Low-income, First-Generation College Students, Job Security, and Major Choice: Evidence from an Information Experiment

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Motivation

- Growing policy focus on low-income, first-generation college students (Engle and Tinto, 2008).
- Disparities in college attainment, retention
- Disparities in field of study (Davies and Guppy, 1997; Goyette and Mullen, 2006; Ma, 2009; Lundy-Wagner et al., 2014)
- Human Capital Theory and major choice:
  - Knowledge of costs/benefits key role in major choice
  - Knowledge of costs/benefits not equitably distributed (Betts, 1996; Beattie, 2002)
  - Lower-SES students also more risk-averse over choices
  - Earnings, risk, and job security
- Especially after Great Recession, need to know:
  - Impact of job security preference on major choice
  - Perceptions of job security varying by low-income, first-generation status
  - Effect of policy intervention to mitigate disparities

Overview of Project

- Our contribution
  - Focus on perceptions of job security: earnings uncertainty/unemployment risk
  - Use large, diverse study sample enabling subgroup analyses by first-generation, low-income status
  - Build on information interventions as tool to improve educational choice and outcomes (Fryer, 2013; Nguyen, 2013; Hoxby and Turner, 2013; Jensen, 2010; Kelly, 2015)
- Today's talk
  - Describe survey and information experiment
  - Show results by family background
  - Show results for information treatments

Research Questions

1. Do students from first-generation, low-income families have different perceptions of earnings and job security across majors than their peers?
2. Does providing students with labor market information about earnings uncertainty and unemployment rates change expectations of earnings and job security relative to students who do not see any labor market information?

The Experiment

- Original survey administered at three separate campuses of a large, public university system
- Launched fall 2015; pre-tested throughout summer 2015
- Invitation to 48,139 undergraduates. Response rate, 13%, with 4,916 students completing. Financial incentive.
- Evaluate six major areas: Business, Education, Health, Humanities, Social Science, and STEM
- Ask respondents to consider the type of careers associated with each major, and then to estimate their earnings and job security if they were working, full time, in the fifth year after graduation.

Information Treatments

Random assignment into one of three conditions:

No Information: Respondents see no labor market information.

Median Earnings: Respondents see median earnings of graduates in each major.

Risk/Dispersion: Respondents see earnings dispersion, unemployment rate, and percent of graduates satisfied with job security in each major.

Data Source: U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study.

Design

Outcomes and Empirical Strategy

- Earnings—expected annual salary (log)
- Job Security—ordinal scale "No Security" to "High Security"
- Least squares and ordinal logit
- Basic model specification for major k, student i
- **T** treatment indicators; **FB** family background indicators:

$$\begin{aligned}\text{Outcome}_{ik} = \beta_{0k} & \\ & + \beta_{1k} * \text{T}_{1k} + \beta_{2k} * \text{T}_{2k} \\ & + \beta_{3k} * \text{FB}_a + \beta_{4k} * \text{FB}_b \\ & + \boldsymbol{\beta_{5k}} \boldsymbol{X} + \epsilon_{i,k}\end{aligned}$$

Sample Statistics

	Sample	University System	National
Freshman	22%	20%	25%
Sophomore	20%	20%	19%
Junior	25%	26%	21%
Senior	33%	32%	28%
Male	34%	48%	44%
Caucasian	44%	40%	71%
African American	10%	10%	16%
Asian	25%	23%	6.8%
Hispanic	16%	15%	12%
SAT Math	610	603	522
SAT Verbal	579	559	518
First Gen.	20%	20%	31%
Pell Grant	29%	28%	39%
Business	17%	19%	20%
Education	0.05%	0.06%	6.9%
Health	8%	8.2%	12.2%
Humanities	6.6%	5.9%	14%
Other	6.6%	5.9 %	9.3%
Social Science	13.1%	11.4%	18.6%
STEM	17%	17%	17%
Undeclared	31%	32%	1.9%

Table 1: Descriptive Statistics. Same and university data from the university office of institutional research. US data from the National Center of Education Statistics.

Sample Statistics

Actual Major	n	Base	Family Background	
			First-Gen or Low-Income	First-Gen / Low-Income
Business	694	17.5	17.1	17.9
Health	321	7.7	8.5	9.1
Humanities	264	6.1	7.5	7.1
Other	265	5.6	7.4	10.8
Social	521	10.7	16.2	18.4
STEM	674	16.8	18.0	14.7
Undeclared	1239	35.5	25.2	22.1
All	3978	100.0	100.0	100.0

Descriptive Statistics: Earnings

Major	Student's Major?	n	Median	SD
Business	No	1026	74726	27878
	Yes	340	80000	28900
Education	No	1270	45821	23371
	Yes	96	51865	29201
Health	No	1126	70909	30759
	Yes	240	83298	30076
Humanities	No	1220	42296	24541
	Yes	146	43926	25181
Social Science	No	1112	45957	24722
	Yes	254	51521	28335
STEM	No	872	87680	28968
	Yes	494	86939	28176

Table 2: Median expected earnings by student's preferred major.

Descriptive Statistics: Earnings

Major	Family Background	n	Median	SD
Business	Base	833	76685	27509
	Low Income or First Gen.	393	73333	29766
	Low Income and First Gen.	140	71111	28415
Education	Base	833	46154	24049
	Low Income or First Gen.	393	46524	24275
	Low Income and First Gen.	140	46117	21802
Health	Base	833	72593	30692
	Low Income or First Gen.	393	72960	31235
	Low Income and First Gen.	140	77506	31704
Humanities	Base	833	42766	24842
	Low Income or First Gen.	393	42222	25528
	Low Income and First Gen.	140	44444	20288
Social Science	Base	833	46915	25347
	Low Income or First Gen.	393	46524	27116
	Low Income and First Gen.	140	45702	22689
STEM	Base	833	87937	28182
	Low Income or First Gen.	393	86809	29402
	Low Income and First Gen.	140	86649	29801

Table 3: Median earnings by family background

Descriptive Statistics: Job Security

Major	Student's Major?	n	Not Secure	-	-	Very Secure
Business	No	3	16	18	44	19
	Yes	1	11	16	44	28
Education	No	6	26	23	33	12
	Yes	6	29	14	32	19
Health	No	2	9	14	41	34
	Yes	0	2	6	28	64
Humanities	No	15	46	24	13	2
	Yes	6	40	32	19	3
Social Science	No	12	41	25	19	2
	Yes	5	34	26	28	7
STEM	No	2	6	7	36	50
	Yes	0	4	5	35	55

Table 4: Security estimate by student's preferred major.

Descriptive Statistics: Job Security

Major	Student's Major?	N	Not Secure	-	-	-	Very Secure
Business	Base	829	2	15	17	45	21
	Low Income or First Gen.	393	4	14	18	44	20
	Low Income and First Gen.	140	4	12	20	36	28
Education	Base	829	6	26	22	34	12
	Low Income or First Gen.	393	7	25	21	33	15
	Low Income and First Gen.	140	6	27	24	32	11
Health	Base	829	1	8	15	40	36
	Low Income or First Gen.	393	2	8	9	35	46
	Low Income and First Gen.	140	1	4	6	45	44
Humanities	Base	829	15	46	24	13	2
	Low Income or First Gen.	393	12	44	25	16	3
	Low Income and First Gen.	140	11	42	26	15	5
Social Science	Base	829	13	39	27	19	2
	Low Income or First Gen.	393	8	40	24	23	5
	Low Income and First Gen.	140	8	41	22	24	5
STEM	Base	829	1	5	6	37	51
	Low Income or First Gen.	393	2	6	7	33	52
	Low Income and First Gen.	140	1	5	5	34	54

Table 5: Security estimate by Family Background status.

Expected Earnings and Family Background

Do students from first-generation, low-income families have different perceptions of future earnings than their peers?

	Business	Education	Health	Humanities	Social Science	STEM
Median Earnings	-0.10^{***}	-0.04	-0.07^{***}	-0.08^{***}	-0.06^{**}	-0.08^{***}
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Risk/Dispersion	-0.09^{***}	-0.02	-0.06^{***}	-0.04	-0.02	-0.08^{***}
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Low Income or First Gen.	-0.07^{*}	-0.04	-0.01	-0.06^{*}	-0.03	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Low Income and First Gen.	-0.11^{**}	-0.08	0.00	-0.06	-0.06	-0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Gender	0.07^{***}	0.09^{***}	0.05^{***}	0.08^{***}	0.05^{***}	0.03
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

Table 6: Expected earnings by major. OLS estimates of expected earnings per major on treatment indicators, family background indicators, and demographic and academic controls. Robust standard errors in parentheses. Three stars indicate statistical significance at the level determined by the Bonferroni method correction.

Expected Earnings and Information Treatment

Does providing students with labor market information about earnings uncertainty and job security change their perceptions of expected earnings relative to students who do not see any labor market information?

	Business	Education	Health	Humanities	Social Science	STEM
Median Earnings	-0.10^{***}	-0.04	-0.07^{***}	-0.08^{***}	-0.06^{**}	-0.08^{***}
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Risk/Dispersion	-0.09^{***}	-0.02	-0.06^{***}	-0.04	-0.02	-0.08^{***}
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Low Income or First Gen.	-0.07^{*}	-0.04	-0.01	-0.06^{*}	-0.03	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Low Income and First Gen.	-0.11^{**}	-0.08	0.00	-0.06	-0.06	-0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Gender	0.07^{***}	0.09^{***}	0.05^{***}	0.08^{***}	0.05^{***}	0.03
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

Table 7: Expected earnings by major. OLS estimates of expected earnings per major on treatment indicators, family background indicators, and demographic and academic controls. Robust standard errors in parentheses. Three stars indicate statistical significance at the level determined by the Bonferroni method correction.

Job Security and Family Background

Do students from first generation, low-income families have different perceptions of future job security across majors than their peers?

	Business	Education	Health	Humanities	Social Science	STEM
Median Earnings	0.01	−0.10	0.17$^{\cdot}$	−0.15$^{\cdot}$	−0.05	0.09
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Risk/Dispersion	−0.00	0.09	0.22*	0.09	0.09	−0.01
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Low Income or First Gen.	−0.08	−0.01	0.26*	0.13	0.14	0.04
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Low Income and First Gen.	0.12	−0.10	0.37*	0.25	0.20	0.14
	(0.17)	(0.16)	(0.17)	(0.17)	(0.17)	(0.17)
Gender	−0.39***	0.25***	−0.15*	0.07	−0.01	−0.11$^{\cdot}$
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)

Table 8: Expected earnings by major. OLS estimates of expected earnings per major on treatment indicators, family background indicators, and demographic and academic controls. Robust standard errors in parentheses. Three stars indicate statistical significance at the level determined by the Bonferroni method correction.

Job Security and Information Treatment

Does providing students with labor market information about earnings uncertainty and job security change their perceptions of job security relative to students who do not see any labor market information?

	Business	Education	Health	Humanities	Social Science	STEM
Median Earnings	0.01	−0.10	0.17$^{\cdot}$	−0.15$^{\cdot}$	−0.05	0.09
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Risk/Dispersion	−0.00	0.09	0.22*	0.09	0.09	−0.01
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Low Income or First Gen.	−0.08	−0.01	0.26*	0.13	0.14	0.04
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Low Income and First Gen.	0.12	−0.10	0.37*	0.25	0.20	0.14
	(0.17)	(0.16)	(0.17)	(0.17)	(0.17)	(0.17)
Gender	−0.39***	0.25***	−0.15*	0.07	−0.01	−0.11$^{\cdot}$
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)

Table 9: Expected earnings by major. OLS estimates of expected earnings per major on treatment indicators, family background indicators, and demographic and academic controls. Robust standard errors in parentheses. Three stars indicate statistical significance at the level determined by the Bonferroni method correction.

Conclusions

- Key findings
  1. Across majors, little difference by first-generation, low-income status in earnings expectations or perceived job security
  2. Showing median earnings has large, negative effect on earnings expectations
  3. Information treatment reduces perceived earnings and security for Humanities and Social Science majors
- Are first-generation, low-income students more likely to seek out information about majors and careers?

Information Sources

"Please rate how helpful or not helpful these sources of information have been at Rutgers in informing your decision about your major?"

Professors	Base	Low-Income or First-Gen	Low-Income and First-Gen
Did Not Use (N/A)	8.7	7.2	7.1
Very Unhelpful	3.4	5.1	5.0
Unhelpful	6.7	7.2	5.8
Neither Helpful nor Unhelpful	20.6	18.5	19.0
Helpful	40.4	38.7	36.0
Very Helpful	19.5	22.8	26.9

Table 10: χ-squared $= 28.344$, df $= 10$, p-value $=< 0.01$

Information Sources

"Please rate how helpful or not helpful these sources of information have been at Rutgers in informing your decision about your major?"

Career Counselors	Base	Low-Income or First-Gen	Low-Income and First-Gen
Did Not Use (N/A)	29.8	25.0	16.8
Very Unhelpful	6.1	7.0	8.4
Unhelpful	7.5	7.7	7.8
Neither Helpful nor Unhelpful	23.6	23.7	22.4
Helpful	22.1	23.2	27.6
Very Helpful	10.4	12.7	16.8

Table 11: χ-squared $= 52.461$, df $= 10$, p-value $= < 0.01$

Information Sources

"I can rely on my family to help advise me on my selection of college major. "

Choose Career	Base	Low-Income or First-Gen	Low-Income and First-Gen
Never	7.3	15.9	22.0
Rarely	10.9	16.8	18.3
Sometimes	25.6	29.0	31.2
Often	29.1	22.6	17.5
All of the Time	26.9	15.6	10.8

Table 12: χ-squared $= 263.65$, df $= 8$, p-value $= < 0.01$

Information Sources

"I can rely on my family to help advise me on my selection of a career ."

Choose Major	Base	Low-Income or First-Gen	Low-Income and First-Gen
Never	6.2	13.9	20.5
Rarely	10.6	16.8	19.2
Sometimes	25.9	29.1	28.2
Often	30.7	24.4	19.6
All of the Time	26.4	15.6	12.1

Table 13: χ-squared $= 251.85$, df $= 8$, p-value $= < 0.01$

END

Information Experiments

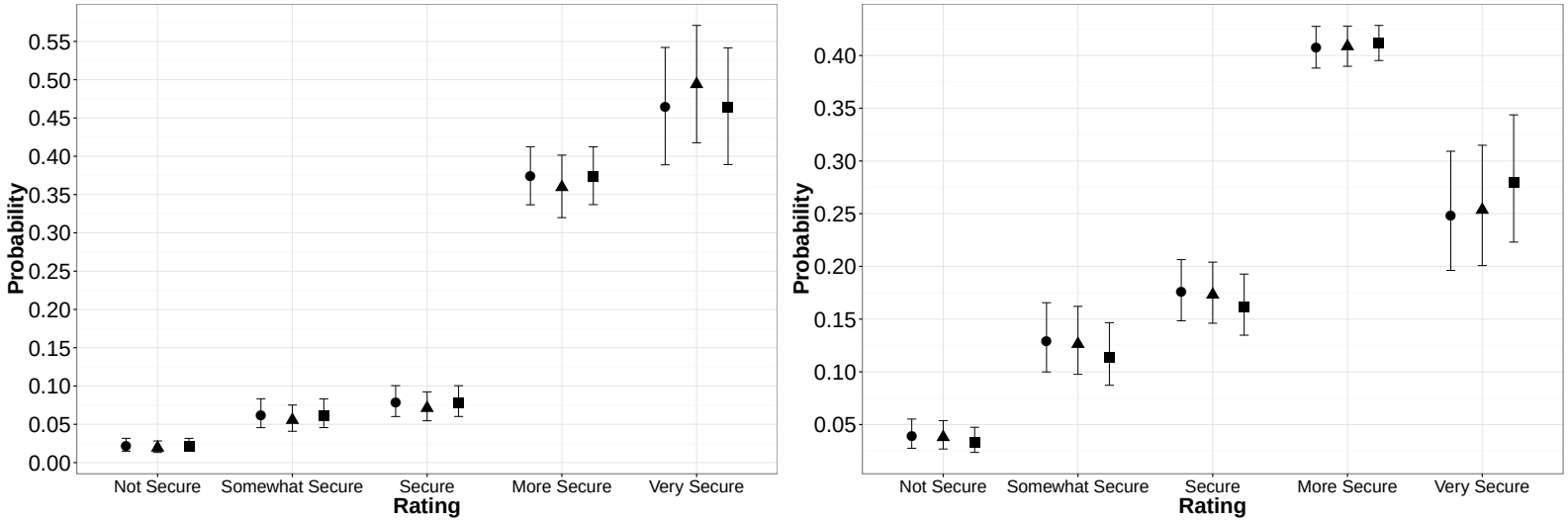
- Earnings, Job Security and Major Choice
  - Students' subjective expectations about future earnings, job security influence major choice
  - Large differences in earnings risk across majors; college students generally risk-averse when choosing majors.
  - Students often poorly informed about these labor market outcomes
  - Family income related to information access Betts (1996)
- Information interventions
  - Growing literature on information interventions as tool to improve educational choice and outcomes (Fryer, 2013; Nguyen, 2013; Hoxby and Turner, 2013; Jensen, 2010; Kelly, 2015)
  - Students hold biased estimates of the true earnings/risk of the population labor market outcomes
  - Information intervention with labor market data impacts students' own expectations of future labor market outcomes and preferred major(Wiswall and Zafar, 2015)

Actual Major by Family Background

Major Group	n	Neither Percent	First-Gen or Low-Income Percent	First-Gen and Low-Income Percent
Business	694	17.5	17.1	17.9
Health	321	7.7	8.5	9.1
Humanities	264	6.1	7.5	7.1
Other	265	5.6	7.4	10.8
Social	521	10.7	16.2	18.4
STEM	674	16.8	18.0	14.7
Undeclared	1239	35.5	25.2	22.1
All	3978	100.0	100.0	100.0

Job Security: STEM and Health

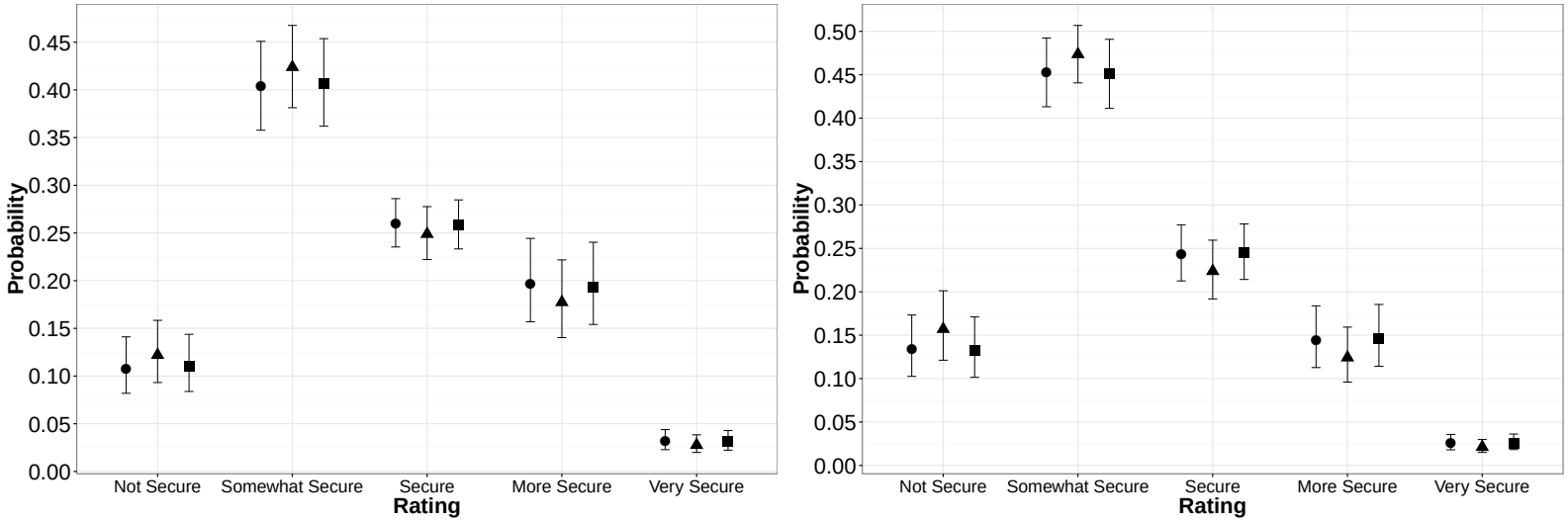
Do students from first generation, low-income families have different perceptions of job security across majors than their peers?



Perceived job security by major and first-generation/low-income status. STEM (left) and Health (right)

Job Security: Social Science and Humanities

Do students from first generation, low-income families have different perceptions of job security across majors than their peers?



Perceived job security by major and first-generation/low-income status. Social Science (left) and Humanities (right)

Sample Statistics

Actual Major	n	Base	Family Background	
			First-Gen or Low-Income	First-Gen / Low-Income
Business	694	17.5	17.1	17.9
Health	321	7.7	8.5	9.1
Humanities	264	6.1	7.5	7.1
Other	265	5.6	7.4	10.8
Social	521	10.7	16.2	18.4
STEM	674	16.8	18.0	14.7
Undeclared	1239	35.5	25.2	22.1
All	3978	100.0	100.0	100.0

Job Security

Earnings question: If you were to receive a Bachelor's degree in each of the following fields of study areas and you were working full time 5 years after graduation, what do you believe is the most likely amount that you would earn per year?

Job security question: Thinking about the types of careers available to you if you were to graduate with a degree in each field of study, what type of job security do you believe you would have with a degree in each field?

That is, how likely is it you would have a job with secure employment where you have a low chance of losing your job or of being forced to accept part-time employment?

References I

Beattie, Irenee R. 2002. "Are All Adolescent Econometricians Created Equal? Racial, Class, and Gender Differences in College Enrollment." *Sociology of Education* 75(1):19–43.

Betts, Julian R. 1996. "What Do Students Know about Wages? Evidence from a Survey of Undergraduates." *Journal of Human Resources* 31(1):27–56.

Davies, Scott and Neil Guppy. 1997. "Fields of Study, College Selectivity, and Student Inequalities in Higher Education." *Social Forces* 75(4):1417–1438.

Engle, Jennifer and Vincent Tinto. 2008. *Moving Beyond Access: College Success for Low-Income, First-Generation Students*. Washington, DC: Pell Institute for the Study of Opportunity in Higher Education.

Fryer, Jr., Roland G. 2013. "Information and Student Achievement: Evidence from a Cellular Phone Experiment." Working Paper.

References II

Goyette, Kimerly A. and Ann L. Mullen. 2006. "Who Studies the Arts and Sciences? Social Background and the Choice and Consequences of Undergraduate Field of Study." *Journal of Higher Education* 77(3):497–538.

Hoxby, Caroline and Sarah Turner. 2013. "Expanding College Opportunities for High-Achieving, Low Income Students." Stanford Institute for Economic Policy Research.

Jensen, Robert. 2010. "The (Perceived) Returns to Education and the Demand for Schooling." *The Quarterly Journal of Economics* 125(2):515–548.

Kelly, Andrew P. 2015. "High Costs, Uncertain Benefits." American Enterprise Institute Center on Higher Education Reform.

References III

Lundy-Wagner, Valerie C., Cindy P. Veenstra, Marisa K. Orr and Nichole M. Ramirez. 2014. "Gaining Access or Losing Ground?: Socioeconomic Disadvantaged Students in Undergraduate Engineering 1994-2003." *Journal of Higher Education* 85(3):339–369.

Ma, Yingyi. 2009. "Family Socioeconomic Status, Parental Involvement, and College Major Choices—Gender, Race/Ethnic, and Nativity Patterns." *Sociological Perspectives* 52(2):211–234.

Nguyen, Trang. 2013. "Information, Role Models and Perceived Returns to Education: Experimental Evidence from Madagascar." The World Bank. Word Bank Gender Impact Evaluation Database. Washington, D.C.

Wiswall, Mathew and Basit Zafar. 2015. "Determinants of College Major Choice: Identification Using an Information Experiment." *Review of Economic Studies* 82(2):791–824.