employed when employment information is missing.

[32] We also show results exchanging these indicators for the more demanding cohort-by-municipality fixed effects as a general robustness test.

[33] At the time, there were roughly 284 municipalities in Sweden.

[34] See Figure A3 for event study figures of the paternal job loss event in terms of his employment rate and earnings.

timing of experiencing paternal job loss, is the main source of variation used in the paper. From this, we base our strategy on the idea that a composite information shock, stemming from paternal job loss occurring before age 16, should have a stronger effect in dissuading the student to select a career program linked to the father's previous sector of employment than if the paternal job loss occurs at age 16 or after, when the program choices have already been made. In a sense, we are postulating that students experiencing early paternal job loss respond to the information shock by substituting away from a career program that would have emulated the father's career.

By contrast, students experiencing later paternal job loss in the same sector will be highly similar to the students experiencing early job loss, but have limited means of adjusting their high school program choice in response to the shock. In our view, experiencing such an event during a massive economic crisis likely contains a number of elements contributing to the discouragement from entering the crisis sector. First, the family-based shock of paternal job loss is likely to make the economic conditions and prospects of the crisis-affected sector more salient to the students. Second, job loss during a crisis likely breaks the information network of the parent that the student is using to help start a career. Third, it may alter the gains from working with the father or following him into the same career path. Fourth, the household's resource loss, when the usual main provider loses his job, may change the risk-preferences of students by causing them to opt for a more stable career program given the volatile economic conditions.

Our empirical specification nets out the main effects of experiencing a paternal job loss shock on career choice, which should capture the reduction in resources stemming from the job loss of the main provider. Thus, we use the specification to focus on capturing the informational aspects of experiencing paternal job loss linked to a specific career choice.

4. Results

4.1 Effects on the Choice of High School Program

General trend in high school program choice. We start by documenting the general time trend in observed high school career programs at age 20 for the cohorts born between 1964 and 1988 (see Figure 1). The drop in manufacturing and construction employment following the crisis

was deep and persistent, and many of the jobs lost in these sectors during the crisis never returned. The cohorts born before 1971 would, with this outcome definition, not have had any chance to react to the economic crisis starting in 1990, while the following cohorts born after then could to some extent react to the information by switching program or choosing a different educational path.

The figure shows that the overarching trend in high school program choice is a substantial increase in the share of high school students completing a general theoretical education track program, making them eligible for further university studies (see Figure 1a). For the smaller programs in the vocational track, there are also apparent changes over time in the program shares, with the majority of the changes occurring for those born during the mid 1970s (see Figure 1b). A notable trend is that the program share of manufacturing, a sector heavily affected by the crisis and the following restructuring of the labor market, was reduced by half in less than 10 years. On the other hand, the heavily affected construction program experienced less of a fall, and started to trend upward as the sector recovered. Other programs, such as the arts or childcare programs, increased in popularity over the time period. As mentioned, however, it is not possible to disentangle the specific contribution of the economic crisis to these patterns, since the high school reform was implemented simultaneously.

Effects of paternal job loss on high school program choice. Next, we proceed with our causal analysis. Our estimation strategy relies on within-cohort-county variation in the timing and sector of paternal job loss and their effects on the students' propensity to complete a crisis-linked high school program, i.e. a program in manufacturing or construction. We use the fact that early paternal job loss from the crisis sectors before age 16 should provide a negative signal that the affected students are able to act upon, compared to when the job loss occurs at age 16 or after, when the high school program choices have already been made. Moreover, we ensure that the effects are limited to paternal job loss from the crisis sectors by netting out the main effects of experiencing paternal job loss in any other sector before and after age 16.

The results for completing a crisis sector-linked high school program are presented in Table 2, and in Figure 2. The graphical results in Figure 2a indicate a clear discontinuity in the propensity to have a completed crisis-linked education if the paternal job loss in the sector occurred before age

16. These graphical results are confirmed in the pooled OLS regression analysis, where we pool the paternal job losses to compare those that occurred before age 16 to those that occurred after. The direct effect of early paternal job loss on having completed a crisis-linked career program (see Equation 1) is negative and statistically significant (−0.011, s.e. 0.003), and is very similar to the preferred DiD specification (−0.012, s.e. 0.003) where we also net out the main effect of experiencing paternal job loss during the same ages in any other sector (see Equation 2). In relation to the mean of the dependent variable for those experiencing paternal job loss in the crisis sectors from age 16, the DiD estimate corresponds to a relative change of −11%. When splitting the outcomes and job loss sectors into the separate manufacturing and construction career programs, we see similar effects: the direct difference and DiD estimates for the manufacturing program (ranging from −0.005 to −0.008, s.e. 0.003) and construction program (−0.011, s.e. 0.003) outcomes are statistically significant and negative. In columns 3, 6, and 9 in Table 2, we further show that the effects on crisis-linked program outcomes are robust to controlling for background characteristics from the 1990 census and to including cohort-by-municipality fixed effects (instead of cohort-by-county fixed effects). All in all, these results show that experiencing paternal job loss in the crisis sectors before age 16 is associated with students opting out of crisis-linked high school programs.

4.2 The Effects of Paternal Job Loss on Lifetime Earnings

Next, we investigate the labor market consequences of early paternal job loss using various measures of cumulative earnings. Based on our earnings panel, we define three measures: cumulative lifetime earnings, cumulative earnings between the ages 20 to 30 and between the ages of 30 and 40, to capture different aspects of the career profile. The results using these outcomes and the preferred DiD specifications are reported in Table 3 and Figure 5.[35]

The effects on cumulative lifetime earnings (SEK 86,664, s.e. 24,697), cumulative earnings between ages 20–30 (SEK 44,975, s.e. 9,967), and cumulative earnings between ages 30–40 (SEK 28,989, s.e. 15,789) in Table 3 are all positive and statistically significant for the main DiD specification. Adding further controls, we see that the estimates decrease in magnitude, but mostly remain statistically significant. These results show that the students affected by early paternal

[35]See Figure 8 for graphical evidence on the treatment effects on earnings during the life cycle.

job loss in the crisis sectors enjoyed better labor market outcomes compared to their peers who experienced paternal job loss at age 16 or later. The relative effects are the strongest in magnitude for cumulative earnings early in the career, and the same effects are also the most robust. This indicates that the positive labor market effects are more concentrated towards the early career years at age 20—30, although there are signs that the effects persist later in the career at age 30–40. The estimated effects are sizable, and amount to roughly a 1–3% increase in cumulative earnings during different parts of the life cycle.

4.3 The Effects of Paternal Job Loss on Substitution to other Career Programs

A key question to be answered is what the students end up doing instead of completing a manufacturing- or construction-linked program. To answer this, we investigate students' substitution to other career programs after opting out of the crisis sector programs following paternal job loss. The results are reported in Tables 4 and 5. The general substitution pattern away from manufacturing programs (−0.008, s.e. 0.002) and construction programs (−0.005, s.e. 0.002) does not lead to any statistically significant shift toward or away from the theoretical programs (−0.003, s.e. 0.005) or to having no high school education (−0.000, s.e. 0.004) at age 20. Rather, the results indicate that the students substitute into closely related career programs that were less affected by the crisis, such as in transportation (0.004, s.e. 0.002), hotel & restaurants (0.006, s.e. 0.002), and agriculture (0.004, s.e. 0.001).[36]

In a more refined analysis in Table 5, we investigate the characteristics of the high school programs that the students substituted into. We characterize these programs by computing the early career age 22–25 average earnings and earnings variance of students who graduated from high school before the crisis, using the outcomes of older cohorts born in 1964/65 and slightly younger cohorts born in 1968/69 separately. The difference between these cohorts are that the early career outcomes of the older cohorts are defined before the economic crisis, while the outcomes of the younger cohorts are determined during the economic downturn. We then map these outcomes to our main sample of cohorts who made their high school program choices just a few years later. The outcomes are standardized to have a mean of zero and a standard deviation of one across all

[36] Also, the students appear to steer away from the arts program (−0.004, s.e. 0.002).

programs.

Our results indicate that experiencing early paternal job loss in crisis sectors did not cause students to substitute into programs with higher average earnings during age 22–25, as measured by the outcomes of older cohorts with early career outcomes defined pre-crisis. They did, however, substitute into programs with higher standardized earnings (0.026 SD, s.e. 0.012), lower earnings variance (−0.045 SD, s.e. 0.010) as measured by the outcomes of the slightly younger cohorts defined during the economic crisis, and lower earnings variance (−0.020 SD, s.e. 0.010) based on the outcomes of the earlier cohorts defined before the crisis occurred. The students also seem to have sorted into career programs with a larger post-graduation employment rate during the crisis (0.002, s.e. 0.001). Combining the measures of earnings and earnings variance, the students appear to have sorted into more stable careers in terms of risk-adjusted earnings (0.044 SD, s.e. 0.011) in response to the paternal job loss, primarily based on the outcomes of the younger cohorts, who are close in age and with outcomes defined during the economic crisis.

4.4 The Effects of Paternal Job Loss on Students' other Long-Run Outcomes

The identification strategy is based on experiencing paternal job loss before or after high school program choices at age 16. From this, it is not clear that experiencing an information shock at such an early age should affect labor market outcomes in the very long run. It could very well be the case that the effects attenuate over time. We investigate the effects on students' long-term outcomes in 2015, i.e. 20 years after the economic crisis ended, by presenting results for sector of occupation, university studies, employment status, and being divorced.

The results reported in Table 6 show that experiencing early paternal job loss in the crisis sectors negatively affected the students' probability of completing university studies (−0.010, s.e. 0.005), but increased their probability of being employed in the long run (0.008, s.e. 0.003). Furthermore, we see that these individuals were less likely to be employed in the specific crisis sector in the long run, whether their father lost his job in manufacturing (−0.007, s.e. 0.003) or in construction (−0.007, s.e. 0.004), with the caveat that the effects from construction job loss are not statistically significant. This indicates that the effects are persistent throughout the individual's career.

4.5 Heterogeneous treatment effects

Municipal crisis exposure. We investigate whether the information shock stemming from early paternal job loss had differential effects on high school program choices depending on the severity of the economic crisis in the municipality of residence at age 16. It is not clear, ex ante, how the information shock from paternal job loss would be affected by the local severity of the crisis. Nor is it clear how students respond to local crisis severity in terms of opting out of crisis-linked high school programs. We look into this by defining two different measures of local crisis exposure: (i) crisis severity in the municipality measured from the employment rate decrease in 1993 relative to 1990 for the full economy, and (ii) the increase in the unemployment rate in the municipality during the same years.[37] The results on heterogeneous treatment effects based on the municipal crisis exposure are presented in Table 7.

Splitting the effects into quartiles of crisis severity, we observe no statistically significant responses of students in terms opting out of the crisis-linked educations based on local crisis severity. This holds both for students in general and for students with fathers working in the crisis sectors in 1990.[38] For the students experiencing paternal job loss, the only statistically significant heterogeneous treatment effect on having attended a high school program linked to the manufacturing or construction sectors is observed for the most affected quartile in terms of municipal employment rate drop (0.019, s.e. 0.009). For these students, the treatment effect on educational choice stemming from experiencing early paternal job loss is close to zero. However, the other quartile 2–4 point estimates for the different measures of crisis severity are also positive, albeit not statistically significant. These results suggest that the information signal from experiencing paternal job loss is attenuated if the local municipality experiences a more severe economic downturn. The same general pattern can be observed for lifetime earnings. Similarly to the effects on educational program, all point estimates for the different measures of crisis severity are of the same sign, but are not statistically significant.

[37] These splits pick up substantial spatial heterogeneity in terms of crisis exposure, with the average employment rate drop 1990–1993 for municipalities in the least affected quartile being 12 pp, and the same drop for the most affected quartile being 19 pp.

[38] The only exceptions are for students with the father working in the crisis sectors and residing in the most crisis-affected municipalities in terms of employment rate drop.

By student gender. Up to this point, the effects of parental job loss have not been estimated separately for male and female students. However, it is well known that the majority of vocational high school students are male and that the gender imbalance is larger in manufacturing and construction programs. Based on this, we present heterogeneous treatment effects for female students in Table 8.

The results confirm the low baseline rate of female students in crisis sector career programs. As a consequence, most of our estimates significantly differ by gender and are weaker for the female students. As expected following this, the estimates strengthen for the male students when separating the effects by student gender, which is reasonable given the higher baseline rate. The effect of paternal job loss on male students' propensity to sort into the crisis sector career program increases substantially (-0.024, s.e. 0.005), as does the effect on their lifetime earnings (SEK $130,357$, s.e. $35,953$). However, the relative effects only increase moderately since the mean dependent variable for these outcomes also tends to be larger for male students.

4.6 Robustness Tests

Predicted crisis sector program education and earnings. A key robustness test relates to selection effects linked to the timing of paternal job loss. If very different families experience late versus early paternal job loss, then this selection may affect the results and lead to biased estimates. We test this concern by predicting our main outcomes of interest using observable background characteristics and see if we can replicate any of the main findings. See Figure 6 for a graphical representation of the results. The characteristics used to predict the outcome are primarily from the 1990 census and the Multi-Generation Register, and include parents' year of birth, high school completion status, marriage status, cohort-by-county of the student, parents' number of children, birth order of the student, sex of the student, and indicators of missing values for the characteristics.[39]

The figures show no clear pattern of replicating the main findings for the predicted crisis-linked high school education outcome. Reassuringly, an F-test of joint significance fails to reject the null of no difference in effect (p-value 0.357). For predicted cumulative earnings age 20–30, the F-test

[39]The R^2s of the predictions range from 0.075–0.104.

also does not reject the null of no difference in effect (p-value 0.223). Although the graphical results indicate minor imbalances at age 14–15 and some gradual decline in the predicted cumulative earnings appearing later in the paternal job loss age profile, they are not statistically significant. It should also be noted that the predicted values are much smaller in absolute magnitude compared to the estimated treatment effects.[40]

Sibling fixed effects. As an additional robustness check, we estimate treatment effects of early paternal job loss, in the crisis sectors, on the main outcomes conditional on sibling fixed effects (see Table 11). These specifications rely on siblings experiencing paternal job loss before and after age 16. While being a demanding specification to estimate, it controls for all common characteristics shared through the mother.

In general, the job loss effects are robust to the inclusion of sibling fixed effects. The estimate for the crisis sector program outcomes are negative and statistically significant (-0.015, s.e. 0.008), albeit with much larger standard errors. The estimates for cumulative lifetime earnings and cumulative earnings between age 20 and 30 often remain highly similar to the baseline specification in terms of magnitude, but are no longer statistically significant.

Alternative job loss ages bandwidth. We further test the robustness of our estimates by using tighter bandwidths of the students' paternal job loss ages in Tables 9 and 10. In line with the graphical evidence in Figures 2 and 5, the effects tend to become smaller when we use a tighter bound on the job loss ages. Restricting the analysis to job losses that occurred between the ages of 14 and 17 reduces the effects on having a crisis-linked education to -0.9 pp. (-0.009, s.e. 0.004), which is still statistically significant. The tightest possible comparison, ages 15–16, is still negative of a similar magnitude but is no longer statistically significant (-0.007, s.e. 0.006). The same general pattern can be seen for lifetime earnings: restricting the analysis to the discontinuity at ages 15–16 leads to an estimate that is not statistically significant ($74,768$, s.e. $55,202$) but is comparable in magnitude to the main estimate.

[40] In Table 3, we show that the main treatment effects on cumulative earnings reduce in magnitude but stay statistically significant when including the controls used in the aforementioned balancing test.

4.7 Mechanisms

Main effect of experiencing paternal job loss from any other sector. In order to investigate the extent to which the subsequent loss of economic resources within the family affects high school educational choices of students, we present graphical evidence of the main effects of experiencing early job loss from any other sector on crisis-linked high school education choice. These figures are meant to show the extent to which paternal job loss in general can affect the students' probability of completing a crisis-linked high school program. The results can be seen in Figure 7.

Figure 7a shows that there is no clear discontinuity in the propensity to have a crisis-linked education based on the age of experiencing paternal job loss from any other sector. Conversely, those experiencing early paternal job loss appear to be slightly more likely to pursue such an education, although this effect is not statistically significant. This result indicates that job loss and the subsequent loss of economic resources does not lead to a significant shift away from the crisis-linked programs.

Other family members' job loss in the crisis sectors before age 16. Given that the treatment effects are concentrated to job losses in the crisis sectors and not linked to loss of economic resources, we extend our analysis to include other information channels besides paternal job loss. We do so by estimating treatment effects of experiencing early job loss from other family members. The results of this analysis can be seen in Table 13. In essence, we use the same empirical specification as for paternal job loss, but this time focusing on new samples of students who experienced maternal job loss, paternal uncle's job loss, maternal uncle's job loss, or an older brother's job loss in the crisis sectors before and after age 16.

Experiencing maternal job loss in the crisis sectors before age 16 is found to negatively affect students' propensity to complete a crisis-linked high school education by 0.9 pp (-0.009, s.e. 0.004), which is statistically significant and only somewhat smaller in magnitude compared to the treatment effect for those experiencing early paternal job loss. For paternal uncle's job loss, we find no significant treatment effect when including all paternal uncles (0.001, s.e. 0.003) and when restricting the job losses to uncles residing in the same municipality (-0.003, s.e. 0.006). For maternal uncles, however, we find statistically significant negative effects for both the specification

including all maternal uncles (−0.005, s.e. 0.003) and when restricting the sample to maternal uncles residing in the same municipality (−0.009, s.e. 0.006), with the latter estimate being highly similar to the treatment effect of maternal job loss. For (the few) older brothers' job losses we capture with our method, the estimated effect is strongly negative, but imprecise and statistically insignificant (−0.020, s.e. 0.027). All in all, the evidence is highly indicative of other information channels besides the father, especially information from family members residing in close geographic proximity, being relevant for early career choices.

School peers affected by paternal job loss in the crisis sectors before age 16. Another potential information channel of importance is the school environment. To gauge the importance of peers' information on career choices, we estimate heterogeneous treatment effects with respect to the share of students in the same school and school year who experienced early paternal job loss in the crisis sectors. We thus collapse the data and compute the share of students, excluding the individual student, in a given school and school year to experience early paternal job loss. We then add the main effect and interaction effect with early paternal job loss to the specification presented in Table 14. The results from this analysis show that for every additional percentage point increase in peers experiencing early paternal job loss, the propensity to complete a crisis-linked education program decreases by 0.1 pp. for those experiencing early paternal job loss (−0.001, s.e. 0.001). With the sample mean share of peers experiencing job loss being roughly 0.05 pp., the results provide suggestive evidence that information from peers can have a large impact on the early career choices of students.

Also, this finding suggests that, in contrast to the earlier results on differential municipal crisis exposure, the effect of very local (school) information shocks can accentuate rather than attenuate information signals stemming from the family environment. We interpret this finding as students being able to make use of the very local information from school peers and make more favorable career choices based on this information. This stands in contrast to those residing in heavily affected municipalities, where the information is salient to all students due to the severity of the economic crisis, and no additional informational advantages can be gained from information shocks from the family.

Effects on working in the same company as the father. In addition to dissuading students from pursuing education programs linked to the father's career following his job loss, it is likely that paternal job loss affects students by disrupting career paths at the father's company or shattering existing workplace networks. We investigate this possibility by estimating treatment effects on the probability that the student at age 20 works at the same company or workplace as the father did before the crisis in 1990. The results are reported in Table 15. We further differentiate the effects based on the number of years the father worked in the sector prior to the crisis (during 1985–1990). The results show that early paternal job loss substantially reduces the chances of the student working in the same company (−0.009, s.e. 0.002) and workplace (−0.006, s.e. 0.002) as the father at age 20. We also find that for every additional year of working in the sector, the treatment effects are reduced by 0.2 pp. for working in the same company as the father (0.002, s.e. 0.000) and 0.1 pp. for having the same workplace (0.001, s.e. 0.000), meaning that the treatment effects are weaker for students with fathers more strongly attached to the sector. This indicates students with weaker paternal attachment to the sector in terms of work opportunities and disruption of networks following paternal job loss.

Triple differences. The main empirical specification uses the timing of paternal job loss during the peak years of the economic crisis affecting Sweden in the early 1990s. We investigate the extent to which the observed effects on educational program choice are limited to experiencing paternal job loss during the crisis years in Table 12 and Figure A5. We do so by estimating a triple difference where, in addition to the main DiD specification, we net out the same effects from experiencing paternal job loss in the crisis sectors after the economic crisis in 1996–1999:

$$y_{i,j,k} = \psi_0 + \psi_1 JL_i^{Cr} \times Early_i \times Crisis_i + \psi_2 JL_i^{Cr} \times Early_i + \psi_3 JL_i^{Cr} \times Crisis_i$$
$$+\psi_4 Early_i \times Crisis_i + \psi_5 Early_i + \psi_6 Jl_i^{Cr} + \psi_7 Crisis_i + \theta_{jk} + \boldsymbol{X_i'\delta} + \varepsilon_{i,j,k},$$

where $Crisis_i$ is an indicator taking the value one for paternal job losses occurring during 1991–1995, and zero for job losses in 1996–1999 after the economy had started to recover. The coefficient on the triple interaction term (ψ_1), which is the coefficient of interest, thus captures the triple difference effect of paternal job loss on educational choice unique to the economic crisis 1991–1995, compared

against the DiD job loss effect 1996–1999. See Figures 2b, 3b, 4b, and 5b for graphical results of experiencing job loss after the crisis on the main outcomes.

In general, the triple difference leads to small changes in magnitude compared to the baseline DiD specification. The triple difference estimate on educational choice is roughly 0.1–0.3 pp. smaller in magnitude compared to the DiD specification, but the estimates are now sometimes marginally insignificant due to the demanding empirical specification leading to larger standard errors. This result indicates that the empirical findings on high school program choice stemming from paternal job loss is largely limited to the crisis years. In Figure A5 we also present graphical evidence of these results by splitting the treatment effects based on the year of experiencing paternal job loss. From this, we see that the treatment effects are concentrated around the crisis years 1991–1995, and are generally weaker for those experiencing early paternal job loss in the crisis sectors before and after the economic crisis. This indicates that the economic crisis event is key in affecting the students' career choices.

5. Discussion

The findings of this paper indicate that behavioral responses to economic downturns in terms of early career choice can be rapid and economically meaningful. The educational choice responses we observe imply that the speedy adaption to economic crisis contribute to structural change on the labor supply side. Based on our empirical approach and the analysis of related mechanisms, we interpret our findings as the causal effects of informational frictions interacted with educational choice flexibility before age 16, net of any main main effects of experiencing paternal job loss in other sectors. We argue that this interpretation is further strengthened by the empirical result that these effects are attenuated based on municipal crisis severity, which we interpret as a weakening of the information signal stemming from paternal job loss when the economic conditions are more salient to the general public. In other words, that the information shock within the family becomes less important if the local conditions in terms of job loss are more severe.

We interpret the magnitude of the estimated treatment effect on having a crisis sector-linked high school education (-11%) as being large, since these effects are in addition to a marked shift away from these high school programs in the general student population. With the baseline rate of

pursuing such an education being higher for the students with fathers working in the crisis sectors, the effects can be interpreted as a partial convergence in high school program outcomes compared to the full population of students. The same interpretation of the effect sizes holds true for the treatment effect on cumulative lifetime earnings (-2%), where we find a clear decrease in lifetime earnings from experiencing paternal job loss in the crisis sectors before age 16.

A key limitation of our empirical approach is that we cannot disentangle the effects of informational frictions about a sector's economic prospects from the student's preferences for entering the same sector as the father. It could be the case that students value entering the same sector as their father and base their educational choices on this, and that paternal job loss removes the utility component of following in the father's footsteps in addition to providing information about economic prospects. The fact that we observe only weak treatment effects in municipalities heavily hit by the crisis, where information about the labor market prospects is more salient to the general student population, strengthens the case that the economic prospects component of the information shock is an important part of the treatment effect. From this, we interpret our estimates as a composite information shock containing both information on the economic prospects and utility stemming from intergenerational persistence in sector of occupation. Our findings thus suggest that economic crisis exposure and paternal job loss can affect economic mobility and intergenerational persistence in labor market outcomes.

In terms of policy implications, our findings suggest that overcoming informational frictions associated with educational choices can significantly improve the labor market consequences of students affected by economic crisis. One way to try to reduce these frictions could be to provide more guidance for students about the prospects of entering each sector, such as career counselling, before making the high school education choices, or other measures to make the economic consequences of early educational choices more salient. This, however, requires that our estimated effects are not solely capturing preferences linked to working in the same sector as the father interacted with educational choice flexibility. If so, then the largest gains from policies to reduce information frictions are likely found for individuals who have some flexibility to alter their career choices. Providing additional information and career counselling for groups beyond students on the verge of making their high school choices would ideally be paired with measures to increase the career

flexibility of more mature workers, such as providing retraining programs.

6. Conclusion

In this paper, we estimate how economic crisis affects the early career choices of the next generation of workers. By exploiting the timing of paternal job loss during the massive economic crisis that hit Sweden in 1990, we estimate causal effects and study mechanisms related to crisis exposure and information shocks for students before they enter the labor market. Specifically, our identification strategy relies on within-cohort variation in experiencing paternal job loss in the heavily affected manufacturing and construction sectors before or after high school program choices are made at age 16.

Our results show a substantial decrease in students' probability of pursuing a manufacturing- or construction-linked high school career program during and after the economic crisis, with students who experienced paternal job loss in the crisis sectors before having made their high school program choices substituting more strongly away from educations linked to these sectors. The substitution patterns away from the paternal crisis sectors mainly lead the affected students into other vocational education career programs. In the long run, the affected students are more likely to steer clear from the paternal crisis sectors, and exhibit greater lifetime earnings and employment rates. In turn, this contributes to a weakening of the intergenerational link between fathers and their children, to the benefit of the children's labor market outcomes.

Delving deeper into the results, we find that students affected by early paternal job loss tend to shift towards more stable educational programs with lower earnings volatility. These students thus respond to the crisis by making less risky career decisions early on, which had a positive impact on their lifetime earnings. Furthermore, our results suggest that exposure to early information signals during an economic crisis, such as paternal job loss, can be influenced by local conditions, including varying levels of municipal crisis exposure and the share of school peers undergoing similar shocks.

In conclusion, the results of this study highlight the existence of significant opportunities for enhancing individuals' ability to navigate informational challenges during economic crises. One promising approach to address these challenges is to combat the informational gaps related to the prevailing economic conditions and the future prospects of various sectors through targeted

interventions. These interventions could help individuals make more informed decisions about their career choices in times of crisis. Furthermore, building on the insights derived from our research, another policy implication is the need to enhance the flexibility of educational pathways for young individuals and potentially provide retraining opportunities for older workers. By doing so, we can empower individuals to adapt to changing economic circumstances and make more resilient career choices. In essence, the combination of flexible educational options and improved access to relevant information can play an important role in mitigating the adverse individual consequences of economic crises.

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Result tables and figures

Tables

Table 1: Descriptive statistics 1990 for the main sample of students experiencing paternal job loss.

	Job loss any sector	Manufacturing job loss	Construction job loss
Year of birth	1977.937	1977.558	1977.710
Share female	.485	.482	.484
Year of birth father	1946.918	1946.539	1947.789
Year of birth mother	1950.403	1950.239	1950.855
Earnings father 1990	1665.873	1683.317	1809.283
Earnings mother 1990	1032.255	994.733	1019.456
Employment rate father 1990	.976	.990	.994
Employment rate mother 1990	.853	.841	.876
Share fathers married	.722	.73	.707
Share mothers married	.722	.738	.712
Share fathers completed high school	.547	.483	.503
Share mothers completed high school	.623	.557	.610
Job loss years	1991–1999	1991–1999	1991–1999
Cohorts	1970–1988	1970–1988	1970–1988
Obs.	232,566	54,146	37,564

The table shows descriptive stats on the main sample from the 1990 census. The descriptives are split by the students experiencing paternal job loss in any sector, in the manufacturing sector, and in the construction sector during 1991–1999.

Table 2: Effect of paternal job loss on crisis sector program outcomes age 20.

Job loss sector:	Crisis sector job loss			Manufacturing sector job loss			Construction sector job loss		
Specification:	1x Diff.	DiD	DiD	1x Diff.	DiD	DiD	1x Diff.	DiD	DiD
Outcome:	Crisis sector education			Manufacturing education			Construction education		
Job loss b. age 16 × Sector	−0.011***	−0.012***	−0.011***	−0.007**	−0.008***	−0.005*	−0.011***	−0.011***	−0.011***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Cohort × County FE	✓	✓		✓	✓		✓	✓	
Cohort × Municipality FE			✓			✓			✓
Controls			✓			✓			✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.107	0.107	0.107	0.072	0.072	0.072	0.060	0.060	0.060
Obs.	175,428	175,428	176,658	175,428	175,428	176,658	175,428	175,428	176,658

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. "1x Diff." refers to the specification capturing the direct difference in outcome for those experiencing paternal job loss in the specified sector during ages 10–15 against those experiencing paternal job loss in the same sector age 16–21. "DiD" refers to the double difference specification where we, in addition to the "1x Diff." specification, net out the effect of experiencing paternal job loss from any other sector during the same ages. "Controls" refers to including control variables based on parental information from the 1990 census, which includes parental birth cohort, student gender, parental labor market outcomes, marriage status, and high school completion status. "Crisis sector education" refers to combining the manufacturing and construction educational outcome into one category, while "Manufacturing education" and "Construction education" shows the outcome separately for the two career programs.

Table 3: Effect of crisis sector paternal job loss on earnings during the life cycle.

Specification:	DiD	DiD	DiD	DiD	DiD	DiD
Outcome:	Lifetime earnings		Earnings age 20–30		Earnings age 30–40	
Crisis sect. job loss b. age 16	86664***	58029**	44975***	36557***	28989*	15462
	(24697)	(24523)	(9967)	(9509)	(15789)	(16000)
Cohort × County FE	✓		✓		✓	
Cohort × Muni. FE		✓		✓		✓
Controls		✓		✓		✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	5,210,000	5,210,000	1,510,000	1,510,000	2,590,000	2,590,000
Obs.	175,428	176,658	175,428	176,658	170,671	171,877

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. "DiD" refers to the double difference specification where we compare the outcome for those experiencing paternal job loss before and after age 16 and also net out the effect of experiencing paternal job loss from any other sector during the same ages. "Lifetime earnings" refers to cumulative earnings during the lifetime (up until the final year of our earnings panel in 2017). "Controls" refers to including control variables based on parental information from the 1990 census, which includes parental birth cohort, student gender, marriage status, and high school completion status.

Table 4: Effect of crisis sector paternal job loss on substitution to other career programs.

Outcome:	Crisis sector ed.	Manufacturing	Construction		
Crisis sect. job loss before age 16	−0.012***	−0.008***	−0.005**		
	(0.003)	(0.002)	(0.002)		
Mean dep. var.	0.107	0.067	0.041		
Obs.	175,428	175,428	175,428		
Outcome:	Theoretical	Nursing	Electrician	Retail	No HS degree
Crisis sect. job loss before age 16	−0.003	−0.001	0.001	0.003	−0.000
	(0.005)	(0.001)	(0.002)	(0.002)	(0.004)
Mean dep. var.	0.188	0.030	0.042	0.057	0.179
Obs.	175,428	175,428	175,428	175,428	175,428
Outcome:	Transportation	Arts	Childcare	Hotel & Rest.	Agriculture
Crisis sect. job loss before age 16	0.004**	−0.004*	0.004	0.006***	0.004***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.001)
Mean dep. var.	0.034	0.026	0.067	0.024	0.017
Obs.	175,428	175,428	175,428	175,428	175,428
Cohort × County FE	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same ages. "Crisis sector ed." refers to combining the manufacturing and construction educational outcome into one joint outcome.

Table 5: Effect of crisis sector paternal job loss on substitution to more stable career programs.

Obs. years:	Pre-crisis	During crisis	Pre-crisis	During crisis	Pre-crisis	During crisis	During crisis
Outcome:	Standardized earnings		Standardized earnings variance		Standardized risk-adjusted earnings		Employment rate
Crisis sect. job loss b. age 16	−0.003	0.026**	−0.020**	−0.045***	0.015	0.044***	0.002*
	(0.012)	(0.012)	(0.010)	(0.010)	(0.012)	(0.011)	(0.001)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓
Mean dep. var.	0.102	0.103	-0.002	0.060	0.085	0.059	0.570
Observation years	1986–1990	1990–1994	1986–1990	1990–1994	1986–1990	1990–1994	1991–1993
Obs.	175,428	175,428	175,428	175,428	175,428	175,428	175,428

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The outcomes are based on average outcomes for the specific programs for cohorts who made their high school program choices before the 1990s crisis. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same ages. "Standardized earnings." denotes the standardized (mean-zero, standard deviation one) cumulative earnings outcome age 22–25 based on the outcome of individuals born during 1964–1965 or 1968–1969, having chosen the same program as the students affected by paternal job loss during the crisis. "Standardized earnings variance" and "Standardized risk-adjusted earnings" denotes the variance of the cumulative earnings outcome for the same cohorts and the quotient of the earnings divided by the variance for the same definition. All of the standardized outcomes are standardized by cohort. "Employment rate" denotes an outcome based on the average employment rate for the individuals by program at age 20 during the early crisis years 1991–1993.

Table 6: Effect of paternal job loss on students' long-run outcomes in 2015.

Job loss sector:	Crisis sector job loss				Manuf. sector job loss		Constr. sector job loss	
Outcome:	Crisis industry	University education	Employed	Divorced	Manuf. industry	Constr. industry	Constr. industry	Manuf. industry
Job loss b. age 16 × Sector	−0.002	−0.010*	0.008**	0.002	−0.007**	0.003	−0.007	0.007**
	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.165	0.312	0.881	0.101	0.072	0.096	0.080	0.076
Obs.	150,047	165,251	166,118	166,118	150,047	150,047	150,047	150,047

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Crisis industry" denotes being employed in the manufacturing or construction industry in 2015.

Table 7: Effect of municipal crisis or paternal job loss by quartile of municipal crisis exposure.

Crisis definition:	Employment rate drop		Unemployment rate increase		JL×Employment rate drop		JL×Unemployment rate increase	
Outcome:	Crisis sector education				Crisis sector education	Lifetime earnings	Crisis sector education	Lifetime earnings
Crisis × Quartile 4	0.003	0.009*	−0.005	−0.003	0.019**	−91128	0.011	−19979
	(0.004)	(0.004)	(0.004)	(0.005)	(0.009)	(91551)	(0.009)	(82338)
Crisis × Quartile 3	0.002	0.006	−0.002	−0.003	0.013	−90181	0.004	−80049
	(0.004)	(0.005)	(0.004)	(0.005)	(0.009)	(90192)	(0.009)	(85356)
Crisis × Quartile 2	0.003	0.006	−0.004	−0.004	0.005	−50107	0.003	−58662
	(0.004)	(0.005)	(0.004)	(0.004)	(0.009)	(90429)	(0.008)	(86109)
Crisis × Quartile 1					−0.022***	144275*	−0.017**	126255*
					(0.008)	(80156)	(0.007)	(70527)
Crisis	−0.000	−0.001	0.003	0.003				
	(0.003)	(0.003)	(0.003)	(0.003)				
Fathers in crisis sect. 1990		✓		✓				
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓	✓
Job loss years					1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.050	0.070	0.050	0.071	0.075	4,690,000	0.075	4,690,000
Obs.	2,663,762	839,721	2,647,706	833,624	175,428	175,428	174,510	174,510

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The first four columns show the interaction effect of residing in a quartile 2–4-exposed municipality around age 16 and being born 1976–1988 and the main linear effect of crisis exposure split by the type of crisis exposure measure used. "Crisis" is standardized to be mean-zero standard deviation one. The other four columns show treatment effects split by the quartile of crisis severity of the municipality of residence (defined as the employment drop in 1993 relative to 1990, for the full economy, or the increase in unemployment in the municipality the same years). For the last four columns estimating the effects of crisis exposure by quartile, we use the main double difference (DiD) specification comparing the outcome for those experiencing paternal job loss before and after age 16 and also net out the effect of experiencing paternal job loss from any other sector during the same ages.

Table 8: Effect of crisis sector paternal job loss on students' outcomes, split by student gender.

Outcome:	Crisis sector education	Lifetime earnings	Earnings age 20–30	Earnings age 30–40	2015 outcomes Employed	2015 outcomes University education	2015 outcomes Divorced
Crisis sect. job loss b. age 16 × Female	0.024***	−92318**	−41581**	−38244	−0.007	−0.001	0.009*
	(0.006)	(43708)	(17827)	(28257)	(0.006)	(0.011)	(0.005)
Crisis sect. job loss before age 16	−0.024***	130357***	63431***	45670**	0.011***	−0.009	−0.003
	(0.005)	(35953)	(15018)	(22880)	(0.004)	(0.007)	(0.003)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.193	6,030,000	1,770,000	3,050,000	0.885	0.284	0.085
Obs.	175,428	175,428	175,428	170,671	166,118	165,251	166,118

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same ages. "Crisis sector education" denotes having a manufacturing or construction-linked high school education at age 20. "Lifetime earnings" refers to cumulative earnings during the lifetime (up until the final year of our earnings panel in 2017).

Table 9: Effect of paternal job loss on career choice using alternative bandwidths for the age of experiencing paternal job loss.

Job loss sector:	Crisis sector job loss			Manuf. sector job loss			Constr. sector job loss		
Outcome:	Crisis sector education			Manufacturing education			Construction education		
Job loss b. age 16 × Sector	−0.012***	−0.009**	−0.007	−0.008***	−0.007*	−0.005	−0.011***	−0.003	−0.003
	(0.003)	(0.004)	(0.006)	(0.003)	(0.004)	(0.005)	(0.003)	(0.005)	(0.006)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Students' job loss ages	10–21	14–17	15–16	10–21	14–17	15–16	10–21	14–17	15–16
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.107	0.107	0.107	0.072	0.072	0.072	0.060	0.060	0.060
Obs.	175,428	56,423	28,114	175,428	56,423	28,114	175,428	56,423	28,114

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 in the specific sector while also netting out the effect of experiencing paternal job loss from any other sector during the same ages. "Crisis sector education" refers to combining the manufacturing and construction educational outcome into one category, while "Manufacturing education" and "Construction education" shows the outcome separately for the two career programs.

Table 10: Effect of paternal job loss on lifetime earnings using alternative bandwidths for the age of experiencing paternal job loss.

Job loss sector:	Crisis sector job loss			Manuf. sector job loss			Constr. sector job loss		
Outcome:	Cumulative lifetime earnings			Cumulative lifetime earnings			Cumulative lifetime earnings		
Job loss b. age 16 × Sector	86664***	54175	74768	72727***	41422	97495	51696*	38436	−3884
	(24697)	(42952)	(55202)	(27248)	(48981)	(60931)	(30408)	(46981)	(62918)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Students' job loss ages	10–21	14–17	15–16	10–21	14–17	15–16	10–21	14–17	15–16
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	5,210,000	5,210,000	5,210,000	4,630,000	4,630,000	4,630,000	4,590,000	4,590,000	4,590,000
Obs.	175,428	56,423	28,114	175,428	56,423	28,114	175,428	56,423	28,114

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Cumulative lifetime earnings" refers to cumulative earnings during the lifetime (up until the final year of our earnings panel in 2017).

Table 11: Effect of paternal job loss on the main outcomes including sibling fixed effects.

Job loss sector:	Crisis sector job loss			Manuf. sector job loss			Constr. sector job loss		
Outcome:	Crisis sector education	Lifetime earnings	Earnings age 20–30	Manuf. education	Lifetime earnings	Earnings age 20–30	Constr. education	Lifetime earnings	Earnings age 20–30
Job loss b. age 16 × Sector	−0.015*	73766	28941	−0.007	150030*	33263	−0.013	−70202	5941
	(0.008)	(72432)	(25871)	(0.008)	(76263)	(31761)	(0.008)	(90875)	(34720)
Sibling FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.107	5,210,000	1,510,000	0.072	4,630,000	1,530,000	0.060	4,590,000	1,530,000
Obs.	176,045	176,045	176,045	176,045	176,045	176,045	176,045	176,045	176,045

Note: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Crisis sector education" denotes having a manufacturing or construction-linked high school education at age 20, while "Manuf. education" and "Constr. education" shows the outcome separately for the two career programs. "Lifetime earnings" refers to cumulative earnings during the lifetime (up until the final year of our earnings panel in 2017).

Table 12: Effect of paternal job loss on career choice outcomes age 20, including additional controls and the triple difference removing job loss effects from the specific sector after the economic crisis.

Job loss sector:	Crisis sector job loss			Manufacturing sector job loss			Construction sector job loss		
Specification:	DiD Post	3x Diff.	3x Diff.	DiD Post	3x Diff.	3x Diff.	DiD Post	3x Diff.	3x Diff.
Outcome:	Crisis sector education			Manufacturing education			Construction education		
Job loss b. age 16 × Sector	−0.003	−0.009	−0.010	−0.003	−0.006	−0.004	−0.001	−0.010*	−0.010*
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Cohort × County FE		✓			✓			✓	
Cohort × Municipality FE	✓		✓	✓		✓	✓		✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Job loss years	1996–99	1991–99	1991–99	1996–99	1991–99	1991–99	1996–99	1991–99	1991–99
Mean dep. var.	0.107	0.107	0.107	0.072	0.072	0.072	0.060	0.060	0.060
Obs.	54,856	229,928	231,514	54,856	229,928	231,514	54,856	229,928	231,514

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. "DiD Post" refers to the double difference specification, where we compare the outcome for those experiencing paternal job loss before and after age 16 and also net out the effect of experiencing paternal job loss from any other sector during the same age for job loss years 1996–1999 after the crisis. "3x Diff." shows the triple difference, where we, in addition, net out the same DiD effect during the years after the crisis (1996–1999). "Controls" refers to including control variables based on parental information from the 1990 census, which includes parental birth cohort, student gender, marriage status, age, and high school completion status. "Crisis sector education" refers to combining the manufacturing and construction educational outcome into one category, while "Manufacturing education" and "Construction education" shows the outcome separately for the two career programs.

Table 13: Effect of paternal job loss on career choice outcomes age 20 when experiencing maternal job loss and job loss for other family members.

Family member exp. job loss:	Mother	Paternal uncle	Maternal uncle			Older brother
Outcome:	Crisis sector education					
Crisis sect. job loss b. age 16	−0.009**	0.001	−0.003	−0.005*	−0.009*	−0.020
	(0.004)	(0.003)	(0.006)	(0.003)	(0.005)	(0.027)
Cohort × County FE	✓	✓	✓	✓	✓	✓
Residing in same municipality			✓		✓	
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.112	0.102	0.110	0.104	0.114	0.121
Obs.	154,978	142,762	43,535	140,958	39,543	3,787

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing the specified family member's job loss in the crisis sectors before and after age 16, while also netting out the effect of experiencing the job loss from any other sector during the same age. "Crisis sector education" refers to combining the manufacturing and construction educational outcome into one category.

Table 14: Effect of paternal job loss on career choice outcomes age 20 split by the share of students in the same school having experienced paternal job loss by age 16.

Job loss sector:	Crisis sector	Manuf. sector	Constr. sector
Outcome:	Crisis ed.	Manuf. ed.	Constr. ed.
Crisis sect. JL × Share school year 9 exp. JL	−0.001**	−0.000	−0.001
	(0.001)	(0.001)	(0.001)
Crisis sect. job loss b. age 16	−0.006	−0.009**	−0.008**
	(0.004)	(0.003)	(0.004)
Cohort × County FE	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95
Mean dep. var.	0.107	0.072	0.060
Obs.	160,130	160,131	160,133

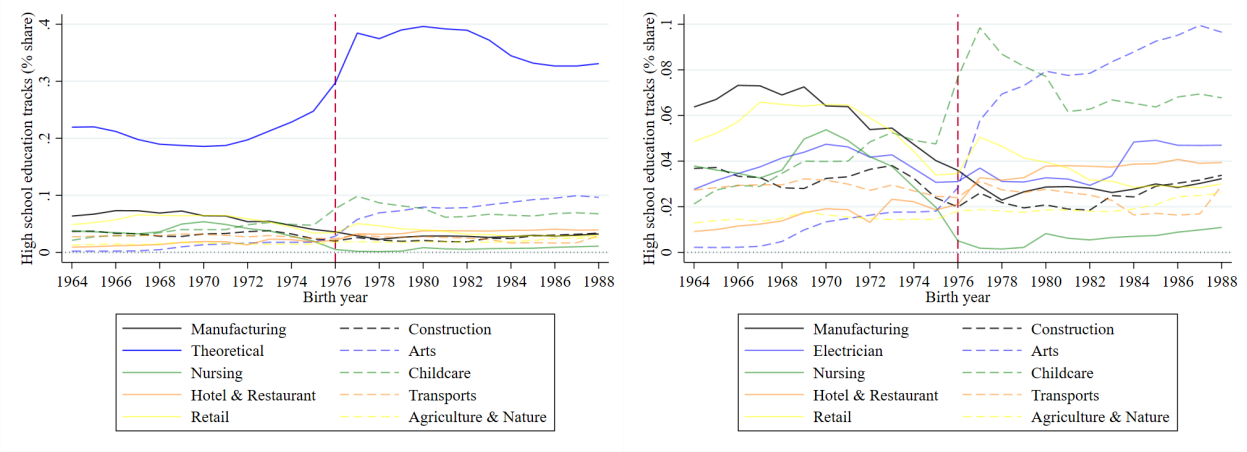
Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Crisis ed." refers to combining the manufacturing and construction educational outcome into one category. The interaction term "Share school year 9 exp. JL" denotes the percentage share (×100) of the students in same school, excluding the individual student, experiencing paternal job loss before age 16 in the specified sector.

Table 15: Effect of paternal job loss on career choice outcomes age 20 and working in the same company as the father.

Job loss sector:			Crisis sect.	Manuf. sect.	Constr. sect.
Outcome:	Same company as father	Same workplace as father	Crisis ed.	Manuf. ed.	Constr. ed.
Crisis sect. job loss × Years in sector	0.002***	0.001***	0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Crisis sect. job loss b. age 16	−0.009***	−0.006***	−0.012**	−0.004	−0.010**
	(0.002)	(0.002)	(0.005)	(0.004)	(0.005)
Cohort × County FE	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.016	0.020	0.107	0.059	0.035
Obs.	147,234	111,849	175,428	175,428	175,428

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Same company as the father" denotes working at age 25 in the same company as the father did before the crisis in 1990. "Crisis ed." refers to combining the manufacturing and construction educational outcome into one category, while "Manuf. ed." and "Constr. ed." shows the outcome separately for the two career programs. "Years in sector" denotes a linear term capturing the father's cumulative years in the manufacturing or construction sector during 1985–1990.

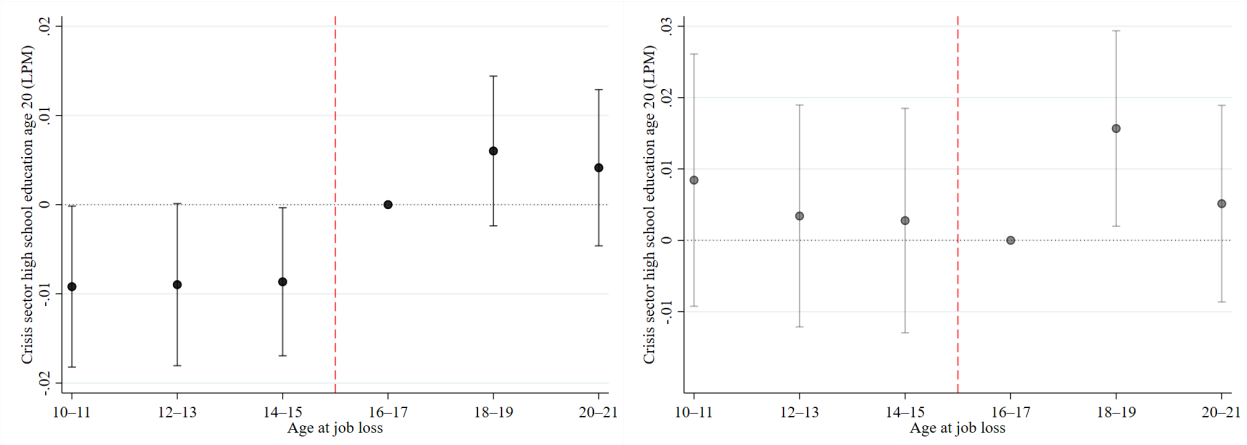
Figures



(a) General trend in high school education program shares, by birth cohort and including the theoretical (science and social science) track.

(b) General trend in vocational high school education, by birth cohort and excluding the theoretical education track.

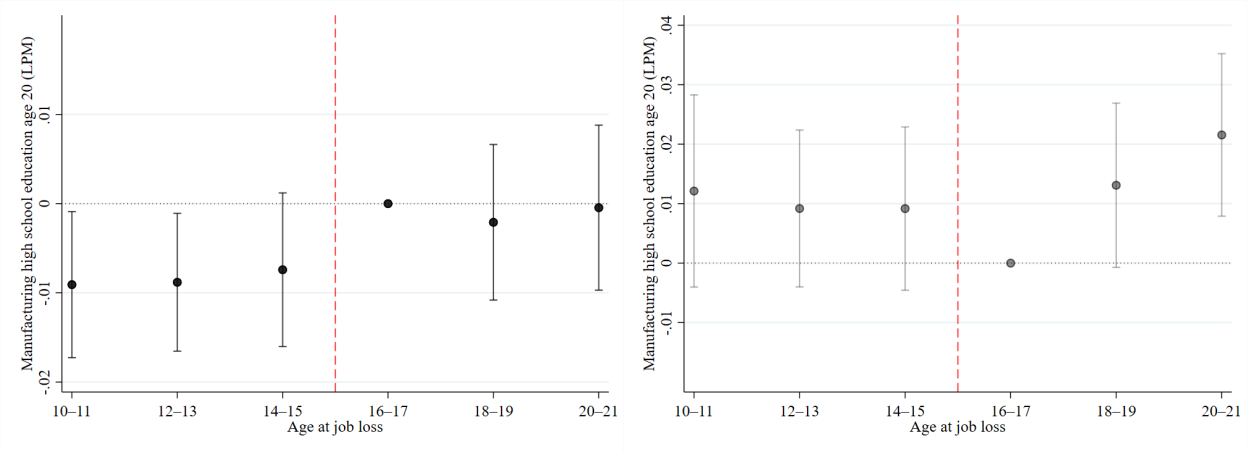
Figure 1: The figures show the general trend in high school programs around age 20, by birth cohort. The individuals excluded from these figures are those who had not completed high school by age 21 (14.4%), and those who had university education already at age 19 (4.5%). Also, some minor programs, unidentifiable programs, and programs that essentially disappeared with the high school reform of 1993/94 (17.3%) are excluded. The dashed red line marks the approximate last cohort not affected by the high school reform of 1993/94.



(a) Crisis sector job loss 1991–1995.

(b) Crisis sector job loss 1996–1999.

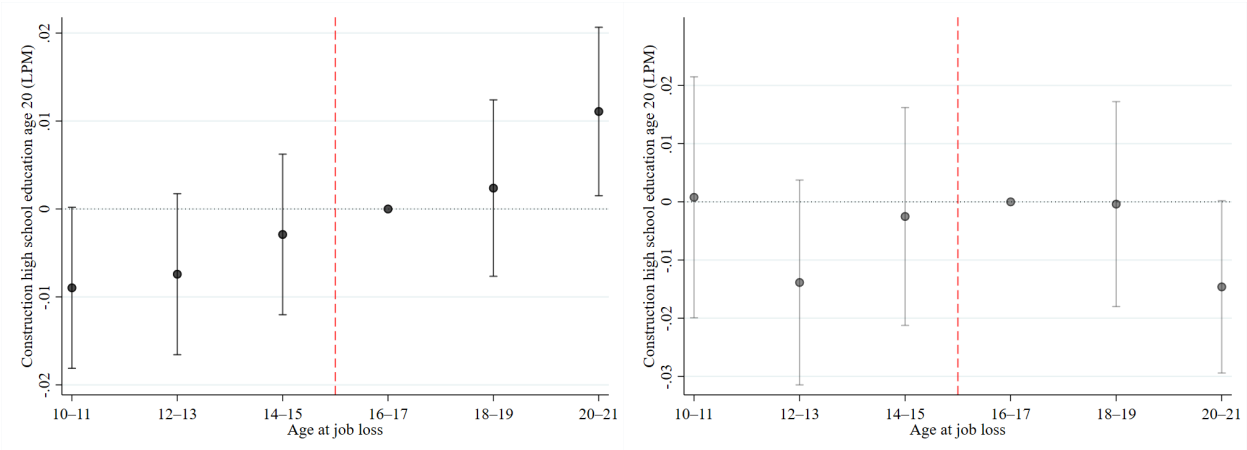
Figure 2: The figure shows the effect of paternal crisis sector job loss at a particular age on the student's propensity to have a crisis-linked high school education around age 20. The displayed effects net out the main effect of experiencing job loss at the same age from the father working in any other sector. The outcome is pooling manufacturing and construction-linked high school education age 20. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.



(a) Manufacturing job loss 1991–1995.

(b) Manufacturing job loss 1996–1999.

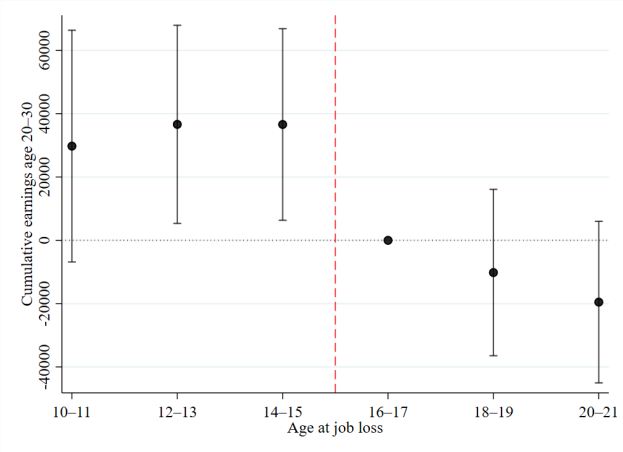
Figure 3: The figures show the effect of paternal manufacturing job loss at a particular age on the student's propensity to have a manufacturing-linked high school education around age 20. The displayed effects net out the main effect of experiencing job loss at the same age from the father working in any other sector. The outcome is shown for the main crisis years 1991–1995 and the post crisis years 1996–1999 separately. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.



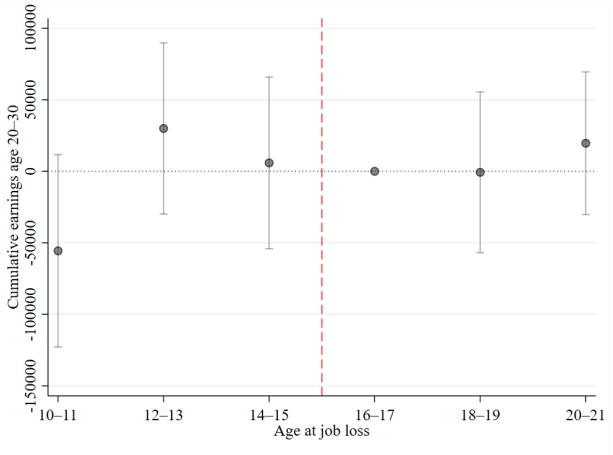
(a) Construction job loss 1991–1995.

(b) Construction job loss 1996–1999.

Figure 4: The figures show the effect of paternal construction job loss at a particular age on the student's propensity to have a construction-linked high school education around age 20. The displayed effects net out the main effect of experiencing job loss at the same age from the father working in any other sector. The outcome is shown for the main crisis years 1991–1995 and the post crisis years 1996–1999 separately. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.

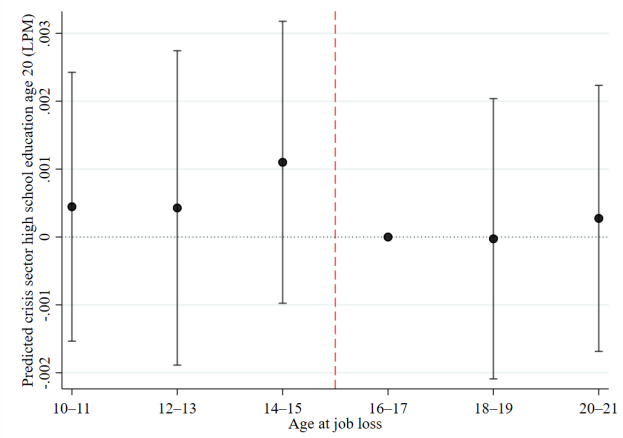


(a) Crisis sector job loss 1991–1995.

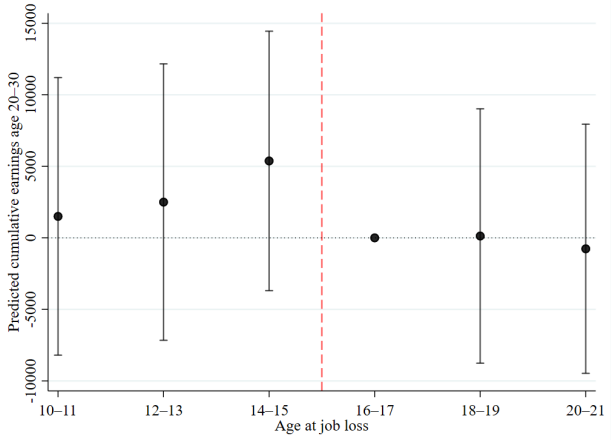


(b) Crisis sector job loss 1996–1999.

Figure 5: The figures show the effect of paternal crisis sector job loss at a particular age on the student's cumulative earnings age 20–30. The displayed effects net out the main effect of experiencing job loss at the same age from the father working in any other sector. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.

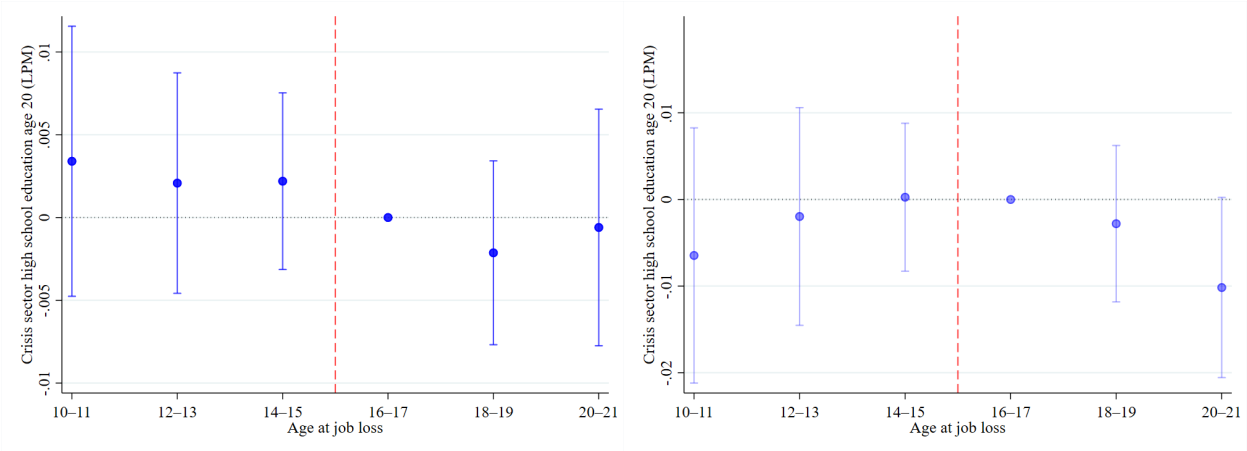


(a) Predicted crisis sector education.



(b) Predicted cumulative earnings age 20–30.

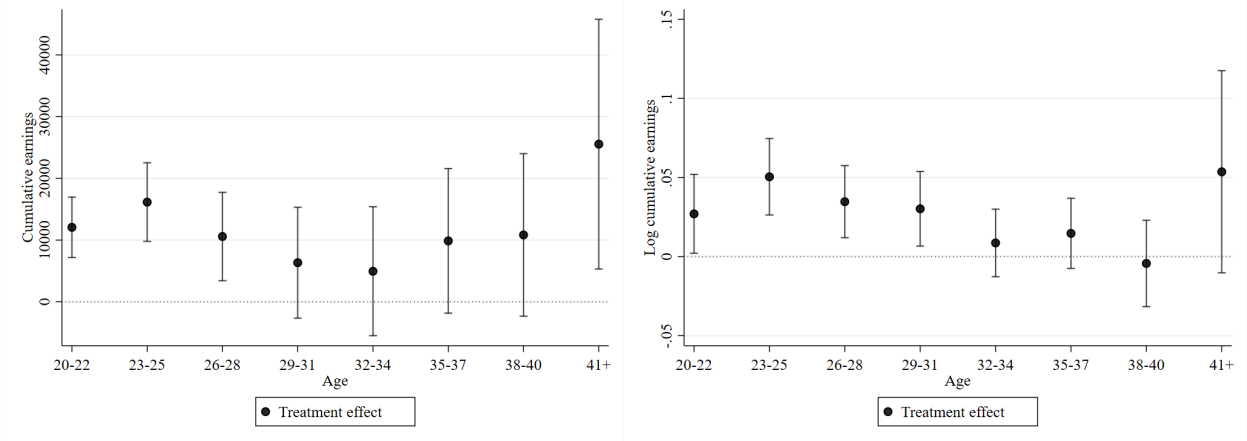
Figure 6: The figures show the effect of paternal crisis sector job loss at a particular age on the student's predicted propensity to graduate from high school with a crisis sector-linked education and the predicted cumulative earnings age 20–30. The characteristics used to predict the outcome are primarily from the 1990 census and the Multi-Generation Register and include parents' year of birth, high school completion status, marriage status, cohort-by-county of the student, parents' number of children, birth order of the student, student gender, and indicators of missing values for the characteristics. The adjusted R^2 of the predictions range from 0.075–0.102. The displayed effects net out the main effect of experiencing job loss at the same age from the father working in any other sector. Standard errors are clustered on the municipality of residence at age 16 level. CI95 are indicated in black.



(a) Main effect of job loss 1991–1995.

(b) Main effect of job loss 1996–1999.

Figure 7: The figure shows the main effect of paternal job loss from any sector other than a crisis-linked one at a particular age on the student's propensity to have a crisis sector-linked high school education around age 20. The outcome is crisis sector-linked high school education age 20 (pooling manufacturing and construction). Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in blue.



(a) Treatment effects on life-cycle earnings.

(b) Treatment effects on life-cycle log earnings.

Figure 8: The figures show treatment effects on life-cycle earnings. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.

Appendix

Additional tables and figures

Table A1: Effect of crisis sector paternal job loss on long-run earnings variance and earnings growth.

Outcome:	Standardized earnings variance		Standardized earn. variance age 20–30		Standardized earn. variance age 30–40		Standardized earnings growth	
Crisis sect. job loss b. age 16	−0.003	−0.004	−0.007	−0.008	−0.001	0.001	0.003	0.004
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)	(0.010)
Cohort × County FE	✓		✓		✓		✓	
Cohort × Muni FE		✓		✓		✓		✓
Controls		✓		✓		✓		✓
Mean dep. var.	-0.013	-0.013	-0.019	-0.019	-0.013	-0.004	0.001	0.001
Obs.	175,428	176,658	175,042	176,270	169,932	171,138	167,553	167,553

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same ages. "Standardized earnings variance" denotes the standardized (mean-zero, standard deviation one by cohort) cumulative earnings variance over the life cycle "Standardized earnings growth" denotes the standardized quotient of the cumulative earnings age 30–40 divided by the earnings age 20–30. "Controls" refers to including control variables based on parental information from the 1990 census, which includes parental birth cohort, student gender, marriage status, and high school completion status.

Table A2: Effect of paternal job loss on career choice using an alternative control group.

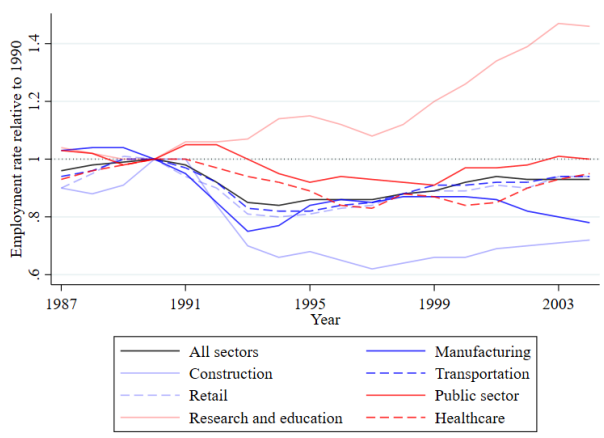
Job loss sector:	Crisis sector job loss			Manufacturing sector job loss		Construction sector job loss	
Outcome:	Crisis sector education	Manufacturing education	Construction education	Manufacturing education	Construction education	Construction education	Manufacturing education
Job loss b. age 16 × Sector	−0.008***	−0.006***	−0.002	−0.004*	−0.000	−0.003	−0.010***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
Cohort × County FE	✓	✓	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.102	0.062	0.040	0.069	0.030	0.058	0.051
Obs.	809,785	809,785	809,785	531,285	531,285	282,298	282,298

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The control group is defined as those with a father in the manufacturing or construction sector in 1990, just before the economic crisis. The outcome is compared against this group and the ones experiencing paternal job loss in the specified sector (crisis sector, manufacturing, or construction sector) before age 16. "Crisis sector education" denotes having a manufacturing or construction-linked high school education at age 20, while "Manufacturing education" and "Construction education" shows the outcome separately for the two career programs.

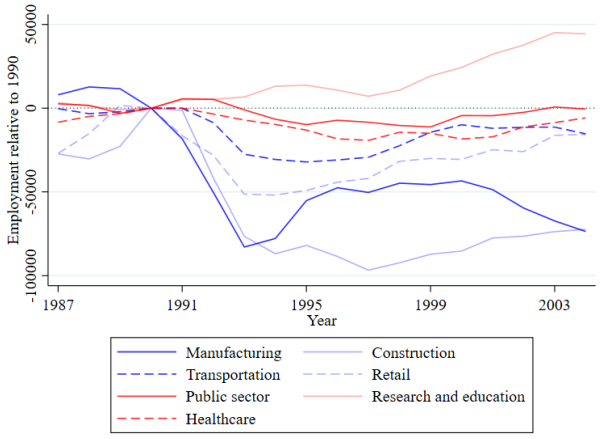
Table A3: Effect of paternal job loss on career choice outcomes age 20 split by parental marriage and cohabiting status in 1990.

Parental marriage status:	Mother married			Father married		
Job loss sector:	Crisis sect.	Manuf. sect.	Constr. sect.	Crisis sect.	Manuf. sect.	Constr. sect.
Outcome:	Crisis ed.	Manuf. ed.	Constr. ed.	Crisis ed.	Manuf. ed.	Constr. ed.
Crisis sect. job loss × Married	0.006	−0.001	−0.005	0.003	0.001	−0.002
	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)
Crisis sect. job loss b. age 16	−0.017***	−0.007	−0.008*	−0.015***	−0.008*	−0.010*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Cohort × County FE	✓	✓	✓	✓	✓	✓
Job loss years	1991–95	1991–95	1991–95	1991–95	1991–95	1991–95
Mean dep. var.	0.107	0.072	0.060	0.107	0.072	0.060
Obs.	172,370	172,370	172,370	175,313	175,313	175,313

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors are clustered on the student's municipality of residence around age 16 level. The main empirical double difference (DiD) specification is used, where we compare the outcome for those experiencing paternal job loss before and after age 16 while also netting out the effect of experiencing paternal job loss from any other sector during the same age. "Crisis ed." refers to combining the manufacturing and construction educational outcome into one category, while "Manuf. ed." and "Constr. ed." shows the outcome separately for the two career programs.

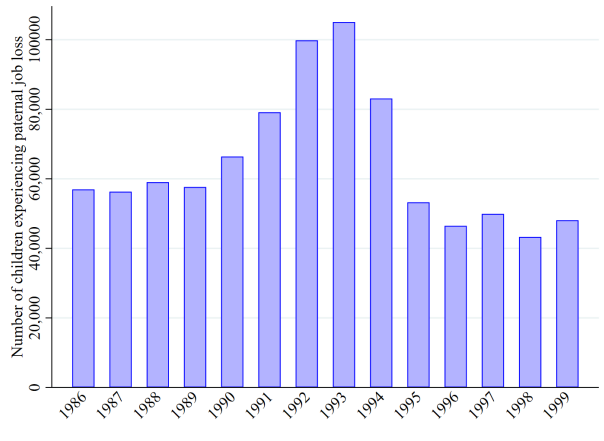


(a) Employment rate for men by sector of occupation, relative to 1990.

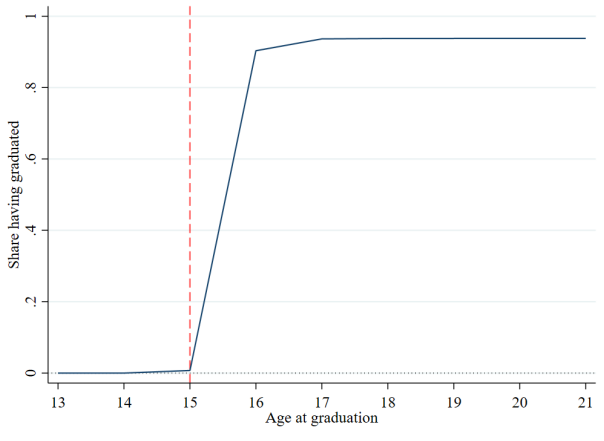


(b) Employment in levels for men by sector of occupation, relative to 1990.

Figure A1: The figures show the evolution of employment rate and employment in levels relative to the last year before the economic crisis hit Sweden. Source: Statistics Sweden.

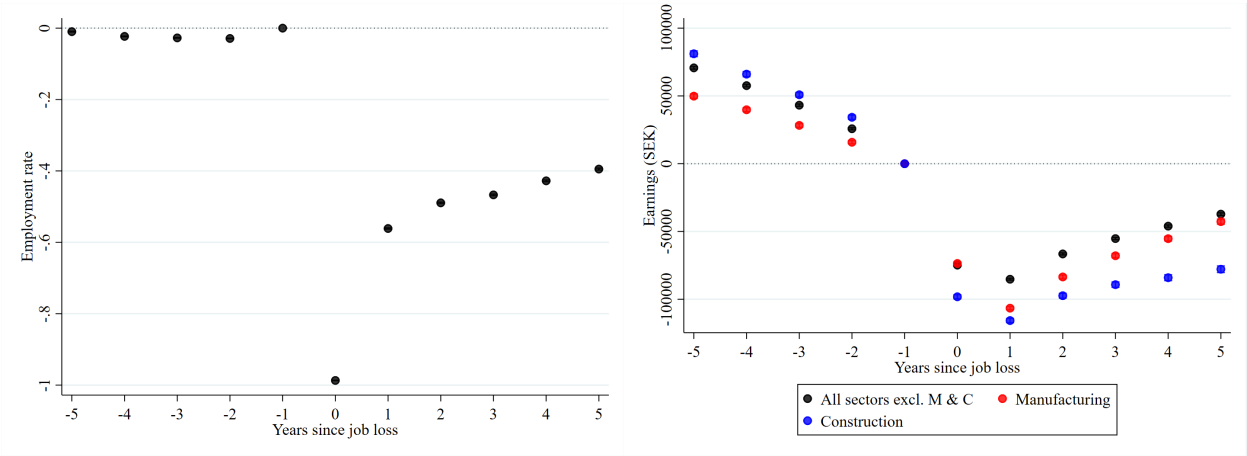


(a) Number of children experiencing paternal job loss each year in Sweden during 1986–1999.



(b) Share of students born 1975–1979 having graduated at a specific age.

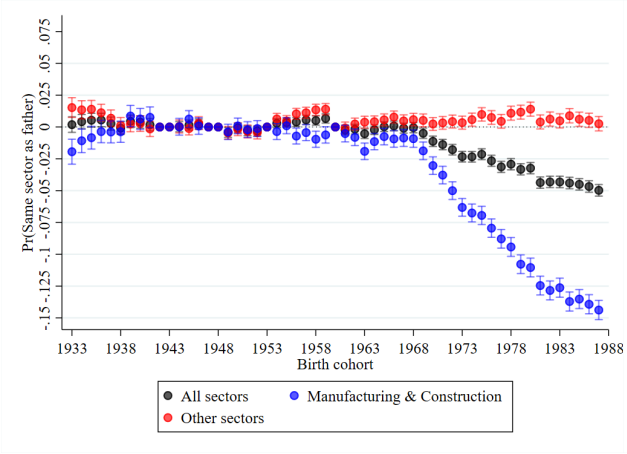
Figure A2: The figures show the number children experiencing job loss each year in Sweden during 1986–1999, and the share of students born 1975–1979 having graduated by age 13–21.



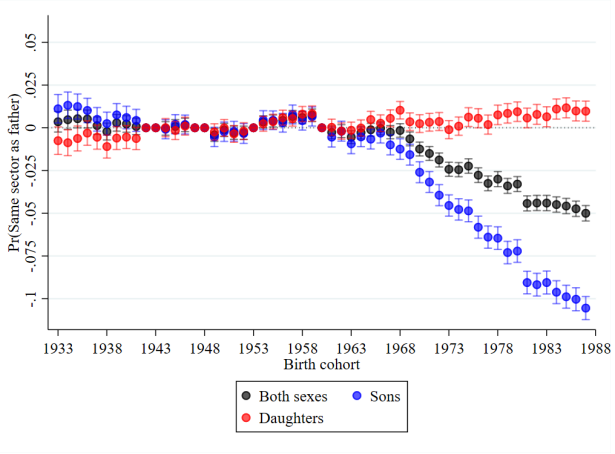
(a) Event study of employment rate ± 5 years around the job loss event.

(b) Event study of earnings ± 5 years around the job loss event.

Figure A3: The figures show the evolution of employment rate and earnings in levels relative to the job loss event for all individuals experiencing job loss at ages 20–59 during 1991–1995. Year fixed effects are included in the estimations. CI95 are included in each respective color. The average earnings in 1990 for those experiencing job loss in 1991 is approximately SEK 128,000.

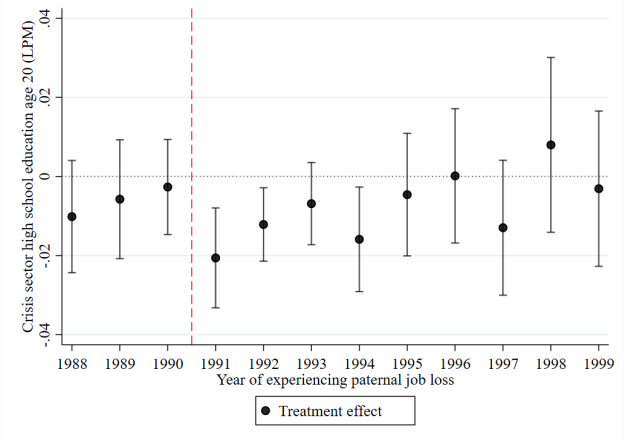


(a) Trend in intergenerational sector of occupation correlation, split by sectors most affected by the economic crisis (manufacturing and construction) and other sectors.

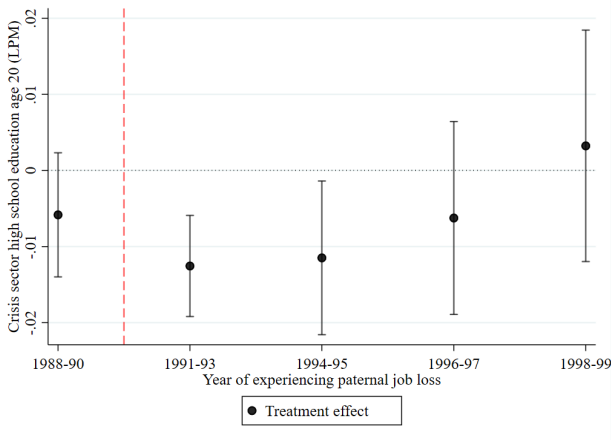


(b) Trend in intergenerational sector of occupation correlation, split by sex of the child.

Figure A4: The figures shows the probability for children at age 30 to work in the same sector as their fathers (around age 50), by birth cohort. The base probability for the reference cohort 1960 is 26% for sons and 13% for daughters. Controls include father's birth cohort effects to ensure that fathers are as similar as possible despite changes in sector definition over the years. The outcome measured during the years 1960–1990 is defined using the censuses every five years until the last census in 1990. After that, we use yearly sector codes based on the main employment of the individual. The level difference in outcome between the two data sources are handled by using cohort 1961 levels as a reference cohort for outcomes after 1960 defined through the yearly employment statistics (mean outcome in 1961 is 20% for sons and 12% for daughters). All outcomes are matched to a specific sector in order for the comparison to be valid over the cohorts, and the regression controls for the mean difference in outcome between the two data sources to estimate the trend correctly.



(a) Treatment effects by year of experiencing paternal job loss.



(b) Treatment effects by year of experiencing paternal job loss, pooled by 2–3-year events.

Figure A5: The figures show treatment effects for the educational choice outcome split by the year the student experiences paternal job loss. Standard errors are clustered on the municipality of residence at age 16 level. All regressions include cohort-by-county FE. CI95 are indicated in black.