AN INSIDE LOOK AT PURDUE'S ---------BACK A BOILER--------- INCOME SHARE AGREEMENTS

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KRANNERT SCHOOL OF MANAGEMENT
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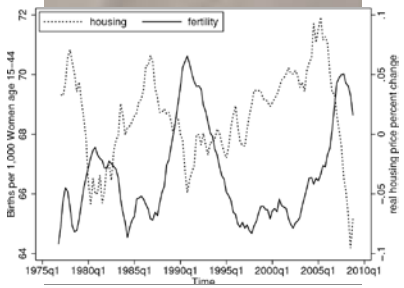
PURDUE UNIVERSITY | Purdue University Research Center in Economics (PURCE)

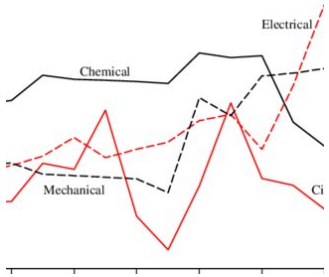
Introduction – Kevin Mumford

Academic Appointments

- Ph.D. in Economics from Stanford University, 2007
- Assistant Professor, 2007 – 2014
- Associate Professor, 2014 – present
- Director of Undergraduate Programs in Economics, 2015 – 2018
- Visiting Professor at the University of Nottingham, 2016
- Director, Purdue University Research Center in Economics, 2018 – present

Research – Kevin Mumford





Research Topics

- Effect of a minimum wage increase on worker wages
- How complex tax changes affect household decisions (child & dependent tax credit)
- How wealth increases affect the number of children families choose to have
- Effect of state-level payday loan regulation on borrower behavior
- Effect of course grades on student major choice, internships, and career choices
- How teacher performance pay affects their students' future jobs and wages
- Measure psychological stigma and participation costs in food welfare programs
- Role of human capital in measuring national wealth

Purdue University Research Center in Economics

PURCE is a research center focused on the creation and dissemination of insights into how **laws, regulations, and government programs** affect the market economy and the well-being of individuals and society.

We do this by:

- Providing resources to **hire faculty** who are trained in empirical economic methodologies and who apply them to policy evaluation
- Training economics **PhD students** in these methods with this research focus
- Supporting the research of faculty and students by helping them **distribute research findings** in top academic journals as well as in other media to reach a general audience.

PURCE - Research

Research Focus Areas

- **Crime and the Legal System**
- **Education**
- **Energy Regulation**
- **Federal Entitlement Programs**
- **Labor Markets and Wages**
- **Merger Policy**
- **Taxation**
- **Trade and Globalization**

PURCE Faculty Affiliates

Jack Barron
Timothy Bond
Jillian Carr
Farid Farrokhi
Clifford Fisher
Trevor Gallen
Huseyin Gulen
David Hummels
Lynne Kiesling
Soojin Kim
Jerry Lynch
Stephen Martin
Joe Mazur
Timothy Moore
Kevin Mumford
Victoria Prowse
Brian Roberson
Miguel Sarzosa
Ralph Siebert
Anson Soderbery
Justin Tobias
John Umbeck
Chong Xiang
Cathy Zhang

PURCE - Events

Communicate Policy Implications of Research

- **PURCE Economic Policy Lunch** held monthly on campus: March 21
- Annual **Economic Ideas Forum**, sponsored by the Hugh and Judy Pence Family: April 18
- Annual **Indianapolis Policy Summit**: Fall 2019

Let me know if you would like an invitation!

mumford@purdue.edu

BACK A BOILER

Program Characteristics
Who selects into the program?
How does participation affect choices?

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IRB Protocol Number: 1704019102

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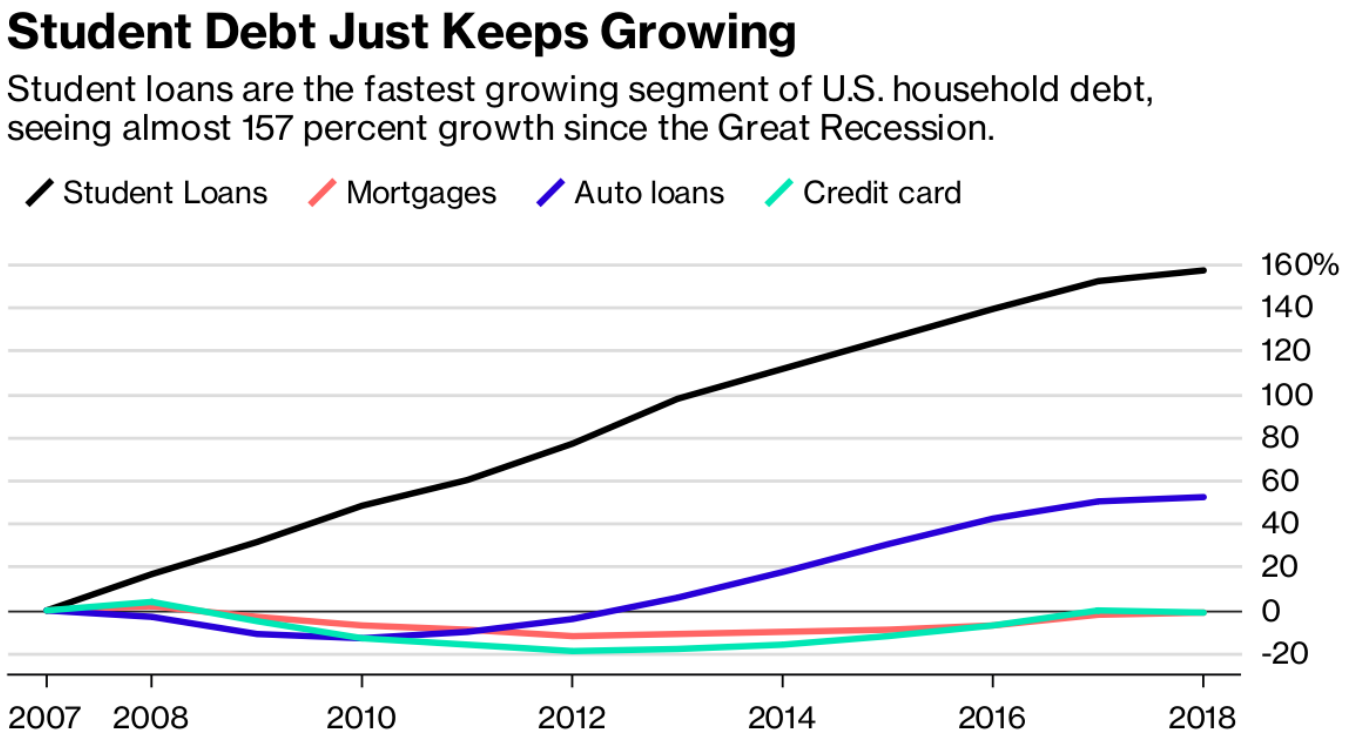
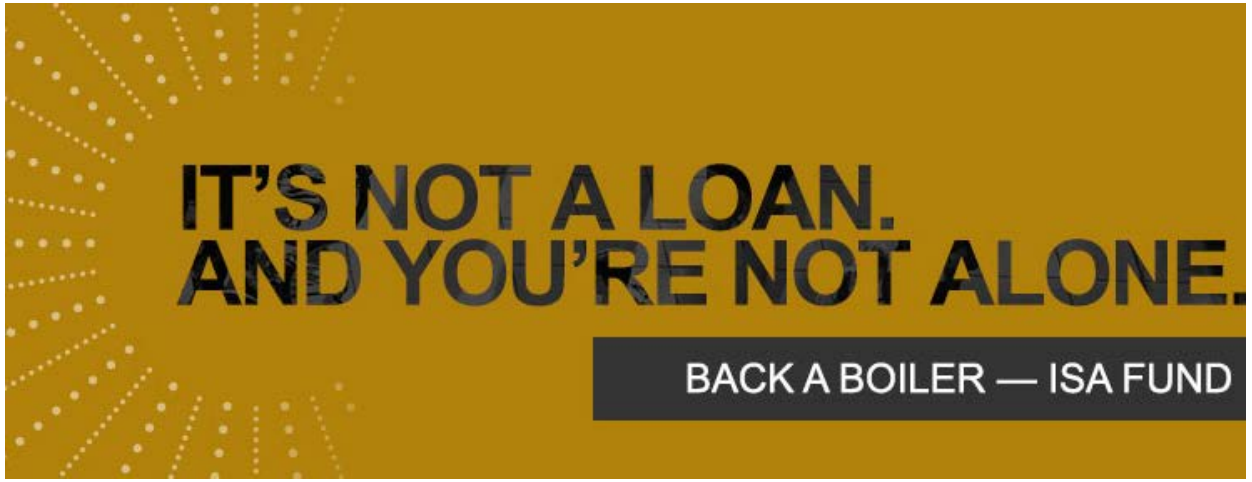
US Student Loan Debt



- Outstanding US student loan debt is $1.6 trillion (2018)
  - $1.4 trillion is federal
- Average student debt for graduating students is $37,000 (2017)
- 9% of student loans are currently in default (rising)
- Department of Education has introduced several income-driven repayment plans for student loans

Purdue Back a Boiler Program



Back a Boiler ISA is an alternative to:

- Parent PLUS Loan
- Private Student Loan

- First year (2016-2017) juniors and seniors
- Second year (2017-2018) sophomores, juniors, and seniors
- Domestic students on main campus
- Credit check: bankruptcy, collection
- Student must have remaining financial need after exhausting:
  - Scholarships
  - Grants
  - Direct Federal Student Loans

Program Rules

- 8 groups of majors with different rates & lengths
- The maximum amount in repayment is 2.5 times the funding amount
- Payments begin 6 months after graduation, the monthly payment is initially determined from a pay stub
- The monthly payment is recalculated every year in June after receipt of the W-2 and 1099-MISC from the IRS to verify annual income. Purdue adjusts the monthly payment for under or overpayment
- Deferment status if earning less than $20,000/year or a self-reported full-time student. Payment term extended up to 5 years (subsequent years are forgiven)

Income Share Agreement (ISA) Approval Disclosure

*** THIS IS NOT A LOAN ***

STUDENT:
[Student Name]
[Student Address]

FUNDER:
Back a Boiler – ISA Fund
1281 Win Hentschel Blvd
West Lafayette, IN 47906
(765) 588-5495

Income Share Agreement Terms

Funding Amount	Income Share	Payment Term	Payment Cap
[$12,000.00]	[4.00%]	[108 months]	[$30,000.00]
The amount of funds you will receive plus any funding charges.	The percent of your total earned income that you will share each month.	The number of months during which you will share your income.	The maximum amount you will pay over the payment term.

ITEMIZATION OF TOTAL FUNDING AMOUNT

Amount paid to you	$0
Amount paid to others on your behalf: • Purdue University	+ [$12,000.00]
Total amount provided	= [$12,000.00]
Initial funding charges: • Disbursement Fee	+ [$0]
Total Funding Amount	**= [$12,000.00]**

ABOUT YOUR INCOME SHARE

• **Your income share is the percentage of your future earned income you will owe in return for the funding you receive.** Your share is not an interest rate or annual percentage rate.
• **Your income share is fixed.** This means that your income share does not vary with your income and will never be lower or higher than the income share shown above.
• **Your payments will vary based on the amount of your earned income.** The total amount you will pay may be **more** or **less** than the funding amount you receive. The maximum you will pay is two and a half times (2.5x) your funding amount over the payment term, regardless of your earned income.

FEES

Application Fee: $0. **Disbursement Fee:** 0%. **Late Fee:** The lesser of $5 and 5% of the payment amount due if not received within 10 days of the due date. **Returned Payment Fee:** $20. **Prepayment Fee:** $0. **Check Processing Fee:** $0.

Income Share Agreement Payment Illustration

The total amount you will pay for this Income Share Agreement will vary depending upon your future earned income and may be **more** or **less** than the **funding amount** you receive. An ISA is different from a loan, which has principal and interest payments. An ISA requires you to pay a fixed percentage of your earned income each month for a fixed period of time. The table below shows illustrative monthly and total ISA payments for different levels of earned income.

Average Annual Earned Income	Estimated Monthly Payments Under Differing Levels of Earned Income	
	$[12,000] Income Share Agreement [4.00]% income share, [108]-month term	
	Monthly Payments	Total Payments
$ 10,000	$ 0.00	$ 0.00
$ 20,000	$ 66.67	$ 7,200.00
$ 30,000	$100.00	$10,800.00
$ 40,000	$133.33	$14,400.00
$ 50,000	$166.67	$18,000.00
$ 60,000	$200.00	$21,600.00
$ 70,000	$233.33	$25,200.00
$ 80,000	$266.67	$28,800.00
$ 90,000	$300.00	$30,000.00 (cap)
$ 100,000	$333.33	$30,000.00 (cap)

Examples if Income Increases by 5% per Year
[4.00]% income share, [108]-month term

• If your first job pays you: $ 20,000
Your total payments will be: $ 8,821

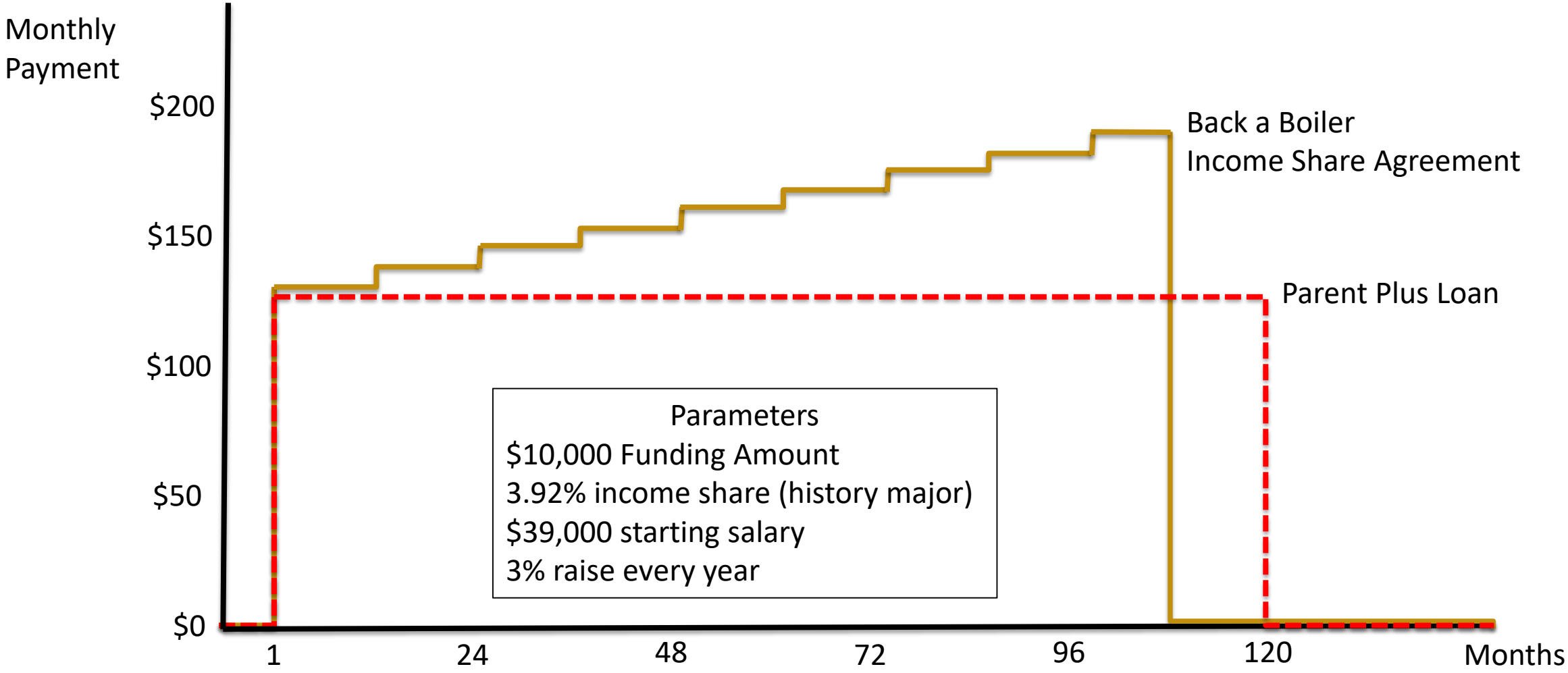
• If your first job pays you: $ 40,000
Your total payments will be: $ 17,643

• If your first job pays you: $ 60,000
Your total payments will be: $ 26,464

• If your first job pays you: $ 80,000
Your total payments will be: $ 30,000 (cap)

• If your first job pays you: $100,000
Your total payments will be: $ 30,000 (cap)

Repayment Example 1



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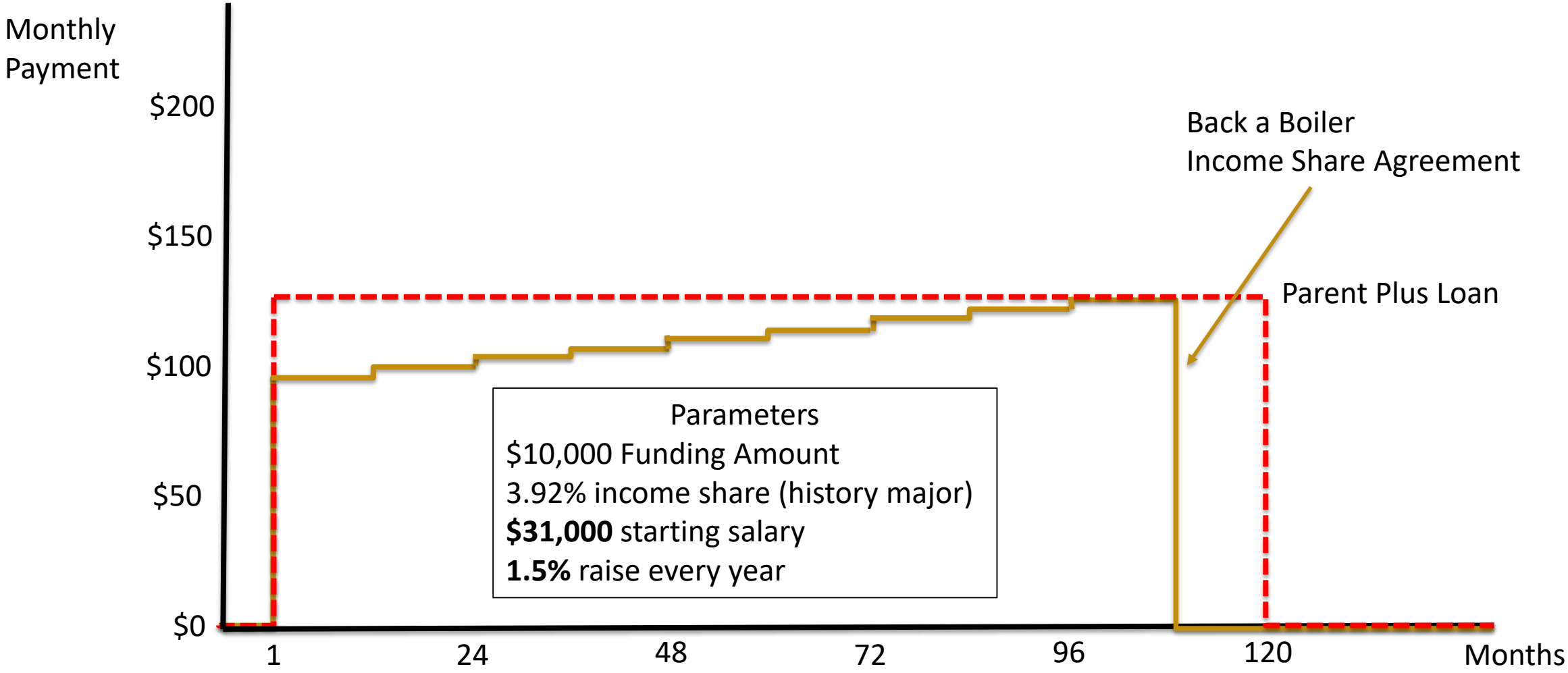
Repayment Example 2



Advantages

Income-Driven Repayment

- US Department of Education now provides income-driven repayment plans for refinancing student loans. This limits the monthly payment to a percentage of income, but extends the length of the loan.
- Back a Boiler provides a similar service: making the monthly payment a percentage of income.

Insurance Against Low Earnings

- Unlike student loans, even with the income-driven repayment options, Back a Boiler provides the student with insurance against low earnings.
- Students entering careers with a high variance of earnings should find this attractive

Problems

Adverse Selection

- Students have better information about their own future incomes (ability, motivation, intensity of work, future education plans, family plans, etc.)
- We would expect students with lower expected future income to be more likely to select into Back A Boiler

Moral Hazard

- Students who select into Back A Boiler have to pay a specified percentage of income, which gives them an incentive to earn less than they otherwise would have.
- We would expect Back A Boiler participants to reduce their work effort at Purdue and in their career after signing up for Back A Boiler

The Data: Participation

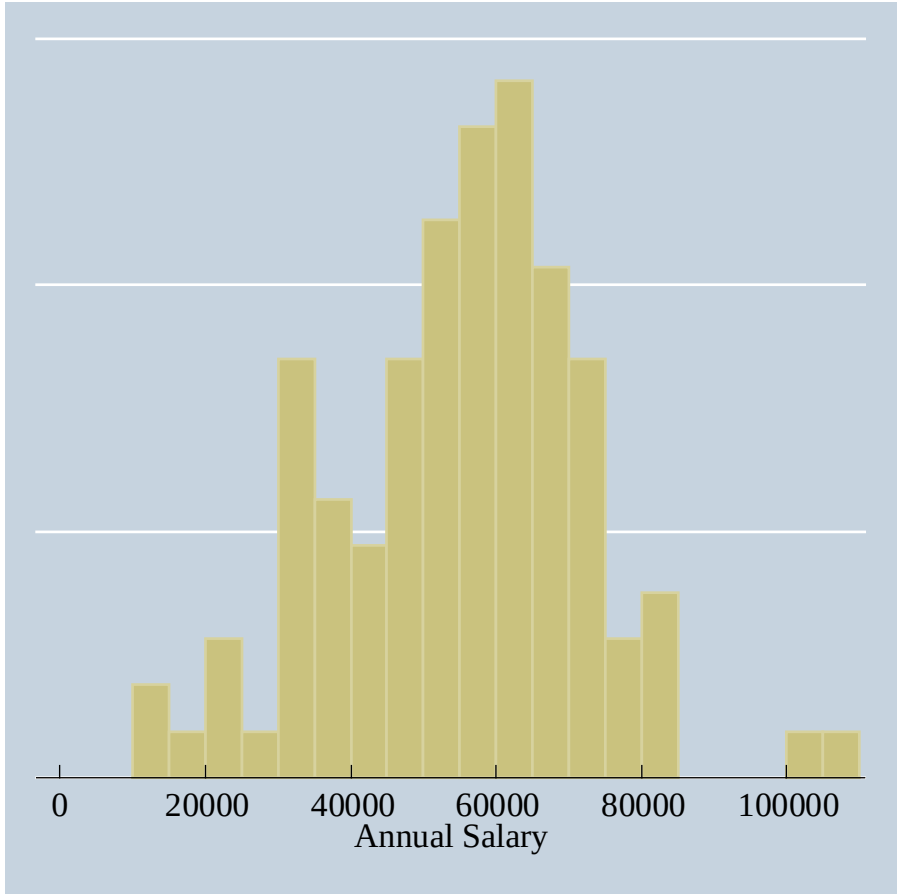
Purdue Administrative Data

- The Financial Aid Office provided 320 students in year 1 and 434 students in year 2 with ISA disclosures. This is the study population
- 155 (48%) in year 1 and 278 (64%) in year 2 selected the ISA
  - $6.1 million dispersed ($14,000 per participant)
  - Participants come from 115 different majors
- 165 (52%) in year 1 and 156 (36%) in year 2 did not sign up for the ISA
  - Students who applied both years are in the data twice
  - 668 Unique Students

The Data: After-Graduation Earnings

First Destination Survey of Graduates

- University survey of all graduates within 6 months of graduation.
- 191 students graduated
- 163 first-destination respondents (85%)
  - 97 employed
  - 27 grad school
  - 34 other or still seeking employment
- 88 report starting salary ($54,577 average)



Characteristics of ISA Applicants

		ISA Applicants		
	All Students	Non-Participant	Participant	p-value
Sophomore	0.288	0.262	0.260	0.939
Junior	0.294	0.420	0.385	0.337
Senior	0.418	0.318	0.355	0.287
Female	0.419	0.464	0.503	0.289
Black	0.032	0.117	0.088	0.189
Hispanic	0.046	0.056	0.093	0.057*
Asian	0.069	0.093	0.070	0.248
First-Generation Student	0.218	0.293	0.285	0.808
Transfer Student	0.276	0.131	0.132	0.965
Observations	22,912	321	432	

ISA applicants are more likely to be female, under-represented minority, and first-generation students. They are less likely to be transfer students.

ISA participants are very similar to ISA applicants who choose not to participate

Characteristics of ISA Applicants

		ISA Applicants		
	All Students	Non-Participant	Participant	p-value
prior-year GPA (relative to major)	3.03	2.72	2.79	0.082*
SAT Math	626.3	611.8	614.9	0.645
SAT Reading	623.7	604.3	601.8	0.722
Funding Amount	-	$13,605	$14,331	0.168
Income Share Percentage	-	3.877	3.874	0.947
Average Salary of Major	$55,139	$54,298	$52,584	0.109
Salary Std. Dev of Major	$14,704	$14,343	$14,203	0.752
Indiana Resident	0.533	0.522	0.399	0.001*
Prior ISA Participant	-	0.019	0.153	0.000*
Observations	22,912	321	432	

ISA applicants have fewer scholarships and have exhausted direct federal student loans. They have lower grades, SAT scores, and have chosen slightly lower-paying majors

ISA participants are similar to non-participants, except they are less likely to be Indiana residents (who are less likely to exhaust direct federal student loans).

Selection into the ISA Program: Regression Analysis

	(1)	(2)	(3)	(4)
Prior Year GPA	0.0483	0.0439	0.0437	0.0501
	(0.0297)	(0.0303)	(0.0305)	(0.0329)
SAT Math	0.0003	0.0003	0.0003	0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0004)
SAT Verbal	-0.0005*	-0.0005*	-0.0004*	-0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0003)
Funding Amount ($1,000s)	0.0016	0.0029	0.0027	0.0010
	(0.0030)	(0.0030)	(0.0030)	(0.0035)
Income Share Percentage	0.0379	**-0.0859***	**-0.1224****	**-0.2290****
	(0.0371)	(0.0503)	(0.0557)	(0.0929)
Major Avg Salary ($1,000s)		**-0.0066*****	**-0.0084*****	
		(0.0021)	(0.0026)	
Major Std Dev Salary ($1,000)			0.0039	
			(0.0029)	
Indiana Resident	**-0.1465*****	**-0.1497*****	**-0.1493*****	**-0.1823*****
	(0.0488)	(0.0491)	(0.0495)	(0.0577)
Prior ISA Participant	**0.2601*****	**0.2440*****	**0.2433*****	**0.1720****
	(0.0669)	(0.0681)	(0.0670)	(0.0815)
2nd Academic Year	**0.1449*****	**0.1491*****	**0.1466*****	**0.1448****
	(0.0545)	(0.0552)	(0.0553)	(0.0651)
Major Fixed Effects	No	No	No	Yes
Observations	185	182	181	180
R-squared	0.016	0.032	0.133	0.166

All specifications include controls for: year in school, female, Black, Hispanic, Asian, first-generation student, transfer student, non-native English speaker, and birth year indicators

Standard errors are clustered by major

Selection into Back a Boiler

There is no evidence of adverse selection on ability

- GPA and SAT scores have no impact on participation

There is a strong price effect

- Students in higher-paying majors are less likely to participate
- Higher income share percentage discourages participation

Program is growing in attractiveness

Applicant Survey

Survey Invitation to All Applicants

- Students offered a $20 Amazon gift card
- Told the goal of survey is to learn about how “experiences, attitudes, expectations, and beliefs influence how you pay for college.” No mention of Back a Boiler
- 60% of applicants complete the survey
- Survey measures:
  - Debt Aversion
  - Financial and Employment Experience
  - Future Salary, Work, and Family Expectations
  - Risk Aversion, Time Preference, and Optimism
  - Location Preference
  - Parent Characteristics

Debt Aversion Survey Responses

	Non-Participants	Participants	P-Value
1. There is no excuse for borrowing money	1.810	1.658	0.047**
2. Students have to go into debt (inverse)	2.845	2.981	0.274
3. It is OK to borrow money in order to buy food (inverse)	2.517	2.465	0.626
4. You should always save up first before buying something	4.126	4.151	0.764
5. Debt is an integral part of today's lifestyle (inverse)	2.445	2.377	0.507
6. Students should be discouraged from using credit cards	2.822	2.854	0.780
7. Banks should not be surprised when students incur debts (inverse)	2.190	2.096	0.345
8. It is OK to have a checking account overdraft (inverse)	3.655	3.638	0.874
9. Once you are in debt it is very difficult to get out	3.730	3.704	0.807
10. You should stay at home rather than borrow money to go out	3.741	3.842	0.354
11. Loans allows you to enjoy life (inverse)	3.132	3.288	0.126
12. Owing money is basically wrong	2.213	2.162	0.596
Sum of questions 1 – 12 (higher indicates more debt aversion)	35.25	35.22	0.948
Observations	174	260	

[Strongly Disagree =1, Somewhat Disagree = 2, Neither Agree or Disagree = 3, Somewhat Agree = 4, Strongly Agree = 5]

Participation does not seem to be driven by debt aversion
In retrospect, this isn't surprising given that all applicants have substantial student loan debt already

Financial and Employment Experience

	Non-Participants	Participants	P-Value
Financial Experience			
Do you have a Checking Account?	0.933	0.927	0.838
Do you have a Savings Account?	0.854	0.805	0.189
Have you owned Stocks or a Mutual Fund?	0.163	0.160	0.942
Have you ever had an Auto Loan?	0.124	0.0992	0.422
Have you ever had a Title Loan?	0.0281	0.0344	0.714
How many credit cards do you have?	1.029	0.851	0.087*
I have never had a credit card	0.326	0.408	0.079*
I always pay credit cards in full each month	0.258	0.256	0.949
Employment Experience			
Do you currently have a job?	0.614	0.594	0.680
Do you plan to work this summer?	0.892	0.908	0.583
Did you have a job last semester?	0.597	0.598	0.982
Did you have a job last summer?	0.869	0.851	0.583
Observations	175	262	

Participation does not seem to be driven by financial and employment experience
Some weak evidence that participants have less credit card experience than non-participants

Future Salary and Work

	Non-Participants	Participants	P-Value
Expected starting annual salary	$58,119	$55,401	0.170
Percent chance that annual salary greater than $38,000	82.90	78.03	0.051*
Percent chance that annual salary greater than $51,000	65.08	59.90	0.089*
best guess at salary 2 years from graduation	$55,624	$52,837	0.162
best guess at salary 4 years from graduation	$64,300	$61,988	0.292
best guess at salary 6 years from graduation	$76,459	$74,520	0.573
best guess at salary 8 years from graduation	$90,111	$88,152	0.841
Calculated salary growth rate	0.537	0.603	0.621
Probability of Working full time 2 years after graduation	68.30	69.96	0.613
Probability of Working full time 4 years after graduation	76.48	76.77	0.913
Probability of Working full time 6 years after graduation	78.71	80.03	0.601
Observations	174	256	

Participants seem to expect lower starting salary and higher salary growth (weak evidence)
No difference in future labor force participation expectations

Family Expectations (Women)

	Non-Participants	Participants	P-Value
Ideally, would you like to be married someday?	0.966	0.948	0.522
At what age would you like to get married?	26.42	26.59	0.638
Likelihood married 3 year after graduation	47.39	41.84	0.215
Likelihood married 7 year after graduation	77.91	72.24	0.118
Do you want to have children?	0.876	0.822	0.276
Number of children expected 10 years after graduation	2.205	2.099	0.412
Expected age at first child	28.74	28.77	0.929
Likelihood first child 3 years after graduation	25.25	20.22	0.202
Likelihood first child 7 years after graduation	68.59	63.15	0.175
Observations	89	135	

Female participants believe they are less likely to be married and have children during the repayment period (no statistically significant difference)

Family Expectations (Men)

	Non-Participants	Participants	P-Value
Ideally, would you like to be married someday?	0.976	0.983	0.722
At what age would you like to get married?	27.06	27.56	0.196
Likelihood married 3 year after graduation	39.45	34.71	0.247
Likelihood married 7 year after graduation	71.68	66.91	0.185
Do you want to have children?	0.800	0.843	0.426
Number of children expected 10 years after graduation	1.882	1.824	0.674
Expected age at first child	29.72	30.01	0.518
Likelihood first child 3 years after graduation	15.40	14.50	0.750
Likelihood first child 7 years after graduation	52.04	52.94	0.849
Observations	85	121	

Male participants believe they are less likely to be married during the repayment period (no statistically significant difference). No difference in child expectations.

Location Preferences

1. Indianapolis, IN
2. San Francisco, CA
3. Terre Haute, IN
4. Topeka, KS
5. Washington DC
6. Boston, MA
7. Evansville, IN
8. Pittsburgh, PA
9. Phoenix, AZ
10. Fort Wayne, IN
11. Chicago, IL
12. Peoria, IL

	Non-Participants	Participants	P-Value
Large city preference	0.509	0.449	0.227
Small city preference	0.029	0.035	0.721
Indiana preference	0.225	0.215	0.795
Outside Indiana preference	0.220	0.160	0.119
East Coast preference	0.168	0.223	0.163
Western US preference	0.237	0.191	0.256
Observations	85	121	

Results suggest that non-participants have a strong preference for living in a large city and for leaving Indiana (differences are not statistically significant).

Parent Characteristics

	Non-Participants	Participants	P-Value
Mother did not go to college	0.163	0.149	0.702
Mother attended college, but did not graduate	0.096	0.142	0.148
Mother graduated from college	0.736	0.697	0.381
Mother attended graduate school	0.230	0.222	0.842
Father did not go to college	0.213	0.206	0.852
Father attended college, but did not graduate	0.107	0.195	0.013**
Father graduated from college	0.669	0.580	0.062*
Father attended graduate school	0.247	0.256	0.840
Parent Income	$120,342	$107,184	0.176
My parent were not involved in my college financial decisions	0.103	0.088	0.731
My parent somewhat influenced my college financial decisions	0.167	0.328	0.011**
My parent strongly influenced my college financial decisions	0.436	0.408	0.697
My parent made my college financial decisions for me	0.231	0.128	0.057*
Observations	174	260	

Participants are more likely to have parents who attended, but did not graduate from college.

Participants are more likely to have parents who encourage them to make their own financial decisions.

Student Selection into Back a Boiler

ISA participants are similar to non-participants in:

- Major
- Year in School
- Age
- Gender
- Work Expectations
- Race
- Attitudes about Debt
- Risk Aversion
- Time Preference
- Family Expectations

Potential Selection Drivers:

- Credit Cards
- Salary Expectations
- Location Preference
- Parent Characteristics

Selection into the ISA Program: Regression Analysis

	(1)	(2)
Prior Year GPA	-0.0256	-0.0050
	(0.0465)	(0.0629)
Income Share Percentage per $10,000	-0.0768	**-0.2081***
	(0.0663)	**(0.1077)**
Major Avg Salary ($1,000s)	-0.0048	**-0.0469*****
	(0.0034)	**(0.0083)**
Debt Aversion Index	0.0001	0.0001
	(0.0054)	(0.0081)
Number of Credit Cards	-0.0354	-0.0559
	(0.0254)	(0.0357)
Starting Salary Expectation ($1,000s)	-0.0005	0.0004
	(0.0015)	(0.0019)
Married within 7 years	-0.0016	-0.0007
	(0.0010)	(0.0011)
Large City Preference	**-0.1129****	**-0.1576****
	(0.0519)	**(0.0688)**
Father attended college, did not graduate	**0.1588****	**0.2409****
	(0.0729)	**(0.1070)**
Major Fixed Effects	No	Yes
Observations	381	381
R-squared	0.162	0.419

Both specifications include controls for: year in school, female, Black, Hispanic, Asian, first-generation student, transfer student, non-native English speaker, SAT math, SAT verbal, and birth year indicators

Standard errors are clustered by major

Moral Hazard

Grades

- We would expect Back A Boiler participants to reduce their work effort at Purdue and in their career after signing up for Back A Boiler
- Look for reduction in GPA for participants relative to non-participants in the year the funding is received and the following year (for juniors and sophomores)

Salary

- Students who select into Back A Boiler have to pay a specified percentage of income, which gives them an incentive to earn less than they otherwise would have
- Look for starting salary to be lower for participants-relative to non-participants

Effect of ISA Participation on GPA and Salary

	(1) GPA (t)	(2) GPA (t+1)	(3) Salary
Back a Boiler Participant	**0.0443**	**0.0271**	**-3481.54**
	(0.0442)	**(0.1141)**	**(3005.75)**
Prior Year GPA	0.5861***	0.3340***	2246.98
	(0.0338)	(0.0828)	(2369.35)
SAT Math	0.0010***	0.0017*	-27.99
	(0.0004)	(0.0009)	(34.78)
SAT Verbal	0.0001	-0.0003	50.42
	(0.0003)	(0.0008)	(37.00)
Funding Amount ($1,000s)	0.0084**	0.0114	-128.66
	(0.0033)	(0.0084)	(198.84)
Major Avg Salary ($1,000s)	0.0310	0.0235	779.06*
	(0.0210)	(0.0301)	(424.45)
Major Fixed Effects	Yes	Yes	Yes
Observations	657	208	101
R-squared	0.515	0.591	0.894

All specifications include controls for: year in school, female, Black, Hispanic, Asian, first-generation student, and non-native English speaker

Standard errors are clustered by major

Conclusions

Back a Boiler has 2 characteristics that reduce selection:

1. Eligibility into the program is restricted to sophomores, juniors, and seniors in an environment where it is fairly difficult to change majors
2. The income share and term length differ by major group

Evidence of low adverse selection and moral hazard may not (probably doesn't) apply to some of the other programs that have been proposed.

THANK YOU

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