THE IMPACT OF THE ILLINOIS PROMISE GRANT
ON COLLEGE GRADUATION

BY

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DISSERTATION

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ABSTRACT

The purpose of this study is to examine the impact of the Illinois Promise grant on four and five-year graduation rates. As a loan replacement or last-dollar grant, Illinois Promise covers the difference between other grants and scholarships and educational costs for low-income students for up to four years at the University of Illinois at Urbana-Champaign. The study also tests the impact of loans and non-loans on graduation.

A quasi-experimental design using Propensity Score Matching is employed for first-time, full-time students enrolled as freshman from fall, 2007 through fall, 2010. Eligibility criteria are used to construct the comparison group of one-to-one matches for a total of 868 low-income students in examining four-year graduation rates and a subset of 414 students in assessing five-year graduation rates. Demographic, pre-college, and academic control variables available through institutional data are utilized in multivariate logistic regression models.

Results show students receiving the I-Promise grant graduate at higher percentage rates in years four and five, with year five being statistically significant in the full multivariate regression model. Specifically, the odds ratio of graduating within five years is 2.3 times more likely for I-Promise students in relation to the low-income comparison group. Financial nexus theory is used in explaining these results. There is not statistical significance in the full multivariate four and five year models with either loans or non-loans predicting college graduation. However, the contrast in the levels of loans and non-loans between the treatment and comparison groups may not be large enough to impact graduation. Academic factors explain more of the variance in predicting college graduation for low-income students than financial aid variables.

Keywords: loan replacement grant, low-income students, loans, non-loans, graduation

DEDICATION

I dedicate this work to the Illinois Promise students. My fortuitous encounter with Illinois Promise students in the fall of 2007 changed my life. Over the course of the next eight years, they allowed me into their personal and academic lives and, by doing so, illuminated the power of hope and determination. In being given the chance to succeed, they, in turn, brighten the future for their families, communities, and society.

ACKNOWLEDGEMENTS

AUTHOR'S NOTE

As the researcher of this study, it is important to disclose that I served as Director of Illinois Promise Student Services between January, 2008 and December, 2015. No one served in this role prior to me. My service as Director of I-Promise enabled deep insights into the structure and operation of the program, but it also brings potential bias from having served as an advocate for the program. Results should be viewed with this role as a participant observer in mind.

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CHAPTER 1

INTRODUCTION

Higher education is a great equalizer and an important tool for social mobility in the United States. Education has a larger effect on earning power over a career than does race or gender (Bureau of Labor Statistics, 2016). In addition to the economic benefits of receiving a college degree, social and health benefits are recognized as well (Oreopoulos & Salvanes, 2009). But how do children living in poverty gain access to higher education and attain a college degree in the face of financial barriers and lifelong economic disadvantages impacting academic ability and non-cognitive skills?

The growing inequality between the rich and poor is a significant challenge in the United States. One out of five children in this country grows up in poverty, and for Black and Hispanic children, the ratio increases to three in five (National Center for Children in Poverty, 2014). Growing up in poverty hinders the ability to learn and contributes to poor health and mental difficulties (National Center for Children in Poverty, 2014). As a nation, poverty is considered a drain on our national budget both in terms of reduced productivity and increased welfare spending. While barriers to education are certainly not the only factor in inequality, they are an important contributor. The consequences of inequality in postsecondary educational opportunities are significant. It impacts the type of society we have and how we fare as a nation relative to other nations.

From a cost perspective, since the mid-1980s increases in the price of tuition and fees have outpaced by three times the rate of growth in inflation as is illustrated in Chart 1.1.

Chart 1.1: College Tuition and Fees vs. Overall Inflation
Cumulative Inflation Comparison
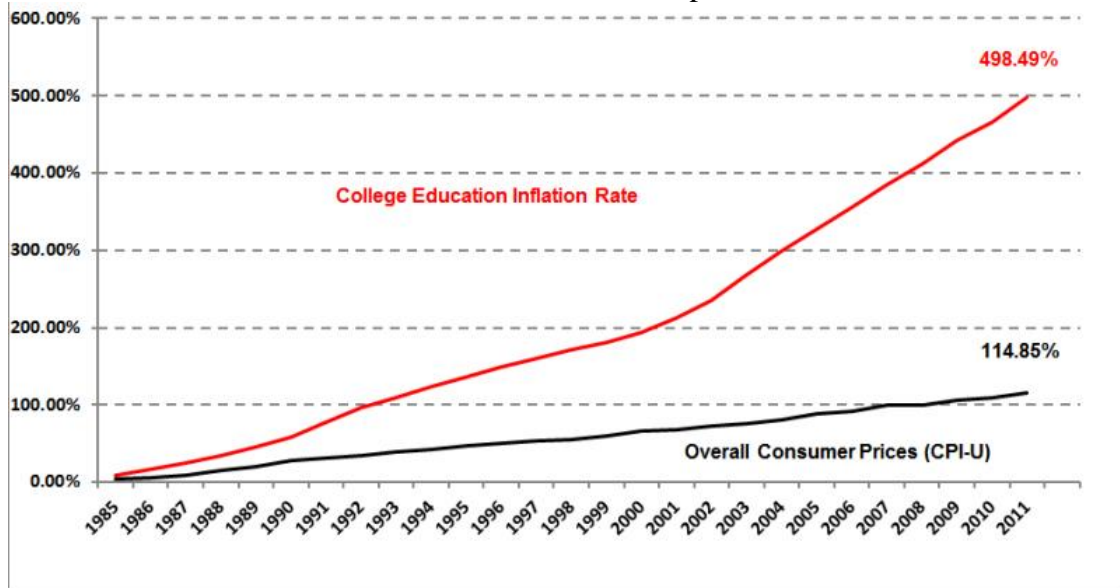
Despite the increase in tuition and fees, the enrollment trend over the past 22 years in postsecondary education for students in the lowest income group is positive (National Center for Education Statistics, 2012), as is indicated in Chart 1.2. In fact, the percentage change in growth for the lowest-income students is higher than for the highest income students (54.5 percent compared to 24.6 percent).

Chart 1.2: College Enrollment Trends
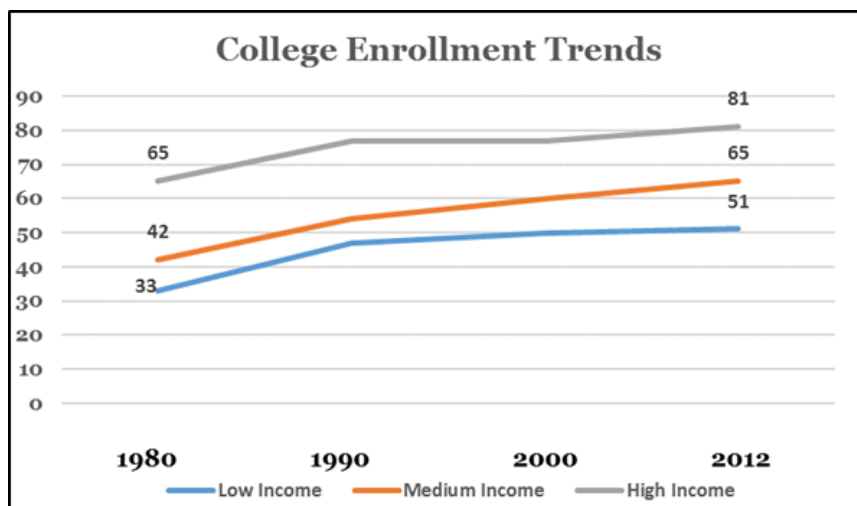
While enrollment rates for low-income students have increased, it is the graduation rate that has not improved over several decades (Turner, 2007). Furthermore, the gap in bachelor's degree completion rates between the highest and lowest income quartiles has increased and is now over 40 percent, as reflected in Chart 1.3.

Chart 1.3: Estimated Percentage of U.S. Population
with Baccalaureate Degree by Age 26, by Family Income
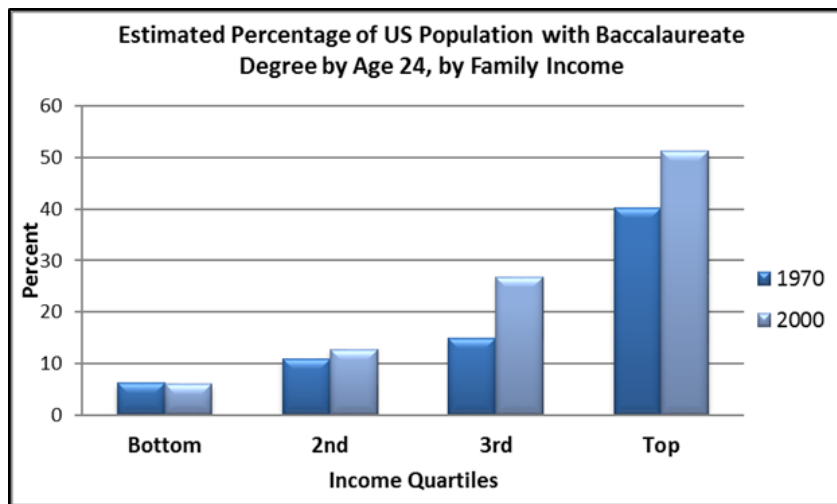
Source: Mettler, 20011

The link between family income and college attainment is strong (Aud, et al. 2013; Belley & Lochner, 2007; Ellwood and Kane, 2000; Engle & Tinto, 2008; Haveman and Smeeding, 2006; Mettler, 2011). However, there has not been a systematic study of the relationship between full non-loan support (loan replacement grant) and college graduation among low-income students in a large public university, which is the focus of this dissertation.

Since the Higher Education Act of 1965, the U.S. government has intervened primarily through grants and loans for low-income families. More recently, higher education became a top priority under the Obama administration. In addition to making college choice and financial aid information easier for consumers to understand, efforts to make college more accessible for low-income students resulted in an increase in the maximum Pell Grant and linking the aid to

inflation, an expansion of tax-based tuition assistance, and a reform of student loans to lower

costs and broaden access (U.S. Department of Education, 2016).

State governments, higher education institutions, and foundations also provide support

through grants, scholarships, and tuition waivers. However, the level of state support for public

colleges and universities has been declining (see Chart 1.4 below). Moreover, there is criticism

that institutional aid is used more as a recruitment tool instead of meeting financial need, with

the neediest students at hundreds of colleges paying an amount that equals more than half of their

families' yearly earnings (Burd, 2016).

Chart 1.4: State Funding and Tuition as a Share of Revenue at Public Institutions
FY 2003-2012
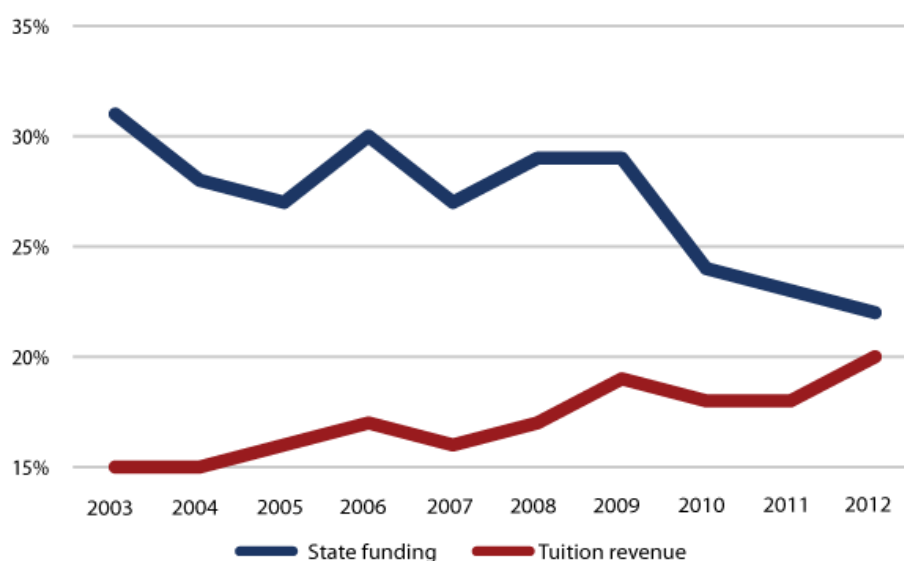
Source: Baylor and Bergeron (2014)

Combined with nearly $30 billion in federal grant dollars, over $175 billion was invested

in by public and private institutions in the 2010-2011 academic year (Heller, 2013). Despite

these efforts, over a thirty-year period the United States has made no progress in the percentage

of 25-34 year olds with a college degree from the lowest income quintile (Mettler, 2011).

Nationally, only 34 percent of low-income students graduate within six years compared to 66

percent for the upper four quintiles (Engle & Tinto, 2008). Does this mean that financial aid is ineffective or that the rising costs have outpaced financial aid or that other factors account for lower levels of college attainment among children from low income families?

The issue of college access and success has been studied extensively, over several decades, and from multiple disciplines. Research demonstrates that academic, social, and economic factors impact college access and persistence (Advisory Committee on Student Financial Assistance, 2001, 2002, 2006; Perna, 2010). This study advances this literature since it is the first to present data on the impact of a loan replacement grant on college graduation for students coming from poverty.

Statement of Purpose/Aim

The purpose of this study is to assess the impact of a I-Promise (a loan replacement grant) on four-year college graduation for students whose family income is at or below the poverty level. The overall hypothesis is that I-Promise will have a positive and significant impact on the likelihood of graduating from college in four and five-years in comparison to an appropriately constituted comparison group. The size of this effect will be estimated. Additional analysis will identify effects of types of aid (non-loans such as grants, scholarships, and waivers versus loans) on graduation.

Significance

Even though several universities began replacing loans with grants thereby essentially offering fully-funded scholarships for low-income students starting in the mid-1990s (beginning with Princeton), there has been no published study examining the impact of a loan replacement grant for poverty-level students on college graduation. Instead, there have been numerous studies that examine the impact of partial financial aid on enrollment and measures of college student

success. Among these studies, not all distinguish among type of aid (grants and scholarships versus loans) for different populations. This is surprising considering loans need to be repaid, there is unequal access to capital markets, and aversion to risk is not homogenous among students and their families. Additionally, many studies on the impact of financial aid on college student success fail to control for factors that influence eligibility for need-based aid and academic factors that are known to be positive and significant predictors of graduation. These omitted variables can over or under estimate the impact of financial aid on student success. The proposed study addresses selection bias and controls for several academic factors known to impact college success, beyond the typically reported cumulative GPA.

The proposed study thus fills a gap in the literature. No other study has examined the impact of a loan replacement grant on four-year college graduation for students coming from poverty. Previous studies that do examine the impact of type of aid on college student success, as cited in Chapter 2 literature review, have mixed results with regard to loans. This study will further advance understanding on the impact of non-loans (grants, scholarships, and waivers) compared to loans on four-year college graduation. Also, very few studies on financial aid control for academic factors beyond GPA. This study controls for a number of academic factors, such as type of initial major, first-semester GPA, and differences between credit hours attempted and credit hours earned. While additional research is also needed to combine the impact of economic, academic, and non-cognitive factors on four-year college graduation for students coming from poverty, this study provides a baseline on economic factors (while controlling for academic and demographic factors).

The results can have considerable policy and practice implications. At a university level, there are incentives to allocate more funding for merit aid as compared to need-based aid, since

merit aid is assumed to have a greater impact on traditional university metrics. This study has the

potential to inform these assumptions and point leaders toward additional relevant metrics.

Evidence-based data are also relevant for donors and the broader society, as all stakeholders

want to see a return on investment. This research has the potential to reinforce the value of a loan

replacement grant and provide increased hope for low-income students to earn a college degree

and achieve upward mobility. For social workers and others who are committed to reducing

inequality in society, this study promises to provide critical insights that may lead to

interventions and advocacy. This research will advance understanding the impact of what is

designed to be a transformative intervention to make the American dream real for vulnerable

populations.

Organization of the Dissertation

The first chapter identifies the societal challenge that this research addresses, namely

minimal and stagnant college graduation rates for low-income students. The purpose and

significance of the study are also presented.

Chapter 2 identifies key methodological challenges in studying the impact of financial aid

on student success (persistence, graduation, and other measures) and then reviews research that

has made some progress in addressing these challenges. Financial nexus theory is guiding this

research and is summarized in Chapter 2, along with relevant economic and sociological

theories.

Chapter 3 provides contextual information about Illinois Promise, which is the treatment

intervention in this study. Historical and comparative descriptions of similar promise-like

institutional, place-based, and national initiatives are presented.

Chapter 4 describes the quantitative research methodology. The hypotheses are

identified, the variables (dependent, control, independent) derived from institutional and Illinois

Board of Higher Education Report Card are defined. Propensity score matching and resulting balancing tests are explained and illustrated. Descriptive statistics are presented. Logistical models are also presented.

Chapter 5 presents the statistical analysis and interpretation of the findings. Limitations of the study are also identified.

Chapter 6 presents a summary of the findings and the considers the implications of the results. Recommendations for policy and practice are identified. Recommendations for future research are also included.

CHAPTER 2

LITERATURE REVIEW

There is a vast literature on financial aid and student success, but much of this literature is flawed because of issues of causality and using cross-sectional methods for longitudinal measures. As well, the financial aid literature has been limited due to not distinguishing among types of aid awarded and/or types of student. This literature review identifies the methodological challenges and then focuses on the research that has made some progress in addressing these challenges.

Methodological Challenges

There are challenges in identifying causal impacts of financial aid on enrollment and college success – whether success is measured by GPA, credits earned, persistence, or graduation. The challenges are due, in part, to nonrandom assignment. Financial aid is awarded based on some criteria and there is difficulty of separating the role of these factors influencing eligibility for aid from the impact of the aid itself (Goldrick-Rab, Harris, & Trostel, 2009). For example, based on nonrandom assignment, students receive the federally-funded, need-based Pell Grant. Pell recipients may be substantially different than their counterparts who do not receive the grant. It is difficult to determine the causal effects of receiving the grant from the differences among students who do and do not receive this financial support. Concerns with selection bias due to the lack of experimental designs have been well noted (Alon, 2005; DesJardins, Ahlburg, & McCall, 2001; Dynarski, 2003; Goldrick-Rab, Harris & Trostel, 2009; Pascarella & Terenzini, 2005). For ethical and logistical reasons, however, the "gold standard" using randomized control trials (RCTs) is not practical or ethical in this and other similar

contexts (Shadish, Cook, & Campbell, 2002). For this study, quasi-experimental methods will be used to address the issues of causality.

In addition to issues of causality due to selection bias, another threat to causality is omitted-variable bias (DesJardins & Flaster, 2013; Goldrick-Rab, Harris & Trostel., 2009). This happens when factors that are correlated with both an independent variable and dependent variable are not included in the regression model. This omission causes over or under estimations of the financial aid intervention (DesJardins & Flaster, 2013). A relevant variable in the Pell example is including a measure of academic performance, such as high school GPA, ACT composite score, or first-semester GPA. However, national datasets commonly used to study financial aid (National Postsecondary Student Aid Study and Beginning Postsecondary Study) contain few measures of academic performance, and national databases used to study college completion lack reliable financial aid measures (National Educational Longitudinal Study). Omitted-variable bias is an issue in all studies that rely on National Center for Education Statistics (NCES) data (Becker, 2004; Heller, 2004). For this study, a unique dataset has been constructed that includes person, academic terms, and financial aid variables to address this shortcoming in other studies on the impact of financial aid. Additional information about the dataset constructed for this study is included in the methods section, Chapter 4.

DesJardins and Flaster (2013) recommend natural experiments and statistical methods (regression discontinuity - RD, difference-in-differences - DD, instrumental variable techniques – IV, and propensity score matching -- PSM) as solutions to the nonexperimental methods inferential problem. Shadish, Cook and Campbell (2002) explain that with RD, assignment to treatment or control groups is not random (for ethical or logistical reasons), but assignment is based on a cut-off score taken prior to treatment. RD "capitalizes on selection but still provides

unbiased causal estimates" (p. 207). DD uses observational panel data to calculate the effect of a treatment on an outcome by comparing the average change over time in the outcome variable for the treatment group to the average change over time for the control group; the treatment effect is the difference between the observed outcome and the average outcome (Angrist & Pischke, 2008). It is a more rigorous estimate than a simple pre-post tests because DD more likely can account for underlying trends unrelated to the treatment and characteristics of students receiving the treatment (DesJardins & Flaster, 2013). The IV approach introduces a third variable "instrument" (which is outside the control of the student) that helps to explain the treatment but is not directly affect the outcome (DesJardins & Flaster, 2013). An example of an IV that can help explain amount of aid (treatment) that is outside the control of the student is the number of siblings concurrently enrolled in college. PSM is a statistical matching technique that works to mimic randomization by selecting the comparison group who has observable pretreatment characteristics most similar to the treatment group (DesJardins & Flaster, 2013). There are various steps and choices in implementing PSM (Caliendo & Kopeinig, 2015). This proposed research study uses PSM and addresses omitted variable bias by including a number of control variables (demographic, pre-college and college), which is discussed in Chapter 4.

An extensive literature examines the impact of financial aid on some measure of student success. Leslie and Brinkman (1988) reviewed more than seventy studies, and Heller (1997) updated their review and found this long literature unreliable. Most of the early studies have been criticized for not employing methods to distinguish causality. Concern has also been noted about using cross-sectional methods to measure longitudinal data (Goldrick-Rab, Harris & Trostel, 2009). This literature review will *only* focus on a representative selection of those studies that have addressed previous methodological challenges. As will be evident, even these

studies examining the impact of financial aid on student success give very limited attention to controlling for academic factors.

The representative selection of studies summarized below is primarily those that employ the methods recommended by DesJardins and Flaster (2013) to address selection bias and/or omitted variable bias in examining the impact of financial aid on some measure of student success. A few additional studies are included because hazard models are used to attend to the concern with cross-sectional designs. All the studies are included here to indicate what we know about the impact of financial aid on college success and as the foundation on which this research builds. Studies are organized in chronological order by the dependent variable of 1) persistence, 2) graduation, and 3) other success variables. Prior research on the impacts of financial aid on initial enrollment decisions as the dependent variable are not summarized but encounter similar methodological challenges.

Studies on the Impact of Financial Aid on Persistence

Studies on persistence generally look to retention from freshman to sophomore year because attrition is highest during this period, with the extent of attrition varying by type of institution. For example, the ACT (2015) reports one-year retention is highest at four-year private institutions (70.2 percent) and lowest at two-year public institutions (54.7%), meaning approximately 30-45 percent of students depart from their initial higher education institution before sophomore year.

In assessing retention from freshman to sophomore years, Singell (2004) uses institutional data from the University of Oregon for 10,560 applicants in 1997-1998 and 1998-1999 academic years. Because he is not using the national data sets, Singell is able to include a detailed set of observable explanatory variables used in prior work to reduce omitted variable

bias. These variables include personal attributes (e.g., gender, race, age), characteristics of students' high school and peers (e.g., type of high school, size of town/city, number of AP courses), academic ability measures (e.g., net cumulative SAT, college GPA), and financial aid information (e.g., average family income, grants, scholarships, median household income for zip code from 1990 census). Singell's results provide evidence that financial aid improves freshman to sophomore retention, though the effects are not homogenous across students. Rather, type of aid matters to different types of students. In general, a $1,000 increase in aid is associated with a 1 to 5 percentage increase in one-year retention. This proposed research also examines the heterogeneity of types of aid but, importantly, focuses on college graduation (not just one-year retention).

Goldrick-Rab, Harris, Kelchen, and Benson (2012) examine the impacts of a private need-based grant of $3,500 per year on retention. The Wisconsin Scholars Grant (WSG) is distributed at random to first-year, full-time Pell Grant recipients. It is important to note that this study appears to be the only random assignment study on the impacts of a need-based grant on persistence that is not performance-based (beyond requirements set by the Federal Government for Pell eligibility). The grant amounts to 20.4 percent of the estimated cost of attendance (tuition, fees, room and board, and other expenses), and it is a "last dollar" grant meaning it fills the gap between other grants and scholarships and the cost of education, aiming to displace student loans, similar to the proposed study. The study by Goldrick-Rab et al. (2012) is an improvement over the Singell study because of random assignment and analysis of four cohorts (nearly 13,000 students) across 13 public universities within the Wisconsin system. It is of particular note that results were similar to Singell's study in that an increase of $1,000 in total financial aid received during the freshman year was associated with a 2.8 to 4.1 percent point

increase in one-year retention. Unlike the Singell study, however, Goldrick-Rab and colleagues found that the accrual of financial dollars – whether in grants or loans – promoted college persistence for Pell recipients. The Singell study was more nuanced in this regard, suggesting federal work study and unsubsidized loans that require some form of immediate output or repayment can actually lower the probability of retention.

Davidson (2015) examines the impacts of the College Access Program (CAP), a state need-based grant with a maximum award of $1,900 per academic year, on first-year retention at Kentucky's two and four-year public institutions. The CAP grant is awarded on a first-come, first-served basis, increasing selection bias. To address selection bias, Davidson uses PSM, specifically nearest neighbor matching without replacement method. According to Caliendo and Kopening (2005) nearest neighbor is "the most straightforward matching estimator" but the problem of matching without replacement is that "estimates depend on the order in which observations get matched" (p. 9). No discussion about the order is presented by Davidson. Findings show that differences in one-year retention varies depending on full-time vs. part-time status and dependent vs. independent status. Specifically, dependent, full-time students with the CAP grant have 51 percent greater odds of one-year persistence, but no statistical significance is found with persistence for part-time dependent students. This dissertation research only focuses on full-time students at a four-year university; however, dependency status is not known.

These studies address some of the methodological weaknesses in previous research (selection bias or omitted variable bias). They show a positive and significant relationship between partial financial aid and first-year college retention, though the results are not uniform. Variation occurs with type of financial aid and type of student. The next selection of studies

examines the impact of financial aid beyond first-year retention with a focus on graduation. This is key because the greatest economic payout is for students earning a college degree.

Studies on the Impact of Financial Aid on Graduation

DesJardins, Ahlburg, and McCall (2002) examine factors in the literature, including financial aid (by type – merit and loan) related to timely graduation and stopouts (e.g., defined as the first occurrence of non-continuous enrollment). They utilize institutional data (over a 19-term period or six years plus one term) and ACT assessment data (Student Profile Questionnaire) from a sample of 2,373 students who matriculated at the University of Minnesota-Twin Cities campus as freshmen in the fall of 1991. They apply an event history or survival model to determine whether independent variables cited in the literature (e.g., GPA, financial aid) have effects that are different over the course of a student's academic year. Results that relate to financial aid are summarized here. DesJardins and colleagues use financial aid offered instead of awarded to mitigate self-selection issues, contending that "aid offered is closer to the actual (unobserved) variable that affects a student's decision whether to accept an aid offer or not" (p. 560). The researchers find the effects of financial aid offered are beneficial and related to stopouts (which are indirectly related to graduation). Specifically, merit aid is negatively related and loans are positively related to stopouts in all years, though the impact lessens over time with merit aid having a more powerful effect. Their study is valuable considering different types of aid over time on persistence. It is limited, however, in that it doesn't have the amounts of aid awarded. The inclusion of amounts awarded might reveal non-linear effects. For example, research discussed below (Dwyer, McCloud, & Hodson, 2012; Zhan 2014) finds that loans under $10,000 have a positive impact on graduation while higher loans have a negative impact. This study also suffers from selection bias because only students who completed the FAFSA could be included.

Another hazard model employed that is more closely related to the proposed study is by Stinebrickner and Stinebrickner (2003). Their study is more closely related because of the low-income population of college students in the sample and the examination of the impact of full tuition and partial room and board study on retention up to seven semesters, which is "almost synonymous for graduation" (p. 598). The generous subsidy for all the students, regardless of income, results in the direct cost of approximately $1,000 per year for a college education. These researchers find that even under a large tuition subsidy program, differences remain in college outcomes based on family income. For example, the probability of a student in the highest one-third income group finishing more than six semesters is 18 percent larger than the probability of a student in the lowest one-third income group. The researchers conclude that factors other than the direct cost of college, primarily college grades, explain the difference in persistence. While there are similarities with the Stinebrickner & Stinebrickner study and this dissertation, the dissertation is different in methodology (logistic regression versus hazard model), type of institution (pubic versus private), extent of academic subsidy (full vs $1,000 direct costs), some independent variables (such as actual family income versus income quintiles), and dependent variable (graduation vs. seventh semester enrollment). Still, the results of the Stinebrickner and Stinebrickner study inform the current proposed study, because it almost fully addresses the policy issue of removing the direct cost of college for low-income students with results pointing toward factors other than costs as being key to their persistence in college. In this proposed study any unexplained variance will point to factors other than financial aid, measured academic indicators, and other control variables.

Alon (2007) utilizes the Instrumental Variable Probit procedure to evaluate the impact of three highly correlated variables on college graduation (up to six years) for 15,196 college

students initially enrolled in 1989 at 20 elite institutions. The variables are: 1) academic success; 2) eligibility for financial aid; and 3) dollar amount of financial aid received. Data come from the C&B restricted-access database, and student files link to financial aid data available through the Higher Education Research Institute (HERI). Alon finds that eligibility for need-based aid decreases likelihood of graduation by 15 percent. The actual amount of financial aid, however, can help offset this initial disadvantage of needing the aid. Grant aid is most effective with an additional $1,000 in grant aid increasing the probability of graduating by 1.5 percent. The interaction terms between minority status and grant dollars indicate $1,000 in grant dollars have an even greater effect on minority students, further increasing the probability of graduating by 2 percent. Loans have no impact on graduation nor does federal work study. Working off campus has a negative impact on six-year graduation, reducing the probability by 1.7 percent. In sum, Alon's research points toward the value of separating out aid eligibility from the actual financial aid award to address misspecifications found in earlier research. In doing so, he finds grant aid increases likelihood of six-year graduation and the grant aid has an even greater, significant impact for minority students at elite universities.

In contrast to the literature on student grants and scholarship aid, there are comparatively fewer studies on student loans and college graduation (Zhan, 2014), despite the high proportion of loans, which Heller (2008) reports comprise 55 percent of all aid. A recent study by Dwyer, McCloud & Hodson (2012) finds at a public university that students with loans of no greater than $10,000 have a positive impact on college graduation, but debt beyond that amount negatively impacts graduation for low-income students. Zhan examines whether this relationship differed by race and ethnicity and finds that it did. Specifically, Black and Hispanic students are even less likely than White students to graduate when they carry a heavy debt load (over $10,000). With

the treatment group in the proposed study (I-Promise), students would only take out loans for incidental costs (or to cover their contribution toward FWS if they choose not to work) since all academic costs are covered through the full combination of non-loans. It is anticipated that the debt load for four years will vary for the treatment and comparison groups, with the treatment group under and the comparison group over the $10,000 threshold identified in Dwyer, McCloud, & Hodson and Zhan studies. In addition to examining the impact of a full combination of non-loans on college graduation for poverty-level students, the impact of loans and non-loans will be analyzed separately to further test the results of these previous two studies.

DesJardins and McCall (2010) contribute to the literature about how financial aid packaging is used to affect temporal events like non-continuous enrollment related to graduation using a multiple spells/competing risks event history model. The dataset is an expanded version from their 2002 study with Ahlburg (previously cited) by including fall, first-time freshman from 1984 and 1986 along with first-time freshman from the 1991 cohort for a total sample of 12,648. They follow students until graduation (more than a six-year observation period) or up to three enrollment and non-enrollment spells, whichever happens first. They also run simulated regressions using coefficient estimates from their results under different financial aid packaging scenarios because of the difficulty in interpreting partial effects in complex non-linear models. Their findings are that stopouts are detrimental to graduation at the institution studied (University of Minnesota-Twin cities). For example, 76 percent of students who graduate did not stopout in comparison to 9.4 percent who stopout at least once, with multiple stopouts further reducing likelihood of graduation. They also find students who have a longer enrollment period are more likely to return after a first stopout, with each additional term increasing the enrollment probability by 2.4 percent. Importantly, with regards to financial aid, every form of aid (loans,

grant, merit, work study) lowers the risk of first stopouts (22.7 percent, 35.2 percent, 32.9 percent and 24.7 percent respectively). In the simulated model, when student aid variables reflect the actual aid received, chances of graduation increase by more than 11 percent and the risk of a first stopout is reduced by 5.27 percent. This study by DesJardins and McCall only looks at a limited number of variables, but it is valuable for examining different types of aid on multiple stopouts over time.

Rather that utilizing institutional data or the national databases, Raikes, Berling, and Davis (2012) researches website data to identify factors by which consumers might predict four-year graduation rates. The sample consisted of 80 member institutions of the Council for Christian Colleges & Universities (CCCU). While this method suffers from omitted variable bias, it does provide insight on the degree to which publicly available data predicts graduation. Results from a hierarchical multiple regression analysis indicates that five independent variables significantly contribute to the variation in four-year graduation, with the full model explaining 48.6 percent. These variables are: 1) institutional aid; 2) "real tuition cost" (tuition less institutional financial aid); 3) instructional expenditure per full-time equivalent student; 4) student-faculty ratio; and 5) average GPA of incoming class. Of these five variables, financial aid variables accounts for 12.9 percent of the variation, after controlling for all other variables. This study is another reminder that financial aid is not the only factor explaining graduation, but it does confirm the importance of studying the impact of financial aid in more detail.

Castleman and Long (2016) examine the impact of the Florida Student Access Grant (FSAG) on a range of college outcomes (enrollment, persistence, credit accumulation, and degree attainment) using RD. Eligibility for the FSAG is based on a families able to pay less than $1,590 per year, which translates to family income below approximately $28,000. The benefit of

a FSAG is $1,300 (2000 constant dollars), which is sufficient to cover 57 percent of the annual

tuition and fees at an average Florida four-year university. The sample includes over 45,000

seniors in Florida public high schools in 1999-2000. The intervention and comparison groups are

selected from a larger sample and created within narrow income bandwidths (+/- $1,000) on

either side of the $1,590 eligibility cutoff. While all outcomes are positive, the focus here is on

their findings with respect to bachelor's degree attainment. Castleman and Long find, on

average, that being eligible for $1,000 in grant aid increases bachelor's degree receipt within six

years by 4.6 percent points. This finding is similar to earlier studies where persistence is the

dependent variable.

Bartik, Hershbein, & Lachowska (2015) use DD methods, comparing eligible to

ineligible graduates before and after the initiation of Kalamazoo Promise, a place-based

scholarship. Kalamazoo Promise is funded by anonymous private donors and pays up to 100% of

tuition and fees (excludes room and board) at any public postsecondary institution in Michigan

on a "first-dollar" basis, which means aid is not reduced from other scholarships. Eligibility for

Kalamazoo Promise is based on continuous enrollment in the Kalamazoo Public Schools (KPS)

since at least ninth grade. The benefit amount is graduated based on the length of enrollment in

KPS, ranging from 100 percent subsidy for students enrolled since kindergarten to maximum of

65 percent if a student has been enrolled since ninth grade. The average spending per recipient is

about $4,000 per semester. The sample includes high school KPS graduate from 2003-2013,

meaning three pre-Promise cohorts and up to eight post-Promise cohorts. The total number of

KPS graduates during this period is 5,415, with 4,829 being eligible for Kalamazoo Promise and

586 students being ineligible. The researchers use inverse propensity score weights to make post-

Promise graduates resemble pre-Promise graduates. This research examines various outcomes,

including credentials earned, and finds statistically significant effects of the Kalamazoo Promise scholarship, including the probability of obtaining a bachelor's degree. There is a 23-33 percent increase in the likelihood of earning a bachelor's degree (pre-Promise mean credential attainment is 36 percent). Of particular interest to the dissertation research, estimates of Kalamazoo Promise effects are both substantially and significantly similar across different income groups. Because the baseline postsecondary outcomes are much lower for low-income students, the effects of Kalamazoo Promise in proportional terms is much higher: bachelor's completion within six years rises by 57 percent for low-income students in comparison to 22 percent for higher-income students. As economists, the researchers also predict lifetime earnings effects of the Kalamazoo Promise's credential gains, compared to the scholarship costs, and estimate an internal rate of return of 11.3 percent, demonstrating net economic benefits.

The studies summarized here have improved the specifications and consistently find positive effects. The use of time series data is valuable for this type of analysis. In addition, studies summarized here address selection bias and omitted variables through more rigorous quasi-experimental designs (RD, DD, IV and use of PSM).

Studies on the Impact of Financial Aid on Other Success Indicators

Two other studies are included for different reasons. Stater's (2009) study is included because the relevancy is on the impact of financial aid on GPA (years one through four), and academic performance is positive and significant predictor of college graduation (Attewell, Heil, & Reisel, 2011; Delaney, 2008; Gershenfeld, Hood & Zhan, 2015; Jesse & Ellersieck, 2009; McGrath & Braunstein 1997; Mettler, 2011; Yizar, 2010). DesJardins and McCall (2014) study is included because of the RD method and the nature of the intervention studied (Gates Millennium Scholarship) is a "last dollar" award, similar to the type of award in this study.

To measure the impact of aid on cumulative GPA, Stater (2009) uses IV in order to compare students who get aid based on merit to those students to get aid based on need. The study involves 18,748 students initially enrolled at three public flagship universities from 1994-1999. Stater employs racial composition in the home zip code as an instrumental variable because it clearly precedes GPA (the dependent variable) and is unlikely to be strongly correlated with family income (an unobserved variable). Numerous other control variables are used. The study finds both forms of aid are positive and significant predictors of cumulative GPA (each year from freshman through senior year). Additionally, merit-based aid is found to be a stronger predictor than need-based aid. Specifically, a $1,000 increase in need-based aid is predicted to increase first-year GPA by 0.04 and merit-based by 0.21. This leads to the controversial recommendation that universities can improve academic performance through merit-based aid rather than need-based aid. This dissertation research is comparable to the proposed study in that it involves flagship public universities as the setting and tracks student performance over time. In this dissertation, however, graduation is examined (not just GPA), and exact amounts of financial aid are included rather than just the type of aid.

DesJardins and McCall (2014) examines the impact of the Gates Millennium Scholars (GMSP) Program, which is a last dollar award, on several outcomes using a RD design. The dependent variables are college enrollment, student debt, working while in college, choice of college major, aspirations for a Ph.D. degree, and occupational choice. Low-income, high-achieving minority students who apply for the GMSP have to meet a number of eligibility criteria, including cognitive and non-cognitive measures. Between 3,000-4,000 students apply annually and about 1,000 are selected for the program. As a "last dollar" award, the GMSP covers the unmet needs remaining after Pell (and any other scholarship or grant that is awarded)

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for up to five years, and they can apply for additional support to attend graduate school in specific disciplines. The average award is about $8,000 for freshman and $10,000-$11,000 for juniors and seniors. Longitudinal survey data is obtained by GMSP recipients who enter in the fall semesters of 2001 and 2002 (N = 1,000 for each cohort) and a total random sample of 2,673 non-recipients are asked to participate in the survey. The survey response rates are lower for non-recipients, ranging from a high of 89.7 percent for recipients to a low of 25.45 percent for non-recipients. There are three surveys in total: baseline (administered spring of freshman year); 1st follow-up (spring of junior year); and 2nd follow-up (2 ½ years after 1st follow-up survey). In addition to the surveys, applicant data are utilized (test scores and demographic variables). Key findings are GMSP recipients have lower college loan debt and parental contributions toward college, and they work fewer hours than non-recipients. This is not surprising. Other outcomes are GMSP recipients have higher GPAs in junior year and more likely to aspire to a PhD than non-recipient. This is based on self-reported data, which would benefit by additional validation. There is little effect of GMSP receipt on enrollment, suggesting there is minimal support that financial credit constraints prevented this sample of non-treatment low-income students from attending college.

In summary, studies examining the impact of financial aid on student success, where methods address selection bias and/or omitted variable biases, show positive results. With regard to first-year college persistence, a positive and significant relationship is found ranging from 1-5 percent per $1,000 of award. Variation occurs, however, with type of financial aid and type of student. There is inconsistency with whether loans help, are neutral, or impede first-year retention. With regard to college graduation, the effects of financial aid are positive. The differential effects of loans versus grants are also evident in the case of graduation, and the

impact is greater with minority students. This distinction is based on race and not income, whereas the dissertation research examines both race and income. In comparing graduation with persistence as a dependent variable the results are similar in that grants are positively related to graduation. Other forms of aid, such as loans and FWS, have mixed results. Type of student and type of institution matters. Financial aid also has a positive impact on other student success factors such as cumulative GPA, which is correlated with graduation. Grant aid has a greater impact than loans on cumulative GPA. Among these dependent variables, graduation is the most important as it has the highest economic payout and other life benefits.

Although all of these studies employ methods that helped address threats to internal validity, none address the impact of a loan replacement grant on the likelihood of four-year and five-year college graduation for students coming from poverty. Further, distinctions between loans and grants need additional attention as do distinctions between race and income, both of which are addressed in this dissertation.

This research will advance the current body of research by combining a number of important features of these studies with a unique data set to examine one key circumstance not addressed in the literature – the impact on four and five-year graduation of a loan-replacement grant for students whose families are at or below the poverty level.
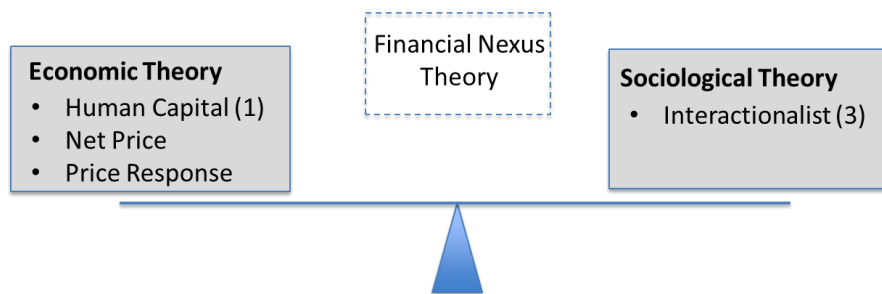
Theories

Only four studies identified above explicitly specify a theory guiding their empirical research. Most of the literature concentrates on achieving increased precision in making point estimates of effects as economic theory predicts lowering the price will increase attendance. Where theory is stated in studying student success, including persistence and degree completion, there is a variety since scholars come to this issue from multiple disciplines and it has been

studied for over 80 years (Braxton, 2000). This includes theory anchored in sociology on the one hand and theories anchored in economics on the other. Though research has been over many decades, it is interesting to note the use of economic theory is a more recent phenomenon (Chen, 2008). Human capital theory (Becker, 1962) and related net-price and price response theory (Heller, 1997; Leslie & Brinkman, 1987), build on the more general economic supply and demand theory in higher education (Radner & Miller, 1970).

The relevant theories are depicted in Figure 2.1 as a balance of social and economic theories with financial nexus theory in the middle.

Figure 2.1

Economic Theories

Human capital theory (Becker 1962) states that investments in people through on-the-job training, higher education, and other means increase future earning potential. It is called human capital because people cannot be separated from their knowledge, skills, health, or values in the way they can be separated from their financial and physical assets. Application of human capital theory to financial aid assumes people behave rationally and are well informed about their choices – sacrificing short-term income (by not working) and paying college expenses (through loans or other means) will result in higher wages that employers pay college-educated workers. This basic model assumes capital markets work perfectly so that students can borrow and pay for college. One important economic shortcoming in the theory is that it does not take into account

credit constraints faced by low-income students (Goldrick-Rab, Harris & Trostel, 2009). Of the studies cited in this literature review, only Castleman and Long (2016) used human capital theory.

A variation of this theory is net-price theory (Leslie and Brinkman, 1987), which focuses only on the present. The theory is that if financial aid reduces the costs of a college education, students will be more likely to finish college. Net price theory differs from human capital theory in that it focuses only on the direct cost of college. As such, it does not include opportunity costs of students working fewer hours and earning less income during the college years in order to have greater earning power later.

Price response theory applies the core economic assumption of an inverse relationship between price and quantity demanded to higher education, and it assumes students behave rationally. That is, as tuition (and related costs) rise enrollment declines as students would be able to improve their return on investment elsewhere. This substitution effect (Hopkins, 1974) is one price response to competition whereas the other price response is "net discouragement effect" meaning the student would altogether withdraw from higher education.

Another important economic concept is price elasticity, which is an economic measure to show responsiveness (or elasticity) in demand based on a change in price. Archibald (2002) finds low-income students pay a larger proportion of family income for college compared to their high income peers. They may have a relatively higher level of price elasticity (or sensitivity), while their wealthier peers have a more inelastic (or less sensitive) demand (Chen, 2008). This means low-income students may be more sensitive to changes in price (tuition, fees, and related educational costs) or amount and type of financial aid offered.

Overall, despite the limitations of economic theory (rationality and uneven capital markets), the main predictions are supported through research. That is, reducing financial cost makes students more likely to attend and finish college. However, it is known through decades of research, that factors other than economics influence persistence decisions.

Sociological Theories

Social class theories explicitly recognize class differences in higher education and persistence. Sociologists developed theories on social class at the turn of the 20th century when industrialization increased economic stratification in society (Goldrick-Rab, Harris & Trostel 2009). An additional dimension is incorporating cultural and social capital theories in better understanding how students respond to college-related decisions, including price and persistence. For example, Perna (2006) argues for an integrated model of human capital theory as well as cultural and social capital theories so as to better understand the complexities that influence decision making and move beyond the rational choice model.

Tinto's (1975, 1986, 1993) interactionalist theory is probably the most widely cited in the student retention literature. Sixteen years ago, Braxton (2000) noted more than 400 citations and 170 dissertations are pertinent to this theory. A key tenant of Tinto's theory is the integration of the student into the institution of higher education. Academic and social integration affect the formation of subsequent institutional commitments and the goal of graduating. It was not until 1993, however, that this theory expanded to include role of finances in student integration, which has been a key criticism (Goldrick-Rab, Harris & Trostel 2009). Still, this interactionalist theory dominates research on success of college students. In fact, three studies cited here in the literature review use Tinto's theory.

With Tinto's theory as a base, psychologists add to it by considering motivation (Stage, 1989), self-efficacy (Peterson, 1993), and an approach/avoidance model of coping (Eaton & Bean, 1995). Bean and Eaton (2000) wrote that some of the most important links in sociological retention models can be explained through psychological theory. While economic theories are limited in only focusing on financial factors in rational terms, sociological theories give limited attention to financial factors. Financial nexus theory, which is introduced below, is conceptualized as a more integrative theory that focuses on finances, but also recognizes the diversity of students. It is the framework primarily guiding this research (see Figure 2.1 above).

Financial Nexus Theory

Financial nexus theory predicts that if the cost of college is important in students' choice in enrolling in college, it will then be an important factor in persisting in college (St. John, Paulsen, & Starkey, 1996). This is a departure from earlier research that looked at the choice to attend college separate from the choice to remain enrolled in college. Operationally, the recruitment and retention functions generally operate under the umbrella of enrollment management, but theory had previously treated them separately.

In addition to assuming a link in the sequence of students' choices (i.e., enrollment and persistence), financial nexus theory assumes there is diversity in students and student choices are made in situated contexts. Key to financial nexus theory are student perceptions. Recognizing students are not homogenous, financial nexus theory incorporates aspects of sociological theory by including demographic, social class, and college experience variables – such as race, first-generation status, living on-campus and GPA categories. Because of these assumptions, financial nexus theory does not assume purely rational actors as is the case with most economic theories.

Financial nexus theory addresses the shortcomings of sociological research by centering on finances, and it is an improvement over economic theory by explicitly recognizing student differences. Still, as Goldrick-Rab, Harris & Trostel (2009) declared, there has been insufficient theorizing and testing of the theories. This helps to explain why it is still difficult after decades of research to answer the "why" question of financial aid's impact on student success. They call for an even more interdisciplinary theory of how and why financial aid matters that include typically omitted moderating influences such as effects of early education, risk aversion, social ties, social meaning of money, and transition to adulthood. While intriguing, data for this study does not allow testing the full interdisciplinary model proposed by Goldrick-Rab and colleagues. This study does, however, combine economic and sociological factors in new ways, which is a step in the direction of a more interdisciplinary approach.

All studies to date applying financial nexus theory have utilized national datasets and have examined the impact of class differences (Franke, 2012; Paulsen & St. John, 2002), race differences (Carter, Paulen, St. John, 2005), and differences based on institutional type (Bryan, 2013; Hwang, 2003) on persistence. With the exception of the Franke and Bryan studies that examined degree attainment within six years, the other researchers use within-year persistence as the dependent variable because of data constraints. Though limited because of time horizon and omitted variable bias with the national datasets, findings using financial nexus theory generally show diverse of pattern of choices when comparing different types of students, but continuity of choice patterns (i.e., enrollment and persistence) and consistency within groups (based on income, for example).

Financial nexus theory guides the current research because 1) economics is center stage – the intervention is a full financial aid package of non-loans (sociological theory does not

effectively address the financial aspects); 2) it recognizes social class differences (economic theory does not effectively address the class aspects); and 3) the sequencing of choices (enrollment, persistence), should be consistent based on an explicit financial aid contract upon enrollment that remains for four years for the treatment group (i.e., no change in full financial aid package unless student doesn't meet ongoing financial or academic expectations).

While this study is guided by financial nexus theory, it differs from previous studies utilizing this theory in the following ways: 1) this study is based on institutional data (not a national database); and 2) behavioral not just perceptual data are used Overall, financial nexus theory would predict a full financial aid package of non-loans upon enrollment and availability for up to four years would significantly improve graduation rates within this time period for students coming from poverty (in relation to the comparison group who do not have full support). It would also predict that non-loans will have a stronger positive impact on graduation than loans as low-income students are more price sensitive and this price sensitivity would not change during undergraduate years.

CHAPTER 3

ILLINOIS PROMISE

Access through Financial Support

Illinois Promise (referred going forward as I-Promise) at the University of Illinois at
Urbana-Champaign (Illinois) is one of the first programs by a public university to offer low-
income students a grant instead of loans to cover academic costs (tuition, fees, room and board,
books and supplies). In 2004, under the leadership of then Chancellor Richard Herman, I-
Promise was launched with a broad, moral vision: "As a public university, we must ensure that
talented students of all economic backgrounds have access to our programs. If the face of our
campus does not reflect our society, we cannot fulfill our obligation to create the leaders of
future generations" (University of Illinois at Urbana-Champaign, 2009). The first class of 129 I-
Promise students enrolled in 2005. This chapter provides an overview of the operation of the I-
Promise program and broader contextual information on comparable institutional programs and
place-based programs – all aimed at enabling access to higher education for low-income
students.

Only the most financially needy students receive the I-Promise grant. The financial
criteria for eligibility are: 1) family income at or below the federal poverty level; 2) family assets
of less than $50,000 (not including the family home); and 3) and Expected Family Contribution
(EFC) that is equal to zero. The EFC is derived from the Free Application for Federal Student
Aid (FAFSA) that all students are required to complete if they want to be considered for
financial aid; the EFC determines need and financial aid eligibility. In addition to financial
requirements, students who receive the I-Promise grant must be an Illinois resident (as well as

their parents or legal guardian), be under the age of 24, and be admitted as a full-time freshman or transfer student.

Potential I-Promise students are first admitted to the university based on their own merit. Illinois has a need-blind admission policy, which means an applicant's financial situation is not considered in admission decisions. Because students have financial need, they complete the FAFSA; there is not a separate application for I-Promise. The Office of Student Financial Aid (OSFA) reviews the FAFSA and through a verification process determines eligibility for I-Promise. No student who meets all of the eligibility criteria is denied receiving an I-Promise grant. Every year for each of the four years a student is enrolled, they need to complete the FAFSA to determine continued eligibility for the I-Promise grant. Continued eligibility is not as strict as initial eligibility in that the income threshold shifts from poverty-level to Pell eligible. The reason for this leniency is to not penalize students whose summer employment might no longer result in their meeting the poverty-level criteria.

Once enrolled, I-Promise students need to meet Satisfactory Academic Progress (SAP) requirements based on federal regulations. SAP refers to staying on course to graduate and is determined through minimum standards: cumulative GPA (not less than 2.0); cumulative pace (successfully complete 67 percent of attempted credit hours per semester); and time frame (cannot earn more than 150% of attempted credit hours without earning an undergraduate degree). The I-Promise grant is intended for four years or eight semesters of continuous enrollment. Should an I-Promise student be unable to graduate within this normal time period due to extenuating circumstances, there is an appeal process for extending funding for an additional semester.

The I-Promise grant is a last-dollar grant. (See Appendix A for financial aid definitions and types of aid descriptions.) This means that the amount awarded is a variable amount and will cover the difference between other grants and scholarships and the cost of attendance. By contrast, a first-dollar grant would be a fixed grant and could reduce the amount of other grants and scholarships so as not to exceed the cost of attendance. All I-Promise students are eligible for the need-based federal Pell grant, the need-based state Monetary Assistance Program (MAP) grant, and the need-based tuition grant. Federal Work Study (FWS) is also included in the financial aid package, which allows students to annually work 10-12 hours a week and contribute $2,500 toward the cost of attendance. Students may also be eligible for other grants. Additionally, the OSFA automatically and annually awards I-Promise students a $2,500 Stafford subsidized loan to cover personal costs, which students can accept, reduce, or decline. For a student coming from a family living at or below the federal poverty level, $2,500 is more money for personal expenses than what they would typically need unless students are using this loan in other ways, such as helping family back home. Compared to an unsubsidized loan, a subsidized loan results in a lower interest rate and repayment does not begin until six months after graduation or unless enrollment is less than half time (less than six credit hours). An illustration of the formula to determine basic financial need and the application of the I-Promise grant is in Table 3.1

The formula is: Cost of Attendance (minus) EFC (equals) Need. For the I-Promise example in Table 3.1, the Cost of Attendance of $30,336 is the same as the Need since parents cannot contribute (EFC=0). Their need is met through a combination of grants (Pell, MAP, other) with I-Promise covering the difference so all academic needs (tuition, fees, room and

board, books and supplies) are covered. The estimated $2,500 of personal expenses in Cost of Attendance can be covered through a subsidized loan.

Table 3.1: Basic Need Formula with I-Promise Example

Basic Need Formula	I-Promise Example
Cost of Attendance	Tuition - $12,036 Fees - $3,590 Standard Room & Board - $11,010 Books & Supplies - $1,200 Personal expenses - $2,500
Minus	
EFC	$0
=Need	$30,336 (minus) Pell - $5,775 MAP - $4,968 Tuition Grant* - $3,000 FWS - $2,500 Other grants/scholarships* - $4,000 I-Promise* - $7,593 Subsidized loan - $2,500

*These amounts are examples for illustration purposes only.

The difference between a low-income student who qualifies for an I-Promise grant and a low-income student who does not meet the eligibility criteria shows up in their annual financial aid package. While other low-income students would still most likely be eligible for Pell, MAP, and tuition grant funding, the remainder (to the extent possible) of the financial aid package would consist of loans -- unless they qualified for other grants, scholarships or waivers. While research shows low-income students have an aversion to loans (Goldrick-Rab & Kelchen, 2013), the "to the extent possible" caveat is still used because the Federal Direct Student Loan has borrowing limits based on class level and dependency status. There are also restrictions in the aggregate amount of direct student loans that can be borrowed over a college career. Additionally, low-income students and their parents can face credit constraints when attempting

to secure a loan in the private banking market (Goldrick-Rab. Harris, & Trostel, 2009). Table 3.2 summarizes the Federal Direct Student Loan borrowing restrictions.

Table 3.2: Annual Maximum Stafford Loan Amount
Unsubsidized* and (Subsidized)

	Dependent Student	Independent Student
Freshman (0-29 credit hours)	$5,500 (no more than $3,500 subsidized)	$9,500 (no more than $3,500 subsidized)
Sophomore (30-59 credit hours)	$6,500 (no more than $4,500 subsidized)	$10,500 (no more than $4,500 subsidized)
Junior/Senior (60 + credit hours)	$7,500 (no more than $5,500 subsidized)	$12,500 (no more than $5,500 subsidized)

Source: University of Illinois Office of Student Financial Aid

*Unsubsidized loans are non-need-based loans whereas subsidized loans are need based.

The bottom line is that unlike I-Promise students, other low-income students have need that is not guaranteed to be met through financial aid at Illinois, even with supplemental institutional aid. Data in 2009 show overall 31 percent of students with unmet need, growing to 32 percent in 2010 (Wise, 2015). Around that time, the average unmet need was $6,000 (Access Illinois, n.d., para. 1), though it is not broken down by family income categories.

With increases in tuition and reduction in other forms of grants and scholarships, the average I-Promise award has grown over time (Gershenfeld, 2012; University of Illinois (2014); University of Illinois (2015). Figure 3.1. illustrates these trends. The average award grew from $3,917 in academic year 2007-08 to $6,010 in academic year 2010-11. This is a 53 percent increase during the time students are included in this study (2007, 2008, 2009, and 2010 cohorts). As of the most recent 2014-15 academic year, the average award is $7,777, which is almost a 100 percent increase.

Figure 3.1: Average I-Promise Award and Costs of Attendance
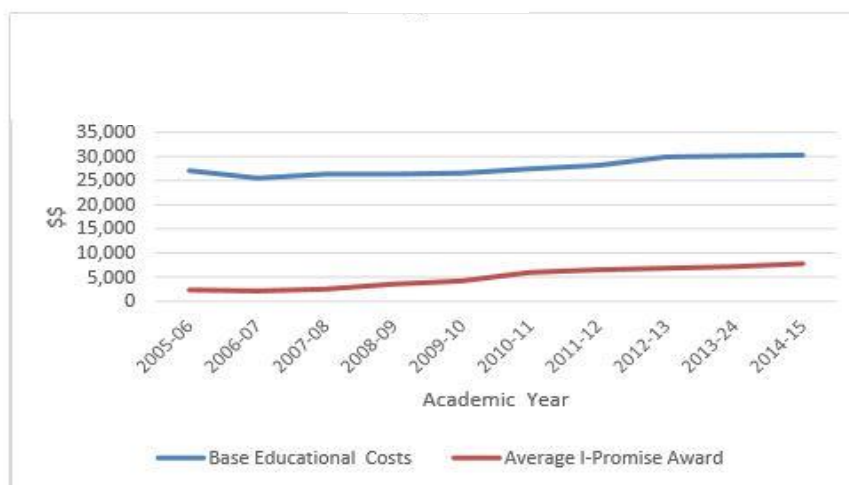
Since summer, 2004 students who enrolled at Illinois are guaranteed the same tuition rate for four continuous academic years by the Truth in Tuition Bill (Public Act 93-0228).

Where does the money for the I-Promise grant come from? It comes from a variety of sources, but primarily through supplemental institutional aid. Foundations, corporate, and individual donors contribute to the I-Promise fund. Not unlike the average I-Promise award, supplemental institutional aid has grown over the past decade in response to increases in sticker price of tuition and fees. For example, in 2010 supplemental institutional aid represented 1.1 percent of need-based aid to students in the University of Illinois system; it increased to 36.6 percent in 2014 (University of Illinois, 2017).

According to Bowen, Chingos, and McPherson (2009), programs like I-Promise are vulnerable to economic downturns that can threaten funding. They wrote that UNC-Chapel Hill "is probably the only public institution that could even contemplate committing itself to financing such a policy without a wholesale revision of other priorities" (p. 190).

This is a challenge in public universities with declining state support and limited endowments. As the state's flagship university, tuition at the University of Illinois is lower

compared to private institutions. For example, the cost of attendance in academic year 2015-16 (tuition, fees, room, board, books and supplies, personal expenses) for in-state residents is $30,336 compared to $50,193 at the University of Chicago and $49,047 at Northwestern University. State subsidies help keep public costs lower than at private institutions. In Illinois, however, state appropriations for higher education funding decreased 34.3 percent over the past ten years (Stewart, 2015). In turn, tuition at the University of Illinois at Urbana-Champaign increased 83 percent during this period (University of Illinois, 2015). Hiltonsmith (2015) states that 79 percent of the cause for rising tuition is due to decreases in state spending. Among public universities in the Big 10, Illinois ranks second highest in cost of attendance. Illinois' endowment, however, is much smaller at $2.39 billion compared, for example, to $10 billion at the University of Michigan (NACUBO, 2015). This combination of factors creates financial stress in the system.

I-Promise is central to the land grant mission at Illinois, yet funding the I-Promise program is annually evaluated. Some policy changes were made in 2008 in response to university budgetary and priority matters (Gershenfeld, 2012). These changes are listed in Table 3.3. Still, as of fall, 2015, all students who qualified for the I-Promise grant receive it, which has been consistent since its launch 10 years earlier. Also, in fall 2015, I-Promise students were guaranteed via email communication from the OSFA that if MAP funding was not restored (due to a state budget impasse), their I-Promise award would increase to cover the annual MAP grant.

Receiving the I-Promise grant with the assurance that it will continue for four years (assuming eligibility is maintained) impacts enrollment decisions. Based on administrative program data from annual spring surveys (2008 – 2013, N=1,003), 50 percent of the non-senior I-Promise respondents thought the financial support received through the I-Promise grant was

"absolutely essential" in their decision to attend Illinois. Another 31percent of respondents thought the I-Promise grant was "very important" in their decision to attend Illinois. Financial support through I-Promise matters, and this initial perception is central to the financial nexus theory guiding this study. Still, having the financial support and assurance does not lessen their overall worry about money and finances. When inquiring through the same survey to what extent they worry about money and finances, 70 percent indicated they "worry endlessly." Just having the full replacement of loans with grants does not guarantee that low income students are free of worry about money.

Table 3.3: Financial Policy Changes in I-Promise (2008)

Policy Change	Rationale
Placed controls on financial awards for summer classes through establishing an appeals process (also for 5th year funding)	Reduce costs. Expensive to pay for summer school (no federal or state support). For example, in academic year 2007-08, funds for summer support exceeded costs for spring support.
Expanded entry point for scholarship to include transfer student status	Link support to Lumina Foundation grant's aim of increasing the opportunities for transfer students at Illinois.
Capped assets at $50,000 (excluding family home)	Target students in most economic need.

**Persistence Through Targeted Support Services**

As demonstrated in Chapter 2, research shows low SES students are least likely to graduate from college. Recognizing that the challenges faced by low SES students are not just financial, since 2008, targeted support is provided to I-Promise students to facilitate student success. This is in addition to a fully-funded financial aid package. The I-Promise targeted support services are briefly described below, and general support services across campus are listed in Appendix B. I-Promise students voluntarily participate in the targeted support services and general support services across the campus.

The organizational structure for the support services function includes an advisory committee and a student outreach committee. Modifications have been made over time in the reporting relationship and organizational structure. From 2008-2015, the Director of Illinois Promise Student Services reported to the Provost's office and then through an arm of the Provost's Office (Campus Center for Advising and Academic Services). Having high level campus access is effective in timely resolution of student issues, and symbolically important to external constituencies such as donors, community leaders, and volunteer mentors. The advisory committee consists of campus representatives from the colleges with the largest concentration of I-Promise students, and key administrative offices (financial aid, advancement, student affairs, housing, minority affairs, provost's office, and alumni relations). Its purpose is to provide guidance on overall policy and programming, initially meeting five times a year. Having the advisory committee is also helpful in garnering support across campus for I-Promise and improving communications across a decentralized campus. The student outreach committee consists of upperclassmen I-Promise students who provide input on and assistance with targeted programs and services for I-Promise students. The outreach committee meetings are every-other-month during the academic year. An added benefit is building relations with and among students and creating developmental leadership opportunities for them.

Support services build community among the I-Promise students and facilitate individual student success. They are designed to not duplicate existing services, such as academic advising. The most noteworthy annual community building opportunities are the fall Chancellor Reception, spring BBQ, and the spring senior reception. With each event, approximately one-third to one-half of the invited I-Promise students attend. Additionally, students can take leadership roles in organizing or presenting at these annual events. Over the years, I-Promise

students are asked in the annual spring survey the extent to which they sense community within

I-Promise. The results are consistently positive and displayed in Figure 3.2.

Figure 3.2: "Happy", "Very Happy" or "Thrilled"
with Sense of Community within I-Promise
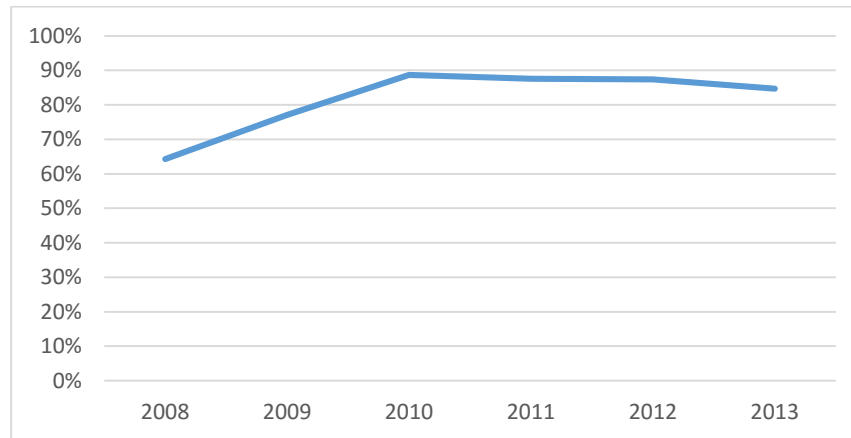
While annual skill building workshops are offered, such as an etiquette dinner, and one-on-one assistance on a variety of matters, the most enduring targeted support is an intergenerational mentoring program designed to facilitate transitioning from high school to college. Most undergraduate mentoring programs on college campuses aim to facilitate the transition to college and retain students beyond freshman year through peer mentorship (Gershenfeld, 2014). While goals of facilitating the transition and retention are similar, the I-Promise mentoring program is distinctive in the mix of volunteer faculty, staff, and retirees who serve as mentors. Approximately one-third of incoming I-Promise students voluntarily participate and choose a mentor for their freshman year, though mentoring partnerships can extend beyond that time frame. Mentoring partnerships are 1:1, with a few exceptions, and the average frequency of meetings is every-other-week. Both mentors and mentees participate in training and additional ongoing supports are offered, including fall and spring receptions that are intended to further build community. Overall, two outcomes are tracked: first-semester GPA and

first-year retention. The results are presented here for descriptive purposes only since the mentoring program does not employ an experimental design. With this in mind, I-Promise students have a significantly higher first-semester GPA and are retained at a higher rate compared to I-Promise students from the same cohort who did not have a formal mentor (University of Illinois 2014, 2015).

During the period of this study, 122 I-Promise students had mentors. For this study, a sensitivity analysis is conducted to assess if students in the sample with mentors (N=69) have different graduation rates than the I-Promise students in the sample without mentors. Whether or not an I-Promise student had a formal mentor through I-Promise is the only quantitative measure of support services available in the database. Because the university does not have a campus-wide tracking system measuring usage of support services, and anonymous annual surveys cannot be not linked with institutional data, it is impossible to measure the impact of targeted support services for I-Promise students on graduation in this study.

However, qualitative data abounds based on student responses to annual surveys, contributions in annual donor books, and public presentations on perceptions of targeted I-Promise support services.   For illustrative purposes, the following two student quotes are from *Transforming Lives- The Illinois Promise 10th Anniversary* (2016):

> "As a first generation college student, I experienced a myriad of fluctuating
> emotions during my first couple weeks of school: guilt, excitement, anxiety,
> pride, extreme responsibility, embarrassment, confusion, and shame. These
> feelings were extremely overwhelming, exhausting, and detrimental to my studies
> and my health. Illinois Promise liberated me from this rollercoaster of emotions.
> In addition to helping with college expenses, Susan Gershenfeld and the Illinois

Promise team helped me find stability and build a foundation to achieve my

ambitions while at the U of I. I-Promise helped me realize that I am not alone. I-

Promise connected me to an inspirational and dedicated mentor. I-Promise

pointed me to activities on campus and to valuable resources to assist me in my

future endeavors. But most of all, Illinois Promise helped me realize who I am."
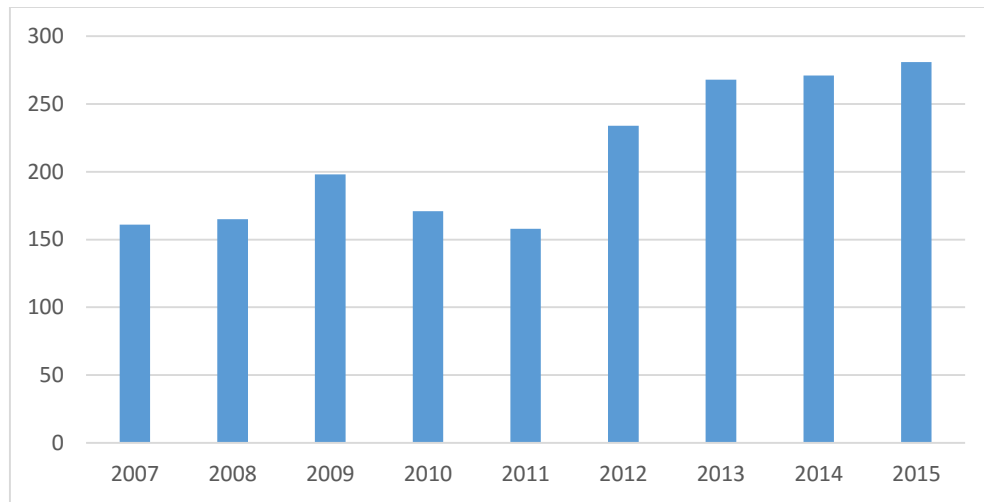
I-Promise Student, 2009-2012

"I-Promise has had a huge impact in helping me find my place here at this

university. Yes, I came into college with a lot of statistics against me. But with

the help of I-Promise and the administrators and donors who make it possible, I

will succeed here, and I will leave this university a changed man."

I-Promise Student, 2013 to present

I-Promise Student Demographics

Since the I-Promise programs inception 10 years ago, 2,561 students (including 244

transfer students) received the I-Promise grant. Of the full-time freshman over these years,

slightly more than half are women: 58 percent. The majority, 82 percent, are racial minorities,

and approximately 70 percent are first-generation college students. While students come from

multiple counties in the state of Illinois, approximately three-quarters are from Cook County,

which includes the city of Chicago. Figure 3.3 depicts the growth and leveling off of freshman I-

Promise students from the 2007-08 – 2015-16 academic years.

Figure 3.3: Freshman I-Promise Students

The racial and ethnic composition of I-Promise students is not a reflection of the racial and ethnic make-up of the university at large. For example, 37.4 percent of I-Promise students are African American compared to only 5.4 percent in the campus undergraduate population. (See Figure 3.4 for racial and ethnic composition of I-Promise freshman.)

Figure 3.4: Percent I-Promise Freshman by Race and Ethnicity
(2005-2014)
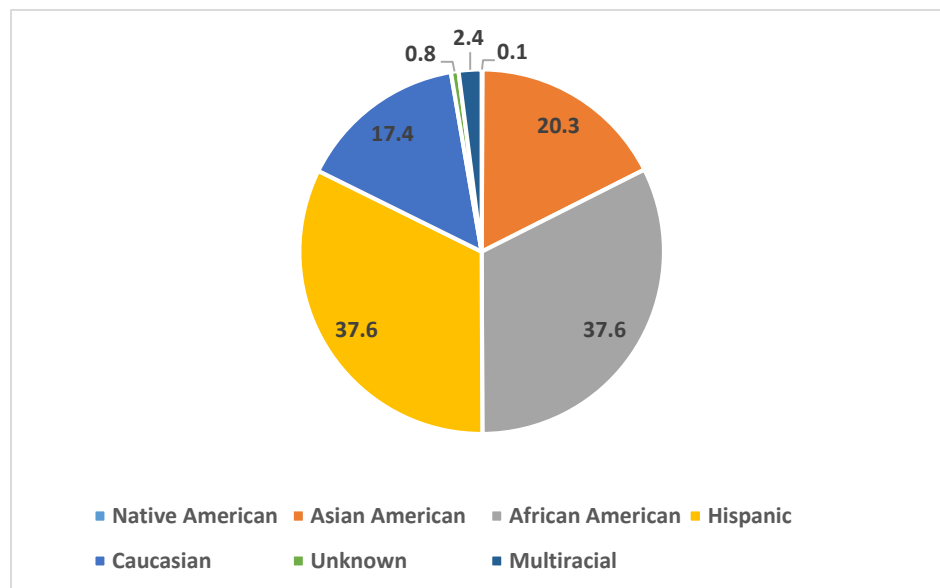
Research shows racial minority students often perceive an unwelcoming and unsupportive campus (González, 2002; Villalpando, 2003). Recent research on racial microaggressions found this to be true on the Illinois campus (Harwood, Choi, Orozco, Browne, & Mendenhall, 2015). The result can lead to attrition and other negative outcomes (Worthington, Navarro, Loewy, & Hart, 2008). Considering the demographic composition of I-Promise, and the recent research on campus climate for minorities, the important role of building community within I-Promise as previously described is validated for achieving the outcomes of the I-Promise program.

I-Promise in Context: Institutional Initiatives

The launch of I-Promise at Illinois in 2005 follows the 2004 implementation of similar programs at other public universities -- the Carolina Covenant at the University of North Carolina-Chapel Hill and Access UVA at the University of Virginia that same year. Both of these other public universities have similar goals with increasing access and opportunity for low-income students, though the specifics of eligibility requirements differ (See Table 3.4), with I-Promise having stricter eligibility requirements.

Table 3:4: Comparison of Eligibility Across Three Programs

Program	Eligibility Criteria			
	Income	Assets	Residency	Other
I-Promise	Poverty	Less than $50,000	X	Full-time, first-time undergraduates under age 24 Admitted as freshman or transfer
Carolina Covenant	200% Poverty	"limited"		Dependency Status; US Citizen; Full-time, first-time undergraduate
Access UVA	200% Poverty			US Citizen, full-time, first-time undergraduate

Initially, private universities, starting with Princeton in 2001, led many higher education institutions to shift their financial aid policies away from loans toward offering grants. Whether it is motivated by access and opportunity or other factors such as competitiveness and concern over losing tax exempt status (which was a focus of congressional inquiry through the U.S. Senate Committee on Finance in 2008), low-income students now have opportunities to earn a college degree debt free or with a significant reduction of debt as a result of these financial aid initiatives, which are often referred to as Promise, Advantage, or Pathway programs.

Lips (2011) offers a typology of these initiatives, which he refers to as "Loan Replacement Grants" (LRGs), in order to clarify the diversity of offering. Lips begins by identifying a minimum of six criteria for a financial aid initiative to be recognized as an LRG that includes: 1) need-blind admissions; 2) meeting full demonstrated financial need (after accounting for family contribution); 3) replace loans with grants so no more than $19,000 in loans can be accumulated over four years; 4) publicize clear eligibility requirements; 5) offer awards based on need (no merit requirements); and 6) grant, at a minimum, covers direct billed costs (tuition, fees, room and board). There are 41 public and 77 private institutions that are on various online lists, including the Project on Student Debt and UNC Chapel Hill survey data from a 2006 conference. Based on the Lips criteria, this set of institutions is reduced by more than half to 52. Additionally, Lips classifies the LRG by: 1) whether there are eligibility criteria for the award or whether the award applies to all; 2) whether a Federal Work Study component is required or not; and 3) whether there is no loan or a cap on loans, and if it is a cap, is it per year or over the four years.

While this initial typology is helpful, elements can be improved in the following ways. First, the eligibility classification can even further be distinguished by type of eligibility criteria

(residency, asset limits, age limits, etcetera) since there is a range of eligibility criteria as is illustrated in comparing I-Promise with Carolina Covenant and Access UVA in Table 3.1. Second, a student contribution in the form of work study is included in the financial aid awards in 50 of the 52 institutions listed by Lips (and may be required in the remaining two, but it is not readily apparent through an Internet search). As such, work study is not a distinguishing feature. Third, differentiating between "no loans" and "loan caps" may be artificial as students can still take out loans (within federal regulations) if books and supplies are not covered and for personal expenses, which vary by location and individual preferences. For example, Brown University is listed as "no loans" for families with income less than $100,000, yet as part of covering the cost of attendance, the student contribution is $2,650. This is also the case at Princeton University, which was the first to announce the "no loan" policy. At Princeton, students are expected to cover the cost of their books and personal expenses. With this expectation, these programs could instead be considered "loan caps". Matt Carter in his Oct. 7, 2015 blog wrote that it is time to rebrand "no loans" to "all grant" for this reason and because some students choose not to do Federal Work Study. The University of Pennsylvania has already rebranded.

Moreover, the Lips typology is incomplete, especially for public universities. For example, for some public institutions with LRGs, there is an annual student eligibility limit for budgetary purposes. This is the case at Appalachian State University, for example. Also, while most LRGs limit continued eligibility to four years, others extend eligibility based on selected criteria. This is the case, for example, at Michigan State University that extends eligibility for up to 10 semesters, excluding summer. Additionally, some LRG offer or require students receiving the grant to participate in programs and services to facilitate success, similar to I-Promise. For

these reasons, Lips' initial typology is incomplete and inaccurate in places when comparing across public universities.

Lips' typology was published in 2011. In examining the financial aid websites of the 52 institutions listed with LRGs, 17 failed to meet the fourth criteria: publicize clear eligibility criteria for the LRG. These institutions are all private and include: California Institute of Technology, Claremont McKenna College, Columbia University, Cornell University, Connecticut College, Grinnell College, Lafayette College, Lehigh University, Massachusetts Institute of Technology, Oberlin College, Pomona College, Rice University, Swarthmore College, Tufts University, Washington University in St. Louis, Wellesley College, and Wesleyan College. While the LRGs may still be in effect in 2016, a prospective student or family member searching online for this information would have difficulty finding and learning about it.

Because of the differences between public and private LRGs, Appendix C provides a list of private LRGs, and Appendix D provides a list of public LRGs. Also, since the 17 private institutions originally listed in the Lips study lack online transparency, these institutions are not included in Appendix C. As can be seen in Appendix C, approximately one half of the private institutions reduce loans with grants to all families eligible for need-based aid. The other private institutions limit eligibility for loan reduction based on income range. A few institutions, including College of William and Mary, Cornell, Dartmouth, and Duke have restricted their no-loan policies since originally offered.

There is more diversity in public institutions that offer grants to reduce loans as can be seen in Appendix D. Income eligibility ranges from poverty level (at Illinois) to the most generous eligibility requirements based on 200 percent of poverty (at UNC Chapel Hill and University of Virginia). To keep costs within bounds, some public institutions have caps on

annual enrollments. Despite budgetary pressures at the Illinois, all students who qualify for I-Promise receive it (as of academic year 2015-16). Unlike private institutions, public institutions name their loan reduction programs, and the majority (11 out of 15) have targeted supports for students receiving the grant. A range exists in the types of supports and whether participation is mandatory varies across institutions, with the majority of institutions not linking grant eligibility to targeted support service participation.

While research is lacking on what types of support services are most effective when combined with full financial aid programs for low-income students, Angrist, Lang and Oreopoulos (2009) do conduct a randomized experiment at a Canadian university and find the only sustained gains in GPA are with the combination of both aid and supports (peer advising and organized study groups). In this dissertation, sensitivity analysis is used to determine if I-Promise students who voluntarily choose to receive support by intergenerational mentors have significantly better graduation rates than those I-Promise students who did not participate in the voluntary mentoring program.

Access to all, despite economic circumstances, is included in the general mission of public higher educational institutions. One way this is measured is by the percent of Pell students who enroll as freshman. At Illinois, the percentage of Pell freshman increased from 17 percent in academic year 2005-06 (the year I-Promise is launched) to 22 percent in academic year 2013-14. For other Big 10 universities that have a similar LRG, Figure 3.5 shows that Pell enrollment also increased among freshman except at the University of Michigan – Ann Arbor. Illinois experienced a slightly higher percentage change at 29 percent compared to 22 percent at Michigan State University.

Figure 3.5: Percent of Pell Freshman Enrolled 2005-06 and 2013-14
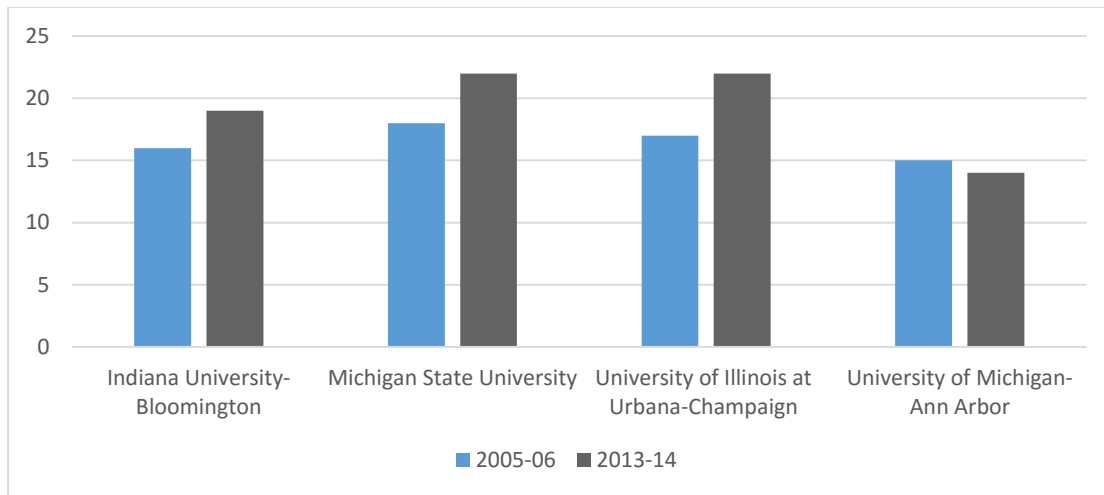
I-Promise in Context: Place-Based Initiatives

Complementary to higher education institutional initiatives to provide access and opportunity to low-incomes students are initiatives that are place-based (rather than institution-based). They are place-based because the financial support for higher education starts at the city, district-, or county-level with the expectation of local economic development. Some have been around longer than the institutional based initiatives listed in Appendix C and D.

Often referred to as "Promise Programs," outreach can start as early as middle-school with students taking a promise and signing a contract to meet certain expectations. As early awareness programs, the intention is to help students take steps in eliminating barriers to higher education. As such, supports are often provided to address barriers (academic, non-cognitive, etcetera) – not just the promise of financial support in college. Student expectations differ across programs, but can include maintaining a minimum GPA, providing community service, staying off of drugs and out of trouble with the law while in high school. If expectations are met, students are awarded funds to cover tuition (and/or other expenses) in part or in full at designated

colleges or colleges of choice. Funding typically comes from private donors, though in some locations the partnerships begin with the government municipality and postsecondary institutions.

In 2011, the US Department of Education awarded funds for Promise Neighborhoods programs to encourage the further development of Promise Programs. The stated purpose is "to significantly improve the educational and developmental outcomes of children and youth in our most distressed communities" (U.S. Department of Education, 2010). Since then, Promise Neighborhoods are in 20 states and the District of Columbia. Together with the Urban Institute, the U.S. Department of Education is collecting data for evaluation purposes.

Research on effectiveness of place-based Promise Programs is limited. However, as reported in Chapter 2, Bartik, Hershbein, & Lachowska (2015) used DD methods to evaluate the success of the Kalamazoo and found positive results with graduation of low-income students.

Unlike the typology identified by Lips for LRG at institutions, no typology exists for place-based Promise Programs. This is an area for future research. Based on an Internet review of a sample of place-based Promise Programs in three states (see Appendix E), the following distinctions begin to emerge: 1) structure (government, foundation, higher education, or community-non-profit); 2) governance (partnership strategic or loosely coupled); 3) financial benefits (fixed, capped, or variable); 4) services (duration – middle school, high school, college; and type – mentoring, academic, college and financial aid preparation); and 5) college location choice (yes or no). Another observation is the clustering of Promise Programs within states. For example, seven out of 13 states with place-based Promise Programs have more than one program within the state; Michigan has the most with 10, followed by California with six. Moreover, Promise Neighborhood funds are awarded in California, which might help explain its expansion.

Summary

As a land-grant university with a need-blind admissions policy, the University of Illinois developed a vision for I-Promise that is fully aligned with the institutional identity. The University of Illinois at Urbana-Champaign is an early leader in public universities expanding access and opportunity for low-income students. The "Promise" name is adopted by similar initiatives in other institutions and by place-based initiatives, which was then followed by the White House Promise Neighborhood grants.

Most importantly, low-income students have enrolled at Illinois at an increasing rate over the last ten years with their potential of moving out of poverty through higher education greatly enhanced. The promise made of graduating with no or significantly reduced debt through the generosity of the I-Promise grant has not waivered despite the great recession in 2008, the increasing average amount of the award, and other economic challenges. This does not mean the students are without financial worry. Targeted supports are put in place to help facilitate their success, in part by building community. In turn, they help diversify and enrich the lives of others on campus.

While measures of support are absent in this research (with the exception of a sensitivity analysis to assess mentoring), understanding the financial impact of the I-Promise grant will inform these programs and initiatives aimed at expanding access and creating opportunity for low-income students. With this institutional context in mind, it is possible to better understand the data available for this study.

CHAPTER 4

METHODS

This study is a quasi-experimental design using institutional data at the University of

Illinois at Urbana-Champaign for first-time, full-time, low-income students initially enrolled as

freshmen in academic years 2007-2010. The time period of analysis is from fall, 2007 through

summer, 2014. The primary focus is on measuring four-year and five-year graduation rates of a

sample of students receiving the Illinois Promise grant, which covers the difference between

other grants and scholarships and the cost of education (tuition, fees, room and board, and books

and supplies) for up to four years. These students are compared to a sample of students who do

not meet the eligibility criteria for the I-Promise grant but who come from low-income

households and are identified through Propensity Score Matching (PSM). Sample size for four-

year graduation is 868 students with a subsample of 414 students for five-year graduation

analysis. Additional analysis of the treatment (I-Promise) and comparison groups will identify

effects of types of aid (non-loans such as grants, scholarships, and waivers versus loans) on

graduation.

The specific hypotheses tested in this thesis are:

H1: Receiving Illinois Promise will have a positive and significant impact on the

likelihood of graduation in four and five years in relation to the comparison group.

H2: Non-loans have a positive and significant impact on four and five-year graduation in

comparison to loans.

As explained in Chapter 3, the Illinois Promise grant is a "last dollar" grant, meaning the

actual amount a student receives is a variable amount that covers the difference between other

grants and scholarships already received and the cost of education. For the first two years of the

Illinois Promise grant (academic years 2005 and 2006), the grant was not limited to first-time freshman. This means that students in these cohorts may not have received the grant during their freshman year but instead later during their academic careers. It is not possible to discern from the data which students from these cohorts received the Illinois Promise grant freshman year and which students began receiving the Illinois Promise grant in subsequent years. For these reasons, these two cohort years are excluded from the analysis. The focus on academic years 2007-2010 provides four cohorts all of which have four-year graduation data; a subset of the sample spanning 2007-2009 allows for five-year analysis. Person, academic term, and financial data from fall, 2007 through summer, 2014 are pulled for this study by the Division of Management Information at the University of Illinois.

There are two key methodological challenges in studying graduation rates of low income students with a full non-loan financial support, as previously noted in Chapter 2. The first challenge is choosing an appropriate comparison group to minimize selection bias (random assignment is not an option). The second challenge is omitted variable bias, which may cause over or under estimation of the financial aid intervention. This study addresses both biases, utilizing Propensity Score Matching (PSM) for selection bias and including a number of education (pre-college and college) variables that are often omitted from studies on the impact of financial aid on college success.

PSM

All eligible students receive the I-Promise grant, so there is no exact equivalent comparison group available. PSM represents the best method to set up a quasi-experimental design, and that is the method utilized in this study. Other methods considered, and rejected as not feasible, include difference-in-difference (DD) and regression discontinuity (RD). DD

requires a before and after research design, for which data are not available for this study. A traditional RD design is another quasi-experimental approach that requires one continuous variable as the "assignment" variable. As is discussed below, there are three financial variables that determine eligibility for the Illinois Promise grant, and it is not possible just to pick one. Some of the benefits of the RD approach can be achieved in the construction of the logit model using PSM.

PSM assesses the probability (via logit model) of participating in I-Promise given observed characteristics and constructs the comparison group that has the highest probability of being comparable. Other possible methods include constructing a comparison group based on similar demographic characteristics (race, gender, etc.) or based on other control variables (such as high school quality). While these and other control variables will be incorporated in the regression model, matching on these variables is not related to I-Promise eligibility.

The advantage of PSM is that it allows for causal inference in a non-randomized study by using relevant covariates to construct a comparison group. As noted by Caliendo & Kopeinig (2005), "only variables that influence simultaneously the participation decision and the outcome variable should be included." (p. 6). In this case, the covariates that determine eligibility for I-Promise are:

1) An Expected Family Contribution (EFC) of zero, which is calculated based on family financial information supplied when completing the Free Application for Federal Student Aid (FAFSA).

2) Assets under $50,000 (excluding family home)

3) Poverty level. Family income divided by number of family members is used.

The 2007-2010 sample was first reduced from 28,077 to 2,073 to only include students who had an EFC=0. Figure 1 illustrates the full distributions of the treatment population and population from which the comparison group was selected, based on assets. As is evident in this illustration, there is a wide overlap of non-Illinois Promise students who meet the asset criterion. Note that there are also some Illinois Promise students with assets that exceed the $50,000 cut-off. This policy was established in 2008, so some students from the 2007 cohort are included in the matching with assets greater than $50,000.

Figure 4.1: Total Assets Prior to Data Transformations
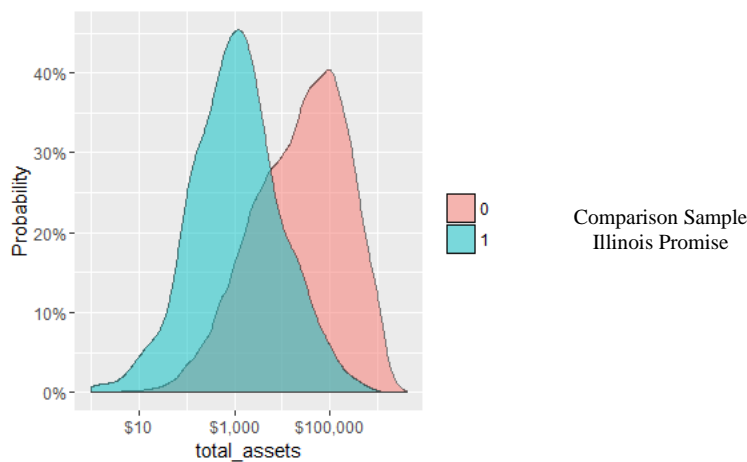
Two data transformations are made prior to implementing PSM using SPSS PSMatching. Because of the wide variation in assets as illustrated in Figure 4.1, the first transformation is to take the Natural logarithm (ln) of total assets and include it as a covariate. The ln transformation preserves relationships among asset distribution observations and reduces the impact of outliers. The second transformation is to convert assets with values of zero (0) to .001. This is needed since taking the ln of 0 is undefined.

There are additional choices when implementing PSM. The algorithm that is the most straightforward is Nearest Neighbor (NN). This is when the student from the comparison group is chosen as a matching partner for a student receiving the Illinois Promise grant that is closest in

terms of propensity score. For this study, NN was used without replacement. This means there is a one-to-one match, and the student in the comparison group is only used in one match (not multiple matches). As recommended by Caliendo and Kopeinig (2005), the matching order was random. To avoid the risk of a bad match when the closest neighbor is far away, these authors also recommend imposing a tolerance level on maximum propensity score distance (caliper). Thoemmes (2012) recommends a standard caliper of 0.15. This means that students in the comparison group were matched randomly to their NN but within a 0.15 propensity range. The final sample is 868 students, with 434 receiving the treatment (Illinois Promise grant) and 434 in the comparison group. For the five-year analysis, the total is 414 (excluding students in the 2010 cohort and matched pairs from other cohorts).

Figure 4.2 illustrates the distribution of the treatment and comparison groups prior to and after PSM. Figure 4.3 illustrates the standard deviations prior to and after PSM. In both figures, the PSM has had the intended effect. Those individuals in the treated and comparison groups after PSM are virtually identical and the standard deviation across the covariates is now zero.

Figure 4.2: Unmatched vs. Matched Treatment and Comparison Group Distributions.
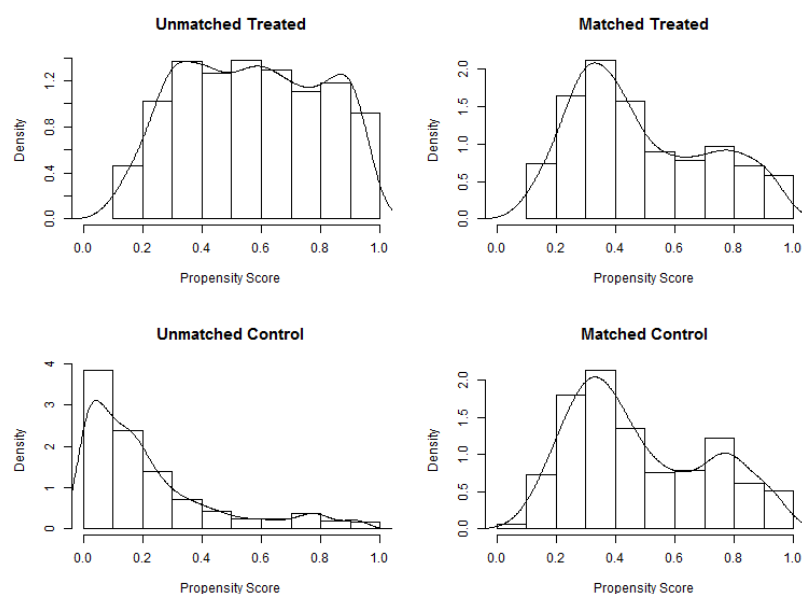
Figure 4.3: Standard Deviations Before and After Matching
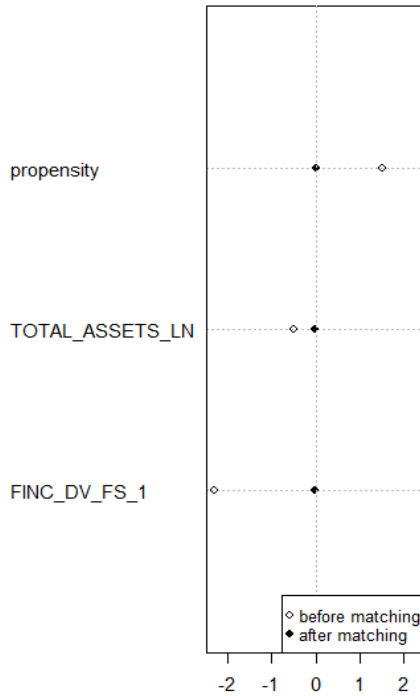
A balancing test of these three key covariates is in Table 4.1 below. As Table 4.1 indicates, the treatment and comparison groups are perfectly matched on EFC and there is no significant difference on income. While there is a statistically significant difference in assets, the difference does not continue when the natural log of assets is used except in the five-year sample, which could be explained by the change in asset policy in 2008.

Table 4.1: Balancing Test of Three Co-Variates Used in PSM

Characteristics	4-Year		5-Year	
	TX (I-Promise) N=434	Comparison N=434	TX (I-Promise) N=207	Comparison N=207
EFC=0	100%	100%	100%	100%
Income/#dependents	$3,631 ($1,716)	$3,597 ($2,436)	$3655 ($1587)	$3,912 ($2,386)
Assets	$7,633 ($34,740)***	$29,236 ($93,384)***	$12,839 ($49,002)*	$26,836 ($89,228)*
(ln)	$5.26 (3.651)	$5.37 (4.465)	$5.74 (3.76)*	$4,77 (4.56)*

p≤***.001; **.01; *.05

Both the treatment and comparison groups are low-income students. For the treatment group, there is aggregate survey data (as noted in Chapter 3) that is consistent with financial nexus theory. That is, the program survey data indicates full financial aid support through I-Promise is "very important or essential" in their decision to attend Illinois. As such, the theory would predict the same reasons for enrolling would be equally important in decisions to remain and graduate at the university. Although there is not equivalent survey data for the comparison group, there is an assumption that a higher proportion of loans and potential for unmet financial need represent a less compelling nexus for enrollment and retention.

Dependent Variable Measures

The outcomes being measured in this study are four-year and five-year graduation. As a benchmark, the overall average four and five-year graduation rates at the University of Illinois at Urbana-Champaign during this period of time are 68.2 percent and 81.8 percent respectively.

A dummy variable of yes (1) and no (0) was constructed for both dependent variables. Five-year graduation is up to five years, therefore including students who graduated in four years. Spring and Summer graduation is considered in the same year, and Fall graduation is considered as an additional year.

Table 4.2a provides descriptive statistics on the number of students in the treatment and comparison groups who graduated in four years or less (56.5 percent vs. 51.8 percent respectively). As additional information, in examining the five-year graduation rate for the reduced sample size (N=414), 76.3 percent of I-Promise students graduate and 67.1 percent of the students in the comparison group graduate. This information is presented in Table 4.2b. The dependent variable is four and five-year graduation. Four-year graduation is consistent with the four-year timeframe for the Illinois Promise grant. Five-year graduation takes into account

additional students who did not complete in four years. While universities report 150 percent

normal time to graduation (six-years), this sample does not allow for a six-year test.

The sample for the five-year graduation analysis is a subsample from the matched pairs

that resulted through PSM. Specifically, to maintain one-to-one matched pairs, the N is reduced

to exclude students matched or in the 2010 cohort (the dataset only extends through summer,

2014). This smaller sample of 414 students, all have the potential to graduate within five-years.

Table 4.2a: Descriptive Statistics – Four-Year Graduation

Characteristics	TX (I-Promise) N=434	Comparison N=434
% Graduated within 4 years	56.5% (N=245)	51.8% (N=225)

p≤***.001; **.01; *.05

Table 4.2b: Descriptive Statistics – Five-Year Graduation*

Characteristics	TX (I-Promise) N=207	Comparison N=207
% Graduated within 5 years	76.3 % (N=158)*	67.1% (N=139)*

*2010 and pairs excluded
p≤***.001; **.01; *.05

Despite the indicated differences in graduation rates between the treatment and

comparison groups, there is no statistical significance in four years. However, there is a

statistical difference in five years. Graduation rates for Illinois Promise may prove significant in

the full model as compared to graduation rate for the comparison group.

Control Variables

Control variables that are included in the proposed logistic regression model fit in the

categories demographic, pre-college, and college.

(1) Demographic variables.

 Demographic categorical variables include gender, race, and first-generation college

status. Consistent with financial nexus theory, these variables allow for an examination of the

heterogeneity of students by class and other factors. Self-identified gender is coded as male (1)

or female (0). Self-identified race is coded as African American, Asian, Caucasian, Hispanic,

Multi-racial, and other/unknown. Dummy variables are constructed with (1) indicating the self-identified race or (0) if not. First-generation college status is constructed based on whether either parent graduated from college. This information originates from the FAFSA where students indicate if their mother and father 1) completed middle school, 2) completed high school, 3) completed college or beyond, or 4) unknown. If at least one parent graduated from college, they were coded as (0) for not first-generation, with (1) for first generation in that no parents graduated from college. All unknowns are converted to 1 since it is not known that the student benefitted from a college-educated parent.

 Non-first-generation status could be overestimated, representing parents who earned a technical certificate or an associates degree, but not a four-year college degree as such distinction is not made with the categorical choices included in the FAFSA. The federal government through the 1965 Higher Education Act Sect. 402A (g)(1)(a) defines first-generation as (A) an individual both of whose parents did not complete a baccalaureate degree; or (B) in the case of any individual who regularly resided with and received support from only one parent, an individual whose only such parent did not complete a college degree. However, the term "first-generation" is often confused based on attended versus graduated from college and type of postsecondary education.

Descriptive statistics of these demographic variables for the sample are in Table 4.3. Pearson Chi-Square tests reveal significant differences between treatment and comparison groups on gender (both four and five year samples), first-generation status and two race categories – Black and Asian students (four-year sample). Considering these demographic variables do not determine Illinois Promise grant eligibility, they are not included as covariates in the PSM but will be controlled for in the logistic regression.

Table 4.3: Descriptive Statistics – Demographic Variables

Characteristics	4-Year		5-Year	
	TX (I-Promise) N=434	Comparison N=434	TX (I-Promise) N=207	Comparison N=207
Gender	44% (M) (N=188)***	56% (M) (N=238)***	45% (M) (N=94)*	55% (M) (N=114)*
Race Black Hispanic Asian White Multi-racial (Other)	34.8% (N=151)** 12.4% (N=54) 24.0% (N=104)** 22.4% (N=97) 1.6% (N=7) 4.8% (N=21)	27.2% (N=118)** 14.0% (N=61) 32.7% (N=142)** 21.7% (N=94) 1.4% (N=6) 3.0% (N=13)	33.3% (N=69) 12.6% (N=26) 22.7% (N=47) 22.2% (N=46) 1% (N=2) 8.2% (N=17)	33.8% (N=70) 12.1% (N=25) 30.4% (N=63) 17.4% (N=36) 1% (N=2) 5.3% (N=11)
First-Gen Status	57.7% (N=251)***	42.1% (N=182)***	52.9% (N=109)	50.1% (N=103)

$p \leq$ ***.001; **.01; *.05

(2) Pre-college variables.

As discussed in Chapter 2, academic performance is highly correlated with college graduation. As predictors of early college academic performance, institutions use standardized tests and other quantitative measures in admission decisions. Including pre-college variables in this model is consistent with past research. For this study, pre-college variables include Predicted GPA (PGPA) and two measures for high school quality. The PGPA is a composite score calculated at Illinois and based on high school GPA, class ranking, and ACT. The ACT is a standardized test used in admission decisions, with the Composite ACT score ranging from 1 (low) to 36 (high), and it is the average of the four tests (English, mathematics, reading, and science). For descriptive purposes, Composite ACT mean and standard deviation scores are provided in Table 4.4. For this study, the PGPA is a stronger predictor for graduation than the Composite ACT score and therefore is used in the regression models instead of Composite ACT. PGPA is an academic factor separate from the financial nexus, but is important to include to address potential omitted variable bias.

The Illinois State Board of Education Report Cards are examined for each Illinois public school attended by students in the sample. The two quality measures from the Report Cards utilized for this study are percent of high school seniors graduating and percent of high school seniors "college ready," which is defined as reaching a minimum average Composite ACT score of 21. High school quality data are not available for private school students, out-of-state students, and some in-state students. Mean substitution is used to fill in missing values. This method is viable since a t-test showed no significant differences in the graduation rates for students with the high school quality data as compared to students with whom such data were not available.

Descriptive statistics of these pre-college variables for the sample are below in Table 4.4.

Table 4.4: Descriptive Statistics – Pre-college Variables

Characteristics	4-Year		5-Year	
	TX (I-Promise) N=434	Comparison N=434	TX (I-Promise) N=207	Comparison N=207
Composite ACT	24.20 (4.25)	25.54 (4.69)	24.52 (4.375)	24.42 (4.728)
PGPA	2.988 (.212)	2.966 (.299)	2.986 (.241)**	2.904 (.337)**

HS Quality
   % graduating
   % college ready
	87.63% (10.07)
	47.75% (30.04)
		89.96% (8.79)
		54.52% (28.07)
			87.75% (6.84)
			48.55% (18.66)
				88.36% (4.61)
				48.95 (15.59)

p≤***.001; **.01; *.05

Independent t-tests reveal no statistical differences between the treatment and comparison groups on these pre-college variables in year four. In this regard, both the treatment and the comparison groups are highly comparable in terms of pre-college measures of academic ability and high school's ability to help with college preparation. The subsample for year five does show a statistically significance difference with PGPA between the treatment and comparison group.

(3) College variables.

College variables address weaknesses with omitted variable bias in previous studies examining the impact of financial aid on student success outcomes. If a college variable is included, it is typically cumulative GPA or a grouping of GPA based on categories. The college

variables utilized here for descriptive purposes include: 1) cohort year (2007 – 2010); 2) initial college enrolled (versus college in which a student may transfer once enrolled); 3) factors relating to their first semester on campus – first-semester GPA, credit hours (differences between attempted versus earned and whether or not at least 15 credit hours were earned during the first semester), initial major (whether it was STEM and whether student initially enrolled without a declared major); and 4) factors relating to subsequent years on campus – final major (STEM or non-STEM), mean number of major changes, mean number of summer sessions enrolled, studied abroad, whether at least one stopout occurs during fall or spring semesters, and whether financial aid is withheld for at least one semester for not meeting Satisfactory Academic Progress (SAP).

During the sampling period for this study (2007-2010), students could initially enroll in one of eight colleges or institutes (Agricultural and Consumer Economics – ACES; Business – BUS; Education – ED; Engineering – ENG; Fine and Applied Arts – FAA; Media; Liberal Arts and Sciences – LAS; Division of General Studies – DGS; Applied Health Sciences – AHS; and Aviation). Two slight exceptions: the first class of undeclared students enrolled in DGS in 2008 and freshman began enrolling in the College of Media also in 2008. Financial nexus theory does not provide predictions based on college enrolled – it is included here to control for fixed effects that might be associated with colleges (some are more selective than others).

Fifteen hours (versus 12 credit hours that is considered full-time status) is the measure used because it is not possible to graduate in four years by enrolling in 12 credit hours fall and spring semesters. All of these factors can impact college graduation. In Table 4.5 below, descriptive statistics on these college variables are presented.

Table 4.5: Descriptive Statistics – College Variables

Characteristics	4-Year		5-Year	
	TX (I-Promise) N=434	Comparison N=434	TX (I-Promise) N=207	Comparison N=207
Cohort				
2007	23.0% (N=100)*	15.4% (N=67)*	30% (N=62)	23.2% (N=48)
2008	24.0% (N=104)	19.4% (N=84)	29.5% (N=61)	30% (N=62)
2009	29.0% (N=126)	27.4% (N=119)	40.6% (N=84)	46.9% (N=97)
2010	24.0% (N=104)***	37.8% (N=164)***		
Initial College Enrolled				
ACES	4.8% (N=21)	5.3% (N=23)	5.8% (N=12)	3.4% (N=7)
BUS	5.8% (N=25)	8.8% (N=38)	7.7% (N=16)	8.7% (N=18)
ED	1.2% (N=5)	0.9% (N=4)	1% (N=2)	1% (N=2)
ENG	7.6% (N=33)**	14.3% (N=62)**	8.2% (N=17)	11.1% (N=23)
FAA	4.1% (N=18)	4.1% (N=18)	2.9% (N=6)	3.9% (N=8)
MEDIA	1.2% (N=5)	1.2% (N=5)	1% (N=2)	0.5% (N=1)
LAS	42.9% (N=186)	37.6% (N=163)	45.9% (N=95)	43.5% (N=90)
DGS	27.9% (N=121)	25.1% (N=109)	20.8% (N=43)	24.6% (N=51)
AHS	3.5% (N=15)	2.8% (N=12)	4.3% (N=9)	3.4% (N=7)
AVIATION	1.2% (N=5)	0.0% (N=0)	2.4% (N=5)*	0% (N=0)*
First-semester GPA	2.9199 (.76950)	2.9122 (.79179)	2.87 (.77324)	2.81 (.81725)
Earned less than attempted credit hours first semester	17.5% (N=76)	17.5% (N=76)	16.9% (N=35)	20.3% (N=42)
Earned less than 15 credit hours first semester	40.3% (N=175)**	49.0% (N=213)**	44.9% (N=93)*	57% (N=118)*
Initial STEM Major	24.0% (N=104)**	31.8% (N=138)**	28% (N=58)	28% (N=58)
Initial "undecided" major	45.0% (N=195)**	37.3% (N=162)**	37.2% (N=77)	42.5% (N=88)
STEM major last semester enrolled	33.6% (N=145)	37.3% (N=157)	36.6% (N=75)	30.8% (N=62)
Mean Number Majors	1.86 (.678)**	1.75 (.669)**	1.86 (.736)	1.80 (.693)
Studied Abroad	10.1% (N=44)	9.0% (N=39)	8.7% (N=18)	10.1% (N=21)
Stopout for at least one fall or spring semester	5.5% (N=24)	7.0% (N=30)	5.3% (N=11)	6.8% (N=14)

Table 4.5 (cont.): Descriptive Statistics – College Variables

Characteristics	4-Year		5-Year	
	TX (I-Promise) N=434	Comparison N=434	TX (I-Promise) N=207	Comparison N=207
Did not meet SAP requirements and had financial aid withheld at least one semester	3.2% (N=14)	3.9% (N=17)	3.4% (N=7)	4.3% (N=9)
Mean Number Terms Enrolled	10.34 (3.334)	9.97 (3.600)	8.49 (2.671)*	7.82 (3.067)*
Mean Summer Session Enrolled	0.85 (1.049)	0.83 (1.047)	0.92 (1.103)	0.90 (1.148)

$p \leq$ ***.001; **.01; *.05

Pearson Chi-Square tests reveal a significant difference in the number of comparison group students admitted in 2007 and 2010 (four-year sample). Dummy variables for each of the four cohorts are included in the model to control for fixed effects associated with the cohorts. The same approach is employed for college initially enrolled. The significance in mean number of major changes can be explained because a significantly higher percent of Illinois Promise students is initially admitted without a declared major. This means they would at least have one additional major change because of this initial "undecided" status. For this reason, number of major changes is not included in the regression model. The comparison group, while earning a similar first-semester GPA compared to the treatment group, is significantly less on track with earned credit hours after the first semester. The mean number of summer sessions is not significantly different, which suggests these students who are significantly more likely to enroll in STEM majors take fewer courses the first semester and do not make it up over summer session, at least at the University of Illinois at Urbana-Champaign.

Formal mentoring through I-Promise is one support variable available for analysis. As noted in Chapter 3, the aim of the formal mentoring program is to help ease the transition to

college and has voluntary participation (both student mentees and adult mentors). Since it is unknown if any students in the comparison group had a formal mentor, a sensitivity analysis is conducted comparing I-Promise students in the sample who had a formal mentor (N=69) to I-Promise students who did not have a formal mentor on the dependent variables of both first-semester GPA and four-year graduation. Results from the sensitivity analysis are presented in Chapter 5.

Independent Variables

There are many components of financial aid, including grants, scholarships, and loans. As Illinois Promise is a "last dollar" grant, it is important to know the other components of financial aid. These components include grants, scholarships, waivers, federal work study (FWS), and loans. According to the University of Illinois Financial Aid website (2016), "grants are awarded based on demonstrated financial need and do not need to be repaid." An example is the Federal Pell Grant and the state of Illinois Monetary Assistance Program (MAP) grant. "Scholarships are a form of gift aid that also doesn't require repayment." They are generally awarded on a variety of factors, including financial need. Waivers reduce the cost of tuition and are used to meet university strategic recruitment objectives in "attracting high-ability students, adding to the diversity of the student population, and removing financial barriers to maintain access for all qualified students." Federal Work Study (FWS) provides funds for part-time employment to help needy students to finance the costs of education with the institution paying up to half of the student wages and the government paying the rest. Students can, of course, also work in non-FWS positions on or off campus. Distinguishing between on-campus and off campus work is not known through these data. Loans need to be repaid and there are various types – need based, non-need based, and other. For the purpose of this study, Parent Plus loans are separated from

other loans in the descriptive statistics. "Parent Plus loans are federal loans parents may borrow to help pay the educational expenses of a dependent undergraduate student enrolled in at least 6 credit hours a semester" (OSFA, 2015). There are strict requirements for eligibility of a Parent Plus loan, such as the borrower can't be 90 days or more delinquent on the repayment of any debt. Unlike federal subsidized loans, interest on Parent Plus loans is charged from the time the loan funds are disbursed until it's paid in full.

The mix of loan and non-loan support at the University of Illinois at Urbana-Champaign is broadly comparable to the mix at most flagship public universities, but all universities independently set financial aid policies. These policies are set within the larger policy context. At the federal level, the Pell Grant and the Stafford Loan provide the bulk of aid to college students with financial need, though the amounts available through both sources are limited. For example, the maximum amount awarded through the Pell Grant in academic year 2016-17 is $5,815, which would cover less than 20 percent of the in-state cost of attendance at Illinois. At the state level, subsidies shifted in the early 1990s from grants being awarded through means testing to grants being award based on merit criteria. The shift was a reduction from 90 to 70 percent in need-based state grant aid over a ten-year period (National Association of State Student Grant & Aid Programs, 2012). These merit-based grants were disproportionately awarded to higher income students since the criteria for awarding merit grants (GPA, standardized test scores) are highly correlated with income (Ehrenberg, Zhang, & Levin, 2005). At an institutional level, the trend has been similar with undergraduate grant awards based on financial need declining from 65 percent to 45 percent (Heller, 2013). Because of these and other trends, national student college debt is a growing crisis, exceeding national credit card debt

(Kantrowitz, 2010) and is now over $1.35 trillion dollars (http://finaid.org). The most recent trend is the loan replacement grants, like I-Promise, that are described in Chapter 3.

Since 2004, The University of Illinois at Urbana-Champaign has had a guaranteed tuition plan for full and part-time students (non-degree students are ineligible). This means that whatever tuition is set for freshman year in which a student is enrolled remains for four years. This allows for families to better plan for the cost of college. It does not impact other associated costs of attendance, such as fees, room and board, and books and supplies.

The elements of the Cost of Attendance (CoA) for the years of initial enrollment in this study are detailed in Table 4.6. This information is derived from the "Tuition Book," which has been presented annually to the University of Illinois Board of Trustees since 1977. Out-of-State CoA data for these years is provided by the Office of Student Financial Aid (OSFA). Note these are standard rates; CoA varies by residency and by program of study. Though all I-Promise students are Illinois residents, 36 students in the comparison group are out-of-state and two are international. While no longer the case, during the time of this study, international students are charged the same rate for tuition as out-of-state students, which as noted below, is higher than Illinois residency. Personal costs (for incidentals, such as travel) are estimated at $2,500 per year, which for a student coming from a low-income background could be perceived as excessive.

Table 4.6: Cost of Attendance

Year	Residency	Tuition & Fees (Base Rate)	Room & Board, Books & Supplies & Personal	Total
2007-08	In-state	$11,130	$12,020	$23,150
	Out-of-State	$25,798	$13,424	$39,222
2008-09	In-state	$12,106	$12,608	$24,714
	Out-of-State	$26,298	$13,424	$39,722
2009-10	In-state	$12,528	$13,128	$25,656
	Out-of-State	$26,898	$13,424	$40,322
2010-11	In-state	$13,508	$13,574	$27,082
	Out-of-State	$27,800	$13,424	$41,224

Table 4.7 provides descriptive statistics on the mean and standard deviation of different funding sources through financial aid for both treatment and comparison groups. Note financial aid award information is based on semester whereas CoA is based on year. Unmet need is also calculated. Unmet need information is derived from first-year enrollment of CoA minus financial aid (loans, non-loans, and work study) for in-state, non-athlete students. Unmet need can change year-by-year based on CoA and financial aid awarded.

Table 4.7: Descriptive Statistics – Financial Aid

Funding Sources x Semester N = 865 Mean (SD)	TX (I-Promise) N=434	Comparison N=431
a. Parent Plus Loans	$37*** ($259) N=23	$744*** ($2,100) N=111
b. All other loans	$1,247*** ($1,010) N=356	$2,482*** ($1,792) N=366
Total Loans (a+b)	$1,284	$3,228
c. I-Promise	$1,590*** ($1,175) N=393	$0.00*** ($0) N=0
d. All other scholarships	$3,699 ($1,795) N=432	$3,645 ($3,526) N=412
e. I-Promise Waiver	$246*** ($558) N=101	$0.00*** ($0) N=0
f. Other waivers	$242*** ($710) N=197	$591*** ($1,078) N=237
g. Pell Grant	$2,528*** ($344) N=434	$2,356*** ($573) N=427
h. All other grants (including MAP)	$2,597*** ($458) N=434	$1,953*** ($1,191) N=401
Total Non-Loans (c+d+e+f+g+h)	$10,902	$8,545

Table 4.7 (cont.): Descriptive Statistics – Financial Aid

Funding Sources x Semester N = 865 Mean (SD)	TX (I-Promise) N=434	Comparison N=431
Work Study	$441** ($556) N=297	$353** ($537) N=262
Unmet Need	$1598*** ($2248) N=358	$1860*** ($2688) N=372

p≤***.001; **.01; *.05

There is a statistically significant difference between the treatment and comparison groups on all except one of the financial aid components. The comparison group takes out significantly more loans. Except for the "other scholarship" category, the treatment group receives statistically more grants and scholarships. Out of all the financial aid categories, it is other scholarships that provide, on average, the most for both the treatment and comparison groups. On average, 90 percent of a financial aid package for I-Promise students is covered by non-loans compared to 73 percent for students in the comparison group. This means the treatment and comparison groups represents a proportionate difference in the combination of loans and non-loans. In other words, the comparison group did receive similar scholarship support, but was not guaranteed a "last dollar" grant to cover their educational costs.

The unmet need represents on average a difference of $262 per semester between the treatment and comparison group, which is statistically significant. The annual $2,500 work study component for I-Promise students, on average, is not earned. As illustrated in Table 4.7, instead the average work study per semester is $441 for I-Promise students and $353 for the comparison group. This could mean these students, on average, keep their personal expenses to a minimum and not spend the $2,500 in personal costs estimated by the university in the CoA. The statistically significant differences in the financial aid variables are not surprising since the

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research questions the impact of a loan replacement grant for low-income students on graduation.

Still, it is important to state that the treatment and comparison group's non-loans are more

similar than what was expected. How these financial aid factors matter is explored in the

regression models. As the financial data are skewed, the data is transformed to z scores for use in

the regression. For two of the financial aid variables (parent plus loans and other waivers) over

half of the students in the sample receive zero financial support. For these two variables, dummy

variables are used with 1 equal to receiving financial support and 0 equal to no financial support

in order to more fully take into account the skewed distribution.

Table 4.8 summarizes the coding scheme for the variables in the regression.

Table 4.8: Regression Variables

Variable	Category	Type	Code	Reference
Treatment or Comparison	IV	Categorical	1=Treatment 0=Comparison	
Race	CV -	Categorical	1=Yes 0=No	White, Non-Hispanic; Multi-racial, Other
Gender	CV	Categorical	Male=1 Female=0	
First-Generation	CV	Categorical	First-Gen=1 Non-first-gen=0	
PGPA	CV	Continuous		
HS Graduates	CV	Continuous		
HS "College Ready"	CV	Continuous		
Cohort Year	CV	Categorical	1=Yes 0=No	2008
Initial College Enrolled	CV	Categorical	1=Yes 0=No	ACES, Ed, Media, Aviation
First-Sem GPA	CV	Continuous		
Earned < attempted credit hours, 1st Sem	CV	Categorical	1=Yes 0=No	
Earned < 15 credit hours 1st Sem	CV	Categorical	1=Yes 0=No	
Undecided major - enrollment	CV	Categorical	1=Yes 0=No	
STEM major – last semester enrolled	CV	Categorical	1=Yes 0=No	
Studied Abroad	CV	Categorical	1=Yes 0=No	

Table 4.8 (cont.): Regression Variables

Variable	Category	Type	Code	Reference
Stopout	CV	Categorical	1=Yes 0=No	
Lost Fin Aid b/c SAP	CV	Categorical	1=Yes 0=No	
Enrolled Su	CV	Continuous		
Parent Plus Loan	IV	Continuous		
Other Loans	IV	Continuous		
Other Scholarships	IV	Continuous		
Other Waivers	IV	Continuous		
Pell Grant	IV	Continuous		
Other Grant	IV	Continuous		
Work Study	IV	Continuous		
4-Year Graduation	DV	Categorical	1=Yes 0=No	
5-Year Graduation	DV	Categorical	1=Yes 0=No	

Logistic Regression Models

Figure 4.4 is a visual representation of the regression models to be tested. On the left side is the independent variable of financial aid, with the primary distinction being whether the individual has the Illinois Promise grant or not. Additional analysis will assess the impact of different forms of financial aid as indicated in the box below Illinois Promise. The control variables are the in the next column and represent demographic, pre-college, and college factors. As will be seen below, model one does not include the college variables and models two and three will include college variables. Model three will further add average loans and non-loans variables. Finally, the dependent variables are four-year and five-year college graduation, which are both dichotomous variables.
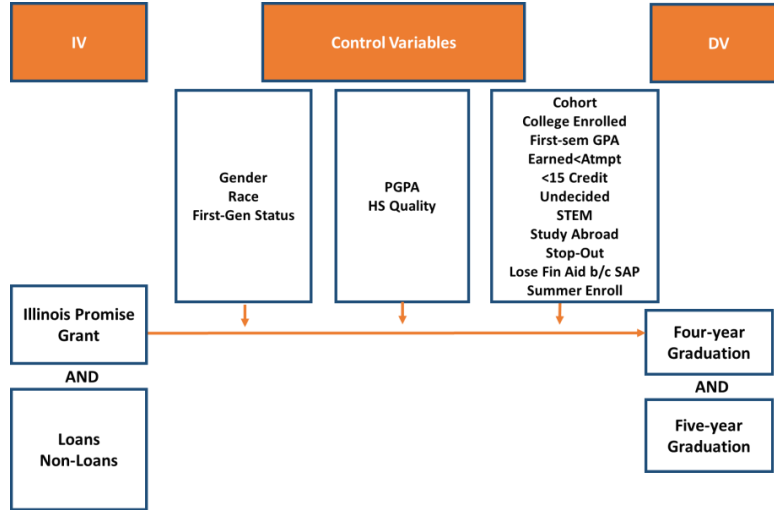
Figure 4.4: Model Visualization

Table 4.9 translates the visualization in Figure 4.4 to three key logistic regression models, although Chapter 5 results will build within each of the models. In all of the models, the central hypothesis is that the full financial aid package provided through Illinois Promise will have a positive and significant impact on the likelihood of four-year or five-year graduation. In Model 1, additional independent effects of race, gender, first-generation status and pre-college variables (PGPA, high school quality) are assessed. To the extent to which these variables are a proxy for class, they provide further insights relevant to the financial nexus theory. Whites, non-Hispanics, multiracial and "other" are the excluded race categories in order to keep the regression from being over specified. The White, non-Hispanic group is selected because they have the highest graduation rate at the University of Illinois at Urbana-Champaign and the other two race categories are included in the reference group because the number of students who self-identified are small. These demographic factors are control variables because extensive research has identified their independent effects on graduation (Attewell, Heil & Reisel, 2011; Chen & Carroll, 2005; Fisher, 2007; King, 1999; Yizar, 2010).

Control variables for cohort years and colleges are also included in Model 1 to control for fixed effects. This includes a policy change that affected only the 2007 cohort differently than others (students with undeclared majors were moved from the college of Liberal Arts and Sciences to the newly created Division of General Studies), and a higher proportion of students are in the 2010 comparison group. To keep the regression from being over specified, the dummy variable for 2008 is excluded. These cohort controls will also address any fixed effects associated with the economy. Graduation rates vary by college across the university and leaving this variable out of the regression would represent a potential omitted variable bias. The ACES college is the excluded variable as it represents an approximate mid-point between the largest and smallest colleges in terms of sample enrollment. Also excluded is the Institute of Aviation, College of Media, and College of Education because of the small number of students in the sample who are enrolled in these colleges.

Model 2 adds to the previous model by including college variables. These are important since a vast literature exists on the importance of academic performance on college graduation. (A basic EBSCO search of undergraduate academic predictors of graduation yielded over 4,000 hits.) Yet, such variables are often omitted in studies assessing the impact of financial aid. Including these academic variables is a further contribution of this proposed research since most of financial aid research only focuses on economics and most studies on academics have limited economic information.

The final model allows for decomposition of the independent effects of different types of aid and average amounts on college graduation. Components of loans (Parent Plus and Other Loans), non-loans (grants, scholarships, and waivers), and work study are standardized as z scores for ease of analysis (Raikes, Berling, and Davis, 2012) with two exceptions. These

exceptions include parent plus loans and other waiver; these financial variables are highly skewed (more than half of the students do not receive either type of financial support) and are converted to dummy variables. These transformations reduce the influence of outliers in the data. The second hypothesis to be tested with this model is that non-loans have a positive and significant impact on graduation in comparison to loans.

Table 4.9: Regression Models

Variables	Model 1 DV= Grad (4 and 5 Year)	Model 2 DV= Grad (4 and 5 Year)	Model 3 DV= Grad (4 and 5 Year)
Treatment Illinois Promise (=1)	X	X	X
Race Black/African American, Non-Hispanic Latino/a/Hispanic Asian or Pacific Islander (White, Non-Hispanic, Multiracial, Other)	X	X	X
Gender Male (=1)	X	X	X
PGPA	X	X	X
First-Generation Status Yes (=1)	X	X	X
High School Quality % graduated % college ready	X	X	X
Cohort 2007 2009 2010 (2008)	X	X	X
Initial College Enrolled BUS ENG FAA LAS DGS AHS (ACES, ED, MEDIA, AVIATION)	X	X	X

Table 4.9 (cont.): Regression Models

Variables	Model 1 DV= Grad (4 and 5 Year)	Model 2 DV= Grad (4 and 5 Year)	Model 3 DV= Grad (4 and 5 Year)
College Variables First-Semester GPA Earned less than attempted credit hours (CH) 1st sem Earned less than 15 CH 1st sem Undecided Major STEM (End) Major Studied Abroad Stopout (Spring or fall) Enrolled Summer Classes		X	X
Financial Support (Sem. Avg.) Avg. Total Loans (z score) -Parent Plus (dummy variable) -Other Loans (z score) Avg. Total Non-Loans -Other Scholarships (z score) -Other Waivers (z score) -Pell Grant (z score) -Other Grants (dummy variable) Work Study (z score)			X

In summary, the models proposed here enable testing of the two hypotheses:

H1: Receiving Illinois Promise will have a positive and significant impact on the

likelihood of graduating in four and five years in relation to the comparison group**.**

Models 1, 2

H2: Non-loans have a positive impact on four and five-year graduation in comparison to

loans. **Model 3**

Human Subjects Consideration

       As institutional data are used, human subjects considerations do not apply. This research was approved by the IRB in case results are presented to an audience broader than the University of Illinois at Urbana-Champaign.

CHAPTER 5

RESULTS

This research has two central hypotheses. The first hypothesis is that receiving I-Promise will have a positive and significant impact on the likelihood of graduation in four years and five years in relation to the comparison group. The second hypothesis is that non-loans (scholarships, grants, and waivers) will have a positive and significant impact on four and five-ear graduation in comparison to loans.

A comparison group is identified using PSM. As indicated in Chapter 4, the profile of the treatment and comparison groups with respect to loans and non-loans (and other variables) is quite similar. I-Promise students on average receive 90 percent of their financial aid through non-loans (fall and spring semesters only) while the comparison group receives on average 73 percent of their financial aid through non-loans. Considering this finding, the first hypothesis is really testing the likelihood of graduating for low-income students in a program with very high levels of non-loan support as compared to students not in the program but who have high levels of non-loan support. That is, this is not an all or nothing test when it comes to the treatment and comparison groups. As it relates to the financial nexus theory, the I-Promise students still have the guarantee of full financial support for all four years of college assuming students meet continued eligibility criteria; the comparison group does not. Similarly, with hypothesis two, it is a test of 90 percent non-loan support compared to 73 percent non-loan support.

To test the first hypothesis a logistic regression model with just treatment and comparison is run for four-year graduation. As reported in Chapter 4, descriptive statistics show I-Promise students in the sample graduate at a rate of 56.5 percent in four years in contrast to the comparison group that graduates at a rate of 51.8 percent. The results are in Table 5.1, which

indicate that the first hypothesis is not supported. That is, even though the descriptive statistics

indicate I-Promise students graduate at a higher rate, this difference is not statistically significant

in four-year graduation rates.

Table 5.1: Four-Year Graduation – Treatment/Comparison

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.186	.136	.173	1.204
Constant	.074	.096	.443	1.077

.002 Cox & Snell R Square; .000 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

To further explore the first hypothesis, an examination of the impact of the I-Promise

grant is tested with a logistic regression model for five-year graduation. To maintain one-to-one

matched pairs, the N is reduced from 868 to 414 since students matched or in the 2010 cohort are

excluded (the dataset only extends through summer, 2014). As indicated in Chapter 4, the five-

year graduation rate is 74.4 percent for I-Promise students in contrast to 67.3 percent for the

comparison group. The results in Table 5.2 show that the first hypothesis is supported. That is,

there is a significant difference in five-year graduation rates between I-Promise students and the

comparison group.

Table 5.2: Five-Year Graduation – Treatment/Comparison

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.456	.221	.039*	1.577
Constant	.715	.148	.000***	2.044

.010 Cox & Snell R Square; .000 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

The financial nexus theory is based on the assumption that there is heterogeneity among

students. Table 5.3 adds to the four-year model race, gender, and first-generation college status.

Among the racial categories, the main excluded category is White students because they have the

highest graduation rates overall in the university. Note that multiracial and "other" are also

excluded categories. The number of students in both categories is relatively small as presented in

Chapter 4. Results show low-income Black students relative to low-income White, multiracial and "other" students are significantly less likely to graduate in four years. Low-income male students are significantly less likely to graduate in four-years than low-income female students. There is no statistical difference in first-generation status and four-year college graduation.

Table 5.3: Four-Year Graduation – Treatment/Comparison, Demographics

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.159	.143	.266	1.172
Black	-.507	.182	.005**	.603
Hispanic	-.070	.235	.764	.932
Asian	.282	.188	.134	1.326
Male	-.539	.141	.000***	.584
First-Generation	.232	.143	.104	1.262
Constant	.328	.179	.067	1.389

.040 Cox & Snell R Square; .769 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

The same demographic variables are applied to a logistic regression testing five-year graduation rates, which is in Table 5.4. The five-year main effect (treatment versus comparison) remains significant when the demographic variables are added. What also is significant is that low-income Hispanic and low-income Asian students are more likely to graduate within a five-year time frame compared to low-income White, multiracial and "other" students. (Note: there are only two multiracial students in the five-year dataset.) For males, while there was a statistically significant difference in four-year graduation, it disappears in five years.

Table 5.4: Five-Year Graduation – Treatment/Comparison, Demographics

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.571	.234	.015*	1.770
Black	-.009	.267	.974	.991
Hispanic	1.524	.486	.002**	4.592
Asian	1.320	.339	.000***	3.744
Male	-.296	.232	.202	.744
First-Generation	-.043	.233	.854	.958
Constant	.410	.296	.166	1.506

.088 Cox & Snell R Square; .130 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

Previous research on the impact of financial aid on college graduation often suffers from omitted variable bias in that academic data in regression models is limited to standardized test scores and /or GPA. Table 5.5 introduces in the regression a number of pre-college and college variables in order to see if the hypothesized treatment effect changes when taking into account academic ability and performance. Although there is no change in treatment versus comparison in four-year graduation, there are a number of observed effects to be noted with these additional variables.

Academic factors matter for low-income students graduating from college in four years. Early indicators have positive predictive value and additional later indicators are also important. Specifically, low-income students who have a higher predicted GPA (PGPA is determined through an algorithm combining ACT and high school factors), is a positive and significant likelihood of four-year graduation. Of note is that ACT is omitted from the model as PGPA is a more robust predictor. First-semester GPA is a positive and significant predictor of four-year graduation for these low-income students, which is consistent with previous research (Gershenfeld, Ward Hood, Zhan, 2015). As low-income students continue in college, if they do not stopout during a fall or spring semester (for whatever reason) and consistently meet Satisfactory Academic Progress (SAP) requirements set by the university, they are significantly more likely to graduate in four-years. Finally, low-income students who are in non-STEM majors are significantly more likely to graduate in four-years. The model also controls for cohort year and initial college enrolled, neither of which impacts four-year graduation.

None of the academic findings are surprising as there has been extensive research on the importance of academics and college graduation (summarized in Chapter 2). Nonetheless, these findings validate policy decisions for admissions and support services that are based on these

specific academic factors. For example, interventions targeted to students with low first-semester

GPAs would be supported by this research. Similarly, decisions that result in students stopping

out a semester are highly consequential when it comes to four-year graduation.

Table 5.5: Four-Year Graduation – Treatment/Comparison, Demographics,
Pre-College and College

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.028	.162	.863	1.028
Black	-.127	.234	.588	.881
Hispanic	.019	.266	.944	1.019
Asian	.377	.215	.079	1.458
Male	-.385	.163	.018*	.680
First-Generation	.272	.164	.097	1.312
Predicted GPA (PGPA)	1.326	.368	.000***	3.764
% of students graduating from high school attended	.030	.023	.189	1.031
% of students graduating from high school attended who are "college ready" (minimum composite ACT 21)	.001	.008	.876	1.001
2007-08 Cohort	.092	.264	.727	1.096
2009-10 Cohort	.049	.224	.826	1.050
2010-11 Cohort	.191	.223	.393	1.210
Initial College Enrolled (ICE) - Business	.668	.426	.116	1.951
ICE - Engineering	-.462	.391	.237	.630
ICE – Fine & Applied Arts	.413	.482	.391	1.511
ICE – Liberal Arts & Sciences	.062	.319	.846	1.064
Division of General Studies	.381	.424	.369	1.464
ICE - AHS	-.334	.547	.541	.716
First-Semester GPA	.585	.130	.000***	1.796
Earned less than attempted credit hours first semester enrolled	-.074	.131	.572	.929
Earned less than 15 credit hours first semester enrolled	-.292	.171	.088	.747
Undecided major upon enrollment	-.123	.284	.664	.884
STEM major last semester enrolled	-.473	.197	.016*	.623
Studied abroad	.015	.279	.957	1.015
Stopout for at least one fall or spring semester (reason unknown)	-1.316	.377	.000***	.268
Did not meet SAP requirements and had financial aid withheld at least one semester	-2.597	.757	.001***	.075
Enrolled in summer classes at Illinois	.140	.080	.081	1.150
Constant	-8.049	2.168	.000***	.000

.192 Cox & Snell R Square; .789 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

In the five-year model that just included treatment/comparison and demographic

variables, there is a significant effect of the treatment on graduation. As Table 5.6 shows, this

effect is no longer significant when academic variables are added; however, the main effect will become evident again in the final model. This suggests that certain academic variables are accounting for some of the variance that is being explained by the treatment/comparison variable. Academic variables that remain significant in the five-year model include PGPA, first-semester GPA, and losing financial aid for at least one semester for not meeting SAP requirements. Academic variables that are significant in the four-year model that are no longer significant in the five-year model include STEM major and stopping out for at least one semester. Some STEM majors have course requirements that make four-year completion difficult, such as engineering, animal sciences, and architecture. Thus, the findings in four-year and five-year graduation rates as it relates to STEM majors is not surprising. Similarly, it is logical that four-year graduation would be more difficult if a student stops out one semester while this might not negatively affect five-year graduation rates for low-income students.

There are three new variables that are significant (or approaching significance) in the five-year compared to four-year graduation model when adding academic factors. Low-income students who enroll in the university with an undecided major are significantly less likely to graduate in five years. The percentage of low-income student who are undecided and who graduate in five years is 66.7 compared to 75.1 percent of low-income students who upon enrollment declared a major and graduated in five years. This highlights the importance of advising and other support services for undecided low-income students upon enrollment.

Slightly less than 10 percent of the low-income students (9.6 percent) in the sample studied abroad. These students were significantly more likely to graduate in five years, which might also have implications for advising and other support services.

More than half of the low-income students in the sample (51.9 percent) enroll in classes at Illinois for at least one summer session. In fact, 26.5 percent enroll for more than one summer session. Low-income students who enroll for at least one summer session are significantly more likely to graduate in five years. The I-Promise grant for the treatment group does not cover summer support (unless in highly exceptional circumstances, such as a class is only offered during the summer and is needed for graduation). Sixty-four percent of average debt accumulated per year by I-Promise students is due to loans during summer session.

Table 5.6: Five-Year Graduation – Treatment/Comparison,
Demographics, Pre-College and College

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.420	.289	.147	1.522
Black	.438	.360	.224	1.550
Hispanic	2.017	.598	.001***	7.518
Asian	1.669	.425	.000***	5.309
Male	-.159	.290	.583	.853
First-Generation	-.211	.292	.470	.810
Predicted GPA (PGPA)	1.218	.547	.026*	3.382
% of students graduating from high school attended	-.042	.037	.261	.959
% of students graduating from high school attended who are "college ready" (minimum composite ACT 21)	.026	.014	.058	1.026
2007-08 Cohort	.290	.404	.473	1.337
2009-10 Cohort	.048	.328	.883	1.049
Initial College Enrolled (ICE) - Business	.073	.806	.928	1.075
ICE - Engineering	-.972	.740	.189	.378
ICE – Fine & Applied Arts	-1.247	.855	.145	.287
ICE – Liberal Arts & Sciences	-.579	.630	.357	.560
Division of General Studies	.922	.818	.260	2.515
ICE - AHS	-.463	.881	.599	.629
First-Semester GPA	.927	.225	.000***	2.528
Earned less than attempted credit hours first semester enrolled	.601	.426	.159	1.824
Earned less than 15 credit hours first semester enrolled	-.353	.311	.257	.703
Undecided major upon enrollment	-.932	.477	.051*	.394
STEM major last semester enrolled	-.328	.357	.359	.721
Studied abroad	1.632	.808	.044*	5.112
Stopout for at least one fall or spring semester (reason unknown)	-.673	.537	.210	.510

Table 5.6 (cont.): Five-Year Graduation – Treatment/Comparison,
Demographics, Pre-College and College

	B	S.E.	Sig.	Exp(B)
Did not meet SAP requirements and had financial aid withheld at least one semester	-2.082	.642	.001***	.125
Enrolled in summer classes at Illinois	.492	.150	.001***	1.635
Constant	-3.024	3.324	.363	.049

.273 Cox & Snell R Square; .908 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

The second hypothesis is that non-loans (scholarships, grants, and waivers) will have a positive and significant impact on four and five-year graduation in comparison to loans. As outlined in Chapter 4, loans categories are Parent Plus loans and all other loans. Non-loans are categorized as scholarships, grants, and waivers. Additionally, students can earn money and this employment is categorized as work study. For ease of analysis, average amounts of loans, non-loans, and work study were converted to standardized z scores with a mean of 0 and a standard deviation of 1. Two of the financial variables that are highly skewed (more than half of the students do not receive either type of financial support) – parent plus loans and other waivers – are converted to dummy variables. These transformations reduce the influence of outliers in the data. As was the case with the first two tables of this chapter, the analysis for hypothesis two begins with just the financial variables in a logistic regression.

Table 5.7 indicates the second hypothesis is not supported. That is, in four-year graduation, the amount of loans are not statistically significant.as a predictor of graduation. Similarly, the amount of non-loans is not a statistically significant predictor of four-year graduation. This means that low-income students in both the treatment and comparison groups are not significantly more or less likely to graduate based on loan and non-loan amounts.

The ability of low-income students to contribute toward the cost of their education is not hypothesized. Financial aid packages for I-Promise students include federal work study (FWS),

in which students work 10-12 hours per week and contribute $2,500 toward the cost of education. Students do not have to accept the FWS, but they are responsible for contributing this amount toward their education unless they had other scholarships to cover it. Students could also choose to work off campus in a non-FWS position.

There is evidence in these data that students who work and earn money are significantly more likely to graduate in four-years. I-Promise students who graduate earn an average of $652 per semester while I-Promise students who do not graduate in four years earn on average $284 per semester. On average, this is still less than the expected $2,500 contribution. For the comparison group, the average amount earned per semester for graduates is $395 compared to $309 for non-graduates. There is no interaction effect between loans and work study in predicting four-year graduation.

Table 5.7: Four-Year Graduation –Average Financial Aid Sources Per Semester
(Standardized Z-Scores)

	B	S.E.	Sig.	Exp(B)
Parent Plus Loans	.012	.221	.955	1.012
Other Loans	-.136	.088	.123	.873
Illinois Promise	-.013	.082	.873	.987
Other Scholarships	-.013	.084	.873	.987
Illinois Promise Waiver	-.049	.074	.511	.953
Other Waivers	-.015	.151	.920	.985
Pell Grant	.109	.079	.166	1.115
Other Grant	.035	.079	.653	1.036
Work Study	.356	.078	.000***	1.427
Constant	.185	.101	.067	1.204

.037 Cox & Snell R Squared; .396 Homser & Lemeshow
***p≤.001; **p≤.01; *p≤.05

Using the same variables with the smaller, five-year sample, hypotheses two is also not supported. Table 5.8 does indicate that work study remains a positive and significant predictor of graduation within the five-year timeframe.

Table 5.8: Five-Year Graduation – Average Financial Aid Sources
Per Semester (Standardized Z-Scores)

	B	S.E.	Sig.	Exp(B)
Parent Plus Loans	.145	.361	.687	1.156
Other Loans	.068	.139	.622	1.071
Illinois Promise	.060	.135	.653	1.062
Other Scholarships	.094	.138	.497	1.099
Illinois Promise Waiver	-.019	.125	.879	.981
Other Waivers	.082	.246	.738	1.086
Pell Grant	.108	.122	.376	1.114
Other Grant	-.085	.124	.492	.918
Work Study	.771	.183	.000***	2.162
Constant	1.004	.187	.000***	2.729

.071 Cox & Snell R Square; .004 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

Table 5.9 represents the full model for four-year graduation. To conserve on space,
cohort and colleges are not reported; there is no difference from earlier results that were reported
on these variables.

The main effects for hypotheses one and two are not supported. That is, there is not a
statistical difference in graduation rates between low-income students receiving the I-Promise
grant with 90 percent of their financial aid package supported through non-loans compared to the
comparison group of low-income students with 73 percent of their financial aid package covered
with non-loans. This relationship continues even when accounting for the various types of loans
and non-loans.

What remained significant in the full model for these low-income students are academic
factors and work study. Key academic factors include PGPA, first-semester GPA, whether a
student is enrolled in a STEM major, whether they stopout for at least one semester, and whether
financial aid was withheld due to not meeting SAP requirements. This indicates that the relative
mix of different types of financial support in the treatment and comparison groups is less
important than academic factors. Additionally, work study remains a positive and significant

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predictor of four-year graduation. Although, there is presumably a point of diminishing returns that is not captured in these data.

Table 5.9: Four-Year Graduation – Treatment/Comparison, Demographics, Pre-College and College; Average Financial Aid Sources Per Semester (Standardized Z-Scores)

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	-.053	.188	.779	.949
Black	-.234	.241	.332	.792
Hispanic	-.021	.270	.937	.979
Asian	.397	.221	.072	1.487
Male	-.339	.167	.042*	.712
First-Generation	.268	.167	.109	1.307
Predicted GPA (PGPA)	1.272	.386	.001***	3.567
% of students graduating from high school Attended	.033	.023	.150	1.034
% of students graduating from high school attended who are "college ready" (minimum composite ACT 21)	.001	.008	.890	1.001
First-Semester GPA	.622	.133	.000***	1.862
Earned less than attempted credit hours first semester enrolled	-.108	.133	.417	.898
Earned less than 15 credit hours first semester enrolled	-.222	.174	.203	.801
Undecided major upon enrollment	-.092	.291	.752	.912
STEM major last semester enrolled	-.418	.199	.036*	.659
Studied abroad	.038	.283	.892	1.039
Stopout at least one fall or spring semester (reason unknown)	-1.261	.388	.001***	.283
Did not meet SAP requirements and had financial aid withheld at least one semester	-2.481	.762	.001***	.084
Enrolled in summer classes at Illinois	.057	.086	.509	1.059
Parent Plus Loans	-.286	.252	.257	.752
Other Loans	-.038	.102	.708	.963
Other Scholarships	-.025	.099	.798	.975
Other Waivers	-.206	.222	.354	.814
Pell Grant	.001	.098	.993	1.001
Other Grant	-.089	.103	.386	.915
Work Study	.322	.093	.001***	1.380
Constant	-8.004	2.186	.000***	.000

.207 Cox & Snell R Square; .337 Hosmer & Lemeshow
***$p \le .001$; **$p \le .01$; *$p \le .05$

Table 5.10 represents the full model for five-year graduation. As with Table 5.9, cohort and colleges are not reported to conserve on space; there is no difference from earlier results that were reported on these variables.

The main effect for hypothesis one is supported. That is, I-Promise students are significantly more likely to graduate than the comparison group when the timeframe is extended from four to five years. Consistent with the financial nexus theory, the guarantee of funding through the I-Promise grant up to four-years apparently provides a foundation to continue and complete studies by the fifth year. Other factors that are significant that did not appear in the four-year model include initially enrolling with a declared major (versus enrolling as "undecided") and enrolling for at least one summer session. Studying abroad for at least one semester also approaches significance.

What remains significant in the full five-year model are demographic variables (Hispanic and Asian low-income students are significantly more likely to graduate than low-income White, multiracial, and "other" students), first-semester GPA, and having financial aid withheld for at least one semester for not meeting SAP requirements. PGPA was significant in the partial five-year model, but is no longer significant when including financial aid variables.

The second hypothesis is not supported. As with Table 5.9, the component parts of loans and non-loans are not significant predictors of five-year graduation. That is, the differences between the matched pairs among the types of financial aid are not significant. Work study remains a significant predictor of graduation in the five-year model.

One puzzle in this table is the "other grants," which are reported as a significant and negative predictor of five-year graduation. This is contrary to what is expected. A possible explanation could be a subset of the sample receiving "other grants" that is not measured through these data, such as independent student for whom additional hurdles are present.

Table 5.10: Five-Year Graduation – Treatment/Comparison, Demographics, Pre-College and College; Average Financial Aid Sources Per Semester (Standardized Z-Scores)

	B	S.E.	Sig.	Exp(B)
Treatment vs. Comparison	.821	.351	.019*	2.273
Black	.142	.392	.718	1.152
Hispanic	2.133	.653	.001***	8.440
Asian	1.726	.450	.000***	5.618
Male	.016	.316	.958	1.017
First-Generation	-.285	.311	.359	.752
Predicted GPA (PGPA)	1.176	.636	.064	3.242
% of students graduating from high school attended	-.031	.042	.454	.969
% of students graduating from high school attended who are "college ready" (min. composite ACT 21)	.019	.014	.176	1.019
First-Semester GPA	1.161	.250	.000***	3.194
Earned less than attempted credit hours first semester enrolled	.719	.453	.113	2.052
Earned less than 15 credit hours first semester enrolled	-.295	.331	.372	.744
Undecided major upon enrollment	-1.095	.518	.035*	.335
STEM major last semester enrolled	-.304	.379	.422	.738
Studied abroad	1.550	.826	.061	4.714
Stopout at least one fall or spring semester (reason unknown)	-.841	.579	.147	.431
Did not meet SAP requirements and had financial aid withheld at least one semester	-2.191	.682	.001***	.112
Enrolled in summer classes at Illinois	.420	.165	.011*	1.522
Parent Plus Loans	.081	.478	.866	1.084
Other Loans	.191	.192	.321	1.210
Other Scholarships	-.135	.199	.497	.874
Other Waivers	-.230	.431	.593	.794
Pell Grant	-.072	.189	.703	.930
Other Grant	-.381	.184	.039*	.683
Work Study	.932	.230	.000***	2.540
Constant	-4.008	3.768	.287	.018

.326 Cox & Snell R Square; .813 Hosmer & Lemeshow
***p≤.001; **p≤.01; *p≤.05

In all of the models that include financial aid variables, work study is positive and significant as a predictor of four and five-year graduation. Chart 5.1 more fully illustrates the relationship between work study and the probability of graduation (in this case, the scatterplot shows the relationship for four-year graduation). A linear regression line is added indicating the positive relationship.

Chart 5.1: Work Study and Probability of 4-Year Graduation
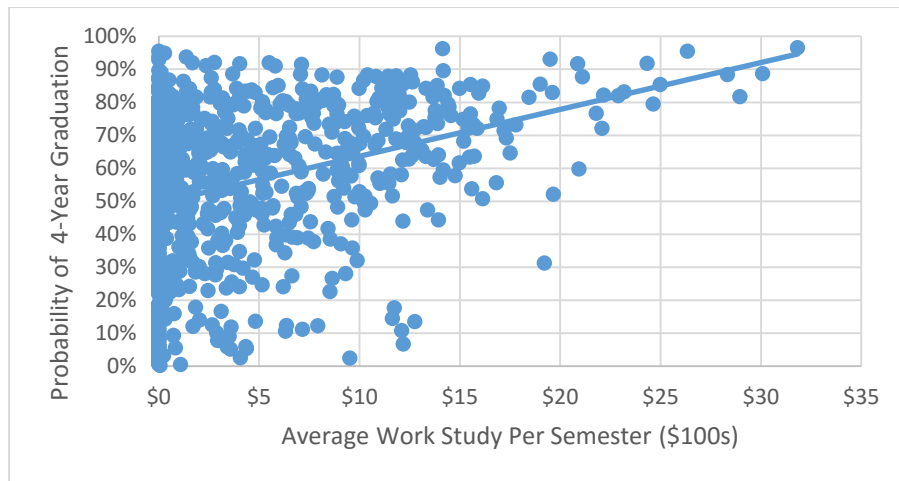
The models presented cover treatment and comparison, demographics, pre-college and academic, and financial aid factors. Although it is not possible in this analysis to measure targeted support services in models that included the matched pairs, it is possible to conduct a sensitivity analysis measuring I-Promise students who had mentors through the I-Promise program. Sixty-nine I-Promise students in the 2009 and 2010 cohorts had I-Promise mentors (out of 230). There are no significant observed effects of formal I-Promise mentoring on four-year graduation rates.

In summary, the main effects of both hypotheses are not supported in the full model with four-year graduation. The main effect of the I-Promise grant is evident in five-year graduation rates, which is consistent with the financial nexus theory. Importantly, these findings are comparing low-income students with non-loan packages representing 90 percent of financial support with low-income students who have non-loan packages representing 73 percent. While the main effects are not robust, the impact of key academic factors and work study are consistent throughout all the models.

Limitations

This quasi-experimental design using PSM addresses selection bias but it is still subject to internal validity concerns. It is not a randomized control trial, which is the gold standard. Without random assignment, differences between the treatment and comparison groups on observed and unobserved characteristics may not be due to chance, which can call into question the statistical significance of the difference in the graduation rate associated with the intervention (I-Promise grant) and comparison group.

While there are many strengths of institutional data, it also has two key limitations. First is the applicability of results across other institutions. External validity is somewhat limited; results from this research will be more applicable to similar higher education institutions such as flagship public universities and not to small private, liberal arts colleges. A second limitation is the actual data. Some cohorts selected for analysis are during the period of the great recession, a time when students are more likely to remain in college as fewer jobs are available. While cohort year is controlled for in the regression, extending the analysis out to additional cohorts would more fully address this limitation. An additional weakness with the data is missing values. Mean substitution is the method used in these situations, most notably high school quality indicators that were not available for students attending private school, international, and out-of-state students. The data are also limited in that no part-time or transfer students are included. Results, therefore, are limited to full-time students who entered as freshman. The data are also limited by not allowing for analysis of six-year graduation rates, a metric reported to the U.S. Department of Education. Two final limitations with the data are 1) not having an attribute to track special populations of low-income students, such as independent students (which may help explain the aberrant finding with "other grants"); and 2) inability to assess the impact of support

services beyond a sample of students in two cohorts who had formal mentors. Support services should be measured and controlled for in the study to address a potential omitted variable bias.

An additional limitation is the study's design. A pooled cross-sectional design is used with longitudinal data. As a result, averages of loans and non-loans are used in the analysis, which does not allow for an understanding of changes in funding over time that can impact graduation. A longitudinal design, such as a hazard model, would be appropriate to assess changes over time. The approach taken in this study, however, is more appropriate to identify the hypothesized main effects.

The financial nexus theory has been tested with national datasets that link student choice responses to academic performance data. This appears to be the first study that is guided by financial nexus theory that uses institutional data and survey data. The survey data is used to understand the importance of the I-Promise grant in their decision to enroll at the university. It is not linked to individual students in the sample but instead reported in aggregate. The research would be strengthened by linking survey data to institutional data for both treatment and comparison groups.

CHAPTER 6

CONCLUSIONS AND IMPLICATIONS

Higher education is the great equalizer in society. For low-income students, the challenges of enrolling in a university and then earning a bachelor's degree are considerable. This research examines the impact of removing the financial challenge through Illinois Promise, a loan replacement grant program, at the state's flagship university. This study is the first of its kind examining the impact on graduation of a loan replacement grant for low-income students. The research also considers the difference between loan and non-loan (scholarships, grants, and waivers) support for graduation rates of low-income students.

Impact of Removing Financial Barriers on Graduation

Results show that Illinois Promise students graduate at a higher rate than the comparison group of comparable low-income students. The percentages are higher for both four-year and five-year graduation rates (56.5 percent vs. 51.8 percent in year four and 74.4 percent vs. 67.3 percent in year five). However, only the five-year graduation rate is statistically significant and this difference persists in a full multivariate model. Specifically, the odds ratio of graduating within five years is 2.3 times more likely for I-Promise students in relation to the comparison group. This difference is present even though the low-income students in the comparison group have an average financial aid package consisting of 73 percent non-loans as compared to the I-Promise treatment group, which has on average 90 percent non-loans (both percentages include approximately three percent work study). In other words, for low-income students, the difference between 90 percent non-loan support and 73 percent non-loan support is enough to produce significantly higher graduation rates in year five.

Helping to explain this result is financial nexus theory. Financial nexus theory predicts that the reasons for enrolling in the university would be the reasons for continuing through to graduation (Paulsen & St. John, 2002). Through survey research, eighty-one percent of I-Promise students indicate that the assurance of a full financial aid package through the I-Promise grant is "very important" or "essential" in their decision to enroll at the university. The comparison group did not have this assurance. Thus, the 90 percent non-loan support provided to I-Promise students may have had more impact than would be suggested just by the difference between 90 percent and 73 percent since it also comes with a four-year assurance. This suggests that the assurance of funding beyond the first year is a key policy consideration when it comes to college graduation for low-income students.

Although there is a statistically significant difference just when comparing 90 percent non-loans versus 73 percent non-loans, the main non-loan variable components do not have a statistically significant impact in the full model. Importantly, loans comparisons are also statistically significant (10 percent for I-Promise versus 27 percent for the comparison group), but this difference does not have a statistically significant impact in the full model. It was hypothesized that the difference between loans and non-loans would be statistically significant in predicting college graduation. While this hypothesis is not supported, it could be that the contrast between the treatment and comparison groups is not large enough to impact graduation.

Past research shows partial non-loan support (grants or scholarships) increases to some degree the likelihood of college graduation (Alon, 2007; Bartik, Hershbein, & Lachowska, 2015; Castleman & Long, 2016; DesJardins, Ahlburg, and McCall, 2002). Past research is more mixed on the impact of loans on graduation, with no impact (Alon, 2007) to a negative impact (DesJardins, Ahlburg, and McCall, 2002) to a positive impact if the amount of the loans is under

$10,000 (Dwyer, McCloud, & Hodson, 2012; Zhan 2014). No study, however, assesses the impact of a full non-loan subsidy on graduation for low-income students with a matched comparison group. This study points toward the value of examining the combination of all elements of a financial aid package rather than the impact of a component part, which is what some studies have done. By looking at the whole, the difference in non-loans is not significant nor is there difference in the impact of loans on four and five-year graduation, even though the average total amount exceeds the $10,000 threshold cited in earlier research; over eight semesters, I-Promise students accumulated on average $10,272 in debt and the matched comparison group of students accumulated $25,824. It is assumed, however, that additional research on the $10,000 threshold would need to include adjustments based on cost of attendance.

Beyond the non-loan and loan main effects, there are other factors in the model that are significant and provide additional insights into graduation rates for low-income students. In reviewing these additional findings and identifying the implications, some additional interaction effects and other results will be presented. These further analyses represent efforts to resolve puzzles in the data that are relevant to the implications discussed.

Additional Impacts on Graduation – Academic Factors

Academics factors are part of the explanation for understanding graduation rates of low-income students. This is consistent with a similar study by Stinebrickner and Stinebricker (2003) that examined the impact of almost a full academic financial aid subsidy on seventh semester persistence of low-income students, concluding primarily grades (not financial subsidy) explain the difference in persistence. The unique data set for this dissertation includes controls beyond standardized test scores and GPA, which is what is typically used when controlling academic

factors in a study of the impact of financial aid on academic outcomes. The inclusion of these more detailed academic factors directly address omitted variable bias that is a relatively common limitation noted in the literature (Goldrick-Rab, Harris & Trostel, 2009; DesJardins & Flaster, 2013). A student's early academic performance is a significant predictor of both four and five-year graduation as measured by PGPA and first-semester GPA. An additional statistically significant academic predictor of graduation is measured by the student meeting SAP requirements.

The PGPA is a tool used in admission decisions; it is a composite score based on high school GPA, high school ranking, and Composite ACT. The PGPA is a powerful predictor of graduation. Specifically, if a student has less than a PGPA of 2.67, they are statistically less likely to graduate within five years. College readiness or academic performance prior to college matters once enrolled in college. Similarly, the first-semester GPA is the canary in the coal mine. If a student is having academic difficulty the first semester, it is unlikely they will complete college within a five-year time frame. This is consistent with earlier research linking early academic performance and college graduation (Attewell, Heil, & Reisel, 2011; Delaney, 2008; Gershenfeld, Hood & Zhan, 2015; Jesse & Ellersieck, 2009; McGrath & Braunstein 1997; Mettler, 2011; Yizar, 2010). This research shows students earning less than a 2.33 (C+) the first-semester in college are significantly less likely to graduate compared to students who earn a first-semester GPA within the 3.68-4.0 range, which is similar to the finding by Gershenfeld, Hood, and Zhan (2015). Also, if students are not meeting SAP requirements and end up losing a semester of funding, they are significantly less likely to graduate; specifically, 48 percent of the students who lost funding did not graduate nor were they enrolled as of fall, 2014.

The implications of these findings suggests that low-income students with a lower PGPA (2.67 or less on a four-point scale) need transitional and other supports at least until they demonstrate successful progress, such as with first-semester GPA. After a low-income student is enrolled, the earliest warning sign is the first-semester GPA. Intervention policies only aimed at students who are on academic probation (which, in most cases, is a GPA less than 2.0), fail to address students who have a slightly higher first-semester GPA and who are also at a high risk of not graduating. Overall, these findings suggest targeting academic support services initially based on PGPA equal to and less than 2.67 and then based on first-semester GPA equal to and less than 2.33 will reach low-income students most at academic risk of not graduating.

There is not an interaction effect between low first-semester GPA and losing academic funding based on not meeting SAP requirements; academic difficulties that result in losing funding occur after the first semester. A possible explanation for the lack of interaction between these two variables is that students with a low first-semester GPA drop out before withholding of financial aid occurs (30 percent of students with a first-semester GPA below 2.0 drop out and 10 percent of students with a first-semester GPA between 2.0 and 2.33 drop out before the beginning of sophomore year). The lack of statistical significance could also be explained by a limited number of students in these categories (31 students lost at least one semester of funding because of not meeting SAP requirements). Low-income students who lose financial support first receive a warning, which allows them a semester to make necessary improvements in their GPA and/or pace of completion. The likelihood of not graduating for low-income students is linked to losing at least one semester of funding. This should be a bright red warning sign for all involved – financial aid administrators, advisors, and students. These stakeholders should all be

involved with the necessary monitoring and academic and other supports to assist students in making satisfactory academic progress.

There are multiple reasons why a student does not perform well academically. Based on research (Allen & Robbins, 2008; Harackiewicz, Barron, Tauer & Elliot, 2002; Robbins, et al. 2004) and professional experience, these include but are not limited to interests, goals, aptitude, study skills, motivation, health (mental and physical), and personal or social issues. Understanding the reasons behind why a student is struggling academically would be more likely to lead to better interventions and outcomes. This calls for a policy and practice approach that supports harnessing and sharing confidential student information across support providers on campus. There can be institutional barriers for collaborating in ensuring student academic success. As a result, progress depends on high-level institutional leadership.

A key policy issue for low-income students receiving substantial financial support is whether targeted support services addressing low PGPA and low first-semester GPA should be mandatory or voluntary. With institutional data and predictive analytics, it will be easier to know when and what types of interventions are needed for student success. Should the responsibility to seek support rest with the student; that is, should they be allowed to "sink or swim"? Alternatively, because of the considerable personal and social costs associated with nationally low graduation rates for low-income students, should there be more oversight and required participation; that is, should the students be provided a life vest? Without current incentives from the federal government, the answer to this question and the models for implementation should consider institutional factors such as culture, structure, and resources as well as individual student factors such as perceptions, attitudes, and motivation.

Other pre-college and college academic variables are included in the multivariate regression, but do not have explanatory power. These include high school quality variables as measured by percent of students that graduate from high school and percent of students who are college ready (based on a minimum Composite ACT of 21). In contrast to these pre-college variables, the PGPA proves to be a better predictor. Year of enrollment also is not significant, despite the fact that the great recession began with the enrollment of the second cohort in 2008. There is also not a difference in graduation based on initial college enrolled. Finally, if a student earned less than the attempted credit hours and/or earned less than 15 credit hours the first semester, these variables are not significant predictors of graduation. In contrast, first-semester GPA proves to be a better predictor. Other contextual and academic factors included in the regression that are significant to either four or five-year graduation are addressed in the appropriate sections that follow.

Additional Impacts on Four-Year Graduation – Contextual and Academic Factors

The I-Promise assurance is for four years, not five (only in highly unusual circumstances is the grant extended beyond four years). Plus, students enroll with the expectation of completing college in four years. Both real costs and opportunity costs result with five-year graduation, which are particularly salient for low-income students. So why is there not a statistical difference between the treatment and comparison in year four, but there is a statistical difference in graduation rates in year five? The multivariate analysis points toward certain types of students not graduating in four years – based on race and gender – and contextual academic factors – type of major and continuous enrollment.

Black students graduate at a significantly lower rate than the reference group (White, multiracial, and "other") in four years but this significant difference disappears in five years.

Males also graduate at a significantly lower rate than females in four, but not five years. Since the early 1980s, women have outpaced men in college graduation (U.S. Department of Education, 2002). Of note is that there is not an interaction effect between blacks and males, even though only 39 percent of low-income Black males in the sample (N=45 out of 115) graduate in four years. There are also no significant interaction effects between males of other races and four-year graduation. This points to two separate issues – one of race and one of gender. However, Keels (2013) in her research to understand gaps in college success at selective, predominately White institutions finds that the significance of gender depends on race and socioeconomic status. She suggests that improvements, particularly for Black men, require creating more supportive college environments. Although there are no statistically significant interaction effects in this study, the separate effects on race and gender may still require a deeper understanding of unique barriers faced by different sub-groups and a mix of targeted interventions. For various reasons not explained through the variables in the multivariate model, both Black students and male students take longer than four years to graduate. Does this reflect different socialization? Does this reflect different patterns of use of support programs? Are there sub-cultures or other dynamics in campus life that are being reflected here? This research points to the need to better understand these demographic results regarding four-year graduation.

Low-income students with a declared STEM major during their last semester enrolled also are significantly less likely to graduate in four years but not in five years. Of note is there is no interaction effect between males and STEM majors or between Black males and STEM majors in the multivariate model predicting four-year graduation. This means enrolling in a STEM major is not the reason Black males or males in general are significantly less likely to graduate in four years. It is not surprising, however, that students who enroll in a STEM major

take longer to graduate. The curriculum for such majors are highly prescribed and any variation

in the curriculum, such as needing to take or retake an earlier level math or science course,

would result in a delay toward completion. Supporting this explanation is research that shows

science teachers in high poverty secondary schools lack advanced degrees (National Science

Board, 2012), and there is a disproportionate offering of more advanced science and math

courses in secondary schools with low Black and Hispanic student enrollments (President's

Council of Advisors in Science and Technology, 2012). Students with STEM majors (or other

majors) who are from under-resourced high schools and who are therefore taking developmental

courses could also be a factor delaying graduation. Additionally, with 23 percent of initially

undecided students eventually declaring a STEM major, this can also contribute to a delay in

completion. An implication for this finding is the need for early and consistent advising and

other supports for students with or considering transferring to a STEM major, thereby avoiding

the costs associated with delayed graduation.

Low-income students who stopout even one semester during the fall or spring terms are

significantly less likely to graduate in four years compared to continuously enrolled students. Out

of the 54 low-income students in the four-year sample who stopout at least once during the

academic year, only 13 (24 percent) graduate within this time period. In the five-year sample, 15

out of 25 (60 percent) students who stopped out *did* graduate in five years and the finding was no

longer significant. There is no interaction between losing financial aid due to not making SAP

and a stopout. This means the reasons for students who stopout are not significantly related to

SAP but are due to other factors not measured in this study. This finding suggests that stopping

out for even one semester negatively impacts time to graduation and should be a warning sign

that the student is at risk of not graduating. If a student does stopout for a semester or longer, this

finding suggests the university should consider intervention options to facilitate the student returning to campus and earning their degree.

Additional Impacts on Five-Year Graduation – Contextual and Academic Factors

What are additional circumstances that help to explain why a low-income student would graduate in five years instead of four years? Based on the variables in the study – the answer can be explained, in part, by choices students make while in college. The first choice is declaring a major upon enrollment. Students with declared majors are significantly more likely to graduate in five years compared to students who enrolled with an "undecided" status. This does not mean they did not change majors once enrolled, it means that they enrolled with an idea of what they thought they would want as a major. Specifically, graduation for low-income students with a decided major increased from 55 percent in four years to 75 percent in five years compared to low-income students with an undecided major where 53 percent graduate in four years and 67 percent in five years. With a sizable amount of low-income students enrolling as undecided students (45 percent of I-Promise and 37.3 percent of the comparison group), this comprises a large number of low-income students.

Although undecided majors are not the primary focus of this research, it is of note that other research shows mixed results when students are initially enrolling as undecided. Kroc, Howard, Hull, and Woodward (1997) find no difference in graduation rates for undecided students. Other researchers find heterogeneity in results based on race and first-generation status. Specifically, St. John, Hu, Simons, Carter, and Weber (2004) find that White undecided freshman are less likely to persist. Monaghan and Hyuan (2013) find most-first generation students who enter with vocationally-oriented majors and are less likely to enter undecided but, for those who do, it is detrimental to graduating. This study contributes to these findings with its

focus on low income students, for whom entry with a declared major does increase the likelihood of graduation.

The campus created the Division of General Studies (DGS) for undecided students in 2008, which is one year into the time period covered by the study. It is not a structural intervention that can be assessed with these data, but the finding that undecided students are significantly less likely to graduate within a five-year window does point toward the need for continued targeted advising and monitoring of undecided students such as is available with DGS. The impacts on graduation of DGS's holistic advising and other supports should be assessed for low-income students.

Enrolling in summer school is the second choice students make that significantly impacts the likelihood of a five-year graduation. It might be expected that enrolling in summer courses would allow for a greater likelihood of a four-year rather than five-year graduation. However, upon further analysis, 44 percent of students who stopout a semester, enroll in summer courses and 65 percent of students who lose financial aid due to not meeting SAP requirements enroll in classes during the summer. Though there are no interaction effects between these variables and summer enrollment in the full regression model, insight is provided in knowing that some low-income students who enroll in summer courses are doing so to catch-up. Most likely other low-income students enroll in summer courses to get ahead, though there is no evidence in the data available to support this. With limited non-financial aid available for summer session and 64 percent of loan debt for I-Promise students being due to taking summer courses, evidence shows they are willing to pay the associated costs. It is not known through the data available if these and other students took summer courses at lower-cost institutions, such as community colleges, and had their credits transferred; this could be a viable alternative for some students. Other than

research on summer bridge programs that aim to give students a head start prior to entering college (which is beyond scope for this dissertation), there is a lack of scholarly research on understanding the reasons for and the impact of summer enrollment for low income students.

Studying abroad is the third choice students make that approaches significance (.061) in the likelihood of graduating in five years. Approximately 10 percent of low-income students in the sample study abroad; these students represent significantly more women and students enrolled in non-STEM majors. It is not evident from the data the reasons why studying abroad would extend college completion to five years. There is a lack of scholarly research on understanding the combination of study abroad and extending college graduation from four to five years for low income students. It could be the result of related academic factors such as credits not transferring or sequencing of courses needed back at Illinois, examples of which may be known choices in advance of studying abroad or these may be unexpected outcomes.

Finally, there are significant differences in race with five-year graduation rates. Specifically, Hispanics and Asians are significantly more likely than the reference group to graduate in five years. There is considerable attention across campuses to diversity. It is low-income White students, however, who are significantly less likely to graduate in five years compared to low-income Hispanics and Asian students based on these data. Scholarly research on academic success of low-income White students is lacking. These students represent diversity based on class (coming from low-income families) at a predominately White institution. The attention to race and gender on campus is important, but these findings suggest that the focus needs to also include class. University administrators need to be aware of this finding as this population of low-income White students could otherwise be overlooked.

The Impact of Work Study

Unlike loans and non-loans, low-income students who work and earn money during college are statistically more likely to graduate in both four-years and five years. It is not known from the data if the earnings are through the federally-subsidized Work Study (FWS) program or through private employment. Focusing just on the impact of FWS, Scott-Clayton and Minaya (2015) report little is known on the impact of these programs on student success. Their research finds a positive link with students in the FWS program and graduation, but results are contingent on whether a student previously worked. The institutional data used in this dissertation does not track prior work experience, but it is likely that low-income students would have previously worked.

Although there is presumably a point of diminishing returns in work study, for this sample, the more students earn, the more likely they are to graduate. For example, I-Promise graduates earn an average of $652 per semester while I-Promise students who do not graduate in four years earn on average $284 per semester. On average, this is still less than the expected $2,500 annual contribution. Based on student loan data, it appears I-Promise students are more likely to use loan support for their academic contribution and use work study for incidental costs, with actual incidental expenses being less than the university estimates. Similarly, for the comparison group, the average amount earned per semester for graduates is $395 compared to $309 for non-graduates. There is no interaction effect between loans and work study in predicting graduation. There is also no interaction effect between unmet need and work study in predicting graduation.

Additional analysis reveals women are engaged in work study at a higher percent than men and I-Promise students at a higher rate than the comparison group (72 percent I-Promise

women compared to 63 percent I-Promise men; 70 percent women in comparison group compared to 49 percent of men in the comparison group). Of statistical significance are the undecided I-Promise versus undecided comparison students who work more. Also, I-Promise students across all races (except Asians) have a higher percentage who work than the comparison group while in college: 83 percent vs 47 percent of Hispanics; 79 percent versus 41 percent of Black; 62 percent 44 percent of White; and 52 percent 57 percent of Asians work.

Rather than being a deterrent to graduation, work is significantly linked to graduation in these data. There are different ways to interpret this finding. One interpretation is that students who work have stronger time management skills that aid in their academic studies. Another interpretation is that students who work are highly motivated and have other non-cognitive attributes that also facilitate their success in the classroom. Yet another interpretation of this finding is that the benefits of the work environment, whether it be the mentoring received on the job, the sense of community formed, or money earned influences their academic performance. While there could also be additional interpretations, what is clear is that low-income students benefit academically from working. More research is needed to accurately interpret this finding.

Going Forward

Guided by financial nexus theory, this research reinforces the link between initial reasons for enrolling in college and how these reasons continue to remain important factors for completing college. Removing the financial barriers of college through the I-Promise grant was an "essential" or "very important" reason for attending the university for the majority of I-Promise students. With this assurance of full support for four-years (assuming eligibility criteria continues to be met), I-Promise students do graduate at higher percentages than the comparison group of low-income student in four years and five years, with the five-year difference remaining

statistically significant in the full regression model. This is despite the comparison group also receiving the majority of their financial aid through non-loans. A key difference is that the comparison group does not have the same four-year assurance. Even though the average amount received through the I-Promise grant is lower than the average Pell grant, and other grants and scholarships, this finding reinforces the value of the assurance of a last-dollar grant such as I-Promise. All students (except those not in a degree seeking program) are assured of no increase in the tuition rate for four years and have reasonable expectation of continuation of some of their financial aid package, but there is no further assurance for the comparison group. More research is needed to understand the impact of assurances on low-income student graduation.

Financial nexus theory alone does not account for all of the results in the model. This is not surprising as different theories are used to explain the impact of financial aid on college graduation – ranging from Becker's narrow human capital economic theory (1962) to Tinto's broad interactionalist sociological theory (1975). With the various academic controls utilized for this study, academic factors have strong predictive power. Indeed, academic factors explain more of the variance in predicting college graduation for low-income students than financial aid variables. The one financial aid variable that is a strong predictor is work study, but this likely has meaning that goes beyond financial aid, including being a signal for motivation, time management, and other factors.

Understanding non-cognitive factors, such as motivation or the recently more popularized notion of "grit" (Duckworth, 2007) behind the process for achieving academic success will further advance research, policy, and practice. This is particularly important as academic findings from this study suggest the need for interventions based on known early warning signs and the use of other predictive analytics. Offering these interventions, however, does not

guarantee students will take advantage of them even if evidence exists that the interventions foster success. Requiring the participation in an intervention also may not guarantee student success without first having a better understanding of motivation and other non-cognitive factors.

Scholars call for an improved theory to explain the complex nature of student persistence (Baxton, 2000; Goldrick-Rab, Harris, & Trostel, 2009; Perna, 2006), and this research supports the need for additional theoretical development. An integrated theory should take into demographics, financial aid, academics, and other factors including cultural, non-cognitive, and institutional. One challenge, however, is the different levels of measurement associated with these factors.

Based on findings in this study, there is a need for further research. In addition to including non-cognitive measures in the existing model, there is a need for better measures of student supports. The I-Promise program has targeted services, there are support services across campus for all students, and there are targeted services for other groups of students who meet certain criteria. However, a systematic method of tracking utilization of these services for measuring impact has not been implemented at this university and such tracking rarely takes place in other universities. Doing so should advance research and lead to evidence-based policy that more effectively enhances student success.

Other research questions that emerged from findings include: why males and Black students are more likely to take longer than four years to graduate; why students stopout or interrupt their educational studies; do students taking summer courses at lower-cost institutions improve their time-to-completion; why is studying abroad more likely to extend time-to-completion; and why does work study facilitate graduation for low-income student and is there a point of diminishing returns.

Complementing the need for more quantitative research is the need for qualitative research. Various questions remain from these findings that can be better understood through qualitative research. For example, why do students who are statistically less likely to graduate end up earning a bachelor's degree? Why do low-income students take summer classes when most of the debt incurred is through the summer? How did the assurance of the I-Promise grant impact student choices on academics and other matters (such as work study and travel abroad)? Answers to these questions are best explored through qualitative research.

Results have important policy and practice implications as demonstrated throughout this chapter. Importantly, it demonstrates the impact of need-based financial aid assurances at a time when universities have incentives for providing merit-based aid. Specifically, this study shows low-income students who have the assurance of need-based aid are significantly more likely to graduate in five years. It reinforces the importance of the promise that is attached to the financial aid. It also serves as evidence to stakeholders of a worthy investment. Social workers and other professionals supporting low-income students can use the evidence from this study, starting with knowing the early and continuing academic warning signs, instead of basing assessment for "at risk" primarily on demographic factors, to inform practice including internal and external advocacy and provide targeted supports. It is also beneficial to educate low-income students on these risk factors that they can encounter and provide targeted supports that address the underlying causes. Overall, this research reinforces the value of using predictive analytics to inform policy and practice.

There are broader implications from this study. First, the federal government and foundations should consider incentives to universities for the development of "promise" programs for low-income students. The goal of improving graduation rates for low-income

students from college is consistent with national goals of economic development and international competitiveness. Second, the federal government should consider offering the Pell Grant to support summer classes. A majority of low-income students enroll during the summer and that is when most debt is incurred (for students with a loan replacement grant). Pell support for summer classes can facilitate the important goals of improving time to completion and reducing student debt.

Replicating the study across other public institutions that have loan replacement grants for low-income students would address one of the limitations of this study noted in Chapter 5. While there are inherent challenges in sharing institutional data, the benefits outweigh the risks. Being accountable through evidence-based decisions is what is owed to all stakeholders – those who financially contribute (including taxpayers), those who work in higher education, and importantly to low-income students and their families who want to be given the chance to live the American Dream.

Finally, a key question is what happens to low-income students who benefit from I-Promise type of programs post-graduation? How does entering professional life with limited college debt influence choices, including career decisions? This research is a start, but there is more still to do to ensure higher education remains the great equalizer in society.

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APPENDIX A

FINANCIAL AID TERMS AND TYPES OF AID

Cost of Attendance (COA) is not the bill that you may get from your college; it is the total amount it will cost you to go to college each year.

Expected Family Contribution (EFC) is a term used in the college financial aid process in the United States to determine an applicant's eligibility for need-based federal student aid, and in many cases, state and institutional (college) aid.

Federal Direct Student Loan (FDSL) provides "low-interest loans for students and parents to help pay for the cost of a student's education after high school. The lender is the U.S. Department of Education rather than a bank or financial institution.

Federal Supplemental Educational Opportunity Grant (FSEOG) is a federally funded, need-based grant, awarded to Pell eligible students. Award amounts vary.

 "First Dollar" award is applied first before other aid and it is not reduced by other scholarships (the full amount is awarded).

Free Application for Federal Student Aid (FAFSA) is a form that can be prepared annually by current and prospective college students (undergraduate and graduate) in the United States to determine their eligibility for student financial aid.

Grants are awarded based on demonstrated financial need. They don't need to be repaid.

 "Last Dollar" award is applied after other grants and scholarships in a financial aid package. A fixed amount award that is last dollar in the financial aid package can be reduced so as not to exceed the total exceeds the cost of attendance.

Loans provide a source of funding to help finance education and unlike grants, scholarships, and waivers, need to be repaid.

Monetary Award Program (MAP) Grant is a state-funded, need-based grant awarded by the Illinois Student Assistance Commission. This grant is awarded to students with an estimated family contribution of less than 9,000.

Need based or Subsidized Loans (Stafford) This loan is awarded to meet financial need after other resources are subtracted or to the annual maximum loan limit, whichever is lower. Interest rates are lower than the private market and repayment begins six months after graduation or enrollment is less than half time. The time period for borrowing is limited to 150 percent of the published length of the student's current educational program. If the limit is reached, students can only borrow unsubsidized loans, and interest begins to accrue on the outstanding subsidized loan.

Non-need Based or Unsubsidized Loans do not require a demonstration of financial need. The amount that can be borrowed is determined by the Office of Student Financial Aid based on the cost of attendance and other financial aid received. Responsibility rests with the student in

paying the interest during all periods, even while in school interest will accumulate and will be added to the principal amount of the loan.

Parent Plus Loans Parent are federal loans parents may borrow to help pay the educational expenses of a dependent undergraduate student enrolled in at least 6 credit hours a semester. parent must be able to pass a credit check that indicates that they don't have adverse credit history. Interest is charged on the loan from the time the loan funds are disbursed until it's paid in full. Borrowing is up to the total of the estimated Cost of Attendance minus resources and all other financial aid received by the student.

Pell Grant is a federally funded, need-based grant awarded by the U.S. Department of Education. This grant is awarded to those with an expected family contribution of less than 5,155 for the 2015-2016 academic year, with awards varying from $626 to $5,775.

Satisfactory Academic Progress (SAP) Federal regulations require the Office of Student Financial Aid monitor all students for SAP regardless of their eligibility or intent to receive financial aid. Students who don't meet SAP requirements may lose eligibility to receive federal, state, and institutional financial aid. The minimum standards for making SAP at Illinois are: 1) maintaining a minimum cumulative GPA of 2.0; 2) successfully complete at least 67% of cumulative attempted hours by the end of each term; and 3) the credit hour maximum time frame for completing a degree is 150% of the credit hours required to receive a first undergraduate degree (including transfer credits).

Scholarships are a form of gift aid that doesn't require repayment. They're generally awarded on a variety of factors, including academic achievement, talent, athletic ability, leadership, geographical location, field of study, or financial need.

Waiver is a type of aid the university provides to reduce the cost of tuition. It does not need to be repaid.

Sources: Bartik, Hershbein, Lachowska (2015); Office of Student Financial Aid, University of Illinois; Wikipedia

APPENDIX B

LIST OF GENERAL CAMPUS SUPPORT SERVICES

General Tutoring and Study Resources
Alpha Lambda Delta Alpha Lambda Delta (ALD)
ESL Tutoring (Linguistics Department)
Office of Minority Student Affairs co

Academic Support Services
Disability Resources and Educational Services (DRES)
Office Hours at the Undergraduate Library (UGL)
Reference, Research, and Scholarly Services
Testing Center
Writers Workshop

Career Planning and Job Resources
Academic Advisors
The Career Center

Financial Aid
Office of Student Financial Aid
Employment and Federal Work Study

Wellness
Counseling Center.
McKinley Health Center

Resources for Specific Populations
American Indian Studies Program
Asian American Cultural Center (AACC)
Bruce D. Nesbitt African American Cultural Center (BNAACC)
La Casa Cultural Latina
Hillel Foundation: Foundation for Jewish Campus Life
Native American House
Disability Resources and Educational Services (DRES)
Office of Minority Student Affairs (OMSA)
Lesbian, Gay, Bisexual, and Transgender (LGBT) Resource Center
Women's Resources Center

Campus Life
Emergency Dean Program
Office of the Dean of Students (ODOS) development
Office for Student Conflict Resolution within the University Community
SafeRides and SafeWalks

Tenant Union
Campus Recreation

Source: 2015 – 2016 Referral Manual for Counseling Center Staff and Paraprofessionals, University of Illinois

APPENDIX C

PRIVATE LRG

Institution – *LRG Name*, Year Est.	Income Eligibility	Institution – *LRG Name*, Year Est.	Income Eligibility
Amherst College, 2007	All Aid Eligible	Haverford College, 2008	< $60,000
Bowdoin College, 2008	All Aid Eligible	Middlebury College	All Aid Eligible
Brown University, 1999 / 2008	< $100,000 Between $100,000 $150,000	Northwestern University, 2008 *No-Loan Arch Scholarship,* 2016	Pell Eligible
Colby College, 2008	All Aid Eligible	Princeton University, 2001	All Aid Eligible
College of William and Mary, *William & Mary Promise,* 2013	<$40,000	Stanford University, 2006	All Aid Eligible
Dartmouth College, 2008	<$100,000	University of Chicago – *Odyssey Scholarship*	<$60,000 Between $60,000 - $75,000
Davidson College – *Davidson Trust,* 2007	All Aid Eligible	University of Pennsylvania 2006,	<$100,000
Duke University, 2008	<$60,00	Vanderbilt University, *Opportunity Vanderbilt* 2009	All Aid Eligible
Emory University – *Emory Advantage, 2007*	< $50,000 Between $50,000 - $100,000	Vassar College, 2008	<$60,000
Harvard University, 2004	All Aid Eligible	Williams College, 2008 / 2012	All Aid Eligible
		Yale University, 2005	All Aid Eligible

APPENDIX D

PUBLIC LRG

Institution – *LRG Name,* Year Est.	Income Eligibility	Cap on # Eligible Students	Eligible Semesters Specified	Targeted Supports
Appalachian State University – *Appalachian Access,* 2007	Federal Poverty Level	50	8	Required participation academic & personal
Arizona State University –*Obama Scholars Program (previously known as ASU Advantage),* 2005	<$42,400	--	8	Required first year success coach
Georgia Institute of Technology – *Georgia Institute of Technology – G. Wayne Clough Tech Promise*, 2007	<$33,000	--	8 semesters	--
Indiana University – Bloomington – *21st Century Scholars Covenant*, 2007	Qualify for Federal Student Lunch Program	--	8 semesters	21st Century Scholar Office offering information and engagement
Michigan State University – *Spartan Advantage,* 2006	Pell Eligible	--	Up to 10 consecutive semesters excluding summer	Required financial aid workshop & meeting with financial aid counselor 1st semester
North Carolina State University – *Pack Promise*, 2006	< 150% Federal Poverty Level	--	--	Peer mentor, academic coach, workshops
University of Florida, *Machen Florida Opportunity Scholars,* 2006	<$40,000 First-Gen	300	8 semesters, petition for extension up to six years	Required orientation, cohort programming, peer mentorship, workshops
University of Arizona – *Arizona Assurance*	<$42,400	--	8	First year transition programming, mentoring, leadership, and career development, graduate/professional school preparation and cultural enrichment

Institution – *LRG Name,* Year Est.	Income Eligibility	Cap on # Eligible Students	Eligible Semesters Specified	Targeted Supports
University of Illinois at Urbana – Champaign – *Illinois Promise*, 2005	Poverty Level	--	8 semesters, appeal process for semester extension	Orientation, intergenerational mentoring, community building and service, information and referral
University of Louisville – *Cardinal Covenant,* 2007	150% Federal Poverty Level	(unspecified, but limited based on funding availability)	--	Two developmental meetings/year for freshman and 1 each year after; freshman ambassador peer mentoring, follow-up on referrals, encourage meetings if cum GPA < 2.5
University of Maryland College Park – *Maryland Pathways,* 2003	EFC=0 All Aid Eligible	--	--	--
University of Michigan – *M-PACT,* 2005	EFC=0	--	--	--
University of North Carolina – Chapel Hill – *Carolina Covenant,* 2004	200% Federal Poverty Level	--	--	Orientation, Mentoring, Academic Workshops, Financial Literacy Guide, Special Programming & Social Events, Community Service
University of Tennessee – *Tennessee Pledge Scholarship*, 2005	<$40,000	--	--	--
University of Virginia – *Access UVA,* 2004	200% Federal Poverty Level All Aid Eligible	--	8 semesters (fall & spring)	Workshops, information and referral, academic outreach, one-on-one support

APPENDIX E

PLACE-BASED PROMISE PROGRAMS: ARIZONA, ARKANSAS, AND CALIFORNIA

SAMPLES

Name Location Year	Structure	Governance	Financial Benefits	Services	College Choice
Promise for the Future, Pinal County, AZ, 2004	Higher Education	Strategic (Pinal County High Schools and Central Arizona Colleges)	Fixed	Middle School (8th grade)	Partial (any Central AZ College)
Arkadelphia Promise, AR 2014	County Government	Strategic (financial award linked with state lottery)	Fixed	High School (Senior)	Yes
The Great River Promise, Mississippi County & Buffalo Island Central, AR n.d.	ANC Foundation	--	Fixed	High School (Senior)	No (Arkansas Northeastern College)
El Dorado Promise, El Dorado, AR, 2007	--	--	Cap (up to $7,500/year up to 5 years)	High School (Senior)	Yes
Long Beach College Promise, Long Beach, CA 2008	--	Strategic (LBCC, CSULB, LBUSD, City of Long Beach)	Fixed (free semester at LBCC)	--	Partial (LBCC or CSULB)
Oakland Promise, Oakland, CA, 2016	Community-based NPO	--	Fixed ($1,000/yr technical colleges; $4,000/yr at 4-year college)	--	Yes
Richmond Promise, Richmond, CA, 2016	Government	--	Variable "full tuition"	--	Yes
San Francisco Promise, San Francisco, CA,2009	Higher Education	Strategic (Mayor's office, DCFS, San Francisco State University)	Fixed ($1,000/yr up to 4 years)	--	No (SFSU)