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ABSTRACT

Rich Grad, Poor Grad: Family Background and College Major Choice*

Expected earnings matter for college major choices, and majors differ in both their average earnings and the age profile of their earnings. We show that students' family background is strongly related to the earnings paths of the major they choose. Students with more educated parents, especially those who have graduate degrees, choose majors with lower early-career earnings but much faster earnings growth. They are also less likely to choose safe majors with little early-career earnings or unemployment downside. Parental income has a weaker relationship with major choice and operates mostly through the type of institution the student attends.

JEL Classification: I21, I23
Keywords: college major, family background

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1 Introduction

For people who attend college, the choice of college major is one of the most important economic decisions of their lives. The earnings gap between majors can be as large as the college earnings premium itself (Altonji et al., 2012), and recent evidence shows that much of this difference is causal (Hastings et al., 2013; Kirkebøen et al., 2016). While expected earnings are an important component of the major choice for many students (Arcidiacono, 2004; Conlon, 2021; Patnaik et al., 2022; Wiswall and Zafar, 2015a), other factors such as parental approval and enjoying coursework also matter (Zafar, 2013).

While majors differ greatly in average or lifetime earnings, they also differ in the age profile of their earnings. Some majors pay off well early in the career, with relatively high earnings and good job prospects shortly after graduation. Other majors typically lead to low earnings in the years following college, but much higher earnings later in life. Parental expectations and family financial constraints could push students to choose majors with different earnings profiles. In particular, some students may prioritize early-career earnings over later success.

In this paper, we investigate the relationship between family background and the earnings age profiles of students' chosen college majors. We first document the large differences in age profiles between majors. While some majors are always near the top (e.g., engineering) or bottom (e.g., theology) of the earnings rankings, other majors move around considerably over the career. Majors like nursing, education, and business rank higher in average earnings early in the career than in mid-career, while majors like biology, history, and philosophy follow the opposite pattern.

Second, we ask whether college students with different family backgrounds are more likely to choose one type of major or the other. Such a pattern could emerge for a variety of reasons. Students whose parents have lower incomes may face financial pressure to choose majors that pay off earlier in life; if so, they may trade off later-life earnings in exchange for financial security soon after college. Parents' educational

background could also matter. Parents with differing education levels could have different expectations for their children when it comes to field of choice. Parental education may also impact the students' exposure to different occupations and role models, which have been shown to influence major choice (Porter and Serra, 2020).

We find evidence that parental education and income are related to the types of major chosen by students. Students with more educated parents (conditional on parents' income) choose majors with *lower* lifetime earnings, but students with higher-income parents (conditional on parents' education) choose majors with slightly *higher* lifetime earnings.

We then dig into the earnings age profiles of the majors students choose. Parental education is strongly related to the earnings growth of the major that students choose. Students whose parents have more education – particularly those who have graduate degrees – choose majors with much faster earnings growth and are less likely to choose safe, low-downside majors. Many of these fast-growth majors have low earnings until much later in the career. The same patterns hold both for students who plan to, and students who do not plan to, attend graduate school.

While income and education are positively correlated, parental income is a weaker predictor of major earnings growth and choosing a safe major than parental education is. Students whose parents have higher incomes choose the faster-growth majors, but the association is somewhat weak and disappears when controls for higher education institution type are added. In other words, parents' income seems to influence where students attend college, but not so much what they study once they are there. Parental education, on the other hand, is always a significant predictor of major choice, and operates mostly within institution type. We show that parental education explains more of the variance in students' major choices than parental income.

Finally, we find that the influence of family background, especially education, does not weaken as students progress through college. Using data on the majors that students report as freshmen and as seniors, we find that the senior-year major is more strongly related to parental education than the freshman-year major. This suggests

that while students encounter many influences during college, including new peers and faculty, these influences do not crowd out the influence of family. Indeed, as students approach graduation and the labor market, family influence may grow in importance.

College major choice is one of the most studied topics in the economics of education. This is a complex decision for students. Major choice has been shown to depend on (among other things) preferences (Arcidiacono, 2004; Wiswall and Zafar, 2015a; Zafar, 2013), peer effects (Feld and Zölitz, 2022; Fischer, 2017; Zölitz and Feld, 2020), grades or feedback (Astorne-Figari and Speer, 2019; Pistolesi, 2017), the stereotypical occupations associated with different majors (Conlon and Patel, 2022), parental expectations (Zafar, 2013), economic conditions (Blom et al., 2021; Weinstein, 2020), and even the order in which college courses are taken (Patterson et al., 2019). Yet major choice also depends on what students expect to earn if they major in a certain field (Beffy et al., 2012; Rapoport and Thibout, 2018; Wiswall and Zafar, 2015a).

Research on major choice and expected earnings has generally focused either on some measure of lifetime earnings for a major (e.g., Webber (2016)) or on earnings for the major at a certain age (e.g., Wiswall and Zafar (2015a,b)). Recent work, though, has documented the fact that majors also differ in their earnings growth over the course of a career. Some majors pay off more early in the career, and others pay off later, meaning that majors with similar lifetime earnings can have very different earnings age profiles. Andrews et al. (2022) document these patterns in detail. Martin (2022), Leighton and Speer (2020), and Deming and Noray (2020) all show that a major's earnings growth is related to other characteristics of that major, including its specificity, vocational nature, and technological intensity. This implies that how much a student discounts future earnings is relevant for her major choice.

There has been little work studying the role of family background in major choice, but the evidence that does exist suggests that it is likely to matter. Saks and Shore (2005), using variance of earnings as a measure of risk, find that wealthier students choose riskier majors. In the UK, Adamecz-Völgyi et al. (2022) find that first-in-family

college graduate women (but not men) earn less than those with college-educated parents, with part of that penalty explained by major choice. Chise et al. (2019) find a sizable intergenerational correlation in the choice of a STEM degree in Italy. In the popular press, it has been suggested that wealthier students choose less "practical" majors like English and history because they have more financial cushion against low earnings (Pinsker, 2015).

Two particularly relevant papers focus (separately) on the roles of parental education and income in major choice. Trejo (2016) focuses on parental education and finds that first-generation college students are more likely than other students to choose majors with strong early-career returns and a "clear career path". Contemporaneous work by Hampole (2022) instead focuses on family income using an impressive combination of data sources. She documents that students from lower-income neighborhoods and those whose parents have lower credit scores are more likely to choose majors associated with higher initial earnings but slower earnings growth.

Our chief contribution is to combine these strains into a fuller study of the relationship between major choice and family background. Significantly, our data include both parental income and parental education. Our findings strongly suggest that parental education is more predictive of the type of major a student chooses than parental income. The associations are not always monotonic but are strongest for students whose parents have advanced degrees. This suggests that the parents' own experience with higher education influences how students trade off early and later returns to their major, while – for those students who enroll in college – parents' income has less influence.

This finding hints at the mechanisms by which parents influence their children's major choices, and therefore their careers, lifetime earnings, and earnings paths. The relatively weak relationships between major choice and parental income operate mostly or entirely through the type of institution the students attend, suggesting that family income has a strong influence on where people go to college but less on what people study once they get there. This also implies that for major choice itself,

credit constraints are not a dominant factor. Parents' expectations – for instance, that college results in a "good job" after graduation, or that the child will match or exceed their own education level – may be particularly influential.

Our results show that students who enter college do not share a level playing field in making their major decisions. Much of the research on the factors that influence major choice has used data from highly selective universities (Ersoy and Speer, 2022; Wiswall and Zafar, 2015a; Zafar, 2013), where most students are high-income, have highly educated parents, or both (Chetty et al., 2020). We show that students with humbler family backgrounds – which includes most students at less elite universities – prioritize major attributes differently.

The remainder of the paper proceeds as follows. Section 2 presents the theoretical framework that we use to motivate our analysis. Section 3 discusses our two major data sources and introduces our outcome variables. Section 4 describes our empirical framework and presents the main results, while Section 5 expands the results and provides robustness checks. Section 6 concludes with a discussion of the implications of our results.

2 Theoretical framework

Theoretically, there are several reasons parental education and income could be related to major choice. Students with lower family incomes, for example, may face credit constraints that necessitate choosing a major with strong earnings right after college and a low chance of being unemployed. Students with less-educated parents, including those who are first-generation college students, may have not been exposed to as many role models who are doctors, lawyers, or professors – paths which pay off later in life and not right after college. They may interpret low early-career earnings as a symptom of low-return college investments, and therefore opt for majors that yield strong earnings before age 30. Their parents may also expect that a college degree must be "practical" and "worth it" – again guiding the student toward the majors that

pay off earlier in life. On the other hand, parents with advanced degrees may themselves have experienced sharp earnings growth after a long period of low or negative income, and therefore feel confident in guiding their children toward majors that pay off later in life.

We hypothesize that students with higher parental income will choose the majors that have faster earnings growth, prioritizing later-life earnings over early-career earnings. We also expect students whose parents have more education to choose the faster-growth majors and those whose parents have less education to choose the safer and slower-growth majors. We have no prior expectation on whether parental education or parental income will have a stronger relationship with students' major choices, so we will also investigate this question.

We motivate our empirical analysis with a simple model of major choice. Drawing on the framework proposed by Altonji et al. (2016a), we let there be two types of majors: early (E) and late (L). These majors differ in the time path of their earnings: *early* majors pay off shortly after graduation, while *late* majors have a higher growth rate of earnings. Students vary in their time preference of earnings. The payoffs to student i holding major j in period t are given by:

$$U_{ijt} = (1 + G_j^{t-1})(\alpha_{1j}), \tag{1}$$

where j is major type (E or L); t is time (from period 1, labor market entry, to T, retirement); G_j is growth rate in earning (with $G_L > G_E$); and α_{1j} is the first period earnings of major j. Students choose their major to maximize the discounted sum of their payoffs, given by the following equation:

$$E\{\sum_{j\in\{E,L\}}\sum_{t=1}^{T}\beta_i^t d_{ij}(U_{ijt} + e_{ijt})\}, \tag{2}$$

where β_i is the student's discount factor; d_{ij} is a dummy variable equal to 1 for student i who studied major j and the e_{ijt} are idiosyncratic shocks.

This simple model has the following empirical implication: all else equal, there is a value of β at which the optimal major choice switches from L to E. While we do not observe a student's discount factor, we hypothesize that it will be determined in practice by two sets of factors: constraints and preferences. Constraints include financial constraints, such as a need to support themselves independently after graduation, or the need to pay off student loans early in the working life. Preferences can include a desire for a certain lifestyle after college, social pressures to conform to expectations of family and friends, or enjoyment of non-pecuniary occupational amenities of majors with early or late earnings. Our empirical strategy seeks to uncover how a student's socioeconomic background is related to their discount factor β and therefore to their choice of an early or late major.

3 Data

3.1 Data sources

We rely on two primary data sources for our analysis: the 2009-2018 waves of the American Community Survey (ACS: United States Census Bureau) and a set of matched freshman-senior observations from the Higher Education Research Institute (HERI). We use the ACS to construct majors' earnings profiles over the course of a career and the HERI data to look at how major choice is related to family background.

The simple model we presented classified majors as "early" or "late" depending on their earnings profiles by age. The ACS's large sample allows us to study this with detailed major categories. To measure early- and later-career earnings, we take the average wage and salary earnings of graduates early in the career (ages 27-30, which we will call "age 28") and later in the career (ages 44-46, or "age 45").[1] We also measure

[1]We start at age 27 to avoid most of the impacts of graduate school, following Altonji et al. (2016b). All of our results are similar when using age 24-26 for the early-career earnings or when using median earnings

the probability of employment, full-time employment, and unemployment at age 27-30, which we use to construct a measure of which majors are "safe" – that is, associated with reliable early-career labor market outcomes and little downside risk.

The ACS is a cross-sectional data set, not a panel, so we are not following people over time as they age. When we construct a major's average earnings profile, we are using those who are ages 28 and 45 at the time of the survey. This means we cannot separate age effects and cohort effects. Among other things, the content of the same college degree could be different for recent graduates as compared to older ones. This is likely minor for most majors, but it could matter for more technical degrees like computer science.

Because the ACS does not include family background information, we require a second data set to investigate the relationship between family background and major choice. For this, we use data from the Higher Education Research Institute. These data come from annual surveys administered to freshman and senior students at colleges across the United States. Specifically, we use a subset of the HERI data which includes matched freshman-senior observations on about 200,000 college students from 1994 to 2008. We use the senior survey to get measures of a student's "final" college major, and later we compare that to the "intended" major from the same student's freshman survey.

Importantly for us, the HERI data contains information on family background. During the freshman-year survey, respondents are asked the highest level of education completed by both their mother and father, as well as their parents' combined income. This information, combined with the college major of the student and the large sample size, makes HERI well-suited to our purpose; however, the data have three limitations which should be highlighted. First, we do not know if the respondents actually graduated, as the survey was done during the senior academic year. It is likely that most students surveyed in their senior year do go on to graduate, but there will be some exceptions. Second, HERI does not have any information on post-graduation

instead of average.

outcomes, including graduate school attendance. The survey does ask whether the student intends to go to graduate school, which gives us an idea of the student's plans. Third, the sample is not necessarily representative of the U.S. college population. Hundreds of colleges and universities in the U.S. administer the HERI surveys, but institutions must opt to do so. The size of the sample and diversity of institutions in the data do, however, give a broader overview of college students in the United States than we would have from any single institution or state.

The ACS allows us to address the second shortcoming of HERI by providing information on the labor market outcomes of graduates from different majors.[2] Two other datasets with post-graduation outcomes help us explore the importance of the other weaknesses. The National Longitudinal Study of Youth (NLSY: United States Bureau of Labor Statistics) also contains similar information to HERI, but in a much smaller sample. The National Survey of College Graduates (NSCG: National Center for Science and Engineering Statistics) does not contain information on family income, although it does have some information on parents' education, and is much larger than the NLSY. We use these alternative data sets to test the robustness of our findings.

3.2 Outcome variables

We will use three primary outcome variables in our analysis. The first is average lifetime earnings of the major. We calculate this by adding up the average earnings of each major at each age from 20 to 65 in the ACS, without discounting later earnings ($\beta = 1$). We compute lifetime earnings with no discounting because students from different backgrounds may have very different discount factor when evaluating majors.[3] Table A.3 shows the highest and lowest majors by lifetime earnings, as well as some of the majors ranked in the middle of the distribution. Note that these are not corrected for

[2]To merge labor market outcomes from the ACS with our working sample from HERI, we must cross-walk the 184 college major codes in the ACS to the 78 major codes in the HERI data. This is relatively straightforward, although a few small majors in the ACS do not match with any HERI code.

[3]The ranking of majors is not very sensitive to this. For example, if we instead set $\beta = 0.95$, the top 10 majors are essentially unchanged.

any type of selection bias into majors, but are meant to represent the observed average earnings that a student might see as they make their major decision.

The second outcome is how the major's average earnings grow with age. Our primary measure of growth is the percentage change in average earnings from age 28 to age 45 for each major. We also calculate the change in earnings rank for each major. To do this, we rank average earnings at ages 28 and 45. We then take the difference between the two rankings, i.e., how the major's rank changes over time.

Table 1 shows some examples of "early" (slower earnings growth) and "late" (faster earnings growth) majors. The slow-growth majors are generally more vocational in nature (e.g., nursing, education, and accounting), while the late-return majors are often those associated with medicine, law, or academic careers (e.g., biology, history, and philosophy).[4] In the Appendix, Table A.1 lists all of the fastest- and slowest-growth majors by earnings, and Figure 1 shows selected pairs of majors with similar lifetime earnings but different earnings paths.

Our final outcome measure is whether a major is safe: some majors are associated with more reliable early career job prospects than others. Anecdotally, many students express that they care about this, saying they want to be sure they have a job and a decent income in the years immediately following graduation. They do not want to take a chance on a major that may leave them unemployed or underemployed after college. We are interested in what types of students are attracted to these safe majors.

We define safe majors as those with limited downside labor market risk early in the career. A safe major is one with solid earnings and good employment prospects after college. Our measure of safe majors includes all those majors which rank low on unemployment (bottom 40 out of 78 majors), high on the probability of full-time employment (top 40 majors), *and* have a high probability of earning at least $40,000 at age 28 (top 40 majors).[5] Eighteen majors out of 78 qualify as safe under this definition

[4]For a detailed analysis of majors' earnings age profiles and associated job outcomes, see recent work by Andrews et al. (2022) and Martin (2022). For more on how the returns to vocational college majors evolve over the course of a career, see Leighton and Speer (2020).

[5]Results using an earnings threshold of $50,000 are similar. We have also experimented with measures based on only employment, only unemployment, and only earnings. The conclusions we draw are largely

Table 1: Examples of "early" and "late" return majors

Panel A: Sample majors with slow earnings growth ("Early" return majors)

Major	Rank, age 28	Rank, age 45	Rank change	% growth in earnings, 28 to 45
Social Work	70	78	-8	28.7
Elementary Education	69	77	-8	30.9
Nursing	19	46	-27	32.7
Secondary Education	60	67	7	43.7
Journalism	36	47	-11	53.5
Computer Science	10	24	-14	57.5
Accounting	17	31	-14	63.7

Panel B: Sample majors with fast earnings growth ("Late" return majors)

Major	Rank, age 28	Rank, age 45	Rank change	% growth in earnings, 28 to 45
Zoology	53	10	43	189.1
Chemistry	33	12	21	152.1
Biology	35	14	21	151.7
History	44	32	12	107.4
Area/Ethnic Studies	57	37	20	105.7
Philosophy	56	39	17	98.7
Economics	9	7	2	92.4

Notes: selected majors by change in earnings rank. Data: ACS 2009-2018.

(the full list can be found in Table A.2 of the Appendix). These are a mix of majors including some that are always high-earning (e.g., several types of engineering), some that offer moderate earnings but little downside early in life (e.g., accounting), and some that are always low-earning (secondary education and special education).

Our measure of safe majors differs from other measures used in the literature as we seek to capture the most immediately salient features of job security from the perspective of a college student. The variance in earnings used by Saks and Shore (2005) could identify as risky some majors with a chance of very high earnings: we want to highlight instead the downside risk. Conlon and Patel (2022) define risky majors as those that are associated with career stereotypes that are infrequent, and for which the non-stereotype careers are low-paid (this is in contrast to majors whose stereotypical career is quite common, or those for whom the non-stereotype career is

the same in each case.

well-paid). When applied to early career earnings, such a measure is likely to overlap with our safety measure: Conlon and Patel's risky majors will have a high share of graduates in low-paid careers, one of the criteria that excludes them from our list of safe majors.[6]

Table 2 summarizes our outcome variables. These variables are initially calculated for each major (or each major-age) in the ACS. The major-level attributes are then applied to the individuals in the HERI data, based on their senior-year declared major. For example, the first row of Table 2 shows that the average lifetime earnings of the majors HERI respondents have chosen is $2.77 million. The average respondent chose a major earning $45,000 at age 28 and $80,000 at age 45. This varies considerably across majors, however, with some majors earning more than three times as much as others over the course of a lifetime. Overall, 17.5% of the students in the HERI sample are in a safe major.

Table 2: Summary statistics of outcome variables

Outcome	Mean	SD	Min	Max
Lifetime earnings	$2.77 mill	768,869	$1.62 mill	$5.00 mill
Age 28 earnings	$45,375	9,726	$29,388	$70,253
Age 45 earnings	$79,508	23,864	$43,777	$146,202
% growth 28-45	74.1	33.8	28.7	191.7
% in safe majors	17.5	38.0	0	1

Notes: major-level characteristics from the ACS 2009-2018 averaged over HERI respondents based on reported major.

3.3 Family background and major choice

Our primary question will be how these outcome variables are related to students' family background. Table 3 provides an overview of our outcome variables by parental education and income, using the data from HERI. There are several patterns that motivate our deeper investigation in the next section. First, we see a monotonic relationship between parental education and a major's percentage earnings growth. Students

[6]Indeed, none of the majors Conlon and Patel (2022) retain as "risky" for their application (humanities, psychology, art, communications, and social/behavioral sciences) appear on our safe major list.

whose parents are well-educated are choosing majors with similar early-career earnings but faster earnings growth. This relationship is also seen in the comparison of first-generation and non-first-generation students, in line with the findings of Trejo (2016). Second, there is a similar relationship for parental income, with students from the highest-income families choosing the faster-growth majors. This is in line with what Hampole (2022) finds.

Third, the relationships between parental characteristics and choosing a safe major are not clear. The students with the most educated parents are the least likely to choose safe majors, but those with middle-income parents are more likely to do so than those with either high-income or low-income parents. This hints that parental education and parental income have different relationships with major choice, which we investigate below. Parental education and parental income are positively correlated ($\rho = 0.4$), so we will seek to disentangle these two influences in the next section.

Table 3: Summary statistics by family background

	Lifetime earnings	Age 28 earnings	Age 45 earnings	% growth	Share in 'safe'
First gen	$2.75 mill	$45,279	$78.695	72.6	18.2
Not first gen	$2.83 mill	$45,529	$81,802	78.6	18.0
Parents no college	$ 2.75 mill	$45,489	$78,634	71.7	18.8
Parents some coll	$2.74 mill	$45,017	$78,760	73.8	17.5
Parents coll grad	$2.81 mill	$45,671	$80,819	75.9	19.1
Parents grad deg	$ 2.86 mill	$45,404	$82,803	81.3	17.0
Low inc	$2.75 mill	$45,018	$79,014	74.3	17.7
Mid inc	$2.81 mill	$45,660	$80,994	76.3	19.6
High inc	$2.90 mill	$46,379	$83,980	80.3	18.3

Notes: major-level characteristics from the ACS 2009-2018, averaged over HERI respondents with row-level characteristics.

4 Results: Family Background and Major Choice

4.1 Empirical strategy

We now turn to our regression analysis. We estimate regressions of the form:

$$y_{ijc} = X_i\beta + M_c\gamma + \lambda_1 \text{parenteduc}_i + \lambda_2 \text{logparentincome}_i + \epsilon_{ijc}. \quad (3)$$

where y_{ijc} is one of our outcome variables for student i who chose major j at institution c. The y_{ijc} outcomes are constant at the major-level, e.g., average earnings of the major chosen by the student. The student-level X_i includes individual characteristics (demographics, SAT/ACT scores, and high school GPA) and in some specifications other parental characteristics (parents' religious preference and occupation). M_c are institution characteristics (state, public/private, average SAT scores, historically Black and single-sex status). Our primary independent variables of interest are parental education and parental income. For our main specifications, we use four categories based on the maximum education of the two parents: no college, some college, college graduate, and graduate degree. In the appendix tables, we use a first-generation dummy variable (neither parent has a college degree) as our measure of parental education, with broadly similar results. Parents' income (which we include in log form) and education are self-reported by the student in their freshman year. We also explore other specifications for parents' income to look for nonlinear relationships.

The two aspects of family background we study here – parents' income and parents' education – are not independent of each other. In addition to being correlated, they are likely to be jointly determined to some degree and themselves related to family history of both income and education. The income measure is also a one-year measure, while education is a more permanent measure of parental status. This puts some limitations on the interpretation of associations of these variables and our outcomes of interest, both when included individually as controls and when included together. Despite these limitations, both parental income and parental education are often used to capture family background, often as alternatives to each other. Our in-depth investigation of both together contributes to our understanding of each individually.

4.2 Main results

Table 4 presents results from regressions with major-average (log) lifetime earnings as the dependent variable. The first column includes parental income and student controls (race, gender, SAT/ACT, and high school GPA), the second parental education and student controls, and the third both parental income and education and student controls. In the fourth column, we add parents' religion and occupation, and in the fifth, we add characteristics of the student's higher education institution.

Table 4: Family background and major lifetime earnings

	Dependent variable: log major lifetime earnings				
	(1)	(2)	(3)	(4)	(5)
Log parental income	0.016***		0.019***	0.016***	0.010***
	(0.001)		(0.001)	(0.001)	(0.001)
Parents some college		-0.010***	-0.011***	-0.008***	-0.004
		(0.002)	(0.003)	(0.003)	(0.003)
Parents college grad		-0.005***	-0.010***	-0.008***	-0.009***
		(0.002)	(0.002)	(0.003)	(0.003)
Parents grad degree		-0.005**	-0.015***	-0.013***	-0.017***
		(0.002)	(0.002)	(0.003)	(0.003)
Constant	14.403***	14.588***	14.388***	14.384***	14.333***
	(0.055)	(0.049)	(0.057)	(0.065)	(0.066)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.121	0.121	0.121	0.133	0.153
Mean of dep. var.	14.79	14.79	14.79	14.79	14.79

Notes: results are from estimates of Equation 3 with log of the average major-level lifetime earnings as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

The table shows an intriguing pattern by parental education and income: while students with higher-income parents choose majors with higher lifetime earnings, students whose parents have more education choose majors with lower lifetime earnings. This is true when the parental characteristics are included individually, and also when they are included together. With both included, a one percent higher parental income is associated with the student choosing a major with 1.9 percent higher life-

time earnings (column 3), which drops to 1.0 when parental and institution controls are included (column 5). Meanwhile, students whose parents have graduate degrees choose majors with about 1.7 percent lower lifetime earnings when compared with those whose parents did not go to college. The difference in the signs of these relationships is surprising. Students from *richer* families and students from *more educated* families are behaving differently.[7]

Now we turn to the earnings age profiles of the majors. As we discussed in the previous sections, majors differ in the degree to which they pay off early in the career or later in the career. In Table 5, our dependent variable is the percentage growth in average earnings of the major from age 28 to 45. These are the same regressions as in Table 4, only with a different dependent variable.

Table 5: Family background and major earnings growth

	Dependent variable: pct. growth in major average earnings, age 28-45				
	(1)	(2)	(3)	(4)	(5)
Log parental income	1.310***		0.622***	0.526***	0.079
	(0.145)		(0.156)	(0.179)	(0.181)
Parents some college		0.321	0.546	0.735*	0.781**
		(0.305)	(0.347)	(0.390)	(0.389)
Parents college grad		0.279	0.378	0.614*	0.198
		(0.248)	(0.288)	(0.327)	(0.327)
Parents grad degree		3.490***	3.596***	3.948***	2.893***
		(0.252)	(0.302)	(0.343)	(0.346)
Constant	51.959***	62.679***	58.874***	56.262***	58.374***
	(7.039)	(6.171)	(7.287)	(8.376)	(8.577)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.087	0.089	0.089	0.092	0.105
Mean of dep. var.	74.14	74.14	74.14	74.14	74.14

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Column 1 of Table 5 shows that students with higher-income parents are choosing

[7]Unfortunately, we do not have any information on family wealth, only income.

majors with faster earnings growth (e.g., the later-return majors), while in column 2 we see that students with more educated parents – particularly those with graduate degrees – are choosing majors with faster earnings growth as well. In column 3, when we include both education and income, the relationship with parents having a graduate degree is essentially unchanged, while the relationship with parents' income is still positive but only about half as large as it was in column 1. Adding other parents' characteristics has little effect (column 4); however, the inclusion of institution characteristics does. With the full set of controls, the income relationship with major earnings growth is close to zero (and statistically insignificant), while the relationship with parents having a graduate degree remains large and significantly positive.

These results suggest that the relationship between major choice and parents' education is stronger and more robust than that with parental income. Parental income is positively related to major earnings growth in the cross section, but this relationship is driven by the association of parental income with parental education and with the types of institutions students attend. In contrast, students within the same type of institution choose majors differently depending on the education level of their parents.

It is useful to note here that the same general patterns hold when we compute major earnings growth from the ACS excluding people in graduate school or with a graduate degree. We explore this in Section 5.3. We believe the version presented here better represents what students expect when they choose a major, as graduate school possibilities are relevant in students' decisions.

So far, we have shown strong evidence of a positive relationship between parents' education and major earnings growth – particularly for parents with graduate degrees – while parents' income seems to affect major earnings growth through institution type. In the language of our model, this suggest that preference factors (including the preferences of parents) are more influential than constraints in determining the discount factor relevant for major choice. However, if credit constraints are a determinant of what kind of major a student chooses, then this may be more likely to show up

only for lower-income students and not necessarily in specifications that aggregate all students.

In Table A.4, we repeat the regressions of the left four columns of Table 5, but now we use more detailed categories of parental income, roughly splitting the sample into quintiles by parental income. If credit constraints are related to students choosing early or late majors, we would expect to see that the lowest-income students are more likely to choose the "early" (slow earnings growth) majors. The results show some evidence of this, but again the relationship between major and parental income weakens as controls are added and disappears once we control for institution characteristics. Again, the effect of parental income seems to operate mostly or entirely through the types of schools students attend.

Our parental income measure is from a question asking freshmen their parents' income from the previous year. One might wonder if measures related to financial aid better capture what we are trying to measure. In addition to the specifications we show here, we have also tried using a dummy variable for being a Pell Grant recipient as our measure of income. When we include this variable, the coefficient is insignificant. When we also include a control variable for total aid received by the student – which is endogenous to the institution and major chosen, so interpretation is difficult – none of our income or education results is affected.

Finally, we analyze the association between family background and the choice of a safe major. As described in Section 3, we define a safe major as one with limited downside: low unemployment, high full-time employment, and high chances of earning at least $40,000 at age 28. Following the specifications in Tables 4 & 5, Table 6 displays results for regressions with a dummy variable for choosing a safe' major as dependent variable. In column 1, we show that parental income is unrelated to the choice of a safe major. Parental education, in contrast, shows a strong negative relationship with this outcome; students whose parents have graduate degrees are 4.4 percentage points less likely to choose a safe major than first-generation students (column 2). With only 17.5% of students in our data choosing these majors, this is a large difference (25%

reduction).

The relationship with parental income, surprisingly, become positive with the addition of further controls in columns 3 and 4: conditioning on parental education (column 3) and other parent characteristics (column 4), those with higher parental incomes are *more likely* to choose safe majors. This effect disappears again when institution characteristics are included (column 5). Parental education, in contrast, has a consistent negative association with safe majors. As we saw with lifetime earnings, students whose parents have higher education and those whose parents have higher income are behaving differently. This suggests that these two measures are not simply different ways of capturing parental status or resources.

Table 6: Family background and choosing a safe major

	Dependent variable: choosing a safe major				
	(1)	(2)	(3)	(4)	(5)
Log parental income	-0.003		0.006***	0.004**	-0.000
	(0.002)		(0.002)	(0.002)	(0.002)
Parents some college		-0.016***	-0.019***	-0.016***	-0.011**
		(0.004)	(0.004)	(0.005)	(0.004)
Parents college grad		-0.013***	-0.016***	-0.018***	-0.015***
		(0.003)	(0.003)	(0.004)	(0.004)
Parents grad degree		-0.044***	-0.050***	-0.052***	-0.046***
		(0.003)	(0.004)	(0.004)	(0.004)
Constant	-0.055	-0.056	-0.123	-0.070	-0.218**
	(0.082)	(0.071)	(0.085)	(0.097)	(0.099)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.035	0.038	0.037	0.041	0.068
Mean of dep. var.	0.18	0.18	0.18	0.18	0.18

Notes: results are from estimates of Equation 3 with a dummy for choosing a safe major as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Once again, we use the parental income categories in Table A.5 to look for evidence of nonlinear effects of income, or of credit constraints being important. We find no evidence that the lowest-income students are sorting into the safe majors. Once

parental education is included, there is no relationship with safe majors for the lowest-income students; interestingly, in the higher quintiles of income, there is a positive relationship between parental income and choice of safe major.

In Tables A.6, A.7, and A.8, we repeat the analysis of Tables 4, 5, and 6 but use a dummy variable for being a first-generation student as our measure of parental education. The results are mostly the same: first-generation students are more likely to choose majors with higher lifetime earnings, lower earnings growth majors (early-return majors), and safe majors. We prefer the more detailed parental education variable, particularly because it highlights the strong association between major earnings growth and having parents with a graduate degree.

To summarize, we find strong and consistent evidence that parental education is related to students' major choices. Students with more educated parents choose majors with faster earnings growth – those that pay off later relative to earlier – and are also less likely to choose safe majors that provide early-career certainty. While parental income is also associated with major choice, these associations are greatly attenuated by the inclusion of parental education in the model. This echoes recent research from Finland showing that the strong correlation between parental income and children's probability of filing patents is greatly diminished by the controlling for parental education (Aghion et al., 2023), as well as evidence from England that shows a much more consistent effect of parental education versus income on years of schooling (Chevalier et al., 2013). Indeed, in our data it appears that the primary role for parental income is through the choice of institution.[8] On the other hand, parental education exerts a large influence on major choice even within institution. These results suggest that, conditional on getting into higher education, parental education may be more important for major choice than parental income.

To formalize this, we apply dominance analysis (DA) to assess whether parental education or parental income can account for more of the variation in college major

[8]Specifically, it is the school's average SAT scores that do most of the work here. Other characteristics like whether the university is public or private matter on their own, but do not affect the income relationships.

along these dimensions. DA is a tool used to compare the relative importance of different variables in explaining the variance of the dependent variable.[9] Table 7 shows that, among the eight basic variables in our regressions (excluding institution and other parental controls), parental education consistently outranks parental income in explaining variance in our outcomes of interest. The same is true when using the income categories instead of simply log income.

Table 7: Dominance Analysis of independent variables

Dependent variable:	Major % earnings growth		Safe major	
	Rank	Rank	Rank	Rank
Parental education	4	5	5	5
Parental income	8	8	8	8
Male	3	4	1	2
White	5	6	6	7
Black	7	9	7	9
Hispanic	9	10	9	10
Asian	6	7	4	6
SAT/ACT	1	2	3	4
HS GPA	2	3	2	3
Major lifetime earnings		1		1

Note: The table shows the results of Dominance Analysis (DA) for each dependent variable. DA runs regressions of the dependent variable on all possible subsets of the independent variables and calculates the share of the variance in the dependent variable explained by each independent variable. The table shows where each independent variable ranks in variance explained for each dependent variable.

It is noteworthy that, for both earnings growth and choosing a safe major, SAT/ACT scores, high school GPA, and gender are three of the top explanatory variables. The former two are measures of ability and preparation, while gender gaps in college major are large and well-documented. Parental education, though it outranks parental income, is less important than those factors, although it is more important than race. While family background is important, it is a secondary factor in understanding major choice, behind preparation and gender. Within the family background influences, parents' education seems far more influential than family income.

[9]See Budescu (1993) for a full explanation of Dominance Analysis.

5 Extensions and Robustness Checks

The main results show that majors differ substantially in their earnings paths and that these differences are related to students' family background, especially parental education. We now present a few extensions and robustness checks.

5.1 Freshman major and senior major

A particular feature of the matched freshman-senior HERI survey data we use in this paper is that they offer two observations of major choice. While we use the senior year major choice as our measure of actual major in our main analysis, we now look at the differences between students' intended major as a freshman and their senior year major. In particular, we explore whether the relationship between the major and family background weakens as the student goes through college. Such an effect is plausible, as students could choose a major influenced by their parents initially but later find their own path, influenced by peers and professors. On the other hand, most students continue to see and speak with family throughout college. As graduation looms, and with it the prospect of financial independence, students may be more open to parental advice than they were as freshmen.

Table 8 replicates our main results on earnings growth for freshman major (columns 1-2) and for senior major (columns 3-4); these specifications include all student, parental, and institution controls. The influence of parental education does not weaken, and may even slightly strengthen, from freshman to senior year. Students whose parents have graduate degrees choose majors with about 3 percentage points faster growth in their senior year; in freshman year, it is only about 2 percentage points. The relationship between parental income and major earnings growth shows the opposite trend: there is a strong positive association between income and major earning growth in freshman year, but by senior year this has dissipated.

The columns 3-4 repeat this analysis for the choice of a safe major. The negative association between parents' having a graduate degree and choosing a safe major

increases from -2.8 to -4.6 percentage points between freshman and senior year. For income, there is no relationship in either freshman or senior year.

Table 8: Comparing freshman-year and senior-year majors

	DV: % maj. earnings growth, 28-45		DV: safe major	
	Fr. major	Sr. major	Fr. major	Sr. major
	(1)	(2)	(3)	(4)
Log parental income	0.459**	0.079	-0.001	-0.000
	(0.214)	(0.181)	(0.002)	(0.002)
Parents some college	-0.235	0.781**	-0.004	-0.011**
	(0.463)	(0.389)	(0.005)	(0.004)
Parents college grad	0.112	0.198	-0.010***	-0.015***
	(0.389)	(0.327)	(0.004)	(0.004)
Parents grad degree	1.953***	2.893***	-0.028***	-0.046***
	(0.412)	(0.346)	(0.004)	(0.004)
Constant	64.531***	58.374***	-0.028	-0.218**
	(10.034)	(8.577)	(0.102)	(0.099)
Demographics/SAT/HS GPA	X	X	X	X
Other parent characteristics	X	X	X	X
Institution characteristics	X	X	X	X
Observations	118,165	111,435	118,165	111,435
R-squared	0.043	0.105	0.048	0.068

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 (columns 1-2) and choosing a safe major (columns 3-4) as the dependent variable. Columns 1 and 3 are for the student's reported major in the freshman year, while columns 2 and 4 are for the major reported in the senior year. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA; college selectivity, type, control, HBCU and single-sex status, and state dummies; occupation and religion of father and mother. Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Overall, it seems that the influence of parental education strengthens as the student progresses through college. This echoes some the findings of Chise et al. (2019) in Italy, where the father's STEM degree choice has a greater influence on their child's degree choice at college than in high school (interestingly, the authors find that mother's STEM degree choice loses influence over the same time). In our data, it does not appear that peer or professor influences crowd out parental influence over time. This suggests that family has meaningful input on student choices not only during childhood but also through college.

5.2 Graduate school plans

Given that graduate school is a strong determinant both of earnings and the age profile of earnings, there is a real concern that our results could be simply picking up the fact that students with more educated parents are more likely to attend graduate school themselves – and thus the majors they choose have strong earnings growth. To investigate this, we again use the detailed survey questions in the HERI: specifically, a question that asks what the student plans to study in graduate school. About 48% of students indicate that they have no plans to attend graduate school. In Table 9, we analyze the major-average percentage growth and safe major choices separately for those who plan and do not plan to attend graduate school.

Table 9: Comparing students' major choices by graduate school plans

	DV: % maj. earnings growth, 28-45		DV: safe major	
	Plan grad school	No plan grad	Plan grad school	No plan grad
	(1)	(2)	(3)	(4)
Log parental income	0.258	-0.107	0.002	-0.002
	(0.264)	(0.237)	(0.003)	(0.003)
Parents some college	0.634	0.730	-0.010	-0.011*
	(0.585)	(0.494)	(0.006)	(0.006)
Parents college grad	0.364	-0.104	-0.006	-0.024***
	(0.493)	(0.414)	(0.005)	(0.005)
Parents grad degree	2.577***	2.563***	-0.035***	-0.058***
	(0.513)	(0.448)	(0.005)	(0.006)
Constant	46.898***	64.623***	-0.289*	-0.158
	(14.678)	(9.966)	(0.156)	(0.130)
Demographics/SAT/HS GPA	X	X	X	X
Other parent characteristics	X	X	X	X
Institution characteristics	X	X	X	X
Observations	61,241	50,194	61,241	50,194
R-squared	0.092	0.109	0.064	0.077

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 (columns 1-2) and choosing a safe major (columns 3-4) as the dependent variable. Columns 1 and 3 are for those who report a planned graduate school major, while columns 2 and 4 are for those who do not report any plans to attend graduate school. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA; college selectivity, type, control, HBCU and single-sex status, and state dummies; occupation and religion of father and mother. Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

The results are similar for the two groups. Those who plan to attend and whose

parents have graduate degrees choose majors with about 2.6 ppt slower growth, which is almost identical to the figure for those who do not plan to attend. The association of income with major earnings growth is insignificant for both groups (although the sign of the coefficient changes). These results give us confidence that our main results are not only picking up propensity to attend graduate school when looking at major earnings growth. For safe majors, the relationship between major and parental education seems stronger for those who do not plan to attend (-0.058) than for those who do plan to attend graduate school (-0.035). This makes sense if the "safety" of a major is more relevant for those who do not plan to attend graduate school.

5.3 Excluding those with graduate degrees

As described in Section 3, our major earnings growth variable is calculated unconditionally and thus includes those in graduate school and out of the labor force. In Table A.9, we repeat our analysis of major growth (Table 5), but use a version of major earnings growth calculated on a sample that excludes those in graduate school or with a graduate degree. The pattern of results is largely the same as in our main results. Higher parental education is associated with majors that have faster earnings growth, and so is parental income, but this relationship operates mostly through institution type.[10]

5.4 Including lifetime earnings as an independent variable

Table A.10 repeats the same regressions of Table 5 but also includes the major's lifetime earnings on the right-hand side. This is equivalent to using the residual of percentage growth in earnings (after regressing on lifetime earnings) as the dependent variable. We do this to ensure that our results are not merely picking up relationships between family background and a major's lifetime earnings, which may be mechanically cor-

[10]We have also computed our major growth variable using only men, to avoid the influence of women leaving the labor force and thus pulling down average earnings in some majors. Our results are nearly identical in this case.

related with earnings growth. Our results for parental education are similar here and even stronger than in our main results. On the other hand, the relationship with parental income is now negative and significant. The weak positive relationship between income and major earnings growth we observed in Table 5 was at least somewhat driven by major earnings growth and lifetime earnings being correlated.

We perform the same analysis for safe majors in Table A.11, including major lifetime earnings as an independent variable. Again, lower parental education is strongly linked to choosing a safe major, while higher parental income shows a negative relationship. These results are similar to those that did not include lifetime earnings.

5.5 Replications in other data sets

To explore the generality of our results, we attempt to replicate them in two other data sets: the National Survey of College Graduates (NSCG 2013-2019: National Center for Science and Engineering Statistics) and the National Longitudinal Survey of Youth 1997 (NLSY: United States Bureau of Labor Statistics). While both of these data sets include college and labor market outcomes for each respondent, each has serious limitations for our purposes: the NSCG has a large sample but does not have family income, while the NLSY has all the necessary variables, but only a small sample of college graduates. A useful benefit of the NSCG is that we can compute major-specific age-28 and age-45 average earnings within the dataset, rather than relying on calculations from the ACS (as we do with both the NLSY and in our main analysis). The NSCG therefore allows us to check the sensitivity of our findings to this data manipulation.

The results of these replications are shown in Appendix Table A.12. In the NSCG (columns 1 & 2), parental education is strongly positively related to the percentage growth in earnings of the student's major, as in our main results. Students whose parents have higher education are again choosing the majors with faster earnings growth, and the coefficients are of similar magnitude to those in Table 5. This is true for both the mother and the father, and true for both of our measures of parental education.

In columns 3 and 4 of Table A.12, we show results from the NLSY. While many of the effects of family background are insignificant here due to the small sample size, the point estimates are similar to what we saw in the HERI and NSCG samples. First-generation students are found in the slower-earnings-growth majors, and the higher the parental education, the faster the earnings growth of the major. Family income is insignificantly related to faster earnings growth of the major. Overall, the results from these alternate data sets provide support for our main findings, and reassure us that the particularities of the HERI data are not driving our results.

6 Conclusion

College majors offer vastly different returns, including different age paths of earnings. Some majors pay off right away with good employment outcomes and high earnings, while others take years to fully pay off for their graduates. These differing types of majors seem to be attractive to different types of students.

We find strong and consistent relationships between parental education and students' major choices. Students whose parents have advanced degrees choose majors that pay off more later in life; they are also less likely to choose safe majors with limited initial downside. These students seem willing to risk having low earnings for years after college in exchange for good jobs and high earnings later in life.

Parental income is less consistently related to major choices. While higher-income students also choose the faster-growth majors, this association is diminished when parents' education is included as a control, and disappears with the inclusion of institution characteristics. This means that parental income seems to have a robust effect on where people study for college, but not on what they study once they are there. We also show that parental education explains more of the variance in students' major choices than parental income does.

Both parents' education and income affect college students' decisions, likely in complex ways we cannot measure. Disentangling the choice of institution and the

choice of major is difficult, because not all types of colleges and universities offer the same set of majors, and some students likely choose their institution based on the available majors, while others likely choose the institution first. While our results are descriptive rather than causal, they provide some insight into how these relationships manifest in students' decisions. For major choice itself, parental education seems to be the more important factor.

A simple interpretation of our results is that family background, particularly parental education, affects students' discount factors. Our findings imply that students whose parents are more educated choose their major in a way consistent with a low discount factor, valuing the future more relative to the present. In contrast, for those students who make it to senior year of college, family income – and related credit constraints – do not seem to be a key determinant of their discounting.

Regardless of the underlying mechanism, our results highlight the long shadow of family background on children's education. Even for those students who enroll in college, and remain there until senior year, their parents' income and education continue to influence the labor market value of their educational decisions. Given the importance of college major choice for lifetime earnings, these findings point to a new channel through which outcomes can be related across generations.

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A Appendix Tables and Figures

Table A.1: Majors with fastest and slowest earnings growth

Panel A: Slowest earnings growth

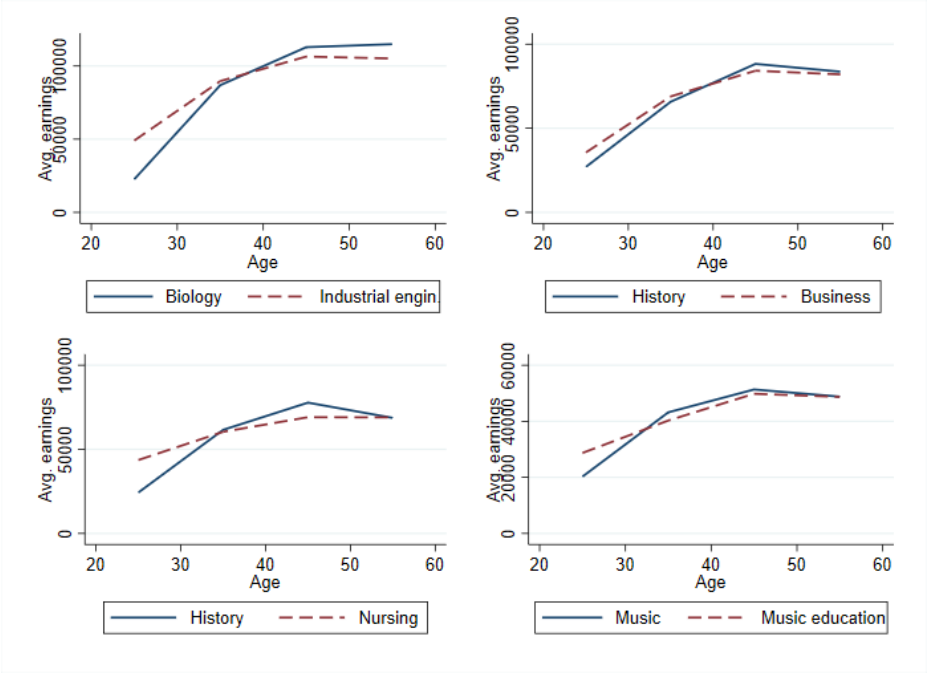
Major	Rank, age 25	Rank, age 45	Change	% growth in earnings, 28 to 45
Social Work	70	78	-8	28.7
Elementary Education	69	77	-8	30.9
Special Education	59	69	-10	31.9
Drafting or Design	61	72	-11	32.5
Nursing	19	46	-27	32.7
Home Economics	71	76	-5	32.7
Library/Archival Science	72	75	-3	36.3
Therapy (occupational, physical, speech)	27	54	-27	37.3
Other Education	65	71	-6	40.4
Music or Art Education	66	73	-7	41.6
Secondary Education	60	67	-7	43.7
Other Health Professional	42	60	-18	44.6
Other Business	14	33	-19	52.0
Mechanics	45	56	-11	52.3

Panel B: Fastest earnings growth

Major	Rank, age 28	Rank, age 45	Change	% growth in earnings, 28 to 45
Biochemistry or Biophysics	32	2	30	191.7
Zoology	53	10	43	189.1
Medicine, Dentistry, Veterinarian	23	1	22	187.2
Astronomy	41	6	35	184.1
Chemistry	33	12	21	152.1
Biology (general)	35	14	21	151.7
Physics	29	11	18	145.8
Microbiology or Bacteriology	48	21	27	142.4
Other Biological Science	39	19	20	135.3
Marine Science (incl. Oceanography)	46	28	18	118.5
Atmospheric Science (incl. Meteorology)	30	25	5	107.6
History	44	32	12	107.4
Ethnic Studies	57	37	20	105.6
Philosophy	56	39	17	98.7

Notes: selected majors by change in earnings rank. Data: ACS 2009-2018.

Figure 1: Comparing majors with similar lifetime earnings



Notes: Authors' calculations using the ACS 2009-2018.

Table A.2: "Safe" majors

Safe majors
Biochemistry/Biophysics
Accounting
Finance
Secondary Education
Special Education
Aeronautical Engineering
Computer Engineering
Civil Engineering
Chemical Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering
Other Engineering
Atmospheric Science/Meteorology
Chemistry
Therapy (occupational, physical, speech)
Building Trades
Other Technical

Notes: list of HERI majors that meet our criteria for "safety": low unemployment, high employment, and high chance of earning $40,000 (being in the top 40 majors of each of the three categories).

Table A.3: Majors ranked by average lifetime earnings

Highest lifetime earnings	**Middle-ranked majors**	**Lowest lifetime earnings**
Medicine/Dentistry/Vet	History	Home Economics
Biochemistry/Biophysics	Marketing	Theology/Religion
Chemical Engineering	International Business	Elementary Education
Aeronautical Engineering	Management	Library Science
Electrical Engineering	Architecture/Urban Planning	Social Work
Mechanical Engineering	Area/Ethnic Studies	Art, fine and applied
Computer Engineering	Nursing	Music or Art Education
Economics	Philosophy	Music
Finance	Computer Programming	Other Education
Chemistry	Environmental Science	Drafting or Design

Notes: selected majors by rank of average lifetime earnings. Data: ACS 2009-2018.

Table A.4: Family background and major earnings growth, using multiple income categories

	Dependent variable: pct. growth in major average earnings, age 28-45				
	(1)	(2)	(3)	(4)	(5)
Bottom income quintile	-2.881***		-1.532***	-1.302***	-0.215
	(0.334)		(0.354)	(0.400)	(0.404)
Fourth income quintile	-3.334***		-2.236***	-2.211***	-1.271***
	(0.314)		(0.326)	(0.364)	(0.368)
Middle income quintile	-1.517***		-0.829***	-0.944***	-0.326
	(0.296)		(0.300)	(0.333)	(0.335)
Second income quintile	1.542***		1.762***	1.536***	1.752***
	(0.403)		(0.404)	(0.444)	(0.442)
Parents some college		0.321	0.547	0.747*	0.789**
		(0.305)	(0.347)	(0.390)	(0.389)
Parents college grad		0.279	0.199	0.468	0.090
		(0.248)	(0.288)	(0.327)	(0.328)
Parents grad degree		3.490***	3.121***	3.514***	2.587***
		(0.252)	(0.304)	(0.346)	(0.348)
Constant	67.931***	62.679***	66.826***	63.327***	60.345***
	(6.863)	(6.171)	(7.102)	(8.169)	(8.400)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.088	0.089	0.090	0.093	0.105
Mean of dep. var.	74.14	74.14	74.14	74.14	74.14

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.5: Family background and choosing a safe major, using multiple income categories

	Dependent variable: choosing a safe major				
	(1)	(2)	(3)	(4)	(5)
Bottom income quintile	0.019***		-0.001	-0.001	0.007
	(0.004)		(0.004)	(0.005)	(0.005)
Fourth income quintile	0.023***		0.007*	0.005	0.011**
	(0.004)		(0.004)	(0.004)	(0.004)
Middle income quintile	0.033***		0.024***	0.020***	0.022***
	(0.003)		(0.003)	(0.004)	(0.004)
Second income quintile	0.033***		0.031***	0.028***	0.023***
	(0.005)		(0.005)	(0.005)	(0.005)
Parents some college		-0.016***	-0.021***	-0.017***	-0.012***
		(0.004)	(0.004)	(0.005)	(0.004)
Parents college grad		-0.013***	-0.019***	-0.021***	-0.018***
		(0.003)	(0.003)	(0.004)	(0.004)
Parents grad degree		-0.044***	-0.053***	-0.055***	-0.048***
		(0.003)	(0.004)	(0.004)	(0.004)
Constant	-0.106	-0.056	-0.069	-0.031	-0.231**
	(0.080)	(0.071)	(0.082)	(0.095)	(0.097)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.036	0.038	0.038	0.042	0.068
Mean of dep. var.	0.18	0.18	0.18	0.18	0.18

Notes: results are from estimates of Equation 3 with choosing a safe major as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.6: Family background and major lifetime earnings, using first-generation status

	Dependent variable: log major lifetime earnings				
	(1)	(2)	(3)	(4)	(5)
Log parental income	0.016***		0.018***	0.015***	0.009***
	(0.001)		(0.001)	(0.001)	(0.001)
First-generation		0.000	0.007***	0.006***	0.010***
		(0.001)	(0.002)	(0.002)	(0.002)
Constant	14.403***	14.568***	14.366***	14.356***	14.310***
	(0.055)	(0.049)	(0.058)	(0.067)	(0.068)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,906	137,251	111,769	111,444
R-squared	0.121	0.121	0.121	0.133	0.153
Mean of dep. var.	14.79	14.79	14.79	14.79	14.79

Notes: results are from estimates of Equation 3 with log of the average major-level lifetime earnings as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.7: Family background and major earnings growth, using first-generation status

	Dependent variable: pct growth in major average earnings, age 28-45				
	(1)	(2)	(3)	(4)	(5)
Log parental income	1.310***		1.015***	0.971***	0.412**
	(0.145)		(0.153)	(0.177)	(0.178)
First-generation		-1.659***	-1.510***	-1.687***	-0.948***
		(0.183)	(0.219)	(0.249)	(0.250)
Constant	51.959***	63.963***	55.512***	52.525***	54.471***
	(7.039)	(6.271)	(7.428)	(8.584)	(8.775)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,906	137,251	111,769	111,444
R-squared	0.087	0.088	0.087	0.091	0.104
Mean of dep. var.	74.14	74.14	74.14	74.14	74.14

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.8: Family background and choosing a safe major, using first-generation status

	Dependent variable: choosing a safe major				
	(1)	(2)	(3)	(4)	(5)
Log parental income	-0.003		0.001	-0.000	-0.004*
	(0.002)		(0.002)	(0.002)	(0.002)
First-generation		0.020***	0.022***	0.025***	0.023***
		(0.002)	(0.003)	(0.003)	(0.003)
Constant	-0.055	-0.081	-0.104	-0.047	-0.192*
	(0.082)	(0.072)	(0.086)	(0.099)	(0.101)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,906	137,251	111,769	111,444
R-squared	0.035	0.037	0.036	0.040	0.067
Mean of dep. var.	0.18	0.18	0.18	0.18	0.18

Notes: results are from estimates of Equation 3 with a dummy for choosing a safe major as the dependent variable. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.9: Family background and major earnings growth, excluding graduate degrees from earnings calculations

	Dependent variable: pct. growth in major average earnings, age 28-45				
	(1)	(2)	(3)	(4)	(5)
Log parental income	0.654***		0.491***	0.434***	0.162**
	(0.064)		(0.069)	(0.079)	(0.079)
Parents some college		0.076	0.083	0.240	0.278
		(0.134)	(0.153)	(0.171)	(0.170)
Parents college grad		0.245**	0.150	0.331**	0.137
		(0.109)	(0.127)	(0.143)	(0.143)
Parents grad degree		1.158***	0.857***	0.982***	0.487***
		(0.111)	(0.134)	(0.151)	(0.151)
Constant	35.214***	42.665***	36.673***	36.462***	34.617***
	(3.107)	(2.713)	(3.220)	(3.673)	(3.752)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.073	0.077	0.073	0.078	0.094
Mean of dep. var.	49.57	49.57	49.57	49.57	49.57

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. People with graduate degrees or who are enrolled in graduate school are excluded from the calculation of the earnings by major. Controls (not shown) are student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.10: Family background and major earnings growth, with lifetime earnings included

	Dependent variable: pct. growth in major average earnings, age 28-45				
	(1)	(2)	(3)	(4)	(5)
Log parental income	0.127		-0.770***	-0.691***	-0.624***
	(0.110)		(0.118)	(0.136)	(0.136)
Parents some college		1.192***	1.496***	1.388***	1.156***
		(0.230)	(0.263)	(0.296)	(0.293)
Parents college grad		0.750***	1.198***	1.286***	0.947***
		(0.187)	(0.218)	(0.248)	(0.247)
Parents grad degree		3.987***	4.845***	4.980***	4.260***
		(0.190)	(0.229)	(0.261)	(0.261)
Constant	-0.972	-3.557	6.764	4.575	11.965*
	(5.345)	(4.672)	(5.526)	(6.365)	(6.463)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.474	0.479	0.476	0.476	0.492
Mean of dep. var.	74.14	74.14	74.14	74.14	74.14

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. Controls (not shown) are the major's average lifetime earnings, student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.11: Family background and safe majors, with lifetime earnings included

	Dependent variable: choosing a safe major				
	(1)	(2)	(3)	(4)	(5)
Log parental income	-0.011***		-0.004**	-0.004**	-0.005**
	(0.002)		(0.002)	(0.002)	(0.002)
Parents some college		-0.010***	-0.013***	-0.012***	-0.009**
		(0.003)	(0.004)	(0.004)	(0.004)
Parents college grad		-0.010***	-0.011***	-0.014***	-0.011***
		(0.003)	(0.003)	(0.004)	(0.003)
Parents grad degree		-0.040***	-0.042***	-0.045***	-0.037***
		(0.003)	(0.003)	(0.004)	(0.004)
Constant	-0.419***	-0.505***	-0.481***	-0.420***	-0.520***
	(0.075)	(0.066)	(0.078)	(0.090)	(0.092)
Demographics/SAT/HS GPA	X	X	X	X	X
Other parent characteristics				X	X
Institution characteristics					X
Observations	138,355	182,541	136,998	111,760	111,435
R-squared	0.179	0.181	0.181	0.180	0.196
Mean of dep. var.	0.18	0.18	0.18	0.18	0.18

Notes: results are from estimates of Equation 3 with a dummy for choosing a safe major as the dependent variable. Controls (not shown) are major average lifetime earnings, student race, sex, normed ACT/SAT scores (level and square), and high school GPA (columns 1-5); occupation and religion of father and mother (columns 4 and 5); and college selectivity, type, control, HBCU and single-sex status, and state dummies (column 5). Standard errors are in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Table A.12: Results from NSCG and NLSY97

Dep. var.: % growth in earnings of major, age 28 to 45

	NSCG Data		NLSY97 Data	
	(1)	(2)	(3)	(4)
Log family income			1.030	0.891
			(1.968)	(1.873)
Parent yrs of education	1.087***		0.448	
	(0.043)		(0.774)	
First-generation		-3.058***		-2.572
		(0.193)		(3.683)

Notes: results are from estimates of Equation 3 with percentage growth in major-level average earnings between ages 28 and 45 as the dependent variable. Controls (not shown) are: institution Carnegie status, gender, race and NSCG survey wave dummy (cols 1 & 2); gender, race & AFQT scores (cols 3 & 4). Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).