

Economic Recession and Full-Time College Enrollment

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Abstract: Using macro data for the United States from 1970-2019, this paper develops a simple linear regression model and by using OLS methods, we conclude that the economic recession reduces full-time college enrollment by 14.1% and that the economic recession has a significantly higher impact on female than male. In this paper, we also replace the independent variable with the overall enrollment in tertiary education, and by the same method, we obtain the same conclusion that the economic recession reduces the enrollment in tertiary education by about 10.87%.

Keywords: Economic recession, Enrollment, OLS methods.

1. Introduction

The economic downturn has had a profound impact on both the supply and demand for higher education. According to Long (2014), the economic recession has caused many educational institutions to experience cuts in multiple sources of revenue, including charitable giving, endowment proceeds, and government grants, all of which may cause tuition to rise. In terms of demand for higher education, the economic downturn has affected household incomes and unemployment rates, and people may not be able to afford high tuition because of the decline in their incomes, so college admissions will decline in response to the economic recession. There is also a view that the economic recession has caused unemployment to rise and earnings from work to fall, which reduces the opportunity cost of college, so people will choose to attend college. This paper will use the National Center for Education Statistics (NCES), combined with data obtained from FRED on the recession, to explore whether the recession affects changes in college enrollments or enrollment rates. The results of this paper show that the economic recession reduces full-time college enrollment by 14.1%, and that the economic recession has a significantly higher impact on female than on male.

This paper proceeds as follows. In Section 2, we will summarize the literature that previously studied this issue. In Section 3, we provide the sources of the relevant data as well as a description of the data. In Section 4, we create a model using a simple OLS regression to analyze whether the economic recession affects the number of college students enrolled and their enrollment rates. In Section 5, the results are given. In Section 6, we provide the conclusions of this study. In Section 7, we point out the shortcomings of our study and future research plans.

2. Literature Review

As we mentioned earlier, economic crises can affect demand for higher education in two different ways, but much of the prior literature has generally concluded that economic crises boost student enrollment in higher education. Fry (2010) empirically analyzes data from the U.S. Department of Education and finds that enrollment in four-year colleges,

community colleges, and trade schools increases during economic recessions, and that these increases Long (2014) reaches the same conclusion, and his analysis shows that part-time enrollment increased and full-time enrollment decreased during the recession, and that the increase in enrollment was concentrated among people of color. However, Wright & Vásquez-Colina (2013) argue that from 1979 to 2009, higher education enrollment in the U.S. was not affected by the recession. Li & Bichsel (2019) analyze U.S. enrollment data from 2004 to 2018 and find that from 2009 to 2011, public school student enrollment rates have increased significantly, and changes in private school enrollment rates have remained relatively stable.

3. Data Description

The dependent variable in this paper is full-time college enrollment (Data is from NCES, available at https://nces.ed.gov/programs/digest/d20/tables/dt20_303.70.asp), and we also log the dependent variables in order to eliminate the effect of heteroskedasticity and to examine how the economic recession affects the rate of change in enrollment. The core independent variable is the economic recession, and Long (2004) analysis indicates that college enrollment tends to increase with unemployment rates, so this paper will also include unemployment as an independent variable. Another independent variable is the U.S. GDP (Unemployment rate and GDP both from FRED database). Considering that the dependent variable in much of the literature is enrollment rate, this paper also includes overall enrollment rate (Enrollment data from UNESCO at: <https://datatopics.worldbank.org/education/>) in higher education as another dependent variable. See Table 1 for specific information on these data.

In order to be able to observe more visually whether there is a causal relationship between the data, we made a scatter plot of the number of enrollments per year, where the vertical line indicates the year in which the main economic recession was experienced. By looking at this we can see that there is a significant drop in enrollment after the economic recession (or the year after it occurs), suggesting that there is some negative relationship between the economic recession and college enrollment.

Table 1. Variable Descriptions

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
economicrecession	48	.229	.425	0	1	Dummy variable, =1 if economic recession
total enrollment	48	14539312	2713724.1	7368644	18082427	The number of people enroll in colleges both as full-time and part-time students
fulltime total	48	8914926	1777626.5	5280064	11457040	The number of people enroll in colleges as full-time students
parttime total	48	5624323.1	978313.67	2088580	6712128	The number of people enroll in colleges as part-time students
fulltime female	48	4828385.9	1115341.6	2183693	6338065	The number of females enroll in colleges as full-time students
parttime female	48	3292500.5	618490.93	935249	3959689	The number of females enroll in colleges as part-time students
fulltime male	48	4086602.6	676008.42	3096371	5118975	The number of males enroll in colleges as full-time students
parttime male	48	2331843.4	367343.42	1153331	2752439	The number of males enroll in colleges as part-time students
unemploymentrates	48	4.671	2.564	0	8.6	Unemployment rates
gdp	48	9.01	6.754	0	21.433	U.S. GDP
ln fulltime total	48	15.982	.211	15.479	16.254	The log form of fulltime total
ln fulltime female	48	15.36	.258	14.597	15.662	The log form of fulltime female
ln fulltime male	48	15.209	.169	14.946	15.448	The log form of fulltime male
enrollment rate	37	76.715	12.566	47.323	96.322	Gross tertiary enrollment rate

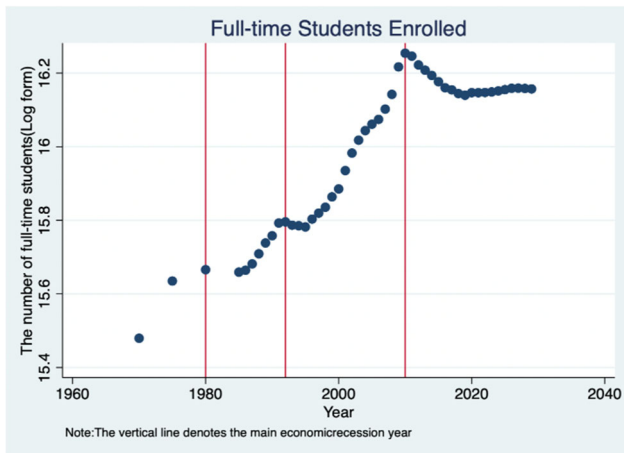


Figure 1. Trend in full-time college enrollment

4. Model Selection and Empirical Analysis

The data in this paper consider only the United States, so our model uses mainly OLS regression, and the expression of

the model is as follows.

$$Enrollment_t = \beta_0 + \beta_1 economicrecession_t + \beta_2 GDP_t + \beta_3 unemploymentrates_t$$

$Enrollment_t$ denotes full-time college enrollment in period t (we also consider the logarithm of full-time college enrollment and the college enrollment rate). $economicrecession_t$ is a dummy variable that equals 1 if there is an economic recession in period t and 0 otherwise. GDP_t and $unemploymentrates_t$ denote the GDP and unemployment rate in the United States in period t . In this paper, we want to investigate whether the economic recession affects the number of enrollments. Using the previous graph, we predict that the coefficient of β_1 is negative. Economic growth leads to higher income, so we predict that β_2 is positive. As mentioned earlier, Long (2004) argues that college enrollment tends to increase with unemployment rate, so we predict β_3 to be negative. In addition, we also predict that the economic recession affects males and females differently, so we also make a gender distinction in this paper.

5. Results

The results are shown in Table 2.

Table 2. Regression Results (the number of enrollment)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Fulltime total	Fulltime total	Fulltime total	Fulltime female	Fulltime female	Fulltime female	Fulltime male	Fulltime male	Fulltime male
EconomicRecession	-1116947.3* (594687.6)	151956.8 (249119.4)	30734.4 (196771.4)	-782997.9** (369557.0)	3236.2 (151909.4)	-61525.3 (129065.3)	-334030.4 (229437.1)	148720.6 (110594.8)	92259.7 (84331.2)
GDP		298048.0*** (19842.4)	297486.5*** (15547.0)		186536.7*** (12099.6)			111511.3*** (8808.9)	111249.7*** (6663.0)
UnemploymentRates			318532.5*** (65508.3)			170171.9*** (42967.8)			148360.6*** (28075.2)
Constant	9170893.1*** (284685.0)	5232806.2*** (269335.6)	3442070.9*** (424451.4)	5007822.9*** (176912.0)	2551050.4*** (164237.0)	1594373.2*** (278404.0)	4163151.2*** (109834.6)	2681755.8*** (119569.6)	1847697.7*** (181908.9)
Observations	48	39	39	48	39	39	48	39	39
R2	0.071	0.867	0.921	0.089	0.875	0.914	0.044	0.819	0.899
Adjusted R2	0.051	0.860	0.914	0.069	0.868	0.906	0.023	0.809	0.891

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Using the table above we find that the economic recession reduces college enrollment when GDP and unemployment are not included, and this coefficient is significant at the 10% level of significance. Columns (4) and (7) show that the

economic recession affects females significantly more than males. The sign of the coefficient on GDP is consistent with our prediction, but the sign of the coefficient on unemployment is in the opposite direction of our prediction.

Nevertheless, we found that the coefficients we obtained were too large, so we also did a logarithmic treatment in this paper to obtain the results in Table 3. We find that the results in Table 3 are not very different from those in Table 2, but the

coefficients are all much smaller, because by taking the logarithmic form, the meaning of the coefficients changes to the percentage effect of the economic recession on the number of enrollments.

Table 3. Regression results (log the number of enrollment)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln_fulltime_ total	ln_fulltime_ total	ln_fulltime_ total	ln_fulltime_f emale	ln_fulltime_f emale	ln_fulltime_f emale	ln_fulltime_ male	ln_fulltime_ male	ln_fulltime_ male
EconomicRece ssion	-0.141*	0.00999	-0.00227	-0.198**	-0.0215	-0.0334	-0.0838	0.0387	0.0259
	(0.0704)	(0.0283)	(0.0239)	(0.0846)	(0.0370)	(0.0344)	(0.0575)	(0.0262)	(0.0206)
GDP		0.0356***	0.0355***		0.0426***	0.0426***		0.0282***	0.0281***
		(0.00225)	(0.00189)		(0.00295)	(0.00271)		(0.00208)	(0.00163)
Unemployment Rates			0.0322***			0.0312***			0.0335***
			(0.00795)			(0.0114)			(0.00687)
Constant	16.01***	15.55***	15.36***	15.41***	14.85***	14.67***	15.23***	14.85***	14.67***
	(0.0337)	(0.0306)	(0.0515)	(0.0405)	(0.0400)	(0.0741)	(0.0275)	(0.0283)	(0.0445)
Observations	48	39	39	48	39	39	48	39	39
R2	0.080	0.879	0.918	0.107	0.863	0.887	0.044	0.838	0.904
Adjusted R2	0.060	0.872	0.910	0.087	0.855	0.877	0.023	0.829	0.895

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

In addition to this, this paper also includes enrollment rate, (The disadvantage of doing this is that we cannot observe the difference between males and females.) which has been used in many papers, as a dependent variable, and by doing the

same, we obtain the regression results in Table 4. The results in Table 4 also confirm our prediction that the economic recession reduces college enrollment.

Table 4. Regression Results (enrollment rate)

	(1)	(2)	(3)
	enrollment rate	enrollment rate	enrollment rate
EconomicRecession	-10.87**	-2.817	-2.801
	(4.345)	(2.426)	(1.985)
GDP		1.875***	1.958***
		(0.194)	(0.160)
UnemploymentRates			2.763***
			(0.655)
Constant	79.65***	57.06***	40.40***
	(2.259)	(2.622)	(4.494)
Observations	37	37	37
R2	0.152	0.773	0.853
Adjusted R2	0.127	0.760	0.839

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

6. Conclusion

In this paper, we have developed a simple OLS regression model using econometric methods to obtain our findings using U.S. data from 1970 to 2019. We argue that the presence of an economic recession reduces full-time college enrollment by 14.1%; or by 10.87% in gross enrollment rate.

7. Limitations and Future Research

This conclusion is different from previous literature (Fry, 2010; Long, 2014; Li & Bichsel 2019) and we believe that there are several main reasons for its existence. First, the model in this paper is too rudimentary and has the problem of omitted variables. Second, the data in this paper are macro-level data, and such data do not take into account the heterogeneity of individuals bringing about bias in individual choices. This is demonstrated by the fact that this paper focuses only on overall admissions, but there are disparities in enrollment by race. Fry (2010) found through his data that from 2007 to 2008, freshman enrollment at postsecondary institutions increased by 15% for Hispanics, 8% for Blacks, 6% for Asians, and 3% for Whites. In addition, our data are

for the entire United States, but there are differences in economic development as well as college admissions policies from state to state, and this difference likely influenced the results we wanted.

The plan for future research in this paper is that we can use individual-level data to differentiate between individuals of different races, as well as to analyze whether the economic recession affects college admissions using panel models, taking into account their state of residence.

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