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Tuition Toss Up: An Economic Analysis of Public and Private University Tuition and Fees

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Abstract

In a society where post-secondary education is a near necessity, examining the true cost of university is an important factor to consider when determining the benefits of higher education. While the long run career benefits of a bachelor's degree are undeniable, the exponential rise in university tuition is a concern for many. This paper examines public and private universities ranked in U.S. News and World Report's *Best Colleges Ranking: National Universities Ranking* and analyzes their fiscal and academic differences. Using economic analysis, the following attempts to determine if public or private universities are a better overall investment when considering the top universities in the United States.

I. Introduction

The economics of post-secondary education is a popular area of study in recent years, as advanced degrees have become a near necessary component of long run career success. This increase in value has been met with an exponential rise in cost, causing the rise in university tuition to outpace inflation over the past decade (Clark, 2015). As a result, millions of students and families sacrifice short-term utility in exchange for long-run financial security.

While earning a post-secondary degree is a sizeable investment, the costs are rarely analyzed from an economic standpoint. Frequently, students rely on "brand recognition" to choose a university, rather than exploring its true cost or value. With this in mind, preforming a detailed cost-benefit analysis of post-secondary education options will assist prospective students in maximizing their investment. Students will be able to weigh the intangible benefits of a university against the economically relevant factors in order to make an informed decision that maximizes overall utility.

Previous research is largely focused on the costs and benefits of a college education. This research is conducted at a more general level, aiming to determine the economic value of any post-secondary degree. In contrast, this study aims to determine the difference between a top-tier public and top-tier private college education. Rather than an all-encompassing analysis, the most selective public and private universities will be observed in order to determine the trade-off of enrolling in a top public or top private university in the United States.

The outline of the paper is as follows. Section two will touch on previous research conducted on university costs and benefits. Section three will examine the data, including any relevant descriptive statistics. Section four will offer the economic analysis and overall results. Finally, section five will provide concluding remarks and suggestions for future research.

II. Literature Review

As stated previously, past research on university costs is largely focused on the general benefit of gaining a post-secondary degree. While these studies do not exactly relate to the research that follows, they do offer some insight into useful characteristics of university data and potential concepts to consider during the analysis.

Ehrenberg (2007) examines the cost of post-secondary education by summarizing data on undergraduate tuition and fees at various public and private institutions. This research focuses on the average tuition individuals effectively pay based on the likelihood of financial aid and grants, as well as the contributing factors to the exponential increase in the cost of post-secondary education in the United States. In addition, Ehrenberg identifies the U.S. News and World Report's *Best Colleges Ranking* as the gold standard in rankings. Utilizing empirical research, he confirms that when an institution improves its U.S. News and World Report ranking the university is able to attract more applicants and increase it overall selectivity. As a result, the research to follow will utilize this ranking system in order to provide the most widely accepted sample of top universities in the United States.

Abel and Deitz (2014) look at the importance of college in modern society in order to determine if the increase in earning power associated with a post-secondary degree outweighs the rising costs of university. Utilizing cross-sectional microdata on individual workers and a fixed composition linear regression approach, they find that the benefits of a college degree still outweigh the short-term cost. According to Abel and Deitz, this benefit is largely due to the declining fortune of those without a college degree, which in effect causes the earnings gap between those with a post-secondary degree and those without to exceed the recent rise in college tuition.

Dale and Krueger (2002 and 2011) offer the most applicable research in relation to this study as they analyze the perceived benefits of elite universities in the United States. These studies are of particular importance as they focus solely on the most selective universities in the country, which is the subset of post-secondary education this analysis aims to target. Using data from the National Longitudinal Study of the High School Class of 1972 (Dale and Krueger, 2002) and cohorts of the 1976 and 1989 College and Beyond Survey (Dale and Krueger, 2011) the two estimate regression models that determine the return of college selectivity during a student's prime working years. Interestingly, they find that college selectivity has little impact on future career earnings when controlling for unobserved student characteristics. These results are subject to exceptions from a few notable subgroups, including low-income families, blacks and Hispanics who likely immensely benefit from the networking opportunities made available at the most selective universities. In other words, attending an elite university does not affect an individual's career earning power (exceptions aside), rather the characteristics that granted them access to that university is the driver of the increase in earnings. As a result, the research to follow must consider these findings in the overall cost-benefit analysis of elite public and private universities in the United States.

III. Empirical Methodology

The study is based on data from the 2016-2017 U.S. News and World Report's *Best Colleges Ranking: National Universities Ranking* as it is the most widely accepted and respected post-secondary ranking system established. The data is comprised of the top fifty public universities and top fifty private universities located in the United States. Each subset contains measures taken directly from the ranking overview, as well as earnings and graduation rate

statistics retrieved from the *United States Department of Education College Scorecard*. The data collected for analysis is as follows:

Ranking: The associated ranking for each observation in the 2016-2017 U.S. News and World Report's *Best Colleges Ranking: National Universities Ranking*. Rankings are ordered by subset, meaning public and private universities are ranked one through fifty respectively.

Tuition: The tuition and fees (in dollars) associated with each university for the 2016-2017 academic year. For public institutions, in-state tuition and fees are recorded.

Out-of-State Tuition: The out-of-state tuition and fees (in dollars) associated with each university for the 2016-2017 academic year. For private institutions, this is simply the listed tuition and fees for the 2016-2017 academic year as private universities do not offer different tuition rates based on residence.

Room and Board: The cost of room and board (in dollars) associated with each university for the 2016-2017 academic year.

Enrollment: The number of students attending each university for the 2016-2017 academic year.

Student-Faculty Ratio: The number of students per faculty member for each university during the 2016-2017 academic year.

Four-Year Graduation Rate: The percent of students who graduate from each university within four years as of the 2016-2017 academic year.

Graduation Rate: The percent of students who graduate from each university within one-hundred and fifty percent of the expected time to completion (typically six years for schools that award predominantly four-year degrees) as of the 2016-2017 academic year.

Financial Aid: The percent of full-time undergraduates who receive some kind of need-based financial aid (excluding student loans or other repayable aid) for each university during the 2016-2017 academic year.

Scholarship: The average need-based scholarship or grant award (in dollars) for full-time undergraduates who receive an award for each university during the 2016-2017 academic year. Scholarship or grant awards include any need or merit based awards that do not have to be repaid during or after attending the university.

Debt: The average total indebtedness for members of the 2015 graduating class at each university.

Salary: The median salary (in dollars) of former students who received federal financial aid of each university at ten years after entering the school.

Table One displays the descriptive statistics of the variables pertinent to the analysis. When examining the variables, one finds that average in-state tuition and fees for the universities in the data is $30,185.19 with a range that stretches from $5,300 to $55,056 per academic year, while the average out-of-state tuition and fees for universities in the data is $40,255.52 per academic year. Additionally, the average room and board for a university in the data is $12,848.84 with a range that stretches from $7,448 to $17,578 per academic year. Enrollment at these universities ranges from 1,001 to 48,960 students with student-faculty ratios as low as three students per faculty member and as high as twenty-five students per faculty member. The average four-year graduation rate of universities in the data is 69%, while the average overall graduation rate is 84%. Approximately 47% of students at these nationally ranked universities receive financial aid with the average award equaling roughly $22,458 per academic year. Finally, the average median salary of a former student ten years after enrolling at a university in

the data is approximately $59,100 per year, while the average debt per individual is roughly $26,500.

Table One: Descriptive Statistics Table (Top Public & Private University Data)				
Variable	Mean	Standard Deviation	Minimum	Maximum
Ranking	24.86	14.39	1.00	50.00
Tuition	30185.19	18594.62	5300.00	55056.00
Out-of State Tuition	40255.52	10029.04	5300.00	55056.00
Room and Board	12848.84	2154.97	7448.00	17578.00
Enrollment	16554.14	11629.69	1001.00	48960.00
Student-Faculty Ratio	13.44	4.91	3.00	25.00
Four-Year Graduation Rate	68.68	14.47	31.00	91.00
Graduation Rate	83.55	8.07	66.00	97.00
Financial Aid	47.10	8.75	19.00	66.00
Scholarship	22457.80	13623.71	4494.00	48533.00
Debt	26527.60	6213.91	8577.00	48244.00
Salary	59076.00	12184.35	41700.00	95500.00
Number of Observations: 100				

IV. Empirical Results

The following presents the empirical results of the top public and private university data subsets, and analyzes their economic impact via a cost-benefit comparison. The empirical results begin with a cost analysis, considering differences in in-state and out-of-state tuition. After the cost analysis, the academic quality of each university type is examined, followed by a post-graduation benefit analysis. Lastly, the limitations of the analysis are detailed and measured in order to formulate an overall conclusion.

A. In-State Cost Analysis

In order to effectively compare the costs of elite public and private universities, several cost measures were examined at various points in the data. Unsurprisingly, elite public universities have a clear advantage in terms of in-state “sticker” or listed cost (in-state tuition and

fees + room and board) when compared to their private counterparts. This difference is rather sizable as a top fifty public university costs an average of $37,891 less per academic year than a top fifty private institution (see Table Two). When considering net cost (in-state tuition and fees + room and board – average scholarship award), public universities maintain their advantage though the magnitude decreases slightly. After factoring in average scholarship awards, a top fifty public university's net cost is an average of $15,168 less per academic year than a top fifty private institution's net cost (see Table Two and Figure One).

When limiting the comparison to the top ten public universities and top ten private universities, the public institution net cost advantage continues to decrease in magnitude. Examining Table Three and Figure Two reveals that the net cost of a top ten private school is just $10,696 more per academic year when compared to a top ten public university.

Table Two: In-State Cost Summary (Public vs. Private Universities)		
Variable	Private	Public
Cost (In-State Tuition + Room & Board)	$ 61,962.73	$ 24,071.24
- Average Scholarship Award	$ 33,934.29	$ 11,210.84
(% Receiving Financial Aid)	*46%*	*48%*
Net Cost *(In-State Tuition + Room & Board - Average Scholarship Award)*	***$ 28,028.44***	***$ 12,860.40***

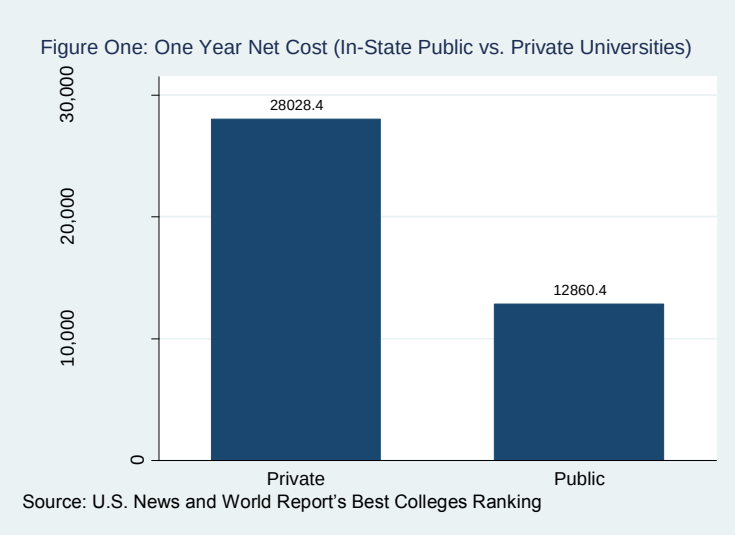
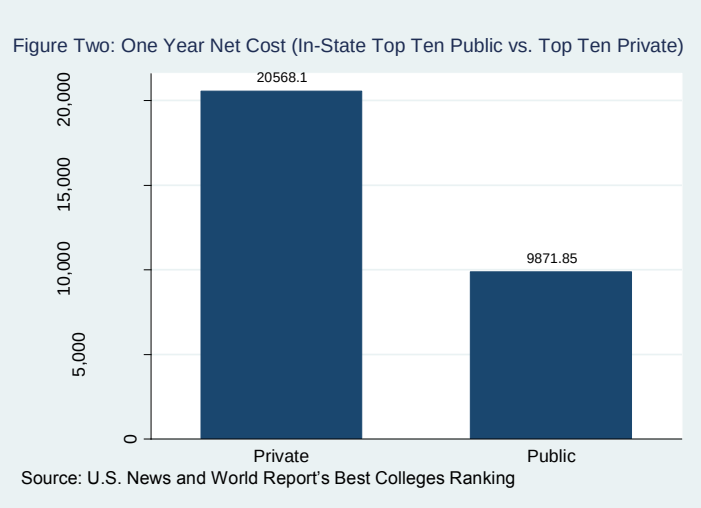


Table Three: In-State Cost Summary (Top Ten Public vs. Top Ten Private University)		
Variable	Private	Public
Cost (In-State Tuition + Room & Board)	$ 64,658.90	$ 26,427.38
- Average Scholarship Award	$ 44,090.80	$ 16,555.54
(% Receiving Financial Aid)	*50%*	*47%*
Net Cost *(In-State Tuition + Room & Board - Average Scholarship Award)*	***$ 20,568.10***	***$ 9,871.84***



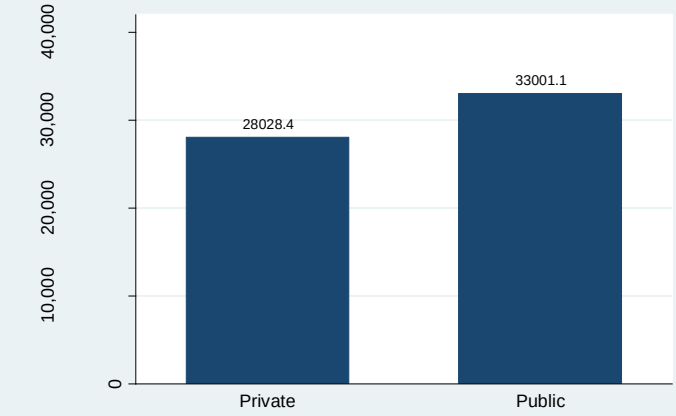
B. Out-of-State Cost Analysis

Interestingly, when considering out-of-state tuition differences the cost advantage shifts to elite private universities due to their static price structure. Elite public universities still have an advantage in terms of out-of-state "sticker" cost with a top fifty public university listing at an average of $17,751 less per academic year than a top fifty private institution (see Table Four). However, when considering out-of-state net costs, private universities seize an advantage costing an average of $4,973 less per academic year (see Table Four and Figure Three).

When limiting the comparison to the top ten public universities and top ten private universities, the private university net cost advantage increases in magnitude. Examining Table Five and Figure Four reveals that the net cost of a top ten private school is $14,170 less per academic year when compared to a top ten public university.

Table Four: Out-of-State Cost Summary (Public vs. Private Universities)		
Variable	Private	Public
Cost (Out-of-State Tuition + Room & Board)	$ 61,962.73	$ 44,211.90
- Average Scholarship Award	$ 33,934.29	$ 11,210.84
(% Receiving Financial Aid)	*46%*	*48%*
Net Cost *(Out-of-State Tuition + Room & Board - Average Scholarship Award)*	***$ 28,028.44***	***$ 33,001.06***

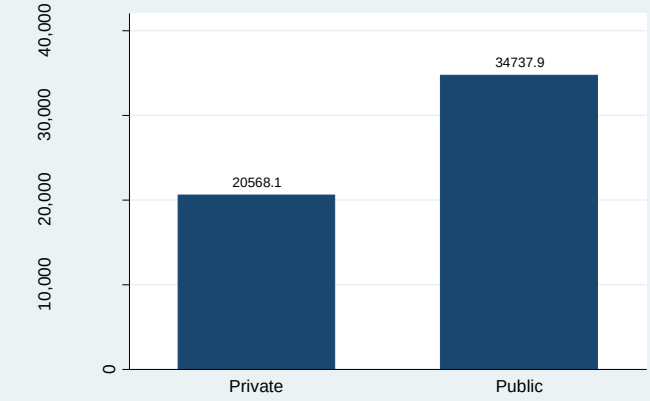
Figure Three: One Year Net Cost (Out-of-State Public vs. Private Universities)



Source: U.S. News and World Report's Best Colleges Ranking

Table Five: Out-of-State Cost Summary (Top Ten Public vs. Top Ten Private University)		
Variable	Private	Public
Cost (Out-of-State Tuition + Room & Board)	$ 64,658.90	$ 51,293.46
- Average Scholarship Award	$ 44,090.80	$ 16,555.54
(% Receiving Financial Aid)	*50%*	*47%*
Net Cost *(Out-of-State Tuition + Room & Board - Average Scholarship Award)*	***$ 20,568.10***	***$ 34,737.92***

Figure Four: One Year Net Cost (Out-of-State Top Ten Public vs. Top Ten Private)



Source: U.S. News and World Report's Best Colleges Ranking

C. Academic Quality Analysis

While initial cost is higher at private universities when considering in-state tuition and fees, private institutions have a clear advantage in terms of overall academic quality when compared to their public counterparts. This advantage is largely fueled by the discrepancy in student-faculty ratios between public and private universities. The small, intimate classroom setting most private universities supply provides the learning environment necessary to gain the critical thinking skills that are imperative for success in the post-graduation labor market. With this in mind, top private universities employ approximately one faculty member per ten students, while top public universities nearly double the ratio at seventeen students per faculty member (see Table Six). This ratio is stressed further when considering the most selective schools in the data, as evidence by the eleven-point difference in student-faculty ratio between the top ten private institutions and top ten public institutions (see Table Seven).

The private university academic quality advantage is also apparent when comparing graduation rate measures at various points in the data. In fact, top private universities consistently outperform top public universities when considering graduation efficiency and overall graduation rate (see Table Six and Table Seven). Specifically, the average elite private institution boasts a seventeen-percent higher four-year graduation rate and nine-percent higher graduation rate when compared to the average elite public university.

Table Six: Academic Quality Summary (Public vs. Private Universities)

Variable	Private	Public
Student-Faculty Ratio	9.66	17.22
Four-Year Graduation Rate	77%	60%
Graduation Rate	88%	79%

Table Seven: Academic Quality Summary (Top Ten Public vs. Top Ten Private University)

Variable	Private	Public
Student-Faculty Ratio	5.6	16.84
Four-Year Graduation Rate	86%	69%
Graduation Rate	95%	87%

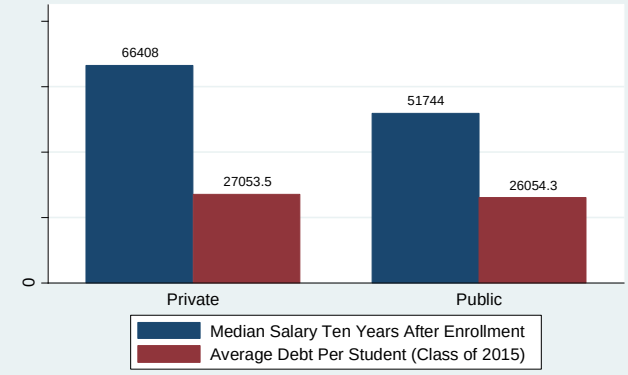
D. Post-Graduation Analysis

Consistent with superior academic quality, top private universities exhibit an advantage over top public universities in post-graduation economic statistics. More specifically, students of elite private institutions earn higher salaries and graduate with relatively the same amount of debt than students of elite public institutions (on average) (see Table Eight and Figure Five). In fact, the average median salary of top fifty private university graduates ten years after enrolling in school is approximately $66,400 and the average amount of debt is roughly $27,000. In contrast, the average median salary of top fifty public university graduates ten years after enrolling in school is approximately $51,700 and the average amount of debt is roughly $26,000. When limiting the comparison to the top ten public universities and top ten private universities, the private university economic advantage increases in magnitude. Examining Table Nine and Figure Six reveals that while average debt per student remains relatively equal, the average median salary of top ten private school graduates ten years after enrolling in school is $20,900 more than top ten public university graduates.

Table Eight: Post-Graduation Summary (Public vs. Private Universities)

Variable	Private	Public
Median Salary (10 Years After Enrollment)	$ 66,408.00	$ 51,744.00
Average Debt Per Student (Class of 2015)	$ 27,053.51	$ 26,054.28

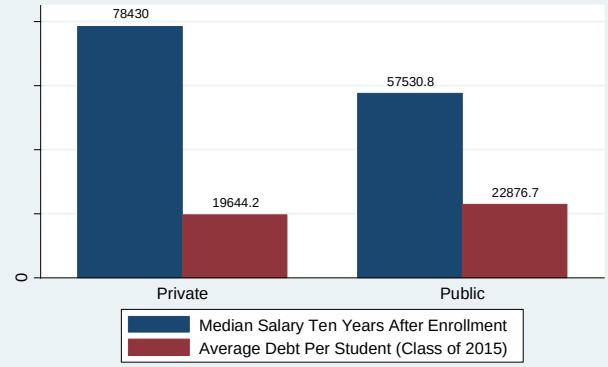
Figure Five: Post-Graduation Salary and Debt (Public vs. Private Universities)



Source: U.S. News and World Report's Best Colleges Ranking

Table Nine: Post-Graduation Summary (Top Ten Public vs. Top Ten Private University)		
Variable	Private	Public
Median Salary (10 Years After Enrollment)	$ 78,430.00	$ 57,530.77
Average Debt Per Student (Class of 2015)	$ 19,644.22	$ 22,876.69

Figure Six: Post-Graduation Salary and Debt (Top Ten Public vs. Top Ten Private)



Source: U.S. News and World Report's Best Colleges Ranking

E. Limitations of the Analysis

In order to determine if elite public or private universities are the better overall investment, the limitations of the data must be considered in the analysis. One limitation of the data is the lack of academic quality and post-graduation variable measures specified by major. Specifying these statistics by major type for each university would provide a more complete analysis of the trade-offs between elite public and private universities. Specifying these statistics by major type would provide the potential for the costs and benefits of public and private universities to differ by degree. Thus, accounting for the scenario where elite private universities are more beneficial for degree X, while elite public universities are more beneficial for degree Y.

Another limitation of the data is the inability to measure the intangible individual benefits of attending one university over another. These intangible benefits may include an individual's social compatibility with the university or sense of pride in the university, which are extremely difficult to quantify. Although these intangible benefits are difficult to measure, they are likely

to make an impact on a student's overall educational and career success. As a result, these intangible benefits must be considered on an individual basis when conducting a cost-benefit analysis of elite university options.

The final limitation of the data is the inability to measure the unobserved student characteristics defined by Dale and Krueger (2002 and 2011). These unobserved student characteristics may include skills like work ethic, attention to detail and intuitiveness, all of which are essential to long-run career success. In fact, Dale and Krueger find that college selectivity has little impact on future career earnings when controlling for these unobserved student characteristics. In other words, attending an elite university does not affect an individual's career earning power, rather the characteristics that granted them access to that university is the driver of the increase in earnings. Put into context of this study, a perceived benefit of one university type (public or private) may simply be a result of their ability to attract students with the most beneficial unobserved characteristics rather than an actual difference in university quality.

V. Conclusion

When considering the available economic measures of the top fifty public and top fifty private universities, it is evident that elite private universities in the United States are the better overall investment. Though the initial in-state cost at top public universities is lower, the difference in out-of-state tuition and fees neutralizes this initial cost advantage. In addition, top private universities offer superior academic quality with lower student-faculty ratios and higher overall graduation rates. Most notably, elite private universities trump top public institutions in

long-term career success, boasting a higher average median salary ten years after entering post-secondary education.

While the analysis points toward the overall benefit of elite private universities, several limitations in the data may affect this conclusion on an individual basis. For example, including economic measures by degree (major) type may neutralize this overall private benefit based on an individual's area of study. Additionally, accounting for intangible benefits and unobserved student characteristics may influence the individual value of attending an elite public or elite private institution. With this in mind, future research will benefit from developing techniques that help account for these intangible factors and individual variability. Ultimately, students must weigh the intangible or immeasurable benefits of a university against the statically relevant factors in order to make a decision that maximizes their individual utility.

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