

# Early Labor Market Prospects and Family Formation\*

Mattias Engdahl, Mathilde Godard and Oskar Nordström Skans

2022-04-20

## Abstract

Using quasi-random variation in graduation years of Swedish vocational high-school females at the sudden onset of a deep national recession, we study how deteriorated early labor-market prospects affected economic and family outcomes during the following decades. Labor-market consequences were severe but not permanent. In contrast, family outcomes were permanently altered, in particular for low-GPA women. These women married and had children earlier, and they partnered with lower-performing spouses. Divorce and single-motherhood rates rose, and welfare-claims remained elevated for decades. This suggests that temporary shocks to female labor market prospects can propagate into long-run poverty through endogenous adjustments of marriage-quality thresholds.

JEL code: E32, I26, J12, J13 J22, J31

Keywords: Family formation, female labor supply, cost of recessions.

\* Mattias Engdahl is a researcher at the Institute for Evaluation of Labour Market and Education Policy (IFAU) in Uppsala, Sweden. Mathilde Godard is a CNRS researcher at at Université Paris-Dauphine-PSL, LEDa in Paris, France. Oskar Nordström Skans is a professor of economics at Uppsala University, Sweden. He is also affiliated with University of Oslo, Norway; IFAU in Uppsala, Sweden and IZA in Bonn, Germany. The study is based on confidential administrative data from IFAU that under certain circumstances can be accessed for replication purposes. Contact the corresponding author for assistance (Mattias Engdahl, [mattias.engdahl@ifau.uu.se](mailto:mattias.engdahl@ifau.uu.se)). The authors declare that they have no relevant or material financial interests that relate to the research described in this paper. An online appendix has been included. The authors are grateful to Jérôme Adda, Knut-Eric Joslin, Rafaël Lalive, Pauline Rossi and seminar participants in Amsterdam, Lyon, Paris and Uppsala, as well as participants to SKILLS 2020, SOLE, ESPE, SCSE and AFSE 2018 for useful comments. They also want to thank Caroline Hall for comments and for generously providing us with data and institutional background. Mathilde Godard acknowledges the support of the EU under a Marie Curie Intra-European Fellowship for Career Development, as well as financial support from the French Research Agency (ANR-21-CE26-0015-01) and CEPREMAP. Mattias Engdahl acknowledges financial support from IFAU. Oskar Skans acknowledges support from the Swedish Research Council, grant number 2018-04581.

## 1 Introduction

Recessions take a disproportionately heavy toll on young workers. Graduating in a recession induces substantial initial losses in employment and earnings, and these losses can persist for years as is documented in a very large body of research.<sup>1</sup> Yet, limited empirical research has examined whether bad labor-market conditions at career entry influence partnership formation decisions among young females. This is surprising, as early labor market prospects can have a significant impact on the marriage-market value of young adults.<sup>2</sup> In particular, if early labor-market prospects affect when and whom young females marry, the lifetime social consequences of recessions could extend far beyond the labor market effects, into fertility, divorce, single-motherhood, and poverty.<sup>3</sup>

In this paper, we assess how early exposure to a very deep national recession at career entry affects key aspects of the family-formation process of young females, including the incidence, timing, quality and dissolution of partnerships. We rely on Swedish data covering school results, educational achievement, employment, earnings, welfare receipt, childbearing, marriages, partner identities and divorces during more than two decades.

We set our analysis at the onset of the Swedish recession of the early 1990s (one of the “Big Five financial crisis” in Reinhart and Rogoff (2008)) which abruptly ended a long period of overheated labor markets and generated a five-fold increase in youth unemployment rates within three years. Our analysis compares females of the same age who, because of a policy design, entered the labor market during different phases of this rapidly evolving recession. The set-up differs from the earlier literature that focuses on fluctuations in local unemployment rates. Our approach instead speaks directly to questions about the long-term consequences of

graduating into deep recessions, such as a financial crisis or the Covid-19 recession, in comparison to earlier cohorts who managed to get a foothold on the market before the recessions hit (“scarred generations” or “unlucky cohorts”). The strategy, which naturally handles all concerns related to cross-cohort differences, endogenous graduation timing, and selective internal migration, is particularly well-suited for a study of the impact of recessions on the partnership formation process as discussed in detail below.

An important feature of our analysis is that we can exploit variation in exposure to the recession by using the gradual roll-out of a policy pilot that prolonged Swedish vocational upper-secondary school programs from two to three years. The pilot generates quasi-random variation in vocational high-school graduation years at the onset of the recession for females who were all the same age when the recession hit.<sup>4</sup> Identification comes from the fact that some, but not all, of the cohorts exposed to the pilot received severely deteriorated initial labor-market conditions at exit when enrolling in a three-year program. A difference-in-differences strategy allows us to compare students from the same birth cohort who entered the labor market in different phases of the rapidly evolving recession, while netting out the impact of the additional year of vocational education.<sup>5</sup>

Our empirical strategy is particularly well-suited to analyze partnership decisions of women because of the sizeable age gap between partners. This gap is on average three years in our data, regardless of initial labor-market conditions and duration of education. The potential “partner pool” therefore consists of three-year older males who face labor market prospects that are unrelated to the pilot intensity facing the graduating females. Our within-cohort identification strategy thus nets out the impact of the recession for the relevant males. Instead, our setting

compares the impact for a quasi-random subset of women whose labor market prospects declined relative to other females who faced an identical partner-pool.

Throughout our paper, we present separate results for the females that entered high school with low compulsory school grades (hereafter “low-GPA” females). We focus on these particularly low-skilled women for several related reasons. First, since their earnings are lower, the welfare consequences of earnings losses are likely to be more pronounced. Second, low-GPA females in general face much higher rates of partnership dissolution and welfare benefit dependency. Finally, these women may adjust their partnership choices more in response to changes in labor market prospects since the insurance motive for entering a partnership is likely to be stronger for low earners.

We start by documenting that labor-market outcomes of female vocational students are adversely affected by graduating straight into the recession. The impact is particularly strong for low-GPA females. The negative labor-market impact is, however, short-lived. Labor market outcomes are not statistically related to the initial unemployment rate beyond a three-year horizon. This is in some contrast with most traditional studies of how the local unemployment rate at graduation affect future labor earnings (of men in particular) (see for example the overview by von Wachter (2020)).<sup>6</sup> Our main results do, however, show that despite of the transitory impact on employment and labor earnings for these young females, exposure to a recession at career entry generates persistent marks that remain visible for decades, in particular for the most vulnerable part of the sample. We document a persistent – even permanent – effect on the use of welfare benefits (social assistance) that lasts for at least 19 years. The contrast between short-run labor market effects and long-run welfare dependencies arise because the initial economic shock propagates through the family formation process.

Females who struggled at school (identified from low compulsory-school grades) form earlier partnerships if they graduate straight into a deep recession. As a consequence, they also become mothers at a younger age. On the negative side, the incidence of failed partnerships (divorces) become substantially higher for females who graduate in a recession, leading to a higher propensity to become single mothers. The speedier family formation process seems to be achieved at the cost of lower-quality partnerships as spouses are drawn from a lower part of the earnings distribution. We show that the persistent increased use of welfare benefits is tightly linked to the formation of low-quality partnerships, divorces and single motherhood. Overall, the family formation and dissolution patterns explain why the elevated propensity to receive welfare benefits persist much longer than the impact on labor market outcomes.

The results suggest that changes in the minimum acceptable marriage match quality is a mechanism through which early labor market prospects can shape family formation, and long-run poverty rates. We outline a stylized model of partnership choice to make this idea more precise. In this model, temporary shocks in female income (holding partner's income constant) induce the formation of earlier partnerships, with this intertemporal adjustment being achieved through a lower quality threshold. This simple model captures the gist of our results, in particular the larger response of low-GPA women, the combination of speedier family formation, lower-quality spouses, and more realized divorces.

Overall, our results show that the long-run negative welfare consequences of deep recessions can be substantial even for groups that only face temporary labor-market setbacks. The results, that remain robust to many variations of the estimated model, even when including sibling fixed effects, suggest that the family formation process in general, and endogenous partnership

thresholds in particular, can propagate the impact of temporary shocks so as to leave persistent socioeconomic scars in midlife.

Our study brings new insights into the large literature showing that graduating in a recession has substantial negative effects on the later earnings of young graduates, suggesting that the welfare consequences of recessions are large.<sup>7</sup> We contribute on the methodological side by providing a new source of identification that isolates the impact of graduation timing at the onset of deep national recessions. The identification and data also allow us to provide novel evidence on the family-related chain-of-events through which early labor market prospects can impact welfare dependencies later in life for low skilled females. In doing this, we lift to the forefront the intricate interplay between marriage markets and labor markets that has forced many earlier studies of graduation effects to exclude females altogether (see for example Kahn, 2010; Genda, Kondo and Ohta, 2010).

A set of related earlier papers has studied the impact of graduating in a local recession on family formation, generally finding evidence of accelerated fertility, but mixed results on marriage, divorce and completed fertility. Recently Schwandt and von Wachter (2020) found that females entering the market during the US 1980s recession were less likely to marry, more likely to be divorced, and experienced higher rates of childlessness in midlife.<sup>8</sup> Most papers do not identify the responses of women separately from adjustments made by men who are affected by the same shocks. Kondo (2012) makes some progress in this direction by using gender-specific unemployment rates and finds accelerated marriages as we do, but nothing on divorces. A difference to our study is that our rich longitudinal register data allow us to track in much more detail how a well-identified labor market shock affect partnership choice, divorce and welfare use later in life while also zooming in on the most vulnerable of women, which is also

where we find the strongest negative long-run effects. Our set-up and results (short- and long-run) are well in line with recent studies of the marriage market impact of secular changes in labor market prospects of men and women (Autor, Dorn and Hanson 2019; Kearney and Wilson 2018). The closest paper is clearly Shenhav (2021), which studies the impact of trends in the female-to-male wage ratio, “relative wage,” over three decades. Somewhat as a mirror image of our paper, she finds that a higher relative wage increases the quality of women’s mates. We add to this paper by showing that even transitory labor market shocks can propagate through the marriage market to deliver long-run effects, at least for low-skilled women.

We interpret our results as suggesting that low-skilled women rush into partnership as an implicit insurance mechanism when labor market prospects are poor. This notion relates to a large previous literature on the role of the family as an institution that helps individuals manage risk (Cáceres-Delpiano 2013). These studies mostly emphasize family formation as an ex-ante insurance mechanism (Rosenzweig and Stark 1989) but our findings suggest that income pooling through marriage can be a mechanism to cope with risk ex post, even in a developed and comparatively gender-equal country such as Sweden.<sup>9</sup>

The paper is organized as follows. Section 2 describes the setting (crisis, school system, policy pilot). Section 3 present the data. Section 4 presents our empirical approach. Section 5 presents our main results and robustness checks. We close the paper by putting our results in perspective in Section 6 and conclude in Section 7.

## **2 Economic Environment and Institutions**

### **2.1 The 1990s Economic Crisis in Sweden**

Our analysis is set at the onset of the very deep Swedish recession during the early 1990s. This financial crisis resulted in a lasting decline in economic performance similar to the Great Recession in the US and elsewhere.<sup>10</sup> The origins of the crisis is usually attributed to a combination of bad monetary and fiscal policies in the 1980s, a bursting housing bubble generated by a poorly timed sequences of financial deregulations and tax reforms, and a collapse of international trade (Bharadwaj, Lundborg and Rooth 2015; Englund 1999).

Before the crisis, Sweden experienced an unprecedented economic boom. Unlike other European countries, unemployment was low (below 5 percent) throughout the 1980s, but in 1989, unemployment was as low as 1.5 percent. This exceptionally strong period was followed by a rapidly evolving economic collapse. Adult unemployment rates increased sharply from less than 2 percent in 1990 to around 10 percent three years later – see Figure 1. Youth unemployment rates had a similar time pattern, but with even more pronounced magnitudes; in 1993-1995, male and female youth unemployment rates peaked at above 20 percent. The unemployment rate remained high until the late 1990s, when it started to decline again.

### **2.2 Upper Secondary Education and the Policy Pilot**

Compulsory school in Sweden lasts for nine academic years, ending in the summer of the 16th year since birth. Almost all students then apply for upper secondary education/high school (gymnasium), which during our study period (enrollment 1987-1992) was either two or three years long. Around two thirds of all students attend high school in the municipality of parental residence.

At high school, students enter a specific track (program), and admittance is based on their compulsory school grades. Programs are either academic, preparing students for university education in different broad fields, or vocational programs, preparing students for working life in specific occupations. About 45 percent of the students in upper secondary school enrolled in vocational programs during this period.

At the start of the period, all vocational programs were two-years long, while academic programs lasted three years. The reform we exploit in this paper transformed the system, making vocational programs three-year long by the enrollment year of 1992.

We use an extensive policy pilot that was rolled out across the country during 1987 to 1991. The pilot ensured that a continuously growing set of students were allowed to enroll in three-year-long vocational programs. The purpose of the pilot scheme was to evaluate the consequences of the prolongation and this aspect has been thoroughly analyzed in previous research.<sup>11</sup>

The National Board of Education was responsible for the roll-out of the pilot scheme and the allocation of pilot slots. Slots were allocated by program and municipality. In some municipalities, only parts of the programs were prolonged, others were treated more intensively. The pilot always substituted between three-year slots and two-year slots without altering the number of available (starting) positions. The pilot only covered 500 slots (students) in 1987. It was increased to 6000 slots in 1988, 10,000 slots in 1989, 11,200 slots in 1990 and 12,800 slots in 1991 (see Online Appendix A.1, Table A1). The numbers for 1988 to 1991 correspond to between 11-20 percent of the total number of vocational slots. In 1987, only 22 out of 284 (that is 8 percent) of the municipalities were included in the pilot scheme to some degree. The share increased to 40 percent in 1988, reached 50 percent in 1989 and remained rather stable until

1991. The ambition was to distribute the prolonged programs across regions with varying industry structures. As a consequence, the distribution of three-year programs is evenly distributed across the country and we find no signs of spatial correlation in pilot intensity, see Online Appendix A.2.

The pilot ensured that students' possibilities of entering three-year programs varied within cohorts depending on where they resided. Because of the changing labor market conditions during the later part of the period, the pilot generates exogenous variation, not only in the duration of studies, but also in labor market conditions at the time of expected graduation.

This will be the source of our identification strategy as discussed in Section 4.

### **2.3 Military Service and the Excluded Males**

In the 1990s, young men were required to complete 7-15 months of military service. Most men enlisted during their 19th to 21st year, regardless of the duration of upper secondary school. The pilot intensity did not affect the timing of military service. This implies that males had a much looser relationship between the graduation year and the time of labor market entry than females. Since our identification relies on graduation years shifting the timing of labor market entry, we focus our analysis entirely on women and refer all results regarding men to Online Appendix G. Note, however, that the two experiments (males, females) should each be viewed in isolation because of the large age difference (on average three years in our data) between male and female partners.

### 3 Data

We use population-wide administrative records covering 1985-2013. The Upper secondary school application register contains information on when and where an individual enrolled in upper secondary school as well as on exact program and duration. The Upper secondary school graduation register provide us with the actual graduation years. Combining the two registers, we can identify dropouts, 'on-time', and late graduates.

The population of interest consists of all females who enrolled in upper secondary school during 1987-1991. We focus on females who enrolled in a two or three year long vocational program directly after the 9th grade. We exclude a very small set of students who enrolled in new three-year programs that did not have a corresponding two-year version.<sup>12</sup> Our sample consists of a maximum of 78,575 individuals each year (68,241 without dropouts).

Compulsory school GPA plays a central role in our analysis. The variable is our best predetermined indicator of individual skills as it is measured prior to the start of vocational school.<sup>13</sup> We construct percentile ranked GPA (and corresponding quintile groups) within cohorts of female students who enroll in vocational schools.

We measure outcomes for up to 19 years after graduation from vocational programs; that is from age 18-19 until age 38. We observe annual labor earnings, welfare benefit usage and educational achievement, as well as household status in each year. To measure labor-market performance, we use data on annual labor earnings and translate them into one extensive-margin measure (employment) and one overall measure (annual earnings). The latter is scaled in relationship to the monthly minimum wage in order to account for real and nominal wage growth. Results for log earnings are very similar, but we use this functional form to ensure that we can include zero-earnings observations.<sup>14</sup>

We use annual data on whether a household receives welfare benefits (social assistance) from 1990 onwards. Welfare benefits is a means-tested grant of last resort provided by the municipalities as poverty relief and is granted to households without assets whose necessary living expenses are higher than their income.<sup>15</sup>

For family outcomes, we use an indicator of “household status” from 1990 onwards. The indicator separates between living at parents’ home, being married, cohabiting with partner and common child, and being single. “Single” cannot be separated from cohabiting without a common child. For non-Swedish readers, it is important to note the specific context regarding marriage and cohabitation. In Sweden, cohabitation with children is a non-stigmatized form of partnership with a legal status that is very similar to formally married couples. The main exception arise if one of the partners die (the children will inherit all if parents are not married). We thus treat couples that are either married or cohabiting with common children equally and refer to them as “partnerships” in our main analysis. We use separate information on the number of (biological) children, as well as the identity of the father for each (biological) child.

We combine these sources to construct the following variables: whether and when the female first engaged in a partnership (marriage or cohabitation with a common child), whether and when her first partnership ended, which we label as as “divorce” (that is arising when a marriage is dissolved or when a father of common child moves out from the household), whether and when she had her first child, her total number of children, and the number of partners she had children with (if any). All these outcome variables are measured by (or up until) the age of 38. In each year, we link women to their partners (if in a relationship) to obtain information on their current partners’ characteristics (GPA from compulsory school, annual earnings, education level and age).<sup>16</sup>

Individual background characteristics include: the municipality of residence in the last year of compulsory school, age, and immigrant background (born in a Nordic country or not). The students are also linked to their biological parents to obtain information on the parents' highest education level. This linkage is also used to construct sibling fixed effects (using the identity of biological mother) which we use in a robustness check.

Initial labor-market conditions are captured by annual sex-specific national youth unemployment rates (for age group 15-24).<sup>17</sup>

### 3.1 Summary Statistics

The first column of Table 1 presents descriptive statistics. 12 percent of the sample drop out from vocational school, while 5 percent graduate later than expected (based on their enrollment cohorts and track duration).<sup>18</sup> On the year of graduation, 77 percent are employed. Their annual earnings upon graduation are 52 percent of a full-time employed minimum wage earner.

Turning to family formation, 85 percent of women have ever formed a partnership, and a similar proportion had at least one child by the age of 38. The average number of children (conditional on ever having one) is 2.17. Women form their first partnership and have their first child at age 27 on average. "Partner's characteristics" in Table 1 refers to a partner (husband or partner living with common child) whose characteristics are measured when the woman is 27 years old (which is the average age when women form their first stable partnership).<sup>19</sup> According to this, 48 percent of females mate with partners whose GPA in 9th grade are below the median of the GPA distribution (henceforth referred to as "low-GPA partners"). The average age-gap between partners in our data is three years, and only 13 percent of partnerships are formed within a cohort. Table 1 further indicates that 33 percent of females have ended their first partnership by the age of 38. Finally, 3 percent were welfare recipients at age 38.

Columns (2) and (3) of Table 1 present descriptive statistics zooming in on females in the bottom and top quintiles of the compulsory school GPA distribution. Even within this homogeneous group of vocational students, we find substantial heterogeneity across the GPA distribution in labor-market outcomes and, which perhaps is less obvious, in family outcomes. In particular, divorce rates are much higher for low-GPA females – twice higher than those of high-GPA females (49 percent and 23 percent respectively). Divorce rates are systematically higher when women mate with low-GPA partners, and divorce rates reach a maximum for low-GPA women forming partnerships with low-GPA men (48 percent). Finally, low-GPA women are much more likely to be welfare recipients at age 38 than high-GPA women (7 percent, versus 1 percent).

## 4 Empirical Strategy

### 4.1 Identification Strategy and Model

Our analysis tracks students over time from high school enrollment, through two-three years of study duration, to graduation and across years of potential post-graduation experience. The *outcome year*  $t = c + d + e$  is the enrollment cohort ( $c$ ) plus the study duration ( $d$ ) and the number of years of potential experience ( $e$ ). *Age* is denoted by  $a$  (hence,  $a = t - c + 16$ ). The *endogenous graduation year*  $Grad = c + \tilde{d}$  equals the cohort of enrollment ( $c$ ) plus an endogenous study duration  $+ \tilde{d}$ .

With this notation in mind, we model the labor market outcome  $Y^{LM}$  for individual  $i$  in year  $t$  as:

$$Y_{i,t}^{LM} = \alpha + \beta_e D_t^e UR_i^{Grad} + \delta_{d(i)} + \chi_{e(i,t)} + \lambda_{c(i)} + \kappa_{j(i)} + \zeta \chi_i + \epsilon_{i,t} \quad (1)$$

The set of parameters  $\beta_e$ , which is specific to each year of experience (each indicated by a separate dummy  $D_t^e$ ) measures the impact of the national female unemployment rate ( $UR_i^{Grad}$ ) faced by individual  $i$  at the time of actual graduation. Note that graduation unemployment will change with endogenous study duration  $\mathcal{d}$  for those who do not graduate on time.  $\beta_e$  is a vector of parameters as we allow the impact of initial unemployment to vary with potential experience. Crucially, the model controls program duration  $\delta_{d(i)}$  and experience dummies. In addition, the model accounts for municipality  $j$  and enrollment cohort  $c$  fixed effects. Finally, we control for predetermined individual characteristics including immigration background and ranked compulsory school GPA (note that all subjects are female). In this model, we always compare individuals with the same potential experience to each other, as is usually done in the labor literature (for example Oreopoulos, von Wachter and Heisz (2012)).

Our key interest lies, however, in how the students family formation outcomes are affected. Here, it is more natural to compare students that are equally old (the choice is not important for our conclusions) as this is more in line with the family formation literature that often focus on outcomes, such as the number of children, at a certain age. See for example Kramarz, Nordström Skans and Rosenqvist (2021).<sup>20</sup> Thus, for partnership outcome  $Y^P$ , we estimate:

$$Y_{i,t}^P = \alpha + \beta_a D_t^a UR_i^{Grad} + \delta_{d(i)} + \chi_{a(i,t)} + \lambda_{c(i)} + \kappa_{j(i)} + \zeta \chi_i + \epsilon_{i,t} \quad (2)$$

where we have reused the notation from equation (1). An advantage of this specification is also that the cohort dummies removes all impact of current labor market conditions as these are

identical at a given age (see Section 5.4 for a discussion on robustness tests related to current unemployment).

We sometimes estimate equation (1) or (2) using only a single outcome year, for example earnings in the year of graduation ( $e = 0$ ) or number of children at the end of the sample period ( $a = 38$ ). These models are identical, but only use the relevant observations for estimation.

We do not want to rely on students self-selection into short vs. long programs to ensure that the selection is unrelated to future unemployment prospects, otherwise our  $\beta$  parameters will be biased.<sup>21</sup> In addition, we need to deal with endogenous deviations of actual study times ( $\hat{d}$ ) from track duration ( $d$ ). To handle both of these problems, we use the pilot intensity to instrument track duration and the interaction between pilot intensity and aggregate labor market conditions to instrument unemployment rate at graduation ( $UR_i^{Grad}$ ). The model is identified because *some but not all* two-year and three-year track students who enrolled in the same year face different unemployment rates upon graduation. The difference is close to zero for earlier enrollment cohorts when the business cycle was stable and increases for later cohorts as the crisis unfolds (see Figure 1).

For track duration, we follow Hall (2012) and instrument track duration by the municipality-level, time-varying pilot intensity as determined by the National Education Board. The instrument – denoted  $P_{cj}$  – is the extent to which the individual’s municipality of residence participated in the pilot by the time she enrolled in upper secondary school, measured as the share of the available vocational tracks which constituted three-year tracks.<sup>22</sup> This generates a setting where the opportunity to enroll into a three-year track depends on the interaction between where she lived and the enrollment cohort. The instrument is defined based on place

of residence before completing compulsory school to rule out selective migration of students across municipality borders.

For labor market conditions at graduation, we define an instrument for  $UR_i^{Grad}$ . Let  $\phi_{c,j}$  denote this instrument, where:

$$\phi_{c,j} = P_{c,j} * UR_{c+3} + (1 - P_{c,j}) * UR_{c+2} \quad (3)$$

$UR_{c+3}$  is the unemployment rate faced three years after enrollment by students belonging to enrollment cohort  $c$ . Similarly,  $UR_{c+2}$  is the unemployment faced two years after enrollment by students in enrollment cohort  $c$ . The intuition is straightforward. To the extent that unemployment at graduation changes from one year to another as the crisis unfolds,  $\phi_{c,j}$  will be separately identified from the effect of the pilot.

We estimate Two Stage Least Squares (2SLS) models. Standard errors are clustered at the level of the instruments, that is municipality\*cohort ( $j \times c$ ).<sup>23</sup> The two first stages (for unemployment rate at graduation and program duration) used with Equation (1) can be written as:

$$UR_i^{Grad} = \tau^{UR} + \omega^{UR} \phi_{c,j} + \rho^{UR} P_{c,j} + \xi^{UR} W_i + v_{i,t}^{UR} \quad (4)$$

$$\delta_i = \tau^d + \omega^d \phi_{c,j} + \rho^d P_{c,j} + \xi^d W_i + v_{i,t}^d \quad (5)$$

where we let  $W_i$  denote all the control variables and fixed effects of Equation (1) and where  $v_{i,t}$  denote the error terms of the first stages. The first stages are identical when using Equation (2) for partnership outcomes.

Note that the students in our sample graduated between 1989-1994 which is either *before or during* the recession. Thus, as highlighted in the introduction, the  $\beta$  parameters do not capture the impact of experiencing vs. not experiencing the recession. Instead the strategy compares students who graduated straight into an ongoing recession to those who had the chance to enter the labor market in the late stages of the preceding boom. In our view, this is a natural way of analyzing the impact of deep national recessions (often arising quickly but dissipating slowly) as there is no natural unaffected control group – everyone will experience such a recession at *some* stage of their career.

## 4.2 Evaluating the Identifying Assumptions

The IV strategy (if valid) allows us to deal with selection into two- versus three-year tracks and its interaction with the unemployment rate. It generates a setting where some students are pushed in the labor market in different years, and a subset of these face sharp and sizable increases in national unemployment rates from one year to another.

The instruments  $P_{cj}$  and  $\phi_{c,j}$  are valid under the assumptions that they are uncorrelated with any unobserved variables affecting the outcomes of interest and that they have no impact on the outcomes other than through influencing whether the person enrolled in a two- or in a three-year track and the timing of graduation relative to the aggregate business cycle. This entails assuming that the availability of pilot tracks ( $P_{cj}$ ) and the predicted unemployment rate at graduation ( $\phi_{c,j}$ ) did not affect the individual's choice of whether to enroll in upper secondary

school (at all), and of whether and when to enroll in vocational school (as opposed to academic studies).

In Table 2 we analyze the impact of sample selection by studying the relationship between the instruments and indicators of high school progression.<sup>24</sup> We find no effect of our instruments on the probability of enrolling in upper secondary school at all, on the probability of enrolling in vocational studies as opposed to academic studies, or on the probability of delaying enrollment into vocational studies (that is later than at age 16) – see columns (1)-(3). That  $\phi_{c,j}$  does not impact these decisions is intuitive as all our students enroll in 1987-1991 – that is before the crisis – so anticipation effects are indeed unlikely. Based on these findings, we use vocational school graduates who enrolled on time (that is at age 16) as our baseline sample, but we also verify that the results are robust to reintroducing students enrolling at other ages.

A related concern is that that  $UR_i^{Grad}$  is unobserved for dropouts. Estimates in column (4) of Table 2 shows that the predicted unemployment rate is completely unrelated to the number of students dropping out from vocational schools. Furthermore, the instruments are also unrelated to the composition of dropouts as measured by compulsory school GPA, see column (5). In our main analysis we therefore exclude dropouts from the regression models in order to have a sensible first stage, but in the robustness section we also discuss reduced-form estimates that include these dropouts and, as expected, results are somewhat attenuated but qualitatively robust.

Table 3 shows further results from regressions that relate the instrument  $\phi_{c,j}$  to important background characteristics (GPA from compulsory school, immigration status, parental education) and the local unemployment rate at enrollment in high school and three years after.

We use the model structure and sample selection of the main analysis to ensure the conclusion hold for the exact same identifying variation we use in the main analysis. Reassuringly, the results show no signs of any systematic relationship between our instrument  $\phi_{c,j}$  and predetermined indicators of student quality. Nor do we find any indications of the instrument being correlated with the local unemployment rate at enrollment, or three years later.

Finally, we analyze whether the returns to an additional year of education are related to initial economic conditions. To devise this test, we exploit variation in municipality-level unemployment rates and estimate the impact of an additional year of education for high and low-UR municipalities. To do so, we run the instrumented version of Equation (1) for high- and low-UR municipalities separately where we define High (Low)-UR municipalities as municipalities in which unemployment in 1994 (the worst crisis year) was above (below) the median local unemployment rate that year.<sup>25</sup> Results for labor-market outcomes are reported in Table 4. These suggest that the impact of an additional year of education is independent of economic conditions: the estimates for the impact of track length are not significantly different between high- and low-UR municipalities in any of the years since graduation. This suggests that the labor-market returns to an additional year of education are orthogonal to initial economic conditions.

## 5 Results

In this section we report the results from the instrumental-variable estimation using the identification strategy just presented. We first show the first stages and the impact on labor-market outcomes. Next, we turn to the impact of early labor market prospects on family formation (and dissolution). We end by discussing an extensive set of robustness checks.

## 5.1 First-stage

We first report estimates for the first-stage regressions in Table 5. We start by showing the impact of the pilot intensity  $P_{cj}$  on the three-year track dummy, but our primary interest concerns the impact of the pilot-unemployment interaction  $\phi_{c,j}$  on actual graduation unemployment. The results in the first column confirm that the pilot intensity  $P_{cj}$  has the expected strong impact on the probability that students enroll in a three-year rather than a two-year vocational program. This is important because it shows that students do not just relocate to another municipality to find the education of their choice - instead they respond to changes in the pilot intensity offered in their home municipality. Even more importantly, from our perspective, the results in column (2) confirm that  $\phi_{c,j}$  is an important predictor of the national unemployment rate at graduation. A 10 percentage point increase in  $\phi_{c,j}$  increases the unemployment rate faced at graduation by 5.1 percentage points. The effect is significant at the 1% level. This implies that students in pilot intense municipalities in the later years (when the recession hits) also are more likely to start a longer education, graduate later, and experience worse labor market conditions upon graduation.

The last rows report R-squared statistics for both first-stage regressions as well as the Kleibergen-Paap Wald rk F statistic (which is much higher than the eigenvalue of 7.03 (for 10% maximal IV size)). Both cross-effects, that is  $\phi_{c,j}$  on the two-year dummy and  $P_{cj}$  on graduation unemployment, are irrelevant. Overall, these results show that both instruments provide a strong exogenous shock to track duration and the national unemployment rate at graduation.

## 5.2 Effects on Labor–Market Outcomes, Education, and Welfare

### 5.2.1 Short-Run Impact

Before turning to the long-term consequences of unemployment rate at graduation, we focus on its impact on employment and annual earnings (deflated by the minimum wage) in the year of predicted graduation. This entails estimating equation (1) for the year when  $e = 0$ . Table 6 shows instrumental-variable estimates for the full sample, and separately for the bottom, median and top quintiles of the compulsory school GPA distribution.

The results show that the unemployment rate at graduation has a large negative effect on employment probabilities. Graduates with a low compulsory school GPA are particularly affected. Our estimates imply that a 1 percentage point increase in the unemployment rate at graduation lowers the probability of employment by 6.8 percent in the year of graduation for this group. This implies that graduating in the recession (defined as a 5-percentage point rise in the aggregate unemployment rate that students face at the onset of the recession) results in a 34% lower probability of initial employment for low-achieving students. The corresponding estimate for high-achieving students is -10.3 percent, and not significant at conventional levels.

Turning to earnings, our results imply that the graduates suffer large losses in earnings in the year of graduation when entering during high-unemployment years. A 1 percentage point increase in the initial unemployment rate corresponds to a 8.4 percent decline in year-one earnings for low-GPA students. The corresponding estimate for high-GPA students is equal to -5.8 percent (both effects are significant at the 1% level).

Thus, the overall impression is that the employment impact is concentrated on the low-GPA females whereas the earnings effects is distributed across a wider set of graduates. This implies

that the short-run impact is primarily on the intensive margin (earnings, but not employment probabilities) for high-GPA females.

## 5.2.2 Persistent Impact

Do initial losses in employment and earnings due to recession at career entry persist over time? Figures 2a and 2b show the effect of graduating in a recession on employment and earnings, (respectively) for each year since (predicted) graduation based on equation (1). Each Figure shows the estimated impact for the bottom and top GPA quintiles. Online Appendix D, Table D1, shows the estimates in table format after aggregating experience into broader bins. We find that irrespective of GPA quintile, employment and earnings are no longer statistically related to the initial unemployment rate after the three-year horizon.<sup>26</sup>

In Online Appendix D.2 we compare the estimates to OLS estimates corresponding to the IV (that is then using endogenous selection into track durations and endogenous unemployment rates at graduation) and OLS estimates using local unemployment rates. Our IV estimates are larger in the short-run than the local OLS estimates (similar long-run point estimates) and these differences may well arise because we are using a different type of identifying variation (timing of graduation early in a deep national recession).

The initial labor demand shock could potentially induce women to shift from working into education. But, if anything, Table 7 suggests the opposite. We do not find that females delay graduation from vocational studies when the economy deteriorates, suggesting that vocational students do not strategically remain in school. Our results in fact suggest that low-GPA students respond to early adverse conditions by accumulating somewhat less education (although the effect is small in magnitude). The corresponding estimate for high-achieving students is not significant at conventional levels.

Notably, the one economic outcome where we find persistent – even permanent – effects is on the probability of receiving welfare benefits. These results are shown in Figure 2c. Nineteen years after graduation, low-GPA women who graduated in the recession (a 5 percentage point rise in the initial unemployment rate) are three times more likely to belong to a household that receives welfare.<sup>27</sup> The corresponding estimate for high achieving students is not significant at conventional levels, but as we saw in the descriptive section, welfare use is (on average) also much more rarer among high achieving students. The permanent welfare impact on low GPA students is not likely to be driven by ‘pure’ labor-market outcomes, as the full recovery of employment and earnings is reached three years after graduation. Instead, it is likely to be explained by the family formation process, which we now turn to.

### **5.3 Effects on Family Formation**

We study family formation outcomes using the same empirical approach as we used for analyzing the labor market process. As noted above, we make one adjustment to the econometric model; we here measure outcomes and the effects of the unemployment rate at graduation by age as illustrated in equation (2) above. By doing so, we explicitly compare individuals of the same age (although with different potential experience) but with different initial exposure to the recession.

#### **5.3.1 Partnership Formation and Fertility**

Table 8 shows the effect of initial unemployment on family formation outcomes. Some estimates are conditional on for example ever having a partner or a child, but we show below that this choice is innocuous. Similarly to the labor-market effects uncovered in the previous section, the impact on family formation is heterogeneous across the ability distribution. Most,

although not all, of the effects are concentrated among the low-GPA students, who also suffered the most upon graduation on the labor market. Much of the discussion in this section will therefore focus on this sub-group.

Panel A of Table 8 shows that economic conditions at graduation have a pronounced effect on the timing of family formation for low-achieving students. Those who graduate in a deep recession leave their parents' home earlier (the effect, naturally, does not persist over time since most eventually leave). A 5 percentage point rise in unemployment rate at graduation results in a 25 percent decrease in the likelihood to remain at their parents' home at age 19. More strikingly, low-GPA women who graduate in a recession enter their first partnership (marriage or child together) earlier and have their first child earlier (both coefficients are significant at the 5% level). According to the estimates, a 5 percentage point increase in the unemployment rate at graduation accelerates the transition to the first partnership – or the first birth – by almost two years.

Although initial labor-market conditions induce intertemporal adjustments in family formation, Panel B shows that they do not affect long-run family formation. Graduating in a recession does not impact the frequency of ever forming a partnership, the propensity to ever have a child, or the total number of children by age 38.<sup>28</sup>

Figure 3 investigate the full time path of the effects. In Figure 3a (Figure 3b), the outcome of interest is whether the individual have formed a partnership (had a child) by a given age.<sup>29</sup> In that sense, these figures estimate cumulative effects. The results concur with the logic of the underlying process. The impact is noticeable (and statistically significant) already from graduation where most of the effect is concentrated. It slowly accumulates over time before reversing around age 27. Since the transition from partnerships to fertility often takes time, it is

not surprising that parts of the effect accumulate after the initial impact on employment and earnings (as we only measure partnership formation at the time of marriage or childbirth).

### 5.3.2 Partner Quality and Family Dissolution

In Table 9, we investigate whether shifts in the timing of partnership formation reflect shifts in partner quality and/or more short-lived partnerships. In Panel A, we first look at partner characteristics as measured when females are aged 27, which is the average age when forming the first partnership.

We use two indicators of partner quality: partner earnings and compulsory school GPA. The point estimates on both of these suggest that women (in particular those with low GPA) partner with lower-quality men when labor-market prospects at graduation worsen. For partner's earnings, the effect is significant for the overall sample as well as when zooming in on low-GPA women. Although the estimates for partner GPA point in the same direction, they are not significant at conventional levels.<sup>30</sup>

Note that our identification strategy ensures that the estimate for partner earnings is not a mechanical result caused by men being hit by the same recession. This is because the men in the prospective partner pool have labor-market prospects that are unrelated to the female's exposure to the pilot intensity (in a direct sense) given the substantial age difference between the partners. Importantly for this argument, we find no relationship between graduating during a recession and the age of the partner as also shown in Table 9.

If poor economic conditions at graduation induce the early pairing of poorly matched couples who would otherwise not mate, the rate of separations from partnerships (divorces, for short) could increase. Estimates presented in Panel B of Table 9 confirm this. Our estimates for low-GPA females imply that a 1 percentage point increase in the unemployment rate at graduation

leads to a 10.6 percent higher probability to have ended the first partnership by the age 38 (the effect is significant at the 5% level).<sup>31</sup> Panel C in Figure 3 shows the time path of the effect for the full (unconditional) sample.

The increase in divorce rates is reflected in a higher proportion of single mothers: a 1 percentage point increase in unemployment rates at graduation increases the probability of being a single mother at age 38 by 11.5 percent. The higher divorce rate is also reflected in the higher number of men females have children with.

### **5.3.3 Welfare Consequences of Poor Partnerships**

The rise in divorce rates is likely to explain the permanent increases in the use of welfare benefits that we documented earlier. It is well-known that welfare usage is closely complementary to being a single parent. Table 10 thus analyzes whether initial economic conditions leads to a long-term increase in the joint probability of being a single mother and being on welfare for low-GPA females. The table proceeds as follows: The first line shows the overall impact on the incidence of welfare usage at age 38. It then decomposes this effect by estimating how unemployment rate at graduation affects the probability of a series of joint events. There is no impact on the joint event of being childless and receiving welfare benefits. In addition, there is no effect on the probability of being in a partnership with child and receiving welfare benefits. But graduating in a recession has a causal impact on the joint event of being a single mother and receiving welfare (coeff: 0.017, significant at the 5% level).

Additional results in the same table explore the relationship welfare usage and first partner's quality using a similar strategy. The results show that there is no effect of graduating during a recession on the joint event of forming the first partnership with a high-quality partner (defined either by earnings or compulsory school GPA) and being on welfare in the long run. On the

other hand, poor initial economic conditions lead to an increased probability (a bit more than 1 percentage point) of forming the first partnership with a low-quality partner (defined either by earnings or compulsory school GPA) and being on welfare in the long run. Overall, these results show that the persistent increased use of welfare benefits is tightly linked to single motherhood and the formation of low-quality partnerships.

#### 5.4 Robustness Checks

Online Appendix E presents several robustness checks for a selected set of outcomes (being a welfare-dependent single mother; employment) for the bottom quintile of vocational students. We show that our baseline results are robust to a range of different model specifications and sample restrictions.

In particular, models controlling for contemporaneous unemployment rate yield very similar results (see Table E2, column 3). Models using local (municipality-level) unemployment rates instead of national ones yield very similar estimates, too (see Table E2, column 6).

We further show that our results are robust to the inclusion of *program-type fixed effects* which accounts for the exact type of training the graduate receives, to *excluding late graduates* from vocational school, or to *excluding graduates who engage in further education* (that is who ever enrolled in university at the age of 38).

Our results are robust to the inclusion of *sibling fixed-effects*, which remove all timeinvariant unobserved heterogeneity that is common within a family (see Online Appendix E.5). This is an important reassurance since family background is a known common cause of both labor market outcomes and family formation choices (Kramarz et al. 2021).

Finally, we show that reintroducing dropouts (for whom unemployment rate at graduation ( $UR_i^{Grad}$ ) is unobserved) in a reduced-form version of the model yields very similar results (see Online Appendix E.6).

## 6 Discussion

### 6.1 Conceptual Framework

To put our results in perspective, we discuss our results in light of models linking economic conditions and marriage decisions.<sup>32</sup> From a conceptual perspective, a rich theoretical literature has provided at least two major frameworks.

Standard economic models of marriage incorporate income gain and search cost considerations, and are concerned with the matching of individuals' traits. In the basic framework of Becker (1981), persons marry when the utility expected from marriage exceeds the utility expected from remaining single. The model suggests that greater specialization by men in market work and women in non-market work raises the gains to marriage. Thus, all else equal, worse labor market opportunities for women are expected to increase the incidence of marriage, while worse labor market opportunities for men are expected to decrease it. Our results for women paint a picture consistent with the Beckerian forces. Estimates for men presented in Online Appendix G.1 are also consistent with the Beckerian principles.<sup>33</sup> In stark contrast with our results for females, males who graduate in a recession tend to delay family formation. Additional results suggest that they divorce less, with no effect on welfare receipt at age 38. As it is the case for women, the effects are only significant for males in the bottom quintile of the GPA distribution.<sup>34</sup> While the Beckerian framework is helpful to rationalize some

of our results, it fails to pick up why women who face worse labor market opportunities chose to accept lower-quality partners. It is hard to reconcile the high utility expected from marriage at the time of marriage and the low utility expected at the time of dissolution, even in presence of uncertainty about partner's quality.<sup>35</sup>

Turning to the other major framework linking economic conditions and marriage decisions is helpful to rationalize endogenous changes in partner's quality. The risk-theoretic approach posits family formation as a tool for risk management. Marriage enables individuals to pool risk and improves their ability to face uncertain and fluctuating environments (Cáceres-Delpiano 2013). This approach often emphasizes family formation as a mechanism to manage risk as an ex-ante decision (Rosenzweig and Stark 1989). Our findings support the idea that marriage can also be an ex-post mechanism to cope with risk through income pooling. Our results are consistent with the principle that temporary shocks in female income (holding partner's income constant) change the incentives to marry and induce the formation of earlier partnerships, with this intertemporal adjustment being achieved through a lower quality threshold.

In Online Appendix F, we present a simple model of partnership choice which formalizes this principle. Agents will accept matches of worse quality in a recession if (and only if) recessions reduce the value of staying single relative to the value of forming a marginal partnership. One obvious reason for why this may be the case is if couples are pooling incomes. More and worse-quality marriages are formed if short-run labor market prospects deteriorate.<sup>36</sup> Our model further predicts that the higher is the partner's income share of total income, the larger is the effect, suggesting that female thresholds should respond more than male thresholds to own income shocks. Letting the divorce probability be a function of match quality does not change the intuition. Our model predicts that the agents accept to form partnerships where the

dissolution risk is higher when the labor market returns are low, which naturally leads to more divorces and associated outcomes. Our model further predicts that females with a high baseline divorce rate or a low earnings potential should respond the most. In our empirical setting, both of these attributes are closely related low compulsory school grades. In a more general sense, the reaction should also be larger for females with a higher insurance motive (with less access to alternative sources of income, for example, from within the family). This suggests that children of low-earning parents should respond more. In the paper we do not focus on parental income as such, but instead focus on the role of compulsory school GPA, which is correlated with both own and parental labor market outcomes.

Although it does not preclude that other mechanisms concurrently are at work, our results provides evidence pointing to changes in the minimum acceptable match quality as a potent mechanism through which early labor-market conditions shape family dissolution and poverty in the longer-run. This has implications for the costs of recessions, which we turn to next.

## **6.2 Implications for the Costs of Recessions**

Our baseline result shows that a 20 percent increase in low-GPA female unemployment rate (relative to male) at the onset of the recession leads to a 10.6 percent increase in the probability to divorce by age 38. To put this in perspective, the effect size is half as large as the excess risk of divorce in the year of partner's job loss, and of similar magnitude to the increase in the divorce rate after the severance of survivors insurance in Sweden (Eliason 2012; Persson 2020).

The impact on partnership age is also substantial, a 5 percentage point increase in unemployment corresponds to about two years earlier partnerships for the low GPA women.<sup>37</sup> These are substantial effects, which suggest that the costs of recessions at graduation go beyond temporary career penalties, into broader midlife outcomes. As single motherhood is often

associated with dependence on welfare and reduced opportunities for children, our results suggest that spillovers could extend even to the next generation. Our results further suggest that part of the gender differences in the costs of recession could arise through gender-specific family formation decisions. This may be especially true when there is a short time gap between graduation and family formation decisions (as is the case for vocational students, and especially low-GPA ones). Finally, and in line with existing studies, our results point to substantial heterogeneity in the costs of recession, even in a rather homogeneous group of students (see for example Oreopoulos, von Wachter and Heisz (2012) for the college-educated).

## **7 Conclusion**

This empirical paper has compared the outcomes of women who graduate straight into a very deep recession to women of the same birth cohort who instead had a brief period of exposure to good economic conditions before the recession hit. The results show that a temporary foothold before a recession hits promotes better labor market outcomes in the short run. There is no evidence of long-run labor market effects but the transitory loss of labor market prospects leaves permanent socioeconomic scars that are mediated through the family formation process. Women who graduate straight into the recession enter earlier into the family formation process at the cost of increased rates of divorce, single-motherhood and welfare claims. The effects appear to be mediated by an increased tendency to match with low-earning spouses who performed poorly at school, which we show is a very good predictor of subsequent divorce.

Jointly, the results imply that dreary labor-market prospects on graduation generate persistent scars through the family-formation process even when the impacts on employment and earnings remain transitory. The results highlight that labor-market experiences and family

decisions of young women are deeply intertwined even in a developed country such as Sweden with one of the highest female labor-market participation rates in the world. The results further suggest that endogenous partnership quality is an important channel through which the impact of poor economic conditions in early adulthood can extend into a wide set of socioeconomic outcomes related to marital stability and economic poverty.

## References

- Altonji, Joseph G., Lisa B. Kahn, and Jamin D. Speer (2016). “Cashier or Consultant? Entry Labor Market Conditions, Field of Study, and Career Success.” *Journal of Labor Economics* 34: 361–401.
- Autor, David, David Dorn, and Gordon Hanson (2019). “When work disappears: Manufacturing decline and the falling marriage-market value of men.” *American Economic Review: Insights* 1: 161–178.
- Becker, Gary S. (1981). *A Treatise on the Family*. MA: Harvard University Press.
- Bell, Brian, Anna Bindler, and Stephen Machin (2018). “Crime scars: recessions and the making of career criminals.” *Review of Economics and Statistics* 100: 392–404.
- Bell, David N. F. and David G. Blanchflower (2011). “Young people and the Great Recession.” *Oxford Review of Economic Policy* 27: 241–267.
- Bharadwaj, Prashant, Petter Lundborg, and Dan-Olof Rooth (2015). “Health and Unemployment during Macroeconomic Crises.” National Bureau of Economic Research (NBER) Working Paper No. 21353.
- Blau, Francine. D., Lawrence M. Kahn, and Jane Waldfogel (2000). “Understanding young women’s marriage decisions: The role of labor and marriage market conditions.” *ILR Review* 53: 624–647.
- Blau, Francine. D. and Anne E. Winkler (2017). *The Economics of Women, Men, and Work*. Oxford University Press.
- Boulier, Bryan L. and Mark R. Rosenzweig (1984). “Schooling, Search, and Spouse Selection: Testing Economic Theories of Marriage and Household Behavior.” *Journal of Political Economy* 92: 712–732.
- Cáceres-Delpiano, Julio (2013). “Literature Review: Family Formation and Fertility as Risk-Coping Mechanisms.” World Development Report: Background Paper, World Bank.
- Chiappori, Pierre-André, Monica Costa Dias, and Costas Meghir (2018). “The marriage market, labor supply, and education choice.” *Journal of Political Economy* 126: 26–72.
- Chiappori, Pierre-André, Bernard Salanié, and Yoram Weiss (2017). “Partner choice, investment in children, and the marital college premium.” *American Economic Review* 107: 2109–67.
- Choi, Eleanor. J., Jaewoo Choi, and Hyelim Son (2020). “The long-term effects of labor market entry in a recession: Evidence from the Asian financial crisis.” *Labour economics* 67:101926.
- Choo, Eugene. and Aloysius Siow (2006). “Who marries whom and why.” *Journal of political Economy* 114: 175–201.
- Cockx, Bart (2016): “Do youths graduating in a recession incur permanent losses.” *IZA World of Labor* 281: 1–11.

- Corno, Lucia, Nicole Hildebrandt, and Alessandra Voena (2020). “Age of marriage, weather shocks, and the direction of marriage payments.” *Econometrica* 88: 879–915.
- Currie, Janet and Hannes Schwandt (2014). “Short-and long-term effects of unemployment on fertility,” *Proceedings of the National Academy of Sciences* 111: 14734–14739.
- Eliason, Marcus (2012). “Lost jobs, broken marriages.” *Journal of Population Economics* 25: 1365–1397.
- Englund, Peter (1999). “The Swedish banking crisis: roots and consequences,” *Oxford review of economic policy*: 15: 80–97.
- Fernandez, Raquel, Nezih Guner, and John Knowles (2005). “Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality.” *The Quarterly Journal of Economics* 120: 273–344.
- Field, Erica and Attila Ambrus (2008). “Early marriage, age of menarche, and female schooling attainment in Bangladesh.” *Journal of political Economy* 116: 881–930.
- Genda, Yuji, Ayako Kondo, and Souichi Ohta (2010). “Long-term effects of a recession at labor market entry in Japan and the United States.” *Journal of Human Resources* 45: 157–196.
- Greenwood, Jeremy, Nezih Guner and Guillaume Vandembroucke (2017). “Family economics writ large.” *Journal of Economic Literature* 55: 1346–1434.
- Grönqvist, Hans and Caroline Hall (2011). “Education policy and early fertility: lessons from an expansion of upper secondary schooling.” IFAU Working Paper 2011:24.
- Haaland, Venke F. (2018). “Ability Matters: Effects of Youth Labor-Market Opportunities on Long-Term Labor-Market Outcomes.” *The Scandinavian Journal of Economics* 120: 794–825.
- Hall, Caroline (2009). “Does making upper secondary school more comprehensive affect dropout rates, educational attainment and earnings? Evidence from a Swedish pilot scheme.” IFAU Working Paper 2009:9.
- Hall, Caroline (2012): “The effects of reducing tracking in upper secondary school evidence from a large-scale pilot scheme.” *Journal of Human Resources* 47: 237–269.
- Hershbein, Brad J. (2012). “Graduating High School in a Recession: Work, Education, and Home Production.” *The BE journal of economic analysis & policy* 12: 1–30.
- Hofmann, Barbara and Katrin Hohmeyer (2016). “The effect of the business cycle at college graduation on fertility.” *Economics of Education Review* 55: 88–102.
- Hoogeveen, Johannes, Bas van Der Klaauw, and Gijsbert van Lomwel (2011). “On the timing of marriage, cattle, and shocks.” *Economic Development and Cultural Change* 60: 121–154.
- Kahn, Lisa B. (2010). “The long-term labor market consequences of graduating from college in a bad economy.” *Labour Economics* 17: 303–316.
- Kearney, Melissa S. and Riley Wilson (2018). “Male earnings, marriageable men, and non-marital fertility: Evidence from the fracking boom.” *Review of Economics and Statistics* 100: 678–690.

- Kondo, Ayako (2012). "Gender-specific labor market conditions and family formation," *Journal of Population Economics* 25: 151–174.
- Kramarz, Francis, Oskar Nordström Skans, and Olof Rosenqvist (2021). "How family background shapes the relationship between human capital and fertility." Forthcoming *Journal of Population Economics*
- Maclean, Johanna. C., Reginald Covington, and Asia Sikora Kessler (2016). "Labor Market Conditions at School-Leaving: Long-Run Effects on Marriage and Fertility." *Contemporary Economic Policy* 34: 63–88.
- Nordström Skans, Oskar (2011). "Scarring effects of the first labour market experience," IZA DP NO. 5565.
- Oreopoulos, Philip, Till von Wachter, and Andrew Heisz (2012). "The short-and long-term career effects of graduating in a recession," *American Economic Journal: Applied Economics* 4: 1–29.
- Persson, Petra (2020). "Social insurance and the marriage market." *Journal of Political Economy* 128: 252–300.
- Reinhart, Carmen M. and Kenneth S. Rogoff (2008). "Is the 2007 US sub-prime financial crisis so different? An international historical comparison." *American Economic Review* 98: 339–44.
- Rosenzweig, Mark R. and Oded Stark (1989). "Consumption smoothing, migration, and marriage: Evidence from rural India." *Journal of political Economy* 97: 905–926.
- Schwandt, Hannes and Till von Wachter (2019). "Unlucky Cohorts: Estimating the Long-term Effects of Entering the Labor Market in a Recession in Large Cross-sectional Data Sets." *Journal of Labor Economics* 37(S1): S161-S198.
- Schwandt, Hannes and Till von Wachter (2020). "Socioeconomic decline and death: Midlife impacts of graduating in a recession." Tech. rep., NBER WP No. 26638.
- Shenhav, Na'ama (2021). "Lowering Standards to Wed? Spouse Quality, Marriage, and Labor Market Responses to the Gender Wage Gap." *Review of Economics and Statistics* 103(2):1-45
- SOU (1989). "6000 platser och 10000 platser för försök i gymnasieskolan." Statens Offentliga Utredningar (SOU) 1989:106.
- SOU (1990). "Utvärdering av försöksverksamheten med treårig yrkesinriktad utbildning i gymnasieskolan." Statens Offentliga Utredningar (SOU) 1990:75.
- SOU (1992). "Utvärdering av försöksverksamheten med treårig yrkesinriktad utbildning i gymnasieskolan." Statens Offentliga Utredningar (SOU) 1992:25.
- Speer, Jamin D. (2016). "Wages, hours, and the school-to-work transition: the consequences of leaving school in a recession for less-educated men," *The BE Journal of Economic Analysis & Policy* 16: 97–124.

Stevens, Katrien (2007). “Adverse Economic Conditions at Labour Market Entry: Permanent Scars or Rapid Catch-up.” Department of Economics, University College London, Job Market Paper.

Tertilt, Michèle (2005). “Polygyny, fertility, and savings,” *Journal of Political Economy* 113: 1341–1371.

von Wachter, Till (2020). “The Persistent Effects of Initial Labor Market Conditions for Young Adults and Their Sources.” *Journal of Economic Perspectives* 34: 168–94.

Table 1: Summary statistics for the sample of female vocational students

	All		Low GPA <sup>(a)</sup>		High GPA <sup>(a)</sup>	
	mean	sd	mean	sd	mean	sd
<b>Education</b>						
Age enrolled in upp. sec.	16.22	(0.28)	16.21	(0.28)	16.25	(0.28)
Age at predicted graduation from upp.sec.	18.14	(0.47)	18.07	(0.42)	18.26	(0.52)
Age at observed graduation from upp.sec.	18.22	(0.60)	18.20	(0.66)	18.30	(0.58)
Share Dropouts	0.12	(0.32)	0.27	(0.44)	0.05	(0.22)
Share Late graduates	0.05	(0.22)	0.08	(0.26)	0.03	(0.18)
Percentile ranked GPA 9th grade	50.07	(28.80)	8.62	(4.96)	88.78	(6.46)
Graduated from a three-year track	0.17	(0.38)	0.11	(0.31)	0.25	(0.43)
Accumulated years of schooling by age 38	12.62	(2.02)	11.62	(1.57)	13.69	(2.13)
<b>Labor-market outcomes at graduation<sup>(b)</sup></b>						
Employment	0.77	(0.42)	0.70	(0.46)	0.82	(0.38)
Annual earnings	0.52	(0.40)	0.48	(0.43)	0.55	(0.39)
<b>Family formation and fertility by age 38</b>						
Ever in a stable partnership	0.85	(0.36)	0.83	(0.38)	0.87	(0.34)
Age at first stable partnership (if ever in one)	26.69	(4.67)	25.62	(4.91)	27.23	(4.40)
Ever had a child	0.87	(0.34)	0.85	(0.35)	0.88	(0.32)
Number of children at age 38 (if ever had a child)	2.17	(0.86)	2.26	(1.00)	2.17	(0.77)
Age at birth of first child (if ever had a child)	26.66	(4.84)	25.12	(4.97)	27.67	(4.46)
<b>Partner's characteristics (at age 27)<sup>(c)</sup></b>						
Partners with low GPA <sup>(d)</sup>	0.48	(0.50)	0.62	(0.49)	0.36	(0.48)
Age difference	-3.32	(3.58)	-3.38	(3.86)	-3.34	(3.42)
Share in same cohort	0.13	(0.33)	0.13	(0.33)	0.13	(0.33)
<b>Family dissolution by age 38</b>						
Ever ended first partnership (if ever in one)	0.33	(0.47)	0.49	(0.50)	0.23	(0.42)
Ever ended first partnership (if partner was low GPA)	0.37	(0.48)	0.48	(0.50)	0.29	(0.45)
Ever ended first partnership (if partner was high GPA)	0.27	(0.44)	0.39	(0.49)	0.20	(0.40)
Welfare receipt at age 38	0.03	(0.16)	0.07	(0.25)	0.01	(0.08)
Nb. of individuals	78,595		15,930		16,079	

Notes: The sample includes female vocational students observed in the year of (predicted) graduation – including dropouts. (a) Low (high) GPA students refer to students in the bottom (top) quintile of the GPA distribution in 9th grade. (b) We assume that an individual is employed (or to some extent active on the labor-market) if her earnings in the current year are higher than the monthly full-time minimum wage. Annual earnings are scaled as months of full-time minimum wage (see Online Appendix B.1 for details). (c) 'Partner' refers to a partner (husband or partner living with common child) whose characteristics are measured when the woman is 27 years old (which is the average age when women form their first stable partnership). (d) Partners with low GPA refer to partners whose grades in 9th grade are below the median of the GPA distribution.

Table 2: The effect of predicted unemployment rate at graduation ( $\phi_{cj}$ ) and pilot intensity ( $P_{cj}$ ) on the individual's choice of whether to enroll in upper secondary school (at all), whether to enroll in a vocational track (vs. an academic one), of delaying enrollment in vocational studies, of dropping out of vocational studies, and on the composition of dropouts.

	Dependent variable:				
	P(enrolls in upp. sec. school)	P(enrolls in voc. track)	P(delays enrollment in voc. track)	P(drops out from voc. track)	GPA rank for dropouts
	(1)	(2)	(3)	(4)	(5)
Predicted UR at grad. ( $\phi_{cj}$ )	0.000 (0.002)	-0.000 (0.002)	-0.000 (0.001)	-0.001 (0.002)	0.257 (0.600)
Pilot intensity ( $P_{cj}$ )	0.001 (0.013)	0.011 (0.016)	0.005 (0.005)	0.014 (0.017)	-7.326* (3.972)
GPA rank in 9 <sup>th</sup> grade	0.004*** (0.000)	-0.010*** (0.000)	-0.000*** (0.000)	-0.003*** (0.000)	- -
Born in Nordic country	0.017*** (0.005)	0.073*** (0.005)	-0.132*** (0.009)	-0.002 (0.007)	3.307** (1.407)
Cohort fixed effects	✓	✓	✓	✓	✓
Municipality fixed effects	✓	✓	✓	✓	✓
Mean of dep. variable	0.86	0.38	0.02	0.12	31.12
Nb. of individuals	255,471	200,502	78,641	77,192	8,946

Notes: (i) Marginal effects are presented (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) Model (1) is estimated using the sample of students observed three years after graduation from compulsory school– including dropouts. Since not all students in compulsory school enrolled in upper secondary school,  $P_{cj}$  and  $\phi_{cj}$  are measured at the municipality\*cohort ( $j \times c$ ) level, where  $j$  stands for municipality of residence at age 16 (as information on the municipality of residence during the last year of compulsory schooling is only available from the *Upper secondary application register*) and  $c$  stands for the year the individual finishes compulsory school. (iv) Models (2)-(5) are estimated using the sample of students observed in the year of (predicted) graduation – including dropouts. We estimate Model (2) conditional on enrolling in upper secondary school at age 16, Model (3) conditional on enrolling in vocational studies, Model (4) conditional on enrolling in vocational studies at age 16, and Model (5) conditional on enrolling in vocational studies at age 16 and dropping out. Unconditional estimations of Models (2)-(4) yield very similar results (not shown). (v) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 3: Placebo tests: the impact of predicted unemployment rate at graduation ( $\phi_{cj}$ ) on pre-treatment characteristics – Full sample

	GPA in 9th grade	Born in Sweden	Mother's years of schooling	Father's years of schooling	Unemp. at enrollment	Unemp. at enrollment + 3 years
Predicted unemployment rate at graduation ( $\phi_{cj}$ )	0.069 (0.197)	0.001 (0.001)	0.017 (0.014)	0.008 (0.015)	-0.011 (0.012)	0.000 (0.000)
N. of individuals	69,130	69,130	69,130	69,130	69,130	69,130
GPA in 9 <sup>th</sup> grade		✓	✓	✓	✓	✓
Born in Nordic country	✓		✓	✓	✓	✓
Pilot intensity ( $P_{cj}$ )	✓	✓	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓	✓	✓

Notes: (i) Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level. (iv) Each model is estimated for vocational students observed in the year of (predicted) graduation.

Table 4: The impact of track length (two- versus three-year track), for high- and low-UR municipalities separately

	Dependent variable: Employment					
	High-UR municipalities		Low-UR municipalities		Diff.	
	(1)		(2)		(3)	
Years since (predicted graduation)	Coeff.	Nb. Obs.	Coeff.	Nb. Obs.	Coeff.	Nb. Obs.
0	0.218*** (0.099)	34,592	0.332*** (0.055)	33,649	0.076 (0.086)	68,241
5	-0.011 (0.068)	34,206	0.067 (0.044)	33,269	0.049 (0.069)	67,475
10	0.053 (0.077)	33,853	0.017 (0.044)	32,991	-0.091 (0.077)	64,844
Track fixed effects	✓			✓	✓	
Cohort fixed effects	✓			✓	✓	
Municipality fixed effects	✓			✓	✓	
Individual characteristics	✓			✓	✓	

Notes: We define High(low)-UR municipalities as municipalities in which unemployment in 1994 (when the crisis was reaching its peak) was above (below) the median unemployment rate that year. (i) Marginal effects are presented (ii) In Model (3), we test for the equality of regression coefficients using the fully interacted form of the model (iii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iv) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 5: First stage regressions

	Dependent variable:	
	Three year track dummy	Unemployment rate at graduation
	(1)	(2)
Predicted unemployment rate at graduation ( $\phi_{cj}$ )	0.010 (0.007)	0.510*** (0.045)
Pilot intensity in municipality of residence ( $P_{cj}$ )	0.451*** (0.042)	0.081 (0.145)
Cohort fixed effects	✓	✓
Municipality fixed effects	✓	✓
Individual characteristics	✓	✓
Number of individuals	68,241	68,241
R2	0.20	0.89
Kleibergen-Paap Wald rk F statistic		67.85

Notes: (i) As we have two endogenous regressors and two IVs, we cannot simply look at the first stage F-statistics to test for weak instruments. We look instead at the Kleibergen-Paap Wald rk F statistic (which is cluster-robust). Here, the eigenvalue (for 10% maximal IV size) is equal to 7.03. (ii) We show first stage estimates for the sample of individuals in the year of (predicted) graduation (68,241 individuals). (iii) Marginal effects are presented. (iv) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (v) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 6: The impact of unemployment rate at graduation on labor-market outcomes in the year of (predicted) graduation – IV specification

	Full sample	Bottom quintile	Median quintile	Top quintile
<b>Dependent variable:</b>	(1)	(2)	(3)	(4)
<b>Employment<sup>(a)</sup></b>				
Effect of unemployment rate at graduation	-0.022** (0.007)	-0.053*** (0.015)	-0.009 (0.014)	-0.017 (0.013)
Track-length dummy	0.279*** (0.052)	0.450*** (0.097)	0.236** (0.090)	0.213** (0.087)
Number of individuals	68,241	13,127	13,239	12,844
Mean of dependent variable	0.776	0.686	0.818	0.827
<b>Annual earnings<sup>(b)</sup></b>				
Effect of unemployment rate at graduation	-0.026*** (0.006)	-0.035*** (0.010)	-0.010 (0.011)	-0.032** (0.010)
Track-length dummy	0.353*** (0.044)	0.364*** (0.086)	0.285*** (0.081)	0.345*** (0.069)
Number of individuals	68,241	13,127	13,239	12,844
Mean of dependent variable	0.501	0.415	0.546	0.552
Track FE (instrumented)	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓
Individual characteristics	✓	✓	✓	✓

Notes: <sup>(a)</sup> We assume that an individual is employed (or to some extent active on the labor market) if her earnings in the current year exceed one month full-time on the minimum wage (see Section 3 for details). <sup>(b)</sup> Annual earnings are scaled as months of full-time minimum wage (see Section 3 for details). (i) Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) Each model is estimated using the sample of students present in the year of (predicted) graduation. (iv) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 7: The impact of unemployment rate at graduation on educational attainment – IV specification

	Full sample (1)	Bottom quintile (2)	Median quintile (3)	Top quintile (4)
<b>Dependent variable:</b>				
<b>Late graduation from upp. sec. school</b>				
Effect of unemployment rate at graduation	0.003 (0.003)	0.003 (0.009)	-0.003 (0.007)	0.004 (0.006)
Number of individuals	68,241	13,127	13,239	12,844
Mean of dependent variable	0.057	0.099	0.047	0.037
<b>Accumulated years of schooling by age 38</b>				
Effect of unemployment rate at graduation	-0.030 (0.023)	-0.077** (0.038)	-0.033 (0.062)	-0.081 (0.056)
Number of individuals	66,293	12,797	12,833	12,433
Mean of dependent variable	12.811	12.022	12.741	13.817
Track FE (instrumented)	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓
Individual characteristics	✓	✓	✓	✓

Notes: (i) Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) Each model is estimated using the sample of students present in the year of (predicted) graduation. (iv) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 8: The impact of unemployment rate at graduation on family formation – IV specification

	Full sample (1)	Bottom quintile (2)	Median quintile (3)	Top quintile (4)
<b>Dependent variable:</b>				
<b>Still living at parents' home at age 19</b>				
Effect of unemployment rate at graduation	0.000 (0.007)	-0.030* (0.017)	0.030* (0.016)	-0.016 (0.013)
Number of individuals	68,241	13,127	13,239	12,844
Mean of dependent variable	0.631	0.578	0.631	0.659
<b>Age at first partnership<sup>(a)</sup></b>				
Effect of unemployment rate at graduation	-0.074 (0.068)	-0.390** (0.172)	0.081 (0.135)	0.050 (0.112)
Number of individuals	57,740	10,777	11,205	11,154
Mean of dependent variable	26.825	26.040	26.973	27.163
<b>Age at first birth</b>				
Effect of unemployment rate at graduation	-0.090 (0.064)	-0.395** (0.178)	0.055 (0.140)	-0.004 (0.117)
Number of individuals	57,103	10,757	11,060	10,926
Mean of dependent variable	26.987	25.794	27.095	27.730
<b>Panel B: Completion of family formation<sup>(b)</sup></b>				
<b>Ever in a partnership</b>				
Effect of unemployment rate at graduation	0.000 (0.004)	-0.006 (0.012)	0.000 (0.011)	0.010 (0.008)
Number of individuals	66,336	12,800	12,854	12,433
Mean of dependent variable	0.870	0.842	0.872	0.897
<b>Ever had a child</b>				
Effect of unemployment rate at graduation	-0.002 (0.005)	-0.001 (0.012)	-0.001 (0.011)	0.000 (0.009)
Number of individuals	66,336	12,800	12,854	12,433
Mean of dependent variable	0.861	0.841	0.861	0.880
<b>Total number of children (if ever had a child)</b>				
Effect of unemployment rate at graduation	0.022* (0.012)	0.033 (0.035)	0.024 (0.027)	-0.015 (0.023)
Number of individuals	57,033	10,746	11,043	10,916
Mean of dependent variable	2.149	2.191	2.116	2.173
Track FE (instrumented)	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓
Individual characteristics	✓	✓	✓	✓

Notes: <sup>(a)</sup> A partnership is defined as either being married or cohabitation with a partner and common child. <sup>(b)</sup> Completed family formation refers to family outcomes at age 38. (i) Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) Each model (except the first model in Panel A) is estimated using the sample of women observed at age 38. (iv) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 9: The impact of unemployment rate at graduation on partnership quality and dissolution – IV specification

	Full sample	Bottom quintile	Median quintile	Top quintile
<b>Dependent variable:</b>	(1)	(2)	(3)	(4)
<b>Panel A: Partner's characteristics<sup>(a)</sup></b>				
<b>Partner's GPA<sup>(b)</sup></b>				
Effect of (own) unemployment rate at graduation	-0.005 (0.013)	-0.050 (0.045)	-0.020 (0.032)	-0.013 (0.034)
Number of individuals	17,521	3,179	3,239	3,561
Mean of dependent variable	2.909	2.725	2.926	3.082
<b>Partner's annual earnings</b>				
Effect of (own) unemployment rate at graduation	-0.025** (0.011)	-0.045* (0.024)	-0.022 (0.027)	-0.042 (0.027)
Number of individuals	28,931	5,482	5,576	5,656
Mean of dependent variable	1.199	1.133	1.212	1.242
<b>Partner's age</b>				
Effect of (own) unemployment rate at graduation	-0.016 (0.076)	0.267 (0.194)	-0.341* (0.188)	-0.005 (0.185)
Number of individuals	28,931	5,482	5,576	5,656
Mean of dependent variable	30.262	30.268	30.245	30.329
<b>Panel B: Partnership dissolution<sup>(c)</sup></b>				
<b>Ended the first partnership (if ever in one)</b>				
Effect of unemployment rate at graduation	-0.003 (0.006)	0.046** (0.020)	-0.006 (0.015)	-0.001 (0.013)
Number of individuals	57,740	10,777	11,205	11,154
Mean of dependent variable	0.308	0.432	0.293	0.221
<b>Single mother</b>				
Effect of unemployment rate at graduation	-0.000 (0.006)	0.037** (0.019)	0.004 (0.012)	-0.008 (0.012)
Number of individuals	66,336	12,800	12,854	12,433
Mean of dependent var.	0.231	0.322	0.217	0.164
<b>Number of fathers (if ever had a child)</b>				
Effect of unemployment rate at graduation	0.010 (0.006)	0.047** (0.019)	0.030** (0.013)	0.010 (0.009)
Number of individuals	56,645	10,632	10,983	10,863
Mean of dependent variable	1.131	1.223	1.118	1.074
Track FE (instrumented)	✓	✓	✓	✓
Cohort FE	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓
Individual characteristics	✓	✓	✓	✓

Notes: <sup>(a)</sup> We measure partners' characteristics (if in partnership) when females are aged 27. <sup>(b)</sup> Partners' GPA refer to grades in 9<sup>th</sup> grade. Sample is reduced since we do not have GPA for all partners. <sup>(c)</sup> Partnership dissolution is measured by the age of 38. Each model in Panel B is estimated using the sample of women observed at age 38. (i)

Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

Table 10: The impact of unemployment rate at graduation on welfare receipt and related joint events – Bottom quintile – IV specification

	Bottom quintile
<b>Dependent variable (measured at age 38):</b>	(1)
<b>Welfare receipt</b>	
Effect of unemployment rate at graduation	0.019** (0.007)
Mean of dependent variable	0.043
Number of individuals	12,800
<b>Welfare receipt*No child</b>	
Effect of unemployment rate at graduation	0.000 (0.005)
Mean of dependent variable	0.008
Number of individuals	12,800
<b>Welfare receipt*In partnership with child</b>	
Effect of unemployment rate at graduation	0.003 (0.003)
Mean of dependent variable	0.009
Number of individuals	12,800
<b>Welfare receipt*Single mother</b>	
Effect of unemployment rate at graduation	0.017** (0.006)
Mean of dependent variable	0.026
Number of individuals	12,800
<b>Welfare receipt*First partner had high GPA<sup>(a)</sup></b>	
Effect of unemployment rate at graduation	-0.003 (0.002)
Mean of dependent variable	0.004
Number of individuals	9,500
<b>Welfare receipt*First partner had low GPA<sup>(a)</sup></b>	
Effect of unemployment rate at graduation	0.011** (0.005)
Mean of dependent variable	0.0148
Number of individuals	9,500
<b>Welfare receipt*First partner had high earnings<sup>(a)</sup></b>	
Effect of unemployment rate at graduation	0.001 (0.002)
Mean of dependent variable	0.004
Number of individuals	12,800
<b>Welfare receipt*First partner had low earnings<sup>(a)</sup></b>	
Effect of unemployment rate at graduation	0.015*** (0.006)
Mean of dependent variable	0.028
Number of individuals	12,800

Track FE (instrumented)	✓
Cohort FE	✓
Municipality FE	✓
Individual characteristics	✓

Notes: <sup>(a)</sup> First partners with low/high GPA refer to first partners whose grades in 9<sup>th</sup> grade were below/above the median GPA. First partners with low/high earnings refer to partners whose earnings were below/above median earnings (measured when their female partner was aged 27). (i) Marginal effects are presented. (ii) Standard errors (in parentheses) are clustered at the municipality\*cohort ( $j \times c$ ) level. (iii) Each model is estimated using the sample of women observed at age 38. (iv) \*\*\* Significant at 1% level. \*\* Significant at 5% level. \* Significant at 10% level.

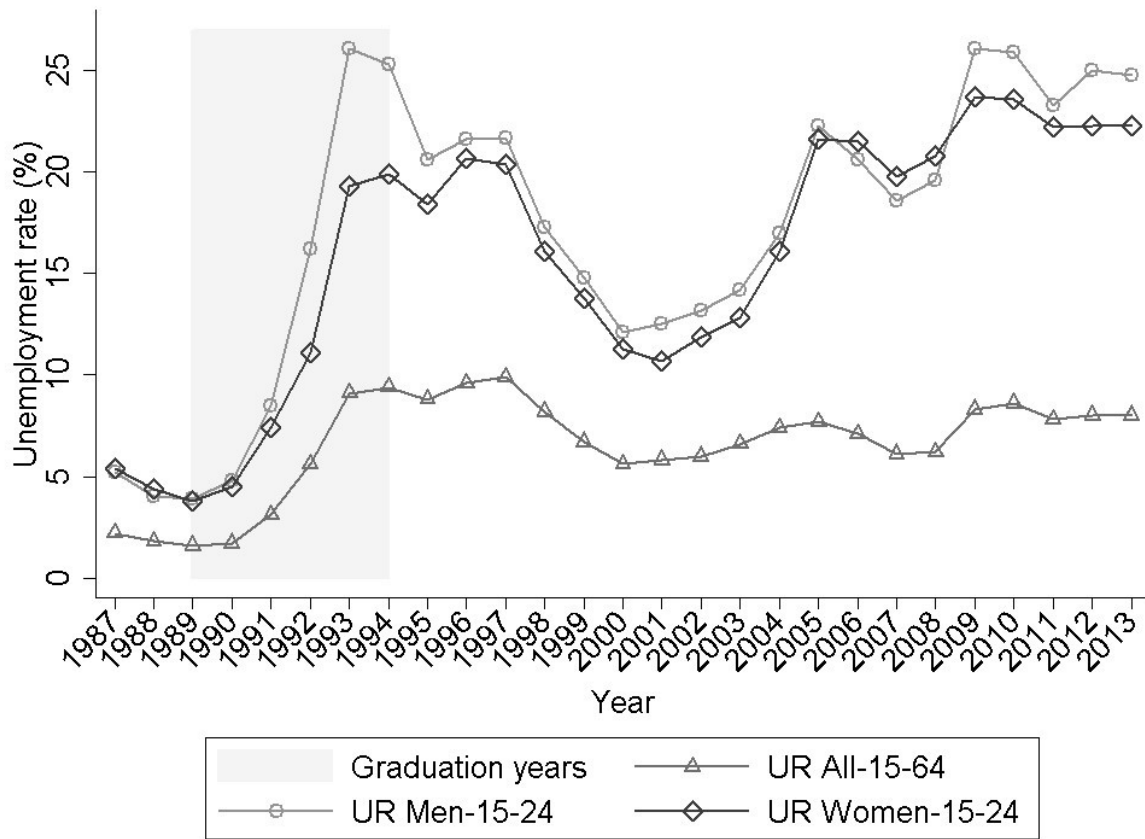


Figure 1: Unemployment Rate (15-64), Sweden, 1987-2013, OECD.

Notes: The shaded area shows the graduation years of the enrollment cohorts studied in this paper. The first enrollment cohort graduated in 1989 or 1990, depending on length of the vocational program, and the last cohort graduated in 1993 or 1994.

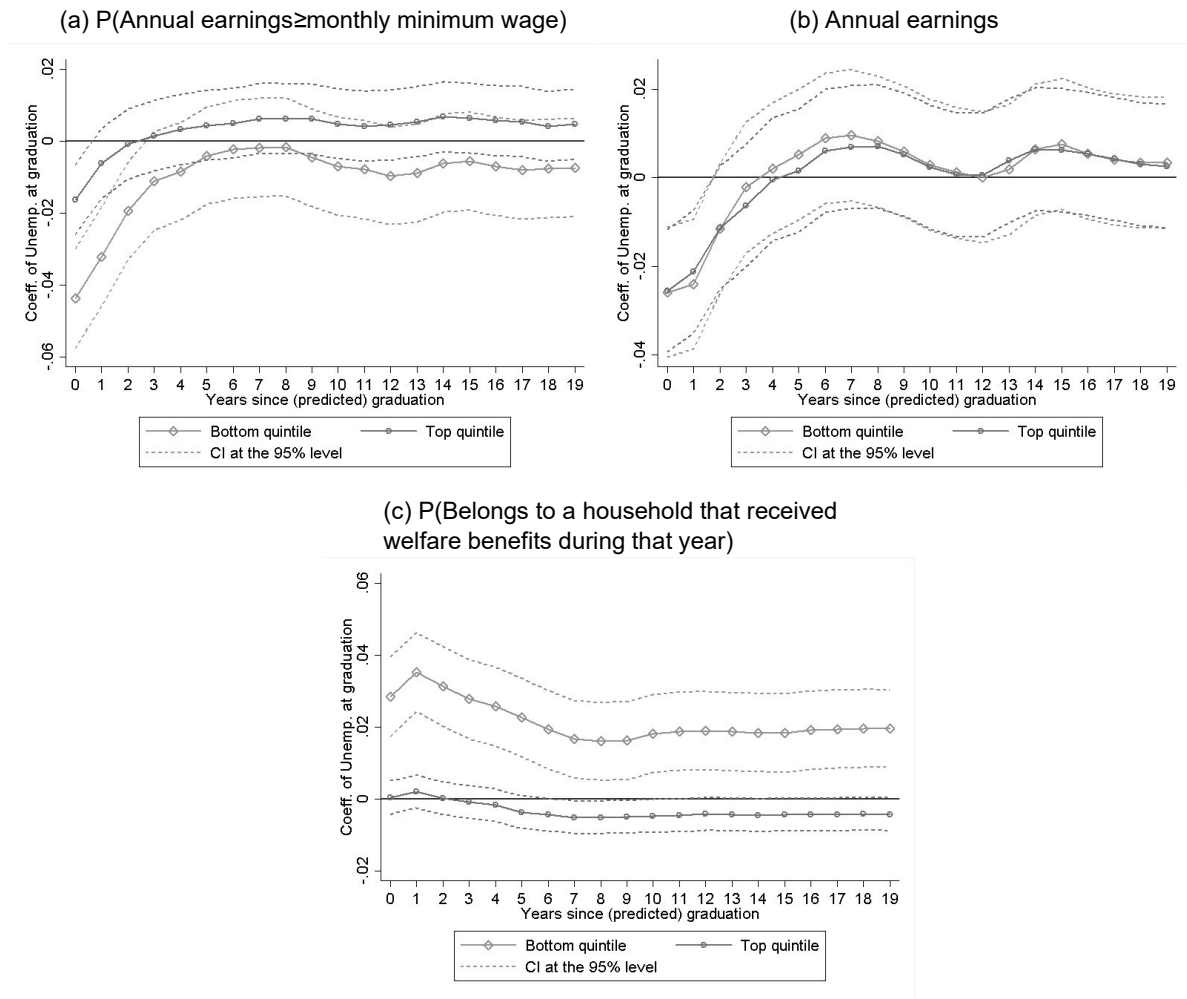
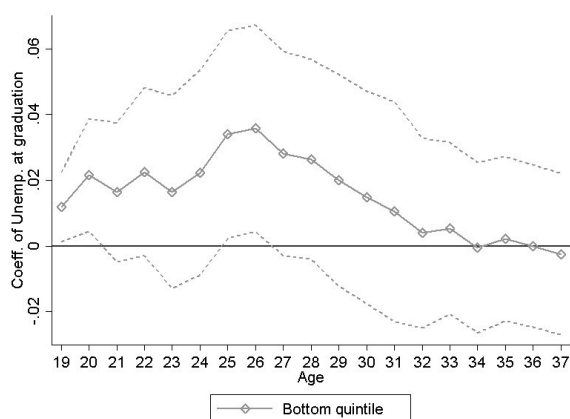
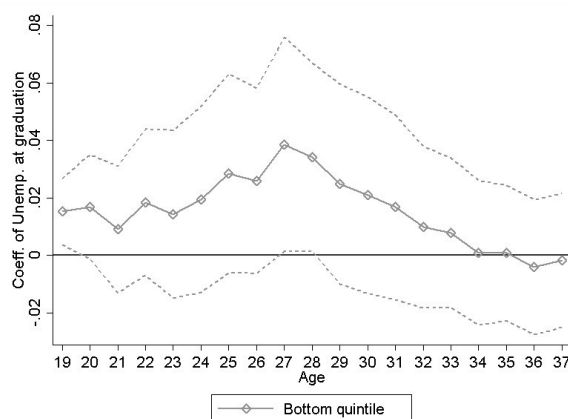


Figure 2: The effect of unemployment rate at graduation on labor-market outcomes and welfare receipt for each year since (predicted) graduation – IV specification.

(a) P(Ever formed a first partnership by a given age)



(b) P(First child born by a given age)



(c) P(Ever dissolved first partnership by a given age)

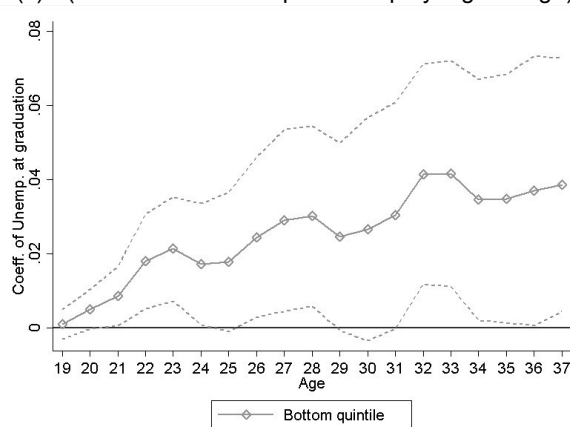


Figure 3: Full time path of the effect of unemployment rate at graduation on family related events – IV specification – Bottom quintile.

Notes: The estimates are unconditional, that is females are included indifferent of whether they ever formed a partnership/had a child/dissolved a partnership.

1 See, for example Kahn (2010), Oreopoulos, von Wachter and Heisz (2012), Schwandt and von Wachter (2019) or the overview by von Wachter (2020).

2 See Becker (1981) on the interplay between labor markets and marriage markets, or Blau and Winkler (2017) for a recent overview. For theories on how marriage markets work and how they interact with economic outcomes, see Chiappori, Salanié and Weiss (2017); Choo and Siow (2006); Greenwood, Gunner and Vandenbroucke (2017).

3 In particular as the timing of marriage appears to be an important determinant of human capital investments, fertility outcomes and risk-sharing opportunities, and since match quality is related to divorce rates (Chiappori, Dias and Meghir 2018; Corno, Hildebrandt and Voena 2020; Field and Ambrus, 2008; Tertilt, 2005).

4 We retain our focus on females throughout the paper. Complementary results for males are presented in an appendix, but our identification strategy is less well suited for this group as participation in compulsory military service weakens the link between the timing of graduation and labor market entry.

5 The impact of the additional year of vocational education is studied by Hall (2012), who was the first to exploit the variation provided by the experimental policy pilot. We exploit the interaction of the pilot variation with the state of the business cycle to focus instead on the impact of labor-market prospects at graduation.

6 For Sweden, Nordström Skans (2011) shows evidence of persistent, but non-permanent, scarring

---

effects of graduation-year unemployment experiences among Swedish high-school graduates.

7 See, for example, Stevens (2007), Kahn (2010), Altonji, Kahn and Speer (2016), Genda, Kondo and Ohta (2010), Bell and Blanchflower (2011), Oreopoulos, von Wachter and Heisz (2012), Hershbein (2012), Cockx (2016), Speer (2016), Schwandt and von Wachter (2019), Haaland (2018) and Bell, Bindler and Machin (2018).

8 The results for marriage and divorce are in contradiction with Choi, Choi and Son (2020) for Korea, possibly due to differences in social security or gender norms. The results for completed fertility are in line with Currie and Schwandt (2014) (US), but not consistent with Maclean, Covington and Siakora Kessler (2016) (US), Choi, Choi and Son (2020) (Korea) and Hofmann and Hohmeyer (2016) (Germany).

9 Hoogeveen, van der Klaauw and von Lomwel (2011) find that marriage in Zimbabwe is an ex-post mechanism to cope with risk.

10 Many prior observers such as the New York Times, September 22, 2008, and Time, September 24, 2008, have compared the Swedish crisis to the Great Recession starting in the US in 2008. As noted by Bharadwaj, Lundborg and Rooth (2015), in both the Swedish and US crises, there was a rapid increase in the unemployment rate and debts in the real estate sector played an important role (in downtown Stockholm, the price of real estate decreased by 35 percent in 1991. See Englund (1999) for more on the background to the crisis.

11 The policy pilot has been documented by Hall (2012), who exploits its variation to evaluate the impact of prolonging vocational programs from two to three years on education achievement and earnings. There are also a number of governmental reports describing/evaluating different dimensions of the experiment, see for example SOU (1989; 1990; 1992). The prolongation of the programs came with some changes in the curriculum. The new three-year programs included a richer set of general (theoretical) courses and more workplace training. Students attending these programs were also granted basic eligibility to higher education (which was one of the main purposes of the reform).

12 This restriction excludes students who enrolled in three-year Graphic and Handicraft tracks. Our results are robust to re-introducing these two pilot tracks.

13 We primarily think of compulsory school grades as capturing cognitive ability. Kramarz, Nordström Skans and Rosenqvist (2021) focus on Swedish male graduates from 1985 onwards and find that the final average grade from compulsory school is strongly correlated with cognitive ability test results in military draft records.

14 See Online Appendix E, Table E1, for robustness checks. There is no formal minimum wage in Sweden as these are defined in collective agreements. Instead, we proxy minimum wage using the wages of janitors since their wages consistently stay in the very lowest part of the wage distribution. See Appendix B.1 for details.

15 Living expenses are calculated as a function of household composition (that is number of children by age, number of adults, etc.), housing costs, and well-motivated special costs (for example due to medical conditions). Thus, graduates residing at their parents' home will qualify for benefits only if the joint household income is too low. Around 88 percent of females still reside at their parents' home in the year of graduation, but this percentage falls to 40 percent three years after graduation, and 17 percent six years after graduation.

16 GPAs of men graduating before 1988 are not systematically observed – see online Appendix B.2 for more details. Our regressions using partner's GPA are thus estimated on a smaller sample of women.

17 Annual unemployment rate by age and gender are available from the OECD. See the Annual Labor Force Statistics at OECD.Stat (<http://stats.oecd.org/index.aspx?r=707579#>).

18 Most of vocational students enroll in business and services programs (29.8 percent) and health care (27.2 percent). See Online Appendix C, Table C1 for a breakdown of vocational students by program types upon enrollment.

19 Note that the partner's characteristics measured at age 27 do not necessarily correspond to those of the first partner

20 When exploring which type of specification makes more sense, we concluded that age is positively related to the partnership probability at a fixed level of experience (9 years=mean experience at partnership formation) but we find no impact of experience at a fixed age (27=mean age at partnership formation).

21  $\beta_e$  will be biased towards zero if students who postpone graduation in an economic downturn have unobserved favorable characteristics (for example financial resources and other parental characteristics) that allow them to do so. Similarly, if low-achieving students drop out when the economy deteriorates,  $\beta_e$  will be biased towards zero.

22  $P_{cj}$  is zero for municipalities not offering any vocational tracks. The results are virtually unchanged when setting  $P_{cj}$  to missing for those municipalities.

23 Clustering at the municipality level instead gives nearly identical standard errors, see online Appendix E.4, Table E2.

---

24 Online Appendix E.3, Table E1, runs the same exercise for low-GPA females, that is female students in the bottom quintile of compulsory school GPA.

25 Results are robust to alternative definitions of High (Low)-UR municipalities, for example according to the rise in unemployment rate at the municipality level between 1987 and 1994.

26 Hershbein (2012) and Speer (2016) also find large but short-lived declines in earnings and employment for low-educated youths. Cockx (2016) argues that since low-educated recession entrants are at the bottom of the qualification ladder, they cannot shield themselves against negative shocks by moving to a lower-skilled job. This makes the short-term impact of a recession more severe for low- than for high-educated youth. However, because skills acquired during vocational training do not erode during periods of inactivity, the penalty in earnings is only temporary.

27 This is a point where instrumentation matters. The results presented in Appendix D.2 suggest that women with a low propensity for using welfare endogenously selected into longer education when unemployment was on the rise.

28 Since we find no effect on long-run family formation, endogenous sample selection is not likely to be a concern when we condition on for example ever having a partner or a child. This is confirmed by unconditional estimates presented in Figure 3. Further results show that even though we do not find an impact on overall partnership frequency, low-GPA women who graduate in a recession are less likely to ever (formally) marry than their luckier counterparts (IV model on “ever married at age 38”, coeff: (-0.039\*\*, se: 0.015)). Thus, there is a substitution in the types of partnerships away from formal marriages.

29 The samples include all women, that is regardless of whether they ever formed a relationship or had a child during the period.

30 We still mention the point estimate since a deeper exploration of this attribute shows that the functional form matters for the statistical power in this case. Figure E2 in Online Appendix E experiments with different thresholds and shows that there is a tendency for unlucky women to mate with lower-GPA men, that is men whose GPA is below the median.

31 To further substantiate our results, we check that partnership duration is negatively affected by unemployment rate at graduation. We find that women in the bottom quintile of the GPA distribution have a higher probability of having (ever) been in a partnership at age 38 that lasted less than five/ten years (results not shown but available upon request).

32 In the Swedish context, we use the terms “marriage” and “divorce” in a broad sense: they refer to a stable partnership, or a failed partnership, respectively

33 Recall that in the presence of military service, males have a much looser relationship between graduation year and the time of labor-market entry. For this reason, results for men should be interpreted with some caution.

34 Comparing the magnitude of the estimates between males and females suggest that worse labor market opportunities have a larger impact on family outcomes for females.

35 To match the empirical discussion, partner’s quality in this discussion does not refer to a match specific measure, but rather to the partner’s cognitive skills and divorce risk.

36 It is, however, clear that changes in the partnership thresholds of agents on one side of the market (here: women) should affect the marriage probability of (in particular, less attractive) agents on the other side (here: men). Online Appendix G.2 analyzes this process empirically. We define the female’s partner pool as men in vocational education who are three years older. Empirical results suggest that when female labor-market prospects deteriorate relative to theirs, males in the partner pool accelerate their entry into partnerships, and mate with higher-GPA women that would otherwise have been unattainable.

37 Our setting makes it difficult to compare our estimates to raw time trends, as the trends also are affected by other aspects, such as the increased national pilot intensity. However, raw time trends suggest an increase in age of partnership formation throughout the sample period (that is starting before the crisis) which is reverted among the low-GPA women when the crisis hits. The divergence relative to trends among higher-GPA women corresponds to about one year.