Extended Abstract for:
Field of Study and Future Fertility

Adam Altmejd John Eric Humphries
Juanna Schrøter Joensen Gregory F. Veramendi *

March, 2025
PRELIMINARY and INCOMPLETE.
Please do not cite or circulate.

1 Introduction

Fertility rates have been declining globally in recent decades, with total fertility rates (TFR) now below replacement in most developed countries. This decline has significant implications such as slower population growth, economic challenges, and strain on social security systems due to population aging (Harper, 2014; Doepke et al., 2023; Bloom et al., 2023). While the causes and consequences of declining fertility rates have been extensively studied, we know relatively little about the role of education – particularly field of study. This is surprising given that many key determinants of fertility decisions are shaped by education choices, including wages, opportunity costs, career disruptions, work schedules, and life aspirations (Kearney et al., 2022; Kearney and Levine, 2022). In this paper, we take a step back and study causal impacts of education on fertility rates, specifically focusing on field of study.

While the field of study is an important determinant of labor market opportunities and gender gaps (Altonji et al., 2012a, 2016; Patnaik et al., 2021; Humphries et al., 2024), much less is known about the impacts on fertility. Field of education has been found to be a stronger predictor of childlessness and first-birth rates than the level of education (Lappegård and Rønsen, 2005; Hoem et al., 2006). Using linked Swedish administrative labor market, education, and medical birth records, we also find that field-specific gaps exceed the gap between college and high school graduates. For example, 82.5% of women with education degrees have had a child by age 35, while 15 percentage points fewer women with law degrees and 9 percentage points fewer women with science degrees have had a child by age 35. In comparison, the difference is only

*Altmejd: SOFI; adam@altmejd.se. Humphries: Yale University and NBER; johneric.humphries@yale.edu. Joensen: University of Chicago, Stockholm School of Economics, TrygFonden's Centre for Child Research–Aarhus University, and IZA; jjoensen@uchicago.edu. Veramendi: Royal Holloway, University of London; gregory.veramendi@rhul.ac.uk. We gratefully acknowledge financial support from the Swedish Foundation for Humanities and Social Sciences (Riksbankens Jubileumsfond) grant P12-0968 enabling the data collection for this project. We are also grateful to the Stockholm School of Economics for hosting our research project. This project has been evaluated for ethical compliance by the Swedish Central Ethical Review Board (EPN) approval 2013/428-31 and privacy compliance by Statistics Sweden (SCB) disclaimer 231046/878029-8. The usual disclaimers apply.

6 percentage points between the average high school graduate and the average college graduate.[1] These field-specific gaps, however, can reflect a range of factors that affect both fertility and education choice. For example, those who become elementary and pre-school teachers may both choose their education, occupation, *and* be more likely to have children based on their passion for teaching and spending time with children. This makes it challenging to identify and estimate causal effects. We follow the recent literature using college application data to compare individuals with similar stated preferences for college programs combined with randomness around admission cut-offs for oversubscribed college programs. This empirical strategy was first proposed by Kirkebøen et al. (2016) and has been utilized to estimate the causal effect of field of study in high school (Dahl et al., 2023) and college (Altmejd, 2018; Heinesen et al., 2022; Humphries et al., 2023) on labor market outcomes and assortative mating in the marriage market (Kirkebøen et al., 2021).[2] It is important to study fertility separately from marriage and assortative mating due to the decoupling of marriage and childbearing (Smock and Greenland, 2010; Hayford et al., 2014; Guzzo and Hayford, 2020). Is there a causal effect of field of study on future fertility? Our preliminary estimates suggest positive effects on fertility for enrolling in law and Science, Technology, Engineering and Mathematics (STEM) fields for women. We do not find significant effects of enrollment in any field on the fertility outcomes of men. We push this literature in a new direction by estimating causal effects of field of college education on fertility.

Prior research on education's causal effects on fertility has primarily focused on education *level* rather than *field*. Most studies focus on women at low levels of education and rely on increases in the duration of compulsory schooling for identification: compulsory schooling law reforms (Black et al., 2008; Monstad et al., 2008; Silles, 2011; Cygan-Rehm and Maeder, 2013; Fort et al., 2016; Chen and Guo, 2022), age at school entry policies (McCrary and Royer, 2011), and the raising of school leaving age (ROSLA) in the UK (Geruso and Royer, 2018; Cummins, 2022). Most of these papers find that increasing education of women reduces teenage pregnancy rates.[3] The effect on total fertility is either found to be negative or insignificant (Monstad et al., 2008; Cygan-Rehm and Maeder, 2013; Fort et al., 2016; Cummins, 2022).

Research on the causal effects of education beyond the post-secondary level remains scarce, but includes a few notable papers. Grönqvist and Hall (2013) study an education reform in Sweden in which vocational tracks in upper secondary school were prolonged from two to three years and the curricula were made more academic. They find that women who enrolled in the new programs were significantly less likely to give birth early in life. They do not, however, find statistically significant effects on men's fertility decisions. Humlum

[1] Note that we just received data for additional years – college applications going back to 1977 (now 1993) and outcomes until 2023 (now 2012) – so we can study completed fertility for the cohorts in our current sample plus fifteen additional cohorts.

[2] Similarly, Artmann et al. (2021) use admission lotteries for four oversubscribed programs in the Netherlands, and find that field of study matters for partner choice. Their working paper version Artmann et al. (2018) also report effects on fertility, where they only find a significantly positive effect for male doctors.

[3] Fort et al. (2016) is an exception, not finding evidence of this negative relationship between womens' education level and teenage fertility.

et al. (2017) use discontinuities in college admission in Denmark to show that the timing of college enrollment affects family formation. Finally, Virtanen et al. (2024) use discontinuities in admission to secondary and tertiary education in Finland. They find that increasing educational attainment for women increases the probability that they have children by their later thirties. However, they do not find any significant effects for men. We contribute to the literature by showing that not only the level, but also the field, of education is an important determinant of fertility decisions.

What could be driving the (positive) effects of field of study on fertility? Why are effects stronger for women, than for men? The key to answering these question is understanding what changes at college admission thresholds.

To better understand the mechanisms driving these fertility effects, we will explore several channels: whether income effects dominate negative substitution effects, labor market opportunities and choices, the role of benefits and leave policies (including means-testing and employer variation), assortative mating patterns, relationship stability, and partner leave-taking behavior. Several papers document a strong association between college field and occupation (Black et al., 2003; Altonji et al., 2012b, 2016; Kinsler and Pavan, 2015; Altonji et al., 2016; Ransom and Phipps, 2017; Arcidiacono et al., 2020; Sloane et al., 2021). We will analyze how measures of occupational hours, skill demands, and flexibility change at college admission thresholds for those at the margin, and more broadly build on foundational work in family economics to illuminate how education choices shape both career trajectories and family formation decisions in contemporary labor markets.[4] This is important for understanding determinants of fertility more broadly, and how fertility rates can be affected by policy.

Our preliminary findings suggest that the field of education specialization may be as consequential as overall educational attainment. In future research, we will continue to explore these intricate relationships. Key areas of inquiry include the long-term impacts of education-specific family policies, the interactions between emerging work configurations and family formation, and the nuanced ways different professional fields shape reproductive choices. This evolving understanding moves beyond simplistic economic models, revealing fertility as a dynamic process influenced by a complex interplay of economic opportunities, policy environments, technological capabilities, and social expectations.

The remainder of the paper proceeds as follows. Section 2 describes the Swedish institutional setting and data. Section 3 describes our empirical strategy. We then present our empirical results in Section 4. Finally, Section 5 concludes.

[4]For more on the literature on family formation see e.g. Becker 1960; Mincer 1963; Becker 1965; Becker and Lewis 1973; Willis 1973; Heckman and Walker 1990; Francesconi 2002; Sheran 2007; Keane and Wolpin 2010; Goldin 2014; Adda et al. 2017; Bronson and Sanin 2024.

2 Institutional Setting and Data

In this section, we describe relevant institutional details (Section 2.1) and the Swedish administrative data (Section 2.2) to put the empirical analysis into context. In Section 2.3, we present summary statistics on the enrollment field gaps in labor market and fertility outcomes.

2.1 Institutional Setting

College admission in Sweden is predominantly conditional on high school grade point average (GPA), but other factors also affect the admission score, including the Swedish Scholastic Aptitude test (SweSAT), high school track and course choices, and labor market experience.[5] For example, only academic STEM track graduates have the qualifications to enroll in *all* 4-year STEM college majors without additional supplementary courses, and only students in the science line are directly qualified for *all* 4-year college majors. College admission is largely centrally administered. A college application includes a rank-ordered list of up to 12 college-program choices.[6] Selectivity varies greatly across college majors and individual programs: the 4-year programs in medicine, law, and humanities are the most selective.[7] Higher education is tuition-free for all students and largely financed by the central government. College students are eligible for universal financial aid of which around one third of the total amount is a grant (or scholarship) and the remaining two thirds are provided as a loan. Student aid is largely independent of parental resources but means-tested on student income and the maximum eligibility period is 240 weeks (the equivalent of 12 semesters or six enrollment years). Student loans are subsidized, and the loan repayment plan was income-contingent for those in our sample.[8]

Sweden has a variety of "family-friendly" policies intended to help families balance children and careers. In the years we study, parents are allotted a total of 16 months of leave for each child of which two months are earmarked to each of the parents. During 13 of these months, parents that were employed at least 240 days before leave receive higher benefits based on past income. Abortion access is relatively unrestricted with free abortion until the 18th week of pregnancy, and later abortions are only allowed if the fetus is deemed unable to survive. Healthcare is universal and free-of-charge for children. Childcare is highly subsidized and enrollment is 70% for 1-2 year old children and 90% for 3-6 year old children. These institutions are

[5] Öckert (2010) describes the college admission process for the earlier cohorts, while Altmejd (2018) describes it for the later cohorts. The SweSAT has become a more important factor over time, particularly after 1991, and it was the key factor for admission for more than a third of our sample. All the details can be found in the Higher Education Act 1992:1434 and the Higher Education Ordinance 1993:100.

[6] In this respect, the college application in Sweden is similar to, for example, Norway (Kirkebøen et al., 2016), Denmark (Humlum et al., 2017; Heinesen et al., 2022), Chile (Hastings et al., 2013; Bordon and Fu, 2015). Altmejd et al. (2021) directly compare college application in Sweden to Croatia, Chile, and the United States.

[7] We provide more descriptives and details in Appendix A.1.

[8] The students in our sample are enrolled in college during the pre-2001-reform study aid regime as detailed in Joensen and Mattana (2020).

described in more detail in Appendix A. It is important to keep this setting in mind when interpreting the empirical results—fertility choices are not, in this setting, likely to be driven by the direct monetary costs of children. The sizes of effects may well differ in places like the US where direct costs of healthcare and childcare are higher and family support is lower.

2.2 Swedish Administrative Data

NOTE: The data in this preliminary draft is the same as was used in Humphries et al. (2023) and Gallen et al. (2025). We are updating our results using recently received higher education application data going back to 1977 (vs. 1993) and outcomes through 2023 (vs. 2012), allowing us to observe completed fertility for many more cohorts.

From the Higher Education registry, we observe the level and field of every college enrollment spell and degree since 1993. We classify all academic programs into two levels (≤ 3 years; ≥ 4 years) according to the SUN2000Niva code and nine fields (1. education; 2. humanities and arts; 3. social sciences and services; 4. math, natural, life and computer sciences; 5. engineering and technical sciences; 6. medicine; 7. health sciences, health and social care; 8. business; 9. law) according to the SUN2000Inr code. The Swedish education nomenclature (SUN2000) codes build on the International Standard Classification of Education (ISCED97), and we group programs into majors according to the first digit of the SUN2000Inr code. We single out business and law from the social sciences major and medicine from the health sciences major to better compare to previous literature. Some of the 3-year programs have few students, so we group them into STEM (science, math, engineering) and non-STEM (humanities, social science) majors. Students in the 3- and 4-year education and health sciences majors (excluding medicine) look similar on observables and labor market outcomes, so the 3- and 4-year programs are grouped together.[9]

As discussed in the prior section, college applicants are screened based on their high school course choices and GPA. Some of them are also admitted based on high performance in the SweSAT on which we have overall test scores and sub-scores on every attempt through the Department of Applied Educational Science at *Umeå Universitet*. We have access to the complete histories of college applications and admissions from 1993 onwards through the Swedish National Archives. These include the complete set of admission scores in each admission group as we basically observe the complete data from the college admission process.

We merge several administrative registers via a unique individual identifier. Labor market data are collected and administered by Statistics Sweden (SCB). The primary source of labor market data is the longitudinal integration database for health insurance and labour market studies (LISA) that contains yearly observations during the period 1990-2013 on earnings, social transfers, employment, sector, and occupation.

[9] Appendix A.1 provides more details and descriptives by college major.

Our primary income measure is earnings (that most closely proxies labor market productivity). We also plan to analyse occupation outcomes to study how occupational characteristics may influence fertility. We construct measures of the types of jobs women do in terms of skill requirements and workplace flexibility.[10] These data also include the level and field of highest completed education, information on enrollment in education, age, civil status, family status, and some information on household composition; including the number of children in various age-groups and the identity of the partner for married couples and for unmarried couples cohabiting with common (biological or adopted) children.

We merge education and labor market data with health data collected and administered by the National Board of Health and Welfare ("*Socialstyrelsen*"). This includes the Medical Birth Registry (MFR), containing all births between 1973 and 2012; the Prescribed Drug Register (LMED), which includes all prescriptions from July 2005 through 2013; and the National Patient Register (NPR), which includes all in-patient care (1987-2013) and outpatient doctor visits including day surgery and psychiatric care from both private and public caregivers (2001-2013), but *not* primary care.

Our sample includes all individuals who are born between 1965-1983 and reside in Sweden.

2.3 Descriptives

Table 1 shows how earnings and birth outcomes at 35 years old vary by field of initial enrollment, with enrollment in education being the comparison category. Individuals who enroll in STEM, business, and law programs have the highest earnings at age 35. Initial enrollees in humanities degrees have the lowest earnings. About 83% of women who enroll in an education program have had a child by age 35, and have had on average 1.7 children. Women who enroll in higher-earning and professional degrees delay having children and have fewer of them by age 35. For example, women who enroll in law and business programs are about fifteen and twelve percentage points less likely to have had a child by age 35, and have 0.5 and 0.4 fewer births on average. It is interesting women who enroll in 3-year and 4-year humanities and social science programs are the least likely to have a child by age 35, where they are also earning the least on average.

[10] The first 3-digits of the Swedish occupation code (SSYK96) have an almost one-to-one mapping to the international ISCO88 code that we use to merge with the O*Net data to construct measures of workplace flexibility.

Table 1: Income (all students) and Fertility Outcomes (women) by Field of Study of First College Enrollment

First Enrollment	Income (1000s)	Any Childbirth (women)	Number of Childbirths	Age at First Birth
Non-STEM (3-year)	16.610***	−0.177***	−0.516***	2.304***
	(0.794)	(0.003)	(0.007)	(0.034)
STEM (3-year)	72.132***	−0.099***	−0.329***	1.407***
	(0.678)	(0.004)	(0.008)	(0.037)
Business (3-year)	140.249***	−0.085***	−0.331***	2.183***
	(1.694)	(0.004)	(0.009)	(0.038)
Health Sciences	15.980***	−0.022***	−0.052***	−0.027
	(0.435)	(0.002)	(0.005)	(0.023)
Humanities	−5.164***	−0.233***	−0.643***	2.581***
	(1.369)	(0.006)	(0.013)	(0.061)
Social Sciences	41.573***	−0.177***	−0.524***	2.300***
	(1.378)	(0.005)	(0.011)	(0.046)
Science and Math	46.991***	−0.160***	−0.470***	2.409***
	(0.987)	(0.004)	(0.010)	(0.040)
Engineering	135.336***	−0.125***	−0.421***	2.967***
	(0.936)	(0.004)	(0.009)	(0.035)
Medicine	182.170***	−0.070***	−0.185***	2.412***
	(2.094)	(0.007)	(0.017)	(0.062)
Business	118.473***	−0.115***	−0.398***	2.286***
	(1.335)	(0.004)	(0.009)	(0.036)
Law	135.466***	−0.149***	−0.494***	2.831***
	(1.902)	(0.005)	(0.012)	(0.052)
Mean for Education	214.337	0.825	1.680	28.338
Observations	587,060	289,052	289,052	276,801

Notes: This table reports the college field gaps in income and fertility outcomes for individuals whose initial enrollment is in a given field. The reference category is education. Income is the average of the yearly earnings between ages 33 and 37 for both men and women. "Any Childbirth" is an indicator if a woman has a childbirth in the birth registry by age 35 and "Number of Childbirths" counts the number of births by age 35. Finally, "Age at First Birth" shows the age at which a woman had their first birth. *p<0.1; **p<0.05; ***p<0.01

3 Empirical Strategy

Our empirical strategy adapts the design from Kirkebøen et al. (2016) to the Swedish setting. In particular, we take ranked lists from the centralized college application process. Similar to many centralized college application processes, individuals submit a ranked list of specific programs (fields of study) at specific institutions. Following Kirkebøen et al. (2016) and our prior work (Humphries et al., 2023), we focus on regression discontinuity analyses where we collapse application data to the field of study. Next, we consider the pairs of applications where the applicant's GPA put them near the threshold and where they would not have already been admitted to a program higher on their list. Like Kirkebøen et al. (2016), this setup gives us individuals who are just-below or just-above the threshold for being admitted to a specific major and is the top program where they could be admitted. This approach additionally allows us to look at RD estimates for admission into a particular major, conditional on the next-best major. Here we focus on the GPA admission threshold, excluding those who have already been admitted to higher ranked programs based on any other admissions criteria.

Using this approach, we consider 2SLS regressions of the following form:

$$Y = \sum_{j \neq k} \beta_{jk} D_j + X'\delta_k + \gamma_{jk} + \epsilon_k$$

$$D = \sum_{j \neq k} \alpha_{jk} Z_j + X'\lambda_k + \eta_{jk} + \nu_{jk}, \ \forall \ j \neq k,$$

where j is the individuals' preferred field and k is the next-best field. D_j is an indicator for enrolling in field j while Z_j is an indicator for being above the GPA threshold for admissions to that major. γ_{jk} is a fixed effect for top program (j) and next-best program (k) and X is a vector of controls including birth cohort and functions of the running variable.

4 Results

In the college applications data, we see if students score above the admissions thresholds based on high school GPA or the Swedish SAT. These discontinuities result in regression discontinuities similar to those used in Kirkebøen et al. (2016). The first panel of Figure 1 shows that at the admissions threshold for a particular program there is a average jump of over 60 percentage points in being admitted. If instead of admissions we consider enrolling in the same major, we see that there is a seventeen percentage point jump at the admissions cutoff. This evidence shows that those barely missing the cutoff for admission are much less likely to be admitted to a program, and that this causes students to be less likely to enroll in that major. Table 2 shows the increase in admission, enrollment, and graduation in the same field from crossing the admission cutoff threshold for individual fields of study.

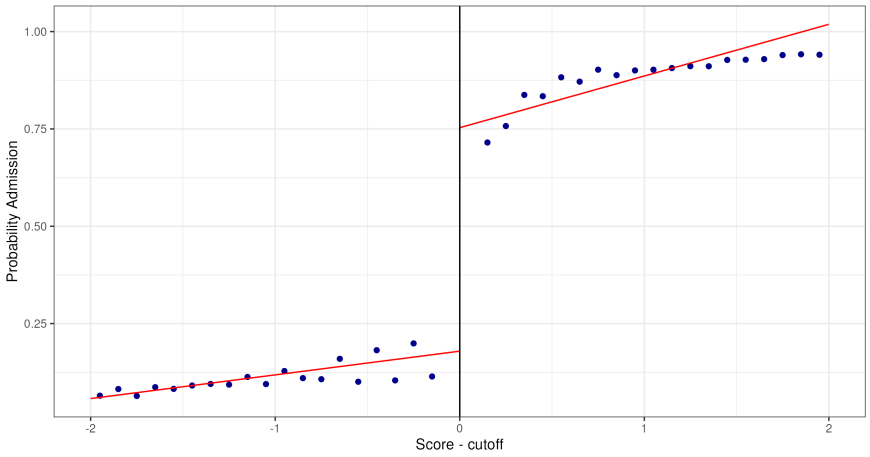
One validation of the quasi-random variation at the cutoff is checking how relevant pre-treatment variables vary across the admissions threshold. Figure 2 shows how ninth-grade GPA varies across the college admissions threshold. There is no sign of a discontinuity at the cutoff.

Table 2: Reduced Form: Education Outcomes

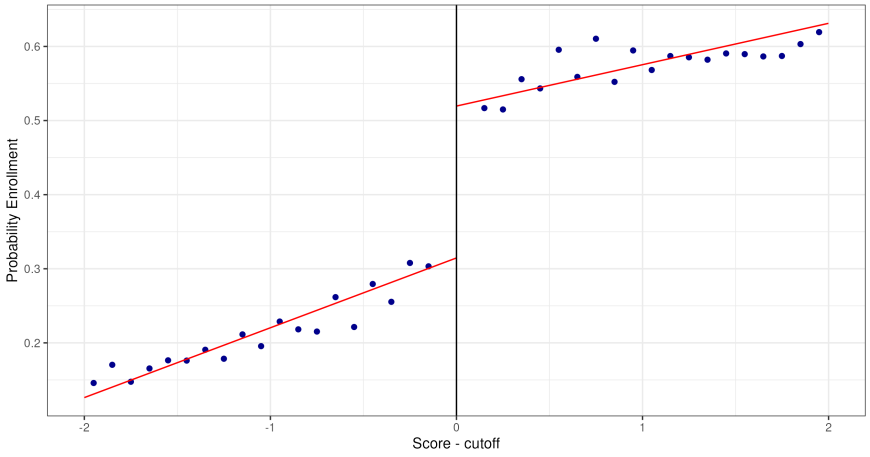
Threshold Field	Admission	Enrollment	Graduation
Non-STEM (3-year)	0.527***	0.111***	0.014
STEM (3-year)	0.575***	0.185***	0.062***
Business (3-year)	0.623***	0.214***	0.038***
Health Sciences	0.617***	0.166***	0.146***
Education	0.597***	0.124***	0.079***
Humanities	0.529***	0.114***	0.005
Social Sciences	0.615***	0.167***	0.046***
Science and Math	0.613***	0.187***	0.066***
Engineering	0.626***	0.319***	0.170***
Medicine	0.627***	0.250***	0.168***
Business	0.655***	0.206***	0.077***
Law	0.695***	0.281***	0.211***
Observations	302,795	302,795	302,795
R^2	0.490	0.131	0.093

Notes: This table shows the reduced form estimating the effect of the GPA and SweSAT admissions threshold discontinuities on admission, enrollment, and graduation in the same field. *p<0.1; **p<0.05; ***p<0.01

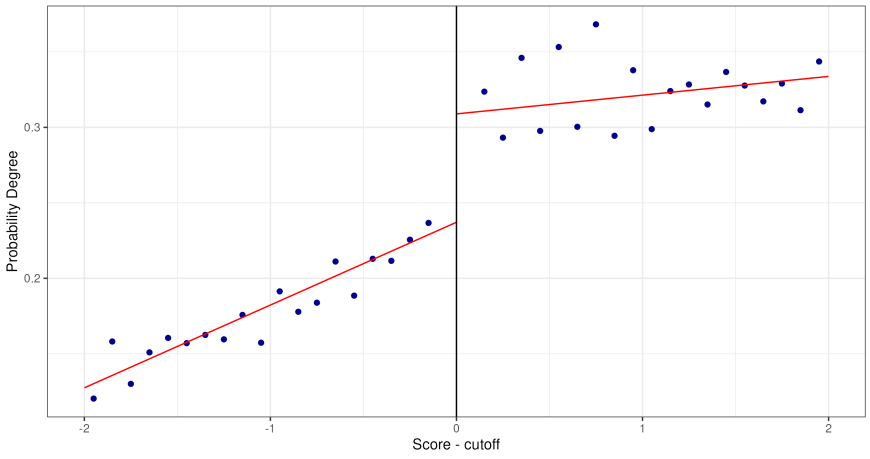
Figure 1: Reduced Form: College Outcomes



College Admission



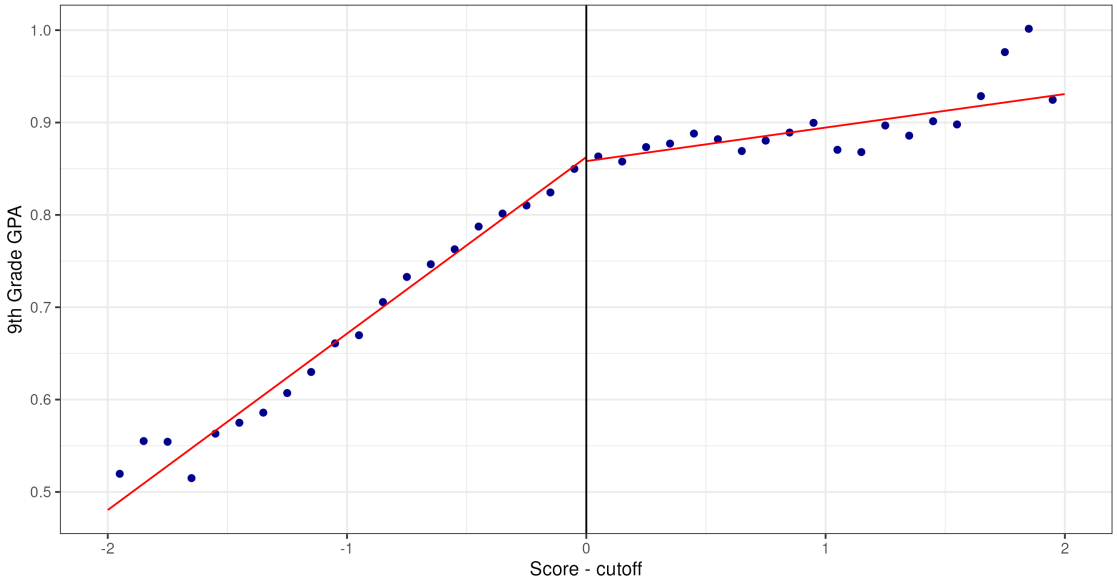
College Enrollment



College Graduation

Notes: These RD figures plot the reduced form using the GPA and SweSAT admissions threshold discontinuities on admission, enrollment, and graduation in the same field.

Figure 2: Balance at Admission Cut-offs



Notes: This figure shows how a pre-treatment measure, 9th grade GPA, varies at the admissions cutoff using the high school GPA and SweSAT admissions thresholds.

4.1 Labor Market Outcomes

Next we estimate returns to enrolling in a college field on earnings at age 35 years old, pooling men and women. Table 3 shows two-stage-least-squares estimates of the effect of enrollment in different fields. Consistent with the literature (see e.g. Kirkebøen et al. 2016), Medicine, Law, Business, and Engineering have the highest returns, while Humanities and other short non-STEM programs have no significant causal return. The results are robust to using different functional forms of the running variable.

Table 3: Causal Effect of Enrollment Field on **Labor Income** (in 1000 SEK) at 35 years old

First Enrollment	2SLS (q=1)	2SLS (q=3)	2SLS (q=5)
Non-STEM (3-year)	−5.297	4.286	3.571
	(16.170)	(16.194)	(16.175)
STEM (3-year)	49.130**	64.575***	61.420***
	(19.837)	(19.847)	(19.837)
Business (3-year)	44.861***	54.346***	53.200***
	(17.177)	(17.207)	(17.176)
Health Sciences	13.142	21.382**	20.433*
	(10.610)	(10.679)	(10.685)
Humanities	23.210	32.445	31.550
	(25.788)	(25.878)	(25.868)
Social Sciences	45.215***	55.321***	53.940***
	(15.196)	(15.225)	(15.213)
Science and Math	25.212	41.746**	39.203**
	(16.727)	(16.707)	(16.714)
Engineering	63.357***	81.445***	78.632***
	(17.481)	(17.418)	(17.426)
Medicine	150.841***	165.100***	161.142***
	(21.480)	(21.363)	(21.350)
Business	86.159***	98.423***	96.812***
	(15.553)	(15.394)	(15.353)
Law	109.934***	122.178***	120.510***
	(17.852)	(17.819)	(17.807)
Observations	262,923	262,923	262,923

Notes: This table reports the causal effect of enrolling in a college field using the admissions cutoffs as an instrument. Income is the average of the yearly earnings between ages 33 and 37 for both men and women. The three columns show results assuming a linear (q=1), a cubic (q=3), and quintic (q=5) functional form of the running varible on either side of the cutoff. *p<0.1; **p<0.05; ***p<0.01

4.2 Results on Fertility Outcomes

Finally, we show preliminary results of the effect of enrollment field on future fertility. Tables 4 and 5 show the effect of enrollment field on fertility for women using birth records. Tables 6 and 7 show the effect of enrollment field on sharing a household with children for men.

If we find a significant effects of enrollment in a field, we mostly find positive causal effects. For example, Table 4 shows that enrolling in short business, four-year engineering, and law programs *increases* the probability of having had a child by age 35 by fifteen percentage points. The effect of a short STEM degree increases the probability by about 25 percentage points. We find similar patterns in Table 7 when looking at the quantity of children, where enrolling in a law or short-STEM program increases the expected number of children by 35 years old by 0.3 and 0.5 children. We find almost identical results from children variables constructed from the household composition information. Looking at Tables 6 and 7, we do not find significant results of enrollment on having children in the household for men.

Table 4: Causal Effect of Enrollment Field on **Any Childbirth** at 35 years old (women)

First Enrollment	2SLS (q=1)	2SLS (q=3)	2SLS (q=5)
Non-STEM (3-year)	0.055	0.065	0.062
	(0.074)	(0.074)	(0.073)
STEM (3-year)	0.246**	0.282***	0.273***
	(0.097)	(0.098)	(0.098)
Business (3-year)	0.153**	0.171**	0.167**
	(0.065)	(0.067)	(0.066)
Health Sciences	0.035	0.054	0.051
	(0.048)	(0.049)	(0.048)
Humanities	−0.190	−0.187	−0.191
	(0.145)	(0.145)	(0.145)
Social Sciences	−0.027	−0.005	−0.011
	(0.071)	(0.072)	(0.072)
Science and Math	0.104	0.141*	0.133*
	(0.074)	(0.074)	(0.074)
Engineering	0.131*	0.172**	0.164**
	(0.073)	(0.074)	(0.073)
Medicine	0.100	0.134*	0.125
	(0.081)	(0.081)	(0.081)
Business	0.078	0.103*	0.099*
	(0.055)	(0.056)	(0.056)
Law	0.146**	0.170***	0.164***
	(0.061)	(0.062)	(0.062)
Observations	104,082	104,082	104,082

Notes: This table reports the causal effect of enrolling in a college field using the admissions cutoffs as an instrument. "Any Childbirth" is an indicator if a woman has a childbirth in the birth registry by age 35. The three columns show results assuming a linear (q=1), a cubic (q=3), and quintic (q=5) functional form of the running varible on either side of the cutoff. *p<0.1; **p<0.05; ***p<0.01

Table 5: Causal Effect of Enrollment Field on **Number of Childbirths** at 35 years old (women)

First Enrollment	2SLS (q=1)	2SLS (q=3)	2SLS (q=5)
Non-STEM (3-year)	−0.101	−0.077	−0.079
	(0.167)	(0.167)	(0.166)
STEM (3-year)	0.463**	0.544**	0.531**
	(0.219)	(0.222)	(0.221)
Business (3-year)	0.168	0.208	0.204
	(0.146)	(0.150)	(0.149)
Health Sciences	−0.005	0.037	0.035
	(0.114)	(0.116)	(0.115)
Humanities	−0.588*	−0.581*	−0.587*
	(0.314)	(0.315)	(0.314)
Social Sciences	−0.176	−0.126	−0.134
	(0.159)	(0.162)	(0.161)
Science and Math	0.218	0.302*	0.290*
	(0.169)	(0.170)	(0.170)
Engineering	0.192	0.286*	0.275
	(0.166)	(0.168)	(0.168)
Medicine	0.265	0.344*	0.328*
	(0.191)	(0.191)	(0.191)
Business	0.101	0.158	0.153
	(0.126)	(0.130)	(0.129)
Law	0.259*	0.312**	0.305**
	(0.138)	(0.142)	(0.141)
Observations	104,082	104,082	104,082

Notes: This table reports the causal effect of enrolling in a college field using the admissions cutoffs as an instrument. "Number of Childbirths" counts the number of births by age 35 for women. The three columns show results assuming a linear (q=1), a cubic (q=3), and quintic (q=5) functional form of the running varible on either side of the cutoff. *p<0.1; **p<0.05; ***p<0.01

Table 6: Causal Effect of Enrollment Field on **Any Children in HH** at 35 years old (men)

First Enrollment	2SLS (q=1)	2SLS (q=3)	2SLS (q=5)
Non-STEM (3-year)	−0.015	0.019	0.020
	(0.119)	(0.121)	(0.121)
STEM (3-year)	0.027	0.063	0.065
	(0.116)	(0.117)	(0.117)
Business (3-year)	0.065	0.093	0.094
	(0.107)	(0.109)	(0.109)
Health Sciences	0.035	0.054	0.061
	(0.109)	(0.110)	(0.110)
Humanities	0.194	0.205	0.212
	(0.180)	(0.180)	(0.180)
Social Sciences	−0.048	−0.015	−0.013
	(0.092)	(0.094)	(0.094)
Science and Math	−0.056	−0.015	−0.011
	(0.103)	(0.105)	(0.105)
Engineering	0.006	0.052	0.055
	(0.108)	(0.110)	(0.110)
Medicine	0.091	0.137	0.137
	(0.118)	(0.121)	(0.120)
Business	−0.013	0.027	0.029
	(0.095)	(0.097)	(0.097)
Law	−0.053	−0.012	−0.010
	(0.096)	(0.099)	(0.099)
Observations	87,551	87,551	87,551

Notes: This table reports the causal effect of enrolling in a college field using the admissions cutoffs as an instrument. The outcome variable is an indicator for whether a man ever had a child in the household since the age of 25. The three columns show results assuming a linear (q=1), a cubic (q=3), and quintic (q=5) functional form of the running varible on either side of the cutoff. *p<0.1; **p<0.05; ***p<0.01

Table 7: Causal Effect of Enrollment Field on **Number of Children in HH** at 35 years old (men)

First Enrollment	2SLS (q=1)	2SLS (q=3)	2SLS (q=5)
Non-STEM (3-year)	0.152	0.216	0.219
	(0.249)	(0.253)	(0.253)
STEM (3-year)	0.088	0.153	0.160
	(0.246)	(0.249)	(0.249)
Business (3-year)	−0.019	0.038	0.042
	(0.222)	(0.226)	(0.226)
Health Sciences	0.024	0.063	0.075
	(0.229)	(0.232)	(0.232)
Humanities	0.584	0.606	0.618
	(0.378)	(0.379)	(0.379)
Social Sciences	0.104	0.168	0.175
	(0.192)	(0.197)	(0.197)
Science and Math	−0.106	−0.033	−0.020
	(0.218)	(0.221)	(0.222)
Engineering	0.111	0.192	0.204
	(0.229)	(0.234)	(0.234)
Medicine	0.361	0.453*	0.456*
	(0.254)	(0.260)	(0.260)
Business	−0.077	−0.003	0.005
	(0.201)	(0.206)	(0.206)
Law	−0.054	0.025	0.031
	(0.204)	(0.210)	(0.210)
Observations	87,551	87,551	87,551

Notes: This table reports the causal effect of enrolling in a college field using the admissions cutoffs as an instrument. The outcome variable is the maximum number of children that a man ever had in the same household since the age of 25. The three columns show results assuming a linear (q=1), a cubic (q=3), and quintic (q=5) functional form of the running varible on either side of the cutoff. *p<0.1; **p<0.05; ***p<0.01

5 Concluding Remarks and Plans

Our preliminary analysis reveals that enrollment in some higher-paying college fields is associated with increased fertility outcomes for women, particularly prior to age 35. While these findings are preliminary, they suggest an important relationship between educational specialization and future fertility. Current data limitations constrain our observation window, though a new expanded dataset will enable analysis of completed fertility patterns across many more cohorts.[11] We further plan to explore the effect on birth timing and spacing across cohorts, and integrate contraceptive and fertility treatment records (Gallen et al., 2025). The hundreds of enrollment thresholds offer opportunities to examine how field characteristics like flexibility and income potentially influence fertility decisions.

To better understand the mechanisms driving these fertility effects, we will explore several channels: whether income effects dominate negative substitution effects, labor market opportunities and choices, the role of benefits and leave policies (including means-testing and employer variation), assortative matching patterns, relationship stability, and spousal leave-taking behavior. Our analysis will incorporate measures of occupational hours, skill demands, and flexibility – building on foundational work in family economics (e.g. Becker and Lewis 1973; Heckman and Walker 1990; Francesconi 2002; Sheran 2007; Keane and Wolpin 2010; Goldin 2014; Adda et al. 2017; Bronson and Sanin 2024). This research aims to illuminate how educational choices shape both career trajectories and family formation decisions in contemporary society.

References

Aalto, A.-M., E. Mörk, A. Sjögren, and H. Svaleryd (2019). Does childcare improve the health of children with unemployed parents? evidence from swedish childcare access reform. *IFAU Working Paper 2019:1*.

Adda, J., C. Dustmann, and K. Stevens (2017). The Career Costs of Children. *Journal of Political Economy 125*(2), 293–337.

Albrecht, J., A. Björklund, and S. Vroman (2003). Is there a glass ceiling in Sweden. *Journal of Labor Economics 21*(1), 145–177.

Albrecht, J., P. S. Thoursie, and S. Vroman (2015). Parental leave and the glass ceiling in Sweden. *IFAU Working Paper 2015:4*.

Altmejd, A. (2018). Relative returns to swedish college fields. Technical report, Stockholm School of Economics.

Altmejd, A., A. Barrios-FernÃ¡ndez, M. Drlje, J. Goodman, M. Hurwitz, D. Kovac, C. Mulhern, C. Neilson, and J. Smith (2021). O Brother, Where Start Thou? Sibling Spillovers on College and Major Choice in Four Countries. *Quarterly Journal of Economics 136*(3), 1831–1886.

Altonji, J. G., P. Arcidiacono, and A. Maurel (2016). The analysis of field choice in college and graduate school: Determinants and wage effects. In *Handbook of the Economics of Education*, Volume 5, pp. 305–396. Elsevier.

[11] Our current application data starts in 1993 and our outcomes go until 2012. Our recently recieved data has college applications starting in 1977 (vs. 1993) and outcomes through 2023 (vs. 2012).

Altonji, J. G., E. Blom, and C. Meghir (2012a). Heterogeneity in human capital investments: High school curriculum, college major, and careers. *Annual Review of Economics 4*(1), 185–223.

Altonji, J. G., E. Blom, and C. Meghir (2012b). Heterogeneity in human capital investments: High school curriculum, college major, and careers. *Annu. Rev. Econ. 4*(1), 185–223.

Altonji, J. G., L. B. Kahn, and J. D. Speer (2016). Cashier or consultant? entry labor market conditions, field of study, and career success. *Journal of Labor Economics 34*(S1), S361–S401.

Arcidiacono, P., V. J. Hotz, A. Maurel, and T. Romano (2020). Ex ante returns and occupational choice. *Forthcoming in the Journal of Political Economy*.

Artmann, E., N. Ketel, H. Oosterbeek, and B. Van der Klaauw (2018). Field of study and family outcomes. Technical report, IZA Discussion Papers.

Artmann, E., N. Ketel, H. Oosterbeek, and B. van der Klaauw (2021). Field of study and partner choice. *Economics of Education Review 84*, 102149.

Avdic, D. and A. Karimi (2018). Modern family? paternity leave and marital stability. *American Economic Journal: Applied Economics 10*(4), 283–307.

Becker, G. S. (1960). An economic analysis of fertility. In *Demographic and economic change in developed countries*, pp. 209–240. Columbia University Press.

Becker, G. S. (1965). A theory of the allocation of time. *Economic Journal 75*(299), 493–517.

Becker, G. S. and H. G. Lewis (1973). On the interaction between the quantity and quality of children. *Journal of political Economy 81*(2, Part 2), S279–S288.

Björklund, A. (2006). Does family policy affect fertility? lessons from sweden. *Journal of Population Economics 19*, 3–24.

Black, D. A., S. Sanders, and L. Taylor (2003). The economic reward for studying economics. *Economic Inquiry 41*(3), 365–377.

Black, S. E., P. J. Devereux, and K. G. Salvanes (2008). Staying in the classroom and out of the maternity ward? the effect of compulsory schooling laws on teenage births. *The economic journal 118*(530), 1025–1054.

Bloom, D. E., M. Kuhn, and K. Prettner (2023). Fertility in high-income countries: Trends, patterns, determinants, and consequences. *Annual Review of Economics 16*.

Bordon, P. and C. Fu (2015). College-major choice to college-then-major choice. *Review of Economic Studies 82*(4), 1247–1288.

Bronson, M. A. and D. Sanin (2024). Female labor supply, fertility and parental leave policy design. Technical report, mimeo.

Chen, J. and J. Guo (2022). The effect of female education on fertility: Evidence from china's compulsory schooling reform. *Economics of Education Review 88*, 102257.

Cummins, N. (2022). The causal effects of education on age at marriage and marital fertility.

Cygan-Rehm, K. and M. Maeder (2013). The effect of education on fertility: Evidence from a compulsory schooling reform. *Labour Economics 25*, 35–48.

Dahl, G. B., D.-O. Rooth, and A. Stenberg (2023, January). High school majors and future earnings. *American Economic Journal: Applied Economics 15*(1), 351–82.

Doepke, M., A. Hannusch, F. Kindermann, and M. Tertilt (2023). The economics of fertility: A new era. In *Handbook of the Economics of the Family*, Volume 1, pp. 151–254. Elsevier.

Domeij, D. and P. Klein (2013). Should day care be subsidized? *Review of Economic Studies 80*(2), 568–595.

Duvander, A.-Z. E. (2008). Family policy in sweden: An overview. *Social Insurance Report 15*, 1–18.

Duvander, A.-Z. E., T. Lappegård, and M. Johansson (2020). Impact of a reform towards shared parental leave on continued fertility in norway and sweden. *Population Research and Policy Review 39*, 1205–1229.

Fort, M., N. Schneeweis, and R. Winter-Ebmer (2016). Is education always reducing fertility? evidence from compulsory schooling reforms. *The Economic Journal 126*(595), 1823–1855.

Francesconi, M. (2002). A joint dynamic model of fertility and work of married women. *Journal of labor Economics 20*(2), 336–380.

Gallen, Y., J. S. Joensen, E. R. Johansen, and G. F. Veramendi (2025). The labor market returns to delaying pregnancy. *SSRN Working Paper No. 4554407*.

Geruso, M. and H. Royer (2018). The impact of education on family formation: Quasi-experimental evidence from the uk. Technical report, National Bureau of Economic Research.

Ginja, R., A. Karimi, and P. Xiao (2023). Employer responses to family leave programs. *American Economic Journal: Applied Economics 15*(1), 107–135.

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review 104*(4), 1091–1119.

Grönqvist, H. and C. Hall (2013). Education policy and early fertility: Lessons from an expansion of upper secondary schooling. *Economics of Education Review 37*, 13–33.

Gustafsson, S. and R. Jacobsson (1985). Trends in female labor force participation in sweden. *Journal of Labor Economics 3*(1, Part 2), S256–S274.

Gustafsson, S. and F. P. Stafford (1992). Child care subsidies and labor supply in sweden. *Journal of Human resources*, 204–230.

Gustafsson, S. and F. P. Stafford (1994). Three regimes of child care: The united states, the netherlands, and sweden. In *Social protection versus economic flexibility: Is there a trade-off?*, pp. 333–362. University of Chicago Press.

Guzzo, K. B. and S. R. Hayford (2020). Pathways to parenthood in social and family contexts: Decade in review, 2020. *Journal of Marriage and Family 82*(1), 117–144.

Harper, S. (2014). Economic and social implications of aging societies. *Science 346*(6209), 587–591.

Hastings, J. S., C. A. Neilson, and S. D. Zimmerman (2013). Are some degrees worth more than others? evidence from college admission cutoffs in chile. Technical report, National Bureau of Economic Research.

Hayford, S. R., K. B. Guzzo, and P. J. Smock (2014). The decoupling of marriage and parenthood? trends in the timing of marital first births, 1945–2002. *Journal of Marriage and Family 76*(3), 520–538.

Heckman, J. J. and J. R. Walker (1990). The relationship between wages and income and the timing and spacing of births: Evidence from swedish longitudinal data. *Econometrica: journal of the Econometric Society*, 1411–1441.

Heinesen, E., C. Hvid, L. J. Kirkebøen, E. Leuven, and M. Mogstad (2022). Instrumental variables with unordered treatments: Theory and evidence from returns to fields of study. Working Paper 30574, National Bureau of Economic Research.

Hoem, B. and J. M. Hoem (1996). Sweden's family policies and roller-coaster fertility. *Journal of Population Problems 52*(3-4), 1–22.

Hoem, J. M., G. Neyer, and G. Andersson (2006). Education and childlessness the relationship between educational field, educational level, and childlessness among swedish women born in 1955-59. *Demographic research 14*, 331–380.

Humlum, M. K., J. H. Kristoffersen, and R. Vejlin (2017). College admissions decisions, educational outcomes, and family formation. *Labour Economics 48*, 215–230.

Humphries, J. E., J. S. Joensen, and G. F. Veramendi (2023). Complementarities in high school and college investments. *SSRN Working Paper No. 4560152*.

Humphries, J. E., J. S. Joensen, and G. F. Veramendi (2024). The gender wage gap: Skills, sorting, and returns. In *AEA Papers and Proceedings*, Volume 114, pp. 259–264. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.

Jaumotte, F. (2004). Labour force participation of women: Empirical evidence on the role of policy and other determinants in oecd countries. *OECD Economic studies 2003*(2), 51–108.

Joensen, J. S. and E. Mattana (2020). Student aid design, academic achievement, and labor market behavior: Grants or loans? *Available at SSRN: https://ssrn.com/abstract=3028295*.

Keane, M. P. and K. I. Wolpin (2010). The role of labor and marriage markets, preference heterogeneity, and the welfare system in the life cycle decisions of black, hispanic, and white women. *International Economic Review 51*(3), 851–892.

Kearney, M. S. and P. B. Levine (2022). The causes and consequences of declining us fertility. *Aspen Institute*.

Kearney, M. S., P. B. Levine, and L. Pardue (2022). The puzzle of falling us birth rates since the great recession. *Journal of Economic Perspectives 36*(1), 151–176.

Kinsler, J. and R. Pavan (2015). The specificity of general human capital: Evidence from college major choice. *Journal of Labor Economics 33*(4), 933–972.

Kirkebøen, L., E. Leuven, and M. Mogstad (2021). College as a marriage market. Technical report, National Bureau of Economic Research.

Kirkebøen, L. J., E. Leuven, and M. Mogstad (2016). Field of study, earnings, and self-selection. *Quarterly Journal of Economics 131*(3), 1057–1111.

Lappegård, T. and M. Rønsen (2005). The multifaceted impact of education on entry into motherhood. *European Journal of Population/Revue européenne de Démographie 21*, 31–49.

Liu, Q. and O. N. Skans (2010). The duration of paid parental leave and children's scholastic performance. *The BE Journal of Economic Analysis & Policy 10*(1).

Lundin, D., E. Mörk, and B. Öckert (2008). How far can reduced childcare prices push female labour supply? *Labour Economics 15*(4), 647–659.

McCrary, J. and H. Royer (2011). The effect of female education on fertility and infant health: evidence from school entry policies using exact date of birth. *American economic review 101*(1), 158–195.

Mincer, J. (1963). Market prices, opportunity costs, and income effects. *Measurement in economics*, 67–82.

Monstad, K., C. Propper, and K. G. Salvanes (2008). Education and fertility: Evidence from a natural experiment. *The Scandinavian Journal of Economics 110*(4), 827–852.

Mörk, E., A. Sjögren, and H. Svaleryd (2013). Childcare costs and the demand for children - evidence from a nationwide reform. *Journal of Population Economics 26*.

Öckert, B. (2010). What's the value of an acceptance letter? using admissions data to estimate the return to college. *Economics of Education Review 29*(4), 504–516.

Patnaik, A., M. Wiswall, and B. Zafar (2021). College majors. *Handbook of the Economics of Education*, 415–457.

Ransom, M. R. and A. Phipps (2017). The changing occupational distribution by college major. In *Skill Mismatch in Labor Markets, Research in Labor Economics*, Volume 45, pp. 129–171. Emerald Publishing Limited.

Rønsen, M. and M. Sundström (2002). Family policy and after-birth employment among new mothers–a comparison of finland, norway and sweden. *European Journal of Population/Revue europeenne de demographie 18*, 121–152.

Sheran, M. (2007, July). The Career and Family Choices of Women: A Dynamic Analysis of Labor Force Participation, Schooling, Marriage and Fertility Decisions. *Review of Economic Dynamics 10*(3), 367–399.

Silles, M. A. (2011). The effect of schooling on teenage childbearing: evidence using changes in compulsory education laws. *Journal of Population Economics 24*, 761–777.

Sloane, C. M., E. G. Hurst, and D. A. Black (2021). College majors, occupations, and the gender wage gap. *Journal of Economic Perspectives 35*(4), 223–248.

Smock, P. J. and F. R. Greenland (2010). Diversity in pathways to parenthood: Patterns, implications, and emerging research directions. *Journal of Marriage and Family 72*(3), 576–593.

Sundström, M. and A.-Z. E. Duvander (2002). Gender division of childcare and the sharing of parental leave among new parents in sweden. *European Sociological Review 18*(4), 433–447.

Sundström, M. and F. P. Stafford (1992). Female labour force participation, fertility and public policy in sweden. *European Journal of Population/Revue Europeenne de Demographie*, 199–215.

van den Berg, G. J. and B. M. Siflinger (2022). The effects of a daycare reform on health in childhood–evidence from sweden. *Journal of Health Economics 81*, 102577.

Virtanen, H., M. Silliman, T. Kuuppelomäki, and K. Huttunen (2024). Education, gender, and family formation. Technical report, ETLA Working Papers.

Willis, R. J. (1973). A new approach to the economic theory of fertility behavior. *Journal of political Economy 81*(2, Part 2), S14–S64.

A Institutional Setting Appendix

A.1 College Admissions

In this Appendix, we describe the college application, admission, enrollment, and graduation decisions in more detail.

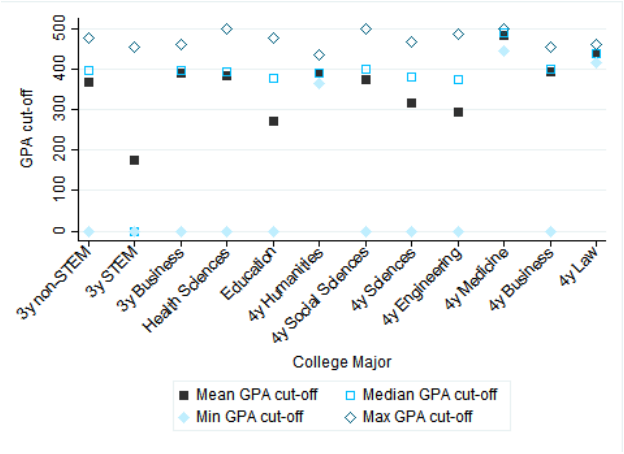
College admission is largely centrally administered. A college applications consist of a list with up to 20 rank-ordered alternatives, and students also submit their high school diploma and transcripts. An alternative consists of a program (e.g. Economics) and a college (e.g. Stockholm University). Universities/colleges are responsible for specifying competence requirements and selection within the regulation of the Higher Education Act, while the Swedish National Agency for Higher Education (now UHR) is a supervisory authority that checks that colleges comply with the regulatory framework. If there are more seats than applicants, then all qualified applicants are admitted. Qualifications are determined by high school courses, and may vary by programs and colleges. The basic requirement is a high school degree, and each college-program has additional requirements related to prerequisite high school courses and grades. When there are more applicants for a college-program than there are seats, the selection is based on the following three main admission groups are screening students on: (i) high school GPA, (ii) SweSAT test score, and (iii) SweSAT test score with additional admission points for relevant labor market experience. Each college-program has a fixed number of seats available in each admission group: at least one third has to be admitted through group (i), at least one third has to be admitted through groups (ii) and (iii), and at most a third through alternative admission rules; predominantly personal interviews. GPA and SweSAT cut-offs in each admission group are determined are determined by a serial dictator mechanism. Each student is admitted to the highest priority they are above the cut-off for in one of the admission groups. After admission decisions are communicated in the first round, students who are evaluated to be qualified based on their high school transcripts but are not admitted to their preferred alternative can be wait-listed and admitted in a second round in August as seats can become available if someone does not accept their initial allocation.

Aggregate college admission data is available from the website of the Swedish Council of Higher Education (UHR). We compiled these statistics for 1998-2010 to show differences in selectivity and admission practices.[12] Figure A1 shows the GPA and SweSAT cut-offs for each college major. It reveals that some majors (e.g. Medicine and Law) are very selective. Panel (c) reveals, however, that Medicine is also the one exception, where a significant fraction of individuals (25%) that are below the cut-off are admitted based on personal interviews. Finally, the micro data on college applications and admissions from the Swedish National Archives

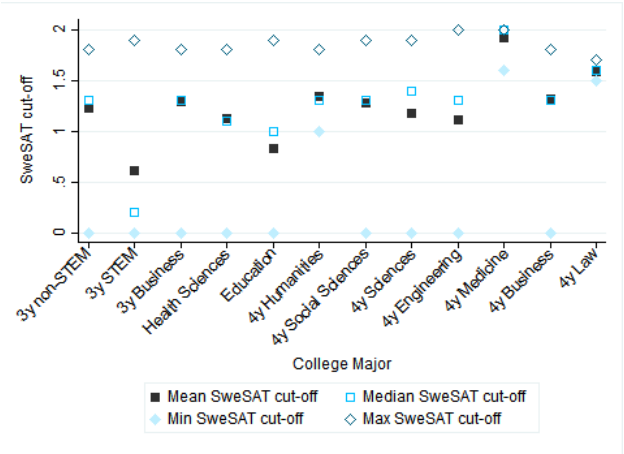
[12] We are in the process of scanning the data for earlier years as these are only available in book form. We are also in the process of cleaning the individual application data from 1993 onward.

(*Riksarkivet*) enables us to directly assess to which extent admission probabilities are taken into account when applying. Figure A2 reveals that students with high high school GPA have highes admission probabilities, apply to more selective programs, and are more likely to be admitted to their more preferred programs. We also find that applications differ substantially by geographic cluster. Figure **??** singles out the location of the leading colleges and universities by one international and one national ranking, the Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) and the commonly used Swedish Fokus ranking. We see substantial geographic variation. Students are particularly likely to prefer the college that is closest to home when there is a highly ranked college within the cluster.

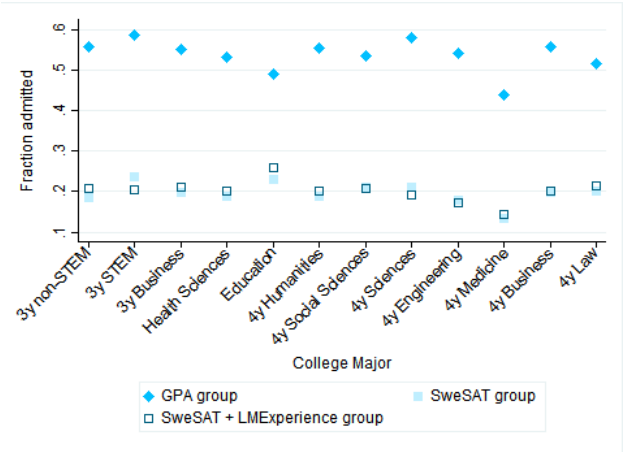
Appendix Figure A1: Selectivity and Admission, by College Major.



(a) GPA cut-off



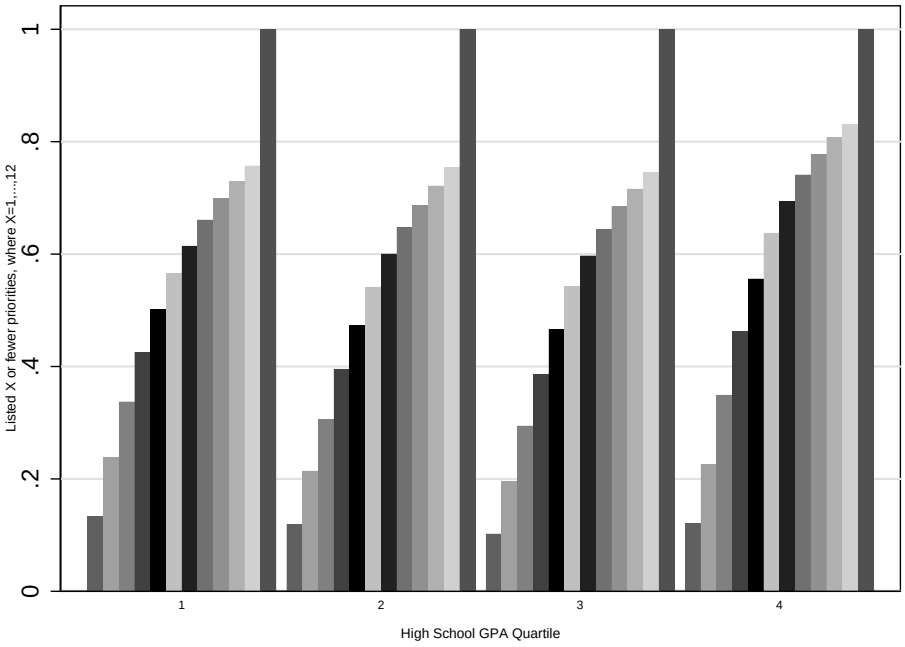
(b) SweSAT cut-off



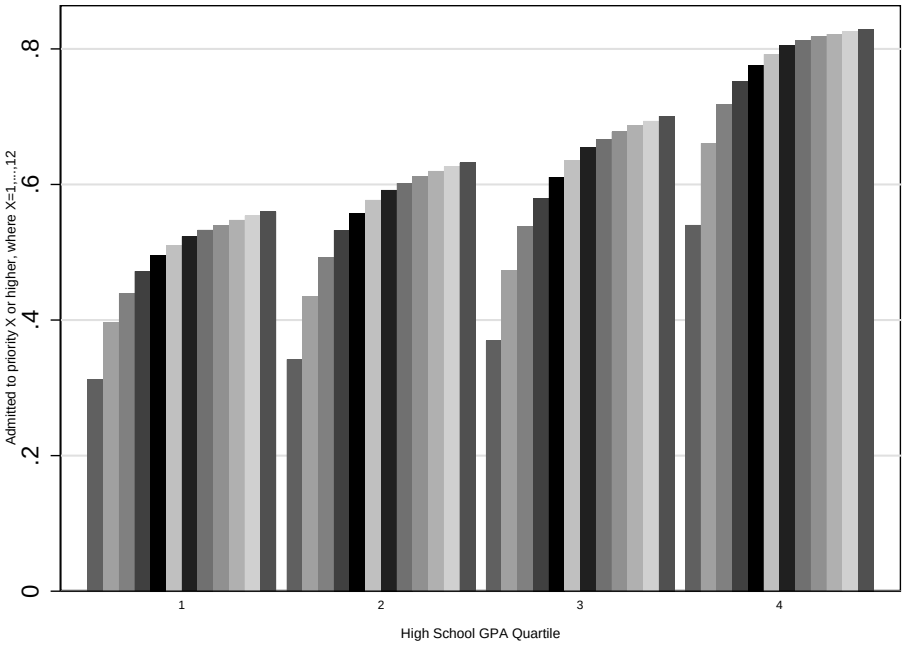
(c) Fraction admitted, by admission group

Note: The Figures display admission statistics for each college major. Panel (a) displays the mean/median/min/max of the GPA cut-off for all college-programs within each college major. Panel (b) displays the mean/median/min/max of the SweSAT cut-off for all college-programs within each college major. Panel (c) displays the fraction admitted in each of the three main admission groups: GPA, SweSAT, and SweSAT plus relevant labor market experience. GPA is measured on a 0-500 scale, while SweSAT is measured on a 0-2 scale. A cut-off of 0 simply means that all were admitted in the relevant admission group. *Sample*: Aggregate admission statistics for 1998-2000 compiled from UHR.

Appendix Figure A2: College Application and Admission.



(a) Fraction listed at least X priorities



(b) Fraction Admitted to Priority X or higher

Note: This Figure describes how many priorities are listed on college applications and which priority individuals were admitted to, by hich school GPA quartile. Panel (a) shows the fraction of applicants within each GPA quartile listing at least X priorities, where $X \in \{1, ..., 12\}$. Panel (b) shows the fraction of applicants within each GPA quartile that is admitted to priority X or a higher/preferred priority, where $X \in \{1, ..., 12\}$.

Appendix Table A1: College Programs within Major, First Enrollment for men

College Major, 1st enrollment	Fraction of major	SUN2000Inr Code
Non-STEM (short)		
Journalism and Media Science	0.14	321
History and Archeology	0.13	225
Media production	0.10	213
Transportation	0.05	840
Sociology, Ethnology, and Cultural Geography	0.06	312
Business (short)		
Business Administration, Trade and Administration (general)	0.64	340
Management and Administration	0.14	345
Purchasing, Sales, and Distribution	0.08	341
Business Administration, Trade and Administration (other)	0.08	349
Marketing	0.05	342
STEM (short)		
Energy- and Electrical Engineering	0.25	522
Mechanical Engineering	0.21	521
Electronics, Computer Engineering and Automation	0.17	523
Building- and Construction Engineering	0.10	582
Computer Science and Systems Science	0.06	481
Health Sci		
Nursing	0.47	723
Social work and Guidance	0.23	762
Therapy, Rehabilitation, and Dietary treatment	0.15	726
Dental care	0.05	724
Technically oriented health education	0.05	725
Education		
Specialist Teacher	0.41	145
Pedagogy and Teacher education (other)	0.21	149
Teacher, primary school	0.14	144
Teacher, preschool and leisure activities	0.14	143
Teacher, vocational and practical/aesthetic subjects	0.09	146
Humanities		
Foreign Language	0.21	222
History and Archeology	0.18	225
Religion	0.17	221
Music, Dance, and Drama	0.15	212
Media production	0.07	213
Social Sciences		
Social and Behavioral Science (general)	0.47	310
Psychology	0.11	311
Sociology, Ethnology, and Cultural Geography	0.07	312
Transportation	0.07	840
Political Science	0.06	313
Business		
Business Administration, Trade and Administration (general)	0.87	340
Marketing	0.10	345
Management and Administration	0.02	342
Business Administration, Trade and Administration (other)	0.01	349
Law		
Law	1.00	380
Sciences and Computer Science		
Computer Science and Systems Science	0.37	481
Mathematics and Science (other)	0.25	469
Biology and Biochemistry	0.07	421
Physics	0.06	441
Chemistry	0.04	442
Engineering		
Mechanical Engineering	0.17	521
Electronics, Computer Engineering and Automation	0.17	523
Technology and Industry Engineering (general)	0.16	520
Energy and Electrical Engineering	0.14	522
Industrial Economics and Organization	0.08	526
Medicine		
Medicine	1.00	721

A.2 Social Insurance in Sweden

Sweden has a high level of social insurance, and it is a Nordic welfare state with a long history of providing high quality and low cost (to the individual) health- and childcare. Sweden simultaneously has maintained high fertility rates and women are almost as likely to work as men (Gustafsson and Jacobsson, 1985; Sundström and Stafford, 1992; Rønsen and Sundström, 2002) but not as likely to reach the top of the career ladder and earn top incomes (Albrecht et al., 2003, 2015).

This could partly be because Sweden has a generous family policy aimed at supporting the combination of working *and* raising children.[13] The Swedish welfare state provides both financial and in-kind support for families with children; including paid parental leave, subsidized child care, paid leave to take care of sick children, and universal child allowances. Swedish family policy asserts the same rights and obligations regarding family and labor market work for both women and men. Most support is conditional on (past) earnings, but individual and independent of civil status (Gustafsson and Stafford, 1992, 1994). This together with individual (progressive) taxation provides strong work incentives in single- as well as dual-earner families.

Parental Leave Sweden already had paid maternity leave and strong job protection for mothers from the mid-1950s. Björklund (2006) describes the evolution of family policies from the 1960s through the following two decades in which there were several major extensions of its generosity. Importantly, in 1974, it became a parental leave system. Although fathers have the same rights to parental leave as mothers, mothers continue to utilize the bulk of paid leave opportunities (Sundström and Duvander, 2002; Duvander et al., 2020; Ginja et al., 2023). More recent papers describing the parental leave scheme during our sample period include Liu and Skans (2010) and Avdic and Karimi (2018).

Parents generally have the right to take full-time parental leave with a duration until their child is up to 18 months old. Since 2002, parents have been allotted a total of 480 days (approximately 16 months) of leave for each child. 390 of these days (approximately 13 months) are based on past income ("parental salary") provided they had been employed for 240 days before leave, otherwise they receive a basic "parental allowance" that is the same amount as the sick leave benefit. The parental salary amount depends on unemployment insurance fund membership and the collective agreement the individual is subject to. Most of the largest funds provide a parental salary such that the total parental benefits replace up to 90% of the parents' salary for the first six months of leave. Many employers also top this up such that many parents face an effective replacement rate of up to 95% for the duration of a year. The remaining 90 days are worth 90 SEK per day if the child was born before July 1, 2006, and 180 SEK per day if the child was born after

[13] See, for example, Hoem and Hoem (1996), Rønsen and Sundström (2002), Björklund (2006), and Duvander (2008) for an overview of Swedish family policy and related employment legislation and Jaumotte (2004) for an OECD country comparison.

July 1, 2006.

The only restriction on how parents distribute the parental leave time among them (during our sample period, or more specifically 2002-2016) is that two months of the allotted leave time is set aside to each parent.[14]

Child Benefits During our sample period of 2005-2012, other benefits related to having a child include temporarily taking care of a sick child, taking care of a sick child for more than six months, and the municipal extension of taking care of a 1-3 year old in special circumstances.

The monetary transfer for temporarily taking care of a sick child is known as *Vab* (an abbreviation of "*vård av barn*"). Parents are eligible for this benefit when they are taking care of a child who must miss school due to sickness, accompanying a child to a visit with a doctor, children's health center, dentist, or child and adolescent psychiatry. Parents can receive these benefits for either 75, 50, 25, or 12.5 percent of a day. Payment is equivalent to slightly less than 80 percent of income. Parents are allotted a maximum of 120 days of *Vab* per year per child, with both parents sharing these 120 days. If a child is sick for more than seven days, parents must submit a letter from a doctor or nurse to the Swedish Social Insurance Agency.

If taking care of a sick child for more than six months, parents are eligible for an additional benefit ("*vårdbidrag*") primarily intended for parents whose child had a disability and/or a chronic disease.[15]

The remaining benefit related to having a child is the municipal extension of taking care of a 1-3 year old in specific circumstances ("*kommunalt vårdnadsbidrag*") which was fully in place in 2011, but it was discontinued in 2016. This transfer allowed municipalities to provide monetary benefits to parents if their child was registered in the municipality and did not have a full-time spot in a preschool program. Aid was split evenly between both parents, regardless of whether one of them was registered outside the municipality. In any given month, parents would not be eligible for payments if they had received parental leave benefits, unemployment benefits, vocational aid, government-provided sick pay, pension payments, aid for assisting the elderly, or certain aid for newly-arrived immigrants.[16]

Childcare Local-government-subsidized center-based childcare is another important component of Swedish family policy. The contemporary daycare system was established in the 1960s and expanded substantially through the 1970s (Björklund, 2006; Gustafsson and Stafford, 1994). The children born during our sample period attend daycare during the post-reform regime described in more more details in Lundin et al. (2008),

[14] See the Parental Leave Act (1995:584) for the complete law text and its changes over time, available in the Swedish digital law archives. The law was enacted in 1995 and there was only one minor change during our sample period in 2006 (2006:442). Also see the Social Security Code (2010:110) for more details.

[15] See the Act on Disability Compensation and Care Allowance (1998:703) and the Social Security Code (2010:111) for complete law text and changes over time.

[16] See the Act on Municipal Guardianship Allowance (2008:307) for the complete law text and changes over time.

Mörk et al. (2013), Aalto et al. (2019), and van den Berg and Siflinger (2022).

Municipalities are required by law to provide highly subsidized, high-quality care to children whose parents work or study during regular work hours. Consequently, enrollment rates are as high as around 70% for children ages 1-2 years old and 90% for children ages 3-6 years old. Childcare is highly subsidized and parents pay a percent of household income but with a cap.[17] The cap is low as the intention in the law is that no parent refrain from childcare due to economic reasons. Child care is offered during regular work hours.

Health Care Healthcare is universal, mostly public, and organized at the county level.[18] Co-payments and out-of-pocket expenses are generally low and capped.[19]

A key source of care for young children in Sweden is the child health care service (BHV). Its goal is to promote children's health, development, and well-being. It focuses on children's everyday lives, health, and development, raises awareness of various health risks, performs age-based health checkups, administers vaccinations, assists children with disabilities and/or chronic illnesses, and aids parents who are at risk. Like overall healthcare, BHV is controlled at the county level. BHV is free of charge and universally offered to children from birth to when they start pre-school (or first grade for those who do not attend pre-school). For school-aged children, preventive health services and vaccinations are organized and provided by school nurses within schools. These services cover all children, and they are also free of charge.[20]

While healthcare is primarily provided at the public level, private healthcare is also available in Sweden. Private healthcare can either be under contract with the local/regional authorities or not be under contract. With healthcare administration being decentralized, patient fees differ across the country. Referrals from general practitioners are not required to contact a specialist, but if a patient does not have a referral, they may need to pay more and/or wait longer.

[17] Domeij and Klein (2013) use data from Germany to show that subsidizing daycare can substantially increase welfare by encouraging women with small children to work in an economy with distortionary taxes on labor, while Lundin et al. (2008) find that female labor supply inelastic at the high level of daycare prize subsidies in the Swedish childcare system the mothers in our sample face.

[18] Aalto et al. (2019) and van den Berg and Siflinger (2022) describe health care for children in Sweden during our sample period in more details.

[19] Act (2002:160) on Pharmaceutical Benefits (consolidated until SFS 2013:1141) reflects all changes until the end of our sample period. This law contains provisions on pharmaceutical benefits and price regulation of goods included in the benefit.

[20] The Health and Medical Care Act (1982:763) (consolidated until SFS 2013:1141 to reflect all changes until the end of our sample period) states the goal of health care and thus also child health care: "The goal of health care is good health and care for equal conditions for the entire population. Care must be given with respect for the equal value of all people and for the dignity of the individual person. Those who have the greatest need for health care must be given priority to receive care."