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The impact of business cycle fluctuations on graduate school enrollment☆

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ABSTRACT

This paper adds to the understanding of student decisions about graduate school attendance by studying the magnitude of the effect of business cycle fluctuations on enrollment. I use data on graduate school enrollment from the Current Population Survey and statewide variation in unemployment rates across time to proxy for changes in business cycle conditions. I find that overall graduate school enrollment is countercyclical for females and acyclical for males. I show that changes in the unemployment rate have non-linear impacts on female enrollment and that poor labor market conditions lead to a substitution from full-time enrollment to part-time enrollment for both genders.

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1. Introduction

Little is known about the effect that business cycle fluctuations and labor market conditions have on graduate school enrollment in the United States. This is somewhat surprising given that the fraction of the population attending and completing graduate school has been steadily rising over time. Eleven percent of the population aged 25 and older currently holds a master's, professional, or doctorate degree.[1] The number of graduate level degrees conferred by US institutions has increased by 96% over the past two decades and is expected to increase by a further 28% over the next decade.[2] This increase in graduate degree completion has persisted despite the fact that costs have been rising dramatically; average tuition levels at graduate schools doubled in real terms between 1989 and 2009.[3]

Given the increasing size and scale of postbaccalaureate enrollment it is important to understand how student attendance at graduate school may be affected by business cycle fluctuations. Federal and state governments can use this information to more fully evaluate the impact of recessions on education decisions and for determining how much money to allot to public higher education institutions and grant programs. In addition, schools offering graduate degrees may find this information useful in predicting future application and enrollment levels.

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[1] See Table 9 of Snyder and Dillow (2011).

[2] The total number of graduate degrees conferred rose from 417,197 in 1989 to 816,504 in 2009 and is expected to increase further to 1,041,500 in 2019. See Table 279 of Snyder and Dillow (2011).

[3] Average tuition and fees increased from $6603 in 1989 to $13,634 in 2009. See Table 348 of Snyder and Dillow (2011). All dollar amounts in this paper are presented in year 2008 dollars.

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The effect of a recession on graduate school enrollment is theoretically ambiguous. The decrease in the opportunity cost of schooling brought about by low wage offers and high unemployment rates indicates that graduate school enrollment should increase. It is also possible that students may stay in graduate school longer during poor economic times because they fear difficulty in finding a job when they graduate or that graduating in a recession will have a long term negative effect on their wages.[4]

However, graduate school enrollment could potentially decrease during recessions if the costs of schooling increase and the availability of funds through loans and grants decreases. Schools may be forced to increase tuition in response to shrinking endowments and decreases in the availability of funding from state governments. This lack of funds may also cause schools to lower the amount of stipends and scholarships they offer to incoming students. During recessions it can potentially be more difficult to borrow money from private lenders and students may be forced to pay higher interest rates on loans to cover schooling expenses. Employers may also be less willing to subsidize the graduate education of their employees during poor economic times.

It is also possible that graduate school enrollment is relatively unresponsive to fluctuations in the business cycle. Given the steady increase in the number of graduate students over the past few decades, it could be the case that schools are enrolling at capacity and that the number of students they are able to enroll does not vary with business cycle conditions. Determining the magnitude and direction of the effect of the business cycle on graduate school enrollment is clearly an empirical question.

There is a substantial literature examining the impact of business cycle conditions on college enrollment for undergraduates in the US. Overall, papers such as Betts and McFarland (1995), Christian (2007), Dellas and Koubi (2003), Dellas and Sakellaris (2003), Gustman and Steinmeier (1981), Hazarika (2002), Humphreys (2000), Kienzl, Alfonso, and Melguizo (2007), Light (1996), Mattila (1982), and Pennington, McGinty, and Williams (2002) show that undergraduate enrollment is countercyclical.[5] There are also many articles in the popular press that discuss the increase in student application to graduate schools during the recession of the late 2000s.[6] In addition, there are a number of descriptive papers that analyze the determinants of graduate school enrollment.[7] However, there is very little research about the impact of business cycle fluctuations on graduate school enrollment. Dellas and Koubi (2003) and Light (1996) include students enrolling in graduate schools in their samples, but they lump all schooling decisions together and do not distinguish between undergraduate and graduate enrollment. Therefore one cannot determine the effects of business cycle fluctuations and labor market conditions on graduate school enrollment from these papers because graduate students are not analyzed separately. Bogan and Wu (2012) document the relationship between various aggregate macroeconomic indicators and graduate school enrollment decisions. Since the authors use national level averages of the macroeconomic indicators it is difficult to separately identify the causal effect of business cycle fluctuations from changes in nationwide graduate school enrollment trends. Goh (2009) examines the relationship between graduate enrollments at the higher education institution level and statewide variation in macroeconomic indicators. The author finds that first time enrollment in professional degree programs is countercyclical but that there is no clear effect of business cycle fluctuations on other graduate enrollment.

Bedard and Herman (2008) analyze the impact of business cycle fluctuations on the graduate school enrollment of science and engineering majors using data from the 1993–2001 waves of the National Survey of Recent College Graduates (NSRCG). They use statewide variation in unemployment rates to examine the effects of business cycle conditions on graduate school enrollment by gender, degree type, undergraduate major, and ability. They find evidence that enrollment in doctorate programs is countercyclical for high GPA males and males with undergraduate degrees in physical science, life science, computer science, and mathematics. They also find that male master's degree enrollment is procyclical, but that enrollment by males in professional degree programs and by women in general is acyclical.

The Bedard and Herman (2008) study provides an accurate description of the effect of business cycle fluctuations on students with science and engineering degrees soon after they graduate from college. However, there are number of students that are not included in the Bedard and Herman (2008) analysis. In the NSRCG sample used in Bedard and Herman (2008) respondents are observed once on average between 18 and 19 months after they graduate from college. This misses a large number of graduate school enrollment spells since approximately 51% of students that ever enroll in graduate school do so for the first time more than 18 months after they receive a bachelor's degree.[8] In addition, since the NSRCG data is limited to science and engineering graduates, students from other majors, particularly those that enroll more females students, are not represented in the Bedard and Herman (2008) study. Only approximately one third of bachelor's degrees awarded are to students in science and engineering fields, and women make up half of science and engineering bachelor's degree recipients whereas they make up approximately 60% of degree recipients in other fields (National Center for Science and

[4] The effect of graduating in a recession on future wages of bachelor's degree holders is studied in Kahn (2010) and Oreopoulos, von Wachter, and Heisz (2012). The effect on Economics Ph.D. graduates is explored in Oyer (2006).

[5] Exceptions to this general finding are the studies by Berger and Kostal (2002), Card and Lemieux (1997), and Kane (1994) that do not find a statistically significant effect of the unemployment rate on undergraduate enrollment.

[6] See for example Burnsed (2010), Koppel (2009), and Ruiz (2010).

[7] See Ethington and Smart (1986), Mullen, Goyette, and Soares (2003), and Perna (2004).

[8] Author's calculations using Baccalaureate and Beyond 1993/2003 data on students 10 years after they complete a bachelor's degree.

Engineering Statistics, 2011). In this paper I extend the analysis of Bedard and Herman (2008) in a number of directions. I use a nationally representative sample of bachelor's degree holders, I include an analysis of the effect of labor market conditions on the choice between full-time and part-time graduate school enrollment, and I use data that span the recession that occurred in the late 2000s which reveals a non-linear relationship between labor market conditions and graduate school enrollment. The fact that I use different data and analyze a population of bachelor's degree holders outside science and engineering fields leads to findings that differ in magnitude and sign from Bedard and Herman (2008). In Section 4.1 I discuss in detail how to interpret these differences in results.

In this paper I use data on bachelor's degree holders from the Current Population Survey (CPS) between 1994 and 2010 to examine the effect of labor market conditions on graduate school enrollment. I analyze the impact of business cycle fluctuations on enrollment decisions separately for men and women. The graduate fields males and females choose to enroll in may be different on average and be differentially affected by labor market conditions. In addition, the effects of covariates such as age and marital status may vary across gender. I also examine the impact of labor market conditions on the choice between part-time and full-time enrollment. Finally, I look at the effect of labor market conditions broken down by degree program.[9]

I find that graduate school enrollment for females is countercyclical but that male enrollment is acyclical. Using data that include the recession of the late 2000s I find that the effect of labor market conditions as measured by the unemployment rate is non-linear for women. At the mean unemployment rate, a one standard deviation increase in the unemployment rate is associated with a 4.3% increase in female graduate school enrollment. There is some suggestive evidence that the countercyclical nature of female graduate school enrollment is driven by master's degree students. I also find that part-time enrollment increases relative to full-time enrollment for both males and females in response to poor labor market conditions.

2. Background and identification strategy

As described in Section 1, graduate school enrollment could theoretically increase, decrease, or remain unchanged in response to business cycle fluctuations. Graduate school attendance might increase in response to adverse labor market conditions. Decreases in wage offers and the probability of receiving a job offer would likely lower the opportunity cost of attending graduate school and make people more likely to attend. But there are also a number of reasons why graduate school enrollments might decrease during poor economic times. The cost of attending school might rise since school endowments tend to shrink and funding to public schools tends to be cut during recessions. The decreases in resources available to schools could be passed on to students in the form of

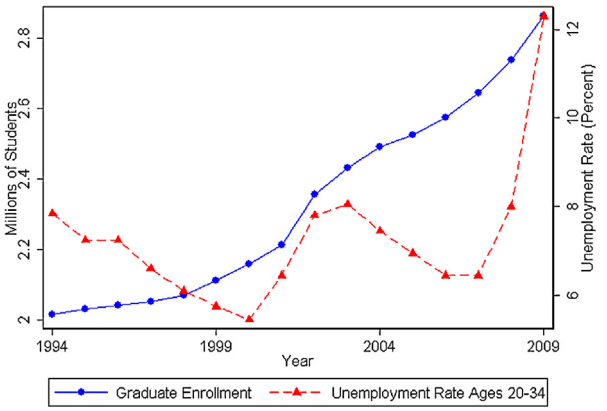

Fig. 1. Graduate school enrollment and unemployment rate.

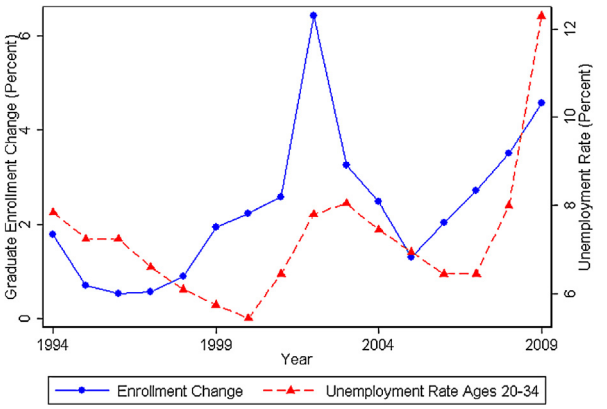

Fig. 2. Percent change in graduate school enrollment and unemployment rate.

increased tuition. Grants in the form of stipends or scholarships may also be less available from schools during poor economic times. In addition, during recessions employers may be less willing to give tuition assistance to their employees as an incentive to enroll in graduate school. However, it is also possible that graduate schools are operating at capacity, so that labor market conditions essentially have no effect on overall attendance since enrollment is constrained on the supply side of the market. Determining the net effect of business cycle fluctuations on graduate school enrollment is therefore empirical question.

Figs. 1 and 2 display the relationship between aggregate graduate school enrollment and the unemployment rate.[10] One can see from Fig. 1 that overall enrollment in graduate school has been steadily increasing over the past 16 years, rising from 2 million students in 1994 to 2.9 million students in 2009. The rate of increase has also varied over time. This can be seen more easily in Fig. 2 which shows

[9] The CPS has very limited data on degree program choice, however. See Section 4.4 for details.

[10] Aggregate graduate school enrollment data are from the Integrated Postsecondary Education Data System school enrollment surveys.

that the percent change in aggregate graduate school enrollment ranges between 0.52% and 6.4%.

The correlation between the data points in the two series in Fig. 2 is 0.5, which indicates that there is a positive association between changes in graduate school enrollment and the unemployment rate. However, little can be learned about the causal relationship between business cycle fluctuations and graduate school enrollment from looking at aggregate data. There could be some other series that is unrelated to the business cycle but happens to trending the same way as the unemployment rate over this time period that could be responsible for the positive correlation.

To identify the impact of business cycle fluctuations on graduate school enrollment I use statewide variation in unemployment rates and contemporaneous school enrollment which should be independent of any nation-wide enrollment trends. One potential concern about the use of this variation is related to mobility of students across states to attend graduate school. If there were high levels of cross-state mobility of graduate students then the coefficient estimates on the state unemployment rate could be biased downwards. This bias would occur if students systematically leave states with high unemployment rates in order to attend graduate school in other states. However, it is very likely that there are frictions that prevent such high levels of mobility and that we can think of states as in large part being self contained labor and graduate school markets. Some frictions that reduce graduate student mobility across states include paying moving costs, being far away from extended family members, and facing higher costs of schooling as a result of being ineligible for in-state tuition at public institutions.

While using variation across states in the unemployment rate would provide estimates of the effect of business cycle fluctuations on graduate school enrollment that are independent of nation-wide trends in enrollment decisions, it is still possible that there are state level factors that might be correlated with both the unemployment rate and graduate school enrollment. For example, a state could have a high tax rate that is in part used to heavily subsidize higher education. The high tax rate could also be discouraging businesses from opening in the state which could lead to high unemployment levels. In this example the high tax rate would lead to a spurious positive correlation between unemployment and graduate school enrollment. To account for such permanent differences in state policies, in the main analysis I add state fixed effects to the models and rely on within state variation over time in the unemployment rate to identify its impact on graduate school enrollment decisions. I show later in Appendix A that similar results are obtained with and without state fixed effects, implying that little bias would be introduced by failing to control for these state specific factors.

3. Data and summary statistics

I use individual level data from the October school enrollment supplements of the CPS. The CPS is a nationally representative monthly survey of approximately 60,000 households. The October surveys contain data on graduate school enrollment decisions of individuals, along with data on characteristics such as gender, age, marital status, and family income. The CPS is a good survey to use to examine the overall impact of labor market conditions because of its large sample size and the availability of cross-sections that span many years and cohorts so that data on graduate school enrollment over a wide range of states of the business cycle are collected.[11] The drawbacks of using the CPS are that it lacks detailed information on ability, bachelor's degree school quality, and other characteristics that may affect school enrollment decisions. Also, since the CPS only collects data on October school enrollment it does not contain data on spring semester enrollment and has very limited data on respondents over time.[12]

In 1994 the CPS October survey questions about school enrollment were changed to distinguish between undergraduate and graduate school enrollment.[13] In this study I use data from the 1994–2010 CPS surveys. The sample I use consists of respondents between the ages of 21 and 35 who have completed a bachelor's degree, since these are the most likely candidates for graduate school enrollment. The total sample size is 117,668 respondents which is an average sample of 6922 per year for 17 years.

The data on unemployment rates that I use to proxy for business cycle conditions are from the Local Area Unemployment Statistics Program run by the Bureau of Labor Statistics (BLS). The BLS collects annual statewide data on unemployment rates broken down by age category. The unemployment rate I use in this study is the average of the unemployment rates for the age 20–24 category and the age 25–34 category.

Sample statistics are displayed in Table 1. Females are slightly more likely to enroll in graduate school than males; 5.6% of females with a bachelor's degree are enrolled in first year graduate school and 13.3% of females are enrolled overall. Females are less likely to enroll full-time in graduate school; 54.7% of female graduate students are enrolled full-time as compared to 60.6% of males. Males and females face similar unemployment rates, slightly less than 8% on average. Female bachelor's degree recipients in the sample are slightly more likely to be black as compared to male degree recipients.[14] Men and women come from households with similar levels of family income and are nearly equally likely to have missing or top-coded income values. There are approximately 12,000 more women in the sample than men, reflecting the fact that women have higher levels of bachelor's degree completion.

[11] The Integrated Postsecondary Education Data System (IPEDS) also contains data on graduate and professional school enrollments, however IPEDS lacks data on individual level covariates.

[12] Use of the Merged Outgoing Rotation Groups would provide at most two school enrollment observations for a subset of respondents.

[13] Prior to 1994 the questions only asked about the current grade number the respondent was enrolled in and did not contain data on degree completion, making it difficult to distinguish between undergraduate and graduate students.

[14] The question about race in the CPS is not consistent across all waves of the survey. In 2003 the survey began to have separate categories for people who identified themselves as being of mixed race. In this paper the mixed raced respondents are placed in the "other" category.

Table 1
Summary statistics for CPS sample.

	Males		Females	
	Mean	SE	Mean	SE
School enrollment				
Enrolled in graduate school	0.128	0.0017	0.133	0.0015
Fraction of students enrolled full time	0.606	0.0068	0.547	0.0061
Enrolled in first year graduate school	0.048	0.0011	0.056	0.0010
Labor market conditions				
Average state unemployment rate (%)	7.63	0.0124	7.70	0.0115
Demographic and family characteristics				
Married	0.485	0.0025	0.533	0.0022
Age (years)	29.2	0.0190	28.9	0.0174
White	0.816	0.0020	0.803	0.0018
Black	0.074	0.0015	0.091	0.0014
Other race	0.111	0.0016	0.106	0.0014
Family income (thousands of year 2008 dollars)	74.5	0.2000	73.7	0.1814
Family income missing	0.114	0.0016	0.111	0.0014
Family income top coded	0.188	0.0019	0.175	0.0017
N	52,709		64,959	

Statewide unemployment data are from the BLS. The remainder of the data is from the 1994–2010 CPS October school enrollment supplements. All statistics are weighted using the CPS person weights. Unless otherwise specified statistics are reported as fractions of the population.

4. Results

I evaluate the effect of business cycle fluctuations on graduate school enrollment by estimating probit models of graduate school attendance and using state unemployment rates to proxy for business cycle conditions. I perform all analyses separately for men and women to see if the effect of the business cycle varies by gender. I analyze both the decision to enroll in graduate school overall and the decision to start graduate school for the first time. It is unclear on theoretical grounds which margin would show the largest impact of business cycle fluctuations. If business cycle fluctuations affect the decision to start a graduate program and do not have a strong effect on persistence, then first year graduate enrollment should show the largest impact. If, on the other hand, students attempt to avoid graduating during a recession or drop out and re-enroll often based on the availability of job offers then overall enrollment should show the strongest impact. In addition, I analyze the decision about whether to enroll part-time or full-time. The effect of business cycle conditions on full-time enrollment is also theoretically ambiguous. Students might be more likely to enroll full-time during poor economic times if no job offers are available. However, if students find it difficult to earn or borrow enough money to finance graduate school they may be more likely to enroll part-time to keep the costs of schooling low. Finally, I examine the extent to which the effect of labor market conditions on graduate school enrollment differs by degree program type.

4.1. Graduate school enrollment

The main results of the graduate school enrollment probits are displayed in Table 2. All regressions are weighted using the CPS person weights. The results are reported as marginal effects for continuous variables and average treatment effects for indicator variables with all effects evaluated at the means of the other variables. All regressions include state and year fixed effects. Standard errors are clustered at the state level to account for statewide shocks to graduate school enrollment that may be correlated across time. The first two columns display results for females and the last two display the results for males.

The main variable of interest is the state unemployment rate. One can see from the first column of Table 2 that the coefficient on the state unemployment rate for females is positive but not significantly different from zero. In the second column I add the square of the state unemployment rate to the probit regression. The coefficients on the linear and quadratic term are jointly significant at the 1% level, indicating that there is a clear non-linear relationship between the unemployment rate and female graduate school enrollment. The non-linear relationship between the unemployment rate and graduate school enrollment appears to be driven mainly by data from the recession of the late 2000s. When I exclude data from 2008 onwards and estimate the models in Table 2 using data from 1994 to 2007 only, the coefficient on the quadratic term becomes insignificant though the coefficient from the linear specification more than doubles in size and becomes positive and significantly different from zero at the 1% level (results available upon request). This is likely due to the fact that the increase in graduate school enrollment for females was not as steep as the increase in the unemployment rate in the late 2000s (see Fig. 2).

To put the numbers from the second column of Table 2 into a more easily interpretable context I evaluate the effect of a one standard deviation increase in the unemployment rate on graduate school enrollment. The average standard deviation of unemployment rates across

Table 2
Graduate school enrollment probit.

	Females	Females	Males	Males
State unemployment rate	0.218	1.093***	0.084	0.221
	[0.136]	[0.371]	[0.185]	[0.461]
Unemployment rate squared		−4.574***		−0.722
		[1.772]		[2.432]
Black	0.034***	0.034***	0.003	0.003
	[0.006]	[0.006]	[0.006]	[0.006]
Other race	0.020**	0.020**	0.060***	0.060***
	[0.010]	[0.010]	[0.011]	[0.011]
Age	−0.036***	−0.036***	−0.035***	−0.035***
	[0.007]	[0.007]	[0.008]	[0.008]
Age squared/100	0.042***	0.041***	0.040***	0.040***
	[0.012]	[0.012]	[0.014]	[0.014]
Family income missing	−0.081***	−0.081***	−0.103***	−0.103***
	[0.004]	[0.004]	[0.005]	[0.005]
Real family income/10	−0.022***	−0.022***	−0.033***	−0.033***
	[0.002]	[0.002]	[0.002]	[0.002]
Family income squared/10,000	0.099***	0.099***	0.147***	0.147***
	[0.014]	[0.014]	[0.012]	[0.012]
Family income top coded	−0.003	−0.003	−0.001	−0.001
	[0.006]	[0.006]	[0.006]	[0.006]
Married	−0.037***	−0.037***	0.006	0.006
	[0.004]	[0.004]	[0.004]	[0.004]
Observations	64,959	64,959	52,709	52,709

Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. All regressions include state and year fixed effects. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

** $p < 0.05$.

*** $p < 0.01$.

states from 1994 to 2010 (weighted by state population) is 1.9 percentage points. Using the quadratic terms on the unemployment rate and starting from the average unemployment rate over the sample period (7.7%) a one standard deviation increase in the unemployment rate is associated with a 0.57 percentage point increase in the fraction of females with a bachelor's degree enrolling in graduate school. This translates to a 4.3% increase in female graduate enrollment, since the average enrollment rate is 13.3%. It is interesting to note that graduate school enrollment overall appears to be less responsive to business cycle conditions than community college enrollment. Betts and McFarland (1995) find that a one percentage point increase in the unemployment rate is associated with an 8.8% increase in the number of students enrolling full-time in community college.

Columns 3 and 4 of Table 2 display the results from the graduate school enrollment analysis performed on males in the sample. There is no evidence in this table that male graduate school enrollment is influenced by business cycle fluctuations. The point estimates for the coefficients on the state unemployment rate variables are much smaller for males than they are for females, and none of the estimates are significantly different from zero.

The results about the effect of labor market conditions on graduate school enrollment presented in this paper are very different from those reported in Bedard and Herman (2008). They find no impact of the business cycle on female graduate school enrollment, but find a significant countercyclical effect for male doctorate enrollment and a procyclical effect for male master's degree enrollment. The magnitude of the effect of the business cycle on male enrollment is similar to the magnitude of the effect I find for females, however. What explains the differing conclusions of this paper and Bedard and Herman (2008)? The three largest differences between the current paper and the main analysis in Bedard and Herman (2008) are due to the set of control variables included in the analysis, the age composition of the survey data used, and the set of undergraduate majors included in the samples. I address the extent to which each difference could be responsible for the discrepancy between the results in this paper and Bedard and Herman (2008) below.

The NSRCG data used in Bedard and Herman (2008) contain a number of additional variables that are not available in the CPS data. These variables include undergraduate GPA, undergraduate major, and details about parental education. However, the covariates included in the models in both my analyses and the analyses in Bedard and Herman (2008) should in general be orthogonal to state specific fluctuations in unemployment rates, so including them should not have large effects on the coefficient on the state unemployment rates (though adding these covariates will increase precision by reducing the variance of the error term). I experimented with removing the covariates included in the analysis using the CPS data and found that the coefficient on the state unemployment rate was not very sensitive to the more

parsimonious specifications. The additional covariates included in Bedard and Herman (2008) are therefore unlikely to be responsible for differences in the results.

The age composition of the samples used in this paper and Bedard and Herman (2008) is another potential source of differences in the results. The data used in Bedard and Herman (2008) only allow them look at the enrollment behavior of students on average between 18 and 19 months after they graduate from college, though as noted previously approximately 51% of students who enroll for the first time in graduate school do so more than 18 months after they finish their undergraduate degree. Since I do not restrict the CPS sample I use based on the time since respondents completed their bachelor's degrees, the average age of respondents in my sample is almost 3 years higher than those included in Bedard and Herman (2008). However, when I limit my sample to include only younger respondents to more closely approximate the age composition in Bedard and Herman (2008) the results are qualitatively similar, indicating that the age composition of the samples is unlikely to explain the differing results between the two papers.

The third main difference between my paper and Bedard and Herman (2008) is related to the undergraduate majors of students that are included in the analysis. I include students from all fields in my analysis, but the data used by Bedard and Herman (2008) only allow them to include students with bachelor's degrees in science and engineering fields. As noted previously, only approximately one third of bachelor's degrees awarded each year are to students in science and engineering fields. The focus on science and engineering students leads to additional differences in the gender composition of the samples, since women make up half of science and engineering bachelor's degree recipients whereas they make up approximately 60% of degree recipients in other fields. This large difference between students included in the samples based on undergraduate major is likely responsible for the discrepancy between my results and Bedard and Herman (2008). When Bedard and Herman (2008) interact the state unemployment rate with undergraduate major they find some differences in the coefficient on state unemployment across majors within science and engineering, indicating that conclusions about the effect of business cycle fluctuations on graduate school enrollment can depend on which majors are included in the sample. Unfortunately the CPS data do not allow me to examine the effect of business cycle fluctuations separately by major, but doing so for majors outside science and engineering would be an interesting area for future research.

Before moving on to the other analyses, it is interesting to examine the coefficients on some of the additional control variables in Table 2. Conditional on completing a bachelor's degree, black females are more likely to enroll in graduate school as compared to whites. Black males tend to enroll in graduate school equally as frequently as white males. Graduate school enrollment tends to decrease with age. For both genders, evaluated at the mean age, growing older by one year is associated with a 1.2 percentage point decline in the propensity to enroll in graduate school. Family income is also negatively correlated with enrollment propensities. Evaluated at the mean for males, an additional one thousand dollars in family income is associated with a decrease in the probability of enrollment of 0.33 percentage points. The negative relationship between family income and enrollment could indicate that people planning on enrolling in graduate school are taking jobs that are meant to be temporary, but provide experience necessary for graduate school enrollment. Also, depending on when the respondent enrolled relative to the survey date and their last reported income, it could be the case that people enrolled in school have lower family incomes because they are not able to work full-time while in school.[15] Marriage is strongly negatively correlated with female enrollment but is unrelated to male enrollment.

As a robustness check I add the lagged state unemployment rate to the analysis. It is quite possible that because of persistence in business cycle fluctuations and the lags between application and enrollment in graduate school that students enrolling in the current year are actually responding more strongly to the labor market conditions of the previous year. This does not appear to be the case, however. The results of the analysis including the lagged state unemployment rate as independent variables are displayed in Table A1. The estimates are similar to the ones reported when lagged unemployment is excluded and the coefficients on the lagged unemployment variables are small and indistinguishable from zero.

4.2. First year graduate school enrollment

The results of the first year graduate school enrollment probit for females are displayed in the first two columns of Table 3. There is a positive effect of labor market conditions on first year graduate school enrollment for females, though the coefficients are smaller than those reported in Table 2. Using the results in the second column and starting from the average unemployment rate over the sample period, a one standard deviation increase in the unemployment rate is associated with a 0.11 percentage point increase in the fraction of females with a bachelor's degree enrolling in graduate school. This translates to a 2% increase in female graduate enrollment, since the average first year graduate school enrollment rate is 5.6%.

The results of the same analysis conducted for males are reported in the third and fourth columns of Table 3. The coefficient on the unemployment rate in the third column is marginally significantly different from zero at the 10% level. However, the magnitude of the coefficient estimate is small and the statistical significance is likely due to random chance. If I make small changes to the number of years of data included in the analysis this coefficient estimate is no longer significantly different from zero. In addition, in the fourth column of the table the linear and quadratic coefficients are not jointly significant from zero at any conventional significance level. Therefore there is little evidence that first year graduate school enrollment for males is influenced by business cycle fluctuations.

[15] The coefficient estimates on the unemployment rate are not sensitive to the exclusion of the family income variables in any of the models.

Table 3
First year graduate school enrollment probit.

	Females	Females	Males	Males
State unemployment rate	0.007	0.415*	0.128*	0.196
	[0.064]	[0.218]	[0.075]	[0.284]
Unemployment rate squared		−2.129**		−0.354
		[0.980]		[1.288]
Black	0.018***	0.018***	0.010***	0.010***
	[0.004]	[0.004]	[0.004]	[0.004]
Other race	0.006	0.006	0.010***	0.010***
	[0.005]	[0.005]	[0.003]	[0.003]
Age	−0.044***	−0.044***	−0.034***	−0.034***
	[0.004]	[0.004]	[0.004]	[0.004]
Age squared/100	0.066***	0.066***	0.049***	0.049***
	[0.007]	[0.007]	[0.007]	[0.007]
Family income missing	−0.028***	−0.028***	−0.026***	−0.026***
	[0.003]	[0.003]	[0.003]	[0.003]
Real family income/10	−0.007***	−0.007***	−0.008***	−0.008***
	[0.001]	[0.001]	[0.001]	[0.001]
Family income squared/10,000	0.032***	0.032***	0.040***	0.040***
	[0.005]	[0.005]	[0.008]	[0.008]
Family income top coded	−0.004	−0.004	−0.002	−0.002
	[0.003]	[0.003]	[0.003]	[0.003]
Married	−0.014***	−0.014***	−0.002	−0.002
	[0.002]	[0.002]	[0.003]	[0.003]
Observations	64,959	64,959	52,709	52,709

Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. All regressions include state and year fixed effects. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Overall the results for first year graduate school enrollment are similar to those for overall graduate school enrollment. Male first year graduate school enrollment is generally acyclical and female first year graduate school enrollment is countercyclical. For females the effect of labor market conditions on first year graduate school enrollment is smaller than it is for overall graduate school enrollment.

4.3. Choice between part-time and full-time enrollment

To analyze the choice between part-time and full-time enrollment I estimate a probit model using the sample of students who decided to enroll in graduate school.[16] The results for both females and males are reported in Table 4. There was no evidence of non-linearities in the effect of labor market conditions on the choice between part-time and full-time enrollment, so only the results of the linear specifications are displayed. The coefficients should be interpreted as the relationship between each variable and the choice to enroll full-time relative to part-time.

The coefficient on the state unemployment rate is negative and significantly different from zero at the 5% level for females. Though the point estimate for the

Table 4
Full time graduate school enrollment probit.

	Females	Males
State unemployment rate	−1.250**	−1.370*
	[0.565]	[0.796]
Black	0.023	−0.004
	[0.022]	[0.030]
Other race	0.155***	0.137***
	[0.031]	[0.035]
Age	−0.253***	−0.152***
	[0.034]	[0.024]
Age squared/100	0.391***	0.213***
	[0.061]	[0.043]
Family income missing	−0.310***	−0.390***
	[0.029]	[0.021]
Real family income/10	−0.092***	−0.112***
	[0.007]	[0.008]
Family income squared/10,000	0.414***	0.513***
	[0.049]	[0.051]
Family income top coded	0.017	0.030
	[0.036]	[0.021]
Married	−0.035**	−0.062***
	[0.015]	[0.017]
Observations	8456	6686

The sample in this table includes only respondents that were currently enrolled in graduate school. Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. All regressions include state and year fixed effects. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

[16] Multinomial probit models where the choice is between not enrolling, enrolling part-time, and enrolling full-time produced similar results. I report the bivariate probit results for ease of interpretation.

Table 5
Multinomial probit of degree program choice: females.

	None	Master's	Professional	Doctorate
State unemployment rate	−0.424	0.462	0.012	−0.049
	[0.382]	[0.336]	[0.053]	[0.079]
Black	0.024	−0.022	−0.001	−0.001
	[0.020]	[0.018]	[0.006]	[0.005]
Other race	−0.022	0.013	0.009	−0.000
	[0.015]	[0.014]	[0.009]	[0.006]
Age	−0.019	0.004	0.004	0.010
	[0.020]	[0.018]	[0.005]	[0.007]
Age squared/100	0.050	−0.020	−0.011	−0.019
	[0.036]	[0.032]	[0.010]	[0.013]
Real family income/10	0.036***	−0.022***	−0.009***	−0.004*
	[0.008]	[0.006]	[0.003]	[0.003]
Family income squared/10,000	−0.282***	0.180***	0.071**	0.032
	[0.074]	[0.059]	[0.029]	[0.025]
Family income top coded	0.030	−0.023	−0.002	−0.005
	[0.019]	[0.015]	[0.008]	[0.006]
Family income missing	0.074***	−0.051***	−0.013***	−0.009***
	[0.008]	[0.007]	[0.002]	[0.003]
Married	0.032***	−0.022**	−0.006	−0.004
	[0.010]	[0.009]	[0.004]	[0.003]

There are 3604 observations included in this analysis. Master's, professional, and doctorate students make up 7.2%, 1.8%, and 1% of the sample, respectively. Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

unemployment rate coefficient is slightly larger in magnitude for males, the coefficient is only significantly different from zero at the 10% level. This is likely due to the smaller sample size for males leading to a larger standard error for the unemployment rate coefficient estimate. Overall the results indicate that worsening of business cycle conditions leads to a substitution from full-time enrollment to part-time enrollment for both genders. Using the coefficient of −1.25 for females in the first column and evaluating the effect of a one standard deviation (1.9 percentage point) increase in the state unemployment rate translates to a 4.2% decrease in full-time enrollment for females relative to part-time enrollment (since the average full-time enrollment rate for females is 54.7%). The results in Table 4 seem to be strongly influenced by data from the recession of the late 2000s, however. When I estimate the models using only data from 1994 to 2007 the coefficient estimates on the unemployment rate remain negative, but the magnitude decreases by half for both males and females (results available upon request).

4.4. Degree program choice

I now turn to the analysis of the effects of business cycle fluctuations on master's, professional, and doctorate degree programs individually. Since master's degrees make up a little over 80% of graduate degrees awarded to women each year, it is very likely that the countercyclical nature of female graduate school enrollment is driven by master's degree students.[17] In this section I analyze the choice of graduate degree program type to examine whether the effect of labor market conditions on enrollment differs for master's, professional, and doctorate students.

Unfortunately the CPS only asked about the type of degree program a respondent was enrolled in during 1994 and this question was dropped from future waves of the survey. I therefore use the data from 1994 and rely on variation across states in order to identify the effect of business cycle fluctuations on enrollment. I am no longer able to use variation in the unemployment rate within a state over time. This may lead to biased results if states with high unemployment rates in 1994 happened to have high graduate enrollment in a specific degree program due to factors unrelated to business cycle fluctuations.

To check how much bias might be introduced by relying on cross-state variation in the unemployment rate to identify the coefficients, I reproduce the main graduate school enrollment specifications and omit the state fixed effects from the regressions. The results are reported in Table A2. The coefficient estimates in this table are similar to the main results coefficients in Table 2. This indicates that the bias introduced by using cross-state variation in unemployment rates is likely to be small, so the analysis of degree program choice using 1994 data should produce informative results despite the fact that it uses only one year of data. One might also be concerned that there is insufficient cross-state variation in the unemployment rate to identify the effect of labor market conditions on degree choice. However, the cross-state (population weighted) standard deviation of the unemployment rate in 1994 was 2.03 percentage points, which is comparable to the level

[17] See Table 279 of Snyder and Dillow (2011) for counts of graduate degrees awarded by degree type and gender.

Table 6
Multinomial probit of degree program choice: males.

	None	Master's	Professional	Doctorate
State unemployment rate	0.369	−0.477	0.077	0.030
	[0.497]	[0.409]	[0.174]	[0.089]
Black	−0.064*	0.077**	−0.007	−0.006
	[0.037]	[0.033]	[0.008]	[0.004]
Other race	−0.090***	0.053***	−0.003	0.039**
	[0.023]	[0.016]	[0.007]	[0.015]
Age	0.004	0.003	−0.015	0.008
	[0.025]	[0.020]	[0.010]	[0.008]
Age squared/100	0.012	−0.017	0.022	−0.016
	[0.044]	[0.036]	[0.018]	[0.014]
Real family income/10	0.043***	−0.024***	−0.010***	−0.008***
	[0.007]	[0.007]	[0.003]	[0.003]
Family income squared/10,000	−0.284***	0.179***	0.064**	0.041
	[0.061]	[0.062]	[0.028]	[0.025]
Family income missing	0.096***	−0.065***	−0.016***	−0.015***
	[0.009]	[0.007]	[0.004]	[0.003]
Family income top coded	0.014	−0.023	0.005	0.004
	[0.020]	[0.017]	[0.014]	[0.010]
Married	0.003	−0.003	−0.010**	0.009**
	[0.016]	[0.013]	[0.005]	[0.004]

There are 3224 observations included in this analysis. Master's, professional, and doctorate students make up 7.4%, 2.4%, and 2.0% of the sample, respectively. Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

of within state variation over time used to estimate the main models in the paper.

An additional potential concern with an analysis that uses data from 1994 is whether the sample size will be large enough to be informative when only one year of data is used. To determine the extent to which the small sample size is problematic for this analysis, I re-estimated the main models using data from 1994 only. The results are displayed in Table A3.[18] The coefficient on the unemployment rate for females is positive and somewhat larger in magnitude than the coefficient from the corresponding linear specification in Table 2. However, the large reduction in sample size increases the standard error of the coefficient estimate on the unemployment rate such that the estimate is not significantly different from zero. This indicates that inference from the analysis of degree program will be very limited as a result of the small number of observations. Due to the potential for bias in the coefficient estimates and the small sample size used in the analysis, caution should be used when interpreting the results displayed in this section.

To examine the impact of business conditions on degree program choice, I estimate a multinomial probit model where the possible outcomes are not enrolling in graduate school and enrolling in a master's, professional, or doctorate program. I again perform the analysis separately for men and women. The results are displayed in Tables 5 and 6. The results are presented as marginal effects with standard errors clustered at the state level.

The results for women are displayed in Table 5. Though the coefficient estimate on the unemployment rate for female master's degree students is not significantly different from zero, the magnitude is almost the same as the coefficient on the unemployment rate in Table A3. The coefficient estimates for female professional and doctorate students are both an order of magnitude smaller that the estimate for master's degree students. These results combined with the fact that female master's degree students make up the vast majority of female graduate students provide some suggestive evidence that the countercyclical nature of female graduate school enrollment is driven by master's degree students. For men, the estimates in Table 6 are consistent with the previous findings and indicate that not only does overall male enrollment in graduate school appear to be acyclical, but the same is true for each individual degree category. The inference from these results is limited by the small sample sizes, however.

Why might master's degree enrollment be countercyclical for females but acylical for males? Two of the three largest masters degree programs in the US by number of degrees awarded are in Education and in Health; women make up over 75% of the degree recipients in each of these fields.[19] It would be useful to look at master's degree

[18] As noted previously the non-linear relationship between the unemployment rate and graduate school enrollment is only present when data from the recession of the late 2000s is used. Therefore only the results from specifications linear in the unemployment rate are reported in this table.

[19] Of all masters degrees awarded in 2008 28% were in Education, 25% were in Business, and 9% were in Health. Women make up 45% of master's degree recipients in Business. See Aud et al. (2010) for details.

programs in Education and Health directly to see if they can explain the differences in the effects of business cycle fluctuations for men and women. This task will be left to future research.

5. Conclusion

In this paper I used a representative sample of the US population holding bachelor's degrees to assess how responsive the choice to enroll in graduate school is to business cycle fluctuations. I found that female graduate school enrollment is countercyclical but that male enrollment is acyclical. A one standard deviation increase in the unemployment rate is associated with a 4.3% increase in female graduate school enrollment. Data that include the recession of the late 2000s show that the overall relationship between labor market conditions and female graduate school enrollment is non-linear. I also found that poor labor market conditions cause a substitution from full-time enrollment to part-time enrollment for both males and females. There is some suggestive evidence that the countercyclical nature of female graduate school enrollment is driven by master's degree students.

Now that the magnitude of the overall effect of the business cycle on graduate school enrollment is known, future research should focus on the various mechanisms through which cyclical fluctuations can affect graduate enrollment. It would be useful to study in detail how business cycle fluctuations impact wage offers for bachelor's degree holders, employment opportunities once enrolled in graduate school, schooling costs, grant and stipend amounts, borrowing opportunities, and employer contributions toward graduate school tuition. It would also be useful to look directly at the master's degree programs in the Education and Health fields since these programs are responsible for a large fraction of the master's degrees awarded each year and enroll predominantly women. Studies in these areas would provide insight into the differences in responsiveness of male and female graduate school enrollment to the business cycle and would give economists a better understanding of how students make decisions about graduate school.

Appendix A. Robustness check results

This appendix contains the results of the robustness checks described in the text. See Tables A1–A3.

Table A1
Robustness check: graduate school enrollment probit with lagged unemployment.

	Females	Females	Males	Males
State unemployment rate	0.128	1.216***	0.182	0.474
	[0.139]	[0.391]	[0.185]	[0.459]
Unemployment rate squared		−5.858***		−1.643
		[2.062]		[2.304]
Lagged state unemployment rate	0.162	−0.280	−0.175	−0.566
	[0.146]	[0.393]	[0.142]	[0.526]
Lagged unemployment rate squared		2.761		2.352
		[2.037]		[2.992]
Black	0.034***	0.034***	0.003	0.003
	[0.006]	[0.006]	[0.006]	[0.006]
Other race	0.020**	0.020**	0.060***	0.060***
	[0.010]	[0.010]	[0.011]	[0.011]
Age	−0.036***	−0.036***	−0.035***	−0.035***
	[0.007]	[0.007]	[0.008]	[0.008]
Age squared/100	0.042***	0.041***	0.040***	0.040***
	[0.012]	[0.012]	[0.014]	[0.014]
Family income missing	−0.081***	−0.081***	−0.104***	−0.103***
	[0.004]	[0.004]	[0.005]	[0.005]
Real family income/10	−0.022***	−0.022***	−0.033***	−0.033***
	[0.002]	[0.002]	[0.002]	[0.002]
Family income squared/10,000	0.099***	0.099***	0.147***	0.146***
	[0.014]	[0.014]	[0.012]	[0.012]
Family income top coded	−0.003	−0.003	−0.001	−0.000
	[0.006]	[0.006]	[0.006]	[0.006]
Married	−0.037***	−0.037***	0.006	0.006
	[0.004]	[0.004]	[0.004]	[0.004]
Observations	64,959	64,959	52,709	52,709

Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. All regressions include state and year fixed effects. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

** $p < 0.05$.

*** $p < 0.01$.

Table A2
Robustness check: graduate school enrollment probit.

	Females	Females	Males	Males
State unemployment rate	0.366***	1.360***	0.080	0.235
	[0.107]	[0.350]	[0.133]	[0.443]
Unemployment rate squared		−5.685***		−0.895
		[1.767]		[2.368]
Black	0.030***	0.030***	0.004	0.004
	[0.006]	[0.006]	[0.007]	[0.007]
Other race	0.020**	0.020**	0.060***	0.060***
	[0.009]	[0.009]	[0.010]	[0.010]
Age	−0.036***	−0.036***	−0.036***	−0.036***
	[0.007]	[0.007]	[0.008]	[0.008]
Age squared/100	0.042***	0.042***	0.041***	0.041***
	[0.012]	[0.012]	[0.014]	[0.014]
Family income missing	−0.080***	−0.080***	−0.103***	−0.103***
	[0.004]	[0.004]	[0.006]	[0.005]
Real family income/10	−0.022***	−0.022***	−0.033***	−0.033***
	[0.002]	[0.002]	[0.002]	[0.002]
Family income squared/10,000	0.098***	0.098***	0.144***	0.144***
	[0.013]	[0.013]	[0.012]	[0.012]
Family income top coded	−0.002	−0.002	0.000	0.000
	[0.006]	[0.006]	[0.006]	[0.006]
Married	−0.039***	−0.039***	0.005	0.005
	[0.004]	[0.004]	[0.004]	[0.004]
Observations	64,959	64,959	52,709	52,709

State fixed effects are omitted from these models. Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. All regressions include year fixed effects. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

** $p < 0.05$.

*** $p < 0.01$.

Table A3
Robustness check: graduate school enrollment probit using 1994 data.

	Females	Males
State unemployment rate	0.415	−0.324
	[0.386]	[0.494]
Black	−0.025	0.062
	[0.020]	[0.039]
Other race	0.023	0.096***
	[0.016]	[0.025]
Age	0.017	−0.005
	[0.021]	[0.026]
Age squared/100	−0.047	−0.011
	[0.037]	[0.045]
Family income missing	−0.082***	−0.105***
	[0.008]	[0.009]
Real family income/10	−0.040***	−0.049***
	[0.009]	[0.007]
Family income squared/10,000	0.314***	0.329***
	[0.079]	[0.063]
Family income top coded	−0.032*	−0.021
	[0.020]	[0.020]
Married	−0.033***	0.000
	[0.010]	[0.017]
Observations	3604	3224

Standard errors appear in brackets below coefficients and are clustered at the state level. CPS person weights are used. Coefficients are marginal effects for continuous variables and average treatment effects for indicator variables. All effects are evaluated at the means of the other variables.

* $p < 0.10$.

*** $p < 0.01$.

References

Aud, S., Hussar, W., Planty, M., Snyder, T., Bianco, K., Fox, M., et al. (2010). *The condition of education 2010*. NCES 2010-028.

Bedard, K., & Herman, D. A. (2008). Who goes to graduate/professional school? The importance of economic fluctuations, undergraduate field, and ability. *Economics of Education Review, 27*, 197–210.

Berger, M. C., & Kostal, T. (2002). Financial resources, regulation, and enrollment in us public higher education. *Economics of Education Review, 21*, 101–110.

Betts, J. R., & McFarland, L. L. (1995). Safe port in a storm: The impact of labor market conditions on community college enrollments. *The Journal of Human Resources, 30*(4), 741–765.

Bogan, V. L., & Wu, D. (2012). *Race, business cycles, and investment in graduate education*. Ithaca, NY: Cornell University. (manuscript).

Burnsed, B. (2010, April). *Getting into graduate school made tougher by the recession*. U.S. News and World Report.

Card, D., & Lemieux, T. (1997). Dropout and enrollment trends in the postwar period: What went wrong in the 1970? In J. Gruber (Ed.), *Risky behavior among youths: An economic analysis* (pp. 439–482). Chicago: The University of Chicago Press.

Christian, M. S. (2007). Liquidity constraints and the cyclicality of college enrollment in the united states. *Oxford Economic Papers, 59*, 141–169.

Dellas, H., & Koubi, V. (2003). Business cycles and schooling. *European Journal of Political Economy, 19*, 843–859.

Dellas, H., & Sakellaris, P. (2003). On the cyclicality of schooling: Theory and evidence. *Oxford Economic Papers, 55*, 148–172.

Ethington, C. A., & Smart, J. C. (1986). Persistence to graduate education. *Research in Higher Education, 24*(3), 287–303.

Goh, W. (2009). *Is enrollment into graduate school affected by the business cycle?* Stanford, CA: Stanford University. (manuscript).

Gustman, A. L., & Steinmeier, T. L. (1981). The impact of wages and unemployment on youth enrollment and labor supply. *The Review of Economics and Statistics, 63*(4), 553–560.

Hazarika, G. (2002). The role of credit constraints in the cyclicality of college enrollments. *Education Economics, 10*(2), 133–143.

Humphreys, B. R. (2000). Do business cycles affect state appropriations to higher education? *Southern Economic Journal, 67*(2), 398–413.

Kahn, L. B. (2010). The long-term labor market consequences of graduating from college in a bad economy. *Labour Economics, 17*(2), 303–316.

Kane, T. J. (1994). College entry by blacks since 1970: The role of college costs, family background, and the returns to education. *Journal of Political Economy, 102*(5), 878–911.

Kienzl, G. S., Alfonso, M., & Melguizo, T. (2007). The effect of local labor market conditions in the 1990 on the likelihood of community college students' persistence and attainment. *Research in Higher Education, 48*(7), 751–774.

Koppel, N. (2009, March). Best defense? Seeking a haven in law school. *The Wall Street Journal,* D1.

Light, A. (1996). Hazard model estimate of the decision to reenroll in school. *Labour Economics, 2*(4), 381–406.

Mattila, J. P. (1982). Determinants of male school enrollments: A time-series analysis. *The Review of Economics and Statistics, 64*(2), 242–251.

Mullen, A. L., Goyette, K. A., & Soares, J. A. (2003). Who goes to graduate school? Social and academic correlates of educational continuation after college. *Sociology of Education, 76*(2), 143–169.

National Center for Science and Engineering Statistics. (2011). *Science and engineering degrees: 1966–2008*. Detailed Statistical Tables NSF 11-316.

Oreopoulos, P., von Wachter, T., & Heisz, A. (2012). The short- and long-term career effects of graduating in a recession. *American Economic Journal: Applied Economics, 4*(1), 1–29.

Oyer, P. (2006). Initial labor market conditions and long-term outcomes for economists. *Journal of Economic Perspectives, 20*(3), 143–160.

Pennington, K. L., McGinty, D., & Williams, M. R. (2002). Community college enrollment as a function of economic indicators. *Community College Journal of Research and Practice, 26*, 431–437.

Perna, L. W. (2004). Understanding the decision to enroll in graduate school: Sex and racial/ethnic group differences. *The Journal of Higher Education, 75*(5), 487–527.

Ruiz, R. R. (2010, January). Recession spurs interest in graduate, law schools. *The New York Times,* A18.

Snyder, T. D., & Dillow, S. A. (2011). *Digest of education statistics: 2010*. Washington, DC: US Department of Education Institute of Education Sciences National Center for Education Statistics.