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Whether the Great Recession Affects Students' Degree Field Choices?

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ABSTRACT

To answer the question of whether the Great Recession moved students towards more stable majors in a systematic manner, I look at how the percentage of degrees awarded in recession-resistant and recession-sensitive degree fields changed in the post-recession period in the treatment states using both the differences-in-differences and synthetic controls methods. The differences-in-differences method shows that the percentage of degrees awarded in recession-resistant majors increased by 1.5 percentage points in the post-recession period in treatment states from a baseline of 45% and the percentage of degrees awarded in recession-sensitive majors decreased by 1.4 percentage points from a baseline of 55% (both statistically significant at the 1% level). The results remain similar when I use a continuous treatment variable, the changes in the state-level unemployment rates, instead of the binary measure (treatment and control states). Synthetic controls method also shows that the percentage of degrees awarded in recessionresistant majors increased and the percentage of degrees awarded in recession-sensitive majors decreased. These results suggest that the Great Recession led students to substitute away from degree fields which were unstable during the recession and towards degree fields which were relatively stable during the recession. Looking at the enrollment trends, I find suggestive evidence that these effects are partially driven by changes in the distribution of students across different types of institutions in the post-recession period in the treatment states. My results are in line with Blom, Cadena, and Keys (2015) who analyze how the economic conditions impact the distribution of majors by considering the variations across business cycles in the US between 1960 and 2011. They also find that students substitute away from the recession-sensitive fields towards recession-proof fields.

KEYWORDS

Great recession; College major; Degree field labor market.

1. Introduction

Choosing a college degree is a difficult and important task. Students' degree fields have long-run consequences on their career paths and might lead to oversupply or undersupply of certain skills in an economy.1 Students need to take various factors into account, including the potential labor market outcomes associated with different fields, to make this critical decision. Although the effect of average labor market outcomes on students' field of study choices has been studied extensively (Altonji, Arcidiacono, & Maurel (2016a)), we do not know much about how large and temporary shocks to labor market conditions affect students' degree fields. The impact of recessions on these choices can be different from the impact of average labor market conditions for at least two reasons. First, the shocks during the recessions might be more salient to students than the average long-run labor market conditions of different majors. Second, students might be misinformed about how these shocks affected different majors. This paper studies the effects of one of the largest recessions in the US history, the Great Recession, on college degree fields and explores whether these effects were correlated with the extent of the shocks to the associated fields.

Given these aggregate effects, one might be interested in which specific degree fields drive the results. Using the differences-in-differences and synthetic controls method, I explore the effects of the Great Recession separately for each major and find that the Great Recession affected some college majors in a non-trivial manner. According to both methods, the percentage of degrees awarded in Psychology increased (statistically significant at the %5 level according to the differences-in-differences method and at the 1% level according to the synthetic controls method), the percentage of degrees awarded in Communication and Librarianship and Interdisciplinary Sciences also increased, and the percentage of degrees awarded in Science and Engineering Technologies decreased.

This paper relates to two bodies of work. First, it directly contributes to the literature on the effects of recessions. Although many researchers evaluate how recessions affect labor markets (Altonji, Kahn, & Speer, 2016b; Kahn, 2010; Oreopoulos, von Wachter, & Heisz, 2012), housing markets (Painter & Yu, 2014), physical and mental health outcomes (Margerison-Zilko, Goldman-Mellor, Falconi, & Downing, 2016), and mortality (Schwandt & von Wachter, 2019); studies regarding the effects of the Great Recession on degree fields have just recently come into prominence. Concurrently with this paper, Shu (2016) and Liu, Sun, and Winters (2018) evaluate how the Great Recession affected the choice of college major, mostly focusing on the STEM and business majors, by using datasets and sources of identification that are different from the ones used in this paper. While Shu (2016) and Liu et al. (2018) answer how the Great Recession affected specific degree field choices, they do not address how those changes were linked to the labor market performance of different degree fields during the recession. Hence, my paper adds to the literature by showing that there is a shift away from the majors that performed worse during the Great Recession towards majors that performed better, beyond a mere change in majors. Furthermore, I am able to analyze whether these effects were driven by certain types of institutions and shed light on whether the effects are driven by within institution versus across institution changes in the distribution of students. Second, this paper contributes to the active literature on the determinants of college major. Studies show that innate ability and performance in high school (Arcidiacono, 2004; Ost, 2010; Turner & Bowen, 1999), preferences (Blakemore & Low, 1984; Patnaik, Venator, Wiswall, & Zafar, 2020; Stinebrickner & Stinebrickner, 2011; Wiswall & Zafar, 2015; Zafar, 2013), expected earnings associated with different majors (Beffy, Fougere, & Maurel, 2012; Berger, 1988; Blom et al., 2015; Freeman, 1971), and risk associated with different majors (Christiansen, Joensen, & Nielsen, 2007; Saks & Shore, 2005) are factors affecting degree field choices. I contribute to this literature by showing that shortterm labor market shocks to labor market outcomes of different majors are also important factors in determining college major choice.

This paper proceeds as follows. Section 2 discusses data sources, data challenges, and the categorization of majors into recession-resistant and recession-sensitive categories. Section 3 explores whether the Great Recession causes a shift away from the recession-sensitive majors towards the recession-resistant majors using both the differences-in-differences and synthetic controls methods. Section 4 looks at the effects of the Great Recession separately for each major. Section 5 summarizes and concludes with possible directions for future research.

2. Data

In this section, I first discuss three data sources (BLS, IPEDS, and IPUMS) I use to systematically analyze the effects of the Great Recession on the field of degree choices of undergraduate students. I, then, describe the challenges associated with the IPUMS data. Finally, I explain how I categorize the degree fields as recession-resistant or recessionsensitive using the changes in labor market outcomes of various occupations during the recession.

To measure how severely the recession hit different geographical areas, I use the Local Area Unemployment Statistics (LAUS) obtained from the Bureau of Labor Statistics (BLS). In my main specification, I define the severeness of the recession using the change and percentage change in state-level unemployment rates between January 2007 and December 2010. I use both criteria to determine the treatment states.

Table 1. Ranking of the degree fields according to percentage change in unemployment rates, change in employment, and percentage change in annual earnings.

	% Change	Ranking	Change	Ranking	% Change	Ranking	Ranking
Architecture	109.98	16	5365	13	-0.67	16	18
Arts & Music	85.23	5	7304	10	-0.51	15	9
Business & Management	106.88	15	10145	2	-1.70	19	15
Communication & Librarianship	90.24	8	9608	4	-0.87	18	9
Education	75.95	1	-2874	19	0.28	8	7
Engineering	146.52	18	3723	16	0.20	11	18
Humanities	96.88	12	6292	11	-0.03	12	13
Interdisciplinary Sciences	96.29	11	8265	8	0.60	6	6
Law	201.36	19	4460	14	1.16	2	13
Life Sciences	102.03	13	11065	1	4.99	1	1
Math & Computer Sciences	94.86	9	3722	17	0.72	3	8
Other Non-Sciences	87.56	7	9212	7	-0.83	17	11
Physical Sciences & Geosciences	77.86	2	3114	18	0.71	4	5
Psychology	94.95	10	9536	5	0.60	5	4
Religion & Theology	85.88	6	9386	6	0.54	7	3
Science & Engineering Tech	104.77	14	6290	12	-0.32	14	17
Social Sciences	113.73	17	8162	9	0.25	10	15
Social Service Professions	82.49	4	9720	3	0.26	9	2
Vocational Studies	81.74	3	4068	15	-0.24	13	11

There are two challenges to be addressed to match the labor market outcomes of different degree fields from the IPUMS data with the IPEDS data. First, the degree field categories from the IPUMS and the IPEDS are not the same. In the IPUMS, there are 38 majors whereas in the IPEDS, there are 20 majors. To my knowledge, there is not a crosswalk between the two datasets. Hence, I manually go through the documentations of the degree field categories reported in the IPUMS and the IPEDS and compress the degree field categories reported in the IPUMS to match the categories in the IPEDS. Appendix Table A.4 shows the match. 9 out of 20 degree fields in the IPEDS (Arts and Music, Business and Management, Education, Engineering, Interdisciplinary or Other Sciences, Law, Physical Sciences, Psychology, and Vocational Studies and Home Economics) have exactly one match in the IPUMS. 5 degree fields in the IPEDS (Architecture and Environmental Design, Math and Computer Sciences, Religion and Theology, Social Sciences, andSocial

Service Professions) have two matches in the IPUMS. Another 5 fields in the IPEDS have more than two matches in the IPUMS. One category in the IPEDS, Geosciences, does not have a match in the IPUMS data. Geosciences is listed under the Physical Sciences in the IPUMS data. Hence, I merge the Physical Sciences and Geosciences categories in the IPEDS into one category: Physical Sciences and Geosciences.

Second, the ACS reports field of study of the respondents only in the survey waves 2009 and afterwards. Hence, I do not know the labor market outcomes of majors for years 2007 and 2008. To address this problem, I construct a transformation matrix linking each degree field category to each occupation category using data from individuals surveyed in the ACS 2009, for whom both major and occupation data are available. Appendix Table A.5 shows this transformation matrix. Each row of the matrix represents a different degree field, and each column shows a different occupation. Each cell (i, j) of this matrix represents the percentage of individuals who are in occupation j conditional on graduating from degree field i. For example, cell (1,1) in Table A.5 states that 5.1% of individuals with Architecture and Environmental Design degree work in "Management, Business, Science, and Arts Occupations". This table reveals that although there is a strong positive relationship between one's degree field and occupation in most cases (for instance, 80% of individuals with education majors work in educationrelated occupations), there is also substantial variation in the occupation one can choose depending on the degree field.

The mapping of majors to occupations may look different across years. If the transformation matrix is not stable across years, then holding the matrix fixed will provide inaccurate information on changes in labor market outcomes of these majors since I look at the changes in labor market outcomes from 2007 to 2010 based on the 2009 mapping. As a check, I look at the stability of transformation matrix from 2009 to 2011. Appendix Tables A.6 and A.7 are the transformation matrices that belong to 2010 and 2011, respectively. The three transformation matrices are similar to each other, suggesting that the transformation matrices are stable across these years.

3. Aggregate Results: How Did the Great Recession Affect Students' Fields of Study?

Table 2 Panel A presents the coefficient of interest, γk, from Eq. 1. The dependent variable in Columns (1) and (2) is the percentage of degrees awarded in each major category in each institution. The specification in Column (1) assigns the same weight to all institutions regardless of their size. According to this specification, although the estimates have expected signs, we cannot detect any significant effects. An alternative specification is weighting observations by institution size to assign the same weight to all students. Column (2) presents the results for this weighted specification. According to this specification, there is a 1.5 percentage points increase in the percentage of degrees awarded in the recession-resistant majors (p-value < 0.001) from a baseline of 45% and a 1.4 percentage points decrease in the percentage of degrees awarded in the recession-sensitive majors (p-value: 0.001) from a baseline of 55%. These effects are sizable. Lastly, specification in Column (3) uses the percentage of degrees awarded in each major category in each state, weighted by state size in terms of number of degrees awarded. We see that the coefficients are similar to the specification in Column (2) both in terms of magnitude and significance.

Table 2 Panels B and C explore whether the effects of the Great Recession are stronger at more local institutions (institutions with more within-state students) using Eq. 1. To answer this question, I first calculate the percentage of within-state students to all students enrolled in an institution in 2000 for each institution (subject to data availability from the IPEDS Fall Enrollment Survey). The median of this variable is 74.75%. That is, half of the institutions has more than 74.75% within-state students. Then, I create a dummy variable which is equal to 1 for institutions with above the median percentage of within-state students (Above Median Local Institutions) and 0 for institutions with below the median percentage of within-state students (Below Median Local Institutions). Panel B shows the results for the above median local institutions and Panel C shows the

results for the below median local institutions. Looking at Column 1, we see that the effects are large and statistically significant for above-median local institutions but small and not statistically significant for below-median local institutions. This finding is line with the estimated effects being causal and suggests that local demand conditions are important determinants of students' labor market expectations.

Table 2. The effect of the great recession on recession-resistant and recession-sensitive degree fields (differences-in-differences method).

Estimate	S.E.	Estimate		S.E.	Estimate	S.E.	Observations for (1) and (2)	Observations for (3)
Panel A: Binary Treatment Variable								
0.015***	0.004	0.006	Recession-Resistant	0.003	0.015***	0.004	137,430	624
-0.014***	0.004	-0.002	Recession-Sensitive	0.004	-0.015***	0.004	96,673	624
Panel B: Binary Treatment Variable (Above Median Local Institutions)								
0.016***	0.005	0.014***	Recession-Resistant	0.003	0.017***	0.004	59,689	540
-0.016***	0.006	-0.014**	Recession-Sensitive	0.004	-0.017***	0.004	42,133	540
Panel C: Binary Treatment Variable (Below Median Local Institutions)								
0.021***	0.006	0.004	Recession-Resistant	0.007	0.019**	0.009	60,294	612
0.005	-0.002	Recession-Sensitive	-0.016**	0.007	-0.019**	0.009	41,211	612
Panel D: Continuous Treatment Variable								
0.0010	0.0028***	Recession-Resistant	0.0056***	0.0015	0.0054***	0.0016	137,430	624
0.0009	-0.0023***	Recession-Sensitive	-0.0053***	0.0016	-0.0054***	0.0016	96,673	624
	Institution-Year	Observation Level		Institution-Year	State-Year		N/A	
	No	Weighted?		Yes, by institution	Yes, by state		N/A	

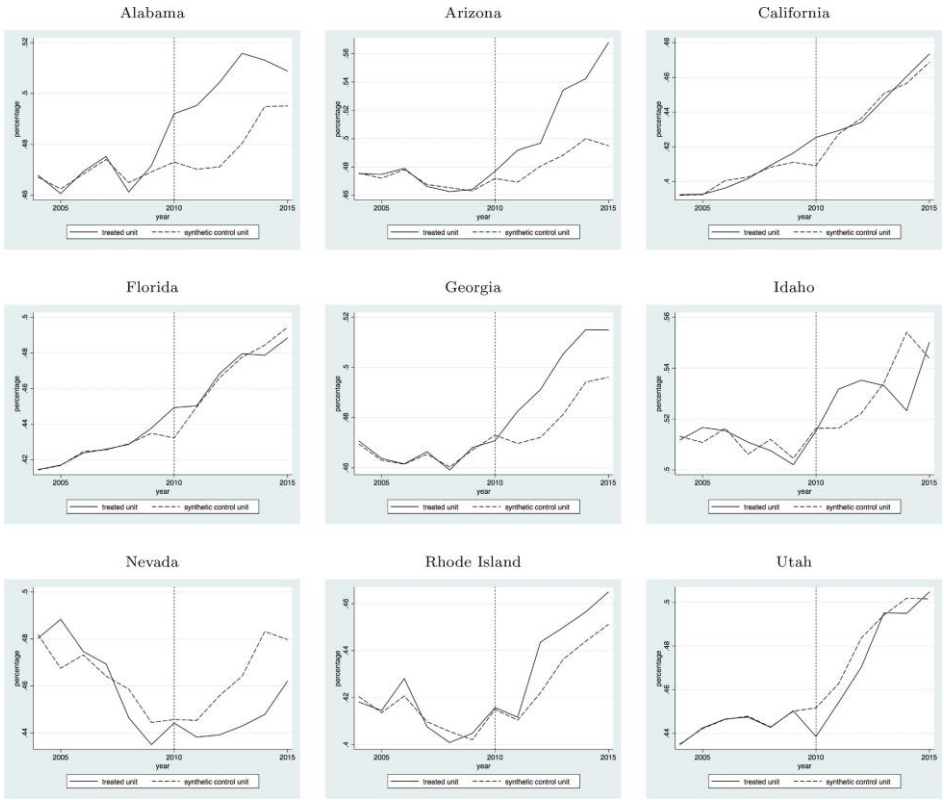

Figure 1. Trends in the percentage of degrees awarded in recession-resistant degree fields, estimated by the synthetic controls method.

In my main specification, I categorize the majors as recession-resistant or recession-sensitive using a composite ranking, which is the average of rankings based on changes in unemployment rates, employment, and annual earnings, since rankings based on individual components vary widely and are only weakly correlated. To shed light on which component(s) of the ranking is responsible for the observed patterns, Appendix Table A.11

reports (γk) from Eq. 1 for different categorizations of majors. Panel A categorizes majors based on the changes in unemployment rates, Panel B categorizes majors based on the changes in employment, Panel C categorizes majors based on the changes in annual earnings, Panel D categorizes majors based on the changes in unemployment rates and employment, Panel E categorizes majors based on the changes in unemployment rates and annual earnings, and Panel F categorizes majors based on the changes in employment and annual earnings. We see that the observed pattern is apparent in rankings that are based on or that include the changes in annual earnings.

4. Specific Results: How Did the Great Recession Affect Students' Fields of Study?

Figure 1 presents the coefficient of interest, γk, from Eq. 1 and formally tests the differential effect of recession on each degree field for three different specifications. The dependent variable in Column (1) is the percentage of degrees awarded in each major in each institution. According to the specification in Column (1), the percentage of degrees awarded in Communication and Librarianship increased by an additional 0.6 percentage points from a baseline of 5.0% (statistically significant at the 1% level), the percentage of degrees awarded in Psychology increased by an additional 1.1 percentage points from a baseline of 7.4% (statistically significant at the 1% level), the percentage of degrees awarded in Vocational Studies increased by an additional 1.2 percentage points from a baseline of 5.5% (statistically significant at the 10% level) in severely affected states in the post-recession period. We also see that there is an additional 0.1 percentage points decrease in the percentage of degrees awarded in Geosciences from a baseline of 0.5% (statistically significant at the 5% level), an additional 0.6 percentage points decrease in the percentage of degrees awarded in Life Sciences from a baseline of 13.1% (statistically significant at the 10% level), an additional 0.5 percentage points decrease in the percentage of degrees awarded in Math and Computer Sciences from a baseline of 5.9% (statistically significant at the 5% level), and an additional 2.0 percentage points decrease in the percentage of degrees awarded in Science and Engineering Technologies from a baseline of 6.5% (statistically significant at the 5% level) in severely impacted states in the post-recession period. The effect sizes range between -30.8% and 21.8%.

Table 1 Column (2) uses the percentage of degrees awarded in each major in each institution as the dependent variable but weights the observations by institution size. According to this specification, the percentage of degrees awarded in Psychology increased by an additional 0.2 percentage points from a baseline of 6.6% (statistically significant at the 5% level) and the percentage of degrees awarded in Other NonSciences decreased by an additional 1.2 percentage points from a baseline of 5.7% (statistically significant at the 5% level) in severely impacted states in the post-recession period. Lastly, specification in Column (3) uses the percentage of degrees awarded in each major category in each state, weighted by state size in terms of number of degrees awarded. We see that the coefficients are similar to the specification in Column (2) both in terms of magnitude and significance. The effect for Interdisciplinary Sciences now become statistically significant at the 10% level. Additionally, the effect for Science and Engineering Technologies is still negative according to the specifications in Columns (2) and (3) though not statistically significant at the conventional levels (p-value is 0.19 for Column (2) and 0.17 for Column (3)).

5. Conclusion

The field of study choices are one of the most important and complicated decisions college students make. The literature documents that prevailing labor market conditions of different occupations affect students' degree field choices. In this paper, I systematically analyze whether the Great Recession, a large, salient, and temporary shock to the labor markets, affects students' degree field choices. Using data from the BLS, I categorize states based on their labor market outcomes during the recession. Then, I categorize each degree field as recessionresistant or recession-sensitive according to a stability ranking based on the change in labor market outcomes of individuals with these degree fields, using the ACS data. Using institutional level data from the IPEDS, I study how degrees awarded in recession-resistant and recession-sensitive fields changed in

the post-recession period in the severely affected states utilizing both the differences-in-differences and synthetic controls methods. I find that there is a shift away from recession-sensitive majors towards recession-resistant majors. This evidence suggests that students pay attention to the current shocks to the major-specific labor market outcomes while making their degree field choices. Whether these shifts in degree field choices are beneficial or harmful is unclear. On the one hand, the effects of the recessions on labor market outcomes can be short-term.

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