

The Economic Determinants of In-State Undergraduate Enrollment for Public Universities within the United States

I. INTRODUCTION

In 1910, only 2.7 percent of the United States population had attained 4 or more years of college education¹. In 2015, that number had increased to over 32 percent for those 25 years and older². The value of a Bachelor's degree has also become quite obvious throughout the last century. According to the Bureau of Labor Statistics, the median usual weekly earnings for those with a Bachelor's degree amounts to 1,156 dollars, while those with only a high school degree expect to earn a median weekly earning of only 692 dollars.

Even with the apparent advantage of attaining a Bachelor's degree, two-thirds of the American population still do not attend any 4-year university. Obtaining a Bachelor's degree is a huge financial undertaking, \$38,500 on average according to CollegeBoard, and there are many other determinants that go into the decision of enrolling in an institution.

This paper will attempt to determine the economic factors within a state that contribute to the enrollment of in-state undergraduates at public universities in the United States. Data regarding the total amount of undergraduates within a state for the years 2011 through 2015 will be utilized in order to analyze the effects of a number of economic variables to determine those significant factors.

¹ Census Bureau, Section 31- 20th Century Statistics

² Census Bureau, Educational attainment in the United States: 2015

II. SAMPLE

The sample used for this study includes the total amount of undergraduates within each state. Each variable has data from the years 2011-2016 for a total of 300 observations.

III. DEPENDENT VARIABLE

Total In-state Undergraduate Enrollment

The dependent variable being analyzed within this paper is the total number of in-state undergraduates per 1,000 population. The number of in-state undergraduates is obtained through the Term Enrollment Estimate report done by the National Student Clearinghouse Research Center and for each year, the fall report numbers were analyzed. Each value is then divided by the state's population (obtained through the Census) and multiplied by 1,000 to reach the desired dependent variable. It has been decided to use in-state undergraduate enrollment per 1,000 population in order to control for the issues that would arise when comparing well-populated states (e.g. California) to less-populated states (e.g. Alaska). Without doing so, well-populated states would receive an automatic bias.

IV. INDEPENDENT VARIABLES

Average In-State Tuition Price for the State

In-state tuition measures the amount an undergraduate would have to pay for a full academic year at the institution, so long that they meet the in-state requirements. These requirements vary per state, but typically include a durational residency requirement and the intent to remain domicile. The intent to remain domicile simply implies that an individual is willing to treat the

United States as their permanent home. These data were obtained through a report done by CollegeBoard³.

Following economic theory, as the price of a good rises, it is expected that the quantity demanded would decrease. If in-state tuition is treated as the price of attending an undergraduate institution it is expected that as this value rises, fewer individuals would attend the university. This suggests a negative coefficient against the independent variable.

Economic Outlook of the State

The economic outlook of a state greatly influences the factors used in considering enrollment in an institution. Income, opportunity costs, confidence, etc. are directly affected by the state of the economy.

In economic research today, there are copious indicators for economic outlook, this paper will examine the state unemployment rate.

State Unemployment Rate

Unemployment is defined as the percentage of individuals in the labor force (those over the age of 16 that are willing and able to work) that are not employed, yet seeking employment. The data for this independent variable was obtained from the Bureau of Labor Statistics and used on a state level.

Intuitively, it makes sense that as the state unemployment rate rises, undergraduate enrollment will increase as individuals seek opportunities to increase their human capital to become more attractive in the labor market. A study to support this claim was done by Gehring(2013)⁴.

³ *Tuition and Fees by Sector and State over Time*- CollegeBoard(2017)

⁴ *Using Unemployment Rates to Predict Post-Secondary Enrollment*- Gehring(2013)

The goal of this study was to use the unemployment rate to predict postsecondary enrollment in the state of Minnesota. Gehring(2013) measured the linear relationship between unemployment and new enrollment to be 0.462, but not significant at the 10 percent level. This occurs because the only variable that Gehring(2013) used to account for new enrollment was the unemployment rate. This paper will be accounting for the other intervening variables for undergraduate enrollment; therefore, it is suitable to expand the results of Gehring(2013) to all states in order to hypothesize that the coefficient on state unemployment rate will be positive.

On the other hand, when unemployment rate is high, individuals face a greater opportunity cost to attend an institution, as they are taking the risk of exiting the labor force instead of searching for a new job. Similarly, financial pressures (along with several other factors) may not allow an individual to return to school. Combined, this reasoning suggests a negative coefficient against state unemployment rate.

This paper will not assume one effect outweighs another and instead will place unknown prediction onto this variable. State unemployment rate will be used a proxy for economic outlook in the second model of the regression. The data for this variable was obtained through the RI Department of Labor and Training.

Percentage of Population aged 18-24

According to the National Center of Education, in 2015 those aged 18-24 accounted for 40.5 percent of undergraduate enrollment⁵. This number has only increased from previous years. In the year 2000, those aged 18-24 made up only 35.5 percent of the undergraduate population. This suggests that those aged 18-24 are increasingly dominating the population of undergraduate

⁵ *Back to school statistics*- National Center of Education (2017)

institutions; thus, the percentage of the population for each state that fall within this age range will have an effect on the number of in-state undergraduates. For each state, the percentage of the population that falls within the age range of 18-24 was gathered from the U.S. Census.

As this group becomes more prominent, it reasonable to hypothesize that the number of in-state undergraduates will follow suit. Therefore, there is an expected positive coefficient for this variable.

Pre-paid Tuition Plans and Hope-Type Scholarships

The financial undertaking required to complete a Bachelor's degree has not gone unnoticed. To date, there are several states that provide pre-paid tuition plans⁶ that allow for families to save sufficient funds for their children to attend college at lower rates. Pre-paid plans allow for parents to purchase tuition credits that will cover their child's future costs. This essentially locks in current tuition prices, while saving a family from any price hikes that could occur in the years prior to a child's entrance into an institution.

Furthermore, there are currently 8 states that provide a hope-type scholarship funded by the state lottery⁷. These scholarships give automatic disbursements to students, so long as they meet the academic requirements and attend an in-state institution. This paper will instill a dummy variable for the existence of either a pre-paid tuition plan or hope-type scholarship.

Students that receive such scholarships or are in accordance with a pre-paid tuition plan reduce their price of attendance dramatically. As previously noted within this paper, as the price of good falls, the quantity demanded of that good is expected to increase. Therefore, it is

⁶ *Prepaid Tuition Plans- Listed by State*- Edvisors

⁷ *A Comparison of States' Lottery Scholarship Programs*- Tennessee Higher Education Commission

expected that there is a positive coefficient for the relationship between the existence of such programs and in-state undergraduate enrollment.

Parental Education

One factor that has become increasingly important in determining undergraduate enrollment is parental education. Even though, according to Smoke (2014)⁸, the exact reasoning behind the relationship between highly educated parents and highly educated children cannot be interpreted (due to the differences between highly- and low-educated parents) the positive correlation between higher educated parents and higher educated children cannot be denied. This may be due either because children with higher educated parents tend to be placed in schools that exhibit higher academic demands or because of the increased expectations of children to attend and graduate from college since they are surrounded by a family that has done so in the past. The incomes of families with college educated parents may also influence a child's ability to attend an institution. Those who have graduated with a Bachelor's degree typically have higher incomes than those who have not. Simply put, with a higher income individuals are more able to afford secondary education for their children, increasing their child's opportunity to attend a university.

Despite the apparent connection between parental education and undergraduate enrollment, there is no data at this time to control for this variable. Data is available on a national level for the year 2012, but this paper is analyzing the economic determinants on a state-level with much of its data obtained from the years 2011 through 2015. Unfortunately, with no data availability, it is likely that the results derived from this paper will be biased.

⁸ *The Effect of Parent's Education on the Educational Aspirations of College Students*- Smoke (2014)

V. RESULTS

Descriptive Statistics of Data

<i>Total In-State Undergraduate Enrollment per 1,000</i>		<i>Average In-State Tuition Price</i>		<i>State Unemployment Rate</i>	
Mean	43.16	Mean	9236.45	Mean	6.33
Standard Deviation	20.95	Standard Deviation	2154.79	Standard Deviation	1.92
Minimum	5.19	Minimum	2003.86	Minimum	2.7
Maximum	78.61	Maximum	15969.56	Maximum	13
Observations	300	Observations	300	Observations	300
<i>Dummy for either pre-paid option or automatic scholarship</i>		<i>Percentage of those aged 18-24</i>			
Mean	0.44	Mean	9.48		
Standard Deviation	0.50	Standard Deviation	0.97		
Minimum	0	Minimum	5.21		
Maximum	1	Maximum	12.19		
Observations	300	Observations	300		

Regression with all variables

Model:

In-State Undergraduate Enrollment = $\beta_0 + \beta_1(\text{Average In-State Tuition}) + \beta_2(\text{Prepaid Option or Hope Type Scholarship}) + \beta_3(\text{Percentage of those aged 18-24}) + \beta_4(\text{State Unemployment Rate}) + \text{Error}$

Excel Regression Output

<i>Regression Statistics</i>	
Multiple R	0.3993
R Square	0.1594
Adjusted R Square	0.1480
Standard Error	19.34
Observations	300

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	20924.19	5231.05	13.99	1.84E-10
Residual	295	110326.80	373.99		
Total	299	131250.98			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	90.60	12.14	7.46	0.00	66.70	114.49
Average In-State Tuition Price	-0.0012	0.0004	-2.681	0.0078	-0.0021	-0.0003
Dummy for either pre-paid option or automatic scholarship	12.48	2.27	5.49	8.65E-08	8.01	16.96
Percentage of those aged 18-24	-3.798	1.173	-3.239	0.001	-6.105	-1.490
State Unemployment Rate	-0.931	0.586	-1.588	0.113	-2.085	0.223

Variable	Coefficients	P-value
In-State Tuition	-0.0012	0.0078
State Unemployment Rate	-0.931	0.113
Dummy for either pre-paid option or automatic scholarship	12.48	8.65E-08
Percentage of those aged 18-24	-3.798	0.001

Interpretation of the Results-

With an adjusted R squared value of .1480, the data the proposed model captures approximately 14.80% of the variance within the dependent variable.

In-State Tuition

Congruent with the hypothesis, there is a negative coefficient placed on this variable. The coefficient value of -0.0012 is next to zero but this is not outlandish since a one dollar increase in tuition is not expected to drastically change in-state undergraduate enrollment. This variable is deemed statistically significant. With a p-value of 0.0078 ($0.0078 < .01$), this coefficient value is significant to the 99th percentile. The upper and lower 95% intervals are also negative, supporting the claim that this variable is negative.

Pre-paid tuition or Hope-Type Scholarship

Congruent with the hypothesis, there is a positive coefficient placed on this variable. The coefficient value of 12.28 suggests that the existence of a pre-paid tuition plan or hope-type scholarship leads to a 12.28 increase in total undergraduate enrollment per 1,000 population. The p-value associated with these results is also statistically significant ($8.65E-08 < .01$), implying that these findings are significant to the 99th percentile. Also, the direction of this variable is supported by the fact that both the upper and lower 95% intervals are positive values.

Percentage of those aged 18-24

Contrary to the hypothesis, there is a negative coefficient placed on this variable. The coefficient value of -3.798 suggests that with a one percentage increase of a state's population within the ages of 18-24 there is a decrease in the in-state undergraduate enrollment by 3.789 per 1,000 population. The p-value associated with this variable is 0.001, implying these results are significant beyond the 99th percentile ($.001 < .01$). The upper and lower bounds of this variable also bolster the idea that the direction of this variable is indeed negative. The exact reasoning behind this finding is unclear and requires further attention.

State Unemployment Rate

This variable did not have an assigned hypothesis, since there are strong arguments for both sides and with these results, the true direction of this variable still remains a mystery. A coefficient value of -0.931, suggests that there is a negative relationship, but with a p-value of 0.113 (> 0.05), these results are deemed statistically insignificant and likely due to chance. Secondly, the lower and upper 95% interval for this variable switches from a negative value to a positive value, making the true direction unclear.

VI. CONCLUSION

The proposed model reported an adjusted R squared of 0.1480. This implies that 14.80% of the variance in the dependent variable can be explained through the model. Despite a low percentage of the variance being captured, there are three statistically significant variables: average in-state tuition, the existence of a pre-paid tuition option or hope-type scholarship, and percentage of those aged 18-24.

While this paper was able to identify statistically significant factors in in-state undergraduate enrollment, the low adjusted R squared valued suggests that there are many other factors that affect in-state undergraduate enrollment. Along with parental education, (as discussed as an omitted independent variable) some other variables to be considered include: geographical location of the top schools, ranking of the schools within the state nationally, sports team performances and job placement percentages. This in conjunction with the reasoning behind the contradictory coefficient placed on percentage of those aged 18-24, provides ample room for improvement for this paper. With a lack of data availability in combination with a short time constraint, none of these items can be considered. On a positive note, these omitted items do give insights into possible opportunities for future research.

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