

THE COLLEGE GAP:
AN ANALYSIS OF POSTSECONDARY TUITION VARIANCE AMONG STATES

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Trevor Thomas
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STATES

Trevor Thomas

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Abstract

Projected increases in demand for postsecondary credentials in the labor market have exposed an immediate need for the United States to significantly increase its college attainment rate. The current growth rate of college tuition and fees, however, has been outstripping inflation for decades, and is limiting access for a growing number of would-be college students. Significant variance in college tuition and financial aid levels among states complicate the issue, having prevented researchers from finding the true indicators that govern college tuition levels. I posit that increased future earnings potential is one of these indicators causing tuition price variance throughout the US. Specifically, each state's college wage premium – the amount a college graduate can expect to make over a high school graduate – causes its tuition prices through a supply/demand equilibrium. I hypothesize that the average public college tuition in a state is directly correlated with its college wage premium. Colleges in states with a high premium have a more valuable product and are able to charge more. I test this by collecting data from College Board and the US Census Bureau on average college tuition and median-level college wage premium, and run a simple OLS regression to determine the strength of correlation. I then discuss my results in the context of the United States' college attainment goals.

KEYWORDS: (Education, College, Attainment, Tuition, Financial, Aid)

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CHAPTER 1

INTRODUCTION

In 2011, the rate of United States citizens, ages 25-64, with either an associates or bachelor's degree was 38.7% in (College Board). Comparing this statistic to the 2010 study by the Georgetown University Center on Education and the Workforce, *Help Wanted: Projections of Jobs and Education Requirements Through 2018*, one will see an immediate need for increasing the college attainment rate in the US (Carnivale, Smith, Strohl, 2010). This report, among many other things, illustrates two concerning facts:

1. That previous estimates of the demand for postsecondary education have grossly underestimated the actual demand; and
2. That by 2018, an average of 63% of jobs in the US will require a postsecondary credential beyond high school

The first fact, in particular, is referring to the 1998 study by the Bureau of Labor Statistics (BLS) that attempted to project postsecondary education demand through 2008. This study underestimated postsecondary education demand in the workforce by 19 million – an error rate of 47% – and Carnevale, Smith, and Strohl, the authors of *Help Wanted*, argue this underestimation was the result of the BLS using a flawed methodology. They altered the method for their study, and when retrofitting this new method to the data used in the BLS study, the results yielded an underestimation of only

2 million – an error rate of 4%. This finding is significant, and carries two important implications:

1. The BLS study was, at the time, the only data available to policy makers on postsecondary education demand, and has therefore influenced policy on higher education based off false conclusions.
2. The previous inability to accurately project postsecondary education demand is no longer relevant, and policy makers now have reliable data for decision making.

These implications, combined with the second concerning fact above, illustrate an immediate need for revamping the US postsecondary education system. They conclude that the US college attainment rate needs to grow 24% to meet the needs of employers by 2018, and through a comparison to the BLS study, it shows that the prediction is sound. This means we can rely on the 63% statistic over any other current estimate (no such study has been conducted since), and that over a decade of higher education policy needs to be revisited with this updated information.

CHAPTER 2

LITERATURE REVIEW

Matching future supply to the now-reliable prediction of future demand for postsecondary education is only part of the equation though. There are many other reasons why the US should aim to increase its level of college attainment, the first of which is competition with other nations. Of the 34 members in the Organization for Economic Cooperation and Development (OECD), the US now ranks 15th in percentage of 25-34 year olds with an Associate's degree or better, scoring 41% (Prince, Choitz, 2012). Canada, South Korea, and Japan, the leading members of the OECD in this area, each have rates of over 50% and are on track to reach 60% by 2020. If the US wants to remain relevant in the developed world, reversing this trend is crucial. Additionally, research has shown that increasing college attainment is correlated with increases in personal earnings, job productivity, civic engagement, and health; it is also correlated with decreases in healthcare costs, social aid programs, and the incarceration rate (Crellin, Kelly, Prince, 2012).

Hopefully, at this point, one can see that increasing college attainment is something the US needs to do to meet postsecondary education demand in the future, and that doing so will only benefit the nation. Realistically speaking, the US will not reach 63% college attainment by 2018. The Obama administration, as well as other philanthropic groups, have set more realistic goals for increasing postsecondary

credentials among the US population – 60% by 2025 (Crellin, et. al., 2012). Moreover, several states have made their own goals for increasing college attainment by their own deadlines. The needs and benefits have been shown, and policy makers have reacted and set goals – the next step for the nation is to determine how to accomplish these goals.

There are many ways to achieve higher levels of college attainment. One way is to increase the financial aid given to students. The introduction of guaranteed federal student loans in the form of Stafford Loans has shown to increase enrollment, but it has created other problems. William Bennett theorized in what is now known as the Bennett Hypothesis that guaranteed federal loans will simply cause schools to raise their tuition by a similar amount (Hearn, Griswold, Marine, 1996). Research has since disproven Bennett’s specific hypothesis (Strauss, 2012), but it proved to be true in a different way. Rather than increasing tuition in response to guaranteed federal aid, colleges have simply reduced institutional aid (Epple, Romano, Sarpca, Sieg, 2013). This means the Bennett Hypothesis is still relevant, and that federal aid does have certain adverse institutional effects. While increased federal aid has shown to increase enrollment, this study will not focus on that aspect due to the combination of the Bennett Hypothesis and rapidly increasing college prices. Specifically, if the price of college is rising at the current rate, and federal aid simply replaces institutional aid, this method is not enough to reach US college attainment goals by itself.

Another way to increase higher education credentials is to increase graduation rates through improving college-preparedness rather than enrollment. Proponents of

this argue that the US has done a great deal to increase access to college over the past few decades, and that graduation rates should be the primary concern. This view is absolutely correct – the US has certainly increased access to higher education, as “70% of high school graduates enroll in some kind of advanced education within two years [of graduation]” (Bridgeland, Milano, Rosenblum, 2011). Of these 70%, “just over one-half of bachelor’s degree candidates complete their degree within six years” according to Bridgeland, et al. Again, this is certainly one way the US should attempt to reach its education goals, but that will not be the focus of this study for multiple reasons, primarily because I have neither the credentials nor the academic data to discuss how to increase college-preparedness/graduation rates.

Some economists have argued for increasing tuition and restructuring aid as a means for increasing college attainment. This position has since been coined as *rationalization*, and it is the stance of many highly reputable economists such as Milton Friedman. Simply put, rationalization is a call to “rationalize” college tuition policy by increasing public tuition to more accurately reflect institutional costs. Proponents argue that public tuition is artificially low, because average tuition levels (at the time of the study) “still average well under one-half of per-student educational costs” (Halstead 1991), making the gap between public and private tuition artificially large and yielding inefficiencies. They claim that current “blanket” subsidies that give little consideration to a student’s actual financial needs, despite increasing enrollment, are an inefficient means for doing so, and a rationalized system “promises the rewards of both greater equity and greater efficiency” (Hearn, et al., 1996). If subsidies no longer went to

students that did not need them, they would flow to those that do, and the price increases would be offset by aid increases to low-income students. This stance is closely related to the Bennett Hypothesis, and seems logical. Unfortunately, because the proposal of rationalization is essentially a sweeping reform of both tuition and federal/state financial aid, there is no way to test it unless it is enacted across the country or in some controlled region. This kind of comprehensive study has not happened, therefore we cannot currently test the efficacy of rationalization.

A fourth and final way to achieve greater levels of college attainment might be to make college more affordable. Arguably the simplest idea of the four I covered, this will be my focus in the formulation of my hypothesis. The reasons I chose to focus on the actual levels of tuition and none of the options listed above are the following:

1. The Bennett Hypothesis (as it pertains to financial aid, not tuition), combined with the fact that the growth rate of college tuition is outstripping inflation, led me to avoid focusing on financial aid;
2. Increasing college-preparedness and the college graduation rate are mostly educational solutions to an economic problem, and therefore fall outside the focus of this study;
3. Rationalization is not testable with my data;
4. Making college more affordable through decreasing tuition or slowing its growth rate in respect to inflation not only increases access to higher education, it also encapsulates two of the three previous ideas;

- a. Lowering the price of college would have the same net effect as increasing aid (if done in similar magnitudes), but at lower social costs in the form of less federal and state financial aid;
 - b. Lowering the price would decrease the dropout rate (discussed below);
5. The data surrounding college tuition levels is far more accessible than the data for the other options listed.

While it may seem obvious that lower tuition would yield higher demand for college education (and therefore higher enrollment), it should be stated that research on this subject has produced conflicting results. Some studies have shown that “...increases in higher education prices lead to substantial declines in a student’s propensity to enroll” (Cheslock, Hughes, 2011). Echoing this sentiment, in a 1994 issue, *The Chronicle of Higher Education* released a report claiming “students’ current major concern is ‘the rising cost of going to public colleges’” (Hearn, Griswold, Marine, 1996). Other research has shown the exact opposite, and indicates that the demand for college education is relatively inelastic in that, “a \$100 increase in tuition produced less than one percent in enrollment decreases” (Hemelt, S., Marcote, D., 2008).

While the inconsistencies between these (and many other) findings are certainly interesting, they do not affect my argument in that, to reach the nation’s higher education attainment goals, we should seek to lower college tuition. Regardless of the nature of the price-elasticity of demand for college education, there is evidence that lower prices decrease the dropout rate, meaning college attainment will still increase

with lower prices via an increased graduation rate. Specifically, 80% of education leaders surveyed in the 2011 study, *Across the Great Divide*, “identified financial pressures, such as needing to work, as a major challenge to students completing a post-secondary degree or credential at their institution...and 42% of education leaders selected their students’ need to work as the single biggest obstacle to improving post-secondary completion rates at their institution” (Bridgeland, et al., 2011). If the former theory on college elasticity is correct, and college price has a material effect on enrollment, then lowering tuition is a great way to increase attainment through increasing both enrollment and the graduation rate. If the latter theory is correct, and college price has an immaterial effect on enrollment, lower prices will still increase college attainment through a decrease in the dropout rate. Additionally, the price-elasticity of demand for college education is an important figure for determining the effects of price changes on enrollment, but it leaves out the simple fact that lower tuition will increase the ability for low-income students to attend college, regardless of the overarching effects on total enrollment (or lack thereof).

It seems, therefore, that lowering college tuition will have positive effects on college attainment, either through increased enrollment, increased graduation rates, or a combination of both. Lowering tuition would also increase higher education access to greater numbers of low-income students, which would provide them with access to the numerous stated benefits of obtaining a college degree. Providing those benefits to low-income students would increase social mobility, because “...while it is true that the middle class is declining, a more accurate portrayal of the American class dynamic

would be to say that the middle class is dispersing into two opposing streams of upwardly mobile college-haves and downwardly declining college-have-nots” (Carnivale, et al. 2010). Even if college education is price-inelastic, the indirect benefits of lowering tuition would still achieve the goal of increasing college attainment, albeit in a lesser magnitude than if it were price elastic.

I posit that if the US can decrease college tuition prices, or at least bring the growth rate down to that of inflation, then it will begin to achieve its college attainment goals. I do not, however, claim in any way that this would serve as the lone catalyst for reaching our national goals. In all likelihood, the solution to increasing postsecondary credentials is a combination of one or more of the four methods I outlined in addition to potential other methods I left out. This study will primarily be concerned with college tuition levels, and how they can be manipulated to accomplish the current US educational goals. I have outlined the legitimacy of these goals through the projected labor supply shortage for college graduates and the many benefits that the US will obtain as a result of reaching them. I then outlined how lowering tuition is one of the ways the US can meet these goals. The final piece of the equation is simply the following two questions:

Can the United States lower the average price for attending college?

If so, how?

Before tackling these question, the current status of college tuition needs to be elucidated. In the 2013-2014 school year, the average prices of public 4 year universities and a public 2 year universities, respectively, were \$8,893 and \$3,264.

Those figures represent a 5 year growth rate of 27% for public 4 year universities and 29% for public 2-year universities (College Board). Those growth rates, while still outpacing inflation, represent a slowing of the college tuition growth rate. A 2009 article by Penelope Wang, a senior writer for *Money Magazine*, stated that

For more than two decades, colleges and universities across the country have been jacking up tuition at a faster rate than costs have risen on any other major product or service – four times faster than the overall inflation rate and faster even than increases in the price of gasoline or health care. The result: After adjusting for financial aid, the amount families pay for college has skyrocketed 439% since 1982 (Wang, Is College Still worth the Price? CNN Money, Money Magazine).

Perhaps stated best by Sandy Baum, an independent policy analyst for the College Board, the slowing growth of tuition is “An improvement in a bad story.” While it is certainly a good thing that college tuition growth is slowing, it is still larger than inflation, and the decrease in the current growth rate does not reverse the 439% growth seen in the last three decades. In practical terms, the decrease in the growth rate bodes well for the future, but does not adequately address the highly inflated current rate of tuition that has resulted from the past few decades.

Regardless of the bleak picture of higher education painted above, there is one final characteristic of college tuition that dwarfs all that has been stated thus far, and that is the fact that college is funded primarily at the state level and tuition is set at a combination of state and institutional levels. The importance of this fact cannot be

overstated, because it leads to considerable variances in every single national level statistic discussed thus far. To illustrate this point, one only needs to look at a few individual cases. *Help Wanted* estimates that the national demand for college educated labor will reach 63% of the workforce in 2018 (Carnivale, et al., 2010). Contrast this with two individual states, West Virginia and Minnesota, and the picture changes. The same labor demand projection is 49% for West Virginia and 70% for Minnesota. The 63% figure, while still relevant to the state of the US economy and the decisions of federal policy-makers, does not make as much sense when discussed in the context of these two states.

The differences certainly don't stop there. As stated, public 4 year universities saw a 5 year national growth rate of 27% as of the 2013-2014 school year. During the same period, Missouri only saw a growth rate of 5%, and Arizona saw a growth rate of 70%. The national college wage premium median – the increased annual earnings that can be expected of median-earnings college grads over median-earnings high school grads – is currently about \$23,000. That premium is only \$12,700 in Vermont, however, and \$27,800 in New Jersey. Finally, the average cost of attendance at a public 4 year university in the US in 2013-2014 was \$8,893, while it was just \$4,404 in Wyoming and \$14,665 in New Hampshire (College Board).

The reason this important state-by-state factor was left out of the earlier discussion is simple – much of the research on higher education policy does the same thing, and that omission is at the very core of this issue. There is significant research on national higher education trends and statistics, ample evidence of which can be found in

the sources listed above. But as one can see in the previous paragraph, nearly every national level statistic discussed loses its meaning when a state by state analysis is employed. That is not to say national-level research is not valuable. If it were not for national aggregate research, we would not know that the US ranks 15th in education in the OECD. We would not know that, as a whole, tuition is outpacing inflation nationally. We would not know a great deal of valuable information about the US economy. In the context of increasing college attainment, the problem with aggregate research arises when it comes to the practical application of solutions to national higher education issues, because the costs and benefits of higher education vary so much from state to state. Telling students that plan to live in New York, Massachusetts, and Connecticut that they need to attend college if they want to move beyond the middle class is far truer than telling that to a student that plans to live in Wyoming or Vermont. Moreover, it makes little sense, practically speaking, to discuss the national growth rate of 27% for public 4 year universities when Missouri saw a meager growth rate of 5%, and Arizona experienced a vast 70% increase. Clearly the solution has to come from the states themselves.

While the current literature does not blatantly ignore the variance among states, it tends to understate the impact. Most research relevant to this study falls into one of three categories (Hearn, et al., 1996):

1. It is too broad to make practical applications (Chronicle of Higher Education)

2. It is too narrow to make generalizations about the economy as a whole (Fiske 1987)
3. It attempts to determine the causes of higher education variance across states, and may or may not attempt to expand these findings to fit the current national goals for college attainment (Hearn, et al., Crellin, et al., etc.)

These studies are all valuable for their own reasons, but in the context of the above goal – increasing national college attainment through tuition reduction or growth control – one must apply the third approach. One must reconcile differences at the state level with problems and goals at the national level. That is the aim of this study, and the first step in this reconciliation is to determine the causes of postsecondary tuition variance among states.

The 1996 study, *Region, Resources, and Reason*, was one of the first to acknowledge this state to state variance and the issues it creates when discussing national concerns. Hearn, Griswold, and Marine, the authors of this report, initially discuss the rising price of college at the time. “Between 1976-77 and 1990-91, annualized growth in the average level of tuition and required fees for undergraduate education was more than 8% per year, a rate easily exceeding price inflation in the general economy. Although more recent years brought some signs of slowing in this growth, price gains in higher education have continued to exceed general inflation rates” (Hearn, et al. 1996). The “slowing...growth” they mention is interesting for two reasons. First, it parallels the time in which this report was written with the present,

allowing us to gain greater insights to more current research. Second, because the slowed growth of tuition did not continue through the 2000's, we know that the current slowing of tuition growth may not be a long term trend, and action may still be required to sustain this slowing.

After discussing the issues with tuition growth, the report discusses the state to state variances in higher education and then tests for potential causes of this variance. The authors hypothesized that region, population, mean level of disposable income, educational resources, high school graduation rate, reliance on public over private education, and governance arrangements would be the exogenous variables describing state to state tuition variance. They found that region was by far the largest indicator of tuition price. After region, lower disposable income and higher reliance on private education were correlated with higher tuition. After this, two governance arrangements – strong coordinating boards and planning agencies – were correlated with higher tuition, although weakly. They also found that states with higher populations tend to give higher aid per capita, but they also tend to have higher tuition, implying a high tuition/high aid mentality in the larger states that reflects rationalization, although not perfectly, because higher-income students still have access to the “blanket” federal subsidies. These findings show that tuition levels are mostly governed by factors that are not within the power of policy makers to change.

Increasing College Attainment in the United States: Variations in Returns to States and Their Residents is a more recent report that discusses the national college attainment goals set forth by the Obama administration in the context of this state

variance. The study acknowledges that increasing college attainment will inevitably require additional state and federal spending on higher education.

Nevertheless, under a scenario in which the US as a whole is performing at the rate of the three highest-performing states, federal and state revenues each top \$80 billion by 2025, far exceeding federal and state costs for that year – approximately \$15 billion and \$30 billion, respectively. An important caveat is that the benefits begin to accrue several years after the costs and do so over the time it takes for students to earn credentials and experience the resulting gains in earnings (Crellin, et al., 2012).

This finding should motivate policy makers to invest more in education, but the time lag between the investment and the returns might cause them to resist. Additionally, due to the weak correlation found between governance variables and tuition levels and the stated time lag, governance structures will not be used as a variable in this study.

Cheslock and Hughes, the authors of the 2011 report, *Differences Across States in Higher Education Finance Policy*, seek to further explain the tuition variance.

According to them,

Almost all past research in this area has attempted to explain whether differences across states in governance structures and state political characteristics partially determine differences across states in tuition and state grant aid. As a result, we have a good understanding of how these factors contribute to the variation in public higher education prices across states. We have not, however, thoroughly described the variation itself...We do not know

whether states have become more similar or more diverse in their tuition and state grant aid policies (Cheslock, Hughes, 2011).

This report looks at how tuition variance across states has changed from 1989-2008.

“We find that higher education finance policies became more equal in certain areas and less in others” (Cheslock, Hughes, 2011). The findings show that financial aid became more equal over the time period. The proportional differences in tuition and fees have shrunk as well, “but the dollar gap has grown.” The authors expect low tuition states to begin to increase tuition faster than the high tuition/high aid states to cause the dollar gap to shrink. The most important finding for this study, however, is that the tuition variance did not change in predictable ways. While the results show a few national trends, the net effect of the tuition variance did not change, and states are still wildly different from one another in tuition setting and other higher education policies.

Literature Review Conclusion

Thus far, I have discussed a wide array of topics relating to higher education finance, so a brief summary of the progression of ideas is necessary before going forward. The projected supply shortage for college educated labor, as well as the many private and public benefits associated with a college education, displayed the pressing need to increase the US college attainment rate. Although there are numerous ways in which the United States could increase college attainment, this study focuses on making college more affordable; however, the average price of college is growing substantially. The data show that this growth, representing the nation as a whole, does not represent any one state, and that states vary dramatically in both tuition level and growth rate.

Because this variance is so vast, discussing college affordability on a national scale no longer makes sense. More recent studies have begun to focus on the causes of state to state tuition variance, and the only strong correlation found has been region. This study seeks to further explain the variance, and to then discuss it in the context of national college attainment goals.

CHAPTER 3

HYPOTHESES

Previous studies on state tuition variance have largely assumed that, aside from region, state governance policy is the largest factor in tuition setting. These reports have sought to construct exogenous variables to explain state governance differences; they have also tried to capture the nature of state economies as an explanatory variable. While weak correlations were found between tuition levels and certain governance structures, these structures have proven to be an inadequate method for determining state tuition levels (Hearn, et al., 1996, Cheslock, et al. 2011). This study will take a simpler approach. Rather than attempt to quantify the political economy of each state and fit a regression line to their respective tuition levels, I seek an explanation rooted in basic supply and demand equilibriums. Specifically, I contend that each state has its own market for higher education, and the differences in these markets will account for some of the variance in tuition. In this light, students are consumers and colleges are producers, and the consumer demand for the college “product” in each state will determine the price level. Implicit in this assumption is that the college “product” is different in each state, and that this difference is the source of some of the variation in demand, and therefore, price.

I posit that the college “product” is the promise of a higher future wage. While I acknowledge that colleges sell more than this promise alone – many consumers choose

to go to college for the education, and others for the experience – I argue that the increase in future earnings potential is the main product of any institution of higher education, and that the other reasons are small enough in comparison that they will not affect the aggregate demand. If this assumption is correct, a simple supply/demand analysis of college tuition can be applied. It should be stated that my assumption about the college product – that different states have different college “products” that yield different demands – while crucial in the formation of my hypothesis, will not affect the outcome of this study, and the reasons will be discussed in the conclusion.

Hypothesis 1a: The median-earnings college wage premium in each state is correlated with the average public college tuition level in each state.

If this hypothesis is true, states with high college wage premiums will have higher average tuition levels than those that don't. It does not take into consideration, however, the differences in cost-of-living in each state.

Hypothesis 1b: The median-earnings college wage premium in each state, divided by the cost of living index (indexed to national average of 100), is correlated with the average public college tuition level in each state.

Because Hearn, et al. found region to be the single greatest indicator of college tuition variance, I include this variable as well, with a slight adjustment. Rather than divide the country into geographical regions like the previous study, I divided it into the 9 sub regions used by the United States Census Bureau. These sub regions are just divisions of the larger geographical regions along demographic lines. As with RRR, they are not

perfect representations of all types of regions in the US, but they capture more region-specific details than the purely geographical regions.

Hypothesis 2: Region will be the largest indicator of tuition variance.

The remainder of this paper will serve to outline my methods for the statistical tests, explain the results of the tests, and finally discuss the implications of the results in the context of national college attainment goals and future research.

CHAPTER 4

METHODOLOGY

4.1: Data

Hypothesis 1a will test for a correlation between the average tuition level in each state and the median earnings college wage premium. The average tuition level for each state was obtained through the College Board, which collects this data through its Annual Survey of Colleges. These data are provided by all accredited two and four year colleges each year, and then College Board calculates the average cost for each state. Next, the median level earnings per state was drawn from the US Census Bureau, and represents the most up to date data on income. The US Census Bureau provides the total median-level wage, the median-level wage of college graduates, and the median-level wage of high school graduates for each state. After collecting these, I simply subtracted the median level wage of high school graduates from the median level wage of college graduates to determine the median earnings college wage premium.

The reason I chose to use median earnings as opposed to average earnings is because I believe this more accurately reflects the “average” (colloquially, not mathematically) person in each state. Median-level-earnings are more resistant to very-high-income outliers, and I did not want this small segment of the population to dilute the data. Few people can expect to reach that level of income regardless of education

level, and I am looking for data that accurately capture the state of mid-level earning college grads.

I also chose to limit my research to public institutions to narrow my focus and lessen the snob factor. While there are certainly public universities with a snob factor, they represent a much smaller percentage of universities than private colleges with a snob factor. Moreover, because the initial goal was to increase college attainment in the US by reducing or controlling tuition growth, it makes sense to focus on public universities, because they are far cheaper than their private counterparts and they represent a much larger percentage of college students than private institutions.

Hypothesis 1b will test for a correlation between the average college tuition level in each state and the median earnings college wage premium, divided by the Missouri Economic Research and Information Cent (MERIC) cost of living index value. The same data from Hypothesis 1a will be used in addition to the new variable. The cost of living index was obtained from MERIC, and it is used to compare the different costs of living across states. To calculate this statistic, MERIC collects data on the average price of rent, food, transportation, etc. in each state, and then indexes this total amount to a national average of 100. States with an index below 100 are have a below average cost of living, and states above 100 are above average. The reason for including a cost of living indicator is because my hypothesis is based on the increases in earnings a college graduate can expect in different states, but a dollar does not have the same purchasing power across the country. The problem with using the college wage premium alone is it does not account for these differences in purchasing power. The college wage premium

in Wyoming may be significantly lower than in New York, but a dollar has significantly greater purchasing power in Wyoming than New York, complicating the issue. I determined that by dividing each state's college wage premium by its cost of living index, I would capture a more meaningful statistic that more accurately reflects the idea in Hypothesis 1a. I did not want to replace Hypothesis 1a entirely, however, because cost of living may not affect tuition levels.

Hypothesis 2 is simple and needs little explanation. Each state was placed into one of nine possible categories based on region. As stated, I chose to split up the geographical regions into the demographic regions used by the US Census Bureau. The Northeast was split into New England and the Mid-Atlantic. The Midwest was split into East North Central and West North Central. The South was split into the South Atlantic, East South Central, and West South Central. Finally, the West was split into Mountain and Pacific. I created nine dummy variables for the nine regions and used a binary variable to determine whether states were part of each region. If a state fell within one of these regions (as defined by the US Census Bureau), it received a value of 1, and if it did not, 0.

4.2: Statistical Tests

For each hypothesis, I ran at least two regressions – one with the average price of public two year universities as the dependent variable, and one with the average price of public 4 year universities as the dependent variable. If more than these two regressions were used for testing a hypothesis, I will discuss the reasoning in the results section. The hypotheses take the form of the following equations

- Hypothesis 1a
 - $Y_2 = x_n b_n + a$, and
 - $Y_4 = x_n b_n + a$, where
 - Y_2 = average price of public 2 year universities in a state
 - Y_4 = average price of public 4 year universities in a state
 - x_n = weight coefficient for each variable in state n
 - b_n = median earnings college wage premium in state n
 - a = unknown constant

- Hypothesis 1b
 - $Y_2 = (x_n b_n) / c_n + a$, and
 - $Y_4 = (x_n b_n) / c_n + a$, where
 - All variables from Hypothesis 1a remain the same
 - c_n = cost of living index for state n

- Hypothesis 2
 - $Y_2 = x_1 b_1 + x_2 b_2 + \dots + x_n b_n + a$, and
 - $Y_4 = x_1 b_1 + x_2 b_2 + \dots + x_n b_n + a$, where
 - Y_2 = average cost of public 2 year universities in a state
 - Y_4 = average cost of public 4 year universities in a state
 - x_n = weight coefficient for each variable in state n
 - b_n = binomial dummy variable determining which region state n belongs to
 - a = unknown constant

Each hypothesis was tested using a simple OLS regression. All data was imported into the statistical software program, STATA, and then I ran each regression.

CHAPTER 5

RESULTS

5.1: Hypothesis 1a

This hypothesis, my initial reason for completing this study, proved to be conclusively false. The regression against public 2 year university tuition had an abysmal r square of .003, meaning there is essentially no correlation whatsoever. Public 4 year university tuition did slightly better, with an r square of .18, but is still far from adequately explaining state tuition variance. The first test with 2 year schools produced an incredibly high p score of nearly 70%, meaning it was not statistically significant, but we can reject the hypothesis regardless due to the r square. The second test was statistically significant, with a p score of .02%.

5.2: Hypothesis 1b

I added this hypothesis after running my initial regression, thinking the cost of living may be the confounding variable preventing the model from finding correlation. When testing for public 2 year universities, again, no correlation was found, producing an r squared of less than .06 and a p value of nearly 10%. Public 4 year colleges actually did worse in this regression, yielding an r squared of .04 and a p value of 12%. I can firmly reject Hypothesis 1b for both types of schools, as neither showed a correlation and both were statistically insignificant. After the failure of this test, I ran a regression that simply included the cost of living index as its own variable instead of dividing the college wage

premium by it. This test showed essentially the same results, and I can confirm that college tuition varies among states for reasons other than the college wage premium or the cost of living index.

5.3: Hypothesis 2

Hypothesis 2 was proven, but that was expected. All research in the past has shown that region is the greatest determinant of college tuition, and I did not think this would change in my test. This test produced an r squared of .37 for public 2 year colleges and .46 for public 4 year colleges, nearly identical to the results achieved by (Hearn, et al. 1996). This test, although it behaved as expected, did show a few interesting points, primarily when comparing the 2 and 4 year results. The 4 year test showed every region's result was statistically significant except for the Pacific, the East North Central, and New England. While the Pacific had a p value of roughly 12%, the other two were both over 50%. The 2 year test was shocking, on the other hand. Not a single region had a p value that was statistically significant except for New England. One may expect 2 year and 4 year colleges to differ in this way, due to the fact that they are occupied by two very different demographics. Public 2 year universities are often used as a way to save money or improve grades before transferring to a 4 year university. The results make sense in this light, because if students go to a 2 year university to save money, they will likely go to a school that is near to home; and if they are trying to improve grades to transfer, the region they transfer to is likely more important to them than the region in which they improve their grades.

5.4: Findings

After analyzing each regression, Hypotheses 1a and 1b can be confidently rejected immediately. Neither the college wage premium nor the college wage premium divided by the cost of living index provided an adequate explanation for the source of variance among state public college tuition levels. Public 4 year tuition seems to be more responsive to the college wage premium than public 2 year tuition, but still lacks any explanatory power with an r square of .18 when regressed against the college wage premium alone, and an r square of .04 when regressed against the college wage premium divided by the cost of living index. Hypothesis 2 was confirmed, although dividing the geographical regions into the sub regions used by the US Census Bureau neither improved the model nor hurt it. After it is all said and done, the only new discoveries in this study were the following:

1. The college wage premium in a state is NOT strongly correlated with tuition in said state.
2. Public 4 year colleges are slightly more responsive to the college wage premium than public 2 year colleges, but to reiterate the first point, neither serve as an explanatory tool.
3. Region is the strongest indicator of tuition price for public 4 year colleges, and does not explain public 2 year tuition nearly as well.

CHAPTER 6

CONCLUSION

6.1: Recapitulation

Going back to the very first point in this paper, the US is still in dire need of increasing college attainment rates. One of the many ways the nation can achieve this is by making college more affordable, but that can only be done at the state level. Each state must take measures separate from all other states in order to increase their own attainment rate. The key to being able to do this is first finding what the causes of the variance between states are, and then using that knowledge to enact policy that will promote lower tuition. This study sought to explain the variance by analyzing the median earnings college wage premium in each state and regressing it against the average public 2 year and public 4 year college tuition rates in each state. Hypothesis 1a showed this explanation was unsatisfactory, as public 2 year tuition showed no correlation and public 4 year tuition showed weak correlation. Hypothesis 1b was completely false, as neither regression showed correlation or significance. Hypothesis 2 was proven, but not surprisingly.

6.2: Brief Discussion

The results were not what I expected, to say the least. I believed college tuition would largely be determined by the college wage premium in each state, because that is essentially the product that colleges are offering their customers. If tuition is set state

by state, and legislators in each state are chosen by voters that are currently experiencing the college wage premium (or lack thereof), I thought a simple supply/demand analysis could be employed. This was not the case, but the reasons why are certainly interesting. A student can obviously choose to live in a state other than where they went to college, and this may be the reason my model was too simple. Due to the fact that the only real findings were disproving the main hypothesis, the majority of interesting discussion comes from potential future research arising from this study.

6.3: Future Research

In-state vs out-of-state tuition

Had my hypotheses been proven true, I planned on recommending the abolition of in-state and out-of-state tuition as the solution to making college more affordable. High tuition states would have to start competing more with low tuition states, which would allow a more perfect market to decrease the variance among states. It would also serve to bring more out-of-state students to places that have historically had mostly in-state students. This would have served the purpose of bringing more intellectual capital to places whose economies are more service and manufacturing based, increasing the college wage premium in those places while increasing the value of higher education in those states. While my hypotheses were false, after much research, I still believe in-state and out-of-state tuition could be some of the main factors preventing us from conclusively finding the determinants of state tuition variance.

The justification for in-state tuition discounts is primarily the argument that states want to keep capital within the state, and that state tax-payers do not want to

fund the education of out-of-state students. They do not want students coming from other states to receive a cheap education on the state-tax-payers' dime and then leave once graduating. However, studies have shown that all students, regardless of in/out of state status, are almost equally likely to remain in the state they went to college in. Out-of-state students stay in-state after graduation as much as in-state students, and in-state students leave the state as much as out-of-state students. Additionally, while removing in-state tuition discounts would cause out-of-state students to receive benefits from in-state taxpayers, the in-state tax payers would also receive greater accessibility to out-of-state schools. This implies that more coordination among the states in their tuition setting might yield greater efficiencies. Regardless of whether any of this speculation is true, this would be the next stage of research that I would recommend to anyone that found this paper interesting. The effects of in-state and out-of-state tuition absolutely must be determined before we can adequately understand tuition variance.

Does the college wage premium have any effect on demand?

While the hypothesis that the college wage premium in each state would explain some of the variance among state tuition levels was disproven, many thought-provoking ideas came from the analysis. First, does the college wage premium affect the demand for a higher education? Due to the fact that we now know this premium does not affect the price, there are two possible answers to this question:

1. The college wage premium is not related to the demand for college, and therefore does not affect price; or

2. The college wage premium is related to the demand for college, but the demand is inelastic.

If the first answer is true, it would be interesting to see what factors drive the demand for a college education the most. If the second answer is true, it provides us with an insight into the previous research on the subject. As discussed in the literature review, there is contradicting research on the price-elasticity of demand for a college education. The results of this study, while they do not statistically test for this, indicate the demand may in fact be inelastic. Either way, the fact that the wage premium did not appear to drive price opens up the possibility of further research into that question.

Region as an Indicator: Public 2 year versus public 4 year tuition.

Another finding that was fascinating was the huge discrepancy between the effects of region on pricing of public 2 year and public 4 year colleges. I briefly discussed potential reasons for this above, but that was mere speculation. The fact remains that region is the single greatest known indicator for the price of college tuition for public 4 year universities, but the 2 year university test produced statistically insignificant results. Much future research could be performed surrounding this dichotomy, and it relates heavily to the goal of increasing college attainment. Perhaps 4 year students place too much importance on region when determining where to attend college. If that is the reason, a greater emphasis on going to a 2 year school and transferring to a 4 year school may help drive tuition down, because it appears students are less likely to pay more for a 2 year school based on region than they are with a 4 year school.

Is there as much variance within states as there is within the US?

Finally, the implications of the data are far more interesting than the results of the statistical tests. Simply looking over the spreadsheet, one realizes just how varied the US higher education system is. I have discussed the variance among states throughout this entire paper, but I had not thought about the variance among individual institutions until my results came back negative. If tuition varies so greatly from state to state, it would be interesting to see how much it varies within the states themselves. It is entirely possible that individual colleges within a state vary as much as the state averages themselves. This would have far reaching implications if it were true. Earlier, I argued that it makes little sense to discuss national higher education trends and statistics when the states are so different from one another. If the individual institutions within states vary as well, the same argument applies at that level. That would mean enacting change to the higher education system would be difficult, and increasing college attainment may have to happen at an institutional level. As a result, government may not be able to effectively raise higher education credentials directly, and colleges may need to be incentivized to find ways to lower tuition. Regardless of whether this is the case or not, it certainly opens up the field for substantial future research on the subject.

6.4: Final Thoughts

With the current state of the US economy, there are few things more imperative than increasing college attainment. The need is pressing, the benefits abundant, and the drawbacks nonexistent. There is much research surrounding statistics and indicators of higher education, but we still know very little about the causes of tuition

variance, which is at the very core of the issue. Without understanding why states charge such vastly different amounts for higher education, there is little action that can be taken to increase college attainment or decrease tuition. Simply providing more public funding to colleges is attractive, but faces significant political inertia. The college wage premium may not be the cause of tuition variance, but one can certainly use the insights gained from the data and results to spark future research. If the US is going to address this need before it is too late, this future research is of the highest importance – because once the causes of tuition variance are adequately identified, the US will hold the keys to unlocking considerable long-term benefits, both economic and social, through a well-educated populace that, after falling in relation to other countries, once again sets the standard for higher education in the world.

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