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**Will, John E. *The Relationship Between the Price of College and First Year Enrollment at a Midwestern Technical College***

Abstract

A national movement has led to significant dialogue regarding the potential benefits of free college. Supporters suggest that additional financial resources will remove a barrier that limits access and attainment. This study considered the estimated price of college in a way that is consistent with what is described in most free college models. The resulting estimates of price were used to determine whether a significant relationship existed with first and second term enrollment or completion for a sample of 2016 students who completed the FAFSA at a Midwestern technical college. It provided a statistically significant result that allowed for the development of a predictive model. The model, however, indicated a relationship that was opposite of the expected relationship. As estimated price increased, rates of continued second term enrollment also increased. Information regarding the college's students who participated in its free college program suggest the majority of students already had resources to cover the costs eligible under the program. The study discussed the conclusions drawn from the research and introduced recommendations for future research and to key stakeholders, and can be replicated by institutions with similar information systems.

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To the many students who make the important decision to start college against all odds, you inspire me. Thank you for your exceptional effort and sacrifice. To Mom and Dad, thank you for making sure I didn't have to start against all odds. You inspire me, too.

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## Chapter I: Introduction

Policymakers have increasingly identified a need for broader postsecondary credential and degree attainment as a major national priority. Then-President Obama reflected this perspective in the America's College Promise Proposal, which offers a framework to provide free college on a national scale (The White House, 2015). The proposal was followed by the introduction of legislation intended to model its key components (S. 1716, 2015). An underlying assumption in President Obama's proposal and the closely related legislation is that the price of postsecondary education is a primary barrier to greater rates of postsecondary access and, ultimately, the attainment of credentials and degrees.

Similar recognition of the need for a citizenry with more postsecondary credentials exists at the state level (National Conference of State Legislatures, 2016). Tennessee's version of a promise program was the first of its kind and is designed to create a large number of new postsecondary applicants. The effort is considered a key economic development initiative that broadens postsecondary access to underserved populations (Fain, 2014).

The Campaign for Free College Tuition tracks promise programs around the country and reports that more than 40 such programs exist at the college or state system level (Campaign for Free College Tuition, 2016). These initiatives vary in their form and scope but each supports the idea that the price of postsecondary education remains a substantial barrier to the goal of increasing postsecondary attainment. The existence of proposed federal legislation and the growth in programs at the state and local levels strongly suggest that support for free college has gained momentum at the national, state, and institutional levels (Campaign for Free College Tuition, 2016; S. 1716, 2015;).

There are also indications the general public supports the idea of free college. A July 2016 survey found that 62 percent of respondents support making college debt-free, and a larger percentage support free college access to those in certain low-income categories. However, less than half of those same respondents indicate they are willing to pay more in federal taxes to support the initiative (Mosendz, 2016).

Incentivizing increased levels of enrollments by making college free seems like a logical pathway to improving educational attainment. If financial barriers prevent students from enrolling, they cannot complete. However, data from the Integrated Postsecondary Education Data System (IPEDS) suggests that simply reducing barriers to access may not influence the desired outcomes as expected. The 2007 cohort of incoming first time, full-time college students at four-year institutions completed a bachelor's degree within 6 years just 59% of the time (United States Department of Education, 2015). At two-year colleges, which serve more than 40 percent of all postsecondary students in the United States, less than 30 percent of the 2007 cohort graduated within 3 years (United States Department of Education, 2015). Even when a person makes the decision to access postsecondary education degree attainment is far from guaranteed.

The challenge of enrolling more people in postsecondary institutions is potentially much different than the challenge of utilizing existing postsecondary systems to produce more graduates. No clearly defined strategy exists to ensure students complete at higher rates once they start, especially for those who begin without the academic background to take college level courses (Bettinger, Boatman, & Long, 2013). Enrolling more people in a postsecondary system that may not be designed to meet their needs could result in additional frustration for students, educators, and policymakers rather than a significant change in degree attainment.

Before making a major public investment in free college models it is important to understand the degree to which price potentially influences postsecondary access and, ultimately, attainment. This can be measured by its influence on decision-making as it pertains to initial enrollment and continued enrollment. This research contributes to the literature by examining the relationship between two measures of the price of college and rates of enrollment at a Midwestern technical college. This research is intended to expand knowledge at the institutional level about the price of college and decision-making, and can be easily replicated by other institutions.

### **Statement of the Problem**

The price of college is viewed as a barrier to educational attainment that could be influenced by providing more financial support to students. A recent survey by the Board of Governors of the Federal Reserve (2015) supports this assertion. More than 30 percent of respondents who chose not to attend college cited cost as the primary reason for choosing not to pursue a postsecondary degree. More than 24 percent who started but did not finish college cited cost as the reason for not completing (Board of Governors of the Federal Reserve, 2015). It is not surprising that for many the pathway to a degree is prohibited by real or perceived barriers associated with the price of attending a postsecondary institution.

Free college seems to be a logical solution for those who see the price of postsecondary education as a barrier. The literature, however, provides little in the way of evidence to support the notion that lowering the price of college has a strong relationship to enrollment in postsecondary systems. In fact, two-year public institutions, which are the target institutions for many free college models, have demonstrated an average decrease in net price at the same time enrollments have been in decline (College Board, 2014).

Beyond the discussion of price, it is important to recognize that many students and potential students are already willing to pursue the benefits associated with a college degree. However, they fall short in terms of their willingness or ability to complete the academic requirements necessary to graduate. In addition, many willing students are unable to meet the academic requirements to start college even though in many cases there is little evidence the primary assessment methods predict future success (Allen, 2014; College Board, 2015; Manto, 2006; Scott-Clayton, 2012). Other students face procedural barriers associated with completion of the Free Application for Federal Student Aid (FAFSA). For example, poor students who are first generation college students are the least likely to complete the FAFSA, effectively limiting their access to financial assistance without regard to their academic ability (Feeney & Heroff, 2013).

Given the myriad of challenges potential college students face before and during college it is critical to understand the extent to which greater financial support influences the decision to enroll and subsequently persist. Allocating scarce resources to create pricing subsidies may be a reasonable intervention strategy, but only if it has a measurable impact on rates of enrollment and, ultimately, degree or credential attainment.

### **Purpose of the Study**

The primary purposes of this study are to examine the relationship between the estimated price of postsecondary education and the probability of enrollment in the first and second term. The study will utilize the quantitative causal-comparative approach based on historical information gathered from a Midwestern technical college. More specifically, logistic regression will determine the extent to which different measures of net price are related to first term enrollment, as defined as registration in fall semester classes, and second term enrollment, as

measured by short-term program completion or continued registration in the second term. In addition, the college's version of a free college will be assessed by comparing its impact on enrollment to the larger sample. In summary, this research will examine how the price of postsecondary education influences enrollment at a Midwestern technical college.

### **Research Questions**

The basic hypothesis of this research is that an inverse, or negative, relationship exists between price and enrollment. As the price of a student's postsecondary education increases it logically follows that it will become less likely the student will enroll initially or continue to stay enrolled. The study will examine the relationship by addressing three questions.

1. Does the estimated net price predict the initial decision to enroll in postsecondary coursework at a Midwestern technical college?
2. Does the estimated net price predict continued enrollment or short-term degree completion for students at a Midwestern technical college?
3. Do Promise program participants demonstrate different enrollment and persistence characteristics as compared to the overall sample?

### **Significance of the Study**

As the broader policy discussion regarding free college continues it is important to understand how changes in policy at the federal, state, and local levels are likely to impact enrollment. Decision-making at these beginning stages of the educational process ultimately determine whether not attainment goals will be reached. If increased financial support and its direct impact on price is not a better predictor of enrollment, then other strategies may be a better use of funding to achieve the policy objectives. Examples include a larger investment in remedial education services, co-requisite programming, or enhanced services at the secondary

level. Spurring demand for existing postsecondary systems by using price as an intervention may be the best strategy to achieve policy objectives. Evidence that it is an effective way to increase the end goal of increased rates of enrollment may be found by analyzing the history of an institution already administering financial aid programs.

### **Assumptions of the Study**

The study assumes potential and existing students view postsecondary education as an investment. This assumption allows price to be viewed as a treatment for increasing the probability of enrollment in the first and second terms. Basic investment theory suggests that in normal conditions as the price of postsecondary services decrease its value in the form of increased earnings will increase. While other variables logically affect the ability of a person to enroll, they are assumed to be less impactful than price. The research design makes these assumptions because it is critical to test the assumption that *price alone* will serve as an intervening variable that will impact decisions regarding enrollment. For the purposes of this study, it is assumed that the completion of a short-term credential counts as a success.

### **Limitations of the Study**

The research will be limited to the population being studied and the source data that is accessible. Key limitations are summarized as follows:

- The population will be limited to students at a Midwestern technical college, which may exhibit a different demographic makeup than other populations outside of the region served.
- The sample may have demographic characteristics that are different from future or past students. For example, the sample is skewed towards adult learners, which may be different from future cohorts based on programming and other changes.

- The sample served by the Midwestern technical college represents a rural population without a major urban center.
- The expected family contribution (EFC) represents an estimate of financial support at a point in time and will not capture other changes, such as an unexpected change in household income that could affect the ability to begin college or complete a degree.
- Admissions and instructional processes influence enrollment and completion. College-specific processes will influence the results in a way that may cause variations as compared to other institutions.
- Data to test the effect of potential confounding variables, such as academic ability, work commitments, or family status, did not exist or was not collected.
- Not all potential students complete the FAFSA, which limits the sample. Enrollment information will exist for this portion of the population, but financial information will be unavailable.
- Potential students may not apply due to perceptions about price. No information will exist for these potential subjects even though they may be affected by pricing information.

### **Definition of Terms**

This section defines key terminology that is used throughout the study. It is intended to provide context for the reader with respect to terms commonly used in this research.

**Enrollment.** For the purposes of this study, enrollment is defined as being registered in coursework in the term being studied. Students who completed a short-term credential are considered the same as those who are enrolled.

**Expected family contribution (EFC).** A calculation in the federal financial aid application process to determine a potential student's eligibility for financial assistance. The amount represents the estimated amount the person is expected to access from his or her family (United States Department of Education, 2016a).

**Financial aid.** Financial resources provided directly to students to offset tuition and non-tuition costs. Financial aid can come from both public and private sources and often serves as a negative adjustment to price.

**Free application for federal student aid.** The application that is used to determine eligibility for federal and some forms of state-based financial aid (United States Department of Education, 2016a).

**Free college.** A term representing the movement to provide free postsecondary education services. Free college models are usually limited to 2-year college students who are recent high school graduates and who have met certain academic requirements (Campaign for Free College Tuition, 2016; National Conference of State Legislatures, 2016).

**Institutional aid.** Financial resources provided by the institution directly to students to offset tuition and non-tuition costs. This type of aid is normally funded by endowments or philanthropic organizations.

**Merit-based aid.** Financial resources provided directly to students in return for meeting certain criteria. This type of aid is most often based on academic performance.

**Need-based aid.** Financial aid provided with financial need as the primary basis for the award. This type of aid is often determined by income level.



**Net price.** The estimated program price less the potential offsets grant-based aid and EFC. Estimated net price will be calculated for each student with multiple assumptions regarding offsets for the purposes of this study.

**Non-tuition costs.** Costs of attendance that are not based on tuition. Examples include books, housing, and transportation.

**Pell grant.** A federal need-based grant that is awarded based on information provided in the FAFSA (United States Department of Education, 2016a).

**Promise program.** A program purporting to provide free college with a framework similar to that proposed in the America's College Promise Proposal and America's College Promise Act (S. 1716, 2015; The White House, 2015).

**Total price.** The sum of tuition and non-tuition costs.

**Tuition.** The amount charged to students for the educational services provided at a postsecondary institution. For the purposes of this study, estimated fees were included with tuition.

**Wisconsin grant.** A state need-based grant that is awarded based on information provided in the FAFSA (Higher Education Authorization Board, 2016).

## Chapter II: Literature Review

Increasing educational attainment by making college free has been considered a potential solution for a variety of problems ranging from narrowing the skills gap to reducing economic inequality to reducing student default rates on student debt (Bessen, 2015; Carr, 2013; Mosendz, 2016). However, the literature has relatively little information that attempts to inform the discussion as it pertains to the direct educational outcomes that could be expected from using a free college model as an intervention strategy. It is important to better understand if and how the price of postsecondary education influences variables such as rates of enrollment and persistence for postsecondary students before policymakers commit to new funding at the federal or state level. This chapter considers the existing literature related to the price of postsecondary education and enrollment.

As the expected price of college decreases, it logically should become more likely for people to start college and persist based on basic investment and economic theory. While it is not feasible to understand the actual costs for every potential student, valuable information exists from the 89 percent of 2011 college students who completed the Free Application for Federal Student Aid (FAFSA) (Radwin & Wei, 2015). This application process generates information describing how much aid a student will receive, the extent to which a student's family is expected to provide financial support, and how much attending a postsecondary institution will cost, including costs such as tuition, fees, and other living expenses (United States Department of Education, 2016). The data provides enough information to estimate the average net price of attending a postsecondary institution for those who participate in Title IV financial aid programs.

The definition of what constitutes a truly free postsecondary education is debatable, but the premise that removing or lessening the barrier of price would have a positive impact on both

the ability of students to start and finish college is a core assumption for those who support a postsecondary system that is less expensive to students. Evidence exists that certain grants and other aid that have the effect of making college less expensive have a positive relationship with persistence (Bettinger, 2004; Mabel, 2016; Mayer, 2014; Olbrecht, Romano, & Tiegen, 2015). However, a review of macroeconomic data suggest the ability of net price to predict enrollment is weak at best (College Board, 2014).

Understanding the price of education extends well beyond knowing the amount of tuition and fees of a particular institution (Monaghan & Goldrick-Rab, 2015). Costs such as living expenses, transportation, and books are also costs relevant to understanding price as a potential barrier to attainment. The combination of tuition, non-tuition costs and offsetting financial assistance are what determine the net price of attending a postsecondary institution for each student. To obtain a more comprehensive understanding of price, it is important to consider all costs that are relevant to the student as well as the mechanisms that are in place to offset those costs (Monaghan & Goldrick-Rab, 2015).

Colleges also collect the information necessary to calculate various measures of rates of enrollment and completion. It is possible to examine if and how price potentially influences these important measures of student success by conducting a causal-comparative analysis of historical information at the institutional level. A significant negative relationship between price and enrollment would support the hypothesis that reducing the price of college could ultimately lead to higher rates of educational attainment by reducing barriers associated with cost.

### **Theory Base**

Basic investment theory suggests changes in price will influence decisions related to postsecondary enrollment (Oreopoulos & Petronijevic, 2013). For the purposes of this research

the investment in a postsecondary education is represented by the net price of the services received. The investment has a tangible benefit in the form of increased lifetime earnings. For example, Baum (2014) cites a \$21,300 annual earnings premium for a bachelor's degree as compared to a high school diploma for full-time employees over the age of 25. In the context of the goal of increasing postsecondary credential and degree attainment, an increase in enrollment should result if the price of the services is lower and the benefits of a postsecondary credential are the same. In the case of free college models this theoretically would eliminate price as a barrier to enrolling in college or persisting, in effect increasing the return for successful students

The law of demand is accepted as a foundational component of economic theory and similarly supports the negative relationship between the price of a product or service and demand (Lee, 1998). Application of this theory would suggest that as postsecondary education costs more, fewer people will choose to pay for it.

However, a review of the literature reveals pricing complexities that may not be easily calculated or understood by students or their families. Determining how much it will cost to attend college often requires understanding the stated tuition and fees, but consideration also is required for offsetting adjustments from grants and other forms of aid (Feeney & Heroff, 2013). In addition, the benefits of education are often expressed in estimated financial measurements such as expected lifetime earnings (Baum, 2014; Oreopoulos & Petronijevic, 2013). Expected lifetime earnings are difficult to quantify in advance and vary considerably by the type of program attempted and by geography (Baum, 2014). These benefits should be valued as the present value of future earnings minus the present value of future costs (Bettinger, 2004; Oreopoulos & Petronijevic, 2013). Given the well-documented increase in lifetime earnings attributed to education it is logical that if postsecondary education becomes less expensive more

people will access it, but calculating both the cost and the benefits requires thoughtful and careful analysis that may be beyond the ability level of many people who are not already well educated.

Interestingly, the national data on enrollment in community colleges, which are the target of many free college models, contradicts investment and economic theory. Since 2012, as incomes of the lowest two quartiles of American workers have stagnated or declined, so have overall enrollments (College Board, 2014). The higher incomes associated with a postsecondary credential or degree should have made postsecondary attendance more attractive, but the evidence does not correspond to a positive change in enrollment. It is possible that short-term concerns, such as providing for necessities like food, and long-term considerations, such as an aversion to taking on debt, are barriers to achieving the long-term gains provided by a postsecondary degree or credential.

This demand should have been further spurred by a decline in net price at public 2-year colleges that began in 2007-08 (College Board, 2014). How these data translate to the institutional level will either support basic investment and economic theory that price influences decision-making or will suggest that confounding variables, such as a person's academic ability or desire to work, complicate the application of the theory.

### **Historical Perspective**

Early forms of postsecondary education in what is now the United States were derived from the European university model (Elsner, Boggs, & Irwin, 2008). These institutions primarily served males who were part of the social elite (Topper & Powers, 2013). Since that time there has been a steady progression towards providing postsecondary education access to the broader population. In 1862, President Lincoln signed the Morrill Act, which would usher in

an era of significant public investment in postsecondary education (Paris, 1985). The effort was extended more broadly through the development of the community college system, which developed a unique open admissions philosophy that promoted access for all citizens of the democracy, including many who were from population segments that had previously been underserved (Elsner, Boggs, & Irwin, 2008). From a national perspective, the philosophy that is generally reflected in the United States could be considered a belief in college for all (Hoffman, 2011). By the year 2000, 75 percent of high school graduates were enrolling in college within in two years of secondary completion, and the majority of postsecondary students were female (American Association of Community Colleges, 2002). While the United States may have pioneered systems that broadly promote an educated workforce, other nations have since adopted other strategies that may align better to the implied workforce development objectives of the postsecondary education systems in the United States.

### **Global Differences**

Postsecondary systems are often considered a key driver of economic prosperity, but the evolution of postsecondary education varies dramatically across nations. High rates of postsecondary attainment are associated with higher incomes for individuals and greater productivity from a nation's workforce (Elsner, Boggs, & Irwin, 2008).

In the United States, extending educational opportunities may be best demonstrated in its community college system. Unlike many other developed countries, however, the United States has a relatively disparate collection of systems that differ from state to state, which make it more difficult to create common economic development goals at a national level (Boggs & Irwin, 2008). For the purposes of this research, the most relevant forms of education are connected to programming that does not represent traditional university education. It is in these non-

university level models that the broader population has been typically served at the postsecondary level.

Some countries recognize systems at the secondary level as the best opportunity to align education with economic opportunity. For example, in Germany and Switzerland, which emphasize vocational training options for secondary students, more than 60 percent of secondary students combine workplace learning and traditional classroom learning (Hoffman, 2011). Programming in both countries is closely tied to what is required by employers, often resulting in occupational credentialing rather than degrees. Other countries attempt an approach of utilizing their postsecondary systems for targeted training rather than general academic skill development. South Africa does not have a community college system that resembles what exists in the United States. In response to social and cultural issues, the country has developed a strategy around further education and training colleges that emphasize skill development leading to employment (Fisher & Scott, 2008). Similarly, China's version of the community college was adapted from the United States model, but places greater emphasis on vocational training and lifelong learning (Postiglione, Wang, & Watkins, 2008).

These examples highlight the fact that it is possible to develop a variety of strategies to improve the general education level of a particular population. Investing in postsecondary or other education systems through significant policy changes should be shaped by a clear understanding of policy objectives. The changes could consider approaches already employed in other parts of the world.

### **The Price of College Defined**

To understand the impact of postsecondary education's price on enrollment and completion it is necessary first to understand its typical components. This discussion will use

information reported to the United States Department of Education as a contextual framework. For descriptive purposes, the discussion will use information published in 2015 for the cohort of first-year, full-year students from 2011-12 (Radwin & Wei, 2015).

**Tuition.** The most commonly recognizable component of postsecondary education's price is tuition. Tuition represents the amount a student pays to receive instruction and related services provided by the institution of attendance. In addition to tuition, it is common for postsecondary institutions to charge various fees to students. These fees are normally much smaller in dollar value than tuition. The data utilized for this discussion of price considers fees to be a component of tuition.

Tuition varies significantly based on the type of institution a student attends. In 2011 public 2-year institutions charged an average of \$2,800, public 4-year institutions charged an average of \$9,300, for-profit institutions charged an average of \$15,400, and private nonprofit 4-year institutions charged an average of \$28,800 (Radwin & Wei, 2015). The stated price of a 4-year private nonprofit institution appears to be more than ten times more expensive than a 2-year public institution.

**Public and private subsidies.** The wide variation in tuition between public and private institutions can be partly explained by the operational subsidies that are provided to public institutions. To improve affordability, taxpayer funding is used to subsidize the cost of operations at public institutions and thereby reduce the amount students are required to pay for tuition. In addition, the mission of some public institutions extends beyond providing educational services. For example, many public 4-year institutions conduct research as part of their work. Institutional subsidies are different from student-based subsidies as they make these



institutions more affordable for all students, regardless of need or merit. In contrast, student-based aid is provided to individual students based on certain criteria.

The most significant operating subsidies for 2-year and 4-year public institutions come from the states in which they operate. These subsidies have declined by 23 percent between 2007-08 and 2013-14 and averaged nearly \$7,200 per full-time equivalent student in 2013-14 (Radwin & Wei, 2015). A review of local and state funding reveals an observable average increase in per full-time equivalent student funding since 2011-12. However, the state and local funding levels are 8 percent lower than a decade ago and 11 percent lower than 30 years ago (College Board, 2016).

Free college models require additional taxpayer resources to ensure that all citizens have access to a postsecondary education. An initiative shaped by federal policy would influence institutions that are primarily controlled and funded by the states. On average, this funding has been in decline in recent years, and most Americans do not support a federal tax increase to support free college (Mosendz, 2015). This highlights the need to ensure that additional public investment in postsecondary education is well placed.

A review of longitudinal data suggests that declines in state subsidies are often offset by increases in tuition and fees and, conversely, increases in state subsidies are often offset by decreases in tuition and fees (Radwin & Wei, 2015). This relationship is important because federal funding often supports tuition and fees in the form of grants, loans, and other forms of student-based aid. Increases in federal funding will only decrease the net price for students if decreases in operating subsidies do not offset them. In recent years, the combination of federal funding and operating subsidies in public institutions has had a mixed impact on net price. At 2-

year institutions net price has declined, while an overall increase in net price has occurred in public 4-year institutions (College Board, 2014).

Subsidies also exist in the private-nonprofit postsecondary market, but generally come from institutional endowments or philanthropic organizations (Radwin & Wei, 2015). Approximately 74 percent of students at private non-profit institutions received this type of award in 2011-12. Student-based subsidies from these sources generally come in the form of institutional grants. At these institutions, the stated tuition rate of educational services often is higher than what students pay after institutional aid is factored in. Student-based subsidies have the effect of reducing the stated price, or tuition, of postsecondary education for most students and their families (Radwin, Wine, Siegel, & Bryan, 2013; Radwin & Wei, 2015). This reduces the difference in price of attendance at private nonprofit institutions, making their net price more comparable to their public counterparts.

***Need-based aid.*** Need-based aid is the primary type of aid for most publicly funded financial aid programs. This form of aid has the effect of reducing the price of attendance for many students. This type of subsidy is often directly related to a student or family's ability to pay for the costs associated with attendance.

Examples of this type of aid include the Pell Grant at the federal level and the Wisconsin Grant at the state level. Given the relevance of the Pell Grant and the Wisconsin Grant to this research, both are subsequently described in more detail. The combined effect of federal and state need-based aid can have the effect of providing enough financial assistance to cover costs beyond tuition and fees. Research suggests need-based aid in the form of grants has a positive relationship with persistence (Bettinger 2004; Mabel, 2016).

***Merit-based aid.*** Merit-based aid is provided based on criteria usually related to some form of academic performance. States that provide aid to students have made a shift to place greater emphasis on merit-based aid (Rampell, 2013). Like need-based aid, merit-based aid has the effect of reducing the price of attending a postsecondary institution. Unlike need-based aid the criteria for merit-based aid often represent reward systems for past achievements. For the purposes of this research it is important to note that the students in the sample receive only a marginal amount of aid in this category. However, it is an important form of aid that will be discussed in the context of studies that suggest it may influence certain behaviors related to persistence. Merit-based has been shown to have a positive relationship with enrollment and persistence (Mayer, 2014; Olbrecht, Romano, & Tiegen, 2016; Patel & Rudd, 2012).

**Non-tuition costs.** Non-tuition costs are a significant component of a student's financial commitment to college. Expenses such as housing, books, supplies, meals, and transportation directly affect the ability of many students to attend a postsecondary institution (Goldrick-Rab, 2016; Radwin & Wei, 2015). Here again it is important to note differences across institutions. Students of public 2-year institutions spent an average of \$12,200 on non-tuition costs, students and public 4-year and for-profit institutions spent an average of \$13,900, and students at private non-profit institutions spent an average of \$14,700. Non-tuition costs vary across institutions but the variation is modest as compared to the variation in tuition. The data suggests this component of price is similar regardless of institution type.

Housing is the largest component of non-tuition costs and varies in form and in price across institution types (Radwin & Wei, 2015). The price of on campus housing, for example, can influence this category of cost. Students who attend a non-profit 4-year institution have the highest average cost to live on campus. Since less than 1 percent of 2-year public institutions

utilize an on-campus housing arrangement, this component of cost represents an off-campus arrangement and a more consistent commuter cost for these students. Among all students who do choose on-campus housing its cost varies by institution type with private nonprofit on-campus housing costing the most at \$10,100 on average.

The effect of non-tuition costs on price are significant. It is a larger component of price than tuition for public 2-year and public 4-year institutions. However, it is often overlooked as a cost of attendance (Monaghan & Goldrick-Rab, 2015). It is important to point out that many free college models do not consider this component of price in their definition. While non-tuition costs are often covered through current forms of financial aid, the guarantee provided for most free college models usually stops after the traditional costs of tuition and fees are satisfied (National Conference of State Legislatures, 2016). Nationally, the average student at 2-year public institutions already receive enough aid to cover tuition and fees (Monaghan & Goldrick-Rab, 2015).

**Opportunity costs.** There is often an opportunity cost to attending college in the form of lost wages and other non-economic benefits, such as leisure time. An opportunity cost is the lost value of pursuing the next best alternative, which in the case of many people is the opportunity to earn a living rather than go to school. If the real or perceived value of lost earnings exceeds the real or perceived value of obtaining a postsecondary education rational consumers will logically choose to work. In addition, non-financial costs, such as the time it takes to access available support services to supplement instruction, may increase the opportunity cost from the student perspective.

The percentage of respondents who indicate a desire to work as the reason for not attending college is nearly identical to those who identify cost (Board of Governors of the

Federal Reserve, 2015). The percentage of respondents who identify the desire to work as the reason for not completing college is higher than those who identify cost as the primary barrier to completion (Board of Governors of the Federal Reserve, 2015). This suggests many potential students view the opportunity cost of attending a postsecondary institution to be a substantial barrier to attendance. This can be especially true for those who face substantial economic hardship. Even free college can represent enough lost earnings to threaten basic needs such as housing and food. As a result, sacrificing earnings in the short-run may not be an option for those who stand to benefit the most from accessing a postsecondary education (Monaghan & Godrick-Rab, 2015).

**Total price.** The total price of attending college considers tuition and non-tuition costs. The combined effect of the wide variation in average tuition by institution type and the less severe variation of average non-tuition costs suggests noticeably different price points by institution type. The percentage difference in price, however, narrows between the least expensive and most expensive alternatives as compared to the tuition-only analysis.

Again, the average price of a 2-year public institution has the lowest price at \$15,000 per year (Radwin & Wei, 2015). At the other end of the price spectrum, 4-year private nonprofit institutions are nearly three times more expensive on average at \$43,500 (Radwin & Wei, 2015). The difference is more pronounced when the typical time to complete is considered. A 2-year commitment would result in an estimated \$30,000 outlay at a 2-year public institution and a \$174,000 at a non-profit 4-year institution, with much of the difference attributed to two additional years of college. The for-profit 4-year alternative is the next most expensive at \$29,300 per year. The average annual total price of \$23,200 to attend a publicly funded 4-year

institution is also more expensive than attending a 2-year public institution, with an estimated total price of attendance of \$92,800.

Most free college models are designed to incentivize community college attendance, which is the most common form of 2-year public institution (National Conference of State Legislatures, 2016). This lowest cost alternative could be a method to reduce the cost of a 4-year education for students who complete. A student who attended a public 2-year institution for 2 years and completed a degree at a 4-year institution would expect an average total price of \$76,400. A student who attended all 4 years at the same average 4-year public institution could expect a total price of \$92,800 for the same degree, as described previously.

**Net price.** Need-based aid is a foundational element of the postsecondary system and has the effect of reducing the total price of attending a postsecondary institution for many students. Need is most commonly determined by a formula that considers the financial resources that are available to a student in the absence of need-based aid. One of the key pieces of information that determines eligibility is whether a student is dependent or independent for Internal Revenue Service purposes. Independent students are primarily responsible for their own financial well-being and use their own financial information to determine eligibility. Dependent students rely on parents or others for financial support, and are required to use the information of those who are providing financial support to determine eligibility. The differences in aid amounts for these two categories are significant and are presented separately. In addition, significant differences exist by income quartiles within the dependent and independent status. The ranges differ between the two categories based on the information provided on the FAFSA, which is collected by the United States Department of Education.

For independent students, the low-income category represents family income less than \$4,510, the low middle-income includes the range between \$4,510 and \$14,489, the high middle-income category includes the range between \$14,490 and \$29,096, and the high-income range includes family incomes above \$29,096 (Radwin & Wei, 2015).

Table 1 summarizes the net price information for independent students by income category.

Table 1

*Net Price for Independent Students by Income Level and Institution Type*

Income category	Public 2-year	Public-4 year	For-profit	Private non-profit	Institution Range
Low	\$11,400	\$15,300	\$25,400	\$25,600	\$14,200
Low-middle	\$12,100	\$16,100	\$24,100	\$25,700	\$13,600
High-middle	\$12,400	\$18,300	\$24,600	\$25,700	\$13,300
High	\$14,100	\$20,100	\$25,100	\$27,600	\$13,500
Income range	\$2,700	\$4,800	\$1,300	\$2,000	N/A

Source: Radwin & Wei, 2015

For independent students the public and private systems of providing aid have a somewhat consistent effect on net price. The range of net price by income level is modest when compared to the range of price by institution type. If the decision to attend college or the ability to stay enrolled is influenced by net price, these data suggest the type of institution is of primary importance. The price of attending after grants will offset other differences in price associated both tuition and non-tuition costs, though it is worth noting it is slightly more expensive for independent students to attend any type of postsecondary institution as income rises.

For dependent students, the income categories vary significantly from the independent category of students. The low-income category represents a family income less than \$31,224, the low middle-income includes the range between \$31,224 and \$68,750, the high middle-income category includes the range between \$68,751 and \$111,336, and the high-income range includes family incomes above \$111,336 (Radwin & Wei, 2015). Table 2 summarizes the net price information for dependent students by income category.

Table 2

*Net Price for Dependent Students by Income Level and Institution Type*

Income category	Public 2-year	Public-4 year	For-profit	Private non-profit	Institution Range
Low	\$8,300	\$12,300	\$24,300	\$19,700	\$11,400
Low-middle	\$11,300	\$16,200	\$27,400	\$23,300	\$16,100
High-middle	\$13,300	\$20,400	\$32,600	\$28,800	\$19,300
High	\$14,000	\$22,800	\$33,400	\$35,500	\$21,500
Income range	\$5,700	\$10,500	\$9,100	\$15,800	N/A

Source: Radwin & Wei, 2015

For dependent students, there is more variation in the data both in terms of the range of difference across institutions and by income. This likely relates to much larger differences in the income levels themselves, which are generally used to determine need. Students who are dependent generally have greater access to financial resources so are less likely to receive need-based aid. These data suggest that for dependent students the net price of attendance varies more across institutions and generally gets more expensive as income increases. Other contributing factors that could cause the differences in ranges relate to non-tuition costs like housing. For



example, a dependent student may be more likely to live with a parent than an independent student, which may be a more cost effective housing arrangement.

Both Table 1 and Table 2 demonstrate some of the key pricing attributes of the current postsecondary system and the complexities that exist for students making enrollment decisions. For example, grant-based aid generally has an equalizing effect on the net price of attending a postsecondary institution for independent students, while dependent students are expected to rely more on available family resources. The information demonstrates it is necessary to have an understanding of many economic variables beyond the price of tuition to make an informed decision about postsecondary attendance. It suggests that understanding the price of a college degree requires knowledge of both what costs will exist, but also what types of aid or other resources will be available.

From a macroeconomic perspective, it is possible to compare average changes in net price to enrollment levels by institution type. As mentioned previously, enrollment at 2-year public institutions has decreased as net price has declined in recent years. This contradicts the hypothesized relationship between net price and attendance at the most cost effective institutions. In contrast, data from the College Board (2014) indicates an increase in net price at public 4-year institutions as enrollment has increased. This again represents a counter-intuitive result based on basic investment and economic theory.

Finally, the United States Department of Education reports student loans as an offset to cost that further reduces price by the amount of debt that is available to students. This discussion purposely did not include information related to debt programs. Debt has no impact on the price of postsecondary education as measured in the data presented. For the purposes of this research it is recognized as a financial tool that can be used to delay paying costs. Of course, the decision

to take on debt often comes with the requirement to pay back interest as well. A strong argument could be made that many forms of debt add to the price of attending a postsecondary institution. In the data presented the inclusion of debt as a form of aid further decreased and leveled the cost of a postsecondary education both by institution type and income level, but the decrease would be better characterized as a delay in payment rather than a decrease to cost.

### **Financial Aid**

Students who attend accredited postsecondary institutions are eligible to apply for federal financial aid. There is an important distinction between subsidizing public institutions' operations, as described previously, and providing a subsidy to individual students. Subsidizing an institution with public funding reduces the tuition rate for all students regardless of need or merit. Providing financial aid based on need or merit provides resources directly to individuals rather than to the institution.

**Federal financial aid.** The federal financial aid system in its current form was created by Title IV of the 1965 Higher Education Act. The process of applying for federal financial aid requires completion of the FAFSA. The information from the FAFSA is often then used to distribute additional aid to eligible students at the state and local levels. Students of both public and private accredited institutions are generally eligible for taxpayer-supported financial aid programs, which are most often based on financial need. For the purposes of this research, the discussion of financial aid will center on the financial aid eligibility for students attending public institutions in Wisconsin. In addition to federal financial aid, students in Wisconsin also receive state-based support based on the information provided on the FAFSA.

**Pell grant.** The primary form of need-based federal financial aid is the Pell Grant. The Pell Grant is a subsidy used by the student to directly reduce the price of attending a

postsecondary institution. In some cases, the Pell Grant will fund more than a student's tuition and fees, in which case the funding can be used towards the myriad of other costs, such as housing or books, associated with attending a postsecondary institution. The maximum award for Pell in the 2016-17 academic year is \$5,815, but the grant can be awarded at lower levels based on need (United States Department of Education, 2016a).

The percentage of students receiving Pell Grants rose steadily over the period from the 1999-00 academic year to 2011-12. Over this period, the percentage of Pell Grants recipients increased from 19 percent to 35 percent of all students and the percentage of independent students receiving Pell Grants rose from 25 percent to 48 percent (United States Department of Education, 2016b). However, this increase in access to Pell Grants did not necessarily translate to providing the award to more people with less need. The real median income of dependent recipients decreased from \$29,500 to \$26,100 from 1999-00 to 2011-12 and, for independent students, from \$14,300 to \$12,700 (Nation Center for Education Statistics, 2016b). These data suggest an increase in need is driving expanded eligibility rather than a gradual relaxation of the eligibility criteria.

In Wisconsin, nearly 100,000 students received Pell Grants in 2010-11, with an average award of \$3,445 and a total funding level of more than \$340 million (Pope, 2013). Evidence suggests student access to Pell Grant resources has a positive relationship with persistence, including one study that found a 9-12 percent decrease in persistence when Pell eligibility was lost (Bettinger, 2004; Mabel, 2016).

***Federal supplementary education opportunity grant.*** In addition to the Pell Grant, students may be eligible Federal Supplementary Opportunity Grant (FSEOG) if they attend a participating institution. This award is also based on information provided on the FAFSA and is

awarded to Pell-eligible students who demonstrate exceptional need. The maximum award for FSEOG in 2016-17 is \$4,000 (United States Department of Education, 2016). More than 23,000 Wisconsin students received FSEOG grants in 2010-11, with an average award of \$577 and total funding of \$13.4 million (Pope, 2013).

*Other forms of federal financial aid.* These primary forms of grant-based aid are supplemented by other federal programs. These include loan programs, programs to serve special populations such as minorities, programs that provide assistance to people who enter specific occupations, and tax credits (<https://studentaid.ed.gov/sa/types>).

Tax credits are not discussed in detail for the purposes of this research. While tax credits may represent a direct benefit to independent students, the benefits often accrue to the person providing the financial support to a dependent student. In addition, the actual benefit of tax credits can vary based on a variety of factors including individual taxable income or other information that is not available in these data.

Students who have served in the military may qualify for federal benefits that provide funding for postsecondary education. These veteran benefits primarily come in the form of grants. Between 3 and 4 percent of students received veteran benefits (Radwin & Wei, 2015). This aid reduces the net price of postsecondary education for veterans, but is not discussed in detail because eligibility is so limited.

Students may also qualify for the federal work-study program. As the name suggests, this form of aid results in payments to students for work performed. Between 11 and 12 percent of students qualify for this type of aid (Radwin & Wei, 2015). Since it is essentially a form of subsidized work, it is not considered a reduction in net price to students for the purposes of this research.

**State-based aid.** In addition to Federal programs, most states provide some form of financial assistance to certain students. This research focuses on such programs in Wisconsin as the data is presented for a Wisconsin institution.

**Wisconsin grant.** Students in Wisconsin are eligible for the Wisconsin Grant. Eligibility is based on need and is determined from information provided on the FAFSA. Students attending an eligible institution can receive between \$250 and \$3,000 (Higher Education Authorization Board, 2016). In 2010-11, eligible students attending one of the private institutions in Wisconsin received an average award of \$2,532, public 4-year students received an average of \$1,900, and Wisconsin Technical College System students received an average of \$941 (Pope, 2013). The grant amounts generally correspond to variations in tuitions rates. Tuition at private colleges are higher than tuition rates at in the University of Wisconsin System, which are higher than tuition rates in the Wisconsin Technical College System. Like the Pell Grant and similar awards, the Wisconsin Grant has the effect of reducing the net price of postsecondary education for eligible students.

**Other forms of financial aid in Wisconsin.** Wisconsin provides various other forms of need-based grants to students. These programs account for just over 12% of student-based funding and are awarded to special populations such as veterans, people with disabilities, and Native Americans and to people who enter certain occupations such as nursing or teaching. (Pope, 2013).

**Local aid.** Local assistance is also sometimes available to students. At the college in this study, many students receive scholarships from its foundation, a private, non-profit 501(c)(3) corporation whose purpose is to provide financial assistance to its students. These amounts are considered institutional aid for the purposes of this research. All awards are grants, and can be

either merit-based or need-based depending on specific donor requirements or foundation policies. At private postsecondary institutions there are often scholarship programs to reduce the amount of stated tuition. This institutional aid can be either need-based or merit-based.

### **Student Loans**

The assertion that the accumulation of debt is making postsecondary education a burden rather than a benefit is an increasingly common theme in the press (Bonstein, 2016; Reynolds, 2016; Steele & Williams, 2016). The growth in cumulative student loans to more than \$1 trillion is an often-cited critique on the postsecondary system as a whole (Steele & Williams, 2016). While student loans do not affect the actual net price of attending a postsecondary institution, they can affect decision-making. The present value of future earnings is negatively impacted if a student factors in future interest payments on loans. With the exception of public 2-year institutions where 68 percent of students received only grants or no aid, student loans were part of the financial aid package for most postsecondary students across all other institution types (Radwin & Wei, 2015). For the purposes of this research, providing background into the two main themes that arise from student loan problems is important to add depth to the overall discussion of how all costs, including those associated with the incurrence of debt, are related.

**College doesn't pay.** As stated, student loans do not reduce the price of attendance. In fact, if interest is charged debt can increase the total cost of a postsecondary education. For those who view a postsecondary credential or degree as a pathway to an improved economic situation loans can be an important tool in financing the development of new skills that lead to a higher-paying job. However, the value of a degree in certain fields or from certain institutions varies substantially (Baum, 2014; College Board, 2014). Incurring debt that will not lead to a job that provides sufficient income to repay that debt contributes to the stigma that a college

degree does not necessarily lead to a brighter economic future. In fact, many examples of graduates who find themselves in this situation are regularly reported (Steele & Williams, 2016). While the popular press focuses on these examples, data suggests the earnings premium for a postsecondary degree is actually increasing (Baum, 2014). In addition, the United States Department of Education (2016c) announced a third consecutive annual decline in the student debt default rate. Unfortunately, research shows that a disproportionate amount of federal financial aid flows to institutions with the highest default rates (Jaquette & Hillman, 2015).

**Completion rates influence defaults.** Student loans become an immediate problem for students who do not persist to degree completion (Board of Governors of the Federal Reserve, 2015). Completion rates for first time, full-time 4 year students are 59%. The comparable rate for 2-year degree students is less than 30% (United States Department of Education, 2015). Some studies show that postsecondary education for those who do not complete causes incomes to rise over the long run (Baum, 2014). However, even if the education has long-term value the payments associated with an education that produced no tangible short-run financial result could be problematic. Unlike other forms of debt, student loans have no underlying asset other than a potential increase in future income. When the income does not materialize, the payments become a burden that can lead to significant financial hardship. When the income does materialize, significant benefits are the norm. The premium for a college education has grown over time and the average return for earning a college degree exceeds 15 percent per annum by some measures (Baum, Ma, & Payea, 2013).

### **Grant-Based Aid by Institution Type**

A key observation in the data related to price is that student subsidies tend to rise as the price of postsecondary education rises. In other words, a more expensive education leads to

more financial support. This can be quantified by calculating the difference between total average price and average net price by income level.

Tables 3 and 4 are derived from Tables 1 and 2. They represent the total grant-based aid provided by income level. Table 3 provides the net aid for independent students by institution type and income level.



Table 3

*Grant-Based Aid for Independent Students by Income and Institution Type*

Income category	Public 2-year	Public-4 year	For-profit	Private non-profit	Institution Range
Low	\$3,600	\$7,900	\$3,900	\$17,900	\$14,300
Low-middle	\$2,900	\$7,100	\$5,200	\$17,800	\$14,900
High-middle	\$2,600	\$4,900	\$4,700	\$17,800	\$15,200
High	\$900	\$3,100	\$4,200	\$15,900	\$15,000
Income range	\$2,700	\$4,800	\$1,300	\$2,000	N/A

Source: Radwin & Wei, 2015

Table 4 presents grant-based aid for dependent students by income and institution type. This information is important as more than 72 percent of students receive grants, which means the vast majority of students realize downward adjustments from the average total price (Radwin & Wei, 2015). Just over 66 percent of students who attend public institutions receive grants, while 78 percent of for-profit students and 86 percent of students at non-profit private institutions receive such awards. Much of the aid provided to students of private nonprofit 4-year institutions comes from private sources (Radwin & Wei, 2015).

Table 4

*Grant-Based Aid for Dependent Students by Income and Institution Type*

Income category	Public 2-year	Public-4 year	For-profit	Private non-profit	Institution Range
Low	\$6,700	\$10,900	\$5,000	\$23,800	\$17,100
Low-middle	\$3,700	\$7,000	\$1,900	\$20,200	\$16,500
High-middle	\$1,700	\$2,800	-\$3,300	\$14,200	\$17,500
High	\$1,000	\$400	-\$4,100	\$8,000	\$12,100
Income range	\$5,700	\$10,500	\$9,100	\$15,800	N/A

Source: Radwin & Wei, 2015

**Price and Matriculation**

Investment theory suggests an inverse relationship between the price of a service and the value derived from the service. As postsecondary education becomes more expensive to consumers it follows that fewer people will allocate their own resources to obtain the real and perceived benefits of those services. In this sense, reducing price via a free college model appears to be a very logical way to increase educational attainment as it increases the value of the services to potential students. However, unlike many services where the transaction represents the entire scope of the economic exchange the market for education presents certain complexities that confuse the elements of a typical transaction. For example, students may not fully understand the benefits they will receive from the service they are purchasing (Oreopoulos & Petronijevic, 2013).

Hurwitz and Kumar (2015) documented an illogical positive relationship between tuition growth and application levels at different types of institutions. They found rapid growth in

tuition rates generally corresponded to higher rates of growth in applicants between 2002 and 2012. This suggests the perceived educational value of an institution by potential students is at least somewhat related to this common measure of price. In other words, consumers of postsecondary services may associate a higher price with more value.

The macroeconomic data regarding college enrollment and price in recent years is mixed. The net price of the lowest cost postsecondary alternative, 2-year public institutions, has decreased while enrollments have also decreased in recent years (College Board, 2014). The cyclical nature of enrollments in this postsecondary system is historically more directly related to labor market trends than changes in pricing (Johnson, 2015). As the labor market improves and jobs become readily available people opt to work rather than become students.

At public 4-year institutions the relationship documented by Hurwitz and Kumar seems evident. Net price has increased, as have enrollments (College Board, 2014). Private nonprofit institutions suggest the expected relationship. As net price has dropped, enrollments have increased (College Board, 2014). Similarly, enrollment in the for-profit sector have decreased slightly as prices have increased. While a national free college model may indeed cause an increase in demand for educational services there appears to be little evidence in macroeconomic data that changes in pricing are the most influential component of student decision-making. This supports the need to better understand how pricing impacts individual students at the institutional level. Federal Reserve survey data indicates more than 30 percent of respondents didn't enroll in college because they thought it was too expensive (Board of Governors of the Federal Reserve, 2015).

The financial aid structure described above has reduced the price of college for many low-income students to the point where it already is free based on the definition in many free

college models. It is important to understand that resources beyond those that are considered financial are often lacking in students at the lower end of the economic spectrum (Becker, Krodel, & Tucker, 2009). Interventions that provide these resources or that address academic shortcomings may be as critical to shaping matriculation decisions as additional interventions related to the price of attendance.

### **Price and Persistence**

The literature suggests mixed results regarding the impact of financial resources on persistence. Olbrecht, Romano, and Teigen (2015) found that retention at a selective public liberal arts university had a positive relationship with EFC and with merit-based aid, among other variables. This represents evidence that financial resources that decrease the price of a postsecondary education to the student have a positive impact on persistence. However, the same study showed that unmet need also had a positive relationship with persistence, which suggests that some sort of out of personal out of pocket investment may also be an important motivating factor to students (Olbrecht, Romano, & Teigen, 2015). Another study demonstrated that removing need-based financial aid for late-stage 4-year university students has a negative impact on persistence (Mabel, 2016).

A study involving six community colleges supported the use of performance-based scholarships as an intervention, indicating their use leads to improved academic performance and more credits earned (Mayer, 2014). However, Patel and Rudd (2012) tested the relationship between persistence and performance-based scholarships at two New York community colleges and found no significant difference between the control group, who did not receive scholarships, and those who were awarded additional resources. Survey data from the Federal reserve

suggests that 24 percent of students indicate the price of college as the primary barrier to completion (Board of Governors of the Federal Reserve, 2015).

Financial help for postsecondary students is often based on completion of the FAFSA. The information on the FAFSA is used to determine eligibility for federal aid, but is also often relied upon to distribute state-based or local financial resources. The Pell grant is the primary component of federal aid need-based aid, while the Wisconsin Grant is a need-based grant provided by the state of Wisconsin. Because public sources of financial aid are often distributed based on need, it is important to note that people with the highest level of financial need and who are first-generation college students complete the FAFSA at the lowest rates (Feeney & Heroff, 2013). This suggests a process barrier for those most in need of financial assistance. One study found simple text messaging intervention strategies improved FAFSA completion by as much as 16 percent (Castleman & Page, 2014).

### **Free College as an Intervention**

The free college models currently being discussed often rely on existing programs and systems to deploy the public investment necessary to implement the proposed programs. The America's College Promise Act, for example, would provide new funding for tuition and fees and is primarily intended to serve community college students (S. 1716, 2015). Community college students experience average pricing most consistent with the 2-year public institutions described previously, which means the subsidy would exist only for the lowest priced model of postsecondary education. Students would maintain eligibility by enrolling at least half time and by meeting current academic eligibility requirements currently in effect to participate in federal financial aid programs (S. 1716, 2015). President Obama's proposal is also limited to community college students. Like the related legislation of the same name, it proposes a mix of

additional federal and state funding to provide an average tuition reduction of \$3,800 to as many as 9 million students (The White House, 2015). Finally, completion of the FAFSA is commonly a requirement to participate in free college programs.

The National Conference of State Legislatures tracks legislation related to state legislation supporting free college models. Twelve states have introduced such legislation. Minnesota, Oregon, and Tennessee have free college programs in place, and Kentucky has passed legislation to begin a program in 2020-21 (National Conference of State Legislatures, 2016). While each model has unique characteristics based on its state's policy priorities, some common features include a focus on costs associated with tuition and fees, eligibility criteria that require recipients to be recent high school graduates, the maintenance of certain academic requirements, and maintenance of enrollment thresholds (National Conference of State Legislatures, 2016).

Only Tennessee has reportable outcomes to date. The key outcomes include a 90 percent application rate from high school seniors, increased rates of FAFSA completion, and lower rates of remediation (National Conference of State Legislatures, 2016). The program also includes a mentorship program and a community service requirement. Lower income students often do not receive a scholarship even if they are eligible as other need-based aid covers the full tuition and fees. Tennessee has also recently adopted legislation designed to create similar programming for adults who previously started college (National Conference of State Legislatures, 2016).

There is a well-documented positive relationship between lifetime earnings and education (Baum, 2014; Baum, Ma, & Payea, 2013; Board of Governors of the Federal Reserve, 2015; United States Department of Labor, 2016). This clear benefit supports the concept that postsecondary attainment leads to success for individuals. Making college free should only

enhance the value of postsecondary education. However, growing student debt, which is often used to cover costs outside of those that would be covered under most free college models, may make earning power less significant than the ability of a student to repay his or her obligations in the short run. This suggests that a more comprehensive approach is required when thinking about the return on what is essentially an investment in one's education (Oreopoulos & Petronijevic, 2013).

Oreopoulos and Petronijevic (2013) consider the returns on education with a broad, holistic perspective. Their research documents both a positive return for attending college and a growing premium on college-educated people. In addition, the research suggests a growth in the premium at the same time there was measurable growth in the share of citizenry who were considered college-educated. From an economic standpoint, this indicates the demand for a more highly educated workforce has outpaced a growing supply of more highly-skilled workers. The result is a growing premium on highly skilled workers, especially in fields associated with science, technology and math (Baum, 2014; Oreopoulos & Petronijevic, 2013).

In addition to the practical funding constraints on making postsecondary education beyond community colleges free, there is an argument that this level of education is where the greatest shortage of workers exists. Improved technology is often associated with increased demand for employees with higher-level skills, and data from the Bureau of Labor Statistics and National Center for Education Statistics suggests gap between the projected job openings requiring degrees and certificates, but that do not require a traditional 4-year college degree, and the number of people attaining such credentials (Bessen, 2016). The same projections show a surplus of people who will earn a 4-year degree or graduate degree.

Free college models imply that price is a primary barrier to a more highly educated citizenry, which is supported by survey information where respondents identify cost-related concerns as a barrier to starting or completing college (Board of Governors of the Federal Reserve, 2015). Strong arguments exist to support the notion that using price as an intervention strategy could help individuals through the achievement of improved earnings and the economy at large through the development of a more highly skilled workforce. However, another common reason for not starting and for not completing postsecondary education is a simple lack of interest (Board of Governors of the Federal Reserve, 2015). Using free college, and by association price, as an intervention strategy would likely not affect a majority of these respondents.

### **The Benefits of Postsecondary Education**

The pricing mechanisms for postsecondary education reflect the complexity of the debate over whether the benefits of postsecondary education accrue to individuals or to society. For most students, the cost of attending effectively receives downward adjustments in the form of public and sometimes private student aid (Radwin & Wei, 2015). The net price of a postsecondary education has a clear private benefit to the student. The Bureau of Labor Statistics documents higher earnings and lower unemployment as education level increases (United States Department of Labor, 2016). The potential for individual increased income and job security are reflected in the current system's requirement that some of the price of attendance is absorbed by the individual to whom those benefits accrue.

The contrasting view is that society benefits when its citizenry is well educated, and thus more of the costs of postsecondary education should be absorbed by taxpayers. President Obama reflected this sentiment when he set a target for the United States to have the most educated



population in the world by 2020 (The White House, 2016). A well-educated population provides improved productivity and leads to a more robust economy. More highly educated individuals provide a wide variety of benefits to society, which include paying more in taxes and relying less on various forms of public assistance (Baum, Ma & Payea, 2013).

### **Attainment and Other Interventions**

The literature is rich in its documentation of treatments designed to increase rates of educational attainment. Recognition of this research is important because it highlights the fact that free college is just one of many alternatives that could be considered when attempting to increase the number of people with credentials and degrees. For example, researchers have long sought to identify the best strategies to provide remediation services (Arrendale, 2005). People who access these services have already made the decision to pursue additional education, but a real or perceived shortcoming in academic skill level is the first barrier they need to overcome. Free college is an unlikely solution for those who cannot first demonstrate the ability to complete college-level coursework. Applying treatments other than reducing price have positively affected student performance. For example, accelerated remediation has been shown to increase the odds students are able to successfully begin college coursework (Hodara & Jaggars, 2014; Jaggars, Hodara, Cho, & Xu, 2015). Other strategies, such as de-emphasizing placement test scores, could similarly create access without compromising students' ability to complete (Allen, 2015; Belfield & Crosta, 2012; Ngo & Kwon, 2015; Scott-Clayton, 2012). Models that place more emphasis on academic and non-academic support services have also been proposed as an alternative to increase enrollment and rates of student success (Boylan, 2009; Creighton, 2007).

## Summary

Both investment and economic theories suggest that as the price of postsecondary services decrease the value of the services will increase. Investment theory considers the present value of future benefits, which are more valuable at lower prices. The law of demand in basic economic theory suggests that as price decreases consumption of a good or service will increase. A major policy movement related to free college implicitly accepts this relationship as an intervention strategy that can positively influence rates of postsecondary attainment. However, minimal research exists that demonstrates the relationship between price and student decision-making. If price can in fact influence attainment, it should have a demonstrable impact on decisions regarding enrollment at the beginning of a student's experience.

The first step in understanding the relationship between the price of a postsecondary education and its impact on enrollment is defining the components of price. There is significant complexity in this endeavor. Both tuition and fees, and non-tuition costs like housing, need to be considered. This total price of attending a postsecondary institution needs to be adjusted for a myriad of need-based and merit-based financial aid programs, the majority of which are publicly funded.

These federal, state and local resources adjust the price of attendance downward for most students. It is important to consider the net price of postsecondary education for a particular student given the complexities of determining how much a student will actually need to spend after consideration is given to the various forms of aid. Significant subsidies already exist to help students reduce the financial burden of attending a postsecondary institution. Finally, to make decisions about the value of the credential or degree being sought students should have an understanding of the benefits they expect to receive upon completion.

Prior to making the investment in free college models additional research should establish price as an effective form of intervention that will improve attainment. If this relationship is not evident there are other strategies that should be considered. Some of those include modifications to remedial education models, de-emphasizing placement tests in the admissions process, and supplementing non-academic support services. Any intervention strategy should be implemented after a careful analysis of the expected costs and benefits of implementation.

### **Chapter III: Method and Procedures**

This quantitative, causal-comparative study examined the relationship between the price of college and the probability that potential students enroll or complete. The purpose of the study was to determine if a significant relationship exists between estimates of the price of college and first term enrollment. It also assessed the significance of price with second term enrollment using the same methodology. Finally, it considered the impact of the first year pilot of a promise program. Basic investment and economic theory suggested a negative relationship between price and enrollment. The results of the research will be used to inform the discussion regarding the use of price manipulation as an intervention strategy to increase rates of enrollment and, ultimately, attainment.

This chapter describes the study's research methodology, the process used for subject selection, a description of the sample, the instrumentation utilized, data collection procedures, and how the data was analyzed.

#### **Research Methodology**

The causal-comparative methodology chosen for this study was adapted from a study that considered the impact of financial aid and other variables on second year retention at a private liberal arts college using logistic regression (Olbrecht, Romano, & Tiegen, 2016). Logistic regression is the methodology used to analyze data sets that consider the relationship between a continuous variable, such as price, and categorical outcomes, such as enrollment (Field, 2013). Other statistical methods, such as ordinary least squares regression, require assumptions such as normality and linearity that do not fit with the analysis of categorical outcomes (Peng, Lee, & Ingersol, 2002). This study determined whether two different measures of net price had statistically significant predictive relationship with enrollment in either the first or second term.

Demonstrated statistical significance would document the ability to predict the probability of enrollment based on an estimate of net price through the development logit model.

Most accredited colleges maintain similar information in systems that support the administration of financial aid programs, admissions processes, and student accounting and that can be used to analyze aggregated data from federal reporting systems (Radwin & Wei, 2015; United States Department of Education, 2015). The study is intended to be replicable using the same or similar information as that which was collected for this study. Future research could consider other approaches with expanded information to deepen the understanding regarding how price or other variables influence decision-making.

Qualitative methodologies were considered as alternatives to the selected approach. However, this research provided quantitative information about the relationship at an institutional level, which is better suited to quantitative methodologies (Field, 2013). Regardless of the results of this quantitative study, it is important to recognize the potential understanding that could be gained from additional research targeted towards the individual experiences of those considering postsecondary education.

The specific research framework was adapted from Olbrecht, Romano, and Tiegen's (2016) study that examined the relationship between financial resources and second-year retention at a private liberal arts college. The presence of categorical dependent variables required the transformation of these nominal data into probabilities to predict retention (Cox, 1958; Olbrecht, Romano, & Tiegen, 2016). The study utilized modeling techniques that added multiple independent variables based on findings in the literature (Olbrecht, Romano, & Tiegen, 2016). A key difference in this study is the intentional isolation of one independent variable, which is price. Whereas Olbrecht, Romano, and Tiegen's (2016) objective was to create a

predictive model, the key objective of this study was to intentionally assess the statistical significance of price alone.

The categorical information was converted to probability of occurrence using an odds ratio. Logarithms handled issues dealing with the non-linearity of the categorical data sets, which prevents ordinary least squares regression (Field, 2013; Peng, Lee, & Ingersol, 2002). The resulting data was used to test the statistical significance of the relationship between the independent and dependent variables. Results that were significant were used to algebraically predict probabilities along values of the independent variable that were within the range of the actual sample. The Wald statistic was used for the purposes of testing significance. In addition, descriptive statistics were collected for certain information related to the sample's characteristics. These include the average financial aid available to students in the sample as well as their estimated EFC.

Logistic models rely on the assumption that covariance between independent variables is minimal (Olbrecht, Romano, & Teigen, 2016). In this research, net price was modeled without EFC as an additional resource and with EFC as a reduction to the student's price. Using a logistic regression model offered the opportunity to assess significance as well as the opportunity to create an algebraic predictive model.

The study differed from other research that hypothesized a positive relationship between the availability of financial resources, such as merit-based aid, and persistence (Herzog, 2005; Olbrecht, Romano, & Tiegen, 2016). While the methodology is the same, this study attempted to address co-linearity issues by calculating positive and negative adjustments for the financial commitment required of each student resulting in an estimated price for each student. This estimated price represents the expected investment necessary to pursue a postsecondary degree.

## **Subject Selection and Description**

The target population for the research included all individuals who were considering accessing postsecondary education at the Midwestern technical college. The selection process differs from the Olbrecht, Romano, and Tiegen (2016) research in two important ways. First, this study considered only one cohort while the study it was adapted from used four cohorts. This was intentional, as previous cohorts in this study would not have included any students with access to a formal free college model. Second, this study's focus was short-term decisions associated with initial enrollment and enrollment in the second term. The study by Olbrecht, Romano, and Tiegen (2016) focused on second year retention.

The sample frame consisted of all students who applied to the college. The sample frame provided adequate data to further develop a convenience sample limited to those students who completed the FAFSA. Information on the FAFSA was necessary to determine the estimated net price of attendance for each subject. In particular, students' actual financial aid and calculated EFC were critical components of the study.

The college was selected because it is closely related to the kind of institution targeted by free college proposals. In addition, it has implemented a promise program that includes many of the features commonly proposed in the free college discussion. While much of the literature focused on four-year institutions, this research intentionally focused on a two-year institution with an emphasis on access. If reducing price is an effective intervention strategy for students at this Midwestern technical college, populations with similar characteristics may demonstrate similar decision-making characteristics.

The college serves a region covering more than 10,000 square miles. Four comprehensive campuses and two learning centers serve the largely rural population. The region

is diverse in terms of its economy. Part of the region is suburban with a commuter population that crosses the state line to access a well-developed metropolitan area. The remainder of the district is characterized by incomes that are lower than the state average and unemployment rates that are higher than the state average (Wisconsin Indianhead Technical College, 2016).

The subjects represented the 2016 cohort of applicants who completed the FAFSA. The sample was chosen because the FAFSA requires potential students to provide the information necessary to calculate EFC and other information that could be relevant to predicting enrollment decisions. The 2014-15 student body of the college provided a proxy for the expected demographic characteristics of the 2016-17 cohort of applicants. Publicly available information reports that the college's existing student body is 64 percent female, attends part-time 59 percent of the time, are 91 percent in-state residents, have an average age of 28 and a median age of 24, and 93 percent identify as white (Wisconsin Indianhead Technical College, 2016).

The college's financial aid office provided information for all potential students who received a financial aid package. This information was anonymized by removing all information that can identify individual students. Among other information, the financial aid database provided the amount of financial aid offered, the amount of financial aid accepted, financial aid disbursed, and EFC. Some students were offered financial aid but did not enroll.

### **Instrumentation**

Price was the study's independent variable. The separate dependent variables of probability of enrollment in the first and the second term were additional key data elements. The independent variable is ratio level data, while the separate dependent variables of matriculation and persistence represent nominal measures. For the purposes of this study, a net price calculation was necessary to arrive at expected price. This represented the estimated tuition and



fees used in initial financial aid packaging less the applicant's expected family contribution and grant-based aid and scholarships.

Initially, actual tuition and fees and adjusted financial aid were the expected variables. However, the data revealed a complicated set of adjustments that occur throughout the student's enrollment based on added or dropped classes, differing scholarship and grant timelines, and program changes. The estimated price used the information that most closely reflected what was known near or before the start of the first term. For the purposes of the study, the estimated amount of tuition and fees is the amount that financial aid advisors communicated to potential students and is thus a constant based on their budgeted amounts. The financial aid amounts offered nearest the start of the first semester were the deemed to be the best reflection of what was available to each student. EFC amounts do not change.

Enrollment was defined as being registered for classes or completing a credential after a financial aid offer was provided. Data was collected for both the first and second term from the student information system. Data that could specifically identify individual applicants or students was deleted or anonymized.

The included fields in a combined spreadsheet described each individual's estimated program price, financial aid awards, scholarships, expected net family contribution, gender, birthdate, race, ethnicity, and additional descriptive categorical information. This information was used to provide descriptive statistics for the sample and to calculate estimated net program price.

The resulting database was analyzed using SPSS. This tool provided the ability to examine descriptive statistics and relationships utilizing the logistic regression tool. The basic format for data collection is provided in Appendix A.

## **Data Collection Procedures**

Information that has already been collected was the basis for this research. Potential students provided some information when they applied. Additional information was collected as students worked through the admissions process. The most critical piece of information was financial information collected from the FAFSA.

The FAFSA determines a student's Expected Family Contribution (EFC). By utilizing information related to financial aid eligibility and price, an estimated net price of attendance was calculated. The EFC is an objective measure of financial support available to the student and, along with other variables, is a key determinant in eligibility for federal and state grants such as the Pell Grant and the Wisconsin Grant.

Categorical information for each student was added to the database. Each student who enrolled was assigned a value of 1 and each student who was not was assigned a value of zero. Categorical information was collected for the second term in the same manner, except that each student in the sample that completed a short-term credential was also assigned a value of 1 under the assumption they successfully completed their educational objective.

Multiple factors influence a student's decision to enroll. However, this study is designed to examine whether or not price alone has predictive value in influencing decisions about going to college and staying in college. If price as an isolated independent variable is a major driver for enrollment decision-making it should have demonstrable effect on probability of a student's decision to attend college and subsequently persist.

## **Data Analysis**

The statistical analysis included both inferential and descriptive statistics. Inferential statistics were used to examine the relationship between the independent variable and the

separate dependent variables. The research hypotheses suggested a negative relationship between the independent and dependent variables. As net program price increased, rates of enrollment were expected to decrease. The utilization of historical information to infer the outcomes for future populations made this study causal-comparative.

Descriptive statistics were used as a key tool to understand the sample being studied (Field, 2013). General descriptive information for demographic characteristics such as average age, gender, and minority status were collected for the purpose of generating these statistics. The study will only be generalizable to the extent the population being considered is similar to the one being sampled, but this descriptive analysis may offer opportunities to consider further research. Inferential statistics were used to examine the relationship between the independent variable and the separate dependent variables.

The data utilized to examine the relationship between price and enrollment incorporated the logistic regression tool in SPSS. The outputs determined whether a significant relationship existed and, where present, provided the data necessary to create a model that predicts the probability of enrollment based on price. Further analysis utilized the Realstats add-in for Microsoft Excel. Statistical outputs from SPSS were provided in Appendix B through Appendix E.

### **Limitations**

The method and procedures are generalizable only to the extent the population sample is similar to other samples considered. In addition, the sample may not represent past or future populations of students at this college. The intent of the research was to create an easily replicated study to describe the relationships that exist between price and enrollment.

The sample excluded students who chose not to apply. It contained limited information on students who chose not to complete the FAFSA. While these students may or may not be eligible for financial aid, the absence of FAFSA information prevented meaningful comparison of their net price to students who did complete the FAFSA. Students or groups of students may have chosen not to enroll for reasons other than price. Covariates may exist that would have added predictive value to the analysis, but the purpose of this study was not to seek variables that added predictive value. Its intent was to test the statistical significance of price and model results if significant.

### **Summary**

Price is an independent variable that could influence important student outcomes such as rates of enrollment and, ultimately, attainment. This assumption is implicit to the recent movement to implement free college models across the country. This causal-comparative study utilized information provided on the FAFSA to determine whether the relationship between price and the dependent variables of enrollment in the first and second terms was measurable at the institutional level. Net price was considered using only financial aid as an offset to price and, separately, by considering EFC as a financial resources that would offset price. Other costs that affect price, such as housing and transportation, could not be included due to a lack of reliable estimates. In addition, these costs are typically not included in most free college models. If the estimated price was a potential intervention that could influence these variables it would lead to higher rates of enrollment and attainment. The research also considered the same information provided for the first cohort of students that participated in college's version of a free college model.

## **Chapter IV: Presentation of the Findings**

The study focused on the relationship between the price of post-secondary education and rates of enrollment. The estimated net price of attendance was calculated and tested for significance against first term enrollment. The same procedure was followed and was tested against second term enrollment. In addition, differences between the characteristics of the overall sample and free college program participants was reviewed. Logistic regression was used to test the relationship between two measures of price and students' rate of enrollment and, where significant, it was used to model the predicted probability at various net prices within the range of the sample net price. An inverse relationship between price and enrollment was hypothesized. As price rises the subsequent economic benefits of education fall. The data yielded evidence of a significant relationship between price and second term enrollment. However, the relationship was positive, which does not support the hypothesized negative relationship. Based on the observed characteristics of the sample it is likely that variables other than net price contributed to the relationship. The findings of the study will contribute to the literature by explaining the relationship between various measures of price and enrollment at a Midwestern technical college. This chapter outlines the study's key findings in the context of the research questions.

### **Demographics**

The population sample consisted of 270 applicants that completed the FAFSA and were offered a financial aid package. Approximately 86% of the students from the sample enrolled initially and 71% persisted into the second term or completed a short-term credential. The sample was 48% female, 8% minority, and had an average age of 23. Just over 1,000 students applied, but did not enroll or did not complete the FAFSA. The sample was on average younger

and contained more males than the overall population (Wisconsin Indianhead Technical College, 2016).

The sample received average grant-based financial aid of \$4,667 and had an average EFC of \$993. Of the 270 students in the sample 176 received grant-based financial that exceeded the cost of tuition and fees. If EFC is included as a financial resource for students, 219 students in the sample had a combination of grant-based aid and family resources that exceeded the estimated price for tuition and fees.

### **Research Questions**

The study was designed to examine the relationship between net price and enrollment by addressing three research questions. The hypothesis was that an inverse, or negative, relationship exists between price and enrollment or completion. The research was designed to utilize logistic regression to assess whether significant relationships could be identified and to model predicted enrollment if a significant relationship could be documented. In addition, the characteristics of the students who participated in the college's version of a free college model were reviewed.

**Research question 1: Does the estimated net price predict the initial decision to enroll in postsecondary coursework at a Midwestern technical college?** As reflected in Tables 5 and 6, the study revealed no statistically significant relationship between net price and first term enrollment. Table 5 summarizes the statistical output that resulted from using an estimated net price that adjusted for grant-based aid. In logistic regression, the Wald statistic is used to test the significance of the relationship between the independent variable and dependent variable (Field, 2013). In this, study, net price represents the independent variable and B is the coefficient that is tested. Because the ranges of the independent variable are relatively large, B is

small in this study. In other words, a small change in B would have a significant impact to the predicted probability of enrollment. For B to be a significant predictor, the Significance would need to be less than .05 (Field, 2013).

Table 5

*Statistical Output Modeling Net Price and First Term Enrollment*

	B	Standard Error	Wald	Degrees of Freedom	Significance	Exp(B)
Net price	.000	.000	1.014	1	.314	1.000
Constant	1.818	.180	101.437	1	.000	6.157

The output also includes a measure labeled Exp(B), which represents an odds ratio represented by the formula  $e^B$  (Field, 2013). The value of B for the dependent variable indicates a directional relationship in predicting the probability of the categorical variable (Field, 2013). A positive B would indicate an increase in price would result in an increase in enrollment, and, conversely, a negative B would indicate an increase in price would result in lower enrollment. Since B is .000 in this output, it provides no information regarding the directional relationship between net price and enrollment.

As explained by the college's financial aid officer, EFC is a calculated amount on the FAFSA that is considered an available resource to students in the determination of their financial aid award (T. Klein, personal communication, March 28, 2017). Table 6 represents the statistical output that considers EFC as an additional resource for students to further reduce estimated price. The Significance column for the independent variable of Net price was .742, which indicates no evidence of a statistically significant relationship with first term enrollment. Since

B is .000 for the independent variable, the model provides no information about the directional relationship.

Table 6

*Statistical Output Modeling Net Price Less EFC and First Term Enrollment*

	B	Standard Error	Wald	Degrees of Freedom	Significance	Exp(B)
Net price	.000	.000	.108	1	.742	1.000
Constant	1.740	.208	71.166	1	.000	5.696

A comparison of Tables 5 and 6 suggests significance of the relationship between net price and enrollment is weaker when EFC is introduced since .742 is greater than .314.

**Research question 2: Does the estimated net price predict continued enrollment or short-term degree completion for students at a Midwestern technical college?** This research question was designed to explore whether estimated net price had a different relationship with enrollment with the passage of time. In this case, second term enrollment represented students who were either still enrolled or who had completed a short-term program of study. While 86% of the sample initially enrolled, the enrollment or completion rate dropped to 71% for in the second term.

As indicated in Table 7, the study demonstrated a statistically significant relationship between net price and second term enrollment since Significance is less than .05. This result suggests the availability of financial resources may not affect decision making initially, but may have influence on decisions over the longer term. It is important to note that B is small. The initial SPSS output indicated significance, but a value of .000. To determine the directional relationship, it was necessary to replicate the results using Realstats in Microsoft Excel, which



rounds to six decimal places rather than three. An institutional researcher was consulted to review the output for validity (J. Sullivan, personal communication, 3/26/2017).

Table 7 summarizes the statistical output using net price to predict persistence.

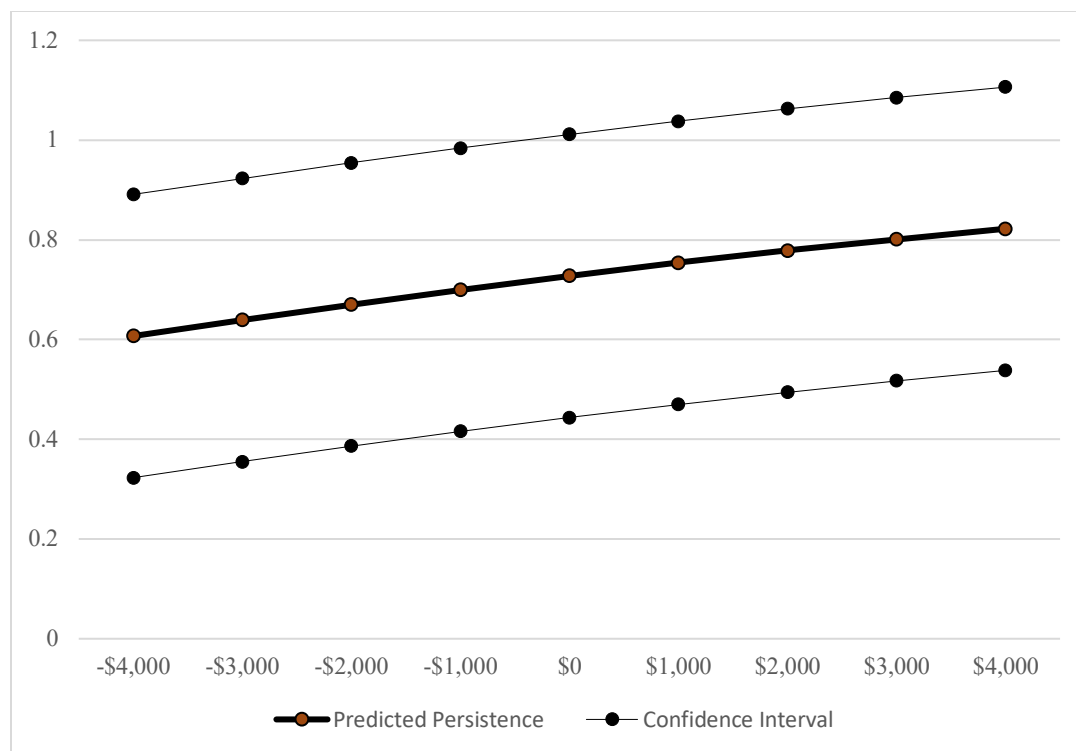
Table 7

*Statistical Output Modeling Net Price and Second Term Enrollment*

	B	Standard Error	Wald	Degrees of Freedom	Significance	Exp(B)
Net price	.000137	.000	4.388	1	.036	1.000137
Constant	.983	.142	48.097	1	.000	2.673

A significant result allows for the creation of a model that predicts the probability of enrollment based on price. The formula is  $P=1/(1+(e^{(.983+ (.000137(X))}))$ , where P is the probability of second term enrollment and where X is the net price (Field, 2013). The Constant B is adjusted by the logit, which in this output is the value of B for the Net price (Field, 2013). It is important to note that the logit is positive, which indicates an increase in Net price increases the probability of enrollment. This result does not support the hypotheses that a negative relationship exists between price and enrollment.

The model allowed for the creation of Figure 1, which represents the probability with confidence intervals at \$1,000 increments. The minimum and maximum ranges of -\$4,000 and \$4,000 were selected to include the majority of the students in the sample. All but 12 of the students had a Net price that was in the selected range, and none of the students was more than \$500 outside of the range.



*Figure 1.* Net price and probability of persistence.

As net price rises the probability of second term enrollment increases. The confidence intervals were created by multiplying the Standard Error from the statistical output by two and adding or subtracting the result from P. The confidence interval suggests an illogical potential result where the probability within the confidence interval exceeds one, but it provided a visual representation of the potential variation in the probability of occurrence at each increment. The odds of an occurrence, however, cannot be greater than one.

The inclusion of EFC as an additional resource for students to further reduce estimated price provided no evidence of a statistically significant relationship with second term enrollment as Significance is not less than .05. Table 8 provides a summary of the statistical output for this model.

Table 8

*Statistical Output Modeling Net Price Less EFC and Second Term Enrollment*

	B	Standard Error	Wald	Degrees of Freedom	Significance	Exp(B)
Net price	.000	.000	.02	1	.889	1.000
Constant	.931	.159	34.161	1	.000	2.536

The significant result represented in Table 7 and lack of a significant result in Table 8 is consistent with the results in Research Question 1 that suggest net price is a better predictor of enrollment when adjustments are made only for financial aid and EFC is ignored.

For the purposes of this study, further analysis is warranted for the data set with a statistically significant result, which found Net price had a positive relationship with second term enrollment or completion. Subgroups for gender, age, and minority status were established based on the demographic data available.

The summary in Table 9 demonstrates that sub-data sets by Gender does not suggest major differences in the overall data's characteristics for males and females. While Net price is slightly lower for females, the result is somewhat logical given that females have slightly lower EFC. Both groups had enrollment rates that were near the overall mean of 71% and the average age was virtually the same. The most significant difference from the overall population may be that just 48% of the sample was female, but the college reported that more than 60% of the overall student population was female (Wisconsin Indianhead Technical College, 2016). It would appear females who attend disproportionately do not apply for financial aid as compared to their male counterparts.

Table 9

*Breakouts Statistics by Gender*

	N	Grant-based			Second Term	
		Net price	aid	EFC	Enrolled	Age
Female	130	-\$447	\$4,791	\$749	73%	24
Male	140	\$-207	\$4,551	\$1,221	70%	23

The summary in Table 10 demonstrates sub-data sets by Age. The sample's average age of 23 was used as a cutoff for the two groups. Students 23 and younger had a higher average EFC, but comparable grant-based aid to the older members of the cohort. It is also worth noting the rate of second term enrollment was higher for the younger group than the older group even though Net price was similar. As compared to the overall sample, the entire cohort is younger than expected population. This could indicate participation in financial aid programs may be influenced by age. Finally, there were just 22 minority students in the overall sample, but it is worth noting that most minority students were 24 or older.

Table 10

*Breakouts Statistics by Age*

	N	Grant-based			Second Term	
		Net price	aid	EFC	Enrolled	Minority
23 or younger	191	-\$317	\$4,660	\$1,186	75%	3%
24 or older	79	-\$207	\$4,551	\$1,221	62%	20%

The data in Table 11 summarize the data set by minority status. While the overall number of minority students is comparable to the overall population, the second term enrollment is substantially lower for minority students than whites. Since most minority students are in the older age category, which demonstrates a lower second term enrollment percentage than the

younger age category, it is possible minority status and age should be considered as additional variables to predict enrollment. Grant-based aid for minority students is slightly less than for white students, even though EFC for minorities is lower.

Table 11

*Breakouts Statistics by Minority Status*

	N	Net price	Grant-based aid	EFC	Second Term Enrolled	Age
Minority	22	-\$263	\$4,607	\$702	64%	24
White	248	-\$328	\$4,672	\$1,019	72%	23

**Research question 3: Do Promise program participants demonstrate different enrollment and persistence characteristics as compared to the overall sample?** The data was insufficient to analyze these students as only three students in the sample were ultimately awarded a promise grant. Like many free college programs, this college limited eligibility to direct from high school students who had certain levels of EFC and who met certain academic requirements (Wisconsin Indianhead Technical College, 2017). A review of the data suggests that many students who would have otherwise been eligible for promise funding already received other grants sufficient to cover the full amount of tuition and fees. Essentially, college was already free for these students. Like most colleges, this college provided a grant only if other resources were insufficient to cover the full cost of tuition and fees.

The data set included 176 students who had a negative net price after grants were applied, so the majority of students would be ineligible based on the availability of need-based or merit-based awards provided through existing financial aid programs. For example, a full Pell grant without any other aid was sufficient to cover the entire amount of estimated tuition and fees. Of

the remaining 94 students who had a positive Net price, all but 26 would have been excluded due to EFC, credit load, or other restrictions.

## **Chapter V: Summary, Conclusion and Recommendation**

A national movement has led to significant dialogue regarding the potential benefits of free college. Supporters suggest that additional resources will remove a barrier that limits access and attainment. This study estimated the price of college in a way that was consistent with what is described in most free college models (National Conference of State Legislatures, 2016). The resulting estimated price was used to determine whether a significant relationship existed with first and second term enrollment or completion. It provided a statistically significant result that allowed for the development of a predictive model. However, the model indicated a relationship that was opposite of the expected relationship. Information regarding the college's students who participated in its free college program suggest the majority of students already have resources for the costs covered under the program or are ineligible due to other program requirements.

This chapter will discuss the conclusions that can be drawn from the research and introduce recommendations for future research and to key decision-makers.

### **Summary/Discussion**

Utilizing actual data to calculate a student's price of attending college would seem to be an achievable and relatively simple task. However, the data in this study revealed a complicated and ever-moving series of adjustments that made the seemingly simple exercise a challenge. Oreopoulos and Petronijevic's (2013) theoretical base that education is an investment is logical, but a rational and reliable estimate of the financial outlay would be required for decision-making purposes. Whether that is possible for those considering postsecondary education is questionable considering the difficulty in ascertaining an accurate price even with the benefit of historical information. In addition, the concept of viewing education as an investment adds the additional complication of predicting future lifetime earnings to determine a return on the investment

(Oreopoulos & Petronijevic, 2013). While Baum (2014) documents an earnings premium in macro level data, a review of data at the individual student level suggests a daunting process that could discourage people from accessing existing programs designed to make college affordable or even free.

A simple inspection of the data suggests that most students at this Midwestern technical college who complete the FAFSA have the resources to cover most, if not all, of their annual tuition and fees. The annual estimated price of tuition and fees of \$4,344 is less than the average grant-based financial aid and EFC, which caused the majority of the net price calculations to be negative. The negative difference represents resources above the cost of tuition and fees that could be used for costs such as books, transportation, and housing that were not included in the study. This observation is important because most free college models consider only tuition and fees (National Conference of State Legislatures, 2016). While these other non-tuition or fee costs may create financial hardship not captured in these data, they would not be solved by typical free college models. This assertion is supported by the fact that so few students participated in the free college program at this college. It is likely their eligibility was limited due to the availability of other resources to cover the costs eligible under the program, as well as limitations for factors such as age and credit load.

For three of the four regression models tested there was no significant finding. In other words, the isolated measures of estimated price did not directly relate to the probability of student enrollment or short-term credential completion. However, the finding that price was positively related to second term enrollment or completion requires considerable interpretation. In this sample, the vast majority of students received need-based or merit-based financial aid. Only 22 students received less than \$1,000 in financial support, and only one received no



financial support. Just 18 students had EFC in excess of the free college threshold. These data suggest that financial support was widely available for this sample, but that there is also substantial need.

More can be learned by contrasting the students with a negative net price to those with a positive net price. Of the 176 students with a negative net price, just 47 students had a positive EFC and it averaged just over \$100 for the group. Of the remaining 94 students, 88 had a positive EFC that averaged just over \$2,659. Of the students with a negative price, the average grant-based aid was \$6,074. For the students with a positive price, the average grant-based aid was \$2,031. While EFC was ignored in the model that had significant results, an analysis of these groups suggest that financial need resulted in need-based aid and that it is likely that this need, not price, is the variable that matters most.

The model in Figure 1 does not consider EFC as an offset to price. Students with a higher estimated price received less aid, which in this college is primarily administered through the Pell and Wisconsin Grant programs. While EFC is not included in the model, it affects the eligibility for aid in these and other need-based grant programs (T. Klein, personal communication, 3/26/2017). Conversely, students with more financial aid resources to offset the expected price likely have less support from non-grant resources. The research that was used as the methodological basis for this study found that EFC was a positively related to retention (Olbrecht, Romano, & Tiegen, 2016). By definition, the students with the lowest price and largest amounts of financial aid in this model would have the highest unmet need. This suggests the students with the lowest price are in fact getting more financial assistance from grants, but the grants may not fully satisfy resource requirements. Financial resources may be sufficient in the first semester, but over the longer run needs beyond tuition and fees may outpace the

assistance that is available in the current financial aid system. In Olbrecht, Romano, and Tiegen's (2016) study merit-based aid was shown to have a positive relationship with retention in an entirely different population. In this study, the high incidence of students with no EFC prevented further testing based on EFC alone (J. Sullivan, personal communication, 3/23/2017). Data was not collected for unmet need as it was not the anticipated subject of the study.

While this relationship does not support the expected hypotheses, it does potentially support the concept that more financial resources could help those with the most need. Many free college models are designed to fill the gap that exists between expected costs and the financial aid resources that are available to high need students (National Conference of State Legislatures, 2016). In order to most accurately test the impact of these additional resources, however, the findings suggest an important first step would be to control for need and then use additional financial resources as a treatment.

## **Conclusions**

The challenges associated with the seemingly simple process of determining the price of college based on actual historical information calls into question the ability to associate the decision of seeking a postsecondary degree with economic theory. Macro data suggest that earning a college degree is correlated with higher future earnings (Baum, 2014; Bureau of Labor Statistics, 2016). However, it is difficult to calculate the short run financial outlay and even more challenging to estimate the future benefits of the decision in the form of increased lifetime earnings. Based on the findings of the study, estimated net price had no identifiably significant impact on the initial decision to enroll. While price may be a barrier for many potential students, the evidence suggests that other variables exist that would influence decision-making as much or more than an isolated measure of price. In particular, additional financial resources available to

the students in this sample appear to be linked to exceptional need, which affects students in a significant way in the second term. This finding supports other research that demonstrates a positive correlation with family resources and postsecondary success (Eagle, 1989; Olbrecht, Romano, & Tiegen, 2016). In addition, it is important to note the initial decision to pursue a postsecondary education does not guarantee completion, as evidenced by completion rates at both two-year and four-year institutions (United States Department of Education, 2015). In that sense, the investment or purchase is different from many economic decisions where an immediate benefit is realized. Baum (2014) notes that the calculation of the long-term benefits that require assumptions about the future, which makes the results difficult to predict. To summarize, intervention strategies that address differences in need and one's socioeconomic background likely relate to the availability of financial resources for tuition and fees, but potentially require additional consideration for additional academic or social supports.

The positive relationship between price and second term enrollment when only grant-based resources were considered suggests a complicated relationship exists between enrollment decision-making and the price of attendance. While the findings of this study do not support the original hypothesis, they may indirectly support other research that indicates that EFC has a positive relationship with retention (Olbrecht, Romano, & Tiegen, 2016). In addition, the research provides support for further consideration of models that provide additional financial assistance to those most in need through the unexpected finding that a positive relationship exists between price and second term enrollment. The fact that most students in the sample received more grant-based aid than tuition and fees suggest that free college as commonly defined exists for many students within the framework of the existing financial aid system. It could be argued

measures that extend beyond free tuition and fees will be necessary to improve postsecondary enrollment and, ultimately, attainment.

### **Limitations of the Study**

The research was limited to the sample being studied and the source data that is accessible. Key limitations are summarized as follows:

- The population was limited to students at a Midwestern technical college, which may exhibit a different demographic makeup than other populations outside of the region served.
- The sample may have demographic characteristics different from future or past students. For example, the sample was skewed towards adult learners, which may be different from future cohorts based on programming and other changes.
- The sample served by the Midwestern technical college represented a rural population without a major urban center.
- The expected family contribution (EFC) represented an estimate of financial support at a point in time and will not capture other changes, such as an unexpected change in household income, which could affect the ability to begin college or complete a degree.
- Admissions and instructional processes influence enrollment completion. College-specific processes influenced the results in a way that may cause variations as compared to other institutions.
- Data to test the effect of potential confounding variables, such as academic ability, work commitments, or family status, did not exist or was not collected.

- Not all potential students completed the FAFSA, which limited the sample. Enrollment information existed for this portion of the population, but financial information was not available.
- Potential students may not have applied due to perceptions about price. No information will exist for these potential subjects though they may be affected by pricing information.

### **Recommendations for Further Research**

This study raised other potential research topics and methods to consider for future research. A summary of those is as follows:

- Existing financial aid and grant programs provide substantial support, but the evidence suggested students with the most support are the least likely to stay enrolled. Unmet need is likely a variable that could be studied further to assess its impact on enrollment and retention. Future studies should focus factors associated with need that affect the ability to stay enrolled.
- The study provided no significant finding related to initial enrollment decisions. Future studies should be expanded to include students who do not complete the FAFSA to learn more about what prevents these students from taking advantage of the existing financial aid and scholarship system.
- Logit models considering variables other than price should be developed. Understanding the influence of factors such as academic performance, socioeconomic background, and age may be helpful in shaping targeted interventions that improve enrollment and, ultimately, attainment.

- Although it was beyond the scope of this research, it may be possible to improve the predictive model by adding other variables. The variables of age and minority status appear to be worth candidates based on the demographic analysis of this data set.
- Both minorities and females had lower amounts of EFC than their comparison groups. While females appeared to receive more grant-based aid, minorities did not. Within these sub-groups it may be possible to test the impact of greater financial assistance on enrollment by controlling for EFC.
- Consideration should be given to using multiple cohorts based on admissions year to remove the bias that may exist in one cohort.
- Models that control for need but use grants as an intervention could be developed. Such studies would better isolate socioeconomic factors that may affect retention and enrollment.
- As more free college model data becomes available, additional research can be conducted to assess their effectiveness as compared to other potential interventions. Current limitations on the model at this college limited participation in the formal program, but the majority of students in the study had enough grant-based aid to cover tuition and fees, the costs typically included in free college programs.
- The fact that the sample was on average younger and more weighted towards males than the overall college population suggests older students and female students may have disproportionate challenges in applying for and receiving financial aid. Additional information should be reviewed to determine whether this is unique to this cohort or should be considered for further study.

- This cohort was limited to attempt to compare participants in the free college model to the broader sample, which was largely unsuccessful. The cohort size could be increased by selecting a larger institution or by using multi-year data.
- More than 1,000 students applied or enrolled without completing the FAFSA. Qualitative methods should be considered to learn why these students did not seek the substantial financial assistance that is available various financial aid programs. These students may not have been eligible for financial aid, or may have chosen not to apply due to circumstances beyond the control of the student.
- Qualitative methods should also be considered to learn about other non-financial factors influenced decision-making regarding enrollment. While aggregated national, state or institutional data provides an opportunity to understand patterns of behavior, the process of reviewing the raw data revealed a complex set of decisions that are likely lost in large data sets that consider only numbers.

### **Recommendations to Key Decision Makers**

The conclusions that were drawn led to several key considerations for stakeholders and decision makers. A summary of these is as follows:

- The financial aid available to students with financial need is substantial. Colleges, and in particular financial aid professionals, should emphasize strategies that encourage students to complete the FAFSA. Efforts to extend assistance through marketing and recruitment channels may lead to an improved understanding of the financial help within existing systems.
- Free college as currently defined under most models is widely available to those with substantial financial need. College-level marketing and recruitment efforts should be

- designed to emphasize both existing and new programs designed to make college affordable.
- Recognition of the relationship between need and the ability or willingness to stay enrolled could be addressed through post-enrollment financial assistance, such as emergency loans and grants. Programs like these may have a significant effect on those who encounter financial stress after making the decision to enroll, and should be considered by student services administrators and other leaders.
  - Non-financial support systems may be an important resource for students who have substantial unmet need. Academic and student services leaders should consider what additional supports, such as remediation or advising services, are most likely to assist students in achieving success.
  - Assessing financial aid access according for key demographic groups, such as females and minorities, should be considered by institutional researchers. Unique barriers may exist for these sub-populations and it may be possible to provide additional assistance or other supports to improve rates of FAFSA completion and student success.



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## Appendix B: SPSS Output for Net Price and First Term Enrollment

```
NEW FILE.
DATASET NAME DataSet1 WINDOW=FRONT.
LOGISTIC REGRESSION VARIABLES Enrollment
  /METHOD=ENTER Net_Price
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

### Logistic Regression

Notes		
Output Created		24-MAR-2017 15:57:13
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	270
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing
Syntax		LOGISTIC REGRESSION VARIABLES Enrollment /METHOD=ENTER Net_Price /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

[DataSet1]

### Case Processing Summary

Unweighted Cases <sup>a</sup>		N	Percent
Selected Cases	Included in Analysis	270	100.0
	Missing Cases	0	.0
	Total	270	100.0
Unselected Cases		0	.0
Total		270	100.0

a. If weight is in effect, see classification table for the total number of cases.

### Dependent Variable Encoding

Original Value	Internal Value
Not Enrolled	0
Enrolled	1

### Block 0: Beginning Block

Classification Table<sup>a,b</sup>

Observed			Predicted		
			Enrollment		Percentage Correct
			Not Enrolled	Enrolled	
Step 0	Enrollment	Not Enrolled	0	39	.0
		Enrolled	0	231	100.0
Overall Percentage					85.6

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	1.779	.173	105.583	1	.000	5.923

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Net_Price	1.021	1	.312
Overall Statistics			1.021	1	.312

### Block 1: Method = Enter

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
--	------------	----	------

Step 1	Step	1.051	1	.305
	Block	1.051	1	.305
	Model	1.051	1	.305

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	221.942 <sup>a</sup>	.004	.007

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

**Classification Table<sup>a</sup>**

Observed			Predicted		
			Enrollment		Percentage Correct
			Not Enrolled	Enrolled	
Step 1	Enrollment	Not Enrolled	0	39	.0
		Enrolled	0	231	100.0
	Overall Percentage				85.6

a. The cut value is .500

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Net_Price	.000	.000	1.014	1	.314	1.000
	Constant	1.818	.180	101.437	1	.000	6.157

a. Variable(s) entered on step 1: Net\_Price.

## Appendix C: SPSS Output for Net Price and Second Term Enrollment

LOGISTIC REGRESSION VARIABLES Persistence  
 /METHOD=ENTER Net\_Price  
 /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

### Logistic Regression

#### Notes

Output Created		24-MAR-2017 15:57:31
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	270
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing
Syntax		LOGISTIC REGRESSION VARIABLES Persistence /METHOD=ENTER Net_Price /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

#### Case Processing Summary

Unweighted Cases <sup>a</sup>		N	Percent
Selected Cases	Included in Analysis	270	100.0
	Missing Cases	0	.0
	Total	270	100.0
Unselected Cases		0	.0
Total		270	100.0

a. If weight is in effect, see classification table for the total number of cases.

#### Dependent Variable Encoding

Original Value	Internal Value
.00	0
Persisted	1

### Block 0: Beginning Block

Classification Table<sup>a,b</sup>

Observed		Predicted		
		Persistence		Percentage Correct
		.00	Persisted	
Step 0	Persistence .00	0	77	.0
	Persisted	0	193	100.0
Overall Percentage				71.5

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.919	.135	46.474	1	.000	2.506

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Net_Price	4.467	1	.035
Overall Statistics			4.467	1	.035

### Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	4.622	1	.032
	Block	4.622	1	.032
	Model	4.622	1	.032

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	318.182 <sup>a</sup>	.017	.024

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Classification Table<sup>a</sup>**

Observed		Predicted		
		Persistence		Percentage Correct
		.00	Persisted	
Step 1	Persistence .00	0	77	.0
	Persisted	0	193	100.0
Overall Percentage				71.5

a. The cut value is .500

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup> Net_Price	.000	.000	4.388	1	.036	1.000
Constant	.983	.142	48.097	1	.000	2.673

a. Variable(s) entered on step 1: Net\_Price.



## Appendix D: SPSS Output for Net Price less EFC and First Term Enrollment

```
LOGISTIC REGRESSION VARIABLES Enrollment
/METHOD=ENTER Net_Price_NoEFC
/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

### Logistic Regression

#### Notes

Output Created	24-MAR-2017 15:57:43	
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	270
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing
Syntax	LOGISTIC REGRESSION VARIABLES Enrollment /METHOD=ENTER Net_Price_NoEFC /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).	
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

#### Case Processing Summary

Unweighted Cases <sup>a</sup>		N	Percent
Selected Cases	Included in Analysis	270	100.0
	Missing Cases	0	.0
	Total	270	100.0
Unselected Cases		0	.0
Total		270	100.0

a. If weight is in effect, see classification table for the total number of cases.

#### Dependent Variable Encoding

Original Value	Internal Value
Not Enrolled	0
Enrolled	1

### Block 0: Beginning Block

Classification Table<sup>a,b</sup>

Observed			Predicted		
			Enrollment		Percentage Correct
			Not Enrolled	Enrolled	
Step 0	Enrollment	Not Enrolled	0	39	.0
		Enrolled	0	231	100.0
	Overall Percentage				85.6

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	1.779	.173	105.583	1	.000	5.923

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Net_Price_NoEFC	.108	1	.742
	Overall Statistics		.108	1	.742

### Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	.117	1	.733
	Block	.117	1	.733
	Model	.117	1	.733

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	222.876 <sup>a</sup>	.000	.001

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Classification Table<sup>a</sup>**

Observed		Predicted			
		Enrollment		Percentage Correct	
		Not Enrolled	Enrolled		
Step 1	Enrollment	Not Enrolled	0	39	.0
		Enrolled	0	231	100.0
	Overall Percentage				85.6

a. The cut value is .500

**Variables in the Equation**

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Net_Price_NoEFC	.000	.000	.108	1	.742	1.000
	Constant	1.740	.208	70.166	1	.000	5.696

a. Variable(s) entered on step 1: Net\_Price\_NoEFC.

## Appendix E: SPSS Output for Net Price less EFC and Second Term Enrollment

### Logistic Regression

```
LOGISTIC REGRESSION VARIABLES Persistence
  /METHOD=ENTER Net_Price_NoEFC
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

#### Notes

Output Created		24-MAR-2017 15:57:54
Comments		
Input	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	270
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing
Syntax		LOGISTIC REGRESSION VARIABLES Persistence /METHOD=ENTER Net_Price_NoEFC /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02

#### Case Processing Summary

Unweighted Cases <sup>a</sup>	N	Percent
Selected Cases		
Included in Analysis	270	100.0
Missing Cases	0	.0
Total	270	100.0
Unselected Cases	0	.0
Total	270	100.0

a. If weight is in effect, see classification table for the total number of cases.

#### Dependent Variable Encoding

Original Value	Internal Value
.00	0
Persisted	1

### Block 0: Beginning Block

Classification Table<sup>a,b</sup>

Observed		Predicted		
		Persistence		Percentage Correct
		.00	Persisted	
Step 0	Persistence .00	0	77	.0
	Persisted	0	193	100.0
Overall Percentage				71.5

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.919	.135	46.474	1	.000	2.506

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Net_Price_NoEFC	.020	1	.889
Overall Statistics			.020	1	.889

### Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	.019	1	.890
	Block	.019	1	.890
	Model	.019	1	.890

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	322.784 <sup>a</sup>	.000	.000

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

**Classification Table<sup>a</sup>**

Observed		Predicted		
		Persistence		Percentage Correct
		.00	Persisted	
Step 1	Persistence .00	0	77	.0
	Persisted	0	193	100.0
Overall Percentage				71.5

a. The cut value is .500

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup> Net_Price_NoEFC	.000	.000	.020	1	.889	1.000
Constant	.931	.159	34.161	1	.000	2.536

a. Variable(s) entered on step 1: Net\_Price\_NoEFC.