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# Tuition discounting at private higher education institutions and implications for revenue

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**Tuition discounting at private higher education institutions and implications for revenue**

by

**Luke Behaunek**

A dissertation submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
**DOCTOR OF PHILOSOPHY**

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2015

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## CHAPTER 1: OVERVIEW OF STUDY

During the past several decades, financial aid practices across the country have seen a dramatic change (Doyle, 2010a). One of the broad and substantial transitions within student financial packages has been the increased presence of institutional tuition discounting, which is generally defined as using institutional grants to subsidize educational expenses (Hubbell & Lapovsky, 2004). This practice has been especially prevalent at four-year private institutions. These types of institutions generally have the highest published cost of attendance and use this type of financial assistance to attract students and generate tuition revenue (NACUBO, 2014). Over the course of the past decades, this practice and its results have been increasingly called into question as a sustainable method of achieving enrollment and fiscal goals (Supiano, 2012).

Tuition discounting (TD) is more precisely defined as the percentage of tuition that is provided to students in the form of grant aid. In this study, tuition discounting was further narrowed to include only grant aid provided to students through an institution, which is the most common definition and source of tuition discounting (NACUBO, 2013). An institution can provide grant aid through two venues, restricted and unrestricted, with restricted aid funded by gifts or accounts specifically designated for and restricted to student financial aid. Unrestricted funds, commonly referred to as general funds of an institution, can be used at an institution's discretion to fulfill its mission in a wide array of interests (Hillman, 2011). A large majority of institutional tuition discounting practices that occurs through unrestricted grant aid comes from the general funds of an institution (NACUBO, 2013). Only about 10% of merit aid is currently being funded by endowment earnings, which is the most common source of restricted grant aid (NACUBO, 2013).

Over the past several decades, institutional grant aid practices have become commonplace throughout higher education and unrestricted grants comprise a significant amount of many institutions' annual budgets (NACUBO, 2014). These statistics and trends have been tracked by the National Association of College and University Business Officers (NACUBO). Grant aid for all undergraduates, as a percentage of tuition, has steadily increased from 33.9 percent in 2003 to 40.9 percent in 2013 for reporting private, non-profit NACUBO institutions, and almost every private institution uses discounting as part of admissions packages (NACUBO, 2014). "Colleges and universities are appealing to two sets of students with their discounts: those who are unable to afford the price and those who are unwilling to pay the price" (Baum, Lapovsky, & Ma, 2010, p. 2). In general, a transition of grant aid dollars from students unable to pay to those who are unwilling to pay has been realized as institutions of higher education (IHEs) use discounting to focus aid strategically to attract students with desirable characteristics (Doyle, 2010a; Heller, 2008). This strategy has been referred to as crafting a class, and while focused grant aid was moderately successful to attract certain students, many authors have questioned its effectiveness in the current higher education marketplace (Ehrenberg, Zhang, & Levin, 2006; Heller, 2006; Redd, 2000). In competing for highly desirable students in a competitive marketplace, IHEs are using large amounts of institutional resources to enroll students and fulfill the goals of the institutions. Consequently, the extent of this discounting may impact net tuition revenue (NTR) being generated by incoming classes (Hillman, 2011; Summers, 2004). Net tuition revenue is defined as the revenue gained through tuition and fees after institutional grant aid is subtracted.

There have been several groups that have published opinion papers and have reported levels of tuition discounting at private institutions over the past two decades. None have

completed a more thorough tracking than NACUBO. Since 1994, NACUBO has published results from a survey of four-year nonprofit institutions. The 2013 survey had 401 colleges and universities reporting, which provided data for the entering first-year cohorts in the fall semester of 2013. NACUBO reported an increase of the first-time, full-time freshmen tuition discount rate from 37.2% to 46.4% from 2000 to 2013, with 2013's level being the highest rate achieved over the years surveyed (NACUBO, 2014).

With the current levels of institution grant aid reaching the highest levels recorded in 2013, the influence of tuition discounting strategies on financial aid, budgetary, and college-choice processes has continued to increase (NACUBO, 2014). As a result, the reasons for administering institutional grant aid continue to evolve and are becoming an economic necessity for many colleges and universities, especially those that are heavily reliant on tuition revenue (Merea, 2010). While many organizations and authors have focused on the descriptive nature of the financial aid strategy, little has been done to evaluate the relationship between tuition discounting practices and net tuition revenue. This research focused on this relationship and investigated future implications of the current trends of tuition discounting.

### **Problem Statement**

As tuition discounting practices and purposes have shifted over the past two to three decades, researchers have questioned the effectiveness of this practice. The sticker price of an institution, the published price of attendance normally cited on an institution's website or in publications, has become more misleading as tuition discounting has significantly altered the price students may actually pay to attend (Cabrera & La Nasa, 2000; Davis, 2003; Fain, 2010; Lapovsky, 2004). As TD practices and levels continue to increase, families unfamiliar with financial aid practices that are considered standard at four-year, non-profit, private institutions

are particularly influenced by sticker prices that fail to capture the true cost of attendance. Students who are first-generation students or come from a household with a low income level can be particularly affected by this issue by feeling a published price is unaffordable, creating unintentional barriers to accessing higher education (Cabrera & La Nasa, 2000). Additionally, the ability for institutions to price discriminate between individual students, charging different tuition levels to different students for reasons unlikely to be known to incoming students, creates unpredictability in net prices for students (Baum, Lapovsky, & Ma, 2010). So, even if a student or family understands general financial aid practices, net price may still be difficult to predict (Baum, Lapovsky, & Ma, 2010).

Additionally, congressional and government officials have stated dissatisfaction with rising tuition levels. In 2003, Boehner and McKeon released a report outlining the cost crisis, from their perspectives, but failed to include institutional tuition discounting practices in their work, another example of the misconceptions surrounding tuition levels and affordability. The congressional members focused on the sticker price of tuition, rather than the net price students were charged after institutional tuition discounts were applied. In a more recent report provided by the former Secretary of Education Margaret Spellings in 2006, similar views were echoed, stating “the commission notes with concern the seemingly inexorable increase in college costs, which have outpaced inflation for the past two decades and have made affordability an ever-growing worry for students, families, and policymakers” (USDE, 2006, p. 2). These sentiments were recently furthered by President Obama, and he has proposed several initiatives to increase transparency, affordability, and accessibility (“Higher Education,” 2014).

With the changing levels in sticker prices and congressional and governmental sense of lack of affordability plaguing higher education, a stronger push has been made within the last



five years to increase transparency of net price facing students. In 2011, the Higher Education Act of 1965 required each college or university receiving Title IV funding to post a net price calculator on its website to give students and families a more realistic picture of the cost of an education at that institution (NCES, 2015b). This alteration to the existing Higher Education Act of 1965 was a significant step to raising awareness of net price and increasing transparency of total costs at varying institutions, giving students and families another tool during their college choice process.

With both tuition and TD levels continuing to increase across four-year private non-profit institutions, it remains unclear if these increases are sustainable in the future landscape of higher education. According to a recent survey of college and university business officers conducted by *Inside Higher Ed* and Gallup, 45% of officers at private, nonprofit institutions agreed or strongly agreed that their institution's current tuition discount rate was unsustainable, with another 25% remaining neutral (Jaschik & Lederman, 2014). Tuition discounting with institutional funds occurs in all types of higher education, but the practice is particularly crucial in private non-profit institutions due to their reliance on tuition revenue (Martin, 2012). In preparing annual budgets and financial aid strategies, each individual institution attempts to place itself in the best position possible to advance its mission. As a result, even if institutional leaders understand the national landscape and pressures facing their college or university due to rising tuition levels and tuition discounting, they will refrain from dramatic shifts in pricing or financial aid practices if changes are predicted to negatively impact the school either through reduced tuition revenue, enrollment, or prestige. Alarmingly, NACUBO has reported that during some years, net tuition revenue actually decreased across its respondents, even as discounting increased (NACUBO, 2013). In its *2012 Tuition Discounting Study*, NACUBO (2013) presented anonymous anecdotes

and examples from chief business officers. One person reported their institution's decrease in NTR was created by a combination of a 4.5 percent increase in tuition, decline in enrollment by about 7 percent, and an increase in financial aid by 4 percent (NACUBO, 2013). In NACUBO's 2013 study released in 2014, another institution reported increasing first-year discounting rates by one percent, hoping to increase net tuition revenue. However, "the plan did not work, as fall enrollment for first-year students fell below the desired goal, while the discount rate was higher than expected" (NACUBO, 2014, p. 32). NACUBO's finding of negative net tuition revenue growth and anecdotes showcase the complex relationship among net revenue, institutional grant aid, and tuition levels. Unfortunately, most research on this relationship has been presented in relatively descriptive statistics such as the NACUBO reports or admonitions of rising tuition levels. Few researchers have sought to analyze the relationship between net revenue and TD practices across institutions more deeply, forming a void in the research needing to be filled due to the severe implications of net tuition revenue at heavily tuition-dependent institutions.

### **Purpose of the Study**

The purpose of this study was to investigate the relationship between net tuition revenue and tuition discounting levels at four-year, non-profit, private institutions of higher education in the United States. Specifically, this study examined if there existed a level of tuition discounting at which the practice is associated with negative net tuition revenue. In response to the range of concerns presented by higher education administrators (NACUBO, 2014) and lack of data in this area, it was particularly useful to research if there existed a level of tuition discounting that was related to declines in net tuition revenue over the years of interest.

The selection of institutions was limited to four-year, non-profit, private colleges and universities primarily focused in baccalaureate education since tuition discounting practices have

historically been present at the highest levels within these types of institutions and most likely to have significant consequences (Hillman, 2011). Due to the high level of dependence upon tuition revenue at these institutions and the importance of tuition discounting within institutional financial strategies (Hillman, 2011), further analysis of the current and future state of institutional grant aid practices within these settings is warranted.

This study utilized panel data sets formed from data provided within the Integrated Postsecondary Education Data System (IPEDS) and The Institute for College Access & Success (TICAS), sources of information that provided data for the same institutions over the same time period. Using the panel data set, the research implemented a quantitative technique known as generalized methods of moments (GMM) in order to account for the complex relationship between the variables of interest. This particular method was utilized by Hillman in 2011 to investigate similar questions in public university settings. As Hillman (2011) noted, this specific modeling technique was helpful because “aid is utilized to generate revenue but institutions generating greater revenue are able to provide additional aid to students” (Hillman, 2011, p. 272). In addition to GMM, a supplemental regression model was included to model if institutions are maximizing net tuition revenue based on the net price charged to students.

In the few previous studies focused on the relationship between NTR and tuition discounting, similar but contradictory findings have been presented. Summers (2004) focused on four-year, non-profit, private institutions, and found that NTR increased as tuition discounting increased, but the author did not present a point in which the strength or direction of that relationship shifted nor investigated if a non-linear relationship existed between TD and NTR. Massa and Parker (2007) along with Hillman (2011) each presented studies that signaled that while the relationship presented by Summers (2004) existed within their research, there also

existed a tuition discounting rate that began to become negatively correlated with NTR. “In other words, the cost of aiding students is expected to eventually outweigh the (financial) benefits of enrolling students” (Hillman, 2011, p. 269). A purpose of this research was to investigate the nature of the relationship between discounting and NTR to uncover which, if either, of these patterns exist. This study added to the available research and was unique since it employed GMM and descriptive statistics within private, four-year, non-profit institutions to investigate if a relationship between TD practices and NTR exists, and if it does, if the relationship was linear or non-linear.

### **Research Questions**

The research questions for this study were focused on four-year, not-for-profit, baccalaureate, private institutions during the academic years from 2003-2004 to 2012-2013. The data provided in the panel set for the years of interest was grouped to focus on these research questions. The project sought to answer:

1. What is the effect of unrestricted institutional grant aid expenditures on net tuition revenue?
2. Does a rate of tuition discounting utilizing unrestricted funds exist that contribute to diminishing revenue returns of net tuition revenue?
3. If an affirmative finding to Question 2 is realized, what implications for the sustainability of current tuition discounting practices are found?

### **Significance of the Study**

The study supplemented the existing literature on the relationship between tuition discounting and revenue. Specifically, this research utilized quantitative methods that have not been previously applied to the sample of institutions chosen for the study. The findings of the

study have relevance to the type of institution represented in the study as private, baccalaureate, not-for-profit IHEs are continually making important decisions regarding institutional grant aid. The study has significance for individual IHEs as well as the national landscape of tuition discounting practices.

Due to the dependence of small, private, not-for-profit institutions on tuition revenue for general operating budgets, changes in net revenue can have significant impacts upon the general education of students, fiscal health of the institution, and affordability of a college education. If the study was unable to uncover more detail concerning the relationship between TD practices and net tuition revenue, it may impact how institutional leaders, enrollment managers, and financial analysts approach tuition discounting strategies. The relationship between tuition discounting and net tuition revenue may mean the difference between surviving, thriving, or failing as an institution.

### **Theoretical Framework**

In 1994, David W. Breneman published an economic theory regarding private colleges entitled “Liberal Arts Colleges: Thriving, Surviving, or Endangered?” Breneman’s theory provided this study with a framework that facilitated an understanding and interpretation of tuition discounting decisions taking place at four-year private institutions.

In Breneman’s work, he suggested a two-stage optimization approach, with the first stage of the theory “setting the desired enrollment, as well as creating the inputs (faculty, staff, facilities, and so forth) needed to serve that enrollment at a financially sustainable quality” (Breneman, 1994, p. 37). In the second stage, a college focuses on quality of the students, staff, and facilities, while being confined to certain budgetary restraints. Tuition discounting plays an important role in the second stage, because the “determinants of total revenue are an essential

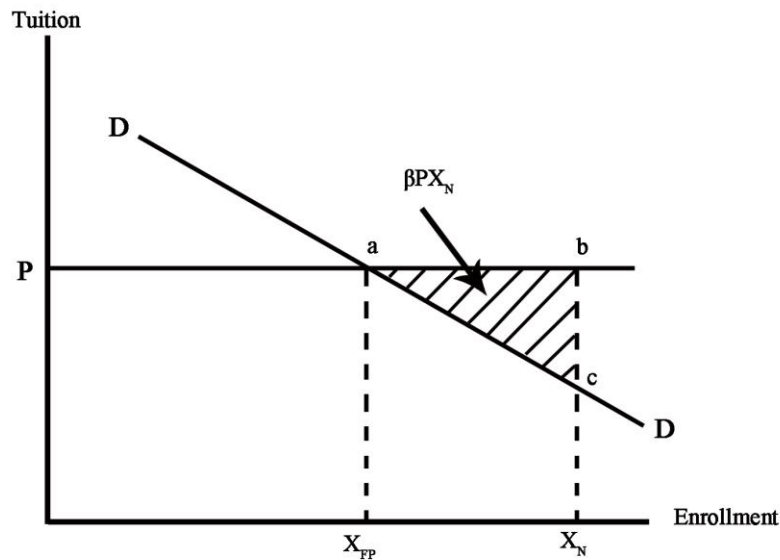
part of the budget constraint, and net tuition revenue (gross tuition revenue minus unfunded student aid) is, for most colleges, the largest single revenue source” (p. 38).

Breneman stressed the importance of TD when analyzing private four-year institutions, especially due to their reliance on tuition. Breneman (1994) reported:

Because tuition is the dominant revenue source for most private colleges, the linkage among the published tuition price, unfunded student aid, and enrollments is the central financial puzzle that must be solved if the financing of these colleges is going to be understood. (p. 40)

The author’s theoretical work depicting the relationship with these various financial components, informed by site visits to 12 different private institutions, created a framework that this study utilized.

Figure 1 presents a simple graphical representation of Breneman’s theory. Institutions face a downward sloping demand curve and seek to enroll an optimal number of students ( $X_N$ ), determined in the first stage of the two-step optimization model. However, only a portion of these students ( $X_{FP}$ ) will be able and willing to pay the full tuition and fees of the institution. Area *abc* shows the amount of unrestricted institutional grant aid required to reach optimal enrollment levels at tuition level *P* and demand curve *DD*. This figure and the accompanying theory provided the theoretical framework for the study by outlining how tuition levels, tuition discounting, and net tuition revenue are linked at four-year, private institutions.



*Figure 1.* Enrollment Demand and Unrestricted Tuition Discounting.  $\beta$  represents the tuition discount rate for unrestricted funds.  $X_{FP}$  is amount of full-pay students, and  $X_N$  is total enrollment.  $P$  is the tuition level of the institution, and line  $DD$  indicates the demand curve facing institutions. Adapted from “Liberal Arts Colleges: Thriving, Surviving, or Endangered,” by David W. Breneman, 1994. Copyright 1994 by The Brookings Institution.

### Definition of Terms

When conducting research across a period of time, a span of institutions, and higher education databases, it is useful to define specific terms within the research to facilitate consistency and a common understanding. The following terms were utilized either in the general discussion of the research questions or relevant to the analysis presented.

**Tuition Discounting.** Tuition discounting (TD) was defined as the percentage of tuition that was provided to students in the form of grant aid. In this study, tuition discounting was further narrowed to include only grant aid provided to students through an institution, which is the most common definition and source of tuition discounting (NACUBO, 2013). Tuition discounts can also include state, federal, or local funds to assist students attending IHEs, and if the study mentioned TD in this context, the expansion of the definition will be clearly indicated.

The rate of tuition discounting may be calculated by the ratio of institutional expenditures of grant aid to gross tuition and fee revenues for a group of students (NACUBO, 2014).

**Unrestricted Grant Aid.** Unrestricted (or unfunded) grant aid is composed of institutional grants that were funded from the institutional general funds, not a specified endowment fund or gift (Breneman, 1994). Institutional use of these funds represents a true trade-off between grant aid and other institutional spending priorities (Hillman, 2011).

**Restricted Grant Aid.** Restricted (or funded) grant aid is financed by gifts, endowment income, or other revenue sources that can only be used for student financial aid (Martin, 2012). Using restricted funds for grant aid does not contain the same opportunity costs to the institution as financing student scholarship through unrestricted tuition discounts (Hillman, 2011).

**First-time Student.** A first-time student in an undergraduate context is a student who has no prior postsecondary experience (except as noted below) and who is attending any institution for the first time at the undergraduate level, either on a part- or full-time basis. This includes students enrolled in academic or occupational programs. It also includes students enrolled in the fall term who attended college for the first time in the prior summer term, and students who entered with advanced standing (college credits earned before graduation from high school) (NCES, 2014b).

**Fall Cohort.** A fall cohort of students is a group of students entering in the fall term established for tracking purposes. For the graduation rates component, this includes all students who enter an institution as full-time, first-time degree or certificate-seeking undergraduate students during the fall term of a given year (NCES, 2014b).

**Net Tuition Revenue.** Net tuition revenue (NTR) is defined as the gross tuition and fee revenue less expenditures on institutional grant aid (Hillman, 2011). Similarly, net price is the



amount of tuition and fees a student pays after grant aid is deducted (NCES, 2014b). For purposes of this study, net price will generally reflect only institutional grant aid deductions. When the definition of grant aid is expanded to include other sources of grant aid, the adjustment will be made apparent.

**Institutional Revenue.** This revenue definition is defined as net tuition revenue (NTR) plus the amount of institutional resources spent on restricted tuition discounts. It also equals gross tuition and fee revenue less unrestricted tuition discounts. Institutional revenue, therefore, is the amount of funds the institution has from restricted sources and tuition and fees that is not spent on unrestricted discounts.

**Full-time Equivalent.** The full-time equivalent (FTE) of students is a measure that combines both full-time and part-time student enrollment into a meaningful measure. The Integrated Postsecondary Education Data System (IPEDS), created and managed by the U.S. Department of Education, has two definitions of FTE (NCES, 2014b). This research used the definition based on institutional credit hours of instruction as the main criteria for calculation. This calculation method divides the total undergraduate credit hours by 30 to derive undergraduate FTE, and graduate FTE is derived by dividing graduate credit hours by 24 (NCES, 2015a). Using this form of calculation was primarily due to the metric having both undergraduate and graduate student calculations. However, other studies citing FTE may have utilized a different metric.

**Baccalaureate Colleges – Arts & Sciences.** Baccalaureate College - Arts & Sciences institutions were identified as having at least half of all undergraduate degrees within arts and sciences fields (Carnegie, 2010). Institutions not meeting this stipulation were categorized in the diverse fields classification. The Carnegie Foundation altered this classification system in 2000,

2005, and 2010. Using the 2010 definitions provided by the Carnegie Foundation, institutions categorized as Baccalaureate College – Arts & Sciences in the fall of 2013 were included in this study.

**Baccalaureate Colleges – Diverse Fields.** Baccalaureate institutions not having at least half of all undergraduate degrees within arts and sciences were categorized in the diverse fields classification. The Carnegie Foundation altered this classification system in 2000, 2005, and 2010. Using the 2010 definitions provided by the Carnegie Foundation, institutions categorized as Baccalaureate College – Diverse Fields in the fall of 2013 were included in this study.

### **Variables**

The dependent variable in the study was net tuition revenue (NTR) and the independent variables were quantitative measures that focused on economic measures and institutional characteristics of interest. The years of interest included the time spanning 2003-2004 and 2012-2013 academic years, including the years between, with the 2012-2013 academic year being the latest time period that IPEDS student financial aid data was fully available. The data from these years was utilized to construct a panel data set to analyze the relationship between tuition discounting and net tuition revenue. This range of time allowed for annual differences to be present to analyze the relationship between tuition discounting practices and net tuition revenue, while maintaining a small enough range where common reporting practices were maintained and broad institutional changes, such as dramatic shifts in mission, were minimized.

In a supplemental model focused on the net tuition revenue amount per FTE and its impact on institutional revenue, the dependent variable is institutional revenue, as defined in the previous section. The data set from the primary model was utilized to analyze this relationship.

### **Economic independent variables.**

The economic independent variables of interest were undergraduate tuition and fee levels, graduate tuition and fee levels, unrestricted and restricted institutional grant aid amounts, and endowment value per FTE. The undergraduate tuition and fee levels were for the fall of each year and affect every student attending at an undergraduate level. The graduate tuition and fees level was the average sticker price for full-time graduate students. Grant aid amounts, due to the delineation between unrestricted and restricted, were reported in the aggregate measures, as fall cohort grant aid data for an incoming class is not divided between the different funding sources in IPEDS. Therefore, unrestricted and restricted aid amounts and subsequent discount rates were generated from the institution's expenditure data, not from student financial aid data for an incoming cohort. In the supplemental model focused on institutional revenue, net tuition revenue per FTE student was included as an independent variable.

### **Institutional independent variables.**

Institutional characteristics included as independent variables were FTE enrollment, graduate student enrollment, selectivity of admissions, percent of students who identify as a racial minority, SAT/ACT of incoming cohort, and number of students receiving federal Pell grants. Selectivity of admissions was calculated by the percentage of applications that were admitted by the institution for the entering fall cohort. Racial, academic profile, and socioeconomic status variables were added to the model since those variables are tied closely to potential aims of TD practices (Breneman, 1994; Hillman, 2011).

The pursuit for high-achieving students as measured by SAT score and selectivity, the priority of ensuring greater student diversity along the lines of race and ethnicity, and

assisting low-income students are but three motivations driving colleges to engage in discounting. (Hillman, 2011, p. 272)

As Hillman also discussed, many of these variables were endogenous to the model (Hillman, 2011). Endogeneity can occur when “it is unclear whether gains in net tuition are leveraged to “craft a class” of desirable students, or whether the opposite may occur; these variables both *influence* and are *influenced* by net tuition revenue” (Hillman, 2011, p. 272). For example, TD levels will influence net tuition revenue, but NTR levels may also impact the level of TD present at each institution. Therefore, a quantitative method that addressed this endogeneity was needed.

## **Methodology**

This study utilized a quantitative methodology to address the research questions. When analyzing higher education tuition discounting, this methodology is primarily used due to the high level of financial and numerical variables. Studies focused on tuition discounting utilizing qualitative methods were not discovered. Research generally differs on the specific quantitative methods, and the methods used in this study sought to differentiate this analysis of TD from other published work. The study used a panel data set and a technique referred to as generalized method of moments to approach this population of institutions.

Since this study focused on the relationship between net tuition revenue (NTR) and TD levels, more mainstream quantitative techniques such as ordinary least squares (OLS) were insufficient as many of the independent variables were endogenous to the model (Hillman, 2011). For example, TD levels influenced net tuition revenue, but NTR levels may also have impacted the level of TD present at each institution. Therefore, a quantitative method that addressed this endogeneity, and the endogeneity of other variables, was needed. In many cases, an

instrumental variable approach, utilizing a variable that is highly correlated with the endogenous variable but yet uncorrelated with the error term (Stock & Watson, 2007), may be implemented to address this concern. However, it is often difficult to find instruments that will be highly correlated with the independent variable while remaining exogenous to the model (Hillman, 2011).

Generalized method of moments (GMM) is a quantitative technique that has been employed by a few higher education researchers (Austin, 2010; Hillman, 2011; Titus, 2009), and Hillman's work most directly applied to this study since he utilized the technique to study TD practices at public IHEs, and his research questions were similar in nature to the aim of this study. GMM was utilized due to its ability to utilize instrumental variables while avoiding the common hurdle of identifying powerful instruments. "Through first-differencing the equation, GMM utilizes the lags of the differences to serve as instruments" (Hillman, 2011, p. 273), assuming that past levels of the endogenous variables (tuition levels, tuition discounting rates, demographics) will be "relevant predictors of future values" (Hillman, 2011, p. 273). This process allows the GMM technique to generate more instrumental variables than would be used in a more common two-stage least squares (2SLS) approach (Bond, 2002).

In addition to the GMM technique utilized to model the relationship between unfunded tuition discounts and net tuition revenue, a similar GMM technique was employed to investigate the relationship between net tuition revenue per FTE and institutional revenue.

This study focused on four-year, not-for-profit, private institutions that were primarily baccalaureate degree-granting, as defined in the fall of 2014 reporting year. Within the Carnegie classifications, the research was restricted to institutions classified as Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields. Baccalaureate/Associate's institutions will not be included as less

than half of degrees granted at those locations were bachelor's degrees (Carnegie, 2010), and this study was focused on institutions where baccalaureate education is the main priority. The Carnegie website identified 456 not-for-profit institutions within the two bachelor-level groups. These 456 IHEs were the institutions of interest in the study, assuming data was available on IPEDS for those locations.

### **Assumptions**

An assumption within this study was that institutions reported data consistently and accurately during the years of interest. Although the data from IPEDS is generally viewed as a reliable source of information, the data set relied on accurate and consistent institutional reporting. Changes in institutional staffing or reporting guidelines may create subtle variances within the panel data set that was utilized. While this may be true, personal communication with the research staff at IPEDS has indicated that the reporting methods and definitions used by private, four-year institutions from 2000-present have not changed significantly in regards to financial aid (G. Jones, personal communication, October 2, 2014).

Although the panel data set's time window was limited, substantial institutional changes could be present at a few IHEs. The Carnegie classifications were based on 2008-09 data when they were restructured in 2010 (Carnegie, 2010), and since the classifications were based on this snapshot of time, a few institutions may have changed characteristics relating to the classifications in the panel set's timeframe. The institutions included in the study were chosen based on these 2010 classifications, and if broad shifts in missions or characteristics were present within institutions during 2002-2009, institutions that may not directly reflect the institutional characteristics of interest may be included. These characteristics may have included, among

others, a reliance on tuition and fee revenue, breadth of tuition discounting practices, and focus on baccalaureate education.

### **Limitations**

Tuition discounting practices currently exist across all types of institutions, including public and for-profit entities that have much different missions and characteristics than those researched in this project. While this study sought to inform tuition discounting's relationship with net tuition revenue at a portion of baccalaureate institutions across the country, further research is also warranted concerning all types of institutions.

The National Center for Education Statistics has worked diligently to create uniform definitions for the topics researched in this article, but the financial recording and reporting mechanisms at IHEs vary. As stated, an assumption of this project is that data is reported accurately, but it is important to note that the gathering practices across institutions may vary. So, while the institutions may be reporting their own data accurately, true comparisons within national databases relied on institutional definitions aligning with national definitions. Additionally, there is a small but not insignificant lag in data availability within the IPEDS system. Data regarding student financial aid can take two to three years to be fully updated and accessible.

Due to the nature of the variables constructed within IPEDS, an important limitation is that not every variable was available for the same population of students. For instance, national test score quartiles (ACT and SAT) were available for fall cohorts of students, but the breakdown of unrestricted and restricted grant aid was only available from institutions as an aggregate measure for all students. The models were constructed in a manner that minimized the impact of this limitation, but this fact did influence the type of models able to be analyzed.

## Summary

Tuition discounting rates at private institutions of higher education have been increasing for decades, but the relationship between net tuition revenue and tuition discounting is still unclear. As Breneman (1994) stated, it is very important to understand how tuition discounting influences net tuition revenue since that relationship is key in understanding an institution's financial situation. The purpose of this study was to investigate the relationship between net tuition revenue and tuition discounting levels using a strategy under-utilized in investigating this research topic. The selection of institutions was limited to four-year, nonprofit, private colleges and universities primarily focusing in baccalaureate education, and the timeframe of interest was 2003-2013.

Chapter 2 will present relevant literature and research focused on the theoretical framework, costs of higher education, and tuition discounting, in order to provide an understanding of the broader context and material that have guided the study. The quantitative methodology and techniques will be discussed in Chapter 3, and the results of the study will be presented in Chapter 4. Chapter 5 will cover the major findings and conclusions, along with implications for practice for the institutions of interest.



## CHAPTER 2: REVIEW OF LITERATURE

Over the course of the past three decades, discussions and conversations regarding tuition discounting have become more commonplace within higher education literature. Analysts have shed doubt on the use of tuition discounting as a financial aid mechanism and have questioned its consequences (Baum, Lapovsky, & Ma, 2010; Doyle, 2010b). Although that is the case, almost every private institution uses merit- and need-based tuition discounts as part of admissions packages, which is “a major departure from past uses of institutional grant aid . . . [when] institutional grants were awarded primarily on the basis of students’ demonstrated financial need” (Redd, 2000, p. 1). Much of the recent literature regarding tuition discounting has focused on this transition, primarily investigating if TD practices have met enrollment management purposes. However, there is a gap in the literature directed at the relationship between revenue management and tuition discounting (Hillman, 2011), and the studies and reports which do exist on the topic tend to be descriptive in nature, outlining trends in net revenue over the same time period that TD trends are analyzed. Hillman (2011) addressed this void in the public university context, and this study aimed to accomplish the same within the context of not-for-profit, private, baccalaureate institutions.

The purpose of this study was to analyze the relationship between tuition discounting rates and net tuition revenue. This section will outline a theoretical model that guided the study and provide a review of the literature concerning the topic. First, Breneman’s 1994 work *Liberal Arts Colleges: Thriving, Surviving, or Endangered?* will be presented as a theoretical framework for the study. Literature concerning the cost of higher education, specifically focused on private, non-profit, four-year institutions will then be discussed. This section will focus on the rising tuition levels of higher education, forces or explanations for the increased tuition levels, and

public reaction to increasing costs. The coverage of these topics is meant to provide a context and setting for a discussion concerning tuition discounting and net tuition revenue.

The last, and most relevant, section of the review of literature will present research and studies focusing on tuition discounting. A brief history of TD practices will be present along with information from the National Association of College and University Business Officers (NACUBO) focused on national TD levels. The reasons and aims of TD will be presented with research illustrating the success (or lack thereof) of TD practices in achieving these goals. Finally, the limited research relating to the relationship between net tuition revenue and discounting rates will be discussed, and the chapter will conclude with case studies of institutional strategies addressing high tuition discounting rates.

### **Theoretical Framework: Breneman's Theory of Private Liberal Arts Colleges**

In 1994, David W. Breneman, an economist and former college president, published an economic theory regarding private colleges entitled "Liberal Arts Colleges: Thriving, Surviving, or Endangered?" Breneman's work was inspired by David Hopkins and William Massy's 1981 work "Planning Models for Colleges and Universities." In their study, Hopkins and Massy (1981) generated a theory of behavior of non-profit institutions and focused their framework on research institutions. Breneman utilized their approach, but he applied his research to more than 200 private liberal arts institutions, focusing on the institutions he felt were true to a liberal arts definition. In doing so, he eliminated all institutions awarding more than 60% of degrees in professional fields. Through this work, Breneman provided this study with a framework that facilitates an understanding and interpretation of tuition discounting decisions taking place at four-year private institutions examined in this study.

In Breneman's work, he suggested a two-stage optimization approach for private institutions, with the first stage of the theory "setting the desired enrollment, as well as creating the inputs (faculty, staff, facilities, and so forth) needed to serve that enrollment at a financially sustainable quality" (Breneman, 1994, p. 37). In the second stage, a college focuses on quality of the students, staff, and facilities, while being confined to certain budgetary restraints. Tuition discounting plays an important role in the second stage, because the "determinants of total revenue are an essential part of the budget constraint, and net tuition revenue (gross tuition revenue minus unfunded student aid) is, for most colleges, the largest single revenue source" (p. 38).

Breneman (1994) stressed the importance of tuition discounting when analyzing private four-year institutions:

Because tuition is the dominant revenue source for most private colleges, the linkage among the published tuition price, unfunded student aid, and enrollments is the central financial puzzle that must be solved if the financing of these colleges is going to be understood. (p. 40)

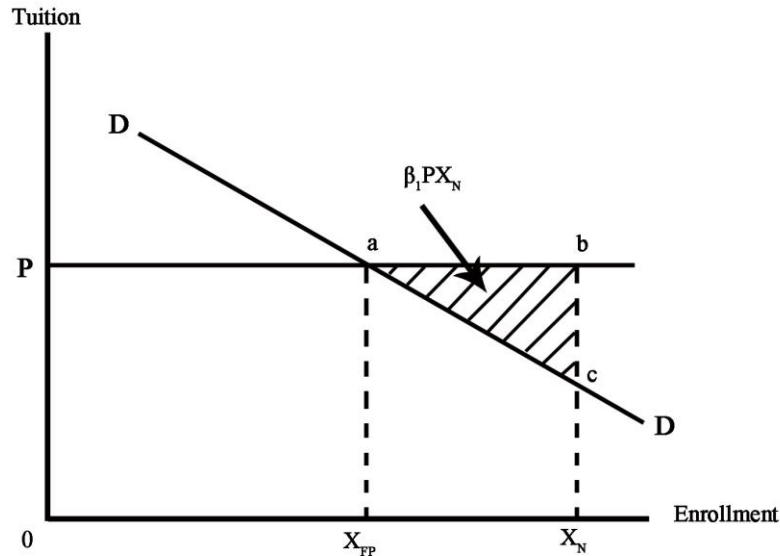
The author's theoretical work, informed by site visits to 12 different private institutions, created a framework that this study utilized.

Figure 1 depicts a downward-sloping demand curve facing institutions; higher enrollments can be obtained with lower tuition levels. In Breneman's view, institutions are unable to cap or restrict the amount of funds allocated to tuition discounting without potentially affecting enrollment levels. Breneman (1994) discussed three ways NTR can be increased at institutions: increasing demand facing the institutions (represented by a demand curve shift up and to the right in Figure 1), increases in tuition with the assumption that lower enrollments do

not offset gains in tuition revenue, and altering admissions standards to enroll some students who are able and willing to pay full tuition prices without institutional aid. The last way could be achieved by lowering academic standards or by widening the admitted student population in another manner, attracting students who are able to pay a larger amount of the published price of attendance. Importantly, tuition discounting strategies are not directly identified in these three areas. “Capping unfunded student aid at some arbitrary percentage of the expense budget, unrelated to the demand curve, could result in lower enrollments and a loss in net tuition revenue” (Breneman, 1994, p. 49). Following from this statement, Breneman would find that much of the alarm in high TD rates is unfounded. “Rather than arguing about the amount of unfunded student aid to budget each year, college officials would be advised to spend more time analyzing the changes in net tuition revenue that a combination of marketing, student aid, and tuition increases can generate” (Breneman, 1994, pp. 49-50).

Breneman also suggested that a careful examination of Figure 1 would yield changes in tuition and financial aid levels if an institution was seeking to maximize net tuition revenue. If, while facing the same demand curve, the cost of tuition is increased to a point where the demand curve intersects the vertical axis, the institution would enroll only one full-pay student and use discounting to achieve the desired enrollment,  $X_N$  (Breneman, 1994). “In this fashion, the college could in principle extract all of the consumer surplus from students and their families” (Breneman, 1994, p. 45). This practice would face some hurdles, Breneman suggested in three points. Primarily, no college could unilaterally raise tuition levels so steeply without repercussions, sticker shock would cause applications to fall, and institutions that practiced this would face an “outpouring of critical commentary, and few, if any, colleges would be willing to

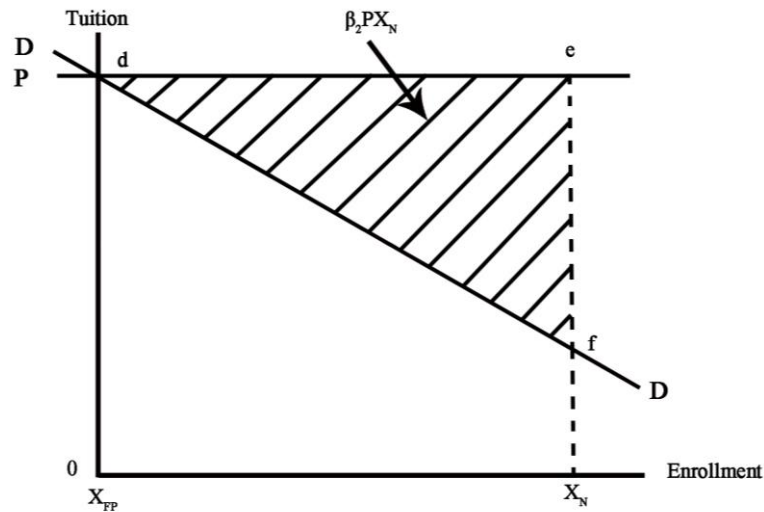
face such criticism alone” (Breneman, 1994, p. 45). Figure 2 extends Figure 1 to depict how this practice would be graphically represented within Breneman’s theory.



*Figure 1.* Enrollment Demand and Unrestricted Tuition Discounting.  $\beta_1$  represents the tuition discount rate for unrestricted funds.  $X_{FP}$  is amount of full-pay students, and  $X_N$  is total enrollment.  $P$  is the tuition level of the institution, and line  $DD$  indicates the demand curve facing institutions. Adapted from “Liberal Arts Colleges: Thriving, Surviving, or Endangered,” by David W. Breneman, 1994. Copyright 1994 by The Brookings Institution.

When comparing Figure 2 to Figure 1, the area within  $def$  is clearly greater than  $abc$  due to the increase in tuition level.  $\beta_2$ , the unrestricted tuition discount rate in Figure 2, also grows considerably compared to  $\beta_1$ . And, most importantly from Breneman’s viewpoint, the NTR represented by the area in  $PeX_N0$  in Figure 2 is now greater than  $PbX_N0$ , showing the maximization of NTR when faced with demand curve  $DD$ .

Breneman asserted that he felt the scenario presented in Figure 2 was unlikely for several reasons. However, due to the relatively rapid changes within tuition discounting practices since



*Figure 2.* Enrollment Demand and Unrestricted Tuition Discounting with One Full-pay Student.  $\beta_2$  represents the tuition discount rate for unrestricted funds.  $X_{FP}$  is amount of full-pay students, and  $X_N$  is total enrollment.  $P$  is the tuition level of the institution, and line  $DD$  indicates the demand curve facing institutions. Adapted from “Liberal Arts Colleges: Thriving, Surviving, or Endangered,” by David W. Breneman, 1994. Copyright 1994 by The Brookings Institution.

his publication in 1994, this situation is present within several colleges and universities in this study. For example, 266 of the 456 institutions awarded institutional grant aid to more than 95% of their incoming first-year cohort in the fall of 2012, and 174 of the 456 IHEs awarded institutional grant aid to 99% or 100% of the incoming first-year cohort in the same year (NCES, 2015a). To truly maximize NTR, however, each institution must be able to discern where a student falls on the demand curve. This may not only be affected by an individual’s ability to pay, but it will also be impacted by a student’s willingness to pay. The latter may be especially hard to measure (Cheslock, 2006), although recent modeling and data gathering techniques have made this more feasible.

Looking past the 1990s, Breneman posited that the challenges and futures facing liberal arts institutions varied widely. In his sampling, he studied a range of institutions with a variety

of factors influencing the demand curves facing those schools. He argued that the schools in his study filled all three possibilities outlined in his title; some were thriving, a majority of them were surviving, and few were endangered. Based on events since that time, it seems fitting to say that institutions existed in each of those categories (Baker, Baldwin & Makker, 2012). Even though most of the institutions present during his study are still functioning, many are facing similar challenges to those outlined in his work. Also, there have been a few colleges and universities that have closed their doors since his publication (Bidwell, 2015), and others have shifted in focus (Baldwin & Baker, 2009). “Many former liberal arts colleges are evolving, consciously or unconsciously, into more academically complex institutions offering numerous vocational as well as arts and sciences majors (Baldwin & Baker, 2009, p. 1). In a recent study, researchers found that only 130 of Breneman’s 212 institutions from 1990 were still classified as liberal arts institutions, using the same selection criteria (Baker, Baldwin, & Makker, 2012), indicating substantial shifts in the existence of these colleges over the past two decades. These shifts indicate how important it is to understand the economic, financial, and academic pressures small, four-year private institutions face, lending evidence to support the value of studies focused on tuition discounting strategies and viability of these institutions.

Breneman’s (1994) work provided this study with a framework to understand tuition discounting practices and how they may influence net tuition revenue. One of the most important deductions from Breneman’s work is his assertion that tuition discounting levels cannot necessarily be set and controlled if a certain enrollment level is desired. Although TD practices certainly have an important place in determining the financial health of institutions, alarm raised purely based on the rate of tuition discounting is not entirely founded, according to Breneman

(1994). Through his research, Breneman provided a structure that can be used to interpret the findings of the study.

### **Costs of Private, Four-Year Higher Education**

Since the purpose of this study was to analyze the relationship between institutional tuition discounting practices and net tuition revenue, it is important to analyze tuition levels and their growth during the last decade. Tuition levels intuitively have an effect on the demand of institutions (Heller, 1997), and Breneman's theory of the nonprofit private college utilized a downward-sloping demand curve (Breneman, 1994). This slope signals that increases in tuition levels leads to decreases in student demand for enrollment, a result commonly realized in studies focusing on student demand for higher education (Heller, 1997; Leslie & Brinkman, 1987).

#### **Pricing levels and potential impact upon demand.**

Price levels for undergraduate education at four-year, nonprofit, private colleges and universities for undergraduate education have undoubtedly increased during the past 12 years. Between the 2000-2001 and 2012-2013 academic year, the average tuition and required fees at these institutions increased from \$20,892 to \$28,746 in 2012 constant dollars (NCES, 2015a). This difference of \$7,854 represents an annual growth in tuition and required fees of 2.7%. For perspective, there was an annual increase of 4.75% at public, four-year institutions as tuition and required fees rose from \$4,625 to \$8,070 during the same time period, an increase of \$3,445 (NCES, 2014b).

During this time, the demand for four-year private institutions has seemed to vary, although the span of 12 years has witnessed an overall increase in the number of first-time, first-year students enrolling in these IHEs. In 2012, there were 642,686 first-time, first-year students enrolling at four-year, private IHEs, an increase from 498,532 measured in 2000 (NCES, 2014a).



However, the peak enrollment during this time period was in fall 2009 with 713,284 enrollees, and there has been a downward trend in each year between 2009 and 2012. The result mirrors total enrollment trends for first-time full-time students across education (NCES, 2014a). Between 2000 and 2012, this annual enrollment growth of 2.1% has lagged behind the 2.5% increase witnessed at four-year, public institutions during the same time period (NCES, 2014a). The market share of four-year private institutions of total undergraduate full-time first-year students has increased to 26.7% in 2012 from 26.0% in 2000 (NCES, 2014a), indicating that although the growth of students in four-year private institutions has been outpaced by four-year public institutions, the 2.1% annual enrollment growth has outperformed other sectors of education. This indication is borne out by enrollment results: growth at 2-year public institutions was 1.5% per year and -3.6% at 2-year private institutions (NCES, 2014a).

In the 2012-2013 academic year, the 456 institutions had a combined FTE student population of 652,611 students. These same institutions had an FTE student enrollment of 587,489 during the 2003-2004 academic year, although seven institutions did not report data in 2003-2004 for this variable. If those same institutions are removed from the 2012-2013 year's FTE, the number is adjusted to 649,971 FTE students, representing an increase of over 62,000 FTE students. This 10.6 percent increase during the years of interest mirrors the growth seen in first-time, first-year students enrolling at all private IHEs between 2000 and 2012, although the 1.02 percent annual growth rate realized at the institutions of interest in this study between 2003-2004 and 2012-2013 lagged behind the 2.1 percent annual increase witnessed at four-year private institutions during 2000-2012.

There have been a few researchers who have focused on meta-analyses of student demand and price response to tuition levels. Leslie and Brinkman (1987) first tackled this

challenge, focusing on 25 studies of student price response. They were not the first to attempt this, although the authors argued many findings were eroded and diminished by errors committed when standardizing studies for comparison. Although decades old, their processes and techniques established a foundation for future studies. Leslie and Brinkman (1987) concluded that a \$100 increase in tuition levels would lead to a decrease of .7 percentage points in 18-24 year-old participation rates. In relation to private institutions, the authors found student price response to be two to three times less powerful than at two-year schools, indicating that increases in tuition levels at more expensive and selective schools had lower effects (Leslie & Brinkman, 1987).

Heller (1997) extended Leslie & Brinkman's (1987) work to more recent studies, finding a \$100 increase in tuition levels was associated with a .5 to 1.0 percentage point decline in enrollment, a finding consistent with Leslie and Brinkman (1987). Heller's (1997) analysis also included financial aid, racial, and income variables. Heller concluded lower-income students and African American students were more responsive to price increases. Additionally, Heller (1997) found decreases in financial aid awarded were associated with decreases in enrollment, but the effect was different based on what types of financial aid were changed. Grant aid changes were met with higher sensitivity than changes in amounts of loans or work study (Heller, 1997). In general, however, Heller confirmed Leslie & Brinkman's (1997) findings of a downward sloping demand curve facing higher education.

The connection between student demand and tuition levels is a complex one, and some authors have posited that increased tuition levels may even create demand. This effect, coined the "Chivas Regal effect" after a high-priced alcoholic beverage, can lead institutions and consumers to view tuition levels as an indicator of quality, and as a result, create upward

pressure on costs of higher education (Russo & Coomes, 2000). “Proponents have argued that there are some psychological benefits to having a high sticker price, such as the perception of quality, and high discounting, such as the value a student perceives when he is offered a large package” (Kiley, 2011, p. 1). Due to this pressure, IHEs may be unwilling to lower published tuition levels since they may be perceived as less prestigious or lower quality (Breneman, 1994; Lapovsky, 2004). This contributed to the rapid tuition increases at the elite private institutions, and “the Chivas Regal effect suggests the perceived quality of an aspiring institution in the market may increase by raising tuition” (Martin, 2012, p. 37). If this demand effect is powerful enough to counter the downward-sloping demand curve outlined in Breneman’s theory (Breneman, 1994) or the demand studies by Leslie and Brinkman (1987) and Heller (1997), net tuition revenue gains will be realized by institutions as both tuition levels and demand increase.

These analyses concerning price of higher education have contradictory effects. In the study, specific connections between price and demand were of secondary interest. The primary focus on the study was to examine the relationship between net tuition revenue and tuition discounting. However, tuition levels for both undergraduate and graduate education were included in the model and analysis, to aid in controlling for these price fluctuations and potential influences on demand. As Breneman (1994) suggested, an institution’s main ability to increase net tuition revenue is driven by the demand curve facing that university or college, and this demand curve may be impacted by gross tuition and fee levels.

#### **Rising costs facing higher education.**

Although pricing levels of tuition have increased during the past few decades, it is reasonable to expect some modest increases due to the increasing price of goods that higher education utilizes. The increased price levels of those goods may be due in part to inflation or

scarcity, if a good is in relatively short supply and the market price of the good increases. A measure of inflation facing IHEs is the Higher Education Price Index (HEPI). Table 1 displays the factors and percentage increases within the HEPI and CPI during the years of interest. The month of August was used to show annual CPI changes since monthly statistics are available through the Bureau of Labor Statistics.

Table 1  
*CPI and HEPI Factors, 2003-2012*

	CPI	% Change	HEPI	% Change
2003	184.6	----	223.5	----
2004	189.5	2.65	231.7	3.67
2005	196.4	3.64	240.8	3.93
2006	203.9	3.82	253.1	5.11
2007	207.9	1.97	260.3	2.84
2008	219.1	5.37	273.2	4.96
2009	215.8	-1.48	279.3	2.23
2010	218.3	1.15	281.8	0.90
2011	226.5	3.77	288.4	2.34
2012	230.4	1.69	293.2	1.66

Inflationary pressures can account for some of the price increases over the past few years, but there are also theories that attempt to explain the increases in costs. These include the cost disease theory of William Baumol and William Bowen (1966) and the revenue theory of cost formed by Howard Bowen (1980).

#### ***Cost disease theory.***

In their work on cost disease theory, Baumol and Bowen (1966) first focused on the arts, stating that attempts to increase labor productivity would often be met with decreases in real or perceived quality. The theory is “based on the idea that technological progress that increases labor productivity (and thus reduces unit cost) is not randomly distributed across industries and over time” (Archibald & Feldman, 2006, p. 6). However, in higher education, efforts to increase

labor productivity such as using adjunct faculty or increasing class sizes are normally perceived to be decreases in instructional quality (Archibald & Feldman, 2006). Therefore, many IHEs intentionally choose to have less growth in productivity, which creates upward pressures on costs associated with higher education compared to other types of industries. Although many institutions are experimenting with more cost-effective mechanisms for delivering higher education, such as large on-line courses, pay-as-you-go degrees, and a decrease in tenure-track faculty members, the types of institutions represented in this study have lagged behind in efficiency gains (Selingo, 2013).

***Revenue theory of cost.***

The revenue theory of cost was created by Howard Bowen (1980) and focused on revenue as the driving influence of cost. Institutions seek to increase all types of revenue and will spend all resources they can raise, producing the value of unit cost. Bowen's (1980) work summarized his main points in five statements, including:

1. The dominant goals of institutions are educational excellence, prestige, and influence.
2. There is virtually no limit to the amount of money an institution could spend for seemingly fruitful educational ends.
3. Each institution raises all the money it can.
4. Each institution spends all it raises.
5. The cumulative effect of the preceding four laws is toward ever increasing expenditure. (pp. 19-20)

As institutions increase revenue through tuition and fees, fundraising, state and federal funding, and grants, the unit cost increases as well. However, IHEs do not necessarily seek to maximize all forms of revenue; practicing need-blind admissions, for example, leaves potential

revenue unrealized (Archibald & Feldman, 2006; Breneman, 1994). “This behavior suggests that Colleges and universities maximize some measure of excellence, prestige, or quality, but not revenue” (Archibald & Feldman, 2006, p. 10). Although this is in conflict with Bowen’s (1980) opinion that IHEs will raise all of the revenue they can, it also is predicted by Bowen’s first point that stated institutions are focused on excellence and quality (Archibald & Feldman, 2006).

***Comparisons between theories of rising costs.***

Archibald and Feldman (2006) compared and contrasted these theories, analyzing which, if either, was useful in explaining the cost increases of higher education. Their analysis utilized pricing changes in other industries across decades and sectors, and ultimately concluded the “cost per student in higher education follows a time path very similar to the time path of other personal service industries that rely on highly educated labor (Archibald & Feldman, 2006, p. 27). This result led the authors to conclude that the cost disease theory had greater explanatory power in analyzing the cost increases facing higher education. These increases in cost especially impact private, four-year, non-profit institutions, since “the fact private colleges are tuition-driven has resulted in a process that requires private colleges to increase their tuition levels to meet increased institutional costs” (Russo & Coomes, 2000, p. 34).

The various upward pressures facing pricing levels at IHEs can be seen through investigation of HEPI and the varying theories relating to increasing costs facing colleges and universities. Further evidence of the complexity of pricing and costs levels can be seen by the relationship between pricing levels and net tuition revenue. As pricing levels have increased, several colleges have begun challenging the high-price model of private, four-year, non-profit higher education by either sustaining low tuition levels or slashing sticker prices (Lapovsky, 2004; Massa & Parker, 2007; Stripling, 2009), indicating that pricing levels do not necessarily

dictate net tuition revenue. NACUBO (2014) reported in their annual study on tuition discounting that net tuition revenue had decreased in 2011 but increased in 2012 while price levels increased for the reporting institutions, and NTR was also projected to increase modestly in 2013 at a rate of 1.1%. The average institution of their study, which focused on 401 private, non-profit, four-year colleges and universities, continued to witness fluctuating tuition revenue amid a market that has witnessed sustained tuition level increases (NACUBO, 2014). However, due to varying circumstances facing IHEs, it remains unclear how tuition discounting influenced these fluctuations in NTR, which lends further credibility to this study.

### **Implications of high tuition levels.**

In 2003, United States House of Representatives' members John Boehner and Howard "Buck" McKeon co-authored an analysis of college price levels. The report was frank, blunt, and alarmist. This report signified some government officials' anger and concern regarding tuition levels and called for wide-ranging reforms such as cutting wasteful spending, increasing the amount of information available to consumers, and holding tuition levels at or below other measures such as inflation or income growth (Boehner & McKeon, 2003). However, the study failed to mention or analyze the growth of institutional tuition discounting. Rather than framing the conversation around net price levels, the report illuminated the public outcry focused almost solely on sticker prices.

A consequence of the increased prevalence and average amounts of institutional tuition discounts is that "the published price of a college education today is becoming less meaningful" (Lapovsky, 2004, p. 1). This has caused policymakers, such as Boehner and McKeon, to not consider all components influencing affordability for enrolling students. "The public debate over tuition prices is based solely on the listed tuition price, and policymakers increasingly are

pressuring colleges and universities not to increase listed tuition prices higher than inflation” (Cheslock, 2006, p. 38). Many prospective students, families, and other involved parties who do not understand the full picture may be negatively distracted by rising tuition levels, believing that is a sole indicator of affordability (Heller, 1997). If tuition increases are offset by additional grant aid, the net price facing students may not change.

Nevertheless, rising sticker prices may have a disproportionately adverse effect on some populations. Student’s perceptions regarding ability to pay and the affordability of college can have a substantial impact upon application and enrollment rates, and low-income populations are particularly sensitive (Cabrera & La Nasa, 2000; Fain, 2010). As a result, the historically high tuition levels witnessed today may unintentionally create barriers to access for low-income families or others who may not have a full understanding of the financial aid processes and availability. Although it is difficult to portray the individual situations influencing families and college-going decisions, this study utilized numbers of Pell Grant recipients as an independent variable, and it analyzed trends in Pell Grant recipients at institutions over the years of interest.

In addition to the Boehner and McKeon (2003) report, there have been other government commissions and reports focused on the topic of increasing costs and price levels in higher education. The National Commission on the Cost of Higher Education was formed in 1997, and the commission co-authored “Straight Talk About College Costs and Prices” (1998). This report discussed the costs and tuition levels in higher education, and included tuition discounting in the conversation. The commission presented a thorough analysis of rising costs and price levels, and stated the concern of accessibility of higher education to families was a substantial one that should be addressed (National Commission on the Cost of Higher Education, 1998).

More recently, continued examples of policymakers’ concern regarding tuition levels,



affordability, and accessibility have been present. In 2006, Secretary Spellings of the U.S. Department of Education commissioned a report focused on higher education. Unsurprisingly, cost and affordability of higher education were discussed in the report, and the commission concluded both institutional and federal leaders should be focused on reducing costs associated with post-secondary education and simplifying a financial aid system that is “confusing, complex, inefficient, duplicative, and frequently does not direct aid to students who truly need it” (U.S. Department of Education, 2006, p. 11). These sentiments were furthered by President Obama, and he proposed several initiatives to increase transparency, affordability, and accessibility (“Higher Education,” 2014).

Over the past two decades, the public criticism and alarm over tuition levels has increased along with the prevalence and role of tuition discounting in four-year, non-profit institutions. It is clear that tuition discounting plays a more important role each year (NACUBO, 2013), but it is still unclear how TD practices impact net tuition revenue. As this relationship is analyzed, it is useful to have a better understanding of the broader context facing private, non-profit, four-year institutions: increasing costs, growing concerns regarding accessibility, and higher levels of public scrutiny.

### **Tuition Discounting**

In order to investigate the relationship between tuition discounting and net tuition revenue, it is important to investigate literature focused on tuition discounting. This section will provide a brief history of tuition discounting practices, current levels of tuition discounting and the NACUBO annual survey, the reasons for tuition discounting and research focused on those outcomes, discounting’s relationship to net tuition revenue, and finally, other approaches some colleges and universities are taking to tuition discounting.

### **History of tuition discounting.**

Tuition discounting through institutional or other means has been part of the system of United States higher education for centuries (McPherson & Shapiro, 1998), beginning with a small, singular donation at Harvard University in the 1600s to help a needy college student (Martin, 2012). However, the practice did not spread widely and remained focused on small, need-based programs until the 1950s when the College Scholarship Service (CSS) was established to “apply a uniform methodology in determination of financial need” (McPherson & Shapiro, 1998). For the first time, meritorious attributes such academic ability, special skills, desirable characteristics, etc., were included in the discussion of financial aid practices, although discounting programs remained largely focused on need-based aid during the following decades (McPherson & Shapiro, 1998). During the middle of the 20th century, several government-operated initiatives also began to focus on increasing access to higher education. These initiatives included the GI Bill following World War II, National Defense Education Act in 1958, Higher Education Act of 1965, and the Basic Educational Opportunity Grant, which was formed in the 1970s and transformed into the Pell Grant program (Russo & Coomes, 2000).

The 1970s to early 1980s witnessed a sharp growth in merit-based aid practices (Davis, 2003; McPherson & Shapiro, 1998; Russo & Coomes, 2000), and this growth was followed by steady and significant increases in tuition levels and the emergence of the Chivas Regal effect (Russo & Coomes, 2000). Merit aid began to be used as an important leveraging tool to attract the highest achieving students and created a competitive marketplace (McPherson & Shapiro, 1998). Colleges and universities, as a response, began entertaining agreements to reduce or remove bidding wars focused on merit aid, which drew the attention of the Department of Justice due to the collusion of institutions focused on manipulating the financial aid marketplace

(McPherson & Shapiro, 1998). During the 1980s and 1990s, merit aid practices continued to expand and became an important enrollment management tool (Davis, 2003). Even as early as 1990, literature began emerging concerned about the escalating tuition discount levels (Russo & Coomes, 2000), and as tuition discounting rates have climbed, so has the documentation over the drawbacks and unintended consequences of the practice.

As tuition discounting levels have increased, so have the potential trade-offs between spending institutional resources on financial aid and other major areas of a college or university's budget. Dollars spent on unfunded, or unrestricted, institutional grant aid are provided by the IHE's general resources. As a result, decisions supporting having additional funds directed to unfunded institutional aid may redirect resources away from other areas of the budget and alter the educational experience for students and faculty (Griffith, 2009; Massa & Parker, 2007). If an institution increases unfunded tuition discounts but does not realize growth in net revenue, the circumstances "may make the colleges less valuable to their students and less able to compete in the marketplace for future students" (Davis, 2003, p. 24). Nonetheless, the upward trend of institutional tuition discounts has continued in spite of the potentially negative consequences.

#### **NACUBO annual survey.**

There have been several groups that have published opinion papers and have reported levels of tuition discounting at private institutions over the past two decades, but none have completed a more thorough tracking than the National Association of College and University Business Officers (NACUBO). Since 1994, NACUBO has published results from a survey of four-year nonprofit institutions, with 401 colleges and universities reporting for the 2013 survey, which provided data for the entering first-year cohorts in the fall semester of 2013. Since 2000, NACUBO reported an increase of the first-time, full-time freshmen tuition discount rate from

37.2% to 46.4% in its most recent survey, which is the highest level achieved over the years surveyed (NACUBO, 2014).

The amount of the average discount has increased since 2000, and so has the frequency of students receiving discounts. In 2013, nearly 89% of first-time, full-time students received institutional grants, the highest level recorded and an increase from 77% from 2000. Small institutions had the highest rates of students receiving grant aid, with an estimated 93.7% receiving an institutional grant in 2013, up from just 80.6% in 2000 and from 90.1% in 2012 (NACUBO, 2014). Due to the increased overall rate and the greater percentage of students receiving institutional grant aid, the average institutional grant as a percentage of tuition and fees for those receiving one was 53.5% in 2013, which was the highest level recorded between 2000 and 2012, and an increase from 49.6% in 2000 (NACUBO, 2014).

NACUBO has also tracked net tuition revenue for the reporting institutions during the past decade. After controlling for inflation using the HEPI, “over the past 13 years, institutions have had flat net tuition revenue. Said another way, gross tuition price increases have been largely offset by increased aid to students” (NACUBO, 2014, p. 45). Although the report did not use modeling or statistical techniques to further examine this relationship, anecdotal comments were provided anonymously from chief business officers responding to the survey. Many of the comments focused on this complex relationship between net tuition revenue, tuition discounting, and tuition levels. Some officers reported increased tuition levels leading to NTR increases but declining enrollment, while others reported increased tuition levels corresponding with as much as a 10% decline in NTR. An institution in the Great Lakes region reported budgeting for a decline in first-year enrollment with a flat discount rate. Late in the enrollment process the school identified a targeted group of students, and “institutional aid dollars were redeployed in

order to increase net tuition revenue. This program was moderately successful” (NACUBO, 2014, p. 17). This example showcases how institutions leverage not only amounts of tuition discounts to attempt to achieve budget and enrollment goals, but also the timing of such discounts in the decision-making process. Due to the aggregate nature of the data within IPEDS, this study will not be able to account for the various strategies and timing used in TD practices.

NACUBO (2013) also reported information related to college and university endowments. Although endowment earnings may be used for institutional grant aid, for the FY12 year (academic year of 2011-2012) only 10.4% of institutional grant aid focused on undergraduates was funded by endowment revenue. At small institutions, this value was 10.1% for FY12. Unsurprisingly, the amount of grant aid funded by the endowment varied by the endowment level. For institutions with endowments valued at over \$1 billion, endowment earnings funded 32.5% of grant aid. As endowment value declined, so did the amount of institutional grant aid funded by the earnings. Institutions with \$100 million to \$500 million endowments funded only 9.8% of their grant aid with endowment earnings, and those with endowments valued at less at \$25 million funded 6.2% of grant aid with earnings (NACUBO, 2013). Another interesting trend related to endowment values is the greater the value, the higher percentage of grant aid that is directed to meeting students’ financial need. At institutions with endowment values of over \$1 billion, over 90% of grant aid focused on meeting student need, while only 62% was need-based at institutions with endowments valued below \$25 million.

In their concluding thoughts, the 2012 NACUBO report quotes a survey participant as stating, “it gets harder every year...” (NACUBO, 2013, p. 54), referring to the overall balance between net tuition revenue and tuition discounting practices. NACUBO felt this was an apt summary of the results of the “2012 Tuition Discounting Study” and acknowledged “there are

many indicators the business model that higher education has relied on for many years may have to change” (NACUBO, 2013, p. 54). Although there were many institutions reporting they were able to use tuition discounting effectively to meet enrollment goals, increasing net tuition revenue, or realize other objectives, the sacrifices, trade-offs, and consequences necessary to do so are becoming increasingly complex.

### **Reasons for discounting.**

The reasons colleges and universities employ tuition discounting vary across institutions but they generally fall into two categories: enrollment management and revenue generation (Doyle, 2010a; Hillman, 2011). Institutions may attempt to shape or craft a class to fit enrollment priorities. This may mean removing barriers to increase accessibility for students unable to pay full tuition prices, focusing on students from diverse backgrounds, recruiting academically talented students, or enticing students with other characteristics the institution finds desirable (Breneman, 1994; Davis, 2003; Hillman, 2011; Redd, 2000). Efforts to direct resources to these categories of prospective students may have a financial impact due to discount strategies. “Institutions may desire to achieve a variety of enrollment management objectives through the strategic use of tuition discounts, but these efforts are ultimately conditioned by the financial benefits and costs associated with aiding students” (Hillman, 2011, p. 264). As a result, it is important to review these reasons for discounting and include them into the models used to analyze the relationship between tuition discounting and net tuition revenue.

### ***Tuition discounting and low-income students.***

Of the goals that relate to student characteristics, meeting the financial needs of low-income students has drawn attention from researchers and analysts. Many students are unable to pay the cost of attendance, even after other sources of financial aid such as federal grants, state

funding, or private loans are exhausted. Institutions may decide to direct institutional grant aid to meet the uncovered costs of these students' attendance, either out of a sense of mission or obligation or if an institution will still realize a net gain in tuition revenue (Doyle, 2010a; Redd, 2000). However, as the purposes of institutional tuition discounting have begun to encompass more areas than meeting financial need of students, "dollars are sometimes provided to the students even if they and their parents could pay the full cost of tuition and fees" (Redd, 2000, p. 2). The increased focus on meritorious reasons to discount "means that resources at institutions are being spent on where, and not whether, a student goes to college" (Doyle, 2010a, p. 808). This could present a trade-off between enrolling lower-income students and other individuals who institutions find attractive (Ehrenberg, Zhang, & Levin, 2006).

Several authors have investigated the amount of tuition discounts applied to various income brackets, and the trend of offering more amounts of institutional grant aid to more wealthy students is well-documented (Davis, 2003, Doyle, 2010a; Heller, 2006; Heller, 2008; Redd, 2000). Heller (2006) indicated that in 2003-2004, students from the highest income quartile (income greater than \$92,433) received 21% of institutional need-based grants while receiving 30% of merit-based institutional grants. In comparison, the same quartile received only 1% and 4% of federal and state need-based grants, respectively (Heller, 2006).

Researchers have investigated the impacts of offering merit-based grant aid on enrollment levels of lower-income students. Ehrenberg, Zhang, and Levin (2006) attempted to model if merit scholarships, measured by National Merit Scholarship (NMS) recipients at an institution, were associated with levels of lower-income students, measured by Pell grant recipients. They focused on the 100 colleges and universities with the most NMS recipients in 2003. However, their study was limited in a significant manner; since NMS levels were

measured by first-year recipients and Pell grants were measured aggregately by undergraduates, they had to create admittedly unrealistic assumptions. These assumptions included that every student entered as a first-year, students graduated and did so in four years, and Pell eligibility did not change during college. With their model, the researchers found that the impact of NMS awardees varied by how the awards were funded. If type of funding was not considered, the authors found for each additional 10 NMS recipients, a predicted decline of about two Pell grant recipients was predicted. If the institution funded the NMS awards, the effect doubled to a decrease four Pell grant recipients. However, if the institution did not fund the NMS awards, there was no statistically significant effect upon Pell grant recipient levels. Based on this evidence, the authors concluded that a trade-off between employing merit-based awards and enrolling lower-income students may exist at institutions (Ehrenberg, et al., 2006).

William Doyle (2010b) investigated the question of this trade-off by focusing on a different form of funding. Doyle analyzed state financial aid programs from 1984 to 2005 to see if state spending on merit aid programs resulted in lower spending on need-based aid. Doyle, using several different model specifications and techniques, did not find a statistically significant relationship between changes in merit aid and need-based aid. Doyle was unable to answer what would have happened to levels of need-based aid if merit aid spending was not present in states, but the author did find that little happened to need-based programs when merit aid funding was present in states.

Authors and researchers have raised concerns about the shift from need-based aid to merit aid from different perspectives. Cabrera and La Nasa (2000) indicated through their research that increases in income were associated with increased knowledge regarding financial aid programs and qualifying criteria. Therefore, lower-income students were engaged in the



college-choice process differently than students from more affluent backgrounds, possibly having real or perceived financial barriers due to a lower socioeconomic status (Cabrera & La Nasa, 2000; Hubbell & Lapovsky, 2004). The inclination for some low-income families to avoid the perceived high cost of a college education may further the income and education gap present between wealthy and lower-income families that is already a critical issue in this country (Kim, DesJardins, & McCall, 2009; “Higher Education,” 2014).

It remains unclear if merit aid has reduced the resources directed to need-based grant aid, but the lack of access, affordability, and knowledge facing lower-income families are current issues that need addressed on national, state, and institutional levels. Federal, state, and institutional grant aid programs have undoubtedly increased access to families from all backgrounds, including those who are in lower income brackets. However, current tuition discounting practices should be carefully reviewed to evaluate if they truly benefit all who are involved.

#### ***Enhancing diversity with tuition discounting.***

Diversifying the racial or ethnic profile of a campus may be another goal of institutions, and achieving this result may be an intended outcome of tuition discounting (Breneman, 1994; Davis, 2003; Hillman, 2011; Redd, 2000). Institutions may focus on this goal due to mission alignment, a sense of duty to a specific community, or a prioritization of diverse perspectives. Although literature focused on the possible equity issues involved with tuition discounting usually highlights lower-income students and families, there have been some authors who have focused specifically on racially diverse students.

Griffith (2009) analyzed 133 private, four-year colleges and universities that were not offering merit-based grants in 1987 and followed them until 2005. During that time 93 began

offering merit-based scholarships while 40 did not change aid-awarding strategies. Griffith divided the institutions into three tiers based on median SAT score and analyzed the changes in the student profiles after merit aid policies were adopted using descriptive statistics and ordinary least squares (OLS). Relating to race, the author concluded that merit aid policies were correlated with a decline of about 2 percentage points of Black students at the top two tiers of institutions but were correlated with an increase of about 2 percentage points in the lowest tier. This suggested to the author that “Black students are being redistributed from top tier colleges to bottom tier colleges as a result of merit aid programs” (Griffith, 2009, p. 19).

Changes in other racial demographics were less significant, with Hispanic populations seeing declines in the bottom two tiers of only .5 percentage point and an increase of 1 percentage point at top tier institutions. Asian students only saw a change in the lowest tier of institutions with a decrease ranging from .7 to 1.3 percentage points five and ten years from merit aid policies, respectively. The author generally concluded the strongest finding was related to a decrease of Black students at more selective institutions and this relationship merited further research (Griffith, 2009). This finding, combined with other tuition discounting implications connected with race, illustrate the significance of including race demographics in this study’s models.

Student expectations surrounding tuition discounts and grant aid can have a significant influence on college choice, and authors have analyzed how these expectations and actual aid awarded may influence enrollment probabilities and differ by race (DesJardins, Ahlburg, & McCall, 2006; Kim, DesJardins, & McCall, 2009). In 2006, DesJardins, Ahlburg, and McCall published a study introducing the idea that it is not only the amount of received aid that influenced college choice, but perceptions of aid matter as well. The authors noted that their

“most important finding is that disappointing students with regard to their aid expectations can have serious negative effects on enrollment” (DesJardins, Ahlburg, & McCall, 2006, p. 415).

The authors also concluded enrollment probabilities were higher for students from wealthier families, and that finding was consistent across White, African American, Asian American, and Latino/a students. White students were the most likely to enroll, followed closely by Asian Americans. Latino/a students were more likely than African American students to enroll, although both groups were less likely to enroll than Asian Americans across all expected aid amounts (DesJardins, et al., 2006).

In 2009, two of the authors along with Jiyun Kim expanded their research to include how racial groups were influenced by differing types of aid (Kim, DesJardins, & McCall, 2009). The authors employed a logistic regression model that addressed the self-selection bias that can be present in student choice studies. The results furthered the previous study and again found application probabilities increases for students from wealthier families across all racial groups. Asian American students were particularly sensitive in application behavior to expected aid amounts. Asian American and White students were more likely to enroll when aid surpassed their expectations; African American and Hispanic students responded with lower increases in enrollment probability. The authors concluded, relating to African American and Hispanic students, that the “same amount of aid awarded to white and Asian students might not meet these underrepresented minority students’ standard of adequate aid, thereby failing to increase minority enrollments relative to their white and Asian counterparts” (Kim, DesJardins, & McCall, 2009, p. 763). Therefore, customization of aid packages may be required to increase minority student application and enrollment with tuition discounting (Kim, DesJardins, & McCall, 2009).

Tuition discounting is an important tool institutions can utilize to enhance the application and enrollment of underrepresented populations. However, policymakers must be aware that shifting to merit-based practices can have a negative impact upon need-based aid (Ehrenberg, Zhang, & Levin, 2006) and this, in turn, can negatively impact minority students (Griffith, 2009). Student aid expectations and reactions may differ by racial or ethnic groups, and customizing aid packages may be necessary to increase enrollment for minority students (Kim, DesJardins, & McCall, 2009). Due to the real or perceived barriers to access education that are present across differing racial groups, financial aid calculators and upfront information about net prices are particularly important to low-income and racially diverse populations.

***Tuition discounting and recruiting academically talented students.***

As the shift from need-based to merit-based scholarships and grants occurred, institutions began to focus on academic ability of prospective students as a reason to employ tuition discounting strategies (Breneman, 1994; Davis, 2003; Hillman, 2011; Redd, 2000). Offering merit-based scholarships to incoming students increases incentives to perform well in high school (Henry & Rubenstein, 2002) and enables institutions to compete for the highest-caliber of students, hopefully sustaining or increasing the academic profile of an incoming class (Davis, 2003; Redd, 2000).

Descriptive data presented by Redd (2000) and Davis (2003) signaled that institutions that have employed the largest increases in tuition discounting have not realized gains in improving the academic quality of incoming students, as measured by median SAT score. Standardized test scores are one of the only widely measured and reported statistics focusing on academic quality, and the SAT test score is the most commonly used (Redd, 2000). Utilizing NACUBO data for private institutions, Redd (2000) divided the colleges and universities into

three categories based on selectivity and used median composite SAT scores for first-time, first-year undergraduates entering in Fall 1990 and 1997. Redd (2000) measured that for the selective and highly-selective segments of schools, those with below average changes in tuition discounting levels saw the highest increase in median SAT scores with a 9.7% increase, while average and above average changes in TD levels saw a change of only 2.8% and 2.3%, respectively. For less-than-selective institutions, the results are even less positive. IHEs with below average changes in TD levels witnessed a .8% increase in median SAT score, while average and above average changes in discounts were associated with slightly negative changes in SAT scores (Redd, 2000). As a result, the author concluded, “colleges appear to have been more successful at using their institutional grants to meet their educational equity goals, but were less successful in using tuition discounts to enroll more high-ability students” (Redd, 2000, p. 26). Davis (2003) echoed Redd’s (2000) findings although adding that during 1995 to 1999, median SAT verbal scores decreased at 45% of private four-year institutions and 44% of public four-year institutions Davis studied.

Descriptive statistics show little to no relationship between increases in tuition discounting levels and improvements in academic quality, although the simplistic nature of the studies does not address all facets of the competitive marketplace. For instance, some institutions may be intentionally limiting merit-based aid to focus on enrolling students who are from lower-income families (Redd, 2000). Additionally, median SAT score may not be a good indicator of how successful IHEs have been in enrolling their most desired students. Even if IHEs were able to offer high discounts and enroll some of the students with the best academic credentials, the schools may have offered admittance to students with lower scores in order to steady net tuition revenue (Redd, 2000). Also, the consequences of choosing not to employ

merit-based strategies in regards to academic quality remain unknown. In a highly competitive marketplace, high-ability students will likely be less attracted to institutions with no merit-based scholarships or grant aid.

An important contextual factor to consider when modeling the relationship between net tuition revenue and tuition discounting is selectivity of the admitting process of an institution (Hillman, 2011). This is strongly tied to an institution's ability to attract academically strong students, and also enables the model to address the impact of the demand facing institutions. Little research exists that focuses on the relationship between tuition discounting and selectivity, specifically, although some researchers have found that institutions that have a higher selectivity and admit less students are able to keep a higher proportion of tuition increases (Doti, 2004; Summers, 2004). "Since lower selectivity may signal that a school is challenged in achieving its enrollment objectives, this result could indicate such schools try to overcome this challenge through more aggressive aid expenditures" (Summers, 2004, p. 225). Due to this important contextual factor, selectivity, as measured by the rate of students admitted to an institution who completed an application, was included in the model.

Similar to the literature regarding other potential outcomes of tuition discounting, the research on the relationship between academic quality and tuition discounting is inconclusive. However, a model detailing the relationship between discounting and net tuition revenue must account for the factors influencing the relationship such as institutional motivators to employ tuition discounting strategies (Hillman, 2011).

## **Tuition discounting and net tuition revenue.**

### *Descriptive studies.*

Due to high institutional discounting levels, net tuition revenue (NTR) has become an important financial indicator in higher education (Fain, 2010; Hillman, 2011), and the relationship between tuition discounting rates and tuition discounting is the primary interest of this study. The interplay between TD and NTR is a complex one “because aid is utilized to generate revenue but institutions generating revenue are able to provide additional aid to students” (Hillman, 2011, p. 272). Therefore, researchers have studied the relationship between TD practices and NTR with various approaches.

Over the past two decades, researchers have begun chronicling the state of net tuition revenue in addition to discounting, and many have provided descriptive data of the trends. Redd (2000) detailed an interesting trend in the 1990s. Between the 1990-91 and 1996-97 years, the author measured the increases in institutional grant aid per FTE and the increases in tuition and fees per FTE. Redd (2000) showed that of 266 private four-year institutions, 66 had increases of TD rates of 13.1 points or more during that time span, and those institutions averaged negative net tuition revenue with TD spending per FTE outpacing tuition increases per FTE by an average of \$306. Institutions that increased TD rates at lower amounts than 13.1 percentage points realized NTR gains during the time period. Net revenue increased by \$2,844 for IHEs with TD rate increases of 2.5 points or less and \$1,347 for institutions with TD rate increases between 2.5 and 13.1. Across all 266 institutions in the study, the author measured that 59.1% of increased tuition and fee revenue was used for additional grant aid. These results indicate greater increases of tuition discounting rates were associated with decreasing gains in NTR, and this result held when the author disaggregated between selective and less-than-selective four-year private

institutions (Redd, 2000). Another important relationship the author noted was “that institutions that raised their tuition discounts by above-average rates also had the smallest increases in amounts spent to finance major academic-related campus operations” (Redd, 2000, p. 20). This finding represents the trade-off between spending and other educational initiatives described by Griffith (2009) and Massa and Parker (2007).

Redd’s (2000) finding that some institutions’ NTR declined in the 1990s and that decline was associated with increased levels of tuition discounting was supported by Baum, Lapovsky, and Ma (2010) who authored a study for the College Board Advocacy & Policy Center. Baum, Lapovsky, and Ma’s (2010) work utilized data from the College Board and the *2008 National Postsecondary Student Aid Study (NPSAS)* to focus on tuition discounting among varying categories of institutions during the 2000-01 to 2008-09 academic years. Unsurprisingly, their data suggested tuition discounting rates were the highest at private four-year institutions (33.1% in 2008-09), and within that sector of IHEs, TD rates were highest at baccalaureate institutions (35.3% in 2008-09). The authors disaggregated the four-year private institutions by tuition quartiles and found the institutions in the lowest quartile witnessed the largest increases in TD rates between 2000-01 and 2008-09, increasing from 22.0% to 25.3%. “The significant increase in the discount rate among the institutions with the lowest tuitions has had a measurable negative effect on net revenues for these colleges” (Baum, Lapovsky, & Ma, 2010, p. 9). This finding is another example of high tuition discount rate changes associated with negative tuition revenue.

Predictably, the professional organization composed of chief business officers has had a vested interest in tracking net tuition revenue. NACUBO (2014) published its most recent findings relating to NTR and projected a modest net tuition revenue increase for 2013-2014 for their sample of 401 four-year private institutions. During the data presented for 2001-2002 to



2013-2014, all but two years indicated increases in net tuition revenue. In 2008-09 and 2011-2012, the average change in NTR was negative, a worrisome indicator for the financial health of these tuition-dependent institutions during those years. The rebound of a 3.4% increase in 2012-2013 was a welcomed finding to NACUBO, although when inflation-adjusted using the Higher Education Price Index, it is only a real increase of 1.7% (NACUBO, 2014). The estimates for 2013 show an increase of in NTR of 1.1%, although when inflation is adjusted for, the projection is actually a change of -.5% from 2012 (NACUBO, 2014). When HEPI is used during the 2001-2013 timespan to adjust NTR for inflation, NTR growth is essentially flat (NACUBO, 2014).

***Hillman's net tuition revenue study at public institutions.***

Although the descriptive studies presented on the relationship between discounting and NTR are useful in contextualizing the recent environment, they do not attempt to control for other factors facing higher education and four-year private institutions. A few authors have utilized statistical techniques to model how net tuition revenue may be influenced by TD practices. Due to this complexity, the relationship is difficult to model appropriately, but Hillman (2011) presented a valuable model that he applied to public four-year institutions. This model has guided the statistical analysis techniques in this study. Although Hillman's sample of institutions was different than those of interest for this study, the employed techniques are useful in analyzing the relationship. Hillman's model utilized a generalized method of moments (GMM) technique that addressed the possibility of simultaneous causality presented by the intertwined nature of NTR and TD, and it was "able to produce consistent and efficient estimates" (Hillman, 2011, p. 273). Hillman (2011) found tuition discounting could be leveraged by public four-year institutions to increase net tuition revenue, but he also found that a relatively high level of discounting through unfunded resources, beyond 13%, was associated with

diminishing net tuition revenue gains. In his sample of 174 institutions, the average unfunded discount rate was 11.6%, “indicating that a significant amount of institutions may be running discounts near or beyond a point of economic efficiency” (Hillman, 2011, p. 278).

The GMM technique was implemented in this study for the same reasons Hillman (2011) presented. In a public education setting, institutions generally have state funding to help support the college or university, and in private higher education, endowments are generally utilized to help support educational expenditures (NACUBO, 2014). Thus, Hillman’s (2011) general analytical strategy was useful in guiding the study, although the variables between this study and Hillman’s (2011) differ due to the institutional differences.

#### ***Other modeling strategies.***

When discussing research focused on revenue management goals of tuition discounting, Hillman (2011) indicated “there is a significant amount of work to be done” (p. 267). However, there have been a few authors who have provided other models for tuition discounting and net tuition revenue. Summers (2004) focused on Baccalaureate I private institutions, defined as awarding at least 40% of degrees in liberal arts fields, during 1997-2000 to investigate tuition discounting and NTR. Summers (2004) utilized a simultaneous equation model as a technique to address the simultaneous effects as detailed by Hillman (2011). Summers found institutional grant aid and tuition levels were positively correlated in a linear fashion with NTR; as either increased, institutions realized gains in NTR. However, Summers’ (2004) model did not include the possibility of a non-linear result such as Hillman’s (2011), not addressing the possible outcome of institutions reaching a threshold when further gains in NTR are not realized by increases in institutional grant aid. Summers’ (2004) main conclusion was that “at least for the

sample schools, there may be little reason for concern about the potential negative effects of aid on NTR” (Summers, 2004, p. 228).

Studying the relationship between discounting and net tuition revenue from another perspective, DesJardins (1999, 2001) has focused on predicting how net tuition revenue may change due to price discriminating behaviors employed to a certain population of students. DesJardins (1999) used individual-level data focused on students from Wisconsin who were interested in attending the University of Minnesota as part of a reciprocal agreement between the states. A predicament arose when students from Wisconsin were actually paying less to attend the University of Minnesota-Twin Cities program than students from Minnesota. Policymakers were interested in projecting enrollment demands and implications for net tuition revenue if the gap between the price levels was narrowed. DesJardins (1999) predicted that lowering the tuition discounts offered to students from Wisconsin would decrease enrollment yet yields in net tuition revenue would increase, showcasing an example of how strategic shifts in tuition discounts may increase net tuition revenue.

DesJardins (2001) provided another example of how price discrimination may increase NTR when he focused on out-of-state students attending the University of Iowa. Policymakers at the university had noticed that non-resident student enrollment had been declining, and this was particularly worrisome as non-residents were paying a higher tuition level than resident students. Facing a projected decline of graduating high school students from Iowa in the coming years, administrators at the University of Iowa knew options must be pursued to enroll more non-resident students. The university was also interested in increasing the academic profile of incoming classes, so DesJardins (2001) focused on how strategic increases in discounts offered would affect net tuition revenue and enrollments. Differentiating by academic ability, DesJardins

projected NTR gains and increases in academic profile would be witnessed, assuming student demand increased due to the new tuition discounts. DesJardins and colleagues advised college administrators who implemented changes for the entering cohort in Fall 2000.

DesJardins (1999, 2001) detailed how net tuition revenue could be gained through both decreasing and increasing tuition discounts in a strategic manner. Summers' (2004) research indicated a linear and positive relationship between TD and NTR, and Hillman (2011), who built on the prior research and models conducted, found that although tuition discounting was associated with increases in NTR, the strategy would only be effective up to a certain threshold within the public, four-year setting. A case study provided by Massa and Parker (2007) from Dickinson College supported Hillman's (2011) non-linear relationship. Dickinson College, a four-year private institution in Pennsylvania, had a discount rate of 52 percent in 1999, "an intolerable position that would clearly bankrupt the institution within a matter of years" (Massa & Parker, 2007, p. 94). The institution seemed to move past the threshold, as explained by Hillman (2011), and "discounting gone wild can handcuff a college . . . where it doesn't have sufficient revenue to cover expenditures and threatens the quality of the educational experience" (Massa & Parker, 2007, p. 96). Through marketing, branding, and re-visioning of the college, Dickinson leaders were able to strategically reduce discounting, improve the profile of the student body academically and representationally, and increase net revenue.

The body of research focused on the relationship between tuition discounting and net tuition revenue indicates that prudent and intentional strategies of tuition discounting may increase net tuition revenue. Hillman (2011) provided a new approach and raised an interesting question: to what extent is tuition discounting beneficial? Hillman (2011) focused this question at four-year public institutions, and based on the other literature on this relationship,

investigating to what extent tuition discounting is beneficial and private, non-profit, four-year colleges and universities seems especially relevant. The relationship between TD practices and NTR has significant implications for the financial health of institutions, especially those that are heavily dependent upon tuition revenue. Although much literature has been focused TD practices at four-year, baccalaureate, private institutions, the modeling strategies implemented have left more to be studied.

### **Graduate Education**

Within the context of four-year, non-profit, private higher education, the analysis regarding tuition discounting has been primarily centered on the traditionally-aged undergraduate population (NACUBO, 2014). Research focused specifically on graduate-level students at these institutions could not be located. NACUBO (2014), in its most recent study, specifically focused on first-time, first-year students and total undergraduate populations. However, many of the institutions included in this study have graduate programs, even though they are defined by the Carnegie classification system as baccalaureate institutions. Over 50% of the institutions represented in this study had at least one FTE graduate student during the 2012-2013.

Although the trend of expanding the traditional notion of a liberal arts education is not one confined to the last decade, there is little research on how graduate populations have bolstered, enhanced, or altered tuition revenue generation at primarily baccalaureate institutions. NACUBO, the main body of professionals focused on reporting and investigating tuition discounting trends across four-year, non-profit, baccalaureate institutions, has not made mention of these programs and how their discounting strategies and enrollments may or may not impact net tuition revenue generation (NACUBO, 2014).

Due to the relatively unknown impact of graduate students at these institutions, the model included two variables dedicated to these students: FTE graduate students and graduate tuition and fees. The inclusion of these variables worked to include possible impacts across various institutions that may be created by graduate programs.

### **Summary**

The review of literature has focused on Breneman's (1994) work that provided a theoretical framework for the study, the past and current environments facing higher education, and the reasons and revenue implications of tuition discounting. Breneman's (1994) work provided a foundation on which much research, including this study, has been constructed, and it also provided a theory to aid in understanding and contextualizing findings. Private, four-year institutions have the highest levels of tuition, but have also faced rising costs. Public scrutiny of pricing levels has increased, and current government leaders are calling institutions to action over concerns regarding accessibility and affordability. Tuition discounting remains and will continue to be a valuable and essential tool in managing enrollment and revenue objectives, although there may be unintended consequences through tuition discounting and goals may be unmet. Based on the current literature and the lack of techniques that have been focused on NTR and TD practices, this study will add to the body of research on the relationship between tuition discounting and net tuition revenue at private, four-year, baccalaureate institutions.

### CHAPTER 3: METHODOLOGY

This study utilized a panel data set and quantitative methodology to address the research questions focused on tuition discounting and net tuition revenue. Panel data sets include data from several units, institutions in this case, over several time periods (Stock & Watson, 2007). The goal of the study was to analyze the relationship between tuition discounting practices and net tuition revenue at four-year, non-profit, private institutions focused on baccalaureate education.

Because this study focused on the relationship between net tuition revenue (NTR) and TD levels, more mainstream quantitative techniques such as ordinary least squares (OLS) were insufficient as many of the independent variables will be endogenous to the model (Hillman, 2011). For example, the amount of institutional grant aid awarded to students may entice them to enroll at an institution, impacting the revenue generated by their tuition and fees. However, the amount of tuition revenue an institution yields will help determine what funds are available for institutional grant aid. This intertwined relationship complicates normal modeling techniques, and due to this endogeneity, dynamic panel models and a quantitative analysis technique called generalized method of moments (GMM) was implemented.

This section presents information concerning the data sources and study population, and it also contains detailed information about the variables of interest. Generalized method of moments (GMM), the analysis technique utilized by the study, will be described in detail with the reasons it was employed. The regression model focused on profit maximization in relation to Breneman's (1994) will also be discussed.

## **Inquiry Paradigm**

Creswell (2010) presented discussion concerning four worldviews of researchers: post-positivism, constructivism, advocacy/participatory, and pragmatism. The inquiry paradigm for this study was post-positivistic. This worldview is commonly associated with quantitative studies and holds a “deterministic philosophy in which causes probably determine effects or outcomes” (Creswell, 2010, p. 7). This worldview seeks to verify theories through testing in order to better understand the world, traditionally relies upon objective observations and measurements, and is reductionist since “the intent is to reduce the ideas into a small, discrete set of ideas to test, such as the variables that comprise hypotheses and research questions” (Creswell, 2010, p. 7). This study relied upon measurements provided by institutions through the IPEDS database, and reduces the relationship between net tuition revenue and tuition discounting to the following set of measureable research questions.

## **Research Questions**

The research questions for this study were focused on four-year, not-for-profit, baccalaureate, private institutions during the academic years 2003-2004 through 2012-2013. The project sought to answer:

1. What is the effect of unrestricted institutional grant aid expenditures on net tuition revenue?
2. Does a rate of tuition discounting utilizing unrestricted funds exist that contribute to diminishing revenue returns of net tuition revenue?
3. If an affirmative finding to Question 2 is realized, what implications for the sustainability of current tuition discounting practices are found?



## Data Sources

The data for this project was obtained through two data sources: the Integrated Postsecondary Education Data System (IPEDS), created and managed by the U.S. Department of Education, and The Institute for College Access & Success (TICAS). IHEs in the United States are required to annually report a wide range of data to the IPEDS database. As stated by the National Center for Education Statistics' website (NCES, 2014c):

The completion of all IPEDS surveys, in a timely and accurate manner, is mandatory for all institutions that participate in or are applicants for participation in any Federal financial assistance program authorized by Title IV of the Higher Education Act of 1965, as amended. The completion of the surveys is mandated by 20 USC 1094, Section 487(a)(17) and 34 CFR 668.14(b)(19).

IPEDS is a valuable tool for gathering institutional-level data from across the nation. IPEDS has been utilized by Summers (2004) in the researcher's analysis of tuition discounting at private institutions, and Hillman (2011) utilized the Delta Cost Project in his research, a data set that gathers and reformats data from IPEDS (The Delta Cost Project, 2012). The Delta Cost Project is a panel data set currently housed within the National Center for Education Statistics (NCES, 2014f). Although the Delta Cost Project database is already formatted into a panel data set, which is useful for this research project, the data set only contains information through the 2009-2010 academic year. Due to the desire for more current information, this project utilized the IPEDS reporting tools and information to gather data and format into a panel data set. "Panel data . . . are data for multiple entities in which each entity is observed at two or more time periods" (Stock & Watson, 2007, p. 13). Panel data sets can be employed to "learn about

economic relationships from the experiences of the many different entities in the data set and from the evolution over time of the variables of each entity” (Stock & Watson, 2007, p. 14).

Due to a limitation in the IPEDS set, TICAS was utilized for information regarding Pell Grant recipients across the panel data set. The IPEDS data set only had recorded data for numbers of Pell Grant recipients from 2008-2009 to 2012-2013 academic years. TICAS’ data set utilizes several different data sources, including IPEDS, Pell Grant files, Fiscal Operations Report and Application to Participate (FISAP), and the Common Data Set (College InSight, 2014). For the purpose of this study, the Pell Grant files were of particular interest, and the IPEDS data was merged with the TICAS information regarding this form of grant aid.

The benefits of using panel data derive from following several individual entities across time, which when compared to time series or cross-sectional data sets, gives “more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency” (Baltagi, 1995, p. 4). Using panel data sets also has another important characteristic, the ability to control for institution- and time-invariant variables (Baltagi, 1995). In this study, an example of an institution-invariant variable may be federal policy changes that influence all institutions across the country. An example of a time-invariant variable would be location. It is specific to an individual institution but does not vary over time. “Omission of these variables leads to bias in the resulting estimates” (Baltagi, 1995, p. 4), so panel data sets are a useful source of information to account for these institution- and time-invariant variables.

Although IPEDS is a national database and institutions are statutorily required to submit information to the National Center for Educational statistics, the data source does have limitations. The data, when delivered, is unaudited by the NCES, trusting institutions to accurately and honestly report information to the data center through independent audits on

individual campuses, especially when relating to financial information (NCES, 2014d).

Although the data is not fully audited, the IPEDS data collection system implements checks to report issues to respondents that need to be resolved prior to completing data entry (NCES, 2014e). This aids in minimizing errors present in data entry (Martin, 2012). The data utilized by TICAS was pulled directly from the federal government's Pell Grant data files, supplied by the U.S. Department of Education (College InSight, 2014). Thus, with TICAS data regarding Pell Grants, any errors should be minimized due to receiving the information directly from the source of the funding.

When analyzing data over a period of years, data reporting techniques, standards, and requirements may shift. This can create difficulties in using panel data sets that span across the period of interest. However, researchers within the NCES focused on IPEDS have verified there have been no major shifts in reporting of institutional grant aid at the institutions of interest (G. Jones, personal communication, October 2, 2014), minimizing the impact of this limitation.

Through the use of the two data sources, the panel set that was generated should theoretically be complete within each variable of interest. However, lack of reported data minimized the full use of all institutions within the models. Over the 10 years of interest across the 456 institutions, each variable should have 4560 entries. Table 2 shows the main variables of interest and frequency of data available.

The variables focused on admissions rate and standardized tests had the highest frequency of missing data, and this is largely due to the reporting structures within IPEDS. During the years of interest, institutions had an option of selecting the reporting year when they were submitting their data (T. Lawley, personal communication, March 18, 2015). For example, an institution submitted data in the fall of 2012 could have chosen to either report their final data

for the 2011-2012 academic year or the preliminary data for the fall semester of 2012. The option existed in each year of the study, and this led to gaps in the data as institutions would sometimes provide data on the same semester twice. In the example mentioned, this would occur if an institution reported preliminary data for the fall semester of 2012 during their fall 2012 report and then reported again for the fall 2012 semester during their report in 2013.

Table 2

*Frequency of Data Reported for Baccalaureate Institutions, by Variable 2003-2012*

Variable	Entries	Percent Complete
Price	4487	98.4
FTE	4533	99.4
Funded TD Rate	4519	99.1
Unfunded TD Rate	4519	99.1
Pell Grant	4383	96.1
Admissions Rate	4002	87.8
Standardized Test	3611	79.2
Percent Minority	4538	99.5
Endowment	4397	96.4

Gaps in the data also emerged if institutions shifted whether their reporting was for the current semester or was backward-looking to the previous full academic year. As an example, suppose an institution reporting in the fall of 2008 reported final data for the 2007-2008 academic year. During the next reporting cycle in the fall of 2009, the institution reported preliminary data for the 2009-2010 academic year. In this example, the academic year of 2008-2009 is missing data and is left from the IPEDS data set. These two reporting gaps were prevalent within both the admissions and standardized test data, and IPEDS is working on a restructuring of the survey instruments and timing to alleviate this issue moving forward into future years (T. Lawley, personal communication, March 18, 2015).

Techniques and strategies to handle missing data are important in a quantitative study. At the beginning of the analysis, no institutions were wholly eliminated due to missing data. For descriptive analyses, institutions with the data available for each approach were included. When institutions were removed from a specific analysis, the resulting number of IHEs will be included in the table or figure descriptions. When modeling techniques were implemented, listwise deletion was employed to remove records with missing data. No projection or imputation strategies were implemented to predict missing values.

In order to properly adjust for inflation during the years in the study, two different measures were used based on the circumstances. Nationally, the Consumer Price Index (CPI) is a common, widespread measure to capture the changes in the prices “paid by urban consumers for a representative basket of goods and services” (U.S. Department of Labor, 2015). Tuition levels were adjusted using the CPI in order to compare the relative price of tuition and fees to other goods and services an individual or family may be purchasing. This measure was utilized to represent the trade-offs between tuition and fees and other purchasing decisions. To perform this adjustment, the ratio of the CPI factors was first calculated and then applied to tuition and fee levels. For example, to adjust the 2003 levels to 2012 dollars appropriately, 2003 values were multiplied by 1.248. This value was calculated by 230.4 divided by 184.6, the ratio of the CPI levels in Table 1 for 2003 and 2012.

The Higher Education Price Index (HEPI) was utilized as well to adjust tuition and fee levels for inflation, but the HEPI differs from the CPI because the measure focuses specifically on the prices of goods and services that are common within institutions of higher education (Commonfund, 2015). The HEPI was utilized to provide a better estimate of net tuition revenue, as over time, revenue dollars generated by an institution will have varying amounts of

purchasing power based on the cost drivers facing higher education (Commonfund, 2015). Thus, when approaching cost from a consumer prospective, the CPI provided a better measure of tuition and fee levels, and when analyzing the power of net tuition revenue, the HEPI yielded a more appropriate financial indicator. In NACUBO's annual tuition discounting report, the organization also utilized the HEPI to analyze net tuition revenue (NACUBO, 2014). The factors for the CPI and the HEPI used in the analysis are found in Table 1.

### **Study Population**

This study focused on four-year, not-for-profit, private institutions that were primarily baccalaureate degree-granting. The years of interest include the time spanning 2003-2004 and 2012-2013 academic years, including the years between, with the 2012-2013 academic year being the latest time period that IPEDS student financial aid data is fully available. The data from these years was utilized to construct a model to analyze the relationship between tuition discounting and net tuition revenue. This range of time allowed for annual differences to be present to analyze the relationship between tuition discounting practices and net tuition revenue, while maintaining a small enough range where common reporting practices were maintained and broad institutional changes, such as dramatic shifts in mission, were minimized. Additionally, within the IPEDS system, 2003-2004 was the first year that the current FTE calculations were implemented in the system; in 2002-2003, the current calculations of the derived variable were not present (NCES, 2015a).

Using IPEDS, the institutional classification was narrowed to private not-for-profit, 4-year or above in year 2013 that were Title IV participating, meaning they engaged with federal financial aid programs (NCES, 2014b). Within the 2010 Carnegie classifications, the research was restricted to 456 institutions classified as Bachelor's/Arts & Sciences or Bachelor's/Diverse

Fields. Arts & Sciences institutions were identified as having at least half of all undergraduate degrees within arts and sciences fields (Carnegie, 2010). Institutions not meeting this stipulation were categorized in the diverse fields classification. Baccalaureate/Associate's institutions were not included as less than half of degrees granted at those locations were bachelor's degrees (Carnegie, 2010), and this study was focused on institutions where baccalaureate education is the main priority. The Carnegie website identified 456 not-for-profit institutions within the two bachelor-level groups.

These institutions were chosen for three main reasons. First, this classification of institutions is highly dependent upon tuition revenue (Martin, 2012). Any fluctuations in tuition revenue impact these types of institutions since they have minimal state, federal, or external grant funding compared to large state institutions or research universities (Martin, 2012). Second, these institutions have high degree of focus on baccalaureate education and have been categorized as such within the Carnegie classification system. While graduate school education is being discounted heavily by institutional grant aid (Winston & Zimmerman, 2000), this study remained directed at institutions that are primarily focused on undergraduate education. Lastly, these types of institutions have traditionally had a high level of tuition discounting, reliance on TD for enrollment and financial strategies, and expensive costs of attendance, and these IHEs have been the focus of much of the literature on tuition discounting (NACUBO, 2014). Although much has been documented regarding tuition discounting at these types of institutions, the quantitative approaches of this study were unique to this population and broaden the literature focused on private, four-year, not-for-profit, baccalaureate institutions.

Before modeling and analysis of the data was undertaken, a brief examination to determine if data reporting errors were present was employed. While major fluctuations within

variables at or between institutions may be evident, data points lying outside the realm of feasible levels were examined. For example, an institution should not be reporting a negative number of students, highly negative net tuition revenue per FTE student, or other analogous examples for each variable. If such data points exist, further analysis was used to determine if the reported data was deemed accurate or faulty. If an institution has a data reporting error, it was eliminated from the sample.

Within the institution population defined as private, four-year, not-for-profit, baccalaureate institutions, there existed a small subset of colleges and universities that do not have similar tuition discounting practices due to a variety of institutional missions. These institutions were eliminated from the final study population, and they are described more thoroughly in Chapter 4.

## **Variables**

The purpose of this study was to investigate the relationship between net tuition revenue and tuition discounting practices. In the main model focused on this relationship, the dependent variable was net tuition revenue (NTR) and the independent variables were quantitative measures that focus on economic measures and institutional characteristics of interest. In a supplemental model, the dependent variable of interest was institutional revenue and the independent variables were measures of net tuition revenue, economic variables, and institutional characteristics.

### **Economic independent variables.**

The economic independent variables of interest were gross tuition and required fee levels, unrestricted and restricted institutional grant aid rates, and endowment value per FTE. The amounts are provided in FTE form to increase ease of comparison between institutions and create more understandable findings and interpretations.



### ***Undergraduate tuition and fees.***

The undergraduate tuition and fee levels were for the fall of each year and affect every student attending at an undergraduate level. At all private institutions in the data set, the in-district or in-state tuition and fees levels were equal to the out-of-district or out-of-state tuition and fee levels so the in-district amounts were arbitrarily chosen as the variable of interest. This fact was verified when the data set was fully generated, and only one institution, Life University, had reported a different amount of in-district tuition levels when compared to out-of-state tuition levels. This reported data difference was only present for one year, 2003, and the University was missing other data points during the same year and was subsequently not included in the model.

### ***Graduate tuition and fees.***

The graduate tuition and fee levels were calculated within IPEDS as the average tuition and fees for full-time graduate students at an institution. For the institutions that did not have any form of graduate education, the value of this variable was set to 0 since there is no price level set for full-time graduate students.

### ***Tuition discount rate.***

The tuition discount rate (TDR) was calculated by the following formula:

$$\frac{(\text{Restricted Institutional Grants} + \text{Unrestricted Institutional Grants})}{(\text{Undergraduate Tuition and Fees} * \text{UFTE} + \text{Graduate Tuition and Fees} * \text{GFTE})}$$

For the purposes of this study, institutional grants were divided into restricted and unrestricted types based on means of funding. In most research on tuition discounting, tuition discounts are not delineated in this manner, due to most researchers not being interested in the differentiation. NACUBO, the primary reporting vehicle for year-to-year changes in tuition discounting rates among private, four-year institutions responding to their survey, defined TDR in a similar manner. TDR was calculated by the total amount of institutional grants divided by total tuition

and mandatory fee revenue (NACUBO, 2014). Other researchers who have focused on tuition discounting have also defined TDR using the same formula (Baum, Lapovsky, & Ma, 2010; Martin, 2012; Summers, 2004).

Grant aid amounts, due to the desired delineation between unfunded and funded, must be reported in the aggregate measures, as fall cohort grant aid data for an incoming class was not divided between the different funding sources. Therefore, unrestricted and restricted aid amounts and subsequent discount rates were generated from the institution's expenditure data, not from student financial aid data for an incoming cohort (NCES, 2014b).

***Endowment value per FTE.***

The endowment value was measured on a per student basis by using the value of endowment assets at the beginning of the fiscal year divided by total FTE. The endowment assets at the beginning of a fiscal year represent an endowment fund level around the same time period as when the academic year is beginning. Increases or decreases in the endowment level during the fiscal year would have no impact on grant aid awarded at the beginning of the fiscal year.

***Net tuition revenue per FTE.***

The price an average student pays to attend an institution can be calculated by dividing net tuition revenue per FTE students at each institution. This calculation is created by taking the total net tuition revenue for each institution and dividing by FTE count per college or university.

***Institutional independent variables.***

Institutional characteristics included as independent variables were FTE undergraduate enrollment, FTE graduate enrollment, selectivity of admissions, percent of students who identify as a racial minority, SAT/ACT of incoming cohort, and percent of students receiving federal Pell

grants. These variables were included in the model to control for “unique institutional characteristics that are expected to influence net tuition revenues” (Hillman, 2011, p. 272).

***Undergraduate full-time equivalent.***

The undergraduate full-time equivalent (UFTE) of students is a measure that combines both full-time and part-time student enrollment into a meaningful measure. The IPEDS database has two definitions of FTE for undergraduate students. This research used the definition based on institutional credit hours of instruction, as the main criteria for calculation. This calculation method divides the total undergraduate credit hours by 30 to derive undergraduate FTE (NCES, 2015a). This was primarily due to the metric having both undergraduate and graduate student calculations. However, other studies citing FTE may have utilized a different metric.

***Graduate full-time equivalent.***

Due to the limitation of only having access to institutional grant aid at an aggregate level within expenditure data, if an institution had graduate education, the tuition discounts applied to those students were also presented in the aggregate measures of unfunded and funded institutional grants. Although classified as Baccalaureate institutions, 271 of the 456 institutions had at least one FTE graduate student in 2012-2013, with 167 of these institutions having 99 or fewer graduate FTE students. The average amount of FTE graduate students enrolled at institutions with graduate offerings was 113. IPEDS (NECS, 2014b) reported full-time equivalent (GFTE) graduate enrollment for all of the years of interest, and that information was included in the model to act as a control for possible influences of graduate education in the model.

***Admissions rate.***

Selectivity of admissions was calculated by the percentage of completed applications that were admitted by the institution for the entering fall cohort. Institutions consider applications and notify applicants of one of four scenarios: admission, non-admission, waiting list placement, or withdrawing the application, which can also be done by the applicant (NCES, 2014b). Admitted students have been granted an official enrollment offer by an institution (NCES, 2014b).

***Percentage of minority students.***

Racial, academic profile, and socioeconomic status variables were added to the model since those variables are tied closely to potential aims of TD practices (Breneman, 1994; Hillman, 2011). “The pursuit for high-achieving students as measured by SAT score and selectivity, the priority of ensuring greater student diversity along the lines of race and ethnicity, and assisting low-income students are but three motivations driving colleges to engage in discounting” (Hillman, 2011, p. 272). The percentage of students identifying as a racial minority was calculated by removing the race/ethnicity unknown and White students from the grand total and dividing by the students who race/ethnicity is provided. This presents a more simplistic calculation than combining all non-White racial groups.

***Standardized test score.***

In the study, the primary indicator of academic profile was a standardized test score. The most common test scores reported to institutions vary across the country, but the SAT 75th percentile scores were utilized to provide a measure of the academic quality of incoming cohorts of students. If an institution more commonly had the ACT reported as a standardized test score,

the composite ACT scores were translated to accompanying SAT scores as directed by ACT concordance tables (ACT, 2008).

During the years of interest, the SAT writing section was introduced and scoring began to widen the traditional 1600 maximum score to 2400. Since the writing section scores are not available for all years, the SAT combined score will only use the reading and math scores. For the years of data that had over 60 percent of an incoming class reporting SAT scores, the value of the SAT combined score was used, except for the few instances when the 60 to 69 percent reporting range had over 75 percent of students reporting ACT scores. In those few instances, the ACT composite score was utilized in conjunction with the ACT-SAT concordance table.

For institutions that did not have over 60 percent of students submitting SAT scores but had ACT reporting percentages of 60 percent or more, the ACT score was used and converted through the use of the ACT-SAT concordance table. The remaining institutions were analyzed for the highest reporting standard exam and values were used accordingly. In the event that only one component of the SAT exam was reported, the data was either reported as missing or ACT data was used if reported.

### ***Pell Grant.***

When focusing on students with financial need, Hillman (2011) used the percentage of students who received Title IV funds and reported family incomes totaling less than \$30,000. However, within IPEDS, this data is only available in the 2008-09 to 2011-2012 years (NCES, 2014b). In order to measure the amount of students enrolling at institutions who have financial need, the Pell Grant was used as an indicator, and the variable measure was the amount of students receiving a Pell Grant at each institution. The Pell Grant is a federal grant awarded to students demonstrating financial need (Federal Student Aid, 2014b). The award amount varied

across the years of study and was most recently valued at a maximum of \$5,730 for the 2014-2015 award year (Federal Student Aid, 2015). In the 2002-2003 award year the maximum Pell grant was \$4,000 (FinancialAidInfo.org, 2012), and in 2012-2013, the maximum amount was \$5,550 (FinAid, 2015). Eligibility for the Pell grant system is based on demonstrated financial need of students, calculated by Cost of Attendance (COA) – Expected Family Contribution (EFC) (Federal Student Aid, 2014a).

The variables described allowed the model to account for both economic measures and institutional characteristics that are commonly associated with tuition discounting and literature focused on the subject. Net tuition revenue, tuition discounting rates for both unfunded and funded sources, and endowment levels were important economic variables. Admission rates, percentage of minority students, percentage of low-income students, and academic profile of incoming classes were important to consider since the aims of tuition discounting commonly include focusing on these variables (Breneman, 1994; Davis, 2003; Hillman, 2011; Redd, 2000). Table 3 includes information regarding the relevant variables.

Table 3  
Variables, Calculations, and Variable Codes derived from IPEDS

Dependent Variable	Calculation	Variable Codes
Net Tuition Revenue	$((\text{Tuition and Fees}) * \text{FTE}) - (\text{Restricted Institutional Grants} + \text{Unrestricted Institutional Grants})$	NTR
Institutional Revenue	$((\text{Tuition and Fees}) * \text{FTE}) - (\text{Unrestricted Institutional Grants})$	INREV
Independent Variables	Calculation	Variable Codes
<b>Economic Variables</b>		
Tuition Discount Rate	$(\text{Restricted Institutional Grants} + \text{Unrestricted Institutional Grants}) / ((\text{Tuition and Fees}) * \text{FTE})$	TDR
Restricted Tuition Discount Rate	$(\text{Restricted Institutional Grants}) / ((\text{Tuition and Fees}) * \text{FTE})$	RTDR
Unrestricted Tuition Discount Rate	$(\text{Unrestricted Institutional Grants}) / ((\text{Tuition and Fees}) * \text{FTE})$	UTDR
Endowment Value	Endowment Assets at Beginning of Fiscal Year	END
Net Tuition Revenue per FTE	$((\text{Tuition and Fees}) * \text{FTE}) - (\text{Restricted Institutional Grants} + \text{Unrestricted Institutional Grants}) / \text{FTE}$	NTRFTE
<b>Institutional Variables</b>		
Undergraduate FTE Enrollment	Full-Time Equivalent Undergraduate Enrollment (Instructional Activity Derivation)	UFTE
Graduate FTE Enrollment	Full-Time Equivalent Graduate Enrollment	GFTE
Tuition and Fees	Published In-District Tuition and Fees (Current Year)	P
Admission Rate	$(\text{Admissions total}) / (\text{Applicants total})$	ADM
Pell Grant	Number of Students Receiving Pell Grants	PG
Percentage of Minority Students	$(\text{Grand Total} - \text{Race Unknown Total} - \text{White Non-Hispanic Total}) / (\text{Grand Total} - \text{Race Unknown Total})$	MIN
Standardized test score, measured by SAT*	$(\text{SAT Critical Reading 75th Percentile Score} + \text{SAT Math 75th Percentile Score})$	SAT

\*Concordance tables used for institutions with ACT as primary reported test

## Data Analysis

### Research Question 1

**What is the effect of unrestricted institutional grant aid expenditures on net tuition revenue?**

To analyze the research questions of interest, this study utilized a panel data set for 456 institutions of higher education between the academic years of 2003-2004 and 2012-2013. The analysis for the first research question, which focused on the relationship between unrestricted institutional grant aid and net tuition revenue, both descriptive data and quantitative modeling were used.

Descriptive data, such as tracking changes in unrestricted tuition discounting levels, was utilized to see the levels of UTDR across the years of the study. This allowed patterns in UTDR levels during the duration of the study to be witnessed. Additionally, an analysis across institutions was undertaken, breaking the institutions in the study into decile groups by their UTDR rate in 2012-2013 and tracking the NTR per FTE amounts per decile. Through this relatively simplistic data analysis, relationships between UTDR levels and NTR per FTE amounts were displayed.

In the model including the variables described previously, several of the independent variables were endogenous to the model and that endogeneity needed to be addressed (Hillman, 2011). Endogeneity occurs when a variable is correlated with the error term, and it can signify a causal relationship running in two different directions (Stock & Watson, 2007). In the relationship between TD and NTR, “it is unclear whether gains in net tuition are leveraged to “craft a class” of desirable students, or whether the opposite may occur; these variables both *influence* and are *influenced* by net tuition revenue” (Hillman, 2011, p. 272). Due to this



endogeneity, a specific modeling technique was employed to account for these variable relationships (Hillman, 2011). For example, TD levels will influence net tuition revenue, but NTR levels may also impact the level of TD present at each institution. Therefore, a quantitative method that addressed this endogeneity was needed. In many cases, an instrumental variable approach is implemented to address this concern, but it is often difficult to find instruments that will be highly correlated with the independent variable while remaining exogenous to the model (Hillman, 2011).

Generalized method of moments (GMM) is a quantitative technique that has been employed by a few higher education researchers (Austin, 2010; Hillman, 2011; Titus, 2009), and Hillman's work most directly applied to this study since he utilized the technique to study TD practices at public IHEs, and his research questions were similar in nature to the aim of this study. GMM was utilized due to its ability to utilize instrumental variables while avoiding the common hurdle of identifying powerful instruments. "Through first-differencing the equation, GMM utilizes the lags of the differences to serve as instruments" (Hillman, 2011, p. 273). This process allows the GMM technique to generate more instrumental variables than would be used in a more common two-stage least squares (2SLS) approach (Bond, 2002). Similar to Hillman's study, the research used approximately ten years of institutional data, ranging from the early 2000s until the most recent complete data set. This range of time allowed for annual differences to be present and trends to be realized, while maintaining a small enough range where common reporting practices were maintained and broad institutional changes, such as dramatic shifts in mission, were minimized.

***Fixed effects, first-differences panel model.***

There are a few variations of panel models, with one distinguishing feature being how each model addresses unobserved individual heterogeneity that does not vary with the years of the panel data (Cameron & Trivedi, 2005). These unobserved institutional effects, denoted in the equations by  $\eta_i$ , can be treated differently depending if they are characterized as fixed effects or random effects (Cameron & Trivedi, 2005). In general, “economists often view the assumptions for the random effects model as being unsupported by the data” (Cameron & Trivedi, 2005, p. 698). In this model, it is reasonable to assume that  $\eta_i$  may be possibly correlated with the regressors, thus creating a fixed effects (FE) panel model (Cameron & Trivedi, 2005). As an example in relation to tuition discounting, the location of an institution may be correlated with the number of low-income students it serves. The location in this case would be the time-invariant characteristic, and within the model, the population of low-income students who are Pell Grant recipients is a regressor. If these time-invariant effects exist and are correlated with the regressors, “then many estimators such as pooled OLS are inconsistent. Instead, alternative estimation methods that eliminate the [fixed effects] are needed to ensure consistent estimation” (Cameron & Trivedi, 2005, p. 700).

As briefly discussed, one of the benefits of using panel data sets is that first-differencing can be used to address this presence of fixed effects, which leads to consistent estimation (Cameron & Trivedi, 2005). “Panel data sets are most useful when controlling for time-constant unobserved features – of people, firms, cities, and so on – which we think may be correlated with the explanatory variables” (Woolridge, 2012, p. 474). By using several time periods of the same institutions, the institution-specific effects that do not vary by time were eliminated in the model (Hillman, 2011). This result allowed the first-differenced estimators to be consistent (Cameron

& Trivedi, 2005). As a result, the effects of the model that did not vary by time are controlled for in the panel data set. In the example regarding location and Pell Grant recipients attending an institution, the concern about inconsistent estimators deriving from that relationship was eliminated due to first-differencing. This elimination is demonstrated via Equation 1, the base equation for our panel data set, and Equation 2, which represents the previous year of Equation 1 ( $t - 1$ ) subtracted from Equation 1. In this study,  $y$  is NTR,  $i$  denotes institutions,  $t$  denotes time,  $W$  is a vector of endogenous variables,  $X$  is a vector of exogenous variables,  $\eta$  represents the institution-specific characteristics that do not change, and  $u$  is the error term (Hillman, 2011). The process of first-differencing is demonstrated by:

$$y_{i,t} = \alpha y_{i,t-1} + \gamma W_{i,t} + \gamma X_{i,t} + (\eta_i + u_{i,t}) \quad (1)$$

$$y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} - \alpha y_{i,t-2} + \gamma W_{i,t} - \gamma W_{i,t-1} + \gamma X_{i,t} - \gamma X_{i,t-1} + (\eta_i + u_{i,t}) - (\eta_i + u_{i,t-1})$$

$$y_{i,t} - y_{i,t-1} = \alpha (y_{i,t-1} - y_{i,t-2}) + \gamma (W_{i,t} - W_{i,t-1}) + (\gamma X_{i,t} - \gamma X_{i,t-1}) + (u_{i,t} - u_{i,t-1}) . \quad (2)$$

### ***Lagged instrumental variables.***

Utilizing panel data sets offers additional flexibility in approaching complications in the model or data, such as when regressors are not strictly exogenous (Cameron & Trivedi, 2005). As discussed, several of our regressors were endogenous to the model, including student profile measures, as it was possible that student characteristics are driven by net tuition revenue but also have an effect on net tuition revenue (Hillman, 2011). The implementation of instrumental variables “is a standard method to handle endogenous regressors” (Cameron & Trivedi, 2005, p. 743). An instrumental variable, or instrument, is a variable that is correlated with the endogenous regressor but is exogenous to the model (Stock & Watson, 2007). In other words, the instrument is correlated with the endogenous regressor, but not correlated with the error term

in the model, and instruments must satisfy both of these conditions to be valid (Stock & Watson, 2007). More formally, these two conditions are:

1. Instrument relevance:  $\text{corr}(Z_i, X_i) \neq 0$ .
2. Instrument exogeneity:  $\text{corr}(Z_i, u_i) = 0$  (Stock & Watson, 2007, p. 423).

The additional flexibility provided by panel data sets in relation to an instrumental variable (IV) approach included the ability to use previous years' values of the endogenous variables as IVs (Cameron & Trivedi, 2005). These lagged values met both conditions for valid instrumental variables and yielded consistent estimators of the independent variable coefficients (Cameron & Trivedi, 2005).

This model also used previous years of the dependent variable, net tuition revenue, as an independent variable and also as an instrumental variable. For a year  $t$ , the value of NTR for year  $(t - 1)$  was included as a regressor, although due to the endogenous nature of the variable, the lagged variable was instrumented using year  $(t - 2)$  (Hillman, 2011). At institutions within the study, "we expect that past levels of net tuition revenue are relevant predictors of future net tuition revenue values" (Hillman, 2011, p. 273). Panel data sets allow for this data provided there are at least three years of data, which is not a concern in this study, and the GMM statistical techniques used with the panel data set yield consistent estimators (Cameron & Trivedi, 2005). Within the GMM regression model, there were two specification tests that are important in determining consistent estimation: one to test for serial correlation and one to test the set of overidentifying restrictions (Cameron & Trivedi, 2009). These tests were formed during the implementation and analysis of the model.

Due to the endogenous variables and the inclusion of the lagged dependent variable as a regressor, an assumption of strong exogeneity failed, which led to inconsistent estimators

(Cameron & Trivedi, 2005). “Strong exogeneity rules out models with lagged dependent variables or with endogenous variables as regressors” (Cameron & Trivedi, 2005, p. 700). However, with the instrumental variable approach described above, a weak exogeneity assumption was appropriate for the model and led to the generation of consistent estimators (Cameron & Trivedi, 2005).

### ***Equations.***

Through first-differencing and the implementation of lagged variables, the final model is represented by Equation 3 (Hillman, 2011):

$$y_{i,t} = \alpha y_{i,t-1} + \gamma W_{i,t} + \gamma X_{i,t} + (\eta_i + u_{i,t}) \quad (1)$$

$$y_{i,t} - y_{i,t-1} = \alpha (y_{i,t-1} - y_{i,t-2}) + \gamma (W_{i,t} - W_{i,t-1}) + (\gamma X_{i,t} - \gamma X_{i,t-1}) + (u_{i,t} - u_{i,t-1}) \quad (2)$$

$$y_{i,t} = \alpha + \beta_1 y_{i,t-1} + \gamma_2 (W_{i,t} - W_{i,t-1}) + \gamma_3 (X_{i,t} - X_{i,t-1}) + (u_{i,t} - u_{i,t-1}) \quad (3)$$

In the final model,  $y$  is NTR,  $i$  represents institutions, and  $t$  represents the years of interest. The endogenous variables are represented through vector  $W$  and exogenous variables are captured in vector  $X$ . As seen in both Equations 2 and 3, the institution-specific characteristics ( $\eta$ ) drop out due to differencing.

### ***Quadratic predictors.***

It is possible that the relationship between unrestricted tuition discounting rates and net tuition revenue is not simply a linear one. This possibility is examined in Research Question 2 by examining if a point of diminishing returns is reached related to TD levels and revenue generation. For example, it could be the case that certain levels of TD practices utilizing unrestricted funds are associated with gains in NTR. However, there may be a point in which those tuition discounting rates become unsustainable, leading to diminished gains or even losses in net tuition revenue (Hillman, 2011). Due to this potential non-linear relationship, quadratic

values of UTDR and RTDR, the two variables for unrestricted and restricted tuition discount rates, were added in a model along with the standard linear versions. Both specifications, one with the quadratic regressors and one without, were used to further analyze this potential relationship.

When analyzing the model coefficients for UTDR, RTDR, and their quadratic versions, individual significance tests were performed during the analysis. Additionally, joint hypothesis tests were performed to test the combination of the UTDR and  $UTDR^2$  variables to analyze if they are jointly statistically significant. Similarly, a joint hypothesis test for RTDR and  $RTDR^2$  was also performed.

### **Research Question 2**

#### **Does a rate of tuition discounting utilizing unrestricted funds exist that contribute to diminishing revenue returns of net tuition revenue?**

The data analysis for the second research question utilized the same techniques and model as the first research question, although a slightly different focus was present. Within the descriptive data centered on the relationship between UTDR and NTR per FTE values, the data was used to display NTR values in decile groups of institutions by UTDR values. As UTDR values increase, the relationship between these two variables shifted, providing some insight into this research question.

To examine if diminishing returns were present within the model, the specific coefficient of interest was associated with the quadratic form of the UTDR variable. The sign and value of that coefficient signaled if a diminishing relationship was present between amounts of UTDR and NTR per FTE.

In addition to the model described in Research Question 1 that was focused on the relationship of net tuition revenue and unfunded tuition discounting, a second GMM model was undertaken to analyze the relationship between net price (net tuition revenue per FTE) and institutional revenue. A GMM model was specified with the dependent variable being institutional revenue and main independent variable of interest being net price. The other independent variables of interest included FTE, a quadratic version of FTE, SAT, admitted rate, endowment level, Pell Grant, and minority students.

### **Research Question 3**

**If an affirmative finding to Research Question 2 is realized, what implications for the sustainability of current tuition discounting practices are found?**

By using the results of the model generated to answer the first two research questions, the study had context for how to interpret the results in the most recent year of the study, 2012-2013. If there are negative relationships found between UTDR, the quadratic UTDR, and NTR per FTE, the study can analyze how those relationships related to the most current year of data. Implications for those institutions can then be discussed.

As stated in the review of literature, there have been several reasons or motivations to employ tuition discounting strategies (Hillman, 2011). These may relate to generating revenue, increasing desired student characteristics, or helping to serve low-income students and families (Hillman, 2011). By analyzing the changes of UTDR over time, the research may also track how the other variables change, or do not change, over time. These possible effects also have potential implications for tuition discounting and institutions moving forward.

## Summary

The goal of the study was to analyze the relationship between tuition discounting practices and net tuition revenue at four-year, non-profit, private institutions focused on baccalaureate education. Since this study focused on the relationship between net tuition revenue (NTR) and TD levels, more mainstream quantitative techniques such as ordinary least squares (OLS) were insufficient as many of the independent variables will be endogenous to the model (Hillman, 2011). Through the use of a panel data set, first-differencing, and instrumental variables utilizing lagged variables of the endogenous regressors, this research method resolved the inefficiency and bias produced through normal OLS techniques. The research specifically utilized a generalized method of moments (GMM) technique to address the endogenous nature of the independent variables within the model. The years of interest were 2003-2012, and the study focused on 456 not-for-profit, four-year, private institutions that had classifications of either Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields as of the fall of 2014. Information was gathered through IPEDS, a data center hosted by the National Center for Education Statistics to which institutions receiving Title IV funding are statutorily mandated to report information. Pell Grant information was also obtained through The Institute for College Access & Success.

With these research methods and data, the research investigated the relationship between unrestricted institutional grant aid and net tuition revenue at 456 institutions across the country. The next chapter will investigate the results of the models and present evidence focused on the research questions of the study.



## CHAPTER 4: RESEARCH FINDINGS

The purpose of the study was to analyze the relationship between tuition discounting practices and net tuition revenue at four-year, non-profit, private institutions that were categorized as Bachelor's/Art & Sciences or Bachelor's/Diverse Fields within the Carnegie classifications. A quantitative modeling technique and panel data sets were utilized to study this relationship, and the years of interest were 2003-04 to 2012-13. This chapter will focus on the institutions of interest, descriptive data, and the quantitative model produced to study the relationship, and the chapter will be divided into content based on the research questions.

### Research Question 1

**What is the effect of unrestricted institutional grant aid expenditures on net tuition revenue?**

#### Institutional Characteristics

The Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields institutions were of interest in this study since tuition discounting practices have historically been present at the highest levels within these types of institutions and most likely to have significant consequences. Information was not available for all 456 institutions across each year of the study, which caused limitations in the amount of groups in the final model. The 456 institutions represented 41 states across the country, and a listing of the institutions in the sample, as well as the states in which they are located, is presented in the Appendix.

Before implementation of the methods of analysis, it was important to eliminate a small set of institutions from the data set that do not engage in similar tuition discounting practices. These included Berea College, College of the Ozarks, Alice Lloyd College, and Cooper Union for the Advancement of Science and Art.

A few of these institutions primarily are funded through endowment revenues and have lean staffs, requiring the students attending the institutions to complete a certain amount of hours of work per week in service to the institution. The College of the Ozarks and Berea College are two of these institutions, and they are outliers when compared to the other college and universities, by charging no tuition while admitting students with limited financial resources (Berea College, 2015; College of the Ozarks, 2015). Every student receives the equivalent of an annual full-tuition scholarship worth \$20,900 at Berea College (Berea College, 2015) and \$18,300 at the College of the Ozarks (College of the Ozarks, 2015). Due to this, the amounts of grant aid these two institutions were awarding to students was very high compared to other institutions, and it was not fitting to include them in the data since it skewed the results significantly. For example, across all years and institutions, the average NTR per FTE was \$16,590. Over 2003-2012, the average NTR per FTE for Berea College was -\$21,173. Similarly, the NTR per FTE for College of the Ozarks was \$5,010, primarily due to outside grants that some students were using to apply to tuition and fees (College of the Ozarks, 2015). Due to the much different structure of funding, including Berea College and College of the Ozarks in the model was not appropriate.

Other than these work-focused institutions, there are a few others that offer free tuition to students. Alice Lloyd College, located in eastern Kentucky, offers free tuition to any student from within the 108 county service area that is focused on Central Appalachia (Alice Lloyd College, 2015). The Cooper Union for the Advancement of Science and Art, located in New York City, has a long history of providing free or low-cost tuition for its students, although for the most recent classes of students has begun charging partial tuition (Kaminer, 2013). Cooper Union's average UTDR for the time span of the study was over 88 percent, a significant

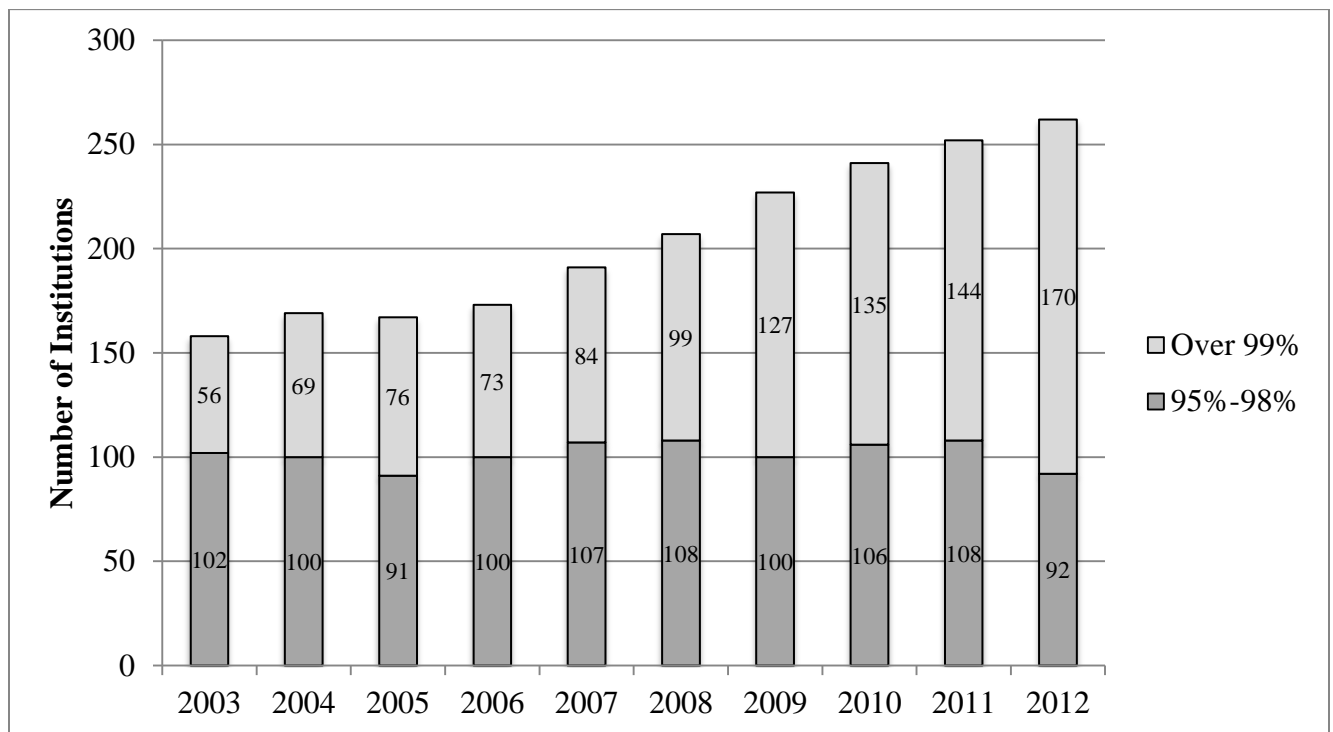
difference from the data set average of 26.4 percent. Due to these free tuition programs, Alice Lloyd College and Cooper Union were not included in the following analysis of pricing, net tuition revenue, and tuition discounting.

One final check of the data set for outliers was undertaken to check for statistical reporting errors that would skew data and results significantly. Upon analysis of net tuition revenue per FTE, a small set of institutions had a negative value for NTR per FTE for at least one year of interest. Berea College had a negative NTR per FTE value for each year in the study, but Stillman College, St. Francis College, the University of Charleston, American Jewish University, and Soka University of America all had at least one year when negative NTR per FTE was present. Further analysis revealed an FTE reporting error for Stillman College for 2005, showing 70 FTE students when the institution averaged 1029 during the other nine years in the study. A similar finding was present for St. Francis College, when in 2005, 247 students were reported when the College averaged 2178 FTE students over the other nine years. The University of Charleston reported 383 FTE students in 2005 when it averaged 1328, and American Jewish University averaged \$14,454 NTR per FTE within the panel but reported a loss of \$3630 per FTE in 2005. The Soka University of America was not eliminated due to no discernible reporting error. The institution averaged -\$2 per FTE in 2004 due to high RTDR values, but those high values were present during the other years of the study. These changes to the institutions of interest brought the total number of IHEs in the data set to 448.

#### ***Frequency of institutional aid.***

As expected based on the population of institutions, the awarding of institutional grant aid was a prevalent exercise. For the incoming cohort of the fall of 2012, 262 of the 448 institutions (58%) awarded institutional grant aid to more than 95% of their incoming first-year

students, and 170 of the 448 IHEs (38%) awarded institutional grant aid to 99% or 100% of the incoming first-year cohort in the same year (NCES, 2015a). In 2003, the number of IHEs awarding institutional grant aid to 95% or more of their entering cohort was 158, or 35%. The increase from 158 institutions in 2003 to 262 IHEs in 2012 represents an increase of over 65%. While a high prevalence of institutional grant aid has existed at the set of institutions for all years the study, the number of IHEs with the highest frequencies changed during the 10 years. Figure 3 represents how these levels have fluctuated between 2003 and 2012.



*Figure 3.* Number of institutions with high frequencies of institutional grant aid ( $n=448$ ). Counts represent number of institutions awarding institutional grant aid to over 99 or 100 percent and 95 to 98 percent of incoming first-time, first-year students for each fall cohort.

As depicted by Figure 3, the number of institutions awarding institutional grant aid between 95% and 98% of incoming fall cohorts has fluctuated slightly but remained between 91 and 108 during the years of interest with no discernible trend. The number of institutions

awarding to 99% or 100% of students, however, has grown steadily, increasing from 56 in 2003 to 170 in 2012.

***Applications for admission and yield.***

Breneman (1994) believed that a major obstacle to such high prevalence of institutional grant aid practices and high tuition levels would be a shift in demand represented by admissions applications, and by extension, yield of applicants enrolling in institutions. By this line of thought, as tuition levels increased over the 10 years of the study, institutions in the study should witness a decrease in applications due to the outcry from the public focused on high tuition levels and lack of affordability (Breneman, 1994). The situation, however, is more complicated within the institutions of interest than Breneman (1994) predicted. Table 4 shows the application levels, admitted student rates, and yield for the institutions during the 2003-2012 fall semesters.

Table 4

*Applications, Admitted Rates, Standardized Test Averages, and Yields*

	Average Applications	Average Admitted Rate	Total Applications	Total Admissions	Total Admitted Rate	SAT	Average Yield	Average Enrolled
2003	1,633	68.0	632,821	372,122	58.8	1,197	41.3	338
2004	1,668	66.9	630,582	371,661	58.9	1,194	40.9	337
2005	1,784	66.1	692,368	398,580	57.6	1,194	38.9	342
2006	1,832	65.1	703,332	393,942	56.0	1,188	39.4	345
2007	1,955	64.6	758,438	424,393	56.0	1,185	37.0	349
2008	2,116	63.2	831,680	453,103	54.5	1,189	37.3	366
2009	2,186	63.0	889,882	493,380	55.4	1,186	34.9	351
2010	2,308	62.2	923,325	507,660	55.0	1,189	33.7	354
2011	2,466	61.8	986,575	535,712	54.3	1,182	31.9	353
2012	2,576	61.3	1,038,043	566,392	54.6	1,184	30.7	352

Table 4 depicts a few interesting trends and relationships over the course of the 10 entering fall cohorts of new first-time, first-year students. The average number of applications at each institution increased over 57 percent from 2003 to 2012, steadily increasing from an

average of 1,633 applications per institution in 2003 to 2,574 in 2012. Within this measure, the demand for these four-year, private, baccalaureate institutions seemed to grow considerably. Along with this trend of increased applications, institutions have gradually admitted fewer students who have applied, represented by the average admitted rate decreasing from 67.6 percent in 2003 to 61.1 percent in 2012. As with the trend concerning average applications, the change occurred consistently and steadily over the years, and it signaled an increase in demand as institutions have been admitting a fewer percentage of applicants.

By analyzing the yield of the institutions, as defined by the percent of admitted applicants who enroll, it can be seen that these colleges and universities have witnessed a consistent trend of decreasing yields. The average yield rate declined over 10 percentage points, ranging from 41.3 percent in 2003 to 30.7 in 2012. This fact indicates that the marketplace is more competitive for these private, primarily baccalaureate institutions as it has become more difficult to matriculate individuals who are applying and have been accepted. This downward yield trend, combined with the increasing applications, may also indicate that students are applying to more institutions in the most recent years in the study. Several within higher education have documented this pattern, along with possible motivators of the increased application behaviors (Kaminer, 2014).

When increases in applications are balanced with decreases in yield, the influence on enrollment has been a slight net gain over the years of the study. The average enrollment for each fall cohort of first-time, first-year students increased slightly from 338 in 2003 to 352 in 2012. Of the institutions that had sufficient data to calculate the change in enrollment, 147 witnessed a smaller first-time, first-year student class in 2012 than 2003, 6 remained the same, and 222 had increased enrollment. The trends in the data indicate that institutions are working

harder each year in order to draw in enrolled students. The net gains in enrollment have been minimal, but enrolling these students in the competitive environment often comes at a higher financial cost in the form of tuition discounts. The next section will take a closer look at tuition discounting rates present at the institutions of interest over the years of the study.

***Price and tuition discounting levels.***

As indicated by the theoretical foundations of tuition discounting and practitioners, there is a complex interplay between tuition discounting practices, pricing levels, and net tuition revenue. Table 5 displays the average tuition and fee level for the institutions in the study. The CPI and HEPI were used as factors to adjust for inflationary pressures in order to put tuition and fee changes into 2012 dollars. When approaching cost from a consumer perspective, the CPI provided a better measure of tuition and fee levels, and when analyzing the power of net tuition revenue, the HEPI yielded a more appropriate financial indicator. Real increases could be seen within each financial measure, with CPI adjusted tuition and fee levels increasing over \$5,600, an increase of over 26%. When adjusting price levels with the HEPI, the increase was smaller although still over \$4,500 resulting in a 20% increase. The CPI and HEPI annualized percentage increases were 2.6% and 2.1%, respectively. When current dollars were used as a measure, the annualized rate of increase of tuition and fees was 5.2%. Within both measures of inflation, modest but steady increases in the price of tuition and fees were witnessed during 2003-2012.

As price increased at institutions over the ten years of interest, one may expect that the revenue being generated by the price increases would increase as well. However, the situation has been more complicated due to increases in institutional grant aid from unrestricted sources within the institutions' budgets. Table 6 displays the average amounts of expenditures of institutional grant aid, by sources of funding. The table also displays the net tuition revenue

generated by institutions and how that amount varied per FTE. All dollar amounts were adjusted with the HEPI in 2012 dollars.

Table 5

*Average Tuition and Fees for Baccalaureate Institutions 2003-2012*  
(N=448).

	Current Dollars	CPI Adjusted	HEPI Adjusted
2003	17,173	21,432	22,529
2004	17,772	21,606	22,489
2005	18,830	22,088	22,928
2006	20,007	22,605	23,177
2007	21,323	23,626	24,018
2008	22,595	23,760	24,249
2009	23,612	25,203	24,787
2010	24,707	26,702	25,706
2011	25,995	26,435	26,428
2012	27,052	27,052	27,052

Table 6

*Average Net Tuition Revenue and Institutional Grant Aid for Baccalaureate Institutions 2003-2012* (N=448).

	Average NTR	Average NTR per FTE	Average Unfunded Grants	Average Funded Grants
2003	20,897,966	14,468	7,791,040	2,628,939
2004	21,744,106	14,812	8,167,707	2,615,699
2005	22,158,862	15,003	8,490,802	2,656,182
2006	22,407,211	15,113	8,754,925	2,644,731
2007	23,706,989	15,659	9,257,719	2,716,236
2008	23,960,132	15,580	9,735,629	2,724,041
2009	24,509,871	15,662	10,726,169	2,665,329
2010	25,328,627	16,003	11,882,777	2,586,851
2011	25,414,360	16,126	12,580,658	2,622,965
2012	25,598,272	16,203	13,319,584	2,699,012

Note. All dollar amounts HEPI adjusted for 2012.

The average NTR at institutions has increased at an annualized 2.3 percent, climbing about \$4.7 million per institution during 2003-2012, and matching the tuition and fee level



annual growth as measured by the HEPI. NTR per FTE in 2012 was \$1735 greater than 2003, representing an annualized increase of 1.26 percent between 2003 and 2012. The increases in FTE across institutions has outpaced NTR generation, leading to a lower growth rate in NTR per FTE when compared to NTR.

Total grant aid increased significantly, but the increases in institutional grant aid directed to students was almost entirely driven by significant growth in unfunded grant aid. Funded grant aid, money restricted for the sole purpose of funding institutional grants, saw a modest .3 percent annualized increase, increasing only about \$70,000 per institution between 2003 and 2012. During the same time, unfunded grant aid directed from resources within the general operating budget of an institution, expanded significantly at an annualized rate of over 6.1 percent. The increase from an average of \$7.8 million in 2003 to \$13.3 million in 2012 represents an overall increase of over 70 percent. Therefore, although institutions have increased pricing levels and made small gains in enrolling more students, the net tuition revenue gains have been minimized greatly by increases in institutional grant aid awards through unfunded sources. Gross tuition and fee revenue increased, in 2012 HEPI dollars, by approximately \$12.12 million between 2012 and 2003, based on Table 5. Net tuition revenue only increased by \$4.7 million during that time, indicating that 61% of increased gross tuition and fee revenue went directly back to funding unrestricted tuition discounts. This finding is similar to Redd's (2000) calculation of 59.1% over the 1990s. However, it is unclear what would have occurred if these increases in institutional grant aid were not witnessed. The lack of such increases may have drawn in fewer students and have a negative impact on net tuition revenue. The complexity of this relationship and lack of information lends further credibility to the quantitative model employed in the study.

Table 7 displays the changes in institutional grant aid practices on a student level. The unfunded discount rate represents the amount of tuition and fees that are distributed to students through grant aid awards that are funded through unrestricted sources within institutions' budgets. This rate has steadily climbed from 2003-2012, increasing 7 percentage points from 23.6 in 2003 to 30.6 percent in 2012. Put another way, for every dollar a student is paying in tuition and fees, an average of approximately 30 cents was returned to them in the form of unfunded institutional grant aid in 2012. The funded discount rate, the percentage of tuition and fees that is covered by funds solely dedicated to that purpose, actually declined over the 2003-2012 timeframe. When these two rates are combined, the result is an increase in the total tuition discount rate, reaching a peak of 36.4 percent in the academic year of 2012-2013. The upward trend of TD rates over the 2003-2012 timespan is similar to the trend witnessed in NACUBO's annual study (NACUBO, 2014). In their report, NACUBO's 401 reporting member institutions reported an overall TD rate of 33.9 percent in 2003 and a rate of 40.2 percent in 2012 (NACUBO, 2014). In summary, institutions are funding more grant aid from their general operating budget, and the rising tuition levels that have been facing students have been mitigated by increases in unfunded grant aid, resulting in an annualized 1.26 percent increase in net price for students from 2003 to 2012, as shown in Table 6.

Since this study is specifically interested in unfunded tuition discounting and the relationship with net tuition revenue, how institutions differ when grouped by unfunded tuition discount rates is of interest. Table 8 shows the 448 institutions broken into decile groups by the unfunded tuition discount rate, UTDR, and the corresponding characteristics of those groups. To provide a snapshot of these relationships, only the 2012-2013 academic year is shown in the table.

Table 7  
Average Tuition Discount Rates for Baccalaureate Institutions 2003-2012  
(N=448).

	Unfunded Rate	Funded Rate	Total TD Rate
2003	23.6	8.1	31.7
2004	23.5	7.8	31.3
2005	24.2	7.7	31.9
2006	24.7	7.5	32.2
2007	24.6	7.2	31.8
2008	25.8	6.8	32.6
2009	26.9	6.4	33.3
2010	28.1	5.8	33.9
2011	29.5	5.8	35.3
2012	30.6	5.8	36.4

Table 8

*Institutional Characteristics by Unfunded Tuition Discount Rate, by Decile for Academic Year 2012-2013*

	Average UTDR	Average RTDR	UG Price	NTR / FTE	Admit Rate	SAT	Minority	Pell Grants / FTE	Endowment / FTE	N
1	51.5	3.5	30,175	13,391	65.4	1212	26.2	38.0	75,411	45
2	44.5	4.0	27,823	14,095	67.8	1162	23.6	35.6	59,440	45
3	41.0	3.9	30,200	16,009	66.9	1203	21.0	33.5	56,079	45
4	37.5	4.4	29,923	17,015	64.7	1185	21.8	32.4	59,032	45
5	34.3	3.8	29,234	17,450	65.0	1185	24.2	37.1	59,338	45
6	30.6	4.7	29,237	18,190	58.1	1188	32.0	37.0	97,036	44
7	26.8	6.1	29,897	19,569	54.1	1216	29.1	33.4	100,791	44
8	22.8	6.7	26,560	17,875	52.8	1213	37.0	42.5	92,719	44
9	14.5	5.3	19,404	14,922	57.7	1111	55.1	63.7	45,588	44
10	1.0	16.5	18,112	13,587	58.7	1113	59.7	69.1	105,869	44

In Table 8, the decile ranges have average unfunded tuition discount rates that vary widely, with the top 10 percent of unfunded discounters having an average of 51.5 percent of tuition and fees covered by unfunded grant aid. The bottom 10 percent only have an average unfunded rate of 1.0 percent. Through the decile rankings, there are few trends or patterns discerned. The principal aims of tuition discounting regarding student characteristics, which at an institutional level may include academic profile, minority students, and low-income students,

do not trend in a positive direction. In fact, lower rates of unfunded discounting are associated with higher rates of Pell grant recipients and minority students. Endowment values do not indicate a strong pattern associated with unfunded tuition discounting rates, and there is only a slight inverse pattern between unfunded and funded rates.

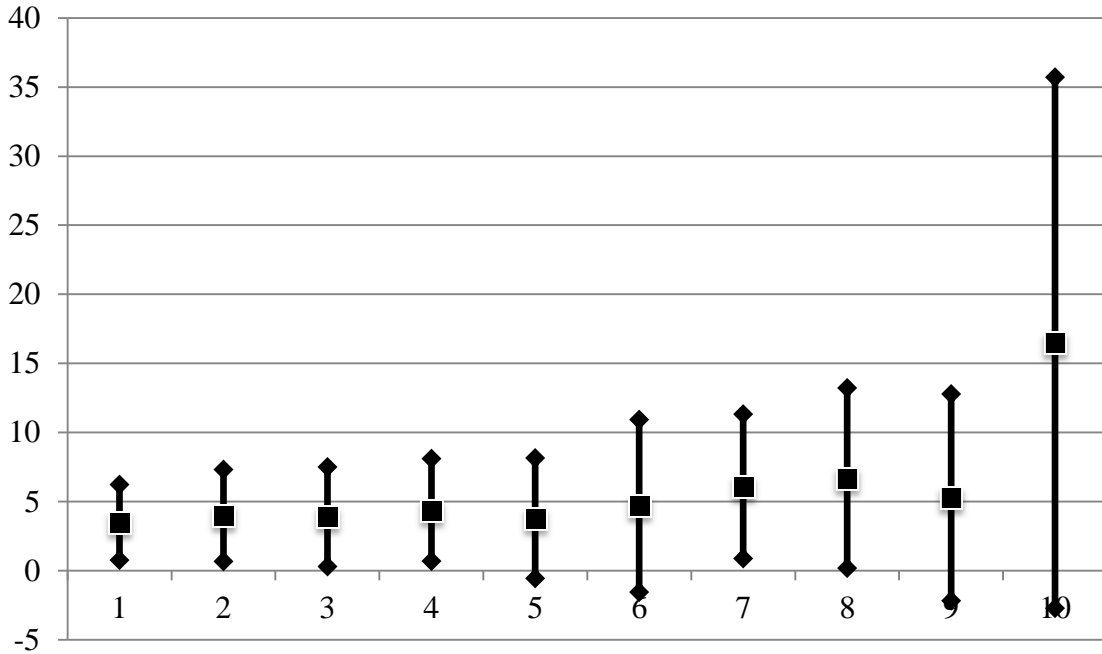
The figures below depict the decile groups represented in Table 8 and show each variable in a graphical format that shows not only the trends of the means, but also the variability within each decile group. Each of the lines extending vertically from the boxes in the graphs measures one standard deviation in each direction from the mean.

As the results from Table 8 indicated, there were not many discernable trends as the data move from decile group 1 to decile group 10, other than those previously mentioned.

Graphically, the relationships between lower rates of unfunded discounting and higher Pell recipients and minority students are represented, although the variability within Deciles 9 and 10 weaken the finding. These deciles' standard deviations extend downward to near the lower threshold of the other deciles, indicating that there are some institutions within each decile that have similar populations. This overlap reduces the perceived differences in the trends focused solely on means. The slight inverse pattern between UTDR and RTDR is also complicated by Decile 10 range of standard deviations; although the mean is significantly higher than the other deciles, the variability is as well, showing that some institutions are similar in RTDR ranges to the others present in the set.

When looking across the set of graphs, Decile 10 seems to have the greatest variability within the sets of institutions. Especially when analyzing RTDR, minority students, Pell grants, and endowment within Decile 10, the standard deviations stretch beyond the other deciles. The institutions in this decile discount the least, at an average of only 1.0 percentage points, but have

a higher degree of variability across other institutional characteristics. These institutions may influence the models due to their inconsistency on those measures, and the graphs below should be analyzed with care to be cognizant of this variability.



*Figure 4.* Relationship between UTDR, by decile group, and RTDR, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.

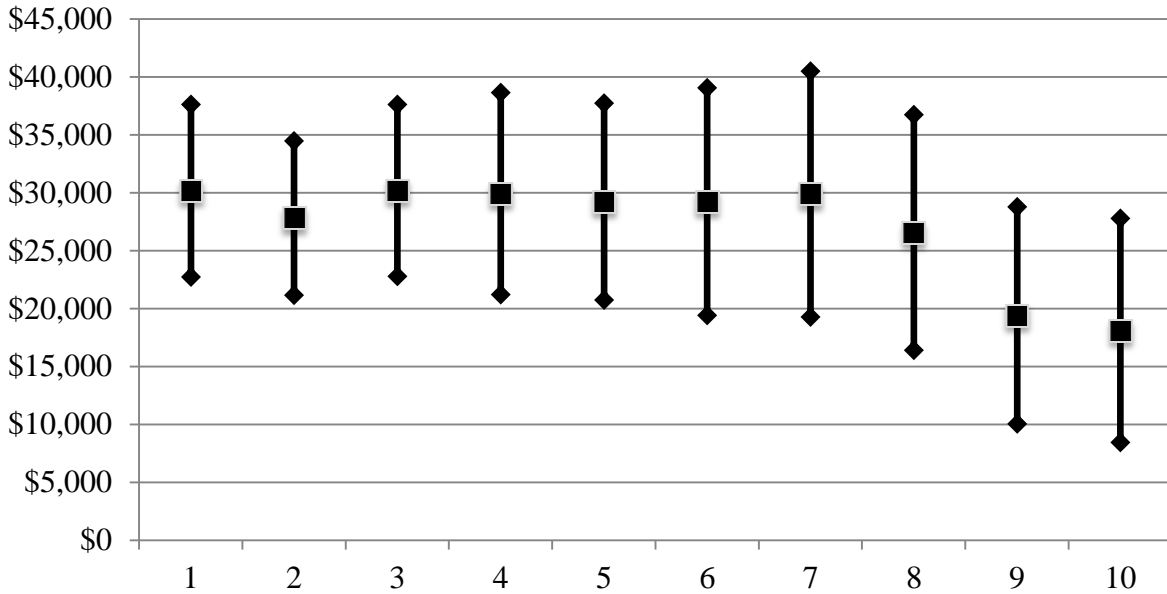


Figure 5. Relationship between UTDR, by decile group, and price level of institutions, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.

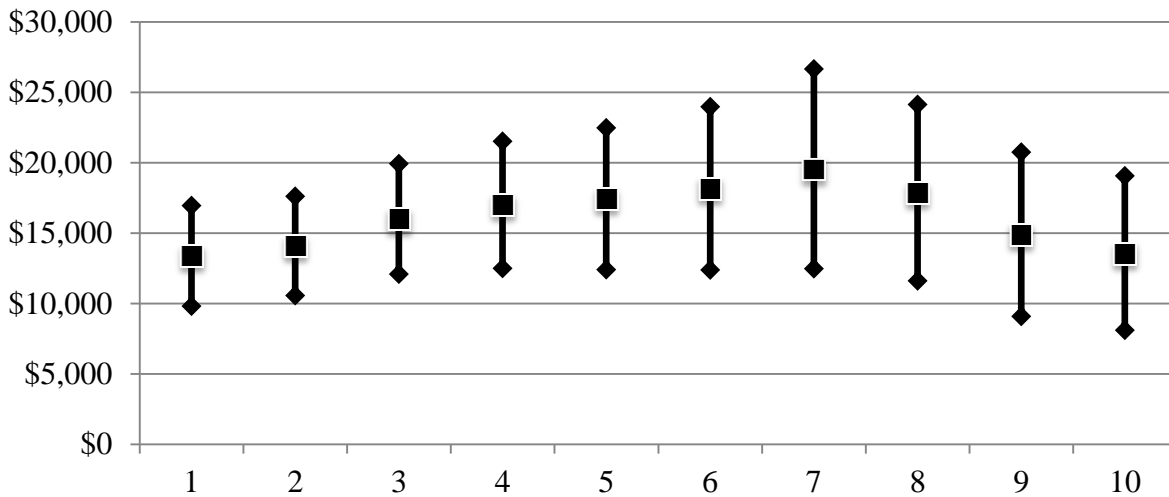
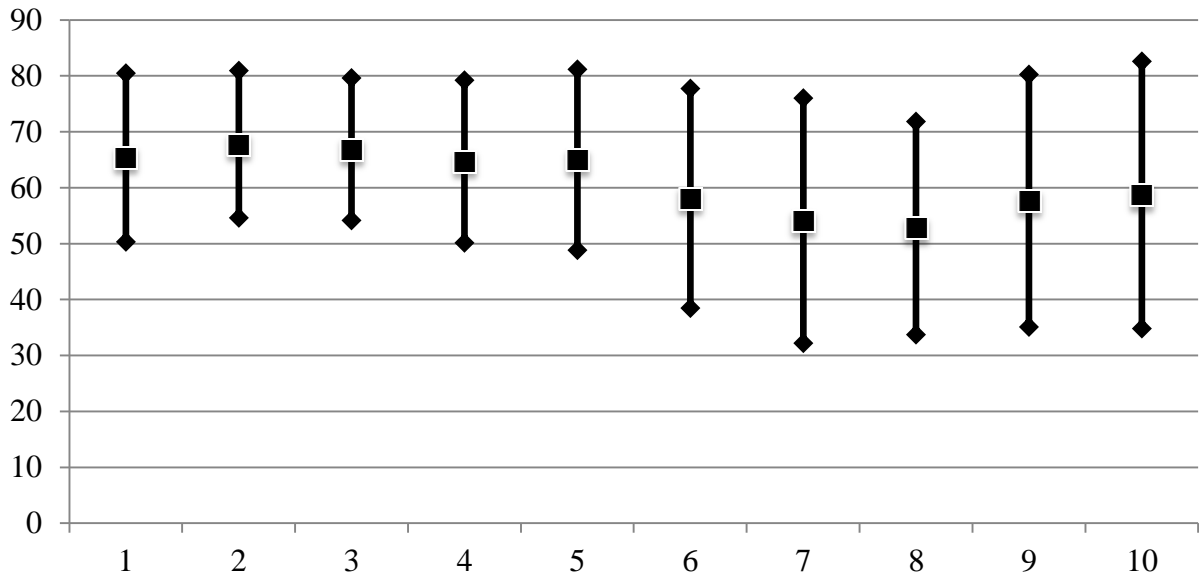
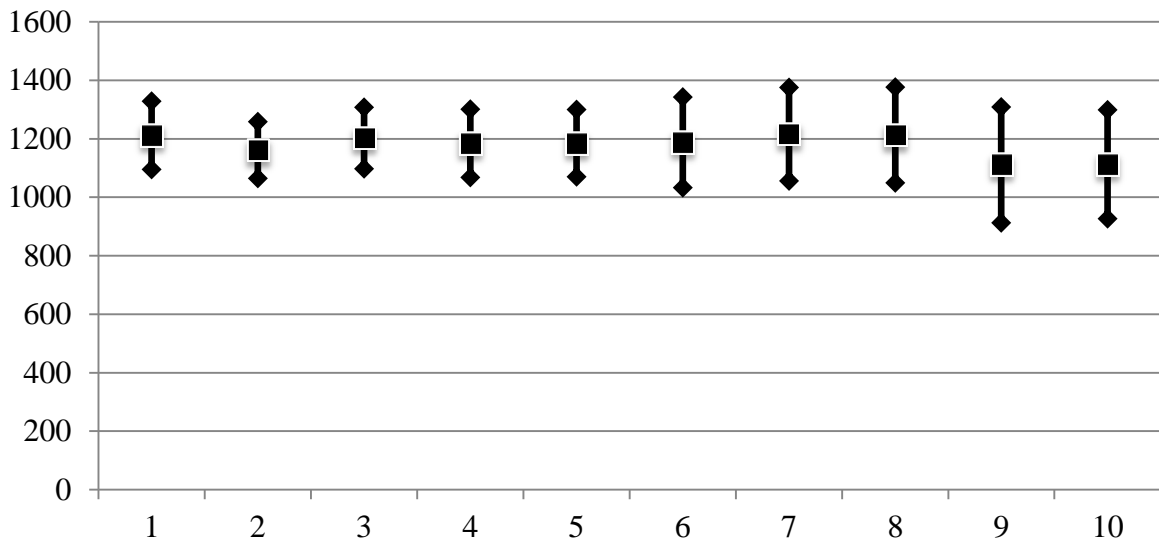


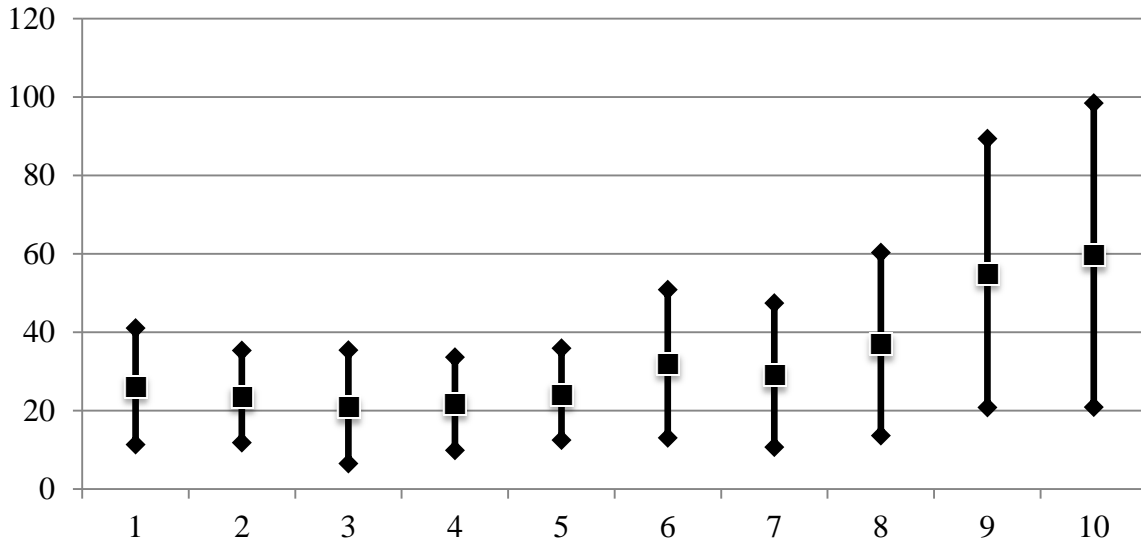
Figure 6. Relationship between UTDR, by decile group, and net price per FTE of institutions, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.



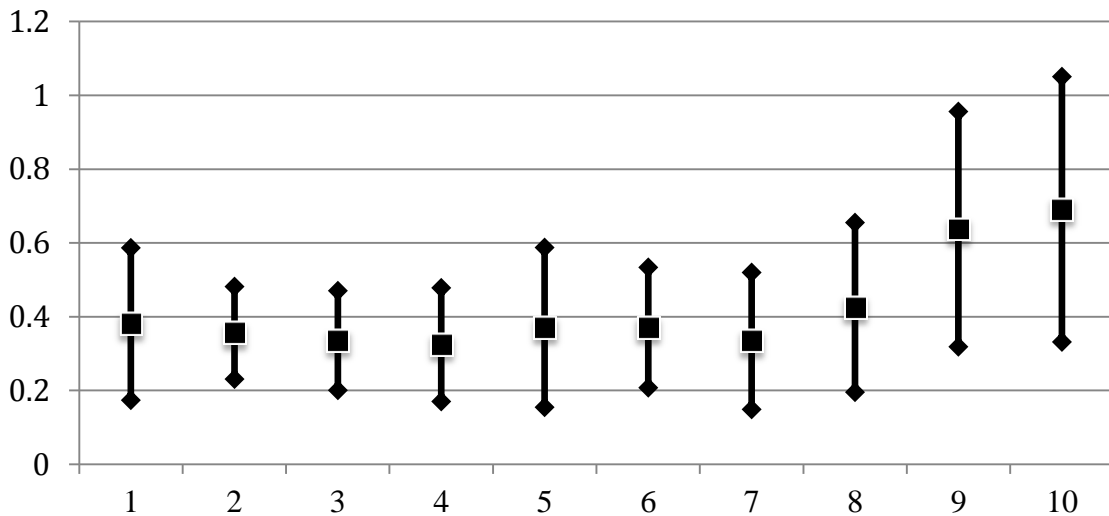
*Figure 7.* Relationship between UTDR, by decile group, and percentage of admitted students, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.



*Figure 8.* Relationship between UTDR, by decile group, and SAT score, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.

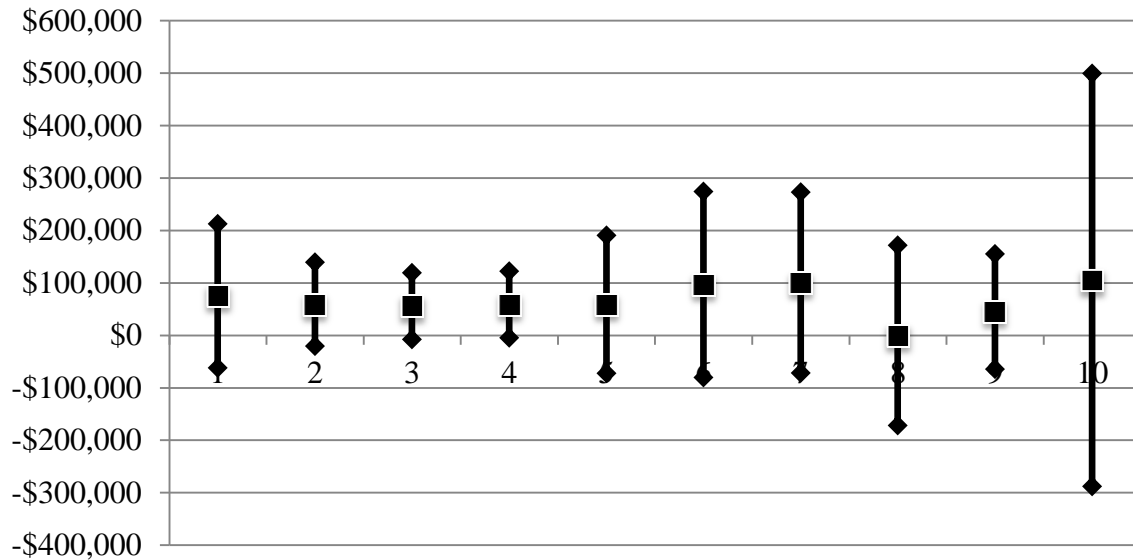


*Figure 9.* Relationship between UTDR, by decile group, and percentage of minority students, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.



*Figure 10.* Relationship between UTDR, by decile group, and Pell Grants per FTE, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.





*Figure 11.* Relationship between UTDR, by decile group, and endowment value per FTE, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting from unrestricted sources, and decile group 10 had the lowest levels. The boxes represent mean values, and extensions equal one standard deviation from the mean in each decile.

When analyzing the relationship between UTDR and NTR, an interesting pattern is unveiled. The lowest values of net tuition revenue per FTE were found within the institutions with the highest and lowest rates of unfunded tuition discounting. The highest amounts of NTR per FTE existed at institutions in decile group 7. The UTDR values within this group ranged between 25.0 and 28.7, and these 44 institutions had an NTR per FTE value of just over \$19,500. This finding indicates that tuition discounting using unfunded sources of grant aid is associated with growing levels of NTR, but the practice is then associated with diminishing values of NTR per FTE after an UTDR around 28.7 percent. This result lends insight into answers for the first two research questions of the study; it appears that tuition discounting through unfunded grant aid can contribute to gains in net tuition revenue, but after an unfunded rate of 28.7 percent, the

relationship shifts. However, this result is only descriptive in nature. It does not control for other factors and changes across and within institutions.

### **Model specification and results.**

This study utilized a panel data set and quantitative methodology to address the research questions focused on tuition discounting and net tuition revenue. Panel data sets include data from several units, institutions in this case, over several time periods (Stock & Watson, 2007). The goal of the study was to analyze the relationship between tuition discounting practices and net tuition revenue at four-year, non-profit, private institutions focused on baccalaureate education.

Because this study focused on the relationship between net tuition revenue (NTR) and TD levels, more mainstream quantitative techniques such as ordinary least squares (OLS) were insufficient as many of the independent variables will be endogenous to the model (Hillman, 2011). For example, the amount of institutional grant aid awarded to students may entice them to enroll at an institution, impacting the revenue generated by their tuition and fees. However, the amount of tuition revenue an institution yields will help determine what funds are available for institutional grant aid. This intertwined relationship complicates normal modeling techniques, and due to this endogeneity, dynamic panel models and a quantitative analysis technique called generalized method of moments (GMM) was implemented.

Within the GMM approach, some of the independent variables were designated as endogenous to the model. These specifically included published undergraduate and graduate tuition and fees, undergraduate FTE enrollment, graduate FTE enrollment, SAT, percentage of minority students, Pell Grant recipients, admitted rate, the unfunded tuition discount rate, and the

unfunded tuition discount rate squared. The exogenous variables included the endowment value per FTE, restricted tuition discount rate, and the restricted tuition discount rate squared.

Table 9 displays the regression results of the panel data set utilizing the lagged NTR per FTE, endogenous independent variables, and exogenous independent variables. Within the GMM regression model, there were two specification tests that are important in determining consistent estimation: one to test for serial correlation and one to test the set of overidentifying restrictions (Cameron & Trivedi, 2009). Post-estimation commands within the statistical package yielded favorable results for both tests. The Arellano-Bond test for zero autocorrelation fails to reject the null hypothesis of no autocorrelation at the .05 level for orders 2 and 3. Additionally, the null hypothesis that the model's moment conditions are correct is not rejected because  $p = .7015 > .05$  (Cameron & Trivedi, 2009).

The coefficient for the unrestricted tuition discount rate was significant at the .05 level, but the coefficient on the squared value of UTDR was not statistically significant at the .05 level. However, a joint significance test of UTDR and  $UTDR^2$  was significant at the .001 level. The negative coefficients on the variables signified that increasing levels of unrestricted tuition discounting was associated with decreasing net tuition revenue. This finding does not conform to the descriptive data presented in Table 8 that showed a positive relationship with UTDR and NTR per FTE until approximately 28 percent. The inverse relationship indicates that unfunded tuition discounts cannot be leveraged effectively to yield NTR gains when controlling for other factors and characteristics of the institutions in the study.

Many of the variables in the model were not statistically significant at the .05 level. Graduate tuition and fees, undergraduate FTE, graduate FTE, admitted rate, SAT, Pell Grant recipients, and the endowment value were all not significant in the model. The restricted tuition

discount rate, RTDR, was statistically significant at the .001 level, and the joint hypothesis test for both RTDR and RTDR<sup>2</sup> was statistically significant at the .001 level. Additionally, minority student enrollment was statistically significant at the .05 level, showing an inverse relationship between minority student enrollment and NTR per FTE.

To display the relationship between UTDR, UTDR<sup>2</sup>, and NTR per FTE within the model, a graphical representation can be produced using the mean values of the other variables. Table 10 shows the mean values and standard deviations of each of the variables in the panel model, and the mean values, coupled with the appropriate coefficients, can be utilized to generate an equation that focuses specifically on the unrestricted grant aid and net tuition revenue variables.

When coefficients are used in the regression equation estimated by the model, *Equation 4* can be utilized to show a graphical relationship between the independent variables focused on tuition discounting and the dependent variable, net tuition revenue per FTE. By using the means of the values utilized in the estimation displayed in Table and 11, *Equation 5* can be generated.

$$\begin{aligned} \text{ntrperfte} = & 8332.61 + .099*\text{laggedntrperfte} - 91.78*\text{utdr} - 1.39*\text{utdr}^2 - \\ & 150.62*\text{rtldr} - .306*\text{rtldr}^2 + .466*\text{uprice} + .009*\text{gprice} - .046*\text{ufte} + 1.06*\text{gfte} \\ & - 1.01*\text{adm} - 26.37*\text{min} - .089*\text{sat} + 12.47*\text{pell} - .00071*\text{endow} \end{aligned} \quad (4)$$

*Equation 5* utilizes *Equation 4* to display the relationship between unrestricted tuition discount rate, the quadratic form of the unrestricted tuition discount rate, and net tuition revenue per FTE.

$$\begin{aligned} \text{ntrperfte} = & 8332.61 + .099*15,826.97 - 91.78*\text{utdr} - 1.39*\text{utdr}^2 - \\ & 150.62*7.08 - .306*130.02 + .466*25,314.76 + .009*8,448.39 - .046*1443.80 \\ & + 1.06*64.78 - 1.01*64.05 - 26.37*25.50 - .089*1186.62 + 12.47*33.94 - \\ & .00071*77,084.58 \end{aligned} \quad (5)$$

Performing the calculations within *Equation 5* simplifies the equation to:

$$\text{ntprperfte} = 20,194.04 - 91.78*\text{utdr} - 1.39*\text{utdr}^2 \quad (6)$$

Based on Equation 6, the model finds a negative relationship with unfunded institutional tuition discounting on net tuition revenue per student. Over the range of the values, the impact of the relationship changes due to the non-linear relationship.

As displayed in Table 10, the standard deviations of some of the variables are quite large. This is a result of the large range of the values of the variables across the institutions in the study population. Along with the model shown in Table 9, other models were attempted using a subset of the population of institutions. When the institutions having no graduate students were analyzed, the GMM model failed to pass the tests for collinearity with the reduced set of universities and colleges. A similar result was found when only institutions that had less than 50 graduate FTE students were analyzed. However, when the model population was expanded to include institutions that had less than 100 graduate FTE students, the model specification tests passed. The coefficient magnitudes and signs were similar to the full model results, so the results of that subset of institutions was not included.

For example, in 2012 the range of tuition and fees for undergraduate students varied from a low value of \$3,770 to a high value of \$46,924. The size of the institutions varied as well, with some institutions enrolling less than 100 undergraduate FTE students and some reaching over 4,000 undergraduate students.

Table 9

*Regression Model Explaining Net Tuition Revenue per FTE, 2003-2012*

	Coefficients and Standard Errors
Lagged net tuition revenue per FTE	.099* (.046)
Undergraduate tuition and fees	.446** (.134)
Graduate tuition and fees	.009 (.045)
Restricted discount rate	-150.62*** (23.88)
Restricted discount rate squared	-.306 (.27)
Unrestricted discount rate	-91.78* (42.53)
Unrestricted discount rate squared	-1.39 (.77)
Undergraduate FTE	-.046 (.12)
Graduate FTE	1.06 (1.21)
Admitted rate	-1.01 (9.44)
Minority enrollment	-26.37* (63.15)
Average SAT of incoming cohort	-.089 (1.64)
Pell Grant recipients per FTE	12.47 (7.48)
Endowment value per FTE	-.00071 (.001)
Constant	8332.61*** (2200.23)
Number of groups	383
Number of instruments	400
Specification Tests	
Arellano-Bond test for AR(1)	.0018**
Arellano-Bond test for AR(2)	.1234
Arellano-Bond test for AR(3)	.1488
Sargan test for overidentification	.7015

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 10

*Regression Model Variable Descriptive Statistics*

	Means	Standard Deviation
Lagged net tuition revenue per FTE	15,826.97	5,230.68
Undergraduate tuition and fees	25,314.76	8,486.91
Graduate tuition and fees	8,448.39	10,839.47
Restricted discount rate	7.08	8.94
Restricted discount rate squared	130.02	383.51
Unrestricted discount rate	27.72	12.80
Unrestricted discount rate squared	932.07	678.41
Undergraduate FTE	1443.80	1260.08
Graduate FTE	64.78	136.48
Admitted rate	64.05	18.13
Minority enrollment	25.50	22.63
Average SAT of incoming cohort	1186.62	141.04
Pell Grant recipients per FTE	33.94	19.35
Endowment value per FTE	77,084.58	170,493.20
Constant	8332.61	---

## Research Question 2

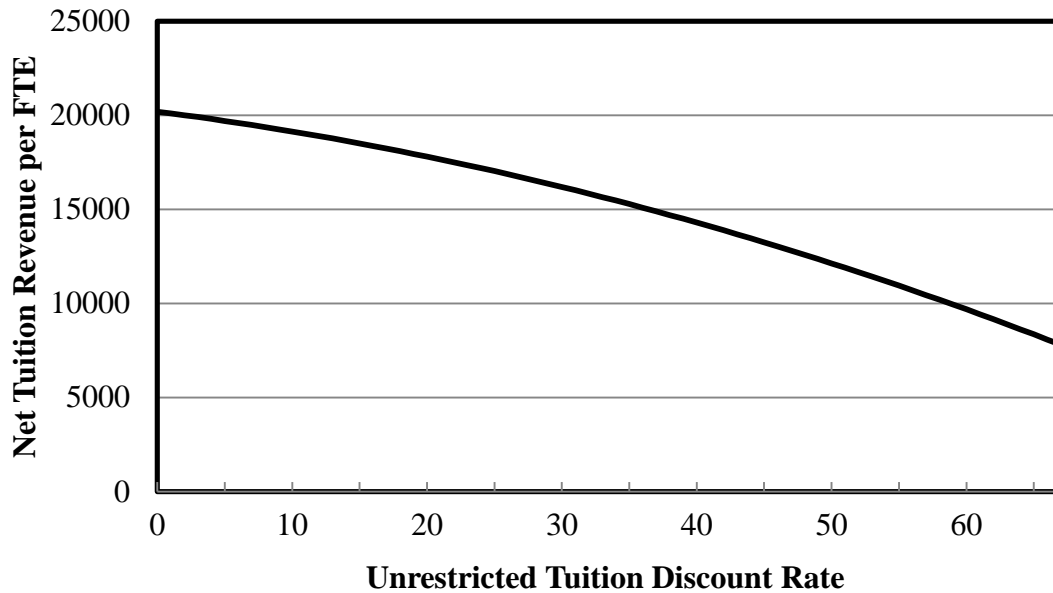
**Does a rate of tuition discounting utilizing unrestricted funds exist that contribute to diminishing revenue returns of net tuition revenue?**

The second research question focused on the possible non-linear nature of the relationship between UTDR values and NTR per FTE. *Equation 6* represents the relationship between unrestricted tuition discounting and net tuition revenue in the model. The coefficient on the quadratic form of UTDR is negative, indicating an increasingly negative impact on NTR per FTE with higher values of UTDR. At a level of no unrestricted tuition discounting, the average institution is expected to have a NTR per FTE value of \$20,194.04. As the value of the UTDR rate grows, the expected NTR per FTE diminishes, and the NTR per FTE value decreases at a faster rate as the value of UTDR increases. For example, institutions with a UTDR value of 10% are predicted to have \$120.97 more NTR per FTE than institutions with a UTDR value of 11%. However, institutions with a UTDR value of 30% are predicted to have \$179.35 more than institutions with a UTDR value of 31%. As Figure 12 displays, the inverse linear and inverse quadratic relationship between UTDR and NTR per FTE yields decreases in NTR per FTE over the span of the unrestricted tuition discount rates in the model. When controlling for the variables in the study, there is not an amount of UTDR that is associated with NTR per FTE growth.

By using the descriptive data from Table 8, a negative quadratic relationship can also be witnessed. Figure 13 displays NTR per FTE, by the UTDR decile groups. The NTR per FTE values reach a peak in the seventh decile group as UTDR values diminish from the highest levels in decile group 1, and as values of UTDR continue to decrease through decile group 10, NTR per

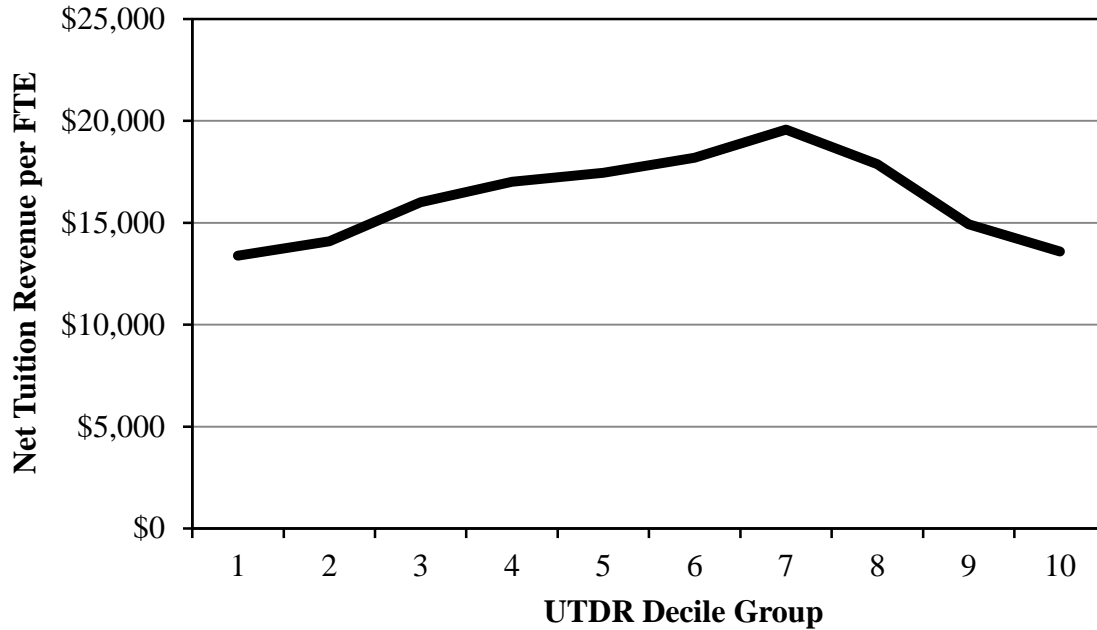


FTE diminishes to levels even with decile group 1, which is composed of institutions with the highest values of UTDR.



*Figure 13.* Modeled relationship between unrestricted tuition discounting and net tuition revenue per FTE for Baccalaureate institutions, 2003-2012.

By analyzing the quadratic relationship between UTDR values and NTR per FTE with both modeling and descriptive analysis techniques, a negative relationship was found. This indicated that a point exists when unrestricted tuition discounting becomes less effective and leads to diminishing returns on NTR per FTE. Using modeling techniques, this point is actually zero, as both linear and quadratic values of the coefficients on UTDR and its quadratic form were negative, as shown in Figure 12. Using descriptive data in Table 8 and Figure 13, decile group 7 represents the point of negative returns on further UTDR spending on NTR per FTE. The institutions with higher values of UTDR in decile groups 1-6 have lower values of NTR per FTE, indicating that values of UTDR higher than 28.7 have a negative impact on NTR per FTE. Both methods indicate, at varying levels, that tuition discounting using unrestricted sources of an institution's budget yield diminishing returns.



*Figure 13.* Relationship between UTDR, by decile group, and net tuition revenue per FTE, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting, and decile group 10 had the lowest levels.

#### **Institutional revenue model specification and results.**

When considering the diminishing returns of tuition discounting strategies on revenue, an alternative strategy was attempted to further analyze this relationship. This technique also used the GMM model with institutional revenue as the dependent variable, net price (net tuition revenue per FTE) as the independent variable of interest, and institutional and economic variables as other independent variables. Two specifications were created, one with a linear format between the institutional revenue and net price variables, and one with a log-log format. The log-log specification allows the results to be interpreted as percent changed (Ramanathan, 2002), which is useful in the analysis.

Table 11 displays the regression results for the GMM model focused on institutional revenue. Within the GMM regression model, there were two specification tests that are important in determining consistent estimation: one to test for serial correlation and one to test the set of

overidentifying restrictions (Cameron & Trivedi, 2009). Post-estimation commands within the statistical package yielded favorable results for both tests. The Arellano-Bond test for zero autocorrelation fails to reject the null hypothesis of no autocorrelation at the .05 level for orders 2 and 3. Additionally, the null hypothesis that the model's moment conditions are correct is not rejected because  $p = .2501 > .05$  and  $p = .1403 > .05$  for the linear and log-log versions, respectively (Cameron & Trivedi, 2009).

In the linear specification of the relationship between institutional revenue and net price, the coefficient on net price is \$1276.10, indicating that a \$1 increase in net price would be associated with a \$1276 increase on institutional revenue. Using the log-log function, the coefficient on the logged version of net price is .429, indicating a 1 percent increase in net price yields a .429 percent increase in institutional revenue (Ramanathan, 2002). Within the sample, the mean of net tuition revenue per FTE is \$15,826.97 and the mean of institutional revenue is \$28,988,106. Using these means, 1 percent increase in net price, \$158, is projected to result in an increase in revenue of \$124,359. This result indicates that institutions in the model could increase revenue by increasing net price; the increased revenue acquired by the higher costs of attendance would offset the diminished number of students attending the institution.

Table 11

*Regression Model Explaining Institutional Revenue, 2003-2012*

	Coefficients and Standard Errors Linear	Coefficients and Standard Errors Log-Log
Lagged institutional revenue	.073*** (.004)	
Lagged institutional revenue logged		.052 (.032)
Net tuition revenue per FTE	1276.10*** (18.39)	
Net tuition revenue per FTE logged		.429*** (.080)
Endowment per FTE	.814*** (.050)	-1.20e-07 (7.09e-08)
FTE	16232.03*** (162.16)	.00057*** (.00011)
FTE <sup>2</sup>	-.273*** (.004)	-1.15e-08*** (2.37e-09)
Admitted rate	22799.53*** (2981.44)	-.0012* (.00058)
Minority enrollment	-144,522.6*** (6935.73)	-.0021 (0015)
Average SAT of incoming cohort	870.65 (722.54)	.00013 (.00034)
Pell Grant recipients per FTE	-2,966,100*** (334,506.7)	-.039 (.075)
Constant	-1.49e07*** (908,702.3)	11.097*** (.784)
Number of groups	383	383
Number of instruments	325	325
Specification Tests		
Arellano-Bond test for AR(1)	.0047**	.0043**
Arellano-Bond test for AR(2)	.2697	.1453
Arellano-Bond test for AR(3)	.4460	.0875
Sargan test for overidentification	.2501	.1403

### Research Question 3

**If an affirmative finding to Research Question 2 is realized, what implications for the sustainability of current tuition discounting practices are found?**

The methods of analysis within the first two research questions showed a non-linear and potentially negative relationship between unrestricted tuition discounting and net tuition revenue per FTE student. When considering the sustainability of the practice of tuition discounting using general revenue sources of institutions' budgets, there may be other implications and consequences of the strategy beyond simply net tuition revenue.

To investigate the impact of UTDR on other aspects of institutions, another approach would be to analyze discounting, net tuition revenue, and other institutional characteristics to examine how institutions have changed over the years of study. Table 12 displays the 448 institutions in the study by decile groupings based on the average annual change of unfunded discount rates during the 2003-2012 timeframe. The rates of change within other institutions characteristics are also considered to see how the institutions with varying rates of change in unfunded discount rates shifted in other ways.

The decile groupings in Table 12 are grouped by the average annual percentage point change of UTDR rates for the institutions. These are not annualized rates of change due to the inability to calculate rates of change for an institution that started with a UTDR value of 0. The calculation is provided as a note in Table 9. Of the 433 institutions in the study that had sufficient data to calculate an average change in UTDR, 328 witnessed growth in the UTDR between 2003 and 2012. Nineteen of the institutions had the same UTDR value between the beginning and end points, and the remaining 86 institutions had a lower level of UTDR in 2012-2013 than 2003-2004. The overall average of the 433 institutions was an increase of 7.11 UTDR

points during the years of the study, which was an average annual change of .79 percentage points. The highest decile had an average annual increase of 3.50 percentage points for an average overall increase of over 31 points from 2003-2004 to 2012-2013. The lowest decile had an average annual decrease of 1.36 points per year, or approximately 12 points decrease overall. The two deciles' averages represent over a 40 point difference in the UTDR value change between the ends of the decile spectrum.

As the values of UTDR change between the decile groups, one would expect other values of variables to shift if there are relationships between UTDR and the aims of tuition discounting. As discussed, these aims could include net tuition revenue generation, increasing the academic profile of students, serving various populations, or leverage tuition discounting to increase interest in the institutions (Hillman, 2011).

Table 12

*Average Annual Change in Variable Value from 2003-2012, by UTDR Decile Group*

Decile	UTDR	Price	NTR per		Admissions			Pell Grants
			FTE	FTE	Rate	SAT	Minority	
1	3.50	654	-25	.9	-0.8	-2.8	0.9	0.8
2	1.90	687	12	9.7	-0.5	.3	1.0	0.8
3	1.33	689	85	5.5	-0.8	-2.9	1.2	0.9
4	1.05	587	128	8.5	-0.6	-1.4	0.8	0.7
5	0.81	629	187	12.0	-1.0	-0.1	1.0	0.6
6	0.58	574	198	15.2	-0.7	-0.5	0.9	0.5
7	0.32	544	281	14.7	-1.0	.4	0.5	0.2
8	0.06	478	310	81.3	-1.2	-1.0	0.8	-1.3
9	-0.21	441	314	18.0	-1.0	1.3	0.8	0.7
10	-1.36	334	422	29.0	-.7	-2.6	0.8	0.8

Note: Price and NTR per FTE in HEPI adjusted 2012 dollars. Amounts calculated by  $((2012 \text{ value} - 2003 \text{ value}) / 9)$ . N = 433.

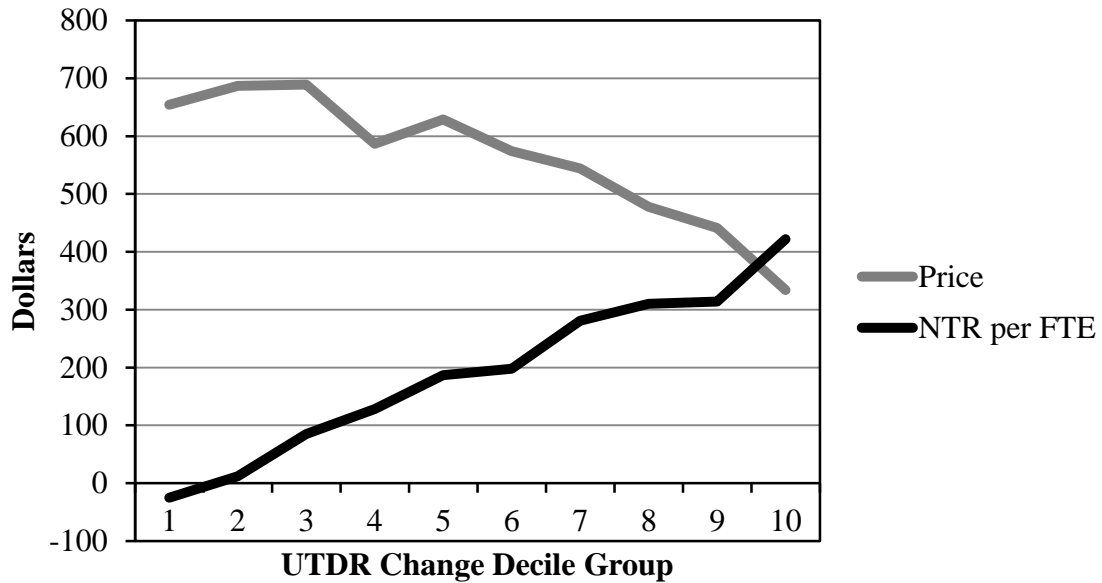
When analyzing the trends within admissions rate, SAT, minority students, or Pell grant students, there does not seem to be discernible patterns throughout the decile groups. However, when price and NTR per FTE are shown, a consistent and powerful pattern emerges when the

variables are analyzed. As UTDR annual change levels increase through the decile groups, price increases consistently, with Deciles 1, 2, and 3 having annual average increases of \$654 to \$689 in undergraduate tuition and fees and Decile 10 having an annual average increase of only \$334, less than half of the changes in Deciles 2 and 3. However, the higher levels in price are not associated with increased revenues, as one may expect. An inverse relationship is present, and higher levels of price increase and UTDR values are associated with lower levels of NTR amounts per FTE students. Decile 1 witnessed an average annual decrease of \$25 per FTE student between 2003-2004 and 2012-2013 while Decile 10, the group that averaged a reduction in UTDR values during the years of interest, experienced an increase of \$422 per FTE student during the same time period. Additionally, the Decile 10 group gained an average of 29.0 students per year while the Decile 1 group only increased FTE enrollment by .9 students per year.

Figure 14 displays the changes in price and NTR per FTE, by the decile groups formed on UTDR changes. There are clear trendlines present in both price and NTR per FTE changes over the decile groups. Decile group 10, the group that witnessed the greatest gains in NTR per FTE, employed negative UTDR changes and kept tuition increases to the lowest level in the sample, as an average.

The trends between UTDR, price, and NTR per FTE indicated the institutions that were changing unfunded tuition discounts the most in order to attract certain students or increase revenue, or some combination, were not succeeding. The IHEs with the highest changes of UTDR realized fewer gains in FTE student enrollment during the time period and witnessed negative NTR per FTE. No discernable trends were present between higher changes in UTDR and academic or student profile characteristics. Based on this descriptive data presented in Table

9 and previously in Table 8, it does not seem that institutions were effective in leveraging unfunded tuition discounts to achieve objectives associated with revenue or student characteristics.



*Figure 14.* Changes in tuition and fees and NTR per FTE, by changes in UTDR, 2003-2012. Data from Table 9. Decile group 1 had the highest increases in UTDR; decile group 10 had the lowest increases in UTDR. Price and NTR HEPI adjusted to 2012 dollars.

## Summary

This quantitative analysis was undertaken to analyze the relationship between net tuition revenue and tuition discounting practices funded by unrestricted financial resources.

Specifically, this study was targeted at the set of non-profit, private, four-year institutions located in the United States that were categorized as Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields and received Title IV funds. Several of the independent variables were endogenous to the model and a method utilizing a panel data set from 2003-2012 was employed to address the endogeneity.



Using descriptive analyses focused on the ranges of unrestricted discount rates and the rates of annual change of unrestricted discount rates, both positive and inverse relationships were discovered between UTDR and NTR per FTE. When analyzing the highest levels of discounting, institutions with a UTDR value of 25.0 to 28.7 had the highest values of net tuition revenue per FTE. At UTDR levels lower than 25.0 and greater than 28.7, lower values of NTR per FTE were found. However, during the span of years in the study, the institutions that had the greatest increases in UTDR levels saw the smallest gains, or even modest losses, in NTR per FTE values. Additionally, the quantitative model utilizing a dynamic panel data set found only a negative relationship between values of UTDR and NTR per FTE. The following chapter will discuss these findings in the context of the institutions in the study, provide implications for practice, and present limitations and recommendations for future research.

## CHAPTER 5: CONCLUSIONS

The purpose of the study was to analyze the relationship between tuition discounting practices and net tuition revenue at 448 four-year, non-profit, private institutions that were categorized as Bachelor's/Art & Sciences or Bachelor's/Diverse Fields within the Carnegie classifications. A quantitative modeling technique and panel data sets were utilized to study this relationship, and the years of interest were 2003-04 to 2012-13. This concluding chapter will focus on the research findings and conclusions from those results, implications for practice, and recommendations for future research.

### Research Findings and Conclusions

In order to aid in the presentation of the findings, this section will be divided based on the three research questions of the study:

1. What is the effect of unrestricted institutional grant aid expenditures on net tuition revenue?
2. Does a rate of tuition discounting utilizing unrestricted funds exist that contribute to diminishing revenue returns of net tuition revenue?
3. If an affirmative finding to Question 2 is realized, what implications for the sustainability of current tuition discounting practices are found?

### Unrestricted Tuition Discounting and Net Tuition Revenue

The first research question and analysis provided the foundation for the two subsequent research questions. When analyzing the results of the descriptive statistic analyses and model, it is important to contextualize the results of the study within the theoretical framework regarding private liberal arts colleges provided by Breneman (1994). In Breneman's work, he suggested a two-stage optimization approach for private institutions, with the first stage of the theory "setting

the desired enrollment, as well as creating the inputs (faculty, staff, facilities, and so forth) needed to serve that enrollment at a financially sustainable quality” (Breneman, 1994, p. 37). In the second stage, a college focuses on quality of the students, staff, and facilities, while being confined to certain budgetary restraints. Tuition discounting plays an important role in the second stage, because the “determinants of total revenue are an essential part of the budget constraint, and net tuition revenue (gross tuition revenue minus unfunded student aid) is, for most colleges, the largest single revenue source” (p. 38).

In the first step of the process, Breneman (1994) suggested that institutions set a desired enrollment and inputs, and based on Table 4, it seems that institutions have been focused on enrolling a relatively steady number of students. The average enrolled first-year cohort each fall remained relatively steady, increasing slowly from 338 students in 2003 to 352 in 2012. However, based on the data, it seems that institutions are finding a more competitive market in enrolling interested students. As shown in Table 4, the number of applications for admittance has continued to increase, and while the admitted rate for institutions, both as a total and as an average across schools, has declined slightly, the total number of admitted students has increased significantly over the 10 years of the study. However, institutions are only yielding 30.7% of students, as an average across schools, in 2012, a sharp decrease from 41.3% in 2003, indicating a more highly competitive environment.

The decrease in the average admitted rate could be the result of a few different factors. First, institutions simply may be more selective due to the higher application amounts witnessed in 2012 compared to 2003, allowing fewer students to enter the institutions as a percentage of application totals. However, this reasoning would lead to fewer admitted students when combined across all institutions, which is a trend that was not witnessed during the timespan.

Total admissions grew by almost 200,000 students, increasing from 376,671 in 2003 to 572,986 in the fall of 2012, a growth of over 52 percent.

Another reason the average admitted student rate could have declined would be an increase of applications from academically undesirable students, whether it is due to lack of academic preparation or a combination of other factors. This would lead institutions to admit a lower percentage of incoming applications, if the admittance standards remained consistent. As measured by SAT averages or ACT concordance equivalents, average standardized test scores over the years of interest have declined slightly for enrolled first-time, first-year cohorts. This could be due to a change in academic preparation of incoming student applications or a lowering of academic standards for admittance across the time frame for some institutions, or a combination of the two reasons. It is unclear what has driven the average standardized examination score downward over the 10 years, although that is a question that may merit further research in future studies.

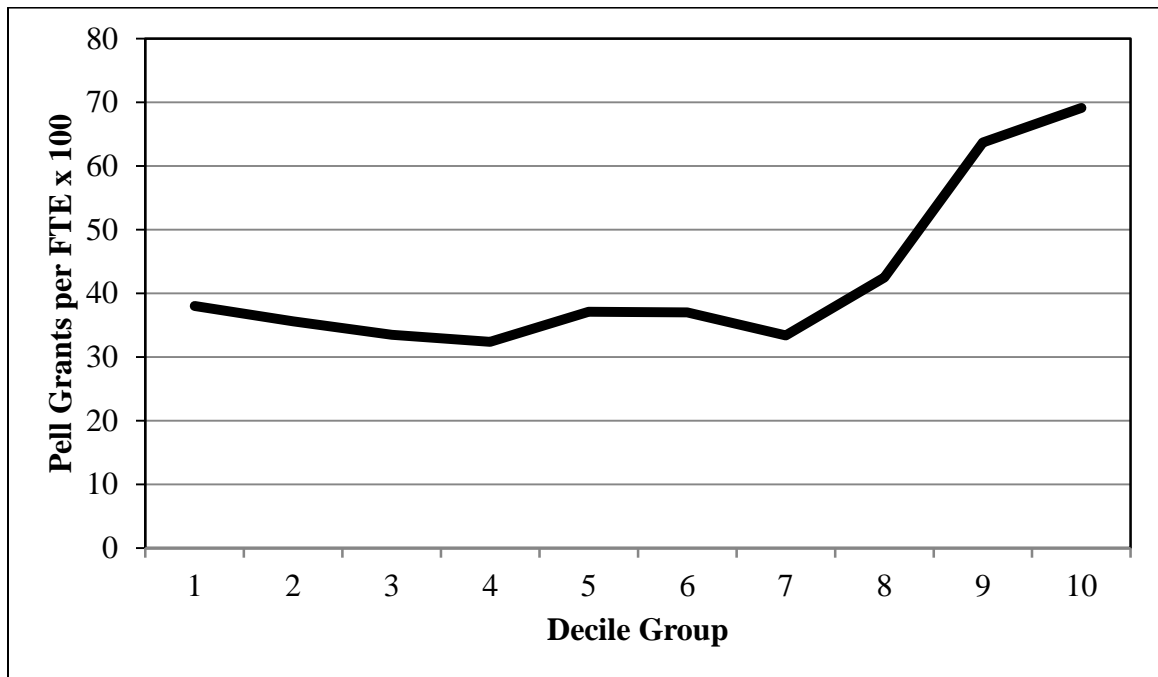
Although the yield of new students has declined across the institutions in the study, the demand measured by applications has not. This signals a lack of outcry from consumers, possibly driven by smaller changes in net price once tuition discounts are offered. This lack of consumer outrage was predicted by Breneman's (1994) position that if tuition levels rose to a point in which tuition discounts were offered to almost every person who was accepted, the marketplace would accept the change. As institutions have increased tuition prices and grant aid dollars together, there have not been institutions in isolation making this decision alone; if only a few had adopted a high-discount, high-tuition model in which there was only a few, if any, full-pay students, sticker shock at those locations would be enhanced. This has normalized the high-price, high-discount model to new extremes, and the practice of applying to an institution,

receiving a financial assistance package, and then determining the college choice seems to be more commonly employed by students and families based on the greater amount of applications and admitted students but lower yield. Thus, when considering how many students will matriculate at institutions after net price is considered, the demand facing these institutions is not increasing, as the number of applications would signal.

Another factor that complicates the application and yield relationship is the growing access to applying to a variety of colleges. The Common Application, a non-profit organization, allows applying students to choose out of over 500 member institutions when filling out one application, making selecting many institutions easier (“History,” 2015). Additionally, some institutions have begun waiving application fees altogether, broadening access to apply (Hopkins, 2012).

It is evident that most are in this situation together, as over 58% of the IHEs in the study are awarding institutional aid to 95% or more of incoming classes. Within Breneman’s (1994) theoretical framework, this change represents a shift in more institutions seeking to maximize net tuition revenue by shifting price levels to where only one, or zero in many cases, students are paying the full price of admission. Even though this situation was presented as an option by Breneman (1994), the researcher posited that it would be unlikely. Breneman believed admissions applications would fall if tuition levels were raised to such levels over time, and Breneman projected that institutions would be unwilling to take the risks and criticism associated with high tuition levels alone (Breneman, 1994). Based on the data, full pay students are becoming increasingly uncommon, and institutions that have traditionally relied on their contributions and net tuition levels need to readjust accordingly (Kiley, 2011).

As Table 8 and Figure 13 displayed, the relationship between levels of UTDR and institutional characteristics has varied. One particular population that deserves focus is the Pell Grant recipients at each institution, measured on an FTE basis. There is a strong inverse relationship between average UTDR values and Pell Grants per FTE, shown in Figure 15, especially prominent with decile groups 7 through 10, representing UTDR values between 0 and 28.7.



*Figure 15.* Pell Grants per FTE, by UTDR Decile Group, 2012-2013. Data from Table 8. Decile group 1 had the highest levels of discounting, and decile group 10 had the lowest levels.

When comparing decile 1 to decile 10 in Figure 15, Pell Grants per FTE varies from .38 to .69. Also, from Table 8 and as displayed by Figure 13, the NTR per FTE was essentially equal between decile groups 1 and 10 with \$13,391 and \$13,587, respectively, with group 2 having similar value at \$14,095. When combining these statistics with sticker price, which varies from \$30,175 in decile 1 to \$18,112 in decile 10, it seems that Pell-eligible students are much less represented at high-tuition, high-discount institutions. This is consistent with concerns

over accessibility to higher education for low-income students (Cabrera & La Nasa, 2000). The net price of each decile of institution is the same, but one is serving significantly more Pell-eligible students, indicating these students are interacting with those institutions differently. There may be other factors in play, such as the change in SAT scores between deciles or other institutional characteristics, but without student-level data to investigate further, it is not possible to know the effects of possible barriers on these populations.

The quantitative model utilizing a panel data set over the years of interest did not depict a positive relationship, at any level of UTDR, between UDTR values and NTR per FTE. For any value of UTDR, the predicted impact on NTR per FTE is negative as shown in Figure 12 and by the negative coefficients on UTDR and  $UTDR^2$ . This finding is contradictory to the descriptive statistics that showed a decrease in NTR per FTE as values of UTDR increased beyond 28.7%. Of the 448 institutions, 269 (60%) had a UTDR value of greater than 28.7%. Within Breneman's (1994) framework, if these institutions are not able to increase additional revenue generation through the use of unrestricted tuition discounting, they should focus less on the raw number of the UTDR value and instead concentrate on the demand curve facing their institution. Additionally, Breneman (1994) would suggest the 170 institutions that awarded institutional grant aid to 99% or 100% of their incoming cohort of first-year students have maximized their NTR based on their demand curve, as displayed in Figure 2. It may be the case that funds should be redirected into a variety of new marketing and recruitment efforts to shift the demand curve, or additional efforts may be possible to further discern where a student falls on a demand curve to exactly meet their willingness to pay (Breneman, 1994; Cheslock, 2006). However, the data suggests that institutions are already working to maximize their NTR gains through unrestricted

discounting strategies, and it may be difficult to generate additional revenue through increasing institutional tuition discounting efforts without other changes.

The second research question was primarily an extension of the first: is there a point where unrestricted tuition discounting strategies begin negatively impacting net tuition revenue gains? This was already partially answered in the analysis of the first research question. Using descriptive statistics, NTR per FTE diminishes past a UTDR value of 28.7%. Within the model generated through the use of the panel data set, NTR per FTE values diminish at an increasingly faster rate as UTDR grows due to negative quadratic coefficient on UTDR.

The implementation of the second GMM model focused on institutional revenue and net price revealed that a 1% increase in net price was projected to yield approximately \$124,000 in additional revenue for institutions, based on the mean values of the institutions in the model. Given an increase of 1% in net price, the increases in revenue would offset the reduction in students enrolling at the institution. This finding indicates that institutions could either reduce tuition discounts being granted to incoming students or raise the sticker price of attendance without experiencing losses of institutional revenue. This finding is consistent with the GMM model focused specifically on the relationship between unfunded tuition discounts and net tuition revenue.

### **Sustainability of Tuition Discounting**

The final research question focused on the sustainability of the practice of tuition discounting using unrestricted funds, if a negative relationship is found between UTDR and NTR per FTE in the previous questions.

Over the years of the study, a majority of the institutions in the study witnessed increases in the unrestricted tuition discounting rate. The 10% of institutions that increased their rates by



the greatest amounts witnessed negative NTR growth despite increasing tuition and fees by over \$650 per year. These institutions also realized the fewest gains in FTE students, and failed to make strides in serving more high ability students, Pell Grant recipients, or minority students than the other baccalaureate institutions in the study. Conversely, the institutions that fared the best in terms of NTR per FTE growth kept tuition increases lower and actually reduced their unrestricted tuition discount rate between 2003-2004 and 2012-2013. Overall, there was not a positive result found in high UTDR increases across the institutions' economic and student profile characteristics.

The IHEs in the study that had the highest levels of UTDR values also had lower rates of serving minority or low-income populations, compared to other institutions that had lower tuition levels and lower amounts of unrestricted tuition discounts. This fact is especially relevant due to the changing demographics of the United States. A recent study provided by the University of New Hampshire (Johnson, 2015) estimated that 95% of the United States population increase in 2014 was due to minority population growth. Attracting students in these demographics will be important for institutions over the coming decades as they work to strengthen their demand in local, regional, or national markets. If they fail to be accessible and affordable for students in these growing areas, these college and universities will continue to struggle to meet enrollment management goals.

From an economic prospective, a recent survey of college and university business officers conducted by *Inside Higher Ed* and Gallup reported that 45% of officers at private, nonprofit institutions agreed or strongly agreed that their institution's current tuition discount rate was unsustainable, with another 25% remaining neutral (Jaschik & Lederman, 2014). One NACUBO report (2014) quote from a senior business officer captured the dilemma well:

Unfortunately, we have not been able to implement strategies to increase net tuition revenue since we have been focused on trying to keep enrollment we have had. That process has ended up resulting in a decrease in net tuition revenue as we have increased financial aid to try to keep competitive. (p. 61)

NACUBO, in the 2012 report, acknowledged “there are many indicators the business model that higher education has relied on for many years may have to change” (NACUBO, 2013, p. 54). This sentiment was echoed by Richard Kneedler, former president of Franklin and Marshall College, an institution included in this study: “The model – if it’s not breaking – it’s showing signs of age . . . The price has been pushed up at a number of top institutions. It’s gotten to the point where people are asking a lot of questions about it.” (Kiley, 2011).

Looking forward regarding the sustainability of the practice of using unrestricted tuition revenue to grant institutional aid, the main focus should be on the demand curves facing these institutions, as suggested by Breneman (1994). Can these institutions enroll enough students who are willing to pay the relatively high costs of education at these colleges and universities, many of which focus on small classroom sizes, labor-intensive practices, and lack state support? There are some institutions in the study, such as Sweet Briar College in Virginia that had a unfunded tuition discount rate of over 40% in 2012, have recently made a decision to close or are going through a painful and lengthy process to evaluate how it is possible to remain open (Bidwell, 2015). Based on the lack of full-pay students, Breneman (1994) would suggest that net tuition revenue is being maximized, and instead of continuing to increase tuition levels to attempt to generate net tuition revenue, institutions should instead consider how to make changes and decisions to strengthen demand. The relationship between unfunded discounts, tuition and

fees, and demand has substantial implications for these tuition-driven schools, and unfortunately, will cause some to close their doors.

### **Implications for Practice and Policy**

The complex balance between pricing, tuition discounting, and enrollment goals is a crucially important topic for non-profit, four-year, baccalaureate institutions (Breneman, 1994). Between 2003-2004 and 2012-2013, the high-tuition, high discount model that gained much attention in the 1990s and early 2000s continued to develop and grow, as evidenced by the data provided in Chapter 4. However, at institutions around the country, the implications and sustainability of such practices is being increasingly called into question from both a student and economic prospective.

From a student prospective, the sticker price of these institutions becomes harder to understand. Net price calculator requirements have created a more realistic initial estimate of the cost of education, but many students and families may not even attempt to generate an estimate due to high costs, perceived barriers, or lack of financial literacy. This may particularly impact minority, low income, and first-generation students (Cabrera & La Nasa, 2000; Heller, 1997). Additionally, the ability for institutions to price discriminate between individual students, charging different tuition levels to different students for reasons unlikely to be known to incoming students, creates unpredictability in net prices for students (Baum, Lapovsky, & Ma, 2010). So, even if a student or family understands general financial aid practices, net price may still be difficult to predict (Baum, Lapovsky, & Ma, 2010). The presence of this gap can widen, however, since some affluent and knowledgeable students may use current scholarship-awarding techniques to their advantage. Those students and families that do understand the complex institutional and federal financial aid systems can create a bidding war or engage in negotiating

to leverage their merits for increased aid packages (de Vise, 2011). In a competitive higher education environment, this increased consciousness of institutionally funded scholarships can make enrollment management even more difficult for college officials.

Over the past decade, there have been some institutions which have engaged in tuition-slashing measures in order to lower tuition and tuition discounting, but hopefully leaving net tuition revenue stable through the transition (Kiley, 2011; Lapovsky, 2004; Massa & Parker, 2007; Stripling, 2009). These tuition resets are aimed at reducing sticker shock and appearing more affordable to prospective students and families (Lapovsky, 2004), while also diminishing the heavy reliance on such high percentages of unfunded tuition discounts within the college's budget and economic model. Many institutions may benefit from undertaking this type of analysis to see if it is strategically and economically viable. However, this type of adjustment is risky:

A college that is really competing with a peer group may not want to lower its price and risk being disassociated with that group... [and the] unintended result could be to move the college out of the competitive sphere it is currently in, and down a notch to another set. (Massa & Parker, 2007, p. 96)

It seems likely that the institutions that could benefit the most from this type of adjustment have a well-known and positive reputation in their respective markets, therefore mitigating the potential negative impact on perceived quality or peer-comparisons. However, at the same time, it is probable that an institution with such a reputation is not facing such a demand dilemma to force its decision makers into such a difficult situation. As a result, many of the institutions that will potentially engage in tuition-cutting measures to shift demand and

remain viable are also those that are at the most at risk, likely causing some to succeed at the endeavor, some to remain neutral, and some to face lower perceptions and possible demand.

As a result of the competitive environment and demand issues facing many of these institutions, some will expand or modify their missions in order to navigate complex economic times (Baker, Baldwin, & Makker, 2012). In 2012, Baker, Baldwin, and Makker found that only 130 of Breneman's 212 original liberal arts institutions would still meet the classification. The introduction of professional or pre-professional programs, especially, shifted many institutions' missions based on their criteria (Baker, Baldwin, & Makker, 2012).

As Breneman (1994) would suggest, a limited focus on capping or limiting the amount of unfunded tuition discounts an institution awards can hamstring an institution when those boundaries do not meet the enrollment demands of an institution:

The context of budget discussions on many campuses would improve if sterile debates about the amount of unfunded student aid were replaced by an emphasis on the nature of the demand for the college and the role that student aid can play as part of an operating strategy to increase net tuition revenue and its role in enhancing the quality and diversity of the student body. (p. 50)

In this sense, the focus on UTD rates and impact it has on budgets and enrollment is largely a product of the demand facing an institution. If institutions cannot leverage unfunded (or funded) discounts to increase demand and positively impact net tuition revenue, tuition prices and UTD rates will continue to climb without any significant impact on net revenue, leading potentially to the undesirable outcomes, such as the ones already witnessed in the institutions with the highest amounts of or largest changes in UTD rates. As institutions continue to make decisions focused on how to use tuition discounts, the larger demand picture must be evaluated, including pricing

levels and a realistic assessment of the true value of their education. If an institution is offering at least a 50% tuition discount to each student attending their institution, is the sticker price still reflective of the price or value of an education? Once a thorough analysis of the demand picture facing an institution is undertaken, enrollment managers can strategize how to implement tuition discounting packages to attract the desired populations of students. Depending on the market of undergraduate or graduate students, some may attempt to make a substantial shift and challenge the high-price, high-discount model. Large, impactful, and difficult conversations such as these are needed on many campuses as they move forward.

The potential trade-offs present between unfunded tuition discounting, academic profile of students, quality of other aspects of the college, and net tuition revenue have important institutional policy implications (Hillman, 2011). When guiding enrollment management policy at the institutional level, administrators and college board members or trustees may choose to broaden access to a group of students via institutional grant aid. For example, it could be decided to focus on low-income students, academically high-ability scholars, or individuals from diverse backgrounds. This research has not shown significant gains in these efforts on a national level, but individualized, nuanced approaches at an institutional level may be more effective and yield desired outcomes.

When considering policy implications of this research at a state or national level of government, it is at least prudent to consider the role of tuition discounting in the financial models and processes of these institutions. As indicated in the review of literature, many government documents have expressed concern, or even outrage, at the rising costs of education, although many of those analyses forego the tuition discounting in the discussions. Public officials should focus on the net price of education as a better measure of the cost of education

and form judgments and opinions with that metric, and others, in mind. Similar to the institutional implications of tuition discounting, there are public, large-scale considerations regarding access and perceptions regarding affordability. Recent efforts to improve and require net price calculators on every institution's website are important to increasing the transparency regarding affordability and net price.

### **Limitations and Future Research**

There are several limitations within this study, and some have been previously mentioned. The idiosyncrasies within IPEDS, for example, limited data available for a few of the variables. The primary data source, IPEDS, also relied on institutional self-reporting with some measures of auditing from the IPEDS research staff. Although IPEDS has been used for much research in higher education, the possibility of data errors still exists.

More broadly that data entry, though, there were some larger limitations within the study. Although the population of institutions was narrowly defined to only be Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields, it is evident that a wide variety of missions, strategies, and student populations were contained in the institutional set. An unexpected result was the amount of colleges and universities that have graduate degree programs, and some in the study have at least a few hundred graduate FTE students. Although the quantitative model accounted for differences in that student population, the variability within the institutions limits the effectiveness of the findings. Further research that is more narrowly focused on growth of graduate programs, on-line delivery methods, or other institutional variability is suggested to focus potential influences on net tuition revenue.

Since this study focused on aggregate measures of institutional grant funding, the strategies across institutions on how that aid is dispersed are not included in the analyses. As

Massa & Parker (2007) case study reported, it is quite possible to leverage less money more effectively and make gains in net tuition revenue through strategic dispersal, market research, and effective integrated marketing techniques. Institutions may have made significant changes in how they awarded institutional grant aid over the years in the study in order to maintain or gain a competitive edge in the marketplace. However, those efforts, if they exist, are unknown, especially since institutions would be very reluctant to share new strategies that seem to be effective for their institution.

Much of analyses focused on institutional grant aid focuses on the first-time, first-year entering cohort. In many descriptions of tuition discounting levels, this is the only statistic mentioned. The rest of the undergraduate population is often ignored as part of picture, as the first-year data generally provides a narrower and more accurate depiction of the competitive atmosphere and demand each fall. It is also generally a higher statistic than the total undergraduate discount rate, since when annual tuition increases are present, institutional discounting is usually not increased at the same level, creating a lower discount rate among non-first-year students. However, the breakdown between funded and unfunded institutional discounting is not provided in IPEDS; the measures are only provided as a total expenditure item. It would be useful to narrow the search directly to focus on first-time, first-year students when considering funding aid through unrestricted and restricted funds.

Another limitation in the study concerned the lack of specific variables that would have supplemented the analysis. When considering student behavior, the prestige and quality of an institution has an impact on college choice and willingness to pay. Variables that focused on the perceived quality and outcomes of an institution, such as career or graduate placement rates, would be helpful in providing some insight in this area. Although recent national efforts and



guidelines have attempted to standardize reporting on these outcomes, the inconsistent definitions and lack of reporting structure make this data currently unavailable.

When considering future research, a continued focus on the high-discount, high-tuition model and its potentially disproportionate impact on low income, first-generation, or minority populations is warranted. Student-level data and other research methods such as interviews and longitudinal studies regarding college access and choice should be investigated to discern strategies that may be used to make institutions with high sticker prices more accessible and to promote financial aid literacy within these populations.

As mentioned, a limitation in the study was a lack of a reliable student outcome measurement. If one could be identified, further research would be possible with a stronger analysis of the drivers of student demand. The outcome variable would also provide a signal of institutional quality.

### **Summary**

This study analyzed the relationship between institutional tuition discounting through unrestricted revenue and net tuition revenue. It focused on Bachelor's/Arts & Sciences or Bachelor's/Diverse Fields institutions across the United States that were non-profit, private colleges and universities. Through the use of descriptive and modeling techniques, it was found that large amounts of tuition discounting through unrestricted means of institutional resources presents challenges for institutions across the nation, including reductions in net tuition revenue for institutions with high unrestricted tuition discount rates.

In 1994, Breneman's book detailed how liberal arts institutions were thriving, surviving, or endangered, and his perspective still feels relevant. Many institutions are considering how to survive and may investigate closing their doors as an option. However, as Breneman (1994)

suggested, too much attention should not be devoted to the tuition discount rates alone. The amount of discounting an institution must employ to meet a student's willingness to pay is a product of the larger demand picture facing that institution. Careful analysis at each institution about how to leverage effective aid partnered with an integrated marketing plan will be needed in order to investigate how to approach the demand curve each school is facing.

The results of this study have important implications for institutional leaders, budget officers, and boards of trustees. Tuition discounting using unrestricted resources was shown to have negative impacts and ultimately did not contribute positively to common reasons for granting institutional aid, such as increasing revenue or student characteristics. Unfortunately, it seems likely that some institutions will be faced with closing over the next decade as the marketplace remains competitive. The strategies centered on tuition discounting, net tuition revenue, and demand will play an important role in determining which institutions thrive, survive, or close.

**APPENDIX: INSTITUTIONS BY STATE**

Amridge University	Alabama	San Diego Christian College	California
Birmingham Southern College	Alabama	Scripps College	California
Concordia College Alabama	Alabama	Simpson University	California
Faulkner University	Alabama	Soka University of America	California
Huntingdon College	Alabama	The Master's College and Seminary	California
Judson College	Alabama	Thomas Aquinas College	California
Miles College	Alabama	University of the West	California
Oakwood University	Alabama	Vanguard University of Southern California	California
Stillman College	Alabama	Westmont College	California
Talladega College	Alabama	Whittier College	California
Tuskegee University	Alabama	Colorado College	Colorado
University of Mobile	Alabama	Connecticut College	Connecticut
American Indian College of the Assemblies of God Inc	Arizona	Mitchell College	Connecticut
Arizona Christian University	Arizona	Trinity College	Connecticut
Embry-Riddle Aeronautical University-Prescott	Arizona	Wesleyan University	Connecticut
Central Baptist College	Arkansas	Wesley College	Delaware
Hendrix College	Arkansas	Ave Maria University	Florida
John Brown University	Arkansas	Beacon College	Florida
Lyon College	Arkansas	Bethune-Cookman University	Florida
Ouachita Baptist University	Arkansas	Clearwater Christian College	Florida
Philander Smith College	Arkansas	Eckerd College	Florida
University of the Ozarks	Arkansas	Edward Waters College	Florida
Williams Baptist College	Arkansas	Everglades University	Florida
American Jewish University	California	Flagler College-St Augustine	Florida
Claremont McKenna College	California	Florida Southern College	Florida
Harvey Mudd College	California	Polytechnic University of Puerto Rico-Orlando	Florida
Hope International University	California	Southeastern University	Florida
Humphreys College-Stockton and Modesto Campuses	California	Webber International University	Florida
Menlo College	California	Agnes Scott College	Georgia
Occidental College	California	Berry College	Georgia
Pacific Union College	California	Brewton-Parker College	Georgia
Pitzer College	California	Covenant College	Georgia
Pomona College	California	Emmanuel College	Georgia
Providence Christian College	California	LaGrange College	Georgia
Life University	Georgia	Huntington University	Indiana

Morehouse College	Georgia	Manchester University	Indiana
Oglethorpe University	Georgia	Marian University	Indiana
Paine College	Georgia	Martin University	Indiana
Point University	Georgia	Saint Josephs College	Indiana
Reinhardt University	Georgia	Saint Mary-of-the-Woods College	Indiana
Shorter University	Georgia	Saint Mary's College	Indiana
Spelman College	Georgia	Taylor University	Indiana
Thomas University	Georgia	Trine University	Indiana
Toccoa Falls College	Georgia	Trine University- Regional/Non-Traditional Campuses	Indiana
Wesleyan College	Georgia	Wabash College	Indiana
Brigham Young University- Hawaii	Hawaii	Briar Cliff University	Iowa
Brigham Young University- Idaho	Idaho	Buena Vista University	Iowa
The College of Idaho	Idaho	Central College	Iowa
Augustana College	Illinois	Clarke University	Iowa
Blackburn College	Illinois	Coe College	Iowa
East-West University	Illinois	Cornell College	Iowa
Eureka College	Illinois	Dordt College	Iowa
Greenville College	Illinois	Grand View University	Iowa
Illinois College	Illinois	Grinnell College	Iowa
Illinois Wesleyan University	Illinois	Iowa Wesleyan College	Iowa
Judson University	Illinois	Loras College	Iowa
Knox College	Illinois	Luther College	Iowa
Lake Forest College	Illinois	Morningside College	Iowa
MacMurray College	Illinois	Mount Mercy University	Iowa
Millikin University	Illinois	Northwestern College	Iowa
Monmouth College	Illinois	Simpson College	Iowa
Shimer College	Illinois	Wartburg College	Iowa
Trinity Christian College	Illinois	William Penn University	Iowa
Wheaton College	Illinois	Benedictine College	Kansas
Bethel College-Indiana	Indiana	Bethany College	Kansas
DePauw University	Indiana	Bethel College-North Newton	Kansas
Earlham College	Indiana	Central Christian College of Kansas	Kansas
Franklin College	Indiana	Kansas Wesleyan University	Kansas
Goshen College	Indiana	McPherson College	Kansas
Grace College and Theological Seminary	Indiana	Ottawa University-Ottawa	Kansas
Hanover College	Indiana	Sterling College	Kansas
Tabor College	Kansas	Merrimack College	Massachusetts

Holy Cross College	Indiana	Mount Holyoke College	Massachusetts
Alice Lloyd College	Kentucky	Mount Ida College	Massachusetts
Asbury University	Kentucky	Newbury College	Massachusetts
Berea College	Kentucky	Nichols College	Massachusetts
Brescia University	Kentucky	Pine Manor College	Massachusetts
Centre College	Kentucky	Smith College	Massachusetts
Georgetown College	Kentucky	Stonehill College	Massachusetts
Kentucky Christian University	Kentucky	Wellesley College	Massachusetts
Kentucky Wesleyan College	Kentucky	Wentworth Institute of Technology	Massachusetts
Mid-Continent University	Kentucky	Wheaton College	Massachusetts
Midway College	Kentucky	Williams College	Massachusetts
Transylvania University	Kentucky	Adrian College	Michigan
University of Pikeville	Kentucky	Albion College	Michigan
Centenary College of Louisiana	Louisiana	Alma College	Michigan
Dillard University	Louisiana	Calvin College	Michigan
Louisiana College	Louisiana	Concordia University-Ann Arbor	Michigan
Xavier University of Louisiana	Louisiana	Finlandia University	Michigan
Bates College	Maine	Grace Bible College	Michigan
Bowdoin College	Maine	Hope College	Michigan
Colby College	Maine	Kalamazoo College	Michigan
College of the Atlantic	Maine	Kuyper College	Michigan
Thomas College	Maine	Michigan Jewish Institute	Michigan
Unity College	Maine	Olivet College	Michigan
Goucher College	Maryland	Rochester College	Michigan
McDaniel College	Maryland	Bethany Lutheran College	Minnesota
Sojourner-Douglass College	Maryland	Carleton College	Minnesota
St John's College	Maryland	College of Saint Benedict	Minnesota
Washington Adventist University	Maryland	Concordia College at Moorhead	Minnesota
Washington College	Maryland	Crown College	Minnesota
Amherst College	Massachusetts	Gustavus Adolphus College	Minnesota
Bay Path College	Massachusetts	Macalester College	Minnesota
Becker College	Massachusetts	Martin Luther College	Minnesota
College of Our Lady of the Elms	Massachusetts	North Central University	Minnesota
College of the Holy Cross	Massachusetts	Saint Johns University	Minnesota
Eastern Nazarene College	Massachusetts	St Olaf College	Minnesota
Gordon College	Massachusetts	University of Northwestern-St Paul	Minnesota
Hampshire College	Massachusetts	Blue Mountain College	Mississippi
Lasell College	Massachusetts	Millsaps College	Mississippi
Rust College	Mississippi	Elmira College	New York

Tougaloo College	Mississippi	Hamilton College	New York
Central Methodist University- College of Liberal Arts and Sciences	Missouri	Hartwick College	New York
College of the Ozarks	Missouri	Hilbert College	New York
Culver-Stockton College	Missouri	Hobart William Smith Colleges	New York
Evangel University	Missouri	Houghton College	New York
Hannibal-LaGrange University	Missouri	Marymount Manhattan College	New York
Missouri Valley College	Missouri	Paul Smiths College of Arts and Science	New York
Stephens College	Missouri	Sarah Lawrence College	New York
Westminster College	Missouri	Siena College	New York
William Jewell College	Missouri	Skidmore College	New York
Carroll College	Montana	St Francis College	New York
Rocky Mountain College	Montana	St Lawrence University	New York
University of Great Falls	Montana	The Kingâ€™s College	New York
Doane College-Crete	Nebraska	Union College	New York
Grace University	Nebraska	Vassar College	New York
Hastings College	Nebraska	Wells College	New York
Midland University	Nebraska	Barton College	N. Carolina
Nebraska Wesleyan University	Nebraska	Belmont Abbey College	N. Carolina
Union College	Nebraska	Bennett College	N. Carolina
York College	Nebraska	Brevard College	N. Carolina
Colby-Sawyer College	New Hampshire	Catawba College	N. Carolina
Saint Anselm College	New Hampshire	Chowan University	N. Carolina
Thomas More College of Liberal Arts	New Hampshire	Davidson College	N. Carolina
Bloomfield College	New Jersey	Greensboro College	N. Carolina
Drew University	New Jersey	Guilford College	N. Carolina
St John's College	New Mexico	High Point University	N. Carolina
University of the Southwest	New Mexico	Johnson C Smith University	N. Carolina
Bard College	New York	Lees-McRae College	N. Carolina
Barnard College	New York	Lenoir-Rhyne University	N. Carolina
Boricua College	New York	Livingstone College	N. Carolina
Cazenovia College	New York	Mars Hill University	N. Carolina
Colgate University	New York	Meredith College	N. Carolina
Concordia College-New York	New York	Methodist University	N. Carolina
Cooper Union for the Advancement of Science and Art	New York	Mid-Atlantic Christian University	N. Carolina
Mount Olive College	N. Carolina	Warner Pacific College	Oregon

North Carolina Wesleyan College	N. Carolina	Willamette University	Oregon
Saint Augustine's University	N. Carolina	Albright College	Pennsylvania
Salem College	N. Carolina	Allegheny College	Pennsylvania
Shaw University	N. Carolina	Bryn Athyn College of the New Church	Pennsylvania
St Andrews University	N. Carolina	Bryn Mawr College	Pennsylvania
Warren Wilson College	N. Carolina	Bucknell University	Pennsylvania
William Peace University	N. Carolina	Cedar Crest College	Pennsylvania
University of Jamestown	North Dakota	Delaware Valley College	Pennsylvania
Bluffton University	Ohio	Dickinson College	Pennsylvania
Cedarville University	Ohio	Elizabethtown College	Pennsylvania
Defiance College	Ohio	Franklin and Marshall College	Pennsylvania
Denison University	Ohio	Geneva College	Pennsylvania
Hiram College	Ohio	Gettysburg College	Pennsylvania
Kenyon College	Ohio	Harrisburg University of Science and Technology	Pennsylvania
Marietta College	Ohio	Haverford College	Pennsylvania
Notre Dame College	Ohio	Juniata College	Pennsylvania
Oberlin College	Ohio	Keystone College	Pennsylvania
Ohio Christian University	Ohio	La Roche College	Pennsylvania
Ohio Northern University	Ohio	Lafayette College	Pennsylvania
Ohio Wesleyan University	Ohio	Lebanon Valley College	Pennsylvania
The College of Wooster	Ohio	Lycoming College	Pennsylvania
University of Mount Union	Ohio	Messiah College	Pennsylvania
Urbana University	Ohio	Moravian College	Pennsylvania
Wilberforce University	Ohio	Muhlenberg College	Pennsylvania
Wilmington College	Ohio	Peirce College	Pennsylvania
Wittenberg University	Ohio	Saint Vincent College	Pennsylvania
Mid-America Christian University	Oklahoma	Seton Hill University	Pennsylvania
Oklahoma Baptist University	Oklahoma	Susquehanna University	Pennsylvania
Oklahoma Wesleyan University	Oklahoma	Swarthmore College	Pennsylvania
Saint Gregory's University	Oklahoma	Thiel College	Pennsylvania
Southwestern Christian University	Oklahoma	Ursinus College	Pennsylvania
Corban University	Oregon	Valley Forge Christian College	Pennsylvania
Lewis & Clark College	Oregon	Washington & Jefferson College	Pennsylvania
Linfield College-McMinnville Campus	Oregon	Westminster College	Pennsylvania
Northwest Christian University	Oregon	Wilson College	Pennsylvania
Reed College	Oregon	Allen University	S. Carolina
Anderson University	S. Carolina	Southwestern Adventist	Texas

Benedict College	S. Carolina	University	
Claflin University	S. Carolina	Southwestern University	Texas
Coker College	S. Carolina	Texas College	Texas
Erskine College	S. Carolina	Texas Lutheran University	Texas
Furman University	S. Carolina	Wiley College	Texas
Limestone College	S. Carolina	Bennington College	Vermont
Morris College	S. Carolina	Burlington College	Vermont
Newberry College	S. Carolina	Champlain College	Vermont
North Greenville University	S. Carolina	Green Mountain College	Vermont
Presbyterian College	S. Carolina	Marlboro College	Vermont
Voorhees College	S. Carolina	Middlebury College	Vermont
Wofford College	S. Carolina	Saint Michael's College	Vermont
Augustana College	South Dakota	Southern Vermont College	Vermont
Dakota Wesleyan University	South Dakota	Sterling College	Vermont
Mount Marty College	South Dakota	Averett University	Virginia
Presentation College	South Dakota	Bluefield College	Virginia
University of Sioux Falls	South Dakota	Bridgewater College	Virginia
Bryan College-Dayton	Tennessee	Eastern Mennonite University	Virginia
Carson-Newman University	Tennessee	Emory & Henry College	Virginia
Fisk University	Tennessee	Ferrum College	Virginia
Lane College	Tennessee	Hampden-Sydney College	Virginia
Le Moyne-Owen College	Tennessee	Hollins University	Virginia
Martin Methodist College	Tennessee	Randolph College	Virginia
Maryville College	Tennessee	Randolph-Macon College	Virginia
Milligan College	Tennessee	Roanoke College	Virginia
Rhodes College	Tennessee	Southern Virginia University	Virginia
Sewanee-The University of the South	Tennessee	Sweet Briar College	Virginia
Southern Adventist University	Tennessee	University of Richmond	Virginia
Tennessee Wesleyan College	Tennessee	Virginia Intermont College	Virginia
Welch College	Tennessee	Virginia Union University	Virginia
Austin College	Texas	Virginia Wesleyan College	Virginia
East Texas Baptist University	Texas	Washington and Lee University	Virginia
Howard Payne University	Texas	Northwest University	Washington
Huston-Tillotson University	Texas	Trinity Lutheran College	Washington
Jarvis Christian College	Texas	University of Puget Sound	Washington
McMurry University	Texas	Whitman College	Washington
Paul Quinn College	Texas	Alderson Broaddus University	West Virginia
Schreiner University	Texas	Bethany College	West Virginia
		Davis & Elkins College	West Virginia
Ohio Valley University	West Virginia		



University of Charleston	West Virginia
West Virginia Wesleyan College	West Virginia
Wheeling Jesuit University	West Virginia
Beloit College	Wisconsin
Carthage College	Wisconsin
Lawrence University	Wisconsin
Maranatha Baptist University	Wisconsin
Northland College	Wisconsin
Northland International University	Wisconsin
Ripon College	Wisconsin
Saint Norbert College	Wisconsin
Silver Lake College of the Holy Family	Wisconsin
Wisconsin Lutheran College	Wisconsin

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