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Tuition Resets: An Economic Analysis

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by

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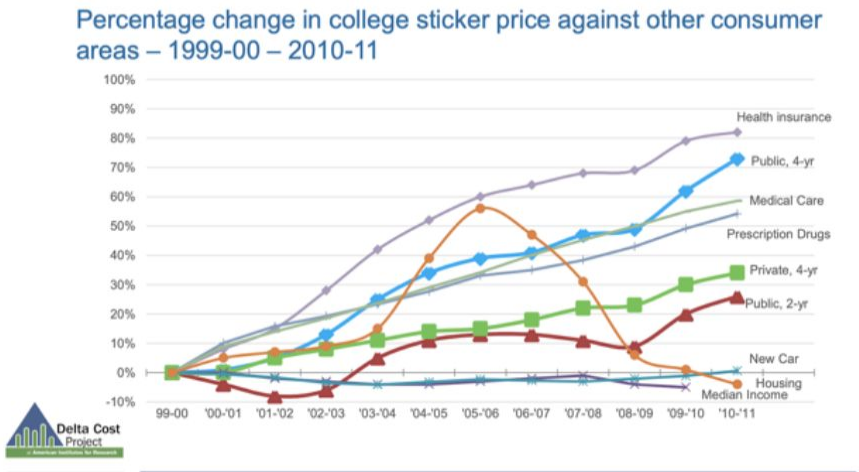
Abstract

American higher education today is defined by rising tuition and decreasing enrollment. As higher education institutions prepare for a looming enrollment crisis, tuition resets – when colleges or universities decrease their sticker price of tuition – are becoming a newly popular strategy. Although much research has been done regarding the economics of higher education and what influences tuition, no quantitative research study has been done on tuition resets. This research study contributes to the existing literature by quantitatively testing the effect of a tuition reset on an institution's financial health, as measured by net tuition revenue from students and undergraduate student enrollment. Using a longitudinal dataset from the Delta Cost Project, fixed effects regression and random effects regressions were run to determine the impact of tuition resets. Although the results lacked statistical significance, the negative coefficient on the tuition reset dummy variable in both sets of regressions suggests that implementing a tuition reset lowers an institution's net tuition revenue and enrollment. In the future after more resets have been implemented by institutions, further research studies could analyze the longer-term implications of a tuition reset.

Section 1: Introduction

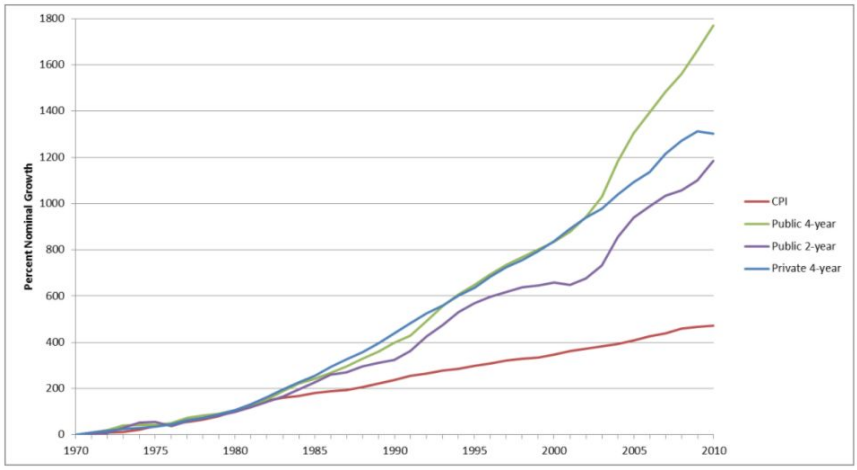
For many people, the first thing that comes to mind when higher education is brought up is tuition. The national conversation about higher education typically centers around the increasing cost of tuition; recent headlines ask, "Why is college so expensive?" and proclaim that, "Families [are] burdened by rising higher education costs." Many Virginia residents are familiar with the Virginia529 "Tuition Monster" whose appearance in Internet and television ads depicts rising tuition as a scary threat to children who aspire to college and the parents who will pay the cost. These perceptions about how expensive tuition is are backed up empirically as well. *Figure 1* shows how the sticker price of tuition is increasing at a much faster rate than other consumer goods, and *Figure 2* shows how tuition has outpaced inflation across all types of higher education. A study from the St. Louis Federal Reserve Bank found that since 1978, the sticker price of a college education has risen at a rate three times greater than the general inflation rate. However, higher education is a very unique market and the sticker price of tuition (an institution's published cost of attendance) is frequently very different from net price (the amount of tuition a student actually pays after grants, scholarships, and aid are subtracted from the sticker price). The same study from the St. Louis Fed found that when financial aid was taken

Figure 1: College sticker price compared to other consumer goods



Source: Delta Cost Project

Figure 2: The rising cost of tuition



Source: The Federal Reserve Bank of St. Louis

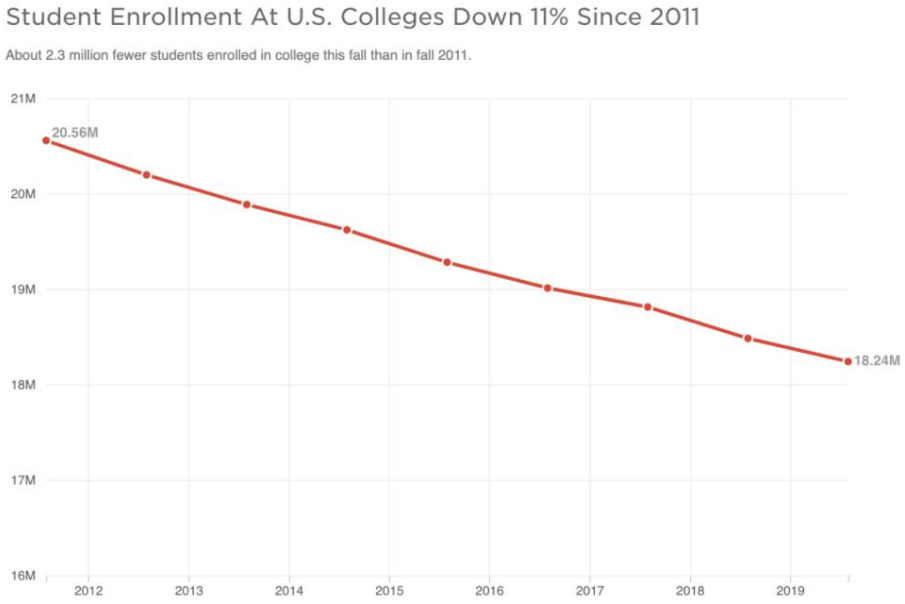
into account, average tuition and fees are effectively unchanged over the period (Wolla 2014). This demonstrates how colleges and universities are able to leverage sticker price and utilize artificial markups and corresponding discounts to attract more students, including students who can pay closer to the full amount of tuition, in order to generate more net tuition revenue.

The rising cost of tuition has a direct effect on applications and subsequently enrollments. A Sallie Mae survey from 2018 found that among the factors students and families consider when evaluating colleges, financial considerations are among the most influential. To narrow down colleges, 85% of students use financial criteria (compared to 78% using academic criteria). Furthermore, 65% of students reported eliminating schools based on published tuition price without further research (Sallie Mae, 2018). This highlights the importance of sticker price in the admissions process – if institutions set their tuition too high, they lose applicants who might otherwise consider applying. Pricing resets move towards a more transparent pricing model where the published price is closer to what the student actually pays.

Although institutions can change the sticker price of tuition with relative ease, they have much less control over enrollment; while students and their families worry about costs, colleges

and universities worry about enrollment. According to a recent report, U.S. college enrollment has decreased for the eighth consecutive year (National Student Clearinghouse Research Center, 2019), as shown in *Figure 3*. Enrollment in colleges and universities has been slowly and steadily declining, and admissions offices fear an inevitable cliff where enrollment will dramatically drop off in the coming years. This is attributable to several factors, including a declining high school graduation rate and concerns about the return on investment of a college education (The Chronicle of Higher Education, 2019).

Figure 3: The looming enrollment crisis



Source: National Student Clearinghouse Research Center

As colleges and universities struggle to simultaneously combat issues of declining enrollment and assuage student concerns about whether the steep sticker price of a higher education is worth the investment, some are employing a new strategy to attract and retain students: dramatically reducing tuition. This substantial reduction in an institution's published tuition price is known as a "tuition reset" and it is increasingly common: according to the National Association of Independent Colleges, 49 institutions have reduced their tuition since 2016. The tuition resets range anywhere from a minor 1% reduction (Davis & Elkins College) to

a 50% reduction (Duquesne University). Some institutions apply a tuition reduction broadly, while others target specific types of students, such as online students or transfer students (NAICU). Regardless of the specific amount or type of reduction in costs, institutions are using tuition resets to strategically adjust their tuition model so that they can attract more students and generate an equal or greater amount of aggregate tuition revenue from students. However, tuition resets do not always work. The education consulting firm EAB notes the potential downsides and reasons for a lack of consistent effectiveness from such resets, including quickly fading publicity gains from the reset, the issue of revenue loss from returning students, and the psychological connection between tuition sticker price and perceived quality (Bloom, 2017).

The new trend of tuition resets reflects the evolving admissions and enrollment strategies in higher education. As a market, higher education is a unique model, involving marketing tactics "associated more with selling airline tickets or flat-screen televisions," according to an article from *The Washington Post* (Anderson, 2019). The strategy of tuition resets intends to increase enrollment while maintaining or even increasing the net tuition institutions receive from students.

This research study analyzes the effect of tuition resets on higher education institutions by considering two key relationships. The first analysis considers the relationship between tuition resets and the tuition revenue institutions get from students, and whether lowering tuition is actually able to, in the aggregate, increase this revenue source for an institution. The second analysis examines the relationship between a reset and enrollment to determine whether lowering tuition helped institutions increase their enrollment numbers. Net tuition and enrollment are of

course different measurements, but both help to demonstrate the overall financial health of an institution – and both are metrics most institutions care about and track closely.

Basic price theory suggests that a decline in the sticker price of tuition from a tuition reset will result in an increased demand (i.e., student enrollment) and by extension net tuition revenue from students, but the business models used by institutions when determining tuition is anything but basic. I hypothesize that tuition resets will lead to an initial boost in both enrollment and tuition revenue from students, to be followed by a levelling off and/or decline in subsequent years. This study attempts to contribute to the current research by quantifying some of the qualitative claims from the existing literature on this topic.

There are a few notable parameters to this research study. First, all for-profit institutions were excluded from analysis because they have vastly different revenue models and ways of operating. This is consistent with the literature, which separates studies of for-profit institutions from studies of not-for-profit institutions. The biggest caveat of this research study is that most resets are relatively recent, and there simply weren't enough data to consider the long-term or even mid-term implications of a reset on an institution. However, by examining the immediate impact of a reset on an institution, this study endeavors to highlight the short-term effects of a tuition reset, which still has important implications for an institution's financial health and operations.

Section 2: Literature Review

There are two sets of literature related to tuition resets. The first considers tuition in the context of the higher education market more broadly, considering things such as how an

institution's tuition model is set up, the factors which affect tuition, and determination of tuition. The second set of literature is more recent and includes qualitative studies related to tuition resets.

Section 2.1: Sticker Price, Net Price, and Tuition Discounting

The first set of literature establishes the intricacies of an institution's tuition model. The sticker price is an institution's published tuition and fees – in a reset, this is the tuition amount which is reduced. However, because of price discrimination and the distribution of financial aid, scholarships, and loans, most students do not pay the full sticker price. The net price is the amount a student actually pays in tuition, after subtracting from the sticker price the grants, scholarships, and education tax benefits received. Tuition discount rates are defined as institutional grant dollars as a percentage of gross tuition and fee revenue. According to a 2019 report from the National Association of College and Business Offices, the average tuition discount rate is 52.2% for students in their first year at private colleges and universities and 46.3% for all other undergraduates. In other words, institutions used almost half of every dollar collected from tuition and fees for financial aid in the form of grants, scholarships, and fellowships. The tuition discount rate has continued to rise over the past decade, with especially significant increases following the 2008 recession (NACUBO, 2019).

The reduction in the sticker price of tuition from a tuition reset is almost always accompanied by a corresponding reduction in financial aid awards. This shifts an institution's pricing model, typically from high tuition and high aid to low tuition and low aid. The traditional "high tuition/high aid" model is especially common at private colleges and universities, where

the published sticker price is usually much higher than the average net price paid by students. However, in the midst of a looming decline in college enrollment and increased price sensitivity from students, this model is becoming less viable for less selective and tuition-dependent institutions (Casamento, 2016). As previously mentioned, one innovation some institutions are turning towards is a reduction of tuition sticker price via a tuition reset.

Section 2.2: Factors That Affect Tuition

Colleges and universities have a variety of different sources from which they can generate revenue, with federal, state and local grants, private gifts, investment returns on their endowments, and tuition among the most common sources. It should be noted that different institutions rely on different revenue sources in different ways. For example, a report from the Federal Reserve Bank of Cleveland found that tuition revenue per student is significantly higher at private institutions than at public institutions – not surprising considering the tax-funded financial support public institutions receive. Across both public and private institutions, funding from the state and local government has fluctuated broadly, but generally decreased over time. In contrast, revenue that institutions receive from the federal government has increased over time, but not at the same level of increase as the observed rise in tuition. In general, however, "a reduction in revenue from one source will be met with an increase from another source," according to the report (Hinrichs, 2017).

Decreases in state funding have significant effects on the tuition prices at public institutions. The New England Policy Center assessed state budget cuts in the New England region and found that when other factors are held constant, every dollar of reduced state funding

led to a 17 cent increase in net tuition and fees at public four-year institutions. The effect is even greater for community colleges which have a stronger reliance on state funding – for every dollar lost in state funding, community colleges cut institutional expenditures by 56 cents, according to the study (Zhao, 2019).

The effects of decreased state funding have been particularly pronounced for public institutions. In addition to raising net tuition and fees, many public institutions have turned to a new source of increased tuition revenue: out-of-state students. A study prepared for the Joyce Foundation analyzed off-campus recruiting visits of 15 public research universities to better understand their enrollment priorities and found that 80% of these institutions made more out-of-state visits than in-state visits, with almost half making twice as many out-of-state visits. Furthermore, for both in-state and out-of-state recruiting visits, the visits were concentrated at high schools in high-income communities with limited numbers of minority students (Han, Jaquette, & Salazar, 2019). Although public institutions are designed to serve the students of their state, they are increasingly attempting to boost student tuition revenue by attracting out-of-state students with a greater ability to pay – and who pay a higher out-of-state sticker price.

While public institutions might be increasing their focus on recruiting students from out of state, there is limited evidence to suggest that these institutions are increasing the amount of net tuition from nonresident students. A 2004 study analyzed changes in tuition and enrollment strategies at flagship state universities in light of changing federal and state need-based financial aid and state appropriations to institutions. The researchers conclude that public institutions use

nonresident enrollment more as a way to improve institutional quality than to capture additional tuition revenue (Rizzo & Ehrenberg, 2004).

The legal environment and government policy are also important factors which may affect tuition. In a study analyzing the impact of state control policies on college tuition, researchers Kim & Ko (2015) apply the principal-agent model to state governments, which have administrative and monetary power over individual higher education institutions and public universities and colleges. These institutions are agents in the sense that they must accomplish the state's educational goals and use the taxpayers' public money to provide higher education at an affordable price. The researchers found that when an institution has tuition-setting authority, the tuition dollar increase is close to double the increase seen at institutions where other sources have authority to set tuition (i.e., state control policies). In the analysis of state policies, the researchers find that two state policies – incentivizing minimum tuition increases and linking tuition policy to financial aid – are effective and have a significant impact in controlling tuition increases (Kim & Ko, 2015).

Section 2.3: Modeling the Determination of Tuition

Declining enrollment suggests reduced demand for a college education, which economic theory says will lead to some price reduction. However, most institutions are incrementally increasing the sticker price of tuition year over year. The process by which institutions set tuition is ambiguous and not publicly available information, but economists and researchers have developed models which propose different ways to model how tuition is set.

Gordon & Hedlund (2016) develop a quantitative model which sets up a structural model of higher education and macroeconomic forces to determine tuition. The study considers three types of shocks to tuition: supply-side, demand-side, and macroeconomic forces. Supply shocks consist of changes to non-tuition revenue such as cuts to state appropriations, while demand shocks focus on expansions in grant aid and loans. On the macroeconomic side, the main force that has an effect on tuition is the rising college wage premium. The model assumes colleges seek to maximize quality which depends on both the academic ability of the student body and the amount of investment expenditures per student. In financing these investment expenditures, institutions draw on revenue from two sources: exogenous non-tuition revenue (i.e., government appropriations, endowment income, etc.) and endogenous tuition revenue from students. In this model, institutions set tuition by charging students marginal cost plus a markup which reflects the individual student's willingness to pay. Gordon & Hedlund find that all three shocks combined generated a 106% increase in net tuition between 1987 and 2010, with the most significant impact coming from demand-side shocks (Gordon & Hedlund, 2015).

The determination of tuition is also commonly modeled using simultaneous equations to determine supply and demand. Paulsen (1986) lays the theoretical foundation of price theory, positing that the tuition students are willing and able to pay depends on the quantity they desire, their income or ability to pay, their tastes and preferences, and the price behavior of providers. Paulsen uses similar supply- and demand-side equations as Gordon & Hedlund (2015) and simultaneously determines both public and private sector tuition. This is also mirrored by Rizzo & Ehrenberg (2004) who used four simultaneous equations to estimate how public institutions respond to revenue shortfalls.

Section 2.4: Tuition Resets

Although there is an abundance of literature on the economics of higher education, tuition resets are a relatively recent phenomenon and there are no quantitative studies on tuition resets specifically. However, there have been a few qualitative studies on the topic, which provided valuable insight and direction for this quantitative research study. Both studies (Lapovsky, 2015 & Casamento, 2016) used interviews at anonymized institutions to compile a case study analysis of tuition resets.

Lapovsky (2015) looked at the situation and experiences of eight institutions before and after implementing a reset. Each of the institutions was private with an undergraduate enrollment of fewer than 3,000 students. The main reasons why the institutions studied reported implementing a reset was to appear more affordable via a lower price and to correspondingly drive up enrollment. Several institutions also implemented the reset in a move away from the "high price/high aid" strategy which predominates particularly across private schools. In terms of financial impact, three of the institutions experienced an increase in aggregate net tuition revenue from students, while the other five saw drops in aggregate net tuition following the reset. At seven of the eight institutions, new student enrollment increased between 1% and 50% in the year of the reset. All eight institutions lowered financial aid in accordance with the price reset. However, as Lapovksy notes, it is difficult to attribute too much credit to resets for increased enrollment because each institution studied implemented a variety of other changes along with the reset such as a four-year price guarantee, new academic programs, and a change in the mission statement.

Casamento (2016) studied four private, tuition-dependent colleges who implemented a reset. The resets differed in both magnitude and application. For example, one college only reset tuition for new students with the goal of improving awareness of the institution and driving up enrollment while another college implemented a reset more as a strategy for revenue diversification. Importantly, not every institution implemented the reset in an effort to drive up enrollment; two colleges in the study actually had rising enrollment at the time of the reset. At all four colleges, the reset resulted in short-term publicity and increased visibility both locally and nationally. Only two of the four colleges, however, successfully increased both undergraduate enrollment and net student tuition revenue in the first year of the reset and the year following. Whether or not the institution succeeded in their goals associated with the reset was largely dependent on the amount of planning that went into the reset – some schools rushed into the reset while others spent a long period studying the price sensitivity of current students and applicants and the potential effects of a reset – as well as the communication strategy following the reset.

Through interviews with top administrators and external consultants hired to help implement the reset, these two qualitative case studies provide very detailed information about the experience of implementing a reset at each institution studied. This research study aims to build off of these observations to quantitatively examine the effects of a tuition reset on an institution's undergraduate enrollment and net tuition revenue from students.

Section 3: Data and Basic Analysis

Section 3.1: Data Source

The data used in this study is drawn entirely from the Delta Cost Project (DCP) on Postsecondary Education Costs, Productivity and Accountability. The dataset endeavors to provide policymakers, educational institutions, and the general public with the data necessary to understand what colleges do with their money and specifically where the money comes from, where the money goes, what tuition money is paying for, and the relationship between spending and outcomes. The DCP website notes that, "The answers to these questions provide insight into the challenges and opportunities we face as we strive to improve higher education affordability and accessibility in the United States."

The database itself is derived from data collected from the Integrated Postsecondary Education Data System (IPEDS). IPEDS is a set of annual surveys conducted by the National Center for Education Statistics (NCES) which is a department within the United States Department of Education. All institutions are required to complete the IPEDS survey in order to be eligible for federal funding under Title IV (federal financial aid funds), so the survey has a consistently high response rate. The data collected in IPEDS is varied and includes institutional characteristics, institutional prices, admissions, enrollment, financial aid, degrees conferred, student success, and institutional resources (NCES).

The DCP is a longitudinal dataset derived from IPEDS. It specifically focuses on the components of finance, enrollment, staffing, completions, and student aid from the IPEDS survey. The dataset spans the academic years 1987 through 2015. In total there are 158,161

observations and 672 variables. The purpose of the dataset is to make the data from IPEDS more accessible and easier to analyze; the variables have been adjusted to constant dollars according to the Consumer Price Index for All Urban Consumers (CPI-U), the Higher Education Price Index (HEPI), and the Higher Education Cost Adjustment (HECA). Additionally, the DCP dataset has replaced missing data and adjusted data where necessary to stay consistent with changes in financial reporting standards over time ("Delta Cost Project Database 1987–2015 Data File Documentation").

While very user-friendly and easy to understand, one flaw of the DCP dataset is the way it presents data for institutions which report data for multiple branch campuses. These "parent" institutions combine their data with their "child" institutions and are reported together in the DCP dataset. According to the DCP database documents, "Institutions that reported data together because of a parent-child reporting relationship on any of the surveys for any year between 1987 and 2015 have been grouped together for all years in order to maintain the consistency of the data for the entire time period" ("Delta Cost Project Database 1987–2015 Data File Documentation"). For example, in the database the University of Texas-Austin observation also contains data for the other institutions in the UT system such as UT-El Paso and UT-Dallas.

A study published in *Research in Higher Education* in August 2016 found that this method of reporting parent-child institutions can potentially affect empirical analyses and results (Jaquette & Parra 2016). However, this problem is unique to the public sector and only 2.4% of all public institutions are affected. Almost all resets occur in the private sector, so this flaw in the dataset is not of material concern for this research study.

Section 3.2: Subset of Data Used

The DCP data are divided into two time periods: 1987-1999 and 2000-2015. This research study used only the second data period, from 2000 to 2015, for a few reasons. First, tuition resets are a recent phenomenon, primarily occurring in the years since 2000. Secondly, the earlier data period had more missing data.

The subset was further restricted by excluding all for-profit institutions because they operate very differently from not-for-profit institutions. In total, there were 60,721 observations for the subset used in this research study. For each observation there were hundreds of variables reported, but the relevant information considered for the study included institutional characteristics, information about tuition price and financial aid, and the general resources of an institution.

Section 3.3: Variable Definitions and Construction of the Reset Variable

Table 1 includes the definitions for key variables used in the research study. For the most part these definitions are straightforward, but there are some nuances which are important to note at the outset of this research study. First, the variable used for sticker price of tuition ("tuition") is the tuition charged by institutions to full-time undergraduate students who do not meet the state's residency requirements. For a school like the University of Richmond, broadly speaking, all students have the same sticker price regardless of residency. Institutions where residency matters for tuition are typically public institutions which have disparate in-state and out-of-state tuition. Because most schools implementing a reset are private schools, whether or not sticker price included in-state or out-of-state students did not change the reset calculations. Out-of-state

sticker price of tuition was chosen as the key variable because it was more likely to be manipulated by public institutions for purposes of enrollment and/or revenue optimization (e.g. see Han, Jacquette, & Salazer, 2019). It is also important to note that the tuition variable is just tuition and does not include additional fees such as room and board.

The second important decision made about which variable to include related to enrollment. Many – although certainly not all – institutions enroll a combination of undergraduate, graduate, part-time, and/or online students. This research study focuses specifically on undergraduate enrollment, so the full-time undergraduates variable is used as the enrollment variable. This variable excludes part-time students.

The third key variable to note is aid percentage, which is defined as the percentage of students receiving any type of financial aid. This includes institutional aid (financial aid and merit aid) as well as external aid such as loans, fellowships, veterans' benefits, and so on. The aid percentage variable has an important effect on both enrollment and net tuition revenue and is included in both sets of regressions.

Although the dataset included a variety of information about an institution's tuition, there were no variables specifically related to changes in tuition or tuition resets. The "tuition change" variable was created within the dataset by calculating the year-over-year percentage change in an institution's sticker price of tuition, using the "tuition" variable. Next, a reset dummy was constructed by looking at whether the tuition change variable was negative; if it was negative this indicated that an institution had decreased its price of tuition from one year to the next, which is by definition a tuition reset. There were 1,739 total resets in the subset of data used for this analysis.

Over 1700 resets may sound like a high number – it's certainly a much higher number of tuition resets than the literature or popular media suggests. However, most studies and news reports of tuition resets focus on tuition resets of a significant magnitude; the resets in this study were much smaller. *Table 2* shows the quartile breakdown of the quantity of the reset. The majority of the resets in this study were relatively small – the first quartile of resets were less than a 3% reduction in tuition, and 75% of all resets in the sample were less than a 25% tuition reduction. From this quartile breakdown, another set of dummy variables was constructed based on which quartile the reset fell into. The two sets of dummy variables (one based on simply whether or not an institution had implemented a reset and the second based on the magnitude of the reset) meant the regressions could include an analysis of any type of reset in addition to considering the size of the reset.

Section 3.4: Summary Statistics

The regression analysis (discussed in the following sections) was split into two parts in order to analyze net tuition and enrollment separately. *Table 3* shows the summary statistics for the first set of regression analyses, related to net tuition. Before running any regressions, all incomplete cases were removed, leaving 44,074 observations. Additionally, 42 observations from the aid percentage variable were removed because they were reported as above 1.00, which would indicate that more than 100% of students were receiving financial aid. This clearly does not make sense and is a reporting error. *Table 4* shows the summary statistics for the second set of regression analyses, related to undergraduate enrollment. Again, incomplete observations were removed, resulting in 38,431 observations.

The summary statistics reveal a few interesting findings. First, tuition had almost a $50,000 range with a mean around $12,000. The minimum value of 0 for tuition reflects how some institutions, primarily community colleges, are free to attend. For example, the state of Tennessee premiered the Tennessee Promise in 2014 which made community college tuition-free to all high school graduates. *Table 3* shows how state revenue was a key source of revenue, on par with net tuition revenue from students. This is especially important to consider when thinking about how a change in one type of funding might subsequently affect tuition sticker price (Zhao, 2019).

Section 4: Methodology

Section 4.1: Theoretical Model

The theoretical model for this research study was quite simple, going back to one of the fundamental basics of economics: price theory. Price theory is the idea that when price increases quantity demanded will decrease, and when price decreases quantity demanded will increase. Conversely, price increases will increase quantity supplied, and price decreases will decrease quantity supplied. A tuition reset is fundamentally a change in price, so price theory was used to hypothesize the corresponding effects on net tuition and enrollment.

Net tuition is the amount of money the institution takes in from students after institutional grant aid is provided. I hypothesized that decreasing the sticker price of tuition via a reset would result in a decrease in net tuition from students because of the revenue loss associated with students who had previously been paying closer to the full sticker price but were now paying a

lesser amount. For undergraduate enrollment, I hypothesized that the decrease in price would increase student demand and, by extension, the number of students enrolled. It has been empirically shown that students and their parents are very price-sensitive when choosing a college, and financial considerations are among the most influential factors in determining which institution to attend (Sallie Mae, 2018). Price theory therefore suggests that a decrease in the sticker price of tuition would drive up enrollment numbers.

Section 4.2: Methods

Because quantitative studies have not previously been conducted on tuition resets, there wasn't a clear method which stood out as the optimal method to use for this study. Economic studies on higher education in the past have utilized a wide range of methods, including simultaneous equations (e.g., Paulsen, 1986), difference-in-differences analysis (e.g., Hoxby, 2000), and standard OLS regression (e.g., Jaquette & Salazar, 2019). In the first stage of this research study, difference-in-differences analysis was used in an effort to focus on the effects of the tuition change, but challenges in constructing a control group and a lack of data for the post-treatment variable resulted in inconclusive and insignificant results.

Ultimately, the effect of a tuition reset on an institution's financial health was analyzed through fixed effects and random effects regressions because using these models best utilized the panel nature of the dataset. One of the key benefits of using panel data regression models is that it can better detect and measure effects that are unobservable in pure cross-section or pure time series data. Additionally, combining the time series of cross-section observations in the analysis provides more informative data and less collinearity among variables (Gujarati & Porter, 2009).

Two different dependent variables were tested: net tuition from students and undergraduate student enrollment. Independent variables included institutional factors (percentage of students receiving aid, size, status as a flagship institution) and funding sources (federal, state, and local grants). The factors chosen for inclusion in the analysis were based on the literature reviewed which suggested the most important factors in determining an institution's tuition.

The two dependent variables, net tuition and enrollment, were tested in two sets of regressions. A Hausman test was used to determine whether a fixed effects model or random effects model was preferred. It was found that a fixed effects model was preferred for the net tuition regressions, and a random effects model was preferred for the enrollment regressions. For both sets of regressions, three models were considered: first, a baseline model without a tuition reset variable; secondly, a model with a reset dummy; and third, a model with a reset dummy based on magnitude (dummy variables for first, second, third, and fourth quartiles) or the tuition change variable. Running a baseline model first highlighted how the models changed following the addition of a reset variable, and having one model with a general reset dummy and one model with a variable based on the magnitude of the reset was intended to determine whether the magnitude of a reset mattered in terms of outcomes.

The first set of regressions used a fixed effects within-group model to analyze the effect of a reset on net tuition. This model pools all observations, and each variable is expressed as a deviation from its mean value. The key assumption of the fixed effects model is that unobservable factors which might simultaneously affect the independent and dependent variables are time-invariant. In this analysis, these factors include things such as sector (public or private), type of institution (two-year or four-year), course offerings, school ranking, location, and so on.

The basic idea of fixed effects is to exploit within-group variations over time, and by controlling for average differences across institutions, there is a reduced threat of omitted variable bias (Gujarati & Porter, 2009). The fixed effects least squares dummy variable (LSDV) model was not used in this set of regressions because having a dummy variable for each institution would lead to a degrees of freedom problem, and would also lead to a potential issue of multicollinearity.

Since tuition resets have not been quantitatively studied previously, the decision to use a fixed effects model for net tuition and a random effects model for enrollment was based entirely off of the Hausman test. However, it makes sense that the two sets of regressions would have different models. For one, net tuition is a story of dollar values while enrollment is a numerical story. Additionally, institutions have much more control over setting their tuition than they do in determining enrollment numbers. The fixed effects model caters to the net tuition regressions by absorbing differences across institutions – key for individual institutions setting tuition – while the random effects model better controlled for the macroeconomic and other random variables not specific to institutions which affect enrollment.

The second set of regressions for enrollment used a random effects model. In contrast to the fixed effects model where the group means are fixed, in the random effects model the group means are assumed to be a random drawing from the sample (Gujarati & Porter, 2009). For random effects to work, institution-specific characteristics need to be uncorrelated with the other covariates of the model; this was tested by running fixed effects, then random effects, and then a Hausman test, which in the case of the enrollment regressions rejected the alternative hypothesis that fixed effects should be used. A random effects model intuitively makes sense for the

enrollment regressions because the individual-specific effect is a random variable which is uncorrelated with the explanatory variable. When thinking about how an individual institution models expected enrollment, there are a great number of variables which simply aren't publicly available and are unique to each institution. For this reason, individual effects are particularly important for the regressions related to enrollment.

Section 5: Results

Unfortunately, the coefficients on the reset dummy variables – the key variables in this study – were all statistically insignificant. Because of the lack of statistical significance there are limited conclusions that can be drawn. However, insights can still be drawn from the results.

Section 5.1: Results from Net Tuition Regressions

Results from the net tuition regressions are shown in *Table 5* (baseline model), *Table 6* (model with reset dummy included), and *Table 7* (model with reset dummy variables based on quartiles included). In the baseline model, the negative coefficient on aid percentage shows how net tuition drops as more students receive aid, which is in line with previous empirical studies. The negative coefficients on federal and local revenue suggest that an increase in this type of funding reduces net tuition, perhaps because institutions receiving federal and local grants rely less on tuition from students as a revenue source (e.g., Zhao, 2019).

The next model includes the reset dummy variable, which is not statistically significant. However, the negative coefficient on the reset dummy variable suggests that implementing a reset lowers an institution's net tuition. It is likely that institutions relied on tuition revenue from

students paying close to the sticker price, so lowering the sticker price would reduce the amount these students were paying, especially if they were paying in full. Additionally, institutions which implement a reset almost always lower financial aid in correspondence with the lowered tuition (Lapovsky, 2015 & Casamento, 2016). If financial aid from the institution is not lowered to minimally match the reduction in tuition, institutions may further decrease their net tuition revenue.

The third model includes reset dummy variables based on quartiles to test whether the magnitude of the reset made a difference. Again, there is a lack of statistical significance on the dummy variables related to the reset, but looking at the coefficients tells an interesting story – the first and third quartiles have a positive coefficient, indicating an increase in net tuition from a reset. This is likely attributable to the different ways the reset affected students. For example, a minor reset in the first quartile (less than a 3% reduction in sticker price) may have been marketed as a reduction in tuition with a corresponding decrease in financial aid, thereby generating more tuition revenue for institutions.

Section 5.2: Results from Enrollment Regressions

Results from the net tuition regressions are shown in *Table 8* (baseline model), *Table 9* (model with reset dummy included), and *Table 10* (model with tuition change variable included). In the baseline model, having more students receive any sort of financial aid increases enrollment, as expected. Dummy variables were also added for institution size based on guidelines from the College Board. Interestingly, status as a flagship institution appeared to lower enrollment.

The second model added the reset dummy variable. Although this variable lacked statistical significance, the negative coefficient suggests that a reset leads to a decline in enrollment. This is perhaps due to a perceived loss of quality at the institution or the psychological effect of students receiving less financial and/or merit aid in parallel with the lowered tuition (Bloom, 2017). In the third model, the positive (although not statistically significant) coefficient on the tuition change model tells the same story.

One thing to note across all three models is the very low R^2 value. This is not necessarily cause for concern because of the many factors which determine an institution's enrollment. These factors include characteristics unique to individual institutions which could not be included in the model because the data is not publicly available.

Section 6: Further Discussion

Tuition resets are a fascinating concept to study, in part because they reveal so much about the state of higher education – the constraints institutions face, the pressure to meet enrollment targets, and the relative weight of various revenue sources. While this research study focuses on resets during the 2000-2015 period and the immediate effects of a reset on an institution, it is also valuable to take a step back and consider tuition resets both in a historical context and in the context of the future direction of higher education.

Section 6.1: Historical Context

A revolutionary moment in higher education came after World War II when the GI Bill, formally known as the Servicemen's Readjustment Act of 1944, gave veterans the option to

return to school for free. Previously, higher education had been surrounded by a veil of mystique and seemed unavailable or out of reach for the working class and poor. But with the advent of the GI Bill, the doors to higher education were suddenly opened up to veterans regardless of economic background. More than 2.3 million veterans attended college under the GI Bill, at a cost of $5.5 billion to the federal government. In the first five years following World War II, veterans dominated the nation's college campuses; the nation's higher education institutions accommodated a total enrollment 75% greater than their prewar record. The GI Bill was considered an "ambitious educational experiment" and it forever altered the landscape of higher education in the United States (Olson, 1973).

Colleges and universities responded to the influx of students after the war by physically expanding campuses or opening new campuses; for example, Virginia Tech during this time opened two new junior colleges. This rapid rate of growth made increasing enrollment even more of a priority in the 1950s in order to sustain growth. Institutions also expanded their faculties, another investment which made enrollment even more important to maintain in order to meet all financial obligations (Frydl, 2000). Veterans and the GI Bill also played a pivotal role in redefining the purpose of higher education in the postwar era. Historian Kathleen Frydl writes that, "Veterans' scholastic preferences and the widespread perception of veterans as mature and vocationally directed both worked a kind of force on the content of education" (Frydl, 2000). While it was not a requirement, the GI Bill strongly promoted vocational training, and institutions quickly updated program offerings to meet those demands.

Frydl further notes that, "The postwar period of American higher education was so dramatically different from anything that preceded it – in scale and function – as to constitute a

generative moment, one that prepared colleges and universities for their postwar position of prominence" (Frydl, 2000). In this "postwar position of prominence," colleges and universities became sites where all types of people could become educated, not just the wealthy or well-connected. The GI Bill had been passed with the intention of warding off another economic depression following the end of a world war, but it also had the unintended effect of liberalizing higher education and making it more readily available to greater segments of the population (Olson, 1973). This, of course, had important implications for people's assumptions about the affordability and accessibility of a college education – considerations which remain important today.

Section 6.2: Covid-19 and the Future of Higher Education

Higher education today is dealing with a great deal of uncertainty associated with the global coronavirus pandemic. Already there has been significant financial loss, with some institutions projecting $100 million losses for the spring and an even greater financial hit in the fall (Hartocollis, 2020). With the spring semester cut short and the possibility of remote learning extending into the 2020-21 academic year, institutions worry about dramatic drops in enrollment. This is especially pronounced for incoming first-year students, many of whom must make a matriculation decision by May 1. A recent survey of high school seniors found that of students who already made a deposit at a four-year institution, 12% are no longer planning to attend college full-time (Seltzer, 2020). Combined with weakened endowments, a greater number of students likely to need financial aid, and travel restrictions limiting the number of international

students (many of whom pay close to full tuition and are key revenue sources for institutions), colleges and universities around the country are concerned about their future.

In mid-March, Moody's Investors Service downgraded the outlook for higher education from stable to negative. The report noted that, "Lower than expected enrollments will reduce tuition fee income and put pressure on institutions' budgets" (Moody's, 2020). While institutions with strong endowments and cash flows will likely be able to weather the virus, smaller institutions with less financial stability might not. A dire headline from *The Wall Street Journal* proclaimed, "Colleges are at a breaking point. The virus has thrown higher education into crisis, and some won't survive" (Korn, 2020). Public institutions may face additional challenges if government funding is cut. However, most institutions are struggling. Colleges and universities across the country have slowed academic hiring, suspended discretionary spending, implemented hiring salary freezes or cuts, and paused new capital projects (Hartocollis, 2020).

What this means in terms of sticker price and potential tuition resets has yet to be determined. The weakened economy and record unemployment suggest more people will consider higher education instead of the workforce, which may ultimately drive up demand for education in the near future. However, a continuation of remote learning or modified in-person instruction in light of public health concerns could make institutions even more hard-pressed to fill seats and justify a high sticker price of tuition. It is certainly possible a greater wave of tuition resets will occur in coming years.

Section 7: Conclusion

As colleges and universities seek to maximize tuition revenue and maintain steady enrollment in the face of a looming enrollment crisis, tuition resets are becoming an increasingly popular strategy. This research study analyzed the immediate effect of a reset on an institution's net tuition revenue from students and undergraduate enrollment. Initial results suggest that a reset actually decreases net tuition revenue and enrollment. However, the success or failure of a reset in large part depends on the way in which the institution implements it, and tuition resets may be a worthwhile strategy for many institutions. Future studies would benefit from more years of data collected following a reset in order to examine some of the long-term effects of a reset.

Section 7.1: Areas for Further Research

There are a variety of areas for future research on this topic. A key limitation of this study stemmed from the fact that only the immediate effects of tuition resets were examined, and not the longer-term implications. Incorporating more recent data from IPEDS could add five more years of data, but in order to fully study the long-term implications of a reset, this study would need to be replicated after more time has passed so that more longitudinal data can be included. Additionally, tuition resets are still relatively rare; as more institutions turn to resets as an enrollment or revenue strategy, future studies will have more data upon which to draw.

In addition to looking at the effect of a reset on an institution's net tuition revenue and undergraduate enrollment, other factors could be considered. For example, institutions are very focused on the quality of students enrolling at their institution. Future empirical studies could

look at how the quality of students changes following a reset, as measured by high school GPA, SAT or ACT scores, or other factors.[1] Colleges and universities also frequently consider the diversity of the students at their institution, so another extension of the research might consider how the student body changes in the years following a reset.[2] Key things to consider in evaluating how the student body changes include socioeconomic diversity, racial diversity, and geographic residency.

In order to better understand tuition resets, it might be valuable to consider the opposite of a reset – a significant price increase – and the effects of that on an institution. One such institution which made this decision was the University of Richmond, which increased the sticker price of tuition by 31% in 2004, an unprecedented action by a small liberal arts institution. Because price may signal quality, institutions like the University of Richmond have benefitted from increased enrollment and a rise in rankings following significant price increases (Columbus, 2014). Another possible extension of this research is the analysis of tuition freezes, which is when an institution decides not to increase tuition or, more commonly, when a governmental body like a state government prohibits an institution from raising tuition.

Finally, there is potential to expand the research on this topic beyond the economic discipline to consider some of the philosophical and ethical questions surrounding tuition resets and college tuition more generally. Putting aside the effects on an institution's financial health (stemming from student enrollment and tuition revenue) there is a question of how institutions use and leverage sticker prices of tuition. Having a high sticker price of tuition arguably functions as a tax on the wealthy, who are able to pay all or most of the full sticker price; this

[1] This extension to the research was recommended by Dr. Craft during my presentation
[2] This was recommended by Dr. Mehkari, also during my presentation.

tuition revenue, in turn, can be used to help subsidize aid given to students who are unable to pay the full amount of tuition. Empirical studies show that students and parents are very price sensitive about college and may eliminate schools from consideration based on sticker price alone (e.g., Sallie Mae, 2018). If an institution maintains a high sticker price, the very students who are most likely to benefit from the additional aid generated by more tuition revenue may not even submit an application in the first place. This could be tested empirically by looking at changes in application count following a reset.

Tables

Table 1: Key variable definitions

Variable	*Description*
Tuition	The tuition charged by institutions to full-time undergraduate students who do not meet the institution's or state's residency requirements
Tuition change	Calculated as the year-over-year percentage change in tuition
Full-time undergraduates	The total number of undergraduate students enrolled for 12 or more semester credits, or 12 or more quarter credits, or 24 or more contact hours a week each term
Net tuition	The amount of money the institution takes in from students *after* institutional grant aid is provided
Aid percentage	Percentage of first-time, full-time undergraduate students who received any financial aid
Federal revenue	Revenue received by the institution through acts of a federal legislative body
State revenue	Revenue received by the institution through acts of a state legislative body
Local revenue	Revenues from appropriations by a governmental entity below the state level
Flagship institution	Either the oldest campus in a public state higher education system, or any of the larger and better-known campuses

Table 2: Reset variable quartiles

Quartile	*Result*	*Notes*
1	-0.03	25th percentile
2	-0.17	50th percentile
3	-0.23	75th percentile

1,739 total resets

Table 3: Summary statistics for net tuition regressions

	Minimum	*1st Quadrant*	*Median*	*Mean*	*3rd Quadrant*	*Maximum*
Tuition	0	5520	9576	12404	17180	49950
Tuition change	-0.5748	0	0.03507	0.04468	0.07709	1.7742
Net tuition	-724,730	1,545,040	5,199,698	30,216,930	15,652,163	1,165,245,171
Aid percentage*	0.00	0.70	0.86	0.80	0.96	1.00
Federal revenue	10	112,296	487,081	2,887,920	2,885,572	106,276,384
State revenue	13,000	3,742,000	8,786,000	37,640,000	17,890,000	1,229,000,000
Local revenue	400	1,919,644	5,853,762	11,990,153	13,523,066	307,158,144

44,074 observations
* 42 observations removed – reporting error

Table 4: Summary statistics for enrollment regressions

	Minimum	*1st Quadrant*	*Median*	*Mean*	*3rd Quadrant*	*Maximum*
Tuition	0	5520	9596	12,437	17281	49,950
Tuition change	-0.992	0.039	0.077	0.189	0.200	1.774
Full-time undergraduates	0	161	679	1827	1934	158,789
Aid percentage*	0	0.70	0.86	0.801	0.97	1.00

38,431 observations
* 42 observations removed – reporting error

Table 5: Result from net tuition regression; baseline model

Variable	*Estimate*
Tuition	4397.80***
Aid percentage	-29,191,000***
Federal revenue	-0.61*
State revenue	0.68***
Local revenue	-0.064

R-squared: 0.7254
Adjusted R-squared: 0.7181

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 6: Result from net tuition regression; model 2 (with reset dummy)

Variable	*Estimate*
Tuition	4397.60***
Reset dummy	-4,547,600
Aid percentage	-29,626,000***
Federal revenue	-0.62*
State revenue	0.68***
Local revenue	-0.064

R-squared: 0.7001
Adjust R-squared: 0.6764

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 7: Result from net tuition regression; model 3 (with reset dummy based on magnitude)

Variable	*Estimate*
Tuition	2743.10***
First quartile	4,602,900
Second quartile	-7,709,600
Third quartile	34,277,000
Aid percentage	-28,648,000**
Federal revenue	-0.42
State revenue	0.62***
Local revenue	-0.32***

R-squared: 0.7001
Adjust R-squared: 0.6764

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 8: Result from enrollment regression; baseline model

Variable	*Estimate*
(Intercept)	1692.70***
Tuition	-7731.70***
Aid percentage	300.58**
Flagship institution	-164.62
Small size	-10.97

R-squared: 0.0004168
Adjusted R-squared: 0.0003127

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 9: Result from enrollment regression; model 2 (with reset dummy)

Variable	*Estimate*
(Intercept)	1713.90***
Tuition	-8550.20***
Reset dummy	-142.32
Aid percentage	294.99**
Flagship institution	-184.71
Small size	-5.87

R-squared: 0.0005019
Adjusted R-squared: 0.0003707

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 10: Result from enrollment regression; model 3 (with tuition change variable)

Variable	*Estimate*
(Intercept)	1202.30***
Tuition	1671.60
Tuition change	1.06
Aid percentage	619.28**
Flagship institution	-11.90
Small size	39.46

R-squared: 0.00090977
Adjusted R-squared: 0.0005199

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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