

THE IMPACT OF LOCAL CONDITIONS ON THE RETENTION OF COLLEGE FRESHMAN ACROSS REGIONAL, PUBLIC UNIVERSITIES

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Abstract

As a result of decreases in support from the state governments, changes in the higher education market, and changes in student characteristics, four-year, public universities in the United States have turned to student enrollment management and in particular retention of Newly Entering Freshman (NEF) students to stabilize their budgets. Using panel data analysis, we attempt to explain variations in the retention of NEF across four-year, public universities; we find that, *ceteris paribus*, universities located in cities with better employment conditions have lower retention rates. By contrast, prior studies on retention across institutions had not included the impact of local economic conditions.

Key Words: Retention, Newly Entering Freshman, Local Economic Conditions, Public Universities

JEL Classification: I21, I23, I25

1. Introduction

As a consequence of the Great Recession, state governments across the United States reduced spending on higher education by approximately US\$2000 per student per year; all but four state governments decreased contributions to four-year universities by over 10%, while 37 states reduced support to four-year universities by over 20% (Michael Mitchell, Vincent Palacios, and Michael Leachman (2104)). While the Great Recession accelerated the decrease in state government support for higher education, since the mid-1980s, there has been a steady and significant reduction in the share of universities' revenues funded by state governments; according to a report prepared by the Department of the Treasury and the Department of Education (2012), the share of public universities' revenue funded by state governments decreased from 60% in the late 1980s to 40% by 2010 (Figure 11). This despite the well documented positive impact that universities have on their local economy, see for example J. Kagochi, M. Malki, and D. Summers (2015).¹

Faced with less support from state governments, regional, public universities have turned to tuition and to student enrollment management to stabilize their revenues. Indeed, the Department of the Treasury and the Department of Education (2012) estimate that the share of tuition as part of four-year universities' revenue has increased from 20% in the late 1980s to slightly over 40% in 2010 (Figure 11). With

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¹ Maria-Carmen Guisan (2005) shows that expenditures per student in higher education in 2002 was much higher in the US compared to European countries; we wonder how this has changed as a result of the decrease in support for higher education in the US.

this significant shift in the cost of attending public universities from the state to the student, there are some who wonder if obtaining a university degree is a worthwhile investment anymore.²

Decreased state governments support for regional, public universities is, however, not the only factor leading universities to focus on student enrollment management and the retention of Newly Entering Freshman (NEF) in particular. In addition, there have been important changes in the market for higher education and in students' characteristics. While we will not attempt to discuss all the changes in this market, we point out as an example, the efforts made by state-wide university systems focusing on increasing the ease of student transfer across member universities and also easing student transfers from community colleges to universities. As transfers become easier, students may enroll at a university to then transfer to another university; in the second case, the length of time a student spends at a university decreases. Both initiatives directly impact universities' budgets and their control over them. Some university systems that have made such efforts include the State University System of Florida, Connecticut State Colleges and Universities, the Minnesota Colleges and University System, and in a joint effort the California Community Colleges System and the California State University System.³

In addition, there is evidence that students' characteristics and expectations might be changing. For example, we note that in the U.S. the percent of high school students who took Advanced Placement courses that count towards college credit increased from 18.9% in 2003 to 33.2% in 2013; moreover, the percent of high school students who earned a grade high enough in their Advanced Placement courses to be accepted for credit at a college or university increased from 12.2% to 20.1% (The College Board (2014)). This, of course, has significant implications for the number of courses (credits) it takes a student to graduate from a college or university and on institutions' revenue expectations. And yet at the same time, according the National Center for Public Policy and Higher Education (2010), 30% of NEF students at four-year universities are not fully ready for college courses.

The result of the confluence of the factors cited above, and others, is that public universities are increasingly focusing on enrollment management and retention. Our focus on retention stems from its three-fold impact on a university. First, the revenues of a university are directly impacted by a student's tuition expenditures as they decide to return or not; secondly, state allocations based on student enrollment

² While this article argues that college is still worth the costs, it provides a flavor of those who argue against it: Krsitin Sturt, "Is College Worth it Anymore?", HuffPost Post 50, November 4, 2015 http://www.huffingtonpost.com/2014/11/04/college-cost-benefit_n_6057262.html provides a nice summary of some who argue college may not be worth the costs.

³ The transfer policies of these systems can be found at <http://californiacommunitycolleges.cccco.edu/Students/AssociateDegreeforTransfer.aspx>, <http://www.ct.edu/admission/transfers>, <http://www.flbog.edu/forstudents/ati/transfer.php>, http://www.mntransfer.org/transfer/mntc/t_mntc.php. These addresses were valid as of June, 2015.

impact the magnitude of tax dollars received by public universities; third, on the cost side, a university's inability to retain its students introduces direct costs to universities in the form of additional resources added for recruiting new students to replace departing students. It is not surprising then that a number of institutions have created task forces or committees to find ways of increasing their retention rates; examples of universities that have created task forces on student retention include Minnesota State University Moorhead (2011), San Jose State University (February 2010), North Carolina State University (May 2003), Wayne State University (2010), Sonoma State University (2009).⁴

While our research does not address the impact of all of these factors on retention, instead we focus on the opportunity cost of attending college because we believe this factor is of particular interest when consumers question the affordability, convenience, and expected return of higher education in their year-to-year enrollment decisions.

Some universities are located in economically thriving cities with many job opportunities for students while other universities instead are located in towns or cities with few job opportunities. The difference in economic environment, *ceteris paribus*, affects the choices made by university students. For example, the mix of hours per week students dedicate to work can alter the hours dedicated to study, the number of credit hours completed per semester, or the amount of loans obtained by students. In this paper, we focus on the impact of local economic conditions on the decision by students to return to the same university in their sophomore year.

We hypothesize that since the opportunity costs of remaining in higher education are higher in universities located in areas with more job opportunities than in those with fewer job opportunities for students, *ceteris paribus*, a lower percent of NEF would return for their sophomore year in economies characterized by low unemployment rates. We find evidence supporting the hypothesis that the percent of college freshmen retained for their sophomore year is lower in universities located in cities where the unemployment rate is lower, controlling for student and institutional characteristics.

Most papers reviewed in detail in Section II analyze factors that influence an individual student's decision to return to a university such as participation in learning communities, decision to live on-campus, access to financial aid, and others. However, we highlight two papers which identify factors affecting retention rates across institutions, but find no paper analyzing the impact of local economic conditions on retention rates. This paper is an attempt to begin filling that void.

⁴ Reports of some of these Task Forces can be found at http://www.sonoma.edu/aa/docs/ap/retention_report_draft_11-25_eyler.pdf, http://provost.wayne.edu/studentsuccess/pdf/retention_report_2011.pdf, http://www.sjsu.edu/provost/initiatives_accomplishments/graduation_initiative/SJSU_RetentGrad_March2011.pdf.

We introduce the empirical model associated with our approach and describe the data set used in our research in Section III. In Section IV, we present the results of our regression analyses. We conclude in Section V with a discussion of some of the shortcomings of this paper and opportunities for future research.

2. Review of Literature

We organize the literature in two main categories, studies that attempt to identify factors affecting the probability that a student may be retained, and papers attempting to analyze differences in retention rates across institutions. Our study falls in this second category.

We first briefly review the literature focusing on analyzing variables affecting the probability that students be retained. In this case, the units of observation are individual students at specific universities and they use probabilistic regressions in their analysis. Regarding the impact of financial factors on student retention, Larry D. Singell (2004), using data at the University of Oregon, finds that need-based and merit-based financial aid increase retention, while James N. Wetzel, Dennis O'Toole, and Steven Peterson (1999) find that while economic variables exhibit a significant impact on retention, a student's academic progress and integration to the institution play a more important role in his (her) persistence at Virginia Commonwealth University. So-Hyun Joo, Dorothy Durband, and John Grable (2008) find that financial stress has a negative impact on student retention.

Analyzing the impact of students' living arrangement, student participation in programs, and their instructors characteristics, Pedro de Araujo and James Murray (2010), using data for students at Indiana University-Purdue University-Indianapolis, find that students who live in university dorms are significantly more likely to be retained than those who live elsewhere; Julie L. Hotchkiss, Robert E. Moore, and Melinda Pitts (2006), controlling for self-selection, they find that at Georgia State University participating in Freshman Learning Communities increases the retention of African American men and women; and in a study at SUNY Binghamton, John Robst, Jack Keil, and Dean Russo (1998) find that the probability that women enrolled in science and mathematics courses are retained increases when a greater percentage of these classes are taught by women.

Audry Light and Wayne Staryer (2000) find that retention probabilities increase if there is a match between the student's ability and the college quality characteristics. Larry D. Singell and Glen R. Waddell (2010) use available personal, financial, and performance data to estimate a predicted retention probability that serves to flag at-risk students

We found two papers focusing on explaining differences in retention rates across institutions: Richard D. Marcus (1989) studies factors that affect retention rates across private colleges while Douglas A. Webber and Ronald G. Ehrenberg (2010) study factors that impact retention and graduation rates across a wider data set. Using data for 780 private colleges for the 1982-83 academic year, Marcus finds that private institutions requiring interviews with prospective students have higher retention rates, *ceteris paribus*. In addition, he finds a negative relationship between acceptance rates

and retention rates and a positive relationship between average SATs and college retention rates, *ceteris paribus*. In a broader sample of academic institutions including 1161 4-year private and public colleges and universities for academic years 2002-2003 to 2005-2006, Webber and Ehrenberg find that student service expenditures influence retention and graduation rates.

In addition to the sample of institutions and years studied, important differences exist between the work of Marcus and that of Webber and Ehrenberg. Marcus argues that while retention rates depend on the nature of students and the institution such as average SATs and acceptance rates, some of these variables are inherently endogenous. Consequently, he argues that retention rates should be modeled as a system of simultaneous equations:

$$(1) SAT_t = a_1 + a_2(X_t) + a_3(ACCPT_t) + a_4(ENROLL_t) + u_1$$

$$(2) ENROLL_t = b_1 + b_2(Y_t) + b_3(ACCPT_t) + b_4(SAT_t) + u_2$$

$$(3) RET_t = c_1 + c_2(Z_t) + c_3(ACCPT_t) + c_4(SAT_t) + c_5(ENROLL_t) + u_3$$

where X , Z , and Y are vectors of college characteristics

Thus, Marcus uses two- and three-stage least squares in his paper.

Webber and Ehrenberg, on the other hand, argue that graduation rates and retention rates can be viewed as a production function of institutional inputs, W , institutional characteristics, V , and student characteristics, Q ,

$$(4) GRAD_{it} = F(W_{it}, V_{it}, Q_{it})$$

where $GRAD_{it}$ are the graduation rates at school i of students who entered the institution full time $t-6$ years earlier and the independent variables are a moving average of the past six-years of some of the independent variables. The use of the six-year moving average allows Webber and Ehrenberg to “alleviate some but not all endogeneity concerns” (p. 950). Further, they note that there are no suitable instruments to test for endogeneity (footnote 11, p. 950) and thus estimate a pooled regression. They measure persistence (retention) rates in the same way. Neither paper accounts for the impact local economic conditions may have on students’ behavior and hence on retention. We attempt to fill that void.

Using the papers reviewed here, next we discuss the empirical model and data. Our focus is to identify sources of differences in aggregate retention rates across regional, public universities and test the impact local economic conditions may have on retention. In essence, we argue that the opportunity costs of continuing one’s education are higher in locations with more job opportunities, *ceteris paribus*, and hence retention rates would be lower.

3. Empirical Model and Data

Similar to Marcus (1989) and Webber and Ehrenberg (2010), we identify sources of differences in retention rates across institutions. However, we focus on regional, public universities instead of private colleges (Marcus) or all 4-year institutions (Webber and Ehrenberg). As discussed above, regional, public universities

have been particularly severely affected by a number of long-term trends as well as the short-run fiscal impact of the Great Recession which together have shifted the financial burden of higher education from the state to students enrolled at these institutions.

Since students returning to an institution in year t are those who entered in year $t-1$, their characteristics and the experiences that would lead them to decide whether to return to the university are those of year $t-1$. We propose that estimating RET_t on lagged variables is more theoretically appropriate and also argue that estimating retention in lagged variables should reduce concerns regarding endogeneity. Hence, the equation for retention is therefore revised as:

$$(3') RET_t = c_1 + c_2(Z_{t-1}) + c_3(ACCEPT_{t-1}) + c_4(SAT_{t-1}) + c_5(ENROLL_{t-1}) + u_3$$

We submit that differences in retention rates among colleges depend on institutional characteristics, student characteristics, *and* local job opportunities for students. An additional independent variable reflective of the opportunity cost of the decision to continue pursuing a college degree is thus included in our regression analyses to reflect our primary research objective. This section concludes with a discussion of how previous findings informed the research process and a description of data used in the regression analyses.

With regards to student characteristics, we expect that, *ceteris paribus*, as students' abilities (as proxied by average SATs) increase, retention rates would increase. Marcus found a positive relationship between college SATs and retention rates; also, Hotchkiss *et al* found a positive relationship between a student's SAT and college performance.

Students facing significant family responsibilities such as children and long-term relationships and/or work requirements may have more difficulty staying in college. Wentzel *et al*, for example, find that the probability of retention for married students compared to single students is significantly lower, *ceteris paribus*. Since non-traditional students (those over 25 years of age) are more likely to be married and may have additional work commitments, we expect a negative relationship between the percent of students older than 25 and retention rates.

According to "First in my Family", a report on first-generation college students by the Higher Education Research Institute, 38.2% of Latino students and 22.6% of African American students are first-generation, while only 13% of white students are first-generation college students. First-generation college students may have more difficulty adapting to the college environment, *ceteris paribus*, than other students. Since it is more likely that minority students are first-generation college students, we expect a negative relationship between the percent of minority students and their respective retention rates. Hotchkiss *et al* find a negative relationship between minority status and student performance as measured by GPA; on the other hand, Marcus and Wentzel *et al* detect no relationship between minority status and retention. Pell Grants are need-based and awarded to low-income students who may have more difficulty affording college or may face more pressure to seek employment while in college; hence, we expect a negative relationship between the percent of students receiving Pell grants and retention rates while controlling for other variables.

There is some empirical evidence that the retention and graduation rates of women are higher than men (Marcus and Light and Strayer, for example). Hence, we expect that institutions with a greater percent of women students would have higher retention rates, *ceteris paribus*.

In relation to institutional characteristics, we expect that, *ceteris paribus*, more selective universities are better able to match student abilities with the college's characteristics ensuring student success and an increase in the student body's institutional commitment; hence, a negative relationship between acceptance and retention rates is expected. Indeed, Marcus finds such a relationship. In addition, it is likely that institutions with higher instructional expenses per FTE can increase students' success and develop a sense of higher goal and institutional commitment, implying a positive relationship between this variable and retention rates. For the same reasons, we expect a negative relationship between the student-to-faculty ratio and retention rates.

We do not include a variable for the number of students at a university. Webber and Ehrenberg do not include it in their regressions; Marcus finds the variable not to be statistically significant. Further, it is unclear that the size of the university may impact retention: larger universities may have more majors and more programs that students could pursue, leading to increased retention rates; on the other hand, smaller universities may provide more personal attention to students.

The theory of human capital suggests that a person who estimates the benefits of attending college to outweigh its costs, will pursue a college education. Once enrolled at a university, a student would decide to continue at this institution if the expected additional costs are outweighed by the expected additional benefits; two significant costs that may affect the decision to re-enroll at the same institution are the explicit costs of tuition and the opportunity costs of time, namely working. To address the explicit costs, we include tuition levels. We attempt to capture the role of different job opportunities around a university on retention rates by including the unemployment rate of the city where the university is located and we expect that universities located in cities with low unemployment rates would have lower retention rates, *ceteris paribus*.

Since students returning to an institution in year t are those who entered in year $t-1$, their characteristics and the experiences that would lead them to decide whether to return to the university are those of year $t-1$. Accordingly, all independent variables are lagged by one year with the exception of tuition and unemployment. Regarding tuition, it is the expected tuition, not last year's tuition that affects a student's decision to return to the institution. Likewise, it is present not past job opportunities that affect the decision to return to continue studying. The expected signs are summarized in Table 1.

We obtain the data from College Results Online which is sponsored by The Education Trust (www.collegeresults.org); we also obtain data from the Bureau of Labor Statistics. In measuring retention rates, it is important to recognize that the national standard focuses on full-time, degree-seeking, first-time students who enroll at a university in the fall. Our dataset includes academic years 2005-2006 to 2010-2011.

Table 1. Summary of Expected Coefficients

Variable	Expected Sign
Average SAT _{t-1}	+
Percent Minority Students _{t-1}	?
Percent of Students Over 25 years _{t-1}	-
Percent Students Awarded a Pell Grant _{t-1}	-
Percent of Women Students _{t-1}	+
Acceptance Rates _{t-1}	-
Undergraduate Student per Faculty Ratio _{t-1}	-
Student Expenditures per FTA _{t-1}	+
Tuition _t	-
Unemployment _t	+

Different universities have different missions which, in turn, may affect freshman student retention. Some focus on research and graduate education while others see undergraduate education as their main mission; in an attempt to isolate universities with relatively similar missions, we focus on public universities with a master level Carnegie classification. We eliminated some universities for missing information across multiple years—some of the universities taken out of the sample did not have unemployment information, while others did not have some information regarding an explanatory variable such as average SAT. Because the Mississippi University for Women and Citadel Military College are so unique in the service demographic, we removed them from the sample. Troy University, which includes four campuses in Alabama, is not included in the sample due to a mismatch in data availability. Distinct local unemployment rates are available for each campus location; however, Troy University reports one collective value for its four institutions for university-specific variables. After eliminating these aforementioned institutions from the sample, 185 observations remain in the dataset for each academic year studied.

Table 2. Retention Rates Descriptive Statistics

	Returning Fall 2005	Returning Fall 2006	Returning Fall 2007	Returning Fall 2008	Returning Fall 2009	Returning Fall 2010
Average	73.2%	72.5%	72.6%	72.7%	73.7%	74.1%
Median	74%	73.0%	73.0%	73.0%	73.0%	73.0%
Standard Deviation	8.4%	8.1%	8.3%	8.2%	7.4%	7.8%
Maximum The College of New Jersey	95%	95%	95%	95%	95%	93%
Minimum	31% Prairie View A&M	53% Eastern NM University	44% Alaska Southeast	54% Eastern Oregon; Montana State- Billings; Alabama State U	53% Alabama State University	53% MS Valley State University

While it would be best to obtain the data for incoming freshman students specifically, the data for the relevant variables are for the university as a whole; for example, while it would be preferable to obtain the percent minority among freshman students, we obtain the percent minority students for the university. In doing this, we are assuming that university population is a reflection of freshmen students.

Descriptive statistics for retention rates are shown in Table 2. Over the sample years, the average retention rate fluctuates within a narrow range from a low of 72.5% to a high of 74.1%. Indeed, in all but one case, a difference of means test at the 5% level of significance cannot reject the hypothesis that the means are the same. The only statistically significant difference detected is between the retention average for Fall 2006 and Fall 2010. Retention rates of individual universities vary significantly as reflected by the large difference between the maximum and minimum retention rates of the universities studied and reported in Table 2.

4. Results

The main focus of the paper is to determine if local economic conditions could have an impact on a university's retention rate. We argue that where the unemployment rate is lower there are more job opportunities for students and the opportunity costs of returning to the university for their sophomore year increase. However, in this dataset some locations are small and even if the unemployment rate is very low, job opportunities would be few and far between compared to a larger city with the same unemployment rate. Thus, we include an interaction variable which measures unemployment in metropolitan statistical areas (MSA); this interaction variable is estimated by multiplying the unemployment rate times a dummy for MSA, where the dummy is equal to 1 if the location where a university is located is an MSA, 0 otherwise. The results of these distinct measurements of local unemployment conditions are included as separate regressions for the fixed and random effects regression models, respectively.

The comparison of fixed and random effects regression models is undertaken with caution. The use of random effects may not be appropriate since it is likely that university dummy variables could be correlated with some explanatory variables, see Wooldridge (2003), p.473. For example, a university's recruitment strategy and associated practices could result in dummy variables for each institution that may be highly correlated with the percent of minority students, percent of women students, percent of students over 25 years of age, or average SATs. Alternatively, some variables in this dataset may not vary much over time for a particular university. For instance, it is unlikely that the retention rate, average SAT, or percent minority variables change much for an institution, particularly in a four-year time span such as the length of this study. In this case, the use of fixed effects may not be best either, see Wooldridge (2003), p. 462. Recognizing the problems related to the use of fixed effects, Webber and Ehrenberg pooled the data over years and institutions in their regressions. Because of the problems associated with the different techniques, we run

random and fixed effects and also a pooled regression and focus on the robustness of the results.

Regression results are presented in Tables 3. The dependent variable is the natural logarithm of the odds ratio ($\log[1/(1-\text{Ret})]$), similar to Marcus (1989) and Webber and Ehrenberg (2010). The p -values are displayed in parentheses and were estimated using the heteroskedasticity and autocorrelation (HAC) robust standard errors. The results obtained using the fixed effects model are in Table 3 columns (1), (2), and (3); the results in column (1) are obtained using the unemployment rate as an independent variable, while column (2) includes the results using the unemployment and MSA interaction variable; column (3) includes neither. Columns (4), (5), and (6) present the results in similar order but estimated with a random effects model and Columns (7), (8), and (9) present the result for the pooled regression.

For all regressions incorporating a local unemployment rate variable (either unemployment rate or the unemployment rate*MSA interaction) as an independent variable, the coefficient for this variable is positive as anticipated by economic theory. Further, the unemployment rate variable is statistically significant at the 5% level in the fixed effects, and pooled regression regressions displayed in Table 3, Columns (1), (4), and (7) respectively. The interaction variable, unemployment rate in MSAs, is also statistically significant at the 5% level in all regressions, columns (2), (5), and (8). The correlation between unemployment and retention rates is robust to the use of fixed effects, random effects, or pooled regressions and in two different specifications of the unemployment rate, lending support to the main hypothesis of this paper that, *ceteris paribus*, local economic conditions affect a university's retention rate.

In both the fixed and random effects regressions, the coefficient for the unemployment and MSA interaction variable is larger than the coefficient for the unemployment variable alone, suggesting that the impact of low unemployment on retention is greater among universities located in larger cities or towns. This result however is not found in the pooled regression model.

We also run both the regressions without either unemployment variable and display these results in Table 3, columns (3), (6), and (9). When using the fixed effects model, the percent of students over 25 years of age and tuition variables become statistically significant in the absence of either unemployment variable. The tuition coefficient has the expected sign while we expected the opposite sign for the students over 25. In the random effects model, when neither unemployment variable is included, the percent of minority students and student-faculty ratio variables become statistically significant. In the pooled regression, the coefficient for the Pell grants is statistically not significant when adding the unemployment and MSA interaction variable.

Collectively, these results suggest that local economic conditions affect retention rates and that not including a variable to account for them may introduce omitted variable bias. The additional finding that unemployment rates have a larger impact on retention in larger cities for our data set suggests that the magnitude of the impact of local economic conditions may differ across different-sized locations. While we do not test

for this here, it is also possible that local economic conditions may affect retention differently among different types of universities as well.

Table 3: Regression results: Fixed Effects, Random Effects, and Pooled Regressions
Dependent Variable: Natural log of the odds ratio of retention rates; *p*-values in parentheses
estimated using HAC robust standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Fixed Effects	Fixed Effects	Fixed Effects	Random Effects	Random Effects	Random Effects	Pooled	Pooled	Pooled
% PELL	0.0060 (0.974)	0.0025 (0.989)	0.0028 (0.988)	-0.1745 (0.298)	-0.1618 (0.320)	-0.1219 (0.456)	-0.4652 (0.000)	-0.2727 (0.0079)	-0.3676 (0.029)
Average SAT	0.0002 (0.435)	0.0003 (0.434)	0.0002 (0.513)	0.0017 (0.000)	0.0016 (0.000)	0.0017 (0.000)	0.0030 (0.000)	0.0028 (0.000)	0.0030 (0.000)
% Women	0.6940 (0.433)	0.6150 (0.482)	0.4720 (0.586)	0.0884 (0.806)	0.0122 (0.972)	0.0070 (0.984)	0.2249 (0.190)	0.0090 (0.959)	0.1751 (0.303)
% Minority	-0.0305 (0.967)	-0.0525 (0.943)	0.1364 (0.855)	0.2586 (0.113)	-0.1931 (0.228)	0.02843 (0.087)	0.4588 (0.000)	0.2851 (0.004)	0.4592 (0.000)
% Over 25	-0.7128 (0.157)	-0.6521 (0.188)	-0.9081 (0.061)	-1.3023 (0.000)	-1.3079 (0.000)	-1.3216 (0.000)	-1.0919 (0.000)	-1.2101 (0.000)	-1.0034 (0.000)
% Acceptance Rate	-0.0062 (0.941)	-0.0138 (0.868)	-0.0101 (0.894)	0.1834 (0.040)	-0.1948 (0.029)	-0.1825 (0.039)	-0.5778 (0.000)	-0.6050 (0.000)	-0.6200 (0.000)
Expenditures on Students	1.34e- 06 (0.786)	1.36e- 06 (0.787)	2.27e- 06 (0.661)	3.27e- 06 (0.399)	2.99e- 06 (0.447)	3.57e- 06 (0.397)	0.00001 (0.000)	0.00001 (0.000)	0.0001 (0.000)
Student to Faculty Ratio	-0.0043 (0.039)	- 0.00438 (0.038)	-0.0053 (0.010)	-0.0017 (0.393)	-0.0019 (0.340)	-0.0028 (0.0067)	0.0144 (0.000)	0.0121 (0.000)	0.0144 (0.000)
Tuition	0.00002 (0.178)	0.00002 (0.122)	0.00004 (0.022)	0.00001 (0.328)	8.79e- 06 (0.414)	0.00002 (0.16)	-5.38e- 06 (0.539)	-3.97e- 06 (0.643)	4.16e- 06 (0.623)
Unemployment (UR)	0.6300 (0.044)	-	-	0.8432 (0.004)	-	-	2.2978 (.000)	-	
UR*MSA	-	0.7963 (0.029)	-	-	1.3236 (0.000)	-	-	-2.1970 (0.000)	-
Constant	0.5209 (0.79)	0.5576 (0.392)	0.6522 (0.319)	-0.4427 (0.376)	-0.2917 (0.568)	-0.3567 (0.248)	-2.1057 (0.000)	-1.5792 (0.000)	-2.0014 (0.0000)

The coefficient for the percent of women students is not statistically significant in any of the estimated regressions. This result is different from Marcus who found that in private colleges the greater percent of women students, the greater the persistence rate; Webber and Ehrenberg report that the greater percent of men, the lower graduation rates.⁵

Lastly, with the exception of the fixed effects regression with no local economic variables included, the tuition coefficient is not statistically significant in any

⁵ While Webber and Ehrenberg estimate regressions for retention rates, they do not report the coefficient for the percent of women.

of the regressions. These results indicate that students seem to transfer for reasons other than tuition and also suggest that tuition increases can be an effective tool for university administrators to increase revenue in the face of decreased state subsidies.

5. Concluding remarks

Faced with steep decreases in state support during the Great Recession, which followed a steady two decades decrease in state support, and also facing changes in the student body and more competition for students, regional, public universities' ability to retain students from the freshman to sophomore year and beyond is crucial for their budget stability. Under these circumstances, many universities have started programs such as Learning Communities and First-Year experience in an attempt to increase retention with different degrees of success. Our research involving this group of institutions suggests that economic conditions in the community surrounding the university may also affect retention rates.

Results of fixed effects, random effects, and pooled regressions support the hypothesis that economic conditions in the area where a university is located (based on alternative measures of the local unemployment rate) affects the university's retention rate. Specifically, when the opportunity costs of studying increase, retention rates decrease. The relationship between the opportunity costs of attending a university and its retention rates has not been studied previously and this paper helps fill that void. In addition, we find no evidence that that tuition affects retention.

While our results are robust to the use of fixed effects, random effects, and pooled regressions and to the use of two related unemployment variables, there are some potential shortcomings. First, while the use of lagged variables should ameliorate endogeneity concerns, it is still possible that because of the time stability of the variable included here, endogeneity may remain an issue. Second, the sample period includes some years of the Great Recession which would significantly impact the variation of unemployment across years and thus affect the results. Future research should take these potential shortcomings into account.

If these initial results are supported by additional research, this may suggest that universities in economically vibrant locations may need to integrate students within the local labor market earlier in their academic experience. Universities may partner with local businesses to introduce mentors, observational experiences, and/or internships in which first-year students gain first-hand knowledge or financial reinforcement of the decision to persist on their chosen academic path.

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