EFFECTS OF STUDENT MAJOR INDECISION ON CAREER OUTCOMES

by

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A THESIS

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Student major indecision is a well-studied problem for counselors, psychologists, and students who seek to build fruitful careers from their college education. To quantify the effects of student major indecision on career outcomes, this paper analyzes University of Oregon alumni's academic history data matched with corresponding career history data taken from online resumes. We use multiple linear regression analysis to estimate the effects of two observable manifestations of students' academic indecision—undeclared status and major switching—on three observable career outcomes of interest: wages, job switching frequency, and managerial attainment. The results show that undeclaredness has significant negative effects on job switching frequency and wages, while major switching has significant positive effects on job switching frequency and wages. Both undeclaredness and major switching were shown to have insignificant effects on managerial job attainment.

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Statistic	N	Proportion
Manager	2588	0.139
Female	9581	0.515
Male	9022	0.485
White	14905	0.801
Asian	1064	0.058
Hispanic or Latino	1016	0.055
Two or more races	575	0.031
Nonresident alien	523	0.029
Black or African American	256	0.014
American Indian or Alaska Native	127	0.007
Native Hawaiian or Other Pacific Islander	102	0.005
Major: Business Administration	3121	0.168
Major: Psychology	1270	0.068
Major: Political Science	1220	0.066
Major: Economics	1043	0.056
Major: Journalism: Advertising	978	0.052
Major: Journalism: Public Relations	949	0.051
Major: Accounting	863	0.046
Major: Sociology	827	0.044
Major: Human Physiology	607	0.033
Major: English	529	0.028

Note: For brevity, only the ten most common majors are included, and 81 major categories are omitted. There are 18,603 students in the total sample for all categorical variables

Table 2: Data statistics — numerical data

Statistic	N	Mean	St. Dev.	Min	1st Quartile	3rd Quartile	Max
Average wage	18,603	69,437.8	36,291.82	10,723	40,868.2	87,724.7	293,584
Job changes	18,340	6.610	4.752	1	3	9	40
Job change frequency	18,336	0.598	0.416	0.026	0.286	0.800	5.000
Major changes	18,603	0.598	0.745	0	0	1	6
Undeclared terms	18,603	1.419	2.518	0	0	2	18
High school GPA	15,649	3.524	0.378	1.140	3.270	3.820	4.900
SAT Math score	13,565	565.957	80.817	200	510	620	800
SAT Verbal score	13,567	559.204	82.104	200	500	610	800
ACT Math score	4,861	24.420	4.235	12	22	27	36
ACT English score	4,861	24.314	4.822	8	21	28	36
Difference between SAT Math & Verbal scores	18,426	62.879	49.499	0	20	90	430
Departmental GPA	18,603	3.241	0.476	0	2.946	3.589	4.300
Normalized departmental GPA	18,603	0	0.999	-6.015	-0.674	0.731	2.817
University GPA	18,603	3.187	0.433	2	2.900	3.507	4.230
Birth year	18,603	1,987.990	5.020	1,946	1,985	1,992	1,997
Years since graduation	18,603	10.379	3.645	2	7	13	20
Years since first employment	18,336	12.314	4.085	3	9	15	78

Table 3: Major changes' effect on job switching frequency

	Dependent variable:				
	Job change frequency				
	(1)	(2)	(3)	(4)	(5)
Major Changes	0.051***	0.048***	0.046***	0.043***	0.011**
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Female		0.058***	0.053***	0.049***	0.028***
		(0.006)	(0.008)	(0.008)	(0.008)
American Indian or Alaska Native		-0.070*	-0.033	-0.011	0.003
		(0.037)	(0.047)	(0.047)	(0.046)
Asian		-0.003	-0.021	-0.021	-0.001
		(0.013)	(0.015)	(0.015)	(0.015)
Black or African American		-0.013	0.016	0.015	0.029
		(0.026)	(0.032)	(0.032)	(0.031)
Hispanic or Latino		-0.003	0.013	-0.007	-0.001
		(0.013)	(0.017)	(0.017)	(0.016)
Native Hawaiian or Other Pacific Islander		0.137***	0.153***	0.168***	0.162***
		(0.041)	(0.047)	(0.047)	(0.046)
Nonresident alien		-0.060***	-0.003	-0.030	-0.004
		(0.018)	(0.052)	(0.051)	(0.050)
Two or more races		0.030*	0.017	-0.027	-0.020
		(0.018)	(0.021)	(0.021)	(0.021)
High school GPA			0.030***	-0.013	0.0002
			(0.011)	(0.012)	(0.012)
SAT Math score			-0.0001	-0.0001**	0.0001*
			(0.0001)	(0.0001)	(0.0001)
SAT Verbal score			0.0002***	0.0001**	0.0001*
			(0.0001)	(0.0001)	(0.0001)
Normalized departmental GPA				0.032***	0.026***
				(0.004)	(0.004)
Years since graduation				-0.016***	-0.013***
				(0.001)	(0.001)
Major: Art					0.014
					(0.038)
Major: Business Administration					0.074***
					(0.020)
Major: Chemistry					-0.069
					(0.082)
Major: Economics					-0.005
					(0.024)
Major: Journalism					0.358***
					(0.029)
Major: Math					-0.032
					(0.042)
Major: Psychology					0.003
					(0.023)
Constant	0.567***	0.540***	0.398***	0.778***	0.546***
	(0.004)	(0.005)	(0.042)	(0.049)	(0.055)
Observations	18,336	18,336	12,754	12,634	12,634
R^2	0.008	0.015	0.015	0.038	0.103
Adjusted R^2	0.008	0.014	0.014	0.036	0.096
Residual Std. Error	0.414 (df = 18334)	0.413 (df = 18326)	0.416 (df = 12741)	0.412 (df = 12619)	0.399 (df = 12535)
F Statistic	153.098*** (df = 1; 18334)	30.561*** (df = 9; 18326)	16.570*** (df = 12; 12741)	35.177*** (df = 14; 12619)	14.738*** (df = 98; 12535)

Note: *p<0.1; **p<0.05; ***p<0.01
Fixed effects dummy variables for many superfluous major categories have been removed

Table 4: Undeclared terms' effect on job switching frequency

	Dependent variable:				
	Job change frequency				
	(1)	(2)	(3)	(4)	(5)
Undeclared terms	-0.004***	-0.004***	-0.008***	-0.006***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female		0.063***	0.057***	0.053***	0.029***
		(0.006)	(0.008)	(0.008)	(0.008)
American Indian or Alaska Native		-0.065*	-0.027	-0.007	0.005
		(0.037)	(0.047)	(0.048)	(0.046)
Asian		-0.001	-0.020	-0.020	-0.0001
		(0.013)	(0.015)	(0.015)	(0.015)
Black or African American		-0.007	0.018	0.016	0.030
		(0.026)	(0.032)	(0.032)	(0.031)
Hispanic or Latino		0.0004	0.015	-0.005	-0.001
		(0.013)	(0.017)	(0.017)	(0.016)
Native Hawaiian or Other Pacific Islander		0.146***	0.155***	0.169***	0.163***
		(0.041)	(0.047)	(0.047)	(0.046)
Nonresident alien		-0.063***	-0.011	-0.036	-0.007
		(0.018)	(0.052)	(0.051)	(0.050)
Two or more races		0.034*	0.017	-0.027	-0.020
		(0.018)	(0.021)	(0.021)	(0.021)
High school GPA			0.019*	-0.020	-0.001
			(0.011)	(0.012)	(0.012)
SAT Math score			-0.0001*	-0.0002***	0.0001*
			(0.0001)	(0.0001)	(0.0001)
SAT Verbal score			0.0002***	0.0001**	0.0001*
			(0.0001)	(0.0001)	(0.0001)
Normalized departmental GPA				0.031***	0.025***
				(0.004)	(0.004)
Years since graduation				-0.016***	-0.013***
				(0.001)	(0.001)
Major: Art					0.013
					(0.038)
Major: Business Administration					0.064***
					(0.019)
Major: Chemistry					-0.106**
					(0.051)
Major: Economics					-0.005
					(0.023)
Major: Journalism					0.352***
					(0.029)
Major: Math					-0.040
					(0.042)
Major: Psychology					-0.004
					(0.023)
Constant	0.604***	0.572***	0.500***	0.858***	0.568***
	(0.004)	(0.005)	(0.042)	(0.049)	(0.055)
Observations	18,336	18,336	12,754	12,634	12,634
R^2	0.001	0.008	0.011	0.033	0.104
Adjusted R^2	0.001	0.008	0.010	0.032	0.097
Residual Std. Error	0.416 (df = 18334)	0.414 (df = 18326)	0.417 (df = 12741)	0.413 (df = 12619)	0.399 (df = 12535)
F Statistic	11.354*** (df = 1; 18334)	16.708*** (df = 9; 18326)	12.158*** (df = 12; 12741)	30.808*** (df = 14; 12619)	14.768*** (df = 98; 12535)

Note: *p<0.1; **p<0.05; ***p<0.01
Fixed effects dummy variables for many superfluous major categories have been removed

Table 5: Major changes' and undeclared terms' effect on probability of being a manager

	Dependent variable:				
	Probability of being a manager				
	logistic				_OLS_
	(1)	(2)	(3)	(4)	(5)
Major Changes	0.003	0.015	0.012	0.013	0.0004
	(0.030)	(0.030)	(0.030)	(0.036)	(0.005)
Undeclared terms	-0.0002	-0.001	-0.004	-0.007	-0.002*
	(0.008)	(0.008)	(0.008)	(0.009)	(0.001)
Female		-0.204***	-0.181***	-0.106**	-0.031***
		(0.044)	(0.046)	(0.051)	(0.007)
American Indian or AlaskaNative		0.021	0.060	-0.010	-0.005
		(0.275)	(0.277)	(0.288)	(0.046)
Asian		-0.213**	-0.232**	-0.214**	-0.031**
		(0.093)	(0.094)	(0.098)	(0.014)
Black or African American		-0.275	-0.356*	-0.322	-0.050*
		(0.202)	(0.206)	(0.212)	(0.030)
Hispanic or Latino		-0.319***	-0.335***	-0.175	-0.025
		(0.107)	(0.108)	(0.112)	(0.016)
Native Hawaiian or Other Pacific Islander		0.051	0.008	-0.078	-0.017
		(0.276)	(0.276)	(0.287)	(0.045)
Nonresident alien		-0.988**	-1.018**	-0.801*	-0.095*
		(0.429)	(0.433)	(0.440)	(0.049)
Two or more races		-0.580***	-0.585***	-0.294*	-0.034*
		(0.151)	(0.151)	(0.155)	(0.020)
SAT Math score			0.001*	0.001*	0.0001**
			(0.0004)	(0.0004)	(0.0001)
SAT Verbal score			-0.001***	-0.001**	-0.0002***
			(0.0003)	(0.0004)	(0.0001)
Difference between SAT Math & Verbal scores			-0.001***	-0.001***	-0.0002***
			(0.0005)	(0.0005)	(0.0001)
Normalized departmental GPA			-0.012	-0.050*	-0.004
			(0.025)	(0.026)	(0.004)
Years since graduation				0.130***	0.020***
				(0.007)	(0.001)
Job change frequency				0.503***	0.089***
				(0.055)	(0.009)
Major: Art				-0.894***	
				(0.272)	
Major: Business Administration				0.324***	
				(0.118)	
Major: Chemistry				-2.021***	
				(0.604)	
Major: Economics				-0.200	
				(0.142)	
Major: Journalism				-0.659***	
				(0.212)	
Major: Math				-1.021***	
				(0.318)	
Major: Psychology				-0.512***	
				(0.145)	
Constant	-1.370***	-1.221***	-0.735***	-2.579***	0.043
	(0.034)	(0.041)	(0.206)	(0.270)	(0.035)
Observations	12,757	12,757	12,637	12,634	12,634
R²					0.039
Adjusted R²					0.038
Log Likelihood	-6,434.040	-6,404.185	-6,345.266	-5,928.638	
Akaike Inf. Crit.	12,874.080	12,830.370	12,720.530	12,059.280	
Residual Std. Error					0.395 (df = 12617)
F Statistic					32.178*** (df = 16; 12617)

Note: *p<0.1; **p<0.05; ***p<0.01
Fixed effects dummy variables for many superfluous major categories have been removed

Table 6: Major changes' and undeclared terms' effect on earnings

	Dependent variable:				
	Average Wage				
	(1)	(2)	(3)	(4)	5
Years since first employment	918.515***	918.915***	962.080***	962.332***	962.676***
	62.499	62.485	62.274	62.274	62.271
Major Changes	1,217.462***		655.320***		535.933**
	211.807		235.776		241.853
Undeclared terms		-483.754***		-203.213***	-166.132**
		69.408		73.160	75.045
Female	-5,698.566***	-5,600.685***	-4,685.033***	-4,677.448***	-4,679.082***
	359.762	359.475	379.594	379.603	379.585
American Indian or Alaska Native	312.199	512.803	668.489	771.238	699.842
	2,453.717	2,452.981	2,499.410	2,499.242	2,499.325
Asian	1,394.852**	1,508.950**	1,159.858	1,228.963*	1,172.788*
	709.922	709.417	712.033	711.606	712.022
Black or African American	-2,585.031*	-2,747.245*	-1,404.995	-1,408.736	-1,469.282
	1,518.723	1,518.686	1,513.540	1,513.573	1,513.743
Hispanic or Latino	-2,061.701***	-2,065.060***	-1,769.769**	-1,758.152**	-1,802.150**
	706.855	706.638	708.225	708.098	708.341
Native Hawaiian or Other Pacific Islander	4,744.776**	4,936.623***	5,304.864***	5,409.307***	5,314.306***
	1,859.183	1,858.191	1,842.876	1,842.382	1,842.789
Two or more races	-2,602.431***	-2,653.863***	-2,779.140***	-2,785.234***	-2,805.631***
	883.775	883.668	883.684	883.717	883.721
Sat Math score	4.993*	3.076	-4.319	-4.360	-4.213
	2.658	2.644	2.866	2.866	2.867
Sat Verbal score	13.094***	12.468***	13.695***	13.471***	13.509***
	2.614	2.616	2.768	2.769	2.769
Normalized departmental GPA			1,567.590***	1,502.681***	1,525.734***
			190.175	190.829	191.103
Major: Art			-18,486.840***	-18,592.700***	-18,278.110***
			1,874.711	1,871.705	1,876.987
Major: Buisness Administration			-1,290.394	-1,894.093**	-1,406.807
			963.602	939.645	964.987
Major: Computer and Information Science			-12,478.160***	-12,805.070***	-12,491.260***
			2,750.903	2,747.262	2,750.772
Major: Economics			-6,806.175***	-6,857.424***	-6,674.832***
			1,176.323	1,174.933	1,177.760
Major: Journalism			-5,897.329***	-6,255.542***	-5,968.255***
			1,194.414	1,187.789	1,194.784
Major: Math			-8,062.653***	-8,570.135***	-8,138.739***
			2,472.492	2,465.055	2,472.608
Major: Psychology			-12,321.630***	-12,752.920***	-12,358.570***
			1,128.743	1,114.750	1,128.810
Constant	52,583.950***	55,508.830***	63,868.260***	64,995.400***	64,217.680***
	(1,484.028)	(1,471.202)	(1,893.281)	(1,867.146)	(1,899.754)
Observations	39,535	39,535	39,105	39,105	39,105
R²	0.015	0.015	0.042	0.042	0.042
Adjusted R²	0.015	0.015	0.039	0.039	0.039
Residual Std. Error	33,518.150 df = 39523	33,511.570 df = 39523	33,063.520 df = 39015	33,063.520 df = 39015	33,061.860 df = 39014
F Statistic	54.013*** df = 11; 39523	55.446*** df = 11; 39523	19.023*** df = 89; 39015	19.023*** df = 89; 39015	18.868*** df = 90; 39014

Note: *p<0.1; **p<0.05; ***p<0.01
Fixed effects dummy variables for many superfluous major categories have been removed

Introduction

As students enter college, they are asked to make life-altering choices with limited information. What school they will attend, what degree they will pursue, how they will pay for it, and what career they want to pursue are all factored into a student's decision-making process. Major choice is a particularly sore spot for many students. Even after choosing a particular school or career field, students are often faced with choosing among many possible programs to accomplish their educational goals. With so many things to consider, prospective students can consider these decisions for months as they weigh their options. Our research uses student data matched with resume data from University of Oregon alumni to investigate how student indecision affects future labor market outcomes like earnings, job switching, and managerial attainment.

To alleviate the burden of choosing a major immediately, many colleges have instituted interim majors, allowing students to enroll as an undecided, undeclared, or exploring student without committing to a specific field of study. This gives indecisive students more time to sample different classes, gather information, pursue different options, and make a more informed decision about their education at a later time. But this information comes at a cost. Undeclared students still pay tuition, and may spend time, money, and energy pursuing fruitless alternatives or taking superfluous classes. By investing in learning skills that have limited relevance to their goal, undecided students enter the labor market later and poorer than their decided peers.

Still, not all indecisive students are formally 'undecided'. Major choice is a crucial step towards earning a degree, but it is not an irreversible one. Students can change their major at any time, and many enter college with a 'declared' major that they

are uncertain about. These students may switch majors frequently during their time in college as they gain information and experience in their field. Like students who stay undeclared, major switchers bear similar costs for their indecision. Switching majors may have lasting effects on career earnings and preparedness. Switching majors and gaining experience in multiple fields diversifies a student's career skill set, but might come at the cost of instability as their more general skills lead them to more varied, multidisciplinary careers.

Likewise, some level of indecision may have a positive impact on earnings, or may lead to more stable, fulfilling careers. To achieve better education outcomes, students should explore when it is personally and economically beneficial. However, student indecision in college may also persist into career indecision later in life, leading to poor outcomes and retraining costs for both the individual and society. A wealth of psychological and counseling research has examined major indecision and its implications for student retention, but relatively few studies have examined the effects of students' indecision on their labor market outcomes. The focus of our research is to investigate this connection.

We examine this connection across three factors: how students' undecided status and major switching in college affect career earnings, job switching frequency, and managerial career attainment. These three critical attributes partially characterize a person's career: their level of income, their level of employment stability, and the kinds of employment they seek.

If we can understand indecisiveness' effect on these career attributes, we can help students make confident, informed decisions about their schooling, and we can inform schools as they design policies and services to better support exploring students.

Literature Review

One of the most common reasons to apply to college is to obtain valuable employable skills. Graduates can leverage these skills to advance employment and gain higher wagers in their chosen field. Using linear modelling, Rumberger and Thomas (1993) find that college major, school quality, and academic performance are all indicators of skill which impact the initial wages graduates earn.[1] However, these graduating students have very limited knowledge of wages across their candidate fields. Surveying American university students on the expected earnings associated with various jobs, Betts finds that the median error of accuracy of wage predictions across all students surveyed was 19.6 percent. He also finds that students were able to much more accurately estimate the wages of jobs related to their field of study than jobs in other fields,[2] which indicates that students have some understanding of their job prospects after college, and allocate more resources towards obtaining accurate information about the expected payoffs of their varied professional interests.

On the phenomenon of major switching, Berger uses data from the National Longitudinal Survey of Young Men and creates regressions on the earnings of 5 different fields of study, finding that while students *will* change to a new major as the present value of the potential earnings of that major increases, they will *not* change based on changes in the median starting salary of a particular field,[3] indicating that

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[1] Russell W. Rumberger and Scott L. Thomas, "The Economic Returns to College Major, Quality and Performance: A Multilevel Analysis of Recent Graduates," Economics of Education Review 12, no. 1 (March 1, 1993): 1–19, https://doi.org/10.1016/0272-7757(93)90040-N.

[2] Julian R. Betts, "What Do Students Know about Wages? Evidence from a Survey of Undergraduates," *Journal of Human Resources*, vol. 31, Winter 1996, http://search.proquest.com/docview/1791795513?pq-origsite=primo.

[3] Mark C. Berger, "Predicted Future Earnings and Choice of College Major," *Industrial and Labor Relations Review* 41, no. 3 (1988): 418–29, https://doi.org/10.2307/2523907.

students make schooling decisions based on long term expectations, rather than short term expectations. It is also important to note that the earning potentials of liberal arts education and business degrees have flattened recently, which would imply an increase in the number of students leaving these fields.

These changes in major seem to be common among college students. Malgwi and Howe (2005) surveyed a college's business school, finding that nearly half of the students surveyed changed their major once or more over their college career. They find that men are more likely to change based on earning potential, whereas women are more likely to change based on their aptitude in their field of study. They also find that counseling from parents and high school advisers prior to a student's entrance to college has little effect on an individual's choice of major.[4] Additionally, Thornson finds that wages for majors tend to increase as training becomes more specific. Specialized majors like computer science or engineering tend to have higher average wages than very broad ones like communications or humanities. He also shows that grade point averages tend to be insignificant with respect to wages.[5]

However, GPA does impact a student's choice of major. Astonre-Figari and Speer collected data from the National Longitudinal Survey of Youth's 1997 survey. Using multiple regressions, they show that a one-point drop in GPA (on a 4-point scale) is associated with a 7.6 percent increased chance of changing majors. Interestingly, they also find that in competitive majors, low aptitude women have a higher chance of

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[4] Charles A. Malgwi, Martha A. Howe, and Priscilla A. Burnaby, "Influences on Students' Choice of College Major," *Journal of Education for Business* 80, no. 5 (June 2005): 275–82.
[5] Amanda Thornson, "The Effect of College Major on Wages," *The Park Place Economist* 13, no. 1 (2005): 15.

leaving the major than low aptitude men,[6] reinforcing Malgwi and Howe's findings that men and women change majors for different reasons.

This result also dovetails with a popular hypothesis given by Ed Lazear, who speculated that students with broader skillsets, and more generalized aptitude than specific technical skills will gravitate towards entrepreneurship, where being a 'jack-of-all-trades' can be an advantage for business leaders who must be apt in several different fields.[7] Our research aims to investigate this hypothesis further, as well as supplement it by investigating student major indecisions' role in the choice to train as a generalist or work as a manager.

Regarding career indecision, Toyokawa and DeWald Show that first generation students perceive higher barriers to successful career outcomes than other college students. They do this by comparing a survey of first-generation students to a control survey. Interestingly these barriers do not negatively correlate with a student's career decidedness.[8] This agrees with the findings of Betz and Voyten, who shows that self-efficacy or belief in one's competence, as well as expectations of educational outcomes, account for 60% of variance in major decisions between students.[9]

Much research has been done on career indecision and how it affects college students. Kelly and Lee identify several factors that lead to career indecision, the most

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[6] Carmen Astorne-Figari and Jamin D. Speer, "Are Changes of Major Major Changes? The Roles of Grades, Gender, and Preferences in College Major Switching," *Economics of Education Review* 70 (June 1, 2019): 75–93, https://doi.org/10.1016/j.econedurev.2019.03.005.

[7] Edward P. Lazear, "Balanced Skills and Entrepreneurship," *The American Economic Review* 94, no. 2 (2004): 208–11.

[8] Teru Toyokawa and Chelsie DeWald, "Perceived Career Barriers and Career Decidedness of First-Generation College Students," *The Career Development Quarterly* 68, no. 4 (December 2020): 332–47, http://dx.doi.org.libproxy.uoregon.edu/10.1002/cdq.12240.

[9] Nancy E. Betz and Karla Klein Voyten, "Efficacy and Outcome Expectations Influence Career Exploration and Decidedness," *Career Development Quarterly* 46, no. 2 (December 1997): 179–89, https://doi.org/10.1002/j.2161-0045.1997.tb01004.x.

prominent being a lack of information.[10] This implies that students make their major

decisions under imperfect conditions, which causes them to make these decisions

without accurately evaluating the possible results.

Santos, Ferreira, and Goncalves extend the delineation of career indecision into

a 2-axis classification system for students, distinguishing between decided-undecided

students and decisive-indecisive ones. In doing this, they show that students who are

both indecisive and undecided have worse mental health and career preparedness

compared other categories such as those who were formally undecided in major, but

generally 'decisive'.[11]

Feldman compiles a meta-analysis of the psychology of career indecision. In it,

he identifies many of the problems that come from career indecision, finding that in the

short run, career indecision results in lower wages and employment rates for young

people. Despite these short-term drawbacks, In the long run, he suggests that people

who spend longer shopping for careers are more likely to settle on one that they liked.

Consequently, those who suffer from career indecision are more likely to be motivated

to continue developing professionally, and even have better physiological health later in

their careers. [12]

So, what happens to these people who have major uncertainty? Orndorff and

Herr find that students with declared majors have higher rates of both major and career

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[10] Kevin R. Kelly and Wei-Chien Lee, "Mapping the Domain of Career Decision Problems," *Journal of Vocational Behavior* 61, no. 2 (October 1, 2002): 302–26, https://doi.org/10.1006/jvbe.2001.1858.
[11] Paulo Jorge Santos, Joaquim Armando Ferreira, and Carlos Manuel Gonçalves, "Indecisiveness and Career Indecision: A Test of a Theoretical Model," *Journal of Vocational Behavior* 85, no. 1 (August 1, 2014): 106–14, https://doi.org/10.1016/j.jvb.2014.05.004.
[12] Daniel C Feldman, "The Antecedents and Consequences of Early Career Indecision among Young Adults," *Human Resource Management Review* 13, no. 3 (September 1, 2003): 499–531, https://doi.org/10.1016/S1053-4822(03)00048-2.

certainty compared to their undeclared counterparts. Even so, they also find that

(contrary to popular belief) there are no significant differences in career development

between the two groups.[13]

[13] Robert M. Orndorff and Edwin L. Herr, "A Comparative Study of Declared and Undeclared College Students on Career Uncertainty and Involvement in Career Development Activities," *Journal of Counseling & Development*, vol. 74, August 1996, http://search.proquest.com/docview/1634067614?pq-origsite=primo&.

Research Questions

In the light of the above discussion our work hopes to correlate a student's difficulty in declaring a major in college with different career outcomes. Broadly, our research questions are organized to investigate two main areas: First, for undecided students, how does time spent undecided affect their career income, and their frequency of changing jobs? How does it affect their career success, and the probability of rising to managerial level in their career path? Second, for students who change majors, how does the frequency of switching majors affect their career income, the frequency they switch careers, and their likelihood of becoming a manager? To analyze this, we measure income, changes in jobs, and managerial attainment as observable career outcomes.

The first set of questions will involve a consideration of undeclaredness' effect on wage outcomes, job switching frequency, and managerial attainment. The second set of questions will consider the effect of major switching on these same outcomes.

Since many high school students lack experience and are unsure about their major when they become freshmen, students who are unable to commit to a particular educational pathway, or who are unsatisfied with their major after entering college may enter the workforce dissatisfied with their career path. We anticipate that major switching and undeclaredness—our indicators of major indecision—will correlate with increased job switching due to this dissatisfaction, and will correlate negatively with wages, as indecisive graduates leave college later, with fewer marketable skills, and a more general skillset which employers may value less in non-managerial roles. This is opposite our third outcome of interest, managerial attainment, which we anticipate will

positively correlate with major switching and undeclaredness, since—in keeping with the Lazear hypothesis of balanced skills and entrepreneurship—students who switch majors and explore various career paths in college will gain a more general skillset and be more desirable in managerial roles.

Data

The data we use in this study came from two sources. The first set of data is student data from the University of Oregon Register's Office, which includes information collected from the University of Oregon alumni as well as timelines on when students had declared majors, were undeclared in their choice of major, or switched majors. These data also provide information on students' personal attributes, such as ethnicity/race and gender, as well as their academic performance and other critical variables to control for, like their choices of major. The first data consist of information on are students' major and academic performance, as well as their date of first enrollment. We have a student's cumulative GPA which measures academic performance across all courses, as well as the student's major GPA which is only calculated from courses in their major's department. Our research only focuses on the student's first major which we turn into binary variables, for each of the 97 majors at the University of Oregon. We also have constructed discrete variables for the numbers of terms that students are undeclared, and variables for the frequency of switching majors throughout college, as well the frequency of changing majors in junior or senior year, and each student's graduation term, and birth year. There is also data on the student's pre-enrollment attributes, including high school GPA, SAT, and ACT scores.

We also have demographic information for our sample of alumni, including race and ethnicity data which is subcategorized by the Federal Ethnic Code. The codes are Hispanic and Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, Two or more races, and Nonresident Alien. Each of these ethnicities is converted into a binary categorical

variable for regression purposes. The dataset also contains gender information, which is converted into binary categorical variables for each gender identity.

After removing datapoints with missing values in major and major GPA, this first dataset has a size of 54066.

The second data set comes from EMSI, which obtained the data at the UO's behest from the online resume/CV data posted by UO alumni and shows us the labor market outcomes for these UO alumni. The data used in this study cover roughly half of people who graduated from the University of Oregon in the last 20 years, and provides their up-to-date information including city, county, state, zip code, and nation of residence and employment, their current position, the name of their employers, along with their corresponding NAICS (North American Industry Classification System) code, the first year they started at each of their jobs, the last year they worked at those job, their last job title, employment status, and the average wage of their current occupation. When available, the data includes their full job histories, but it is often missing employment dates and sometimes whole jobs. The EMSI data also contains the list of hard skills, common skills, certification skills, colleges attended, degrees, majors, and the graduation year that students list on their resumes.

For our research, we will use the alumni's career information including their imputed wage, the Standard Occupation Classification (SOC) 2 Digit Occupation Code associated with their job title, and their employment O*NET Code. Since the purpose of this study is to correlate a student's difficulty in declaring a major in college with career outcomes, we must match the EMSI career data with UO Registrar Data. While the UO Registrar Data has 54066 observations after cleaning, after matching our final dataset

yields just 18603 observations. Part of the reason is that many UO alumni do not have online resume information, especially older alumni. Although the observation data are lost due to the matching process, we still retain a large proportion of historical UO graduates for our analysis.

This final sample group has an average cumulative GPA of 3.187, with standard deviation 0.433. The average major GPA is 3.241, with standard deviation 0.476. We also obtain an average of 1.419 undeclared terms, with standard deviation 2.518. The mean number of major changes per student is 0.598, with standard deviation of 0.745. The mean of job changes per year is 0.598 with a standard deviation of 0.416. The mean of average wage is 69437.8 with a standard deviation of 36291.82. 13.9% of the people were recognized as working in the management occupations which leads us to focus particularly on the possibility to work in manager occupations. Full summary statistics of the matched dataset are available in the List of Tables.

Data Analysis

Our paper will supplement the existing literature on students' major indecision by correlating it with career outcomes and measurements of students' professional success. We want to analyze the differences between students who take a long time to declare a major and students who do not, as well as the differences between students who switch majors frequently and those who do not, using student records data and resume data from University of Oregon graduates. We will measure how the level of major indecision in college, quantified by undeclared terms and major changes, correlate with future earnings, the frequency of switching jobs, and the possibility of being a manager.

During college, students may choose their majors based on what they are interested in, good at, or what they believe will bring them a successful professional career. Some first-year students do not know the college curriculum, are not familiar with the subjects, or simply have no idea what they want to do for a career. These students may like to shop for more majors and may need advice from academic advisors to make confident decisions. As a result, they will enroll in college undeclared. After college, most graduates hope to find employment. Some of them may find a job related to their interests, some of them may get an occupation connected to their major, and some of them may find an occupation not related to their field of study at all. We will use three similar but different empirical models to determine the influences on graduates' job changes, likelihood of managerial position, and pay individually. These influences depend on many variables which describe each graduate, not only on the major indecision or the frequency of changing their major. Therefore, variables such as

gender, ability, major, performance, and specialization may affect the results. In addition, there are factors beyond the student's control, such as the industries related to your field, demand for labor, employment rates and unemployment rates. We use multiple sets of controls to address possible sources of variance in our focus variables and our observable career outcomes. the level of major indecision, the frequency of changing major, ability, specialization, major choice, and individual demographic characteristics are all controlled in our regression analysis of the dataset.

Methods

The question we first examine is whether a person switching majors or remaining undeclared during college affects their propensity to change jobs more frequently after graduation. After graduating, most people hope to seek paid employment with their new degree but may differ in the extent to which they seek varied employment. Some may switch jobs more frequently over their career as they seek higher pay, different working conditions, or to work in different fields. Job switching is contingent on many factors and not only your time spent undeclared or number of major changes. Variables like level of experience, ability, and academic performance might all affect a student's job changing frequency. Additionally, factors outside of a student's control could also influence job changing. Factors like race, gender, industry or field, and labor demand could all exogenously affect a person's choice to quit their job for another. Our model tries to navigate the complexity of the job change frequency variable using sets of control variables for possible sources of variance in job change frequency like ability, experience, schooling characteristics, demographic characteristics, and labor market factors.

Specifically, we use the following statistical specifications:

$JCN_i = \alpha + \beta_1 * MCC_i + \boldsymbol{\beta_2 * CHAR_i} + \beta_3 * GPAH_i + \boldsymbol{\beta_4 * SAT_i} + \beta_5 * YSG_i + \beta_6 * GPADi + \boldsymbol{\beta_7 * MAJ_i} + \varepsilon$

and

$JCN_i = \alpha + \beta_1 * UNDL_i + \boldsymbol{\beta_2 * CHAR_i} + \beta_3 * GPAH_i + \boldsymbol{\beta_4 * SAT_i} + \beta_5 * YSG_i + \beta_6 * GPAD_i + \boldsymbol{\beta_7 * MAJ_i} + \varepsilon$

where JCN is constructed as an alumnus' frequency of changing jobs since the first listed employment date on their resume. MCC and UNDL are our focus variables,

which count major changes and the number of undeclared terms of alumnus i, respectively, during their college career at UO. **CHAR** represents a set of additional controls for alumni's personal attributes including indicator variables for race, ethnicity, and gender. GPAH measures high school academic performance as raw GPA on a standard four-point scale, while **SAT** represents a set of controls which measure alumnus i's ability through SAT math and verbal testing scores, and analogous ACT math and verbal scores where SAT data is unavailable. YSG represents the years since a student's graduation, while GPAD measures their college academic performance, and is constructed as an alumnus' departmental GPA in their chosen major, normalized against the average departmental GPA of students in their same major.

After this initial analysis, we also examine likelihood that an alumnus has attained a job at a managerial level. Managerial occupations generally come with a higher level of authority and prestige than other occupations, and therefore come with higher pay. As a higher-ranking position in typical corporate structure, most people consider obtaining such a job as a mark of success. Since individuals may have concerns about whether exploring majors in college will affect them becoming managers in their chosen industry, we will analyze whether people switching majors or remaining undeclared for many terms in college will affect their likelihood of attaining an executive or management level position in their career. We investigate this question by examining the correlation of attaining a managerial position with the same focus variables as the previous statistical model—the number of times that a person changes majors, and the number of terms the person is undeclared.

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As in our previous model, variables such as major GPA, gender, ethnicity, SAT test scores, years since graduation, and numbers of switching jobs per year all have an effect on the opportunity to come to be a manager. The statistical model that we use for this examination attempts to navigate the complexity of the managerial occupations variable and retains many elements from the first model discussed above.

We begin the analytical process by identifying managerial occupations within the Standard Occupation Classification (SOC) 2 Digit Occupation Code assigned to each observation and using this information to construct a binary categorical variable in our data for whether an observation is working as a manager or not. Managerial occupations within the SOC system are denoted by a "11" in the first two digits of the code. Secondly, we use the following statistical specifications in a logit regression model:

$$MGMT_i = \alpha + \beta_1 * MCC_i + \beta_2 * UNDL_i + \boldsymbol{\beta_3 * CHAR_i} + \beta_4 * GPAD_i + \boldsymbol{\beta_5 * SAT_i} + \beta_6 * YSG_i + \beta_7 * JCN_i + \beta_8 * MAJ_i + \varepsilon_i$$

where MGMT represents whether they hold a management occupation or not. MCC and UNDL are our focus variables and will be included together. All other variables remain as specified in our previous model, except we add two additional control variables. The first additional value is the absolute value of the difference between an individual's SAT Math and SAT Verbal score. This variable was included to control for the possibility of a "Lazear effect"[14] where students with more general ability (less difference between mathematical and verbal aptitude) may be more likely to become

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[14] Lazear, "Balanced Skills and Entrepreneurship."

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managers, absent any difference in career indecision. Additionally, a new variable JCN is included, which measures the frequency with which an individual changes jobs per year over their recorded employment history.

To analyze the effect of major indecision on wages, we created panel data for the larger dataset, looking at each observations' wage level across time. For each observation, we took the O*NET codes associated with each job they had held and constructed a list of job titles in the order that they had been held, along with the associated O*NET codes of the job titles, and the start and end year of each job from the resume data for each observation. Unfortunately, some observations are missing the start or end date of one or more jobs, and the resume data does not include the actual pay of the job. To further clean the data set, we removed all the observations that did not have a listed starting date or a O*NET code that was not recognizable. Then for each of the remaining observations, we matched the employee to our list of University of Oregon graduates and collected each graduate's demographic information as well as their normalized major GPA, and their SAT score. We took the first listed job start year as the first year of employment, to control for the length of time each observation had been in the workforce. This lets us view someone's income in relation to how far along their career is. In order to find pay, we matched the O*NET code the 2020 SOC codes, extracted the listed mean pay and adjusted for inflation to get the present value of wages at the time each job was held by each observation of the dataset. For the panel data our regression specifications were:

$$PAY_i = \alpha + \beta_1 * MCC_i + \beta_2 * GPAD_i + \beta_3 * SAT_i + \beta_4 * CHAR_i + \beta_5 * YSFE_i + \beta_6 * MAJ_i + \varepsilon_i$$

$$PAY_i = \alpha + \beta_1 * UNDL_i + \beta_2 * GPAD_i + \beta_3 * SAT_i + \beta_4 * CHAR_i + \beta_5 * YSFE_i + \beta_6 * MAJ_i + \varepsilon_i$$

This model is similar to models 1 and 2, but introduced a new variable, YSFE which replaces the variable YSG used in previous models, and measures years since an alumnus' first recorded employment date, instead of years since graduation. In the panel data, we created a data point for each new job a person takes in their career rather than one for each person, and then organized them by the length that observation had been in the labor force. Otherwise, graduate school or gap years would appear as time that was spent working, with no pay.

Results

Investigating major changes' effect on job switching, our regression model yields significant results. Major changes, our focus variable, has a positive, significant coefficient of 0.051 in out initial base regression. Inclusion of demographic information, namely gender, race, and ethnicity lower this coefficient to 0.048, while doubling the model's R^2. Notably, female gender has a significant, persistent, positive effect on job switching throughout all regression iterations, as does Native Hawaiian or other Pacific Islander. Including measures of innate ability like high school GPA, SAT Math & Verbal eliminates some observations, and slightly lowers the coefficient of major changes and the constant term. Including a measure of years since graduation, and a measure of major performance, normalized departmental GPA, nearly doubles the constant term, and slightly lowers the coefficient on major changes, while absorbing the effect of high school GPA. Notably, years since graduation is negatively correlated with job switching, while normalized departmental GPA is positively correlated. Finally, the inclusion of fixed effects for a student's major upon graduation significantly lowers the coefficient on major changes from 0.043 to 0.011, and decreases the statistical significance of the result from a 1% to a 5% level. It also absorbs some of the coefficient on female gender, as well as many racial and ethnic categories, and increases the R^2 of the model by a factor of 3.

Investigating undeclared terms' effect on job switching, our regression again yields significant results. Undeclared terms, our focus variable, maintains a negative, significant coefficient of -0.004 throughout most iterations of the model. Inclusion of demographic information in the model induces similar effects as in the first model, with

similar coefficients of the same sign on female gender, and all ethnic and racial categories. Inclusion of measures of innate ability such as high school GPA and SAT scores also have similar effects, with a significant, positive coefficient on SAT Verbal score. Inclusion of normalized departmental GPA and years since graduation have similar significant coefficients and increase the constant term from 0.500 to 0.858. Finally, the inclusion of fixed effects for a student's major upon graduation absorb some of the effects of demographic and gender categories, while bringing the coefficient on Undeclared terms from -0.006 to -0.004 and bringing the constant term back down from 0.858 to 0.568, while tripling the R^2 of the model. Full results tables are available in the List of Tables.

For our second regression model investigating major indecision's effect on managerial attainment, the dependent variable is a binary variable. Because of this we examine and interpret the managerial analysis with logistic regressions. Our model examines the two focus variables together with 12634 observations. We anticipated that both the number of undeclared terms and the count of changing majors should have some positive correlation with the possibility of becoming a manager, but the results of this regression were not conclusive. Although the count of undeclared majors has a small negative coefficient while the number of changing majors has a positive coefficient, the result from this naive initial regression shows that they are not statistically significant from zero.

To add specificity, we include demographic variables including ethnicity and gender first. These results show that for a gender of female, a race of Hispanic or

Latino, or two or more races all have negative coefficients as one of the most significant variables.

When we include SAT Math and Verbal scores and normalized departmental GPA in our regressions, we find that the results from these regressions show slight decreases in the correlation on demographic variables from the previous regressions. The effects of changes in SAT Verbal scores, and the absolute value of difference between them are statistically significant at the 1% level, but only very slightly negative. On the other hand, the score of the SAT Math test has a positive effect but little significance at the 10% level, while the absolute value of their difference has a significant negative effect, implying that more generally apt students have a higher probability of managerial attainment in keeping with the Lazear hypothesis. Also, correlation on the normalized departmental GPA in college is not statistically significant from zero.

Furthermore, the results from the final updated specification with variables of the time since graduation, the number of changing jobs, and some majors show more statistical significance in correlating managerial attainment. The number of years since graduation has a positive coefficient of 0.13. The normalized number of career changes show that switching jobs once per year will increase the probability of becoming a manager from 7.6% to 12.54%, which is a statistically significant result at the 1% level. In addition, a major in Business Administration, which is also statistically significant, has the highest positive coefficient of 0.324 meaning Business students are the most likely to become managers. These results, while producing interesting results for some

control variables, show no meaningful correlation between student undeclaredness or major switching and managerial attainment.

From the panel data regressions on earnings, we find that both changes of major and undeclared terms have substantial statistically significant effects on wage. In the first two regression iterations, we can see that a change in major correlates positively with income while terms undeclared have a negative coefficient. In the third and fourth regression iterations, we add controls for academic performance and degree. Because there is no default major, the coefficients on the binary variables for major represent the difference from the average wage across all majors. By controlling for educational outcomes, the effects of both major changes and undeclared terms on wage are both roughly halved. Also notable, the R^2 of the regression nearly triples from 0.015 to 0.042. The final regression includes both the number of major changes and the number of terms spent undeclared.

In general, the panel data shows that a student who changes their major correlate with an increase in yearly wage of $655 per major change, and one who spends terms undeclared correlate with a decrease in yearly wage of $203 per term spent undeclared. Demographically, female, African Americans, and Latino students all experience significantly lower wages compared to male or white students, while departmental GPA is positively correlated with wages.

Discussion

One of the most obvious shortcomings of the resume data is that it is collected from online job boards. These job boards collect data from job seekers, so our resume data is not a random sample. We likely underrepresent older workers, overrepresent people who change companies often, and underrepresent jobs sectors that do not use job boards like the military. This will lead to sample bias.

Our data on wages is also limited. Since resumes do not typically list salaries, the data collected did not include an employee's actual income from any given job, which would be the most accurate measurement of wage. Instead, we take their wage to be the average wage associated with their job code and title. It is generally expected that when a worker changes jobs, they would receive a higher salary. After all, assuming the workload is constant, workers rarely opt to make less money, except in extraordinary circumstances. However, the salaries used to create the panel data are based on median salaries for the occupation. As a result, if someone were to change jobs from a job with a high median salary to one with low median salary, the panel data would associate this with a decrease in salary. In reality the worker may not be making the median pay, and most likely will receive some level of wage increase. Because of this imperfect measurement the regressions on wage are slightly inaccurate and biased towards zero due to measurement error. Thus, the effect of indecision on wages could be larger, but our results are suitable as a lower bound for the effect and could be more directly observed with an ideal measurement method, which would necessitate each observation including exact wage information. Nevertheless, the results of our regressions of major change and undeclaredness on wage are significant. Firstly, the coefficient on

undeclared terms is negative and has almost a third the magnitude of the coefficient on major changes. This is especially interesting because the University of Oregon functions on a quarter system. Most students only take classes for three quarters: fall, winter and spring. As the university considers 'undeclared' as a major, our analysis counts the switch from the undeclared major to a declared major as a major change. Therefore, a student who spends their freshman year undeclared and declares a major at the end of the spring term will find that their wages are not significantly impacted, since the negative effect of undeclaredness is offset by their choice of a major. Many students remain undeclared for longer periods and can stay undeclared all the way up until graduation if they choose to. Students who remain undeclared for longer periods will likely see their income be negatively affected, as each term undeclared correlates with a $200 decrease in yearly wage. This conforms with our anticipated sign, while the coefficient on major changes does not, indicating that these two observable measurements of student indecision are not congruent. As students go through the process of selecting into majors where they have higher aptitude and which have higher expected wages, our results indicate that major changes positively affect wages.

The regression analyses on job change frequency also bring significant, interesting results. Some necessary caveats are that the dataset skews young, necessarily excludes individuals with no recorded employment history timeline, and that there is likely some selection bias present as people who change jobs frequently are also likely to frequent job boards. That said, there is a significant observed effect of both major changes and undeclared terms. After controlling for time since graduation, major, innate abilities, and demographic differences, changing majors frequently significantly

positively correlates with job switching, and undeclared terms significantly negatively correlate.

This deviates from our expected sign on these two focus variables, which was anticipated to be positive in both cases. Taken together with the significant positive and negative correlations on major changes and undeclared terms with respect to earnings, we see that major switchers tend to switch jobs more and earn more as well, while undeclared students tend to switch jobs less, and earn less as well. A typical four-year bachelor's degree at the University of Oregon is completed in 12 terms, though students are encouraged to declare a major before the end of their sophomore year. A student spending all 6 of those terms undeclared would then be associated with 0.024 fewer job changes per year than a student who enters university declared, or around 1 less job change over the course of a 40-year career. Conversely, a student who changes majors twice in college could expect around 0.022 more job changes per year than a student who doesn't switch majors, or around 1 additional job change over the same 40-year time span. Taken together, our results indicate that changing majors and remaining undeclared in college are not perfect diagnostic tools for student indecision. Students who switch majors, especially students who switch very few times, are likely to be more 'decided' than students who spend long periods undeclared, as major switching is correlated with a lower level of job switching, which despite the varied reasons for switching jobs, indicates a higher level of career certainty. This is not a perfect analog, however, and future research could incorporate qualitative methods to refine this analysis and more accurately reflect the relationship between student indecision and key career outcomes.

The results of our managerial regressions, though not statistically significant on our focus variables, do bring up some interesting results. Results indicate that Business Administration majors are much more likely to enter managerial positions, as the major uniquely prepares an individual for the varied duties that managing a business or team requires. Additionally, women are significantly less likely to be managers, as are many ethnic minorities. This was expected, as was the positive correlation between years since graduation and managerial attainment, as most managers require a high degree of expertise in their field to achieve such a position. Interestingly, the number of job changes has a highly significant, positive correlation with managerial attainment, suggesting that employers look first for a variety of experience in candidate employee's work history before they consider the diversity of their educational background when appointing employees to work as managers. The inclusion of a variable for the difference between SAT Math & Verbal scores also seems to have been fruitful, since the magnitude of the expected negative coefficient implies that students whose innate abilities are more balanced are more likely to attain managerial status, where individuals with more specialized abilities will be less likely to attain a managerial position. This finding is in keeping with the popular "Lazear hypothesis," which posits that managers and people who seek to become them will gain a broad width of knowledge rather than specializing.

In their totality, these results suggest some interesting effects of major indecision on career outcomes and indicate that our two measures of indecision—major changing and undeclaredness—are not analogous and emblematize different forms of student indecision and schooling choices. While we anticipated that both undeclared

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terms and major switching would both positively correlate with job switching and both negatively correlate with wages, this does not bear out in our results. Major change deviates, correlating positively with wages, and undeclaredness deviates, correlating negatively with job switching. We hypothesize that major switching then has a much more substantial positive effect on wages than any undesirability it may communicate to employers, since students will tend to substitute into majors that have higher expected value as they gather more accurate payoff information, and will also substitute into majors which they have higher aptitude in. Undeclaredness may negatively correlate with job switching as students who remain undeclared for long periods may wish to establish themselves within an industry or career path after exiting college and gain stable employment to further their specialized experience in the field. Further research could be conducted on what causes students to remain undeclared for long periods, and if there is an unobserved effect that is responsible for these differences in sign.

These results have strong implications for college and career advising, as the results indicate that depending on a student's educational and career goals, parents, teachers, and counselors have pretense to encourage students to try different majors in order to increase the variety of one's experience both in college and in employment, while also correlating with higher wage outcomes. Choosing a major early and changing if needed is correlated with higher job switching and higher wages. Our results also suggest that students who wish to work in management, though undeclarednesss and major switching have no significant effect on this outcome, should study a discipline that equips them for business management, while also developing a broad skillset to increase their appeal to employers. While these results suffer from

some sampling issues, and utilize an imperfect approximation of individual wages, further research could longitudinally examine specific employment outcomes to better quantify the varied effects of student's academic and extracurricular choices on their career.

Bibliography

Astorne-Figari, Carmen, and Jamin D. Speer. "Are Changes of Major Major Changes? The Roles of Grades, Gender, and Preferences in College Major Switching." *Economics of Education Review* 70 (June 1, 2019): 75–93. https://doi.org/10.1016/j.econedurev.2019.03.005.

Berger, Mark C. "Predicted Future Earnings and Choice of College Major." *Industrial and Labor Relations Review* 41, no. 3 (1988): 418–29. https://doi.org/10.2307/2523907.

Betts, Julian R. "What Do Students Know about Wages? Evidence from a Survey of Undergraduates." *Journal of Human Resources*. Vol. 31, Winter 1996. http://search.proquest.com/docview/1791795513?pq-origsite=primo.

Betz, Nancy E., and Karla Klein Voyten. "Efficacy and Outcome Expectations Influence Career Exploration and Decidedness." *Career Development Quarterly* 46, no. 2 (December 1997): 179–89. https://doi.org/10.1002/j.2161-0045.1997.tb01004.x.

Feldman, Daniel C. "The Antecedents and Consequences of Early Career Indecision among Young Adults." *Human Resource Management Review* 13, no. 3 (September 1, 2003): 499–531. https://doi.org/10.1016/S1053-4822(03)00048-2.

Kelly, Kevin R., and Wei-Chien Lee. "Mapping the Domain of Career Decision Problems." *Journal of Vocational Behavior* 61, no. 2 (October 1, 2002): 302–26. https://doi.org/10.1006/jvbe.2001.1858.

Lazear, Edward P. "Balanced Skills and Entrepreneurship." *The American Economic Review* 94, no. 2 (2004): 208–11.

Malgwi, Charles A., Martha A. Howe, and Priscilla A. Burnaby. "Influences on Students' Choice of College Major." *Journal of Education for Business* 80, no. 5 (June 2005): 275–82.

Orndorff, Robert M., and Edwin L. Herr. "A Comparative Study of Declared and Undeclared College Students on Career Uncertainty and Involvement in Career Development Activities." *Journal of Counseling & Development*. Vol. 74, August 1996. http://search.proquest.com/docview/1634067614?pq-origsite=primo&.

Rumberger, Russell W., and Scott L. Thomas. "The Economic Returns to College Major, Quality and Performance: A Multilevel Analysis of Recent Graduates." *Economics of Education Review* 12, no. 1 (March 1, 1993): 1–19. https://doi.org/10.1016/0272-7757(93)90040-N.

Santos, Paulo Jorge, Joaquim Armando Ferreira, and Carlos Manuel Gonçalves. “Indecisiveness and Career Indecision: A Test of a Theoretical Model.” *Journal of Vocational Behavior* 85, no. 1 (August 1, 2014): 106–14. https://doi.org/10.1016/j.jvb.2014.05.004.

Thornson, Amanda. “The Effect of College Major on Wages.” *The Park Place Economist* 13, no. 1 (2005): 15.

Toyokawa, Teru, and Chelsie DEWALD. “Perceived Career Barriers and Career Decidedness of First-Generation College Students.” *The Career Development Quarterly* 68, no. 4 (December 2020): 332–47. http://dx.doi.org.libproxy.uoregon.edu/10.1002/cdq.12240.