

The Ripple Effects of Rising Loan Costs: Major and Occupation Choices, Earnings, and Job Satisfaction

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Motivation

- The increasing reliance on student loans to finance higher education has emerged as a prominent feature of the contemporary U.S. education system.
- As of 2026, total student loan debt in the United States stands at approximately \$1.83 trillion.
- Of this amount, \$1.69 trillion is outstanding federal loan debt, accounting for 92.3% of the total.
- About 42.8 million Americans are holding federal student loan debt right now, with the average student holding a federal debt of approximately \$38,290.

Our question:

How do financing costs shape education and labor outcomes?

Question: How do financing costs shape life-cycle choices?

- Higher federal loan interest rates

→ What happens to college students' financing behaviors?

- 1 Do they borrow less?
- 2 If they do, do the total debt amounts change?

→ Does the impact go beyond financing choices?

- 1 College major choice and grad school decisions
- 2 Preference and choices for jobs
- 3 Labor market outcomes

Preview our findings

1. Student Loan Interest Rate

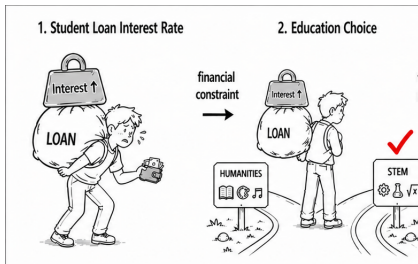


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Lower loan borrowing

- Lower probability of taking a loan
- More family support
- More own savings
- No significant change in total interest payment

Preview our findings



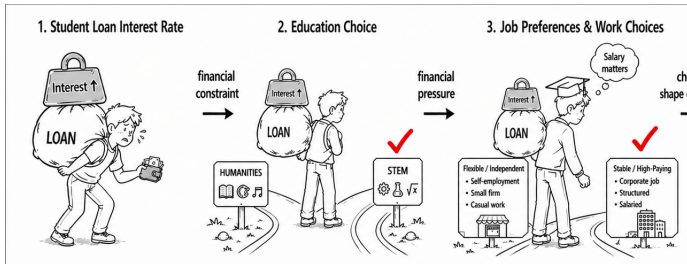
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Choose majors with higher earnings growth

- Shift into STEM fields
- Avoid low-return fields
- Stronger sorting by long-run returns
- Lead to occupations with higher earnings growth

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Job preferences

- Salary becomes more important

Employment type choices

- Less self-employment
- Less small firm employment

Labor supply decisions

- More hours worked
- Stronger labor supply

Occupation alignment

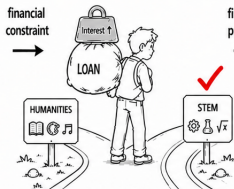
- More likely to work in major-related jobs
- Shift to higher-earning occupations

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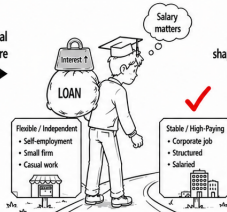
1. Student Loan Interest Rate



financial
constraint



financial
pressure



choices
shape outcomes



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Earnings outcomes

- Higher annual earnings (~2.8%)
- Higher total income via more hours

Trade-off

- Lower job satisfaction (independence, responsibility)
- Prioritize salary over job amenities

- **Identification via borrowing environment.** Previous studies identify loan effects through variation in tuition or grant aid (Field 2009; Bettinger et al. 2019; Chakrabarti et al. 2023; Witteveen 2023) or through structural models with borrowing constraints (Keane and Wolpin 2001; Cameron and Taber 2004; Ionescu 2009; Johnson 2013; Sieg and Wang 2018; Folch and Mazzone 2022).
 - We isolate the *cost of financing* using variation in federal loan interest rates.

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 - We isolate the *cost of financing* using variation in federal loan interest rates.
- **National vs local evidence.** Reduced-form studies typically rely on policy changes or natural experiments in specific institutions or states (Stinebrickner and Stinebrickner 2008; Rothstein and Rouse 2011; Marx and Turner 2019; Barr, Bird, and Castleman 2021).
 - We provide *nationally representative evidence* using NSCG data.

- **Cost vs quantity of borrowing.** Existing work studies loan limits and borrowing amounts (Goodman, Isen, and Yannelis 2021; Black et al. 2023; Black, Turner, and Denning 2025).
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 - We focus on *interest rates* rather than loan quantities.
- **Mechanism: liquidity and trade-off.** Evidence on student debt and labor outcomes is mixed (Minicozzi 2005; Field 2009; Rothstein and Rouse 2011; Sieg and Wang 2018; Velez et al. 2019; Daniels and Smythe 2019; Gervais and Ziebarth 2019; Folch and Mazzone 2022; Hampole 2022).
 - We show that financing costs operate through *liquidity at college entry*, generating an *earnings vs amenities trade-off*.

Empirical Approach

- **Differential exposure to financing costs.**
Students in high private-share regions face higher tuition and rely more on loans \Rightarrow more sensitive to changes in federal interest rates
- **Continuous difference-in-differences.**
Exploit cohort variation in federal loan interest rates \times regional exposure (private share)
 \Rightarrow isolates the *cost of financing* rather than loan availability or policy shocks
- **Linking entry conditions to life-cycle outcomes.**
Interest rates at college entry \rightarrow financing \rightarrow majors \rightarrow occupations \rightarrow labor market outcomes
- **Nationally representative setting.**
NSCG + IPEDS allow us to track education, labor supply, job type, and satisfaction in one framework

What creates variation in financing costs?

- Federal student loan interest rates are centrally set and vary across cohorts
- Students entering college in different years face different borrowing costs
- Most borrowers rely on the same federal loan system
⇒ Interest rate changes affect a broad population
- **Key takeaway:** Cohort-level interest rate variation provides plausibly exogenous changes in financing costs

Direct Loan Program (introduced 1993)

Main products: Subsidized and Unsubsidized loans (75% of issuance)

Analysis uses their average interest rate

Sample period 1993–2015 Mean rate 6.1%, s.d. 1.7%

Institutional Background

What creates variation in financing costs?

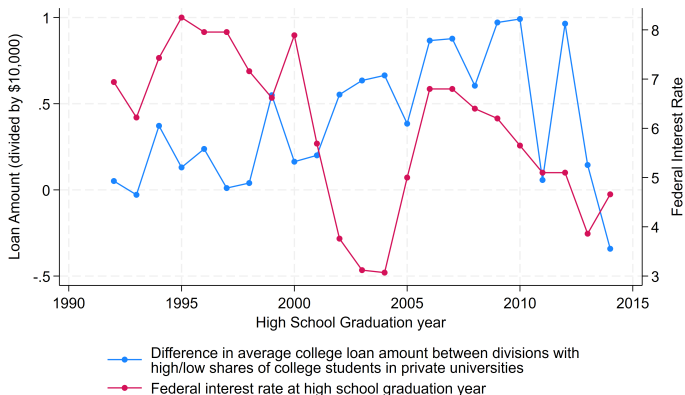


Figure: Trends in Federal Loan Interest Rates and the College Loan Gaps

Who is more exposed to interest rate changes?

High private-share regions

Higher tuition



Greater reliance on loans

Larger financing shock

Low private-share regions

Lower tuition



Less reliance on loans

Smaller financing shock

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Same interest rate change \Rightarrow differential impact across regions

Empirical implication: compare cohorts \times regions

From intuition to estimation

$$Y_{id_0t_0t} = \alpha_0 + \alpha_1 PS_{d_0t_0} + \alpha_2 IR_{t_0} \times PS_{d_0t_0} + \delta_{d_0} + \delta_{t_0} (+ \delta_t) + X_{it} \Gamma + \varepsilon_{id_0t_0t}$$

Key variation:

- Cohort variation \rightarrow interest rates (IR_{t_0})
- Cross-region variation \rightarrow exposure (private share $PS_{d_0t_0}$)

Interpretation:

- α_2 captures the effect of financing costs at college entry on various outcome variables

Why is this identification credible?

- **Parallel trends.**

High and low private-share regions follow similar pre-existing trends in demographics, college conditions, and local economic conditions

- **No institutional response.**

Tuition, total costs, and financial aid do not respond systematically to federal loan interest rate changes [See evidence](#)

- **No selection into the sample.**

Interest rates do not affect college enrollment, completion, or observable student composition [Graduate sample](#) [Education margins](#)

- **Robust to local labor markets.**

Results are robust to controlling for local unemployment at college graduation [See evidence](#)

Key takeaway

Variation reflects financing costs, not other confounding channels

- National Survey of College Graduates (NSCG) 2003-2019
 - Rich information on student loans, college and graduate school outcomes, and labor market results such as employment status, working hours, annual salary, occupation, and job satisfaction.
 - On average, 60.5% of college graduates have taken out college loans, with an average loan amount of \$19,126 (including individuals with zero loans).
- Integrated Postsecondary Education Data System (IPEDS)
 - Institution type, student enrollment, tuition, financial aid, and loans
 - The sample is restricted to four-year private and public institutions and excludes online institutions.

Financing Channel

	(1)	(2)	(3)
	Take loan for college	Loan borrow amount (in 10k)	Interest payment (in 10k)
$IR_{t_0} \times PS_{d_0 t_0}$	-0.051*** (0.017)	-0.461*** (0.084)	-0.007 (0.031)
R-squared	0.205	0.127	0.143
Observations	129,692	129,692	124,715

- Higher interest rates reduce both loan take-up and borrowing amounts
- Magnitude: consider a region with $PS = 35\%$ (median among all division-year), a 1 pp increase in interest rates reduces borrowing by about **\$1,610**
- Interest payments do not change

What do the financing results imply?

Borrowing behavior

Higher interest rates



Less borrowing

Total repayment

Higher interest rates



No change in interest payments

⇒ **Adjustment occurs through upfront resources, not total cost**

Key takeaway:

Interest rates act as a *liquidity shock at college entry*

How do students adjust financing?

	Gov./Bank Loans	Parent Loans	Parent Support	Own Savings
$IR_{t_0} \times PS_{d_0 t_0}$	-0.070***	-0.030***	0.045**	0.043**

Pattern:

- Less borrowing (formal and informal loans)
- More family transfers and own savings

Interpretation:

- Households partially smooth the shock through transfers and savings
- **But liquidity at entry is still tighter**

Key takeaway:

Financing costs operate through liquidity

How are major and occupation returns measured?

$$Y_{it} = \lambda_1^k + \lambda_2^k (\text{Age} - 25) + \lambda_3 (\text{Age} - 25)^2 + X_{it}\Lambda + \epsilon_i$$

where:

- k indexes majors or occupations
- λ_1^k captures **initial earnings**
- λ_2^k captures **earnings growth over the life cycle**

Earnings data \rightarrow estimate return profiles \rightarrow merge back as dependent variables

How do students adjust major choice?

	Initial earnings	Earnings growth	STEM
$IR_{t_0} \times PS_{d_0 t_0}$	0.000 (0.009)	0.000336* (0.000)	0.034** (0.016)
R-squared	0.456	0.401	0.038
Observations	134,045	134,045	134,045

Pattern:

- No change in initial earnings
- Shift toward majors with higher earnings growth
- Increased likelihood of choosing STEM fields

Interpretation:

- Students place more weight on **long-run returns**

Key takeaway:

Students shift toward higher long-run returns

Major shifts map into related occupation shifts

Majors		Occupations
Biology, microbiology, pharmacy	⇒	Health technologists and technicians
0.013**, 0.002*, 0.002***		0.011**
Environmental science	⇒	Petroleum, mining, and geo. engineers
0.005**		0.001***
Engineering	⇒	Precision / production occupations
0.001**		0.013**
Psychology, foreign lang and lit	⇒	Retail sales clerks
-0.019***, -0.009**		-0.017**

Key takeaway:

Educational choices and occupational choices move in coherent, related directions

Do higher financing costs change labor supply?

	Unemployed	Working full time	ln(annual hours)
$IR_{t_0} \times PS_{d_0 t_0}$	-0.012** (0.006)	-0.000463 (0.018)	0.014* (0.008)
R-squared	0.015	0.054	0.049
Observations	134,045	134,045	104,107

Pattern:

- Lower unemployment
- No change in full-time employment
- More hours among full-time workers

Key takeaway:

Increase labor supply pressure

Do financing costs affect job choices?

	Salary important	Self-employment	Small firm
$IR_{t_0} \times PS_{d_0 t_0}$	0.003** (0.001)	-0.021* (0.012)	-0.020* (0.012)

Pattern:

- More weight on salary
- Less self-employment
- Less work in small firms

Interpretation:

- Shift toward **pecuniary returns** and away from flexibility / independence

Key takeaway:

Reshape job preferences

Do workers sort into higher-return occupations?

	Average initial occupational return	Average growth in occupational return	Major-occupation match
$IR_{t_0} \times PS_{d_0 t_0}$	0.008 (0.012)	0.000489*** (0.000)	0.042* (0.023)

Pattern:

- No effect on initial occupational return
- Shift toward occupations with higher earnings growth
- Better alignment between major and occupation

Interpretation:

- Workers move toward **higher long-run returns** and better matches

Key takeaway:

Earnings-driven sorting into occupations

Earnings vs Wage Decomposition

Do higher financing costs increase earnings?

	ln(annual earnings)	ln(hourly wage)	ln(annual hours)
$IR_{t_0} \times PS_{d_0 t_0}$	0.062**	0.030	0.014*
	(0.030)	(0.024)	(0.008)

Pattern:

- Higher annual earnings
- No significant increase in hourly wages

Interpretation:

- Earnings gains driven by **working more hours**, not higher pay per hour

Key takeaway:

Increased labor supply → Increased earnings

At what cost do earnings increase?

	Satisfied with degree of independence	Satisfied with level of responsibility
$IR_{t_0} \times PS_{d_0 t_0}$	-0.014** (0.006)	-0.017*** (0.006)

Pattern:

- Lower satisfaction with independence
- Lower satisfaction with responsibility

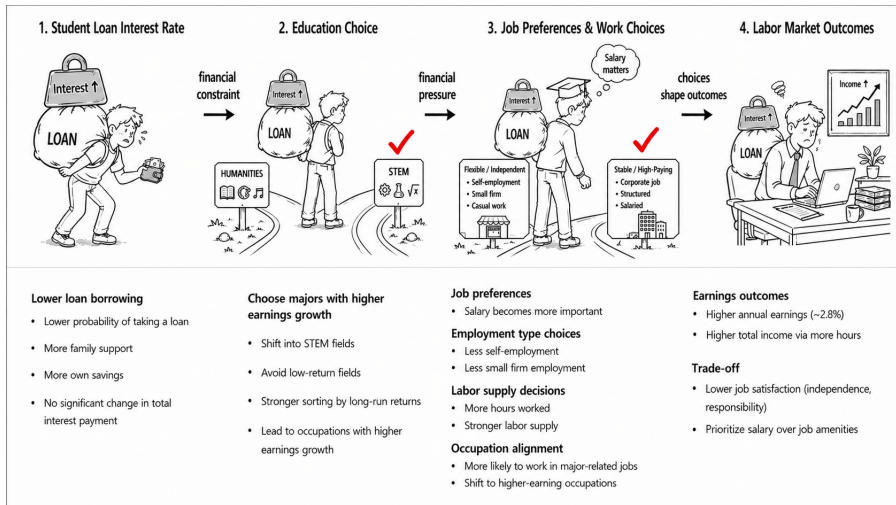
Interpretation:

- Workers sacrifice **non-pecuniary job amenities**

Key takeaway:

Higher earnings come with lower job satisfaction

Conclusion: Full Mechanism



Financing costs → liquidity → choices → outcomes

Thank you!

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Do colleges adjust tuition or aid?

	ln(tuition)	ln(total costs)	ln(financial aid)
$IR_{t_0} \times PS_{d_0 t_0}$	0.019 (0.027)	0.006 (0.009)	0.006 (0.009)

Pattern:

- No significant response in tuition, costs, or financial aid

Key takeaway:

Interest rate variation does not operate through institutional price adjustments

Does the treatment change who enters the sample?

	# freshmen	# college graduates	Father's education	Mother's education
$IR_{t_0} \times PS_{d_0 t_0}$	30.64 (40.47)	5.689 (7.421)	-0.126 (0.112)	-0.056 (0.111)

Pattern:

- No significant effect on freshmen enrollment or college completion
- No significant change in parental education composition

Key takeaway:

Results are unlikely to be driven by selection into the graduate sample

Do students adjust other education margins?

	Attend public univ.	Double major	Change major	Obtain grad degree
$IR_{t_0} \times PS_{d_0 t_0}$	0.028 (0.020)	0.023 (0.017)	0.016 (0.026)	0.008 (0.020)

Pattern:

- No significant effects on public university attendance, double majoring, major switching, or graduate degree attainment

Key takeaway:

Results are not driven by other education-margin adjustments

Are results driven by local labor market conditions?

	Loan amount	Major earnings growth	Unemployed	Self-employment
$IR_{t_0} \times PS_{d_0 t_0}$	-0.489*** (0.090)	0.000332* (0.000)	-0.013** (0.006)	-0.022* (0.012)
	Annual earnings	Annual hours	Occ earnings growth	Satisfied with independence
$IR_{t_0} \times PS_{d_0 t_0}$	0.0699** (0.032)	0.0143* (0.008)	0.000490*** (0.000)	-0.0130** (0.006)

Pattern:

- Main coefficients remain similar after controlling for local unemployment at college graduation

Key takeaway:

Results are not driven by local labor market conditions