HOW DOES INFORMATION IN FINANCIAL AID AWARD NOTIFICATIONS

AFFECT ENROLLMENT AND BORROWING DECISIONS?

EVIDENCE FROM A RANDOMIZED CONTROLLED TRIAL

by

KELLY OCHS ROSINGER

(Under the Direction of James C. Hearn)

ABSTRACT

US higher education couples high tuition levels with targeted financial aid to support college enrollment. This finance model is complicated, and students – particularly low-income students – often lack complete information about costs and aid. Recent research, policy, and advocacy attention has turned to simplifying the financial aid system and providing information to students as they navigate the system in efforts to more equitably and efficiently deliver aid. One way to reduce complexity is for colleges and universities to provide financial aid award notifications communicating costs and financing options. Yet such notifications have proven difficult to interpret.

In 2012, the US Department of Education and Consumer Financial Protection Bureau released a model award notification, or "shopping sheet," intended to simplify and standardize information about costs and aid. More than 2,000 institutions have adopted the shopping sheet for some or all students, and legislation has been introduced that would require institutions to use a standardized format in awarding aid. However, we know little about how these recent policy efforts influence educational decisions.

This study used a randomized controlled trial at a public university and drew on human capital theory and behavioral economics to examine how the shopping sheet affected enrollment and borrowing decisions, paying particular attention to low-income students who face the greatest informational barriers. A sample of admitted and currently enrolled students was randomly assigned to treatment and control conditions. Students in the treatment group received the shopping sheet in addition to the participating university's traditional notification; students in the control group received the institution's traditional notification. The experiment was conducted in spring/summer 2013; enrollment and borrowing was observed during the 2013-2014 academic year.

Findings demonstrate that receipt of the shopping sheet had a limited effect on enrollment and borrowing decisions. Likewise, enrollment and borrowing decisions of low-income students were not more sensitive to receipt of the shopping sheet than those of their higher-income peers. This research aims to contribute to our understanding of how information shapes educational decisions and inform federal policy efforts to standardize and simplify financial aid award notifications.

INDEX WORDS: financial aid, financial aid award notifications, randomized controlled trial, information and decision making, human capital, behavioral economics

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CHAPTER 1

STATEMENT OF THE PROBLEM

Relative to other nations, higher education finance in the United States is characterized by high tuition levels accompanied by significant investments in financial aid to support college enrollment (McPherson & Schapiro, 1998). This approach to higher education finance targets financial aid to students on the margin of college attendance. This finance model often is viewed as more efficient and equitable than maintaining low tuition levels through broad subsidization because it directs scarce public resources to students who would otherwise be unable to attend college.

The coupling of high tuition levels with targeted aid, however, has created a complex financial aid system that students must navigate on the way to college. In 2005, the Advisory Committee on Student Financial Assistance (ACSFA) reported that "rather than promote access, student aid often creates a series of barriers – a gauntlet that the poorest students must run to get to college" (ACSFA, 2005, p. i). The complexity in the financial aid system stems in part from attempts to measure students' financial need and direct aid accordingly. The equity and efficiency outcomes of such a system, however, depend upon students and their families having adequate information about college costs and financial aid (Hearn & Longanecker, 1985). Yet this is not always the case. Students and their families – particularly those with financial need – often lack complete information about costs and aid and overestimate costs (Avery & Kane, 1995; Grodsky & Jones, 2007; Horn, Chen, & Chapman, 2003; Luna De La Rosa, 2007).

Complexity in the financial aid system may limit the efficiency and equity

outcomes of investments in aid. For example, several previous studies have suggested

that the Pell Grant program, which represents the largest source of federal grant aid for

students, has had little influence on enrollment patterns of low-income students (Hansen,

1983; Kane, 1994).[1] Students on the margin of college attendance – those whom the Pell

Grant is intended to support – may lack information about federal student aid or how to

apply (Kane, 1995; Orfield, 1992), perhaps limiting the effectiveness of the Pell Grant

and other aid programs. Indeed, the American Council on Education estimates that more

than 1.5 million students annually from low- and middle-income families who might

qualify for federal student aid do not submit the Free Application for Federal Student Aid

(FAFSA) that is required to determine aid eligibility (King, 2006). Research suggests that

the complexity associated with applying for financial aid may deter some students,

particularly low-income students, from applying (Bettinger, Long, Oreopoulos, &

Sanbonmatsu, 2012; Dynarski & Scott-Clayton, 2006, 2008). Students who do file a

FAFSA but do so after the priority deadline for awarding aid receive less financial aid

from state and institutional sources, on average, and are more likely to be enrolled part-

time or delay enrollment (McKinney & Novak, 2015). These patterns suggest that many

students who would benefit from additional financial support "leave money on the table"

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[1] Research demonstrates that students are more responsive to grant aid than other forms
of financial aid (Heller, 1997; St. John & Noell, 1989), but examinations of the federal
Pell Grant provide mixed evidence of its influence on enrollment (Curs, Singell, &
Waddell, 2007). Other analyses have demonstrated that the Pell Grant program has
expanded enrollment at some institutions (Kane, 1995) and among some subpopulations
of students (Seftor & Turner, 2002). Additionally, changes in the targeting of federal
student aid and trends in enrollment patterns may have obscured enrollment effects of
Pell in earlier studies (McPherson, 1994).

because of limited information, complex procedures, and deadlines associated with applying for financial aid.

Policy, research, and advocacy attention in recent years has turned to simplifying the financial aid system to more equitably and efficiently deliver aid to students (e.g., ACSFA, 2005; Bettinger et al., 2012; Castleman, 2013; Dynarski & Scott-Clayton, 2006, 2007, 2008; Long, 2010; Scott-Clayton, 2012; The Institute for College Access and Success [TICAS], 2013; Whitsett & O'Sullivan, 2012). Much of this research focuses on simplifying the process of applying for financial aid and providing better information to students as they evaluate college application, enrollment, and financing options. This previous work has demonstrated that providing information to students about institutional net costs and admissions processes (Hoxby & Turner, 2013), simplifying the FAFSA (Dynarski & Scott-Clayton, 2006, 2008), providing assistance to students and their families with completing the FAFSA (Bettinger et al., 2012), and sending text messages reminding college students to re-file the FAFSA to continue being considered for financial aid (Castleman & Page, 2014) can lead to improved outcomes for students. Taken together, these studies demonstrate that design and delivery of financial aid contribute to outcomes.

While much of this previous research has focused on the financial aid application process, less studied are financial aid award notifications, which is how colleges communicate information about costs and aid to students and their families. The high tuition with targeted financial aid approach to higher education finance obscures the cost of college because few students pay the full cost of attendance. Rather, financial aid from federal and state governments, higher education institutions, and private sources

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subsidize college costs. Award notifications are the primary way students learn the exact cost of attending a given institution and what their specific options are for financing their education. As a result, award notifications constitute a critical point in the financial aid process when students compare costs and aid at each of the institutions from which they have received an award and make decisions concerning where to enroll and how to finance their education. Institutional award notifications, however, have proven difficult for students and their families to interpret and to compare costs across institutions (Kantrowitz, 2010; Whitsett & O'Sullivan, 2012). Indeed, news articles appear annually around the time students and their families receive financial aid award notifications aimed at helping students understand and "decode" their awards (e.g., Lorin, 2012; McGrath, 2014; National Public Radio, 2014).

As part of the Higher Education Opportunity Act of 2008, the US Department of Education and Consumer Financial Protection Bureau developed a model financial aid award notification with simplified and standardized information about costs and aid. The model award notification, or "shopping sheet," is intended to simplify information about financial aid awards that students receive from colleges and university and to allow students to better compare costs and financing options across institutions. The movement to simplify and standardize financial aid award notifications is part of a broader policy effort aimed at improving transparency in college costs and helping students and their families make more informed educational decisions. Under this legislation as well as the Obama Administration's initiative to improve transparency and accountability, a number of tools, including the shopping sheet, have been developed to assist students in making college application, enrollment, and financing decisions.

The shopping sheet was released in July 2012, and colleges and universities were asked to voluntarily adopt the format during the 2012-2013 academic year. An initial group of 500 institutions – including the State University of New York System, the largest comprehensive state higher education system in the United States – agreed to use the shopping sheet during its first year (US Department of Education, 2012).[2] Now in its third year, more than 2,000 institutions have adopted the shopping sheet in awarding financial aid for some or all students. Together, these institutions enroll 48% of undergraduate students – more than 8.1 million – in the United States (US Department of Education, 2014a). Additionally, legislation has been introduced in the US Senate as part of the Higher Education Reauthorization Act (2014) that would require institutions to use a standardized format in awarding financial aid. However, we know little about how this policy effort to simplify and standardize information in financial aid award notifications has influenced educational decisions.

In this study, I examine how information about costs and aid provided in the shopping sheet influences students' enrollment and borrowing decisions. Specifically, I consider the following research questions:

1)   How does receipt of the shopping sheet affect enrollment decisions?

2)   How does receipt of the shopping sheet affect borrowing decisions?

Because low-income students face greater informational barriers surrounding college costs and financial aid than higher-income students (Avery & Kane, 1995; Grodsky & Jones, 2007; Horn et al., 2003), I also consider whether this subpopulation of

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[2] President Barack Obama issued an executive order (Exec. Order No. 13,607, 2012) requiring institutions that receive funding from federal military and veterans educational benefits programs to use the shopping sheet format for students who receive these benefits.

students responds differently to information about costs and aid provided in the shopping sheet than their higher-income peers, asking:

> 3)   Are the enrollment decisions of low-income students more sensitive to receipt of the shopping sheet than the decisions of their higher-income peers?

> 4)   Are the borrowing decisions of low-income students more sensitive to receipt of the shopping sheet than the decisions of their higher-income peers?

To answer these questions, I designed and collaborated with administrators at a public university to conduct a randomized controlled trial. Randomized controlled trials are considered the "gold standard" of quantitative analyses and have been increasingly emphasized in education research because of their usefulness in evaluating the causal effects of policy (Angrist, 2004; US Department of Education, 2003; Murnane & Willett, 2011). Nearly all students at the participating university receive a financial aid award notification informing them of aid from federal, state, institutional, or private sources. Additionally, cost and aid figures at university in this study are in the medium to high range among other primarily bachelor degree granting institutions (College Scorecard, 2015), providing an appropriate site at which to examine how information about costs and aid affects enrollment and borrowing decisions.

Recent federal policy efforts have emphasized that more information and simpler processes are better for consumers as they evaluate and navigate financial decisions (Sunstein, 2012; Supiano, 2014), and the shopping sheet is one example of these recent efforts to simplify and standardize information about college costs and financial aid. By examining this policy intervention, the present study is aimed toward contributing to the federal policy discussion regarding proposed changes in the delivery of financial aid.

Additionally, this research can assist financial aid administrators in communicating costs and financing options to students and their families and inform our understanding of how information shapes educational decisions with particular attention to low-income students who face the greatest informational barriers surrounding costs and aid.

Overview of the present study

Following this introduction to the present study, the second chapter provides an overview of three main areas of literature that inform this project: 1) simplifying the financial aid system, 2) providing information to students and their families about college application, enrollment, and financing options, and 3) standardizing and simplifying financial aid award notifications. In chapter three, I discuss the two theoretical perspectives that I draw on to understand how information about college costs and financial aid might influence students' educational decisions: 1) human capital theory, which posits that the decision to invest in education is based on the expected costs and benefits associated with additional education, and 2) behavioral economics, which provides an understanding of how complexity in the financial aid system influences the efficiency or equity outcomes of investments in aid. Together, human capital theory and behavioral economics provide hypotheses concerning how information is expected to shape enrollment and borrowing decisions and explain how complexity in the financial aid system may limit efficiency and equity outcomes.

The fourth chapter describes the data and methods used to evaluate recent federal policy efforts to simplify information in financial aid award notifications. In this chapter, I provide a description of the research site at which the study took place and the design of

the randomized controlled trial. This chapter also provides an overview of the methods

used to analyze data from the randomized controlled trial and notes the ethical

considerations and limitations of the study. Chapter five provides a discussion of the

findings from the study. In the sixth chapter, I conclude with a discussion of the

implications of the present study for future research as well as its significance for theory

and policy.

CHAPTER 2

LITERATURE REVIEW

This chapter starts with an overview of the financial aid system in the United States, which is characterized by high tuition levels and targeted financial aid relative to higher education financing systems in other nations. A complex system has emerged to target financial aid to students on the margin of college enrollment and persistence (or, in the case of institutional financial aid, to encourage students to enroll in one institution over other possible options). The complex system that students must navigate on the way to college, however, may deter many students from taking advantage of this aid and limit the effectiveness of programs at achieving desired outcomes.

Recent research, policy, and advocacy attention has focused on the design and delivery of financial aid to improve outcomes of investments in aid. This chapter provides a discussion of three areas of research that relate to this focus: 1) simplifying the financial aid process, 2) providing information to students and their families about college application, enrollment, and financing options, and 3) standardizing and simplifying financial aid award notifications, which is how colleges and universities communicate information about costs and aid to students and their families. In the final section of this chapter, I describe the present study, which evaluates how policy efforts to simplify and standardize financial aid award notifications affect students' educational decisions.

The financial aid system in the United States

The US financial aid system that couples high tuition levels with targeted aid is seen as more equitable and efficient than maintaining low tuition levels through broad subsidization because it targets aid to students on the margin of college attendance who would otherwise be unable to enroll. In doing so, it aims to eliminate ability to pay as a determinant of college enrollment while also limiting public funds directed to students who would attend college without this additional support. In this financing system, federal and state governments, private organizations, and higher education institutions direct funds toward financial aid to support college enrollment (College Board, 2014b). Although colleges and universities as well as states have increasingly allocated financial aid funds to students based on academic characteristics (McPherson & Schapiro, 1998; Heller, 2004),[3] the majority of financial aid is distributed to students with demonstrated financial need in efforts to increase access to higher education for students who would otherwise be unable to attend. For example, the Pell Grant, which represents the largest federal student grant aid program and is targeted toward low-income students, awarded more than $30 billion to 9 million undergraduate students during the 2013-2014 academic year (College Board, 2014b).

Although educational attainment levels have risen across all income levels over time, the educational attainment gap by income level has grown despite investments in need-based financial aid, including four decades of federal support for the Pell Grant

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[3] Growth in state spending on merit-based aid, however, has not been accompanied by declines in state contributions to need-based aid (Doyle, 2010).

(Bailey & Dynarski, 2011; Ellwood & Kane, 2000; Pell Institute, 2015).[4] High achieving, low-income students enroll in higher education and earn college degrees at lower rates than their higher-income peers (Carnevale & Strohl, 2010). Low-income students are also less likely than their peers to enroll in selective institutions, even when academic ability is considered (Hearn, 1991; Karen, 2002). These enrollment patterns prove particularly important because selectivity is associated with greater institutional resources to support students both financially and academically while they are in college (Winston, 2004) as well as higher future earnings (Brand & Halaby, 2006; Brewer, Eide, & Ehrenberg, 1999; Thomas & Zhang, 2005; Zhang, 2005), particularly for low-income students (Dale & Krueger, 2002). Yet many high-achieving, low-income students never apply to a selective institution that reflects their academic abilities (Hoxby & Avery, 2012).

Although low-income students plan on going to college at the same rate as their higher-income peers, there are several places along the path to college that prove particularly challenging to navigate and that prevent many students from realizing these aspirations (ACT, 2014). In the 1980s, Olson and Rosenfeld (1984) identified three features of the financial aid system that may limit low-income students' access to the very programs that are designed to expand their educational opportunities: knowledge of financial aid availability, difficulty completing complex forms, and aversion to borrowing.

The equity and efficiency outcomes of a higher education finance model that couples high tuition with targeted financial aid depend upon students and their families

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[4] The recent Pell Institute report (2015) received a great deal of attention for its figures documenting inequality in bachelor's degree attainment by income quartile. The report has drawn criticism for failing to adjust for data limitations, resulting in overstated estimates of college completion gaps (Chingos & Dynarski, 2015).

having adequate information about college costs and financial aid (Hearn &

Longanecker, 1985). Yet this is rarely the case, which may limit the effectiveness of

some financial aid programs at increasing college enrollment. Informational barriers

surrounding costs and aid exist and are particularly high for low-income students (Avery

& Kane, 2004; Grodsky & Jones, 2007; Horn et al., 2003).[5] Even when students have

information about college costs, few actually pay the full "sticker price," or listed cost of

attendance. Rather, the cost of attendance is adjusted for any financial aid a student may

receive from federal, state, institutional, or private sources. For example, high-achieving,

low-income students often pay little – and sometimes nothing – to attend highly selective

private institutions yet many never apply to such institutions (Hoxby & Avery, 2012).

The amount of discount a student will receive to attend a given institution, however, is

generally not known until after students apply for admission and financial aid. Such a

system of higher education finance often obscures the true cost of college (Orfield, 1992)

and may lead students to believe they cannot afford to attend despite the financial aid that

may be available to them. As Mumper (1996) suggests:

> A plan which may look good in an economics class may prove counterproductive
>
> in the real world of college finance. In this view, lower-income students are likely
>
> to become discouraged by rapid increases in the "sticker price" of higher
>
> education. This occurs because information about tuition levels is much more
>
> widely known and available than is information about financial aid programs (p.
>
> 45).

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[5] See Long (2004) for a more detailed review of studies and data sets that relate to
students' perceptions of college costs and financial aid.

Applying for college admission and financial aid is complex as well, and missed deadlines, bureaucratic details, and incomplete information often discourage students from applying in a process Olson and Rosenfeld (1984) describe as "an avalanche of paperwork" (p. 462). Indeed, the number of questions on the FAFSA rivals – and in some cases, surpasses – the number of questions on many tax forms, particularly those primarily used by low-income families (Dynarski & Scott-Clayton, 2006). The complexity associated with completing the FAFSA likely discourages many students who might be eligible for financial aid from applying. The American Council on Education estimates that more than one and a half million students who come from low- and middle-income families and who might qualify for federal student aid never submit an application for aid (King, 2006).

Complexity in the financial aid system is compounded by the increasing importance of loans in financing higher education. Much of the recent growth in federal student aid has come in the form of loans rather than grant aid (College Board, 2014b; Hearn, 1998). Just over a decade after the introduction in the 1960s of a federal student loan program, federal spending on student loans surpassed spending on grant aid programs (Mumper, 2003). Additionally, grant aid dollars in previous years lagged behind rising tuition levels (College Board, 2014a, 2014b), contributing to students' growing reliance on loans to finance higher education. The growing role of loans in higher education finance raises questions about the consequences for low-income students (Dowd, 2008). Research suggests enrollment decisions, particularly those of low-income students, are more sensitive to grant aid than they are to loans (Heller, 1997; St. John, 1990). Low-income students also face greater credit constraints (Long, 2008)

and demonstrate lower levels of financial literacy (Lusardi, Mitchell, & Curto, 2009) than their higher-income peers, which may contribute to an aversion to borrowing to finance education.

To the extent that complexity in the financial aid system limits the ability of financial aid programs to equitably and efficiently achieve desired outcomes, close attention to the design and delivery of aid is merited. As Dynarski and Wiederspan (2012) note:

> Simplifying student aid is a "last-mile" reform that costs little but requires sustained political and administrative attention. We spend tens of billions of dollars on federal student aid, and the bill is rising rapidly. We need to go the last mile, and design an aid system that maximizes the impact of those billions on student decisions (p. 232).

Recent research, policy, and advocacy focus has focused such "last-mile" reforms to more efficiently and equitably deliver aid to students (e.g., ACSFA, 2005; Bettinger et al., 2012; Castleman, 2013; Dynarski & Scott-Clayton, 2006, 2007, 2008; Long, 2010; Perna, 2005; Scott-Clayton, 2012; TICAS, 2013; Whitsett & O'Sullivan, 2012). This research follows three related efforts to improve the design and delivery of financial aid: 1) simplifying the financial aid process, and 2) providing better information to students and their families as they evaluate college application, enrollment, and financing options, and 3) standardizing and simplifying financial aid award notifications. The last of these areas - institutional financial aid award notifications – is less studied than other parts of the financial aid system, such as the application process, and is the focus of the present study.

Simplifying the financial aid process

Although financial aid is associated with positive enrollment effects (Heller, 1997; Leslie & Brinkman, 1987), some financial aid programs, including the federal Pell Grant (see Hansen, 1983; Kane, 1994), appear to have had a limited influence on the enrollment patterns of low-income students. Similar to other social programs that require an application for eligibility (Bertrand, Mullainathan, & Shafir, 2006; Currie, 2004), a large number of students who might benefit from federal student aid never apply (King, 2006). Similarly, students who submit a FAFSA after the priority deadline for financial aid miss out on financial aid opportunities from states and higher education institutions (McKinney & Novak, 2015). A number of students already enrolled in college also fail to re-file the FAFSA, which is required to continue to receive financial aid (Bird & Castleman, 2014).

Automatic and simpler enrollment in aid programs, on the other hand, has had a substantial influence on student behavior. For example, the elimination of the Social Security Student Benefit Program, which did not require an application, led to a decline in college enrollment (Dynarski, 2003). Likewise, state merit aid programs that have simple, more transparent eligibility requirements have been shown to more effectively influence enrollment patterns than programs with more complex requirements (Domina, 2014; Dynarski, 2004). This research points to the influence of program design in the ability of programs to achieve desired outcomes. In general, programs that are narrowly targeted and require documentation to qualify, such as the federal Pell Grant, have been less effective at changing behavior than programs that provide transparent, simple

information to students about eligibility and are designed to reach a wide range of students, such as state merit aid programs (Deming & Dynarski, 2010).

Recent research has examined how simplifying the federal financial aid application can reduce complexity and uncertainty in the aid process. With more than 100 questions, the FAFSA is longer and more complex than many tax forms and may discourage low-income students from applying for aid (Dynarski & Scott-Clayton, 2006, 2008). Dynarski and Scott-Clayton's work suggests that a significant reduction in the number of questions on the FAFSA results in little influence on the amount of grant aid a student receives. Specifically, their work suggests students' awards would change by less than $100 if 80% of the questions on the FAFSA were removed. Although complexity in the financial aid system is intended to target aid to the neediest students, this work demonstrates that complexity does not result in better targeting of aid and may instead deter the intended recipients of this aid from applying. Based on their research, Dynarski and Scott-Clayton have proposed a system that eliminates the FAFSA by relying on information already used by the Internal Revenue Service (IRS) for tax purposes and providing students with earlier notifications of aid eligibility (2007).

While previous work suggests that simplifying the FAFSA may encourage more students to apply for financial aid and enroll in college (Dynarski & Scott-Clayton, 2006, 2007, 2008), providing assistance to students and their families as they complete the application also influences enrollment patterns and receipt of financial aid for low-income students (Bettinger et al., 2012). Working with H&R Block tax professionals, Bettinger and colleagues assigned low-income families with college-aged children to one of three groups: 1) a control group that received only information about costs at local

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colleges and universities, 2) a treatment group that received a personal estimate of aid eligibility and information about local college costs, and 3) a second treatment group that received assistance from a tax professional with completing and submitting the FAFSA. Although information about aid eligibility and local college costs alone did not influence student behavior, information when paired with assistance completing the FAFSA led to improved outcomes for students.

FAFSA simplification has become a focus of national policy attention in recent years (e.g., Council of Economic Advisors, 2009). While actual change has been slow to come (Dynarski & Wiederspan, 2012), proposed legislation has emphasized simplification of the financial aid application process (Stratford, 2015). For example, senators Lamar Alexander and (R-TN) and Michael Bennet (D-CO) proposed a "FAFSA-on-a-postcard" bill in 2014 based in large part on Dynarski and Scott-Clayton's work (2006, 2007, 2008) that would reduce the 10-page FAFSA to just 2 questions relating to income and family size (Alexander & Bennet, 2014). Other similar efforts to simplify the financial aid process consider the timing of when students learn about the specific financial aid awards they can expect to receive. Kelchen and Goldrick-Rab (2015), for example, have proposed that providing students with earlier notification of Pell Grant eligibility could allow low-income students to better prepare for and enroll in college while also resulting in an equivalent award amount for the majority of students. Further evaluation of such policies is necessary, as the authors note in the study, but such research represents efforts to redesign the financial aid system to more efficiently and equitably deliver aid to students.

Many high-achieving, low-income students who intend to enroll in higher education also may fail to enroll because they miss deadlines or steps in the process of applying for admission or financial aid (Avery & Kane, 2004). Experimental evidence suggests that providing assistance and personalized coaching to students throughout the process of applying for admissions and financial aid is associated with increased likelihood of college enrollment and persistence.[6] For example, Avery (2013) found that providing assistance with academic preparation as well as college and financial aid application submission resulted in an increased likelihood of students submitting an application for admission to a four-year university. Similarly, personalized coaching and financial assistance in the college admissions and financial aid application process can lead to increased likelihood of college enrollment, particularly at four-year institutions, for women and recent immigrants to the United States (Carrell & Sacerdote, 2013). Providing college counseling to low-income students during the summer between high school and college also can increase the likelihood of college enrollment (Castleman, Arnold, & Wartman, 2012) and persistence (Castleman, Page, & Schooley, 2014). For students already enrolled in college, personalized coaching designed to help students set goals and build skills to meet those goals has been associated with an increased likelihood of persistence (Bettinger & Baker, 2014). These studies suggest that assistance delivered in-person, online, or through text messaging can help students navigate college admissions, financial aid, and enrollment processes.

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[6] This review focuses on programs and interventions provided to high school and college students. As Carrell and Sacerdote (2013) note, however, there are a number of programs, particularly the TRIO and GEAR UP programs funded by the US Department of Education, that are aimed at increasing college attendance by reaching low-income students at earlier stages (primarily middle school grades) and working with them throughout high school.

Providing information about application, enrollment, and financing options

Scholarly and policy attention also has focused on providing better information to students and their families to assist them as they evaluate college application, enrollment, and financing options (Long, 2010). A number of these studies use randomized controlled trials to examine how informational interventions relating to college options, costs, and aid affect students' educational decisions.

Generally, such interventions have reduced informational barriers that students face and have led to shifts in college aspirations and enrollment. For example, students were more likely to report that they anticipated pursuing higher education after receiving information via video and interactive tools about college costs, financial aid eligibility, and earnings associated with higher education (Oreopoulos & Dunn, 2013). Hoxby and Turner (2013) examined whether high-achieving, low-income students are deterred from applying to and enrolling in selective institutions by perceived economic barriers and a complicated process of identifying colleges' academic quality and admissions processes. The authors found that students who received information about net costs, admissions procedures, and application fee waivers were more likely to apply to and enroll at institutions with higher graduation rates and greater institutional resources.

Other informational interventions have focused on the financial aid application process. In one such study, Castleman and Page (2014) sent a series of text messages to college students reminding them to re-submit the FAFSA to continue to be considered for financial aid. These reminders – or "nudges" – led to an increased likelihood of continued enrollment for students at community colleges. Taken together, these studies present evidence that information can lead to improved outcomes for students as well as

increased efficiency and equity in the financial aid system. Additionally, informational interventions are low-cost and demonstrate that small investments in informational campaigns represent "last-mile" reforms (Dynarski & Weiderspan, 2012) that can make the financial aid system operate more efficiently and equitably. For example, providing net cost, application information, and application fee waivers cost just $6 per student (Hoxby & Turner, 2013) while sending text messages reminding students to re-file the FAFSA to maintain financial aid eligibility cost $7 per student (Castleman & Page, 2014). Both interventions led to improved enrollment outcomes for students. Although providing personalized assistance to students and their families as they completed the FAFSA in the Bettinger et al. (2012) study was more costly than many other interventions that have been studied, the enrollment effects were similar to those associated with much larger increases in financial aid levels.

In some cases, however, information by itself has not been enough to change behavior. In the Bettinger et al. (2012) study, personalized estimates of financial aid eligibility along with information about local college costs was not enough to encourage college enrollment. Rather, information when paired with assistance completing the complex FAFSA form led to increased likelihood of college enrollment. Thus, while information in many cases can reduce barriers to college enrollment and persistence, its usefulness may be limited in some contexts. Previous research demonstrates that how students access, use, interpret, and respond to information about college costs and opportunities for financial aid is shaped by a number of characteristics, many of which relate to socioeconomic background (Luna De La Rosa, 2007; Olson & Rosenfeld, 1984; Perna & Steele, 2011; Tierney & Venegas, 2009). As these studies emphasize,

information alone may not be enough to clarify uncertainties surrounding costs and aid. Rather, how students perceive and respond to information about college application, enrollment, and financing decisions are influenced by a number of cultural, social, and environmental characteristics. Given this, influences beyond information alone must be considered in designing a financial aid system that can more equitably and efficiently deliver aid to students. Nonetheless, informational barriers necessitate interventions to reduce gaps in students' perceptions and knowledge of financial aid programs and how to access such programs.

Standardizing and simplifying financial aid award notifications

Together, the studies described above present evidence that missed deadlines, bureaucratic details, and incomplete information play a large role in the outcomes of investments in financial aid. Much of this research has focused on the process of applying for financial aid. For example, simplifying the FAFSA (Dynarski & Scott-Clayton, 2006, 2007, 2008) and providing assistance to students and their families as they complete the FAFSA (Bettinger et al., 2012) may reduce barriers that students, particularly low-income students, face on the way to college and lead to improved outcomes of investments in financial aid. However, students and their families also face complexity later in the aid process with interpreting and understanding financial aid award notifications, which is how colleges and universities communicate costs and aid to students. The receipt of a financial aid award notification is a critical point in the financial aid process because this is the primary way students learn about their specific financial aid award and options for financing college. Award notifications, however,

differ across colleges and universities. The National Association of Student Financial Aid Administrators (NASFAA), the professional association for financial aid administrators, notes that differences in award notifications arise in part from institutional differences in student populations and the information each institution has to communicate concerning costs and aid (NASFAA, 2012).

Research suggests that students and their families encounter difficulty interpreting financial aid awards and comparing costs across institutions. Many award notifications lack information on cost of attendance, unmet need, net cost, or specific terms and conditions of loans (Kantrowitz, 2010, TICAS, 2013, Whitsett & O'Sullivan, 2012), contributing to the difficulty students and their families face interpreting what one news article called the "fuzzy math in financial aid offers" (Lorin, 2012). Advocates have called for standardizing financial aid award notifications to better enable students and their families to interpret and compare financial aid awards (e.g., Kantrowitz, 2007).

Under the Higher Education Opportunity Act of 2008, the US Department of Education (ED) and Consumer Financial Protection Bureau (CFPB) developed a model award notification that simplifies and standardizes information that students receive from institutions about costs and aid. The shopping sheet is intended to allow students to better understand college costs and options for financing their education and to more easily compare costs across institutions. The ED and CFPB released a draft of the model financial aid award notification, or "shopping sheet," in October 2011 and allowed for a period of public comment on the format and information included on the form. After receiving feedback from students, families, high school guidance counselors, and college financial aid administrators, the revised shopping sheet was announced in July 2012 (see

Appendix A for shopping sheet). The shopping sheet is one-page document that institutions can use as a supplement or as a replacement to the award notifications that they already provide to students. Colleges and universities that have adopted the shopping sheet have mainly adhered to the former use and include the shopping sheet as a cover letter or addition to the information already provided about costs and aid.

The shopping sheet provides students with information on net cost as well as options for paying net cost, including federal work-study and loan options. By listing loans after net cost – the amount a student is expected to pay after accounting for grant aid – the shopping sheet distinguishes between aid that students do not have to repay (grants) and aid that students repay with future earnings (loans). The shopping sheet also provides institution-specific information on graduation rate, loan default rate, and median borrowing. This institutional data is provided alongside data from a comparison group of institutions (e.g., primarily bachelor's degree granting institutions) to allow students to view student data at a particular institution relative to data from other comparable institutions.

The shopping sheet is part of a larger federal policy effort aimed at improving college affordability and transparency that stems from both the 2008 Higher Education Opportunity Act and the Obama Administration's higher education priorities. As part of these efforts, a number of tools in addition to the shopping sheet have been developed to assist students in evaluate college options. For example, the College Scorecard website allows students to search for colleges by name, location, size, or academic major and to compare colleges within each of these categories on measures such as net cost, graduation rate, and median borrowing. The net price calculator, which all institutions

that receive funding through federal student aid programs were required to place on their websites by the fall of 2011, provides students with early, personalized estimates of the net price they can expect to pay at a given institution. Together, the College Scorecard, net price calculator, shopping sheet, and other related tools are intended to provide simplified and personalized information to students about their college application, enrollment, and financing options.

The US Department of Education asked institutions to voluntarily adopt the shopping sheet, and more than 500 colleges and universities, including state systems in Maryland, Massachusetts, New York, and Texas, adopted the format in the first year (US Department of Education, 2012). The shopping sheet was first used during the 2012-2013 academic year to notify students of their upcoming financial aid awards for the 2013-2014 academic year. Now in its third year, more than 2,000 institutions that together enroll nealy half of US undergraduates use the shopping sheet for some or all students in awarding financial aid (US Department of Education, 2014a). Additionally, an Executive Order issued in 2012 requires colleges and universities that receive funding from federal military and veterans educational benefits programs to use the shopping sheet for students who receive these benefits (Exec. Order No. 13,607, 2012). Legislation that has been introduced in the past and that has been proposed as part of the Higher Education Reauthorization Act (2014) could require colleges and universities to use the shopping sheet or another standardized format in awarding financial aid.

The present study

Despite federal policy discussion surrounding standardization and simplification of financial aid award notifications, however, we know little empirically about how this policy effort affects students' educational decisions. In the present study, I used a randomized controlled trial at a public university to examine how these recent federal policy efforts regarding the delivery of financial aid affect students' enrollment and borrowing decisions. While the present study directly relates to policy regarding standardization and simplification of award notifications, it also aims to contribute to the broader range of "last-mile" reforms, outlined in this chapter, that are designed to make the financial aid system operate more efficiently and equitably.

CHAPTER 3

THEORETICAL FRAMEWORK

The present study draws on two theoretical frameworks to build an understanding of how information about college costs and financial aid might influence educational decisions. The first, human capital theory, which comes from the field of neoclassical economics, posits that investment in education is based on the expected costs and benefits associated with additional education. Second, behavioral economics, which incorporates concepts from economics and psychology, provides an understanding of how complexity and uncertainty in the design and delivery of financial aid affects students' enrollment and borrowing decisions.

Human capital theory

Human capital activities influence future earnings by building skills or investing resources in people that result in increased productivity (Becker, 1962; Schultz, 1961). Such activities can include healthcare, on-the-job training, formal education, continuing education, and the migration of people for work (Schultz, 1961). Similar to investments in machines, buildings, land, and other forms of capital, investments in workers' skills and resources prove profitable over time. Training in both formal (years of schooling) and informal (on-the-job experience) settings can explain much of the variation in workers' earnings (Mincer, 1958).

Human capital theory posits that the decision to invest in human capital activities, such as formal education, is based on the expected costs and benefits associated with the investment (Becker, 1962). In the case of higher education, expected costs include direct costs (tuition, fees, room and board, and other associated charges), indirect costs (opportunity costs that include foregone earnings from time spent in school rather than at work), and the time spent in school. Expected benefits associated with college enrollment include higher future earnings and time spent in the labor force. Because many students who attend college do not complete a degree, the probability of earning a degree also affects expected benefits (Toutkoushian, Shafiq, & Trivette, 2013). The decision to invest is motivated by the expected net benefit associated with additional education, calculated by subtracting expected costs from expected benefits. In this cost-benefit analysis, all costs and benefits are discounted to their present value because the decision is made in the present.

Research demonstrates that the benefits associated with additional education far outweigh the costs (Baum, Ma, & Payea, 2010; Pew Research Center, 2014). In 2013, college graduates earned $17,500 more annually than high school graduates on average, and this earnings gap has grown over time (Pew Research Center, 2014). The value of a college degree over a lifetime has increased relative to the value of a high school diploma (Avery & Turner, 2012). Benefits outweigh costs even when accounting for the probability of not completing a degree (Toutkoushian et al., 2013) and for factors that are likely to influence both earnings and educational attainment (Angrist & Krueger, 1991;

Card, 1994; Cohn & Hughes, 1994).[7] Taken together, this research demonstrates that the investment in higher education pays off for most students.

While the financial returns associated with earning a college degree for individuals are clear, increases in educational attainment rates also benefit society. Educational attainment is associated with a number of positive externalities, including increased tax revenues, decreased reliance on social insurance programs, and greater civic participation (Baum et al., 2010). Because these benefits are societal rather than individual, students do not consider these social benefits when deciding whether to invest in human capital. Rather, human capital theory posits that students invest in human capital to the point where the private marginal benefit of an additional year of schooling equals the private marginal cost. Many students underinvest in education from a socially optimal standpoint (McMahon, 2006, 2009) because the total marginal benefit (social as well as private) is larger than the private marginal benefit that accrues to the individual.

To support college enrollment and persistence, federal and state governments subsidize higher education costs through investments in student financial aid and state appropriations. College and universities also direct substantial funds to financial aid to influence students' college choices. These subsidies lower the direct cost of education and encourage students to enroll. But the form of this subsidy matters. As human capital theory would predict, increases in tuition are associated with a decreased likelihood of

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[7] It is difficult to estimate the causal effect of education on earnings because a number of factors influence both the likelihood of earning a college degree and future earnings, such as motivation and ability. These characteristics also are likely rewarded with higher earnings in the labor market. Motivation and ability, however, are difficult to measure and their exclusion from models examining the relationship between education and earnings results in biased estimates (Griliches, 1977). Studies, including the ones cited above, that use quasi-experimental methods to account for this "ability bias" have found strong effects of education on earnings.

enrollment (Leslie & Brinkman, 1987; Heller, 1997). Research also suggests students are more sensitive to grant aid than other types of aid, including loans and work-study programs (Heller, 1997). Again, these responses are fairly predictable in a human capital framework because students do not have to repay grant aid whereas loans must be repaid with future earnings and work-study requires students to work while in school to cover educational costs.

Students' decisions largely reflect what human capital theory would predict, according to a study of high aptitude students' responses to financial aid awards (Avery & Hoxby, 2004). However, students in the study demonstrated a particularly strong response to offers of loans and work-study (relative to grants) and to grants that were called scholarships (relative to unnamed grants). Avery and Hoxby suggest these responses may partly be due to a lack of information and understanding of the financial aid process. These errors are not minor – the authors estimate that a third of students in their sample underinvested in education at a cost of more than $75,000 each. Although these students did not act in a way that maximized their net financial benefit, this does not imply their decisions were necessarily irrational from an economic perspective. In evaluating the decision to invest in additional education, students attach utility – a value based on personal tastes and preferences – to costs and benefits and base decisions on the associated utility (DesJardins & Toutkoushian, 2005). Typically, as the net benefit of a decision increases, the utility also increases. Students also attach utility to non-financial aspects of higher education, such as campus amenities or proximity to home. In these cases, decisions that do not appear to maximize returns on investment may maximize the

utility a student derives from attending one college over another (DesJardins & Toutkoushian, 2005).

Additionally, as discussed in the previous chapter, many students and their families lack complete information about costs and aid and often overestimate costs (Avery & Kane, 2004; Grodsky & Jones, 2007; Horn et al., 2003; Luna De La Rosa, 2007), which may result in suboptimal enrollment and borrowing decisions. Likewise, the benefits associated with additional education, including future earnings, are unknown at the time students' are asked to invest in higher education. Although the returns to higher education vary, research suggests students are relatively accurate in estimating their future post-college earnings (Webbink & Hartog, 2004). By contrast, Avery and Kane (2004) found that high school students – both from low- and higher-income families – overestimated both the costs and benefits associated with college enrollment, leading to reasonably accurate perceptions of net benefits. Nonetheless, there is some degree of uncertainty involved in evaluating college enrollment decisions, which likely contributes to an underinvestment in education for many students who would benefit from a college degree (McMahon, 2006, 2009).

While studies using human capital theory largely have focused on students' decisions concerning whether to invest in higher education, far less discussion surrounds the financing and borrowing decisions associated with such an investment. Loans play a large role in access to higher education, particularly in the four-year sector. Students who are averse or unwilling to borrow to finance their education, however, may find their college opportunities limited. When it comes to borrowing, students also face many uncertainties, as Avery and Turner (2012) note, "information constraints may lead to

underborrowing if students do not avail themselves of borrowing opportunities, or to overborrowing if students overestimate the return to education" (p. 168).

The shopping sheet may reduce some of the uncertainty surrounding expected costs by providing simplified information to students about costs as well as options for financing education. The shopping sheet also provides institutional data on graduation rate, loan default rate, and median borrowing, which further clarifies information that students have concerning both expected costs and benefits and may influence enrollment and borrowing decisions as a result.

Behavioral economics

Although human capital theory provides an understanding of how enrollment and borrowing decisions may shift in response to simplified information about expected costs and benefits, behavioral economics provides insight into how complexity and uncertainty surrounding costs and benefits influence decision making. Behavioral economics draws on concepts from economics and psychology to explain why people do not always respond to incentives and policy in anticipated ways. In making decisions, behavioral economics suggests people rely on heuristics, or mental short cuts, to reduce complexity associated with evaluating choices and assessing the probability of different outcomes. Such mental short cuts often result in behavior that deviates from human capital predictions (Kahneman & Tversky, 1979, 2000; Tversky & Kahneman, 1986). Heuristics become particularly important in decisions that involve risk and uncertainty, that require a present sacrifice for future gain, or that people do not make regularly. The reliance on heuristics introduces biases into decision making – resulting in decisions that may favor

the status quo or that favor the present time period more than a cost-benefit analysis would suggest.

Often applied to evaluations of health and savings behavior (Thaler & Sunstein, 2008), behavioral economics has been increasingly emphasized in higher education research (e.g., Castleman, Schwartz, & Baum, 2015; Dynarski & Scott-Clayton, 2006; Goldrick-Rab, Harris, & Trostel, 2009; Jabbar, 2011; Lavecchia, Liu, & Oreopoulos, 2014; Ross, White, Wright, & Knapp, 2013). Lavecchia and colleagues (2014) highlight several reasons why students' educational decisions may appear suboptimal from a cost-benefit perspective. Two of these are of particular relevance to the present study: 1) students must complete a number of tasks relating to college admissions and financial aid to enroll in higher education and often lack information about college options, and 2) students demonstrate a preference for the present over the future.[8] While these concepts relate to a broad range of decision makers, they prove particularly salient to students who must navigate the often unfamiliar terrain of the admissions and financial aid systems on the way to college.

Students must meet specific deadlines and complete a variety of forms and applications to successfully enroll in college. Students who do not alter their routines to accomplish these tasks may find their options more limited (Lavecchia et al., 2014). Indeed, many low-income students who anticipate going to college fail to "clear seemingly minor hurdles in the process of applying for college and applying for financial

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[8] Behavioral economics may be particularly relevant when decisions are made by high school students who are more likely to favor the present over the future than older decision makers (see Lavecchia, Liu, and Oreopoulos [2014] and Castleman [2013] for more detailed overviews of the contributions of neuroscience to the study of decision making).

aid," including deadlines and forms (Avery & Kane, 2004, p. 390). In higher education, the default option – the decision that is made if a student does not take action to indicate a different preference – plays an important role during the transition from high school to college. The option to do nothing, essentially to not make a new decision, reflects a bias toward the status quo and is very influential in decision making. Defaults that automatically enroll people in retirement savings plans (Beshears, Choi, Laibson, & Madrian, 2008) or cadaveric organ donation registration (Abadie & Gay, 2006), for example, have higher participation rates than those that require participants to opt-in to a program. Thus, the default option is a powerful mechanism because people tend toward the status quo when evaluating decisions, particularly when decisions involve complexity and uncertainty. The status quo or default bias is one explanation for why financial aid programs that are easy to understand with simple and transparent eligibility criteria have been more successful in achieving outcomes than ones with complex application procedures or eligibility requirements (Deming & Dynarski, 2010; Domina, 2014; Dynarski, 2003, 2004).

Policy efforts to simplify the process of enrolling in public programs and to provide information about programs can lead to increased participation in a variety of contexts (Sunstein, 2012). In higher education, providing information to students as they evaluate college options can increase enrollment, particularly for high-achieving, low-income students (Hoxby & Turner, 2013). Similarly, efforts to simplify or provide assistance with the FAFSA and to provide text messages "nudging" students to re-file the FAFSA have been shown to improve outcomes for students (Bettinger et al., 2012; Castleman & Page, 2014; Dynarski & Scott-Clayton, 2006, 2007, 2008). In such cases,

even small changes in the in the design and delivery of a program have had a large effect on behavior.

Lavecchia et al. (2014) suggest that students also make educational decisions that may appear suboptimal because they place a heavy emphasis on the present over the future and are averse to risk. Investing in higher education requires that students make a sacrifice in the present in hopes of future gain. When students discount the future, they demonstrate a preference for allocating resources toward the present over the future. The benefits associated with a college degree are uncertain and are not realized until after – and only if – a student graduates. If a student has to borrow to finance their education, they may be particularly hesitant to make this investment. Because people tend to be averse to risk (Kahneman & Tversky, 1979, 2000; Tversky & Kahneman, 1986), borrowing to pay for an investment for which the returns are somewhat uncertain may seem like an unappealing prospect.

Indeed, there is a large psychic cost associated with student debt. In one study, law school students who were offered a tuition waiver were more likely to enroll than students who were offered an option of taking out a loan that the institution would repay, despite the monetary equivalence of the two options (Field, 2009). The language used to describe a loan also matters: students in a study in Chile, Colombia, and Mexico preferred debt that was labeled a "human capital contract" over the same debt labeled a "loan" and would accept a financial penalty to avoid such a "loan" (Caetano, Palacios, & Patrinos, 2011). These studies demonstrate that aversion to debt and a tendency to discount the future may contribute to enrollment and financing behavior that appears suboptimal given the expected costs and benefits.

The complexity costs associated with navigating the financial aid system have proven substantial barriers in accessing college and financial aid. But in many cases, small changes in the design and delivery of financial aid have resulted in improved outcomes of investments in aid. As Lavecchia et al. (2014) suggest, "even small changes in the way choices are presented or in the way information is conveyed can lead to large changes in behavior" (p. 4). As a result, simplified information provided in the shopping sheet about the costs and benefits associated with college may affect how students evaluate choices, leading to changes in enrollment and borrowing decisions.

Hypotheses

Prior to presenting the hypotheses for the present study, it is first necessary to provide a more thorough description of the treatment that students in the study received. The shopping sheet that students received included information on the expected costs associated with enrolling at the participating university: cost of attendance, net cost (cost of attendance adjusted for grant aid), and options for paying net costs. The shopping sheet also provided information on the participating university's six-year graduation rate, loan default rate, and median borrowing, each of which may have influenced how students evaluated the costs and benefits associated with enrolling at the participating university. Perhaps most important for forming the hypotheses, the shopping sheet provided a comparison of institutional data at the study university to figures at other primarily bachelor's degree granting institutions. Graduation rate at the participating university was in the medium to high range relative to other institutions that primarily award bachelor's degrees, loan default rate was slightly above average relative to these other institutions,

and median borrowing was around $15,000 (the shopping sheet did not provide a comparison figure for other institutions on this figure). For reference, median borrowing at the participating university was below the national average of college graduates (Project on Student Debt, 2014) and far less than the stories that often are highlighted in the media that focus on students who incur substantial debt – sometimes more than $100,000 – to earn an undergraduate degree (Avery & Turner, 2012).

Together, human capital theory and behavioral economics provide an understanding of why students may underinvest in higher education or demonstrate aversion to borrowing to finance their education despite benefits that outweigh costs when information is unclear or complex. By reducing complexity and uncertainty surrounding expected costs and benefits associated with additional education, I hypothesized that receipt of the shopping sheet would be associated with an increased likelihood of enrollment and borrowing. The benefits associated with earning a college degree outweigh the costs (Baum et al., 2010), which the institutional data provided in the shopping sheet may have clarified for students. At the participating university, the shopping sheet might have encouraged students to enroll and to borrow when necessary because the institutional graduation rate was in the medium to high range while loan default rate was around the average among a comparison group of institutions. Thus, students who enrolled at the participating university were as likely to graduate within six years as students at other institutions and fared no better or worse on average than the average college graduate when it came to defaulting on student loans.

I also hypothesized that receipt of the shopping sheet would have a stronger positive effect on the enrollment and borrowing decisions of low-income students than

those of their higher-income peers. This subpopulation of lower-income students faces

higher informational barriers surrounding costs and aid and is more likely to overestimate

college costs than higher-income groups are (Avery & Kane, 2004; Grodsky & Jones,

2007; Horn et al., 2003; Luna De La Rosa, 2007). As a result, the enrollment and

borrowing decisions of this group of students may have been particularly influenced by

the additional information about costs and aid provided in the shopping sheet relative to

those of their higher-income peers.

CHAPTER 4

DATA AND METHODS

This chapter describes the data and methods used to examine how recent federal

policy efforts to simplify and standardize information in financial aid award notifications

have affected enrollment and borrowing decisions. The chapter begins with a description

of the participating institution that situates the university within the broader context of

US higher education. I then outline the research design with a discussion of the growing

emphasis on randomized controlled trials in education research and a description of the

experiment used to examine the research questions in the present study. Next, I describe

the analytic technique and sensitivity analyses used to estimate the effect of the shopping

sheet on enrollment and borrowing decisions. The chapter concludes with a discussion of

the ethical considerations and limitations of the present study.

Research site

The study was conducted at a mid-sized public institution classified as a

doctoral/research university by the 2010 Carnegie Classification of Institutions of Higher

Education. The majority of students enrolled at the university during the 2013-2014

academic year were residents of the state in which it is located, but the institution also

drew students from other countries and states, particularly bordering states and ones in

the same geographic region.[9] Like the majority of colleges and universities in the United States, the study institution does not have a highly selective admissions process. For the fall of 2013, the university admitted around 85% of first-year, first-time students who applied for admission, according to figures from the National Center for Education Statistics (NCES). Of the students who were admitted to the university, just fewer than half enrolled.

Cost of attendance (including room and board) for in-state students at the participating university was around $23,000 for the 2013-2014 academic year, according to NCES data.[10] Average net price, which reflects the cost of attendance minus the average amount of grant aid per student, was approximately $15,000 for the 2012-2013 academic year according to NCES data from the most recent year available. This figure was in the low to medium range for US institutions that offer primarily bachelor's degrees, according to the College Scorecard (2015), a website that allows students to compare costs across institutions. Nearly all students at the participating university received some form of financial aid from federal (e.g., Pell Grant, direct student loans), state, or private sources. For example, around 40% of undergraduate students at the university received a federal Pell Grant during the 2012-2013 academic year, according to the most recently available NCES data.

Federal direct student loans also proved an important financing mechanism for students at the university in the study; the median borrowing rate was just over $14,000 for students who graduated during the 2011-2012 academic year (College Scorecard,

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[9] To maintain the confidentiality of the university in the study, all enrollment and financial figures are approximated.
[10] In-state cost of attendance is provided because the majority of students at the participating university are residents of the state in which it is located.

2015). Nationwide, the average college graduate accumulates around $28,000 in debt at graduation (Project on Student Debt, 2014), so students graduate, on average, with less debt at the participating university than the average college graduate. The loan default rate for student borrowers at the institution was close to the national average among primarily bachelor's degree granting institutions. Students at the participating university also could expect to graduate at about the same rate as their peers at similar institutions – the six-year graduation rate at the participating university was in the medium range relative to other universities that primarily award bachelor's degrees (College Scorecard, 2015).

The university where the study was conducted provided an interesting and appropriate site at which to examine how information about costs and aid affect decisions for several reasons. First, enrollment and financial figures at the participating university were similar to many other universities, particularly public institutions. Specifically, students at the study university faced similar net prices and borrowed a similar amount to students at other universities across the country that primarily award bachelor's degrees, as indicated by the College Scorecard (2015). Because the majority of students enrolled at the university submitted a FAFSA and received financial aid, the institution also provided a large population of students from which to draw a random sample of sufficient size to examine how the shopping sheet influenced enrollment and borrowing decisions.

Research design

I designed and worked with administrators at the participating university to conduct a randomized controlled trial (RCT) to examine how information in the shopping

sheet affected persistence and borrowing decisions. RCTs are considered the "gold standard" of quantitative analysis and have been emphasized in education research for their usefulness in evaluating how policies affect behavior (Angrist, 2004; US Department of Education, 2003). Identifying the causal effect of information on educational decisions is particularly difficult in the absence of an RCT because a number of observable and unobservable characteristics that are associated with enrollment and borrowing also are related to seeking out information about costs and aid. For example, motivation is likely correlated both with seeking out information as well as enrollment and borrowing decisions. Motivation is difficult to observe and measure, but the exclusion of such variables from analyses results in biased estimates (Wooldridge, 2002). As a result, any estimated effect of information on educational decisions will reflect not only the influence of information but also any unobservable characteristics that are associated with seeking out information, such as motivation. As a result, findings from such analyses are not causal and must be interpreted with caution.

Researchers deal with omitted variable bias in a number of ways. One is to use multiple regression to control for as many observable factors as possible and to then present possible sources and directions of bias. In other cases, quasi-experimental designs are used in an attempt to isolate the effects of policy when randomization is not possible. Many studies use the adoption of a financial aid program as an exogenous policy shock that essentially randomizes aid for some students and not for others. Regression discontinuity (RD) designs, for example, can be used when an exogenously-established cut-off determines eligibility for an aid program. In an RD design, it can be argued that the groups directly on either side of the eligibility criteria cut-off (e.g., students just

above and below the eligibility criteria) may be the same, on average, in observed and unobserved ways (Murnane & Willett, 2011; van der Klaauw, 2002). As a result, any differences that are observed in outcomes between groups can arguably be interpreted as the estimated effect of treatment.

Methodologically and inferentially, RCTs are preferred to multiple regression and quasi-experimental research designs because a well-designed experiment can more precisely isolate the causal effect of policy on behavior. Random assignment to treatment conditions (e.g., information provided in the shopping sheet) ensures there is no systematic relationship between assignment to treatment and observable or unobservable characteristics of students, such as motivation. As a result, treatment and control groups are the same, on average, in observed and unobserved ways, or equal in expectation (Murnane & Willett, 2011). Because the groups are equal in expectation, estimates can more readily be attributable to treatment rather than to other observable or unobservable differences between groups that are associated with treatment.

In the present study, students who received a financial aid award notification were randomly assigned to treatment and control conditions. Random assignment was done with Stata 13 statistical software using the random number generator with a uniform distribution to ensure each student had an equal probability of selection into treatment (Buis, 2007). I randomized assignment to treatment and control conditions for two samples of students:

1) Students who had been admitted to the participating university as first-time, first-year degree-seeking students for the 2013-2014 academic year, and

2) Students who were enrolled at the participating university as full-time, first-year degree-seeking students at the participating university when the experiment was conducted.

The sample of admitted students provided an analysis of decision making among a group of students who were making college enrollment and borrowing decisions for the first time. The sample of already enrolled students provided observations of borrowing behavior among a group of students who may have previously relied on loans to finance college, thus providing a better understanding of the financing decisions that students make while in college.

Students in the treatment group received the shopping sheet in addition to the award notification traditionally used by the participating university; students in the control group received the award notification traditionally used by the university. The shopping sheet provided simplified and personalized information to students and their families about costs and aid with several features that distinguished it from the participating university's traditional award notification: 1) loans were listed after net cost, separate from other types of financial aid, and 2) institutional graduation rate, loan default rate, and median borrowing data was included. The following provides a description of the institutional data that was provided in the shopping sheet:

1) Graduation rate was in the low end of the high range among primarily bachelor's degree granting institutions,

2) Loan default rate was slightly above the national average, and

3) Median borrowing was around $14,000 with a federal loan payment over 10 years of around $150 per month.

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The participating university's traditional award notification included several screens that students navigated in an online student account system; the screen in Appendix B was the main page that listed a student's financial aid award. All financial aid –grants, loans, and work-study – was listed together on the same screen. When students clicked on each type of financial aid, they could read more about each, e.g., terms and conditions of loans as well as about any grant or scholarship aid they received. Appendix A includes the shopping sheet provided to students in the treatment group; Appendix B provides the participating university's traditional award notification, which all students received regardless of treatment status.

Students in the treatment group could view the shopping sheet through their online student account and received a paper copy of the shopping sheet in the mail. Randomization was done between April and July of 2013. Students in the study received financial aid award notifications in the spring and summer of 2013, and enrollment and borrowing behavior was observed during the 2013-2014 academic year. Only students who had submitted a FAFSA and whose aid was ready to be packaged by the university's financial aid office were included in the study. As a result, the sample of students in this study represented a subpopulation of students at the participating university. This subpopulation of students may have differed in some ways from the full population of students at the participating university. For example, students included in the sample used in the present study may have been more likely to have submitted the FAFSA before the priority deadline for financial aid than students not included in the sample. As previous research demonstrates, students who file the FAFSA after the priority deadline are more likely to enroll part-time or delay enrollment (McKinney & Novak, 2015). The extent to

which students in the sample differed from the full population of students at the participating university may be limited, however, because only students who were enrolled full-time or had applied to enroll full-time were included in the study.

Power analysis

I conducted statistical power analyses to determine the sample size necessary to detect an effect of the shopping sheet on enrollment and borrowing decisions if indeed there was an effect. Typically, a pilot study provides an estimate of the anticipated treatment effect size and variance, which are then used to determine the necessary sample size (List, Sadoff, & Wagner, 2011). However, because the participating university – like other institutions – provided financial aid award notifications only once a year, anticipated effect size and variance were based on findings from previous studies using informational interventions (e.g., Bettinger et al., 2012; Castleman & Page, 2014; Oreopoulos & Dunn, 2013).[11] These studies provide mixed evidence about how information influences behavior. For example, the Institute for Education Sciences' What Works Clearinghouse calculated effect sizes that ranged from .15 to .45 standard deviations in college expectation for the informational intervention in Oreopoulos and Dunn's study (US Department of Education, 2013). Castleman and Page's study yielded effect sizes of .11 (at four-year colleges) and .28 (at community colleges) on enrollment (US Department of Education, 2014b).

Power analyses for the present study accounted for the possibility that this intervention had a small effect on behavior, and sample sizes generally provided

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[11] As Bettinger and colleagues (2012) note, the information-only intervention in the study may have lacked statistical power to detect an effect on enrollment.

sufficient power to detect a small effect on behavior (Cohen, 1988). Table 1 provides sample sizes and the minimum detectable effect size associated with each. Power analyses were conducted using *PowerUp!*, a tool developed to determine minimum detectable effect sizes and sample sizes for a variety of research designs in education studies (Dong & Maynard, 2013). Statistical power (.80) and significance level (.05) were based on conventional standards in experimental research (Cohen, 1988). Power analyses also accounted for the inclusion of covariates, which were expected to explain around 10% of variation in models.

The sample size of 2,655 for admitted students was sufficient to detect an effect size of .11 on enrollment, or about one-tenth of a standard deviation difference in treatment and control group means, at 80% power, .05 alpha-level, and 10% variance explained. Based on the number of admitted students who enrolled at the participating university, a sample of 1,243 remained from which to observe borrowing behavior, providing statistical power to detect a .15 effect size on borrowing using the established criteria. Because more than 95% of students in the enrolled student sample re-enrolled at the participating university the following year, only borrowing behavior was observed among this sample. The sample size of 821 was sufficient to detect a .19 effect size on borrowing using the same criteria.

To examine whether low-income students were more sensitive to receipt of the shopping sheet than their higher-income peers, I examined outcomes among students who were eligible for the federal Pell Grant, which is targeted toward low-income students. Focusing on this subgroup of the full sample, however, resulted in a loss of statistical power. The sample of admitted students who were eligible for the Pell Grant (n=1,217)

provided power to detect an effect size of .15 on enrollment. Of these students, 582

students enrolled, which provided statistical power to detect a .23 effect size on

borrowing among admitted students who enrolled at the university. For students who

were already enrolled at the participating university and who were eligible to receive the

Pell Grant (n=339), statistical power allowed for a minimum detectable effect size of .29

on borrowing decisions.

Table 1. *Sample size and statistical power*

	Treatment group	Control group	Total sample size	Minimum detectable effect size
Full sample				
Admitted students				
Enrollment	1100	1555	2655	0.11
Borrowing	503	740	1243	0.15
Enrolled students				
Borrowing	437	384	821	0.19
Pell eligible sample				
Admitted students				
Enrollment	509	708	1217	0.15
Borrowing	233	349	582	0.23
Enrolled students				
Borrowing	175	164	339	0.29

Variables

The first outcome variable of interest was a dichotomous variable indicating

whether a student enrolled at the university during the 2013-2014 academic year. Two

variables measured borrowing behavior: 1) a dichotomous variable indicating whether a

student used federal (direct) loans to finance attendance during the 2013-2014 academic

year, and 2) a continuous variable indicating the dollar amount of direct loans a student

borrowed during the 2013-2014 academic year. The dollar amount of direct loans a

student borrowed included subsidized and unsubsidized Stafford, parent PLUS, and

federal Perkins loans.

The independent variable of interest was a dichotomous predictor indicating

whether a student was assigned to treatment. The coefficient for this variable was the

intent-to-treat effect of the shopping sheet on behavior. I generated a second independent

variable of interest by interacting the dichotomous treatment variable with whether a

student was eligible to receive a federal Pell Grant, one proxy for low-income status. This

interaction term indicated whether enrollment and borrowing decisions of low-income

students were more sensitive to information in the shopping sheet than those of higher-

income students. The coefficient associated with this variable represented the

heterogeneous intent-to-treat effect for low-income students. Because technological

limitations prevented tracking which students viewed the shopping sheet in the online

system, all treatment effects in this study represented the intention to treat, or the effect of

being assigned to receive the shopping sheet, on enrollment and borrowing decisions.

I also included a number of pre-treatment covariates that were likely to shape

students' decisions about whether to enroll and how to finance college. These covariates

included academic (high school GPA, SAT score, and whether a student had completed

more than 15 credit hours at the university for students who were already enrolled),

socioeconomic and financial (amount of grant aid received, whether a student was

eligible for the federal Pell Grant, whether a student had at least one parent with a college

degree, and amount previously borrowed for students who were already enrolled at the

university), and demographic (ethnicity and gender) characteristics of students. The inclusion of pre-treatment covariates reduced unexplained variance in the model, leading to more efficient estimates and increasing statistical power (Murnane & Willett, 2011). Table 2 provides a list and description of the variables used in the analysis.

Table 2. *Description of variables used in analysis*

Variable	Description of variable
Enrollment	Dichotomous variable indicating whether a student enrolled at the participating university during the 2013-2014 academic year.
Borrowing	Dichotomous variable indicating whether a student used subsidized or unsubsidized Stafford, parent PLUS, or federal Perkins loans to finance their education during the 2013-2014 academic year.
Amount borrowed	The dollar amount a student borrowed in subsidized and unsubsidized Stafford, parent PLUS, and federal Perkins loans during the 2013-2014 academic year.
Shopping sheet	Dichotomous variable indicating whether a student was selected to receive the shopping sheet.
Shopping sheet*Pell eligibility	Interaction term indicating whether a student was selected to receive the shopping sheet and was eligible for the federal Pell Grant during the 2013-2014 academic year.
High school GPA	A student's high school GPA.
ACT score	A student's ACT score. SAT scores were converted to equivalent ACT score using concordance tables provided by the College Board.
Previously taken >15 credit hours	Dichotomous variable indicating whether a student had previously taken more than 15 college credit hours.
Pell eligible	Dichotomous variable indicating whether a student was eligible for the federal Pell Grant during the 2013-2014 academic year.
Parent with college degree or higher	Dichotomous variable indicating whether a student had at least one parent with a college degree or higher.
Grant aid	The dollar amount of grant aid that a student received from any source during the 2013-2014 academic year.
Amount previously borrowed	The dollar amount a student borrowed in subsidized and unsubsidized Stafford, parent PLUS, and federal Perkins loans during the 2012-2013 academic year.
Male	Dichotomous variable indicating reported gender (1=male).
Asian	Dichotomous variable indicating reported ethnicity (1=Asian).
Black	Dichotomous variable indicating reported ethnicity (1=Black).
Latino	Dichotomous variable indicating reported ethnicity (1=Latino).
White	Dichotomous variable indicating reported ethnicity (1=White).

Equality in expectation for treatment and control groups

The ability to causally attribute differences in outcomes to treatment assumes that treatment and control groups are the same, on average, in observable and unobservable ways, or equal in expectation (Murnane & Willett, 2011). Random assignment to treatment and control conditions ensures differences between groups are due to random error rather than to systematic differences between groups. By doing so, the control group – which is the same, on average, in observable and unobservable ways to the treatment group – serves as the counterfactual, or what would have been expected to happen in the treatment group if treatment was never adopted. To ensure that random assignment to treatment and control conditions was successful in the present study, I examined differences in means of observable pre-treatment covariates by treatment status.

Admitted student sample

I first examined differences in covariate means by treatment status for the sample of admitted students. Results are presented in Table 3. None of the differences between treatment and control group means for pre-treatment covariates were statistically significant at the .05 level, suggesting treatment and control groups were equal in expectation on average. I also conducted an F-test by regressing treatment status on pre-treatment covariates to determine whether covariates predicted whether a student was assigned to receive the shopping sheet. This test determined whether there were systematic relationships between assignment to treatment and observable characteristics relating to a students' academic, socioeconomic, financial, or demographic characteristics. The test failed to reject the null hypothesis that coefficients were equal to zero ($p = 0.73$), suggesting again that the groups were equal in expectation in observable

ways. As a result, the findings that are presented in the following chapter can be more

readily attributed to receipt of the shopping sheet rather than to systematic differences

between groups that could have influenced enrollment decisions.

Table 3. *Covariate means by treatment status for enrollment (admitted sample)*

	Treatment group mean (n=1100)	Control group mean (n=1555)	Difference in means
High school GPA	3.42	3.40	0.02
	(0.01)	(0.01)	(0.02)
ACT score	21.96	21.90	0.06
	(0.12)	(0.11)	(0.16)
Pell eligible	0.46	0.46	0.01
	(0.02)	(0.01)	(0.02)
Parent income	75383.60	78503.82	-3120.22
	(2305.62)	(1830.99)	(2913.14)
Parent with college degree or higher	0.65	0.63	0.02
	(0.01)	(0.01)	(0.02)
Grant aid	3395.93	3513.37	-117.44
	(146.21)	(126.70)	(194.46)
Male	0.41	0.39	0.02
	(0.01)	(0.01)	(0.02)
Asian	0.02	0.01	0.00
	(0.00)	(0.00)	(0.00)
Black	0.08	0.09	-0.01
	(0.01)	(0.01)	(0.01)
Latino	0.02	0.02	0.00
	(0.00)	(0.00)	(0.01)
White	0.74	0.74	0.01
	(0.01)	(0.01)	(0.02)

Standard errors in parentheses.
+ $p<0.10$ * $p<0.05$ ** $p<0.01$

Not all of the students in the admitted sample enrolled at the participating university during the 2013-2014 academic year. Because I can observe borrowing decisions only among the group of students who enrolled, I was unable to observe borrowing outcomes for all students in the initial sample.[12] As a result, the treatment and control groups may no longer have been equal in expectation for admitted students who enrolled at the participating university. To determine whether treatment and control groups were still equal in expectation after enrollment, I examined differences in means pre-treatment covariates by treatment status once again (presented in Table 4). For admitted students who enrolled at the participating university (the sample of students for whom I can examine borrowing behavior), there were no statistically significant differences in means by treatment status for pre-treatment covariates at the .05 level, suggesting attrition from the sample was similar in treatment and control groups. An F-test obtained by regressing treatment status on pre-treatment covariates failed to reject the null hypothesis that coefficients were equal to zero ($p = .99$).

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[12] Data for borrowing decisions, however, were available for all students who did enroll at the participating university.

Table 4. *Covariate means by treatment status for borrowing (admitted sample)*

	Treatment group mean (n=503)	Control group mean (n=740)	Difference in means
High school GPA	3.45	3.44	0.01
	(0.02)	(0.02)	(0.03)
ACT score	22.28	22.29	0.00
	(0.18)	(0.15)	(0.24)
Pell eligible	0.46	0.47	-0.01
	(0.02)	(0.02)	(0.03)
Parent income	74944.31	72924.82	2019.49
	(3290.21)	(2195.73)	(3802.42)
Parent with college degree or higher	0.65	0.62	0.03
	(0.02)	(0.02)	(0.03)
Grant aid	7375.07	7282.10	92.97
	(209.14)	(182.03)	(280.14)
Male	0.39	0.40	-0.01
	(0.02)	(0.02)	(0.03)
Asian	0.02	0.01	0.01
	(0.01)	(0.00)	(0.01)
Black	0.06	0.08	-0.02
	(0.01)	(0.01)	(0.01)
Latino	0.03	0.02	0.01
	(0.01)	(0.01)	(0.01)
White	0.77	0.76	0.01
	(0.02)	(0.02)	(0.02)

Standard errors in parentheses.
+ p<0.10 * p<0.05 ** p<0.01

Enrolled student sample

Table 5 presents differences in means by treatment status for the sample of students who were already enrolled at the participating university when the study was conducted. In this sample, students in the treatment group were more likely to have had a parent with a college degree or higher than those in the control group. Seventy-five percent of enrolled students who received the shopping sheet had at least one parent with a college degree or higher; sixty-eight percent of enrolled students in the control group

had a parent with a college degree or higher. Students in the treatment group borrowed more, on average, during the previous year than students in the control group, a difference that was significant at the .10 level. Specifically, students who received the shopping sheet borrowed an average of $685 more during the previous year than students in the control group. Although the difference is marginally significant, it is possible that any differences observed in borrowing during the 2013-2014 academic year could be attributed to previous financing decisions rather than to receipt of the shopping sheet. An F-test obtained by regressing treatment status on pre-treatment covariates provided marginal evidence to reject the null hypothesis that coefficients were equal to zero at the .05 level ($p = .05$). Some pre-treatment covariates, then, appeared to be related to whether a student received the shopping sheet and could have influenced outcomes as a result. For example, because students who received the shopping sheet on average had previously relied more heavily on loans, they may have been more likely to borrow or to borrow larger dollar amounts in subsequent years.

Table 5. *Covariate means by treatment status for borrowing (enrolled sample)*

	Treatment group mean (n=437)	Control group mean (n=384)	Difference in means
High school GPA	3.56	3.58	-0.02
	(0.02)	(0.02)	(0.03)
ACT score	23.60	23.37	0.23
	(0.19)	(0.20)	(0.28)
Previously taken >15 credit hours	0.44	0.49	-0.05
	(0.02)	(0.03)	(0.03)
Pell eligible	0.40	0.43	-0.03
	(0.02)	(0.03)	(0.03)
Parent income	80807.60	79601.92	1205.68
	(3593.40)	(3941.88)	(5324.13)
Parent with college degree or higher	0.75	0.68	0.07*
	(0.02)	(0.02)	(0.03)
Grant aid	6794.85	7199.46	-404.61
	(216.16)	(223.13)	(311.33)
Amount previously borrowed	3359.34	2673.86	685.47+
	(256.94)	(231.45)	(349.58)
Male	0.38	0.33	0.05
	(0.02)	(0.02)	(0.03)
Asian	0.02	0.01	0.01
	(0.01)	(0.01)	(0.01)
Black	0.05	0.05	0.00
	(0.01)	(0.01)	(0.01)
Latino	0.02	0.01	0.01
	(0.01)	(0.01)	(0.01)
White	0.83	0.82	0.01
	(0.02)	(0.02)	(0.03)

Standard errors in parentheses.
+ $p<0.10$ * $p<0.05$ ** $p<0.01$

Average intent-to-treat effects

For dichotomous outcomes indicating whether a student enrolled and whether a student borrowed, I used logistic regression to estimate the intent-to-treat effects of the shopping sheet. Logistic regression accounts for the non-linear relationship between variables and the resulting non-normal distribution of the error term associated with dichotomous outcome variables (Greene, 2003). I first estimated a simplified model using only treatment status to predict whether a student enrolled and whether a student borrowed. The simplified model for dichotomous outcomes can be expressed:

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 TREATMENT + \varepsilon$$

where $\ln\left(\frac{\pi}{1-\pi}\right)$ are the log odds of a student at the participating university enrolling or borrowing; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on enrollment and borrowing; and ε is the error term. For ease of interpreting coefficients, results are presented as odds ratios, which were calculated by logging both sides of the equation.

I then estimated an expanded model with the inclusion of pre-treatment academic, socioeconomic, financial, and demographic covariates. Because these covariates were uncorrelated with whether a student was assigned to treatment or control conditions in most cases, the intent-to-treat effects should remain relatively consistent across models, regardless of whether covariates were included. The inclusion of these covariates,

however, reduced unexplained variance in the model and produced more efficient, precise estimates of intent-to-treat effects. The expanded logistic model can be expressed:

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 TREATMENT + \beta_2 \gamma' + \varepsilon$$

where $\ln\left(\frac{\pi}{1-\pi}\right)$ are the log odds of a student at the participating university enrolling or borrowing; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on enrollment and borrowing; γ' is a vector of demographic, socioeconomic, financial, and academic pre-treatment covariates; and ε is the error term. Again, results are presented as odds ratios to ease interpretation.

To estimate the intent-to-treat effect of receipt of the shopping sheet on the total dollar amount borrowed, which is a continuous variable, I used multiple linear regression. Again, I first estimated a simplified model using only treatment status to predict amount borrowed. The simplified model can be expressed:

$$Y = \beta_0 + \beta_1 TREATMENT + \varepsilon$$

where Y is the dollar amount borrowed; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on amount borrowed; and ε is the error term.

I then estimated a second model with the inclusion of pre-treatment academic, socioeconomic, financial, and demographic covariates to produce more efficient estimates of the intent-to-treat effect. The full model can be expressed:

$$Y = \beta_0 + \beta_1 TREATMENT + \beta_2 \gamma' + \varepsilon$$

where Y is the dollar amount borrowed; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on amount borrowed; γ' is a vector of demographic, socioeconomic, financial, and academic pre-treatment covariates; and ε is the error term.

In each case, I estimated separate models for admitted and enrolled students because they represented distinct groups of decision makers. Finally, I used robust standard errors in all models to correct for heteroskedasticity.

Heterogeneous intent-to-treat effects

I also analyzed the data for treatment effect heterogeneity to determine whether students with greater financial need were more sensitive to information about costs and aid than their higher-income peers. This analysis provided a better understanding of how federal policy efforts to simplify information influenced different subpopulations of students (Harris & Goldrick-Rab, 2012), particularly low-income students who face greater informational barriers surrounding costs and aid. To examine this, I interacted Pell eligibility status with the dichotomous variable indicating whether a student received the shopping sheet. This allowed me to examine intent-to-treat effects of the shopping sheet on enrollment and borrowing decisions for Pell eligible students. Although Pell

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eligibility is not a perfect proxy for low-income status, the federal Pell Grant is targeted to students who demonstrate financial need, and the majority of dependent Pell recipients come from households with an annual income of less than $40,000 (Mercer, 2008).

I estimated the same models described in the previous section with the interaction term included in each. Again, I first estimated a simplified model with treatment status as the sole predictor of enrollment and borrowing outcomes and then estimated the full model with the inclusion of pre-treatment covariates. For dichotomous outcomes (whether a student enrolled and whether a student borrowed), the full logistic model can be expressed:

$$\ln \left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 TREATMENT + \beta_2 TREATMENT * Pelleligible + \beta_3 \gamma' + \varepsilon$$

where $\ln \left(\frac{\pi}{1-\pi}\right)$ are the log odds of a student at the participating university enrolling or borrowing; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on enrollment and borrowing; $TREATMENT * Pelleligible$ is the interaction of treatment status and whether a student was eligible to receive a Pell Grant; β_2 is the heterogeneous intent-to-treat effect for Pell eligible students; γ' is a vector of demographic, socioeconomic, financial, and academic pre-treatment covariates; and ε is the error term. Results are presented as odds ratios.

For the continuous variable indicating the total dollar amount of direct loans that a student borrowed, the full linear model can be expressed:

$$Y = \beta_0 + \beta_1 TREATMENT + \beta_2 TREATMENT * Pelleligible + \beta_3 \gamma' + \varepsilon$$

where Y is the dollar amount borrowed; β_0 is the constant; $TREATMENT$ indicates whether a student received the shopping sheet; β_1 is the average intent-to-treat effect on amount borrowed; $TREATMENT * Pelleligible$ is the interaction of treatment status and whether a student was eligible to receive a Pell Grant; β_2 is the heterogeneous intent-to-treat effect for Pell eligible students; γ' is a vector of demographic, socioeconomic, financial, and academic pre-treatment covariates; and ε is the error term.

<p style="text-align:center;">*Sensitivity analyses*</p>

Treatment implementation

In any RCT, it is necessary to examine the implementation of treatment for contamination that may have occurred between treatment and control groups. Contamination of treatment and control conditions – for example, if a student who was assigned to receive the shopping sheet did not receive it – may result in groups that are no longer equal in expectation and lead to findings that cannot be attributed solely to treatment (Murnane & Willett, 2011). To examine treatment implementation, I obtained data from the participating university to confirm that students who were assigned to treatment conditions were treated and students who were assigned to control conditions did not receive treatment. Between the time random assignment was completed and financial aid awards were packaged and posted to students' online accounts, 202 students in the admitted student sample revised data on their FAFSA or chose to enroll at another institution. These students did not receive a shopping sheet with their financial aid award notification. This group was much less likely to enroll than students in the treatment group who did receive the shopping sheet (only 3.5% of students who were assigned to

treatment but did not receive treatment enrolled at the participating university during the 2013-2014 academic year). In the enrolled student sample, far fewer students who were initially selected to receive the shopping sheet did not. Thirteen students in this sample revised their FAFSA or decided not to re-enroll at the university the following semester between the time randomization occurred and the time awards were packaged and posted to online accounts.

Additionally, some students who were not selected into treatment in the initial randomization did receive the shopping sheet. These students received funding from federal military and veterans educational benefits programs. An Executive Order (Exec. Order No. 13,607, 2012) required institutions that receive funding from such programs to use the shopping sheet in awarding financial aid to students who receive these benefits. This was a small number of students. In the admitted student sample, 12 students fell into this category. Just five students in the enrolled sample who were not initially selected to receive the shopping sheet received it.

As a sensitivity analysis of treatment implementation, I estimated a model in which the treatment variable was defined as students who actually received the shopping sheet. Accordingly, the 202 students in the admitted student sample who were initially selected to receive the shopping sheet but did not were coded as "0", or part of the control group. The 12 students who received the shopping sheet because of their status in military and veterans educational benefits programs but were not initially selected to receive the shopping sheet were coded as "1", or part of the treatment group. Findings from this analysis demonstrated that the shopping sheet was associated with an increased likelihood of enrollment. Admitted students who were selected to receive the shopping

sheet but did not were far less likely to enroll at the university and more likely to come

from low-income families, leaving the remaining students in the treatment group more

likely to enroll, on average, than those in the control group. As a result, I included them

in the analysis presented in the following chapter and emphasize that findings are intent-

to-treat effects. For borrowing behavior, this group was excluded because they did not

enroll and therefore did not borrow. A similar group – those who decided to enroll at

other institutions prior to receiving a financial aid award notification – was likewise

excluded in the control group from analyses of borrowing behavior. As a result, findings

for borrowing behavior were similar in signs and significance to those presented in the

following chapter. The same was done for the enrolled student sample with similar

findings to those presented.

Model specification and variable transformations

I also tested the sensitivity of findings to a number of alternate model

specifications and variable transformations. The findings presented in the following

chapter considered borrowing behavior among all students in each of the samples. I also

estimated models examining whether receipt of the shopping sheet influenced the total

dollar amount of direct loans borrowed *among students who borrowed.* Students who did

not borrow to finance their education were excluded from this analysis, allowing me to

focus solely on borrowing decisions among borrowers. In a few instances, findings from

this sensitivity analysis differed from those presented; when this occurred, footnotes are

included in the following chapter to note these differences.

Two additional sensitivity checks related to borrowing behavior. First, I estimated

models in which total dollar amount borrowed was logged (adding 1 to all 0 values) to

account for a non-normal distribution of borrowing amounts. To ease interpretation, I also logged all continuous independent variables in these models. Findings were not sensitive to this transformation except in the case of the amount borrowed by enrolled students, which is described in a footnote in the following chapter. Second, I excluded direct PLUS loans, which were taken out by parents rather than students, from the dollar amount borrowed to determine whether student borrowing behavior in particular was influenced by receipt of the shopping sheet. Again, results were similar to those presented in the following chapter with the exception of the borrowing decisions of enrolled students; this difference is described in a footnote in the following chapter.

Finally, in the heterogeneous intent-to-treat results presented in the following chapter, I used Pell eligibility as a proxy for low-income status to examine whether low-income students were more sensitive to information in the shopping sheet than their higher-income peers. I tested the robustness of these findings to an alternate measure of financial need: expected family contribution. Expected family contribution was calculated from data provided on the FAFSA using a federal formula and was a measure of how much a family was expected to contribute to educational costs. An expected family contribution of zero generally indicates a limited ability to contribute to educational expenses. Results from these models were similar to those presented in the following chapter.

Ethical considerations and study limitations

Ethical concerns often arise in experimental research because treatment is offered to some and withheld from others. However, the treatment in this study did not withhold

information but rather provided additional information about college costs and financial aid in the form of the shopping sheet to randomly selected students. Thus, students were not disadvantaged by assignment to a particular treatment or control condition because financial aid award amounts and composition of awards (e.g., grants, loans, and work-study) did not change. Students, regardless of treatment status, were unaware that they were in a study, so they did not give consent to participate. However, because the treatment in this study was a policy reform that was being used at a number of institutions across the country, students in the study did not face any additional risk relative to other students. Accordingly, this study received administrative support from the participating university and was approved by the Institutional Review Boards at the University of Georgia and the participating university.

Although this study provides practice- and policy-relevant evidence regarding how the shopping sheet affects students' educational decisions, there are several limitations to consider. First, this study drew on data from one university, leading to findings that may by specific to this institution and not generalizable to other institutions or students. This was particularly important in site selection for this study because institutional data in the shopping sheet was provided alongside data for similar institutions. For example, the shopping sheet ranked an institution's graduation rate as low, medium, or high relative to other institutions that award primarily bachelor's degrees. Graduation rate at the participating institution was in the low end of the "high" range, and the loan default rate was slightly above the national average for primarily bachelor degree granting institutions. As a result, findings may best be generalized to other institutions that share a similar profile.

Because the shopping sheet provided several pieces of information to students, it is hard to know how different pieces of information shaped students' perceptions of costs and benefits. Each piece of information in the shopping sheet (e.g., graduation rate, loan default rate) may have had a different effect on how students perceived costs. For example, a higher than average institutional graduation rate may have encouraged enrollment while a loan default rate that was slightly above average may have discouraged students from enrolling or borrowing. If different pieces of information in the shopping sheet had opposite influences on enrollment and borrowing behavior, the effects of each were cancelled out when considered together. Rather than identifying how specific pieces of information shape behavior, however, this study provides an analysis of recent federal policy efforts to simplify information in financial aid award notifications. Important work remains to examine what information is most helpful as students evaluate college enrollment and financing decisions.

Additionally, the treatment in this study was not the shopping sheet itself but the differences between the participating university's award notification and the shopping sheet. Because notifications vary by institution, results may be more applicable to institutions with similar notifications to the university in this study. The shopping sheet, however, differs from award notifications at the participating university and many other institutions by providing institutional data on graduation rate, loan default rate, and median borrowing, suggesting results may be broadly generalizable beyond the participating university.

In addition to simplifying information that students received about costs and aid, the shopping sheet was intended to allow to students to easily compare costs across

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institutions. In this study, I considered how the shopping sheet influenced decisions at one institution and thus did not examine whether this federal policy efforts assisted students in making optimal decisions about where to attend or how to finance college, which future research might consider. As a final point of consideration, this study focused on federal direct student loan borrowing. Because private loans typically carry higher interest rates, the shopping sheet may lead to a decrease in borrowing from private sources by providing more information about loan options. The shopping sheet also may alter the composition of borrowing, shifting students away from higher-interest private loans and toward lower-interest or subsidized direct loans. Less than one percent of students in the present study reported borrowing from private sources, so this study is unable to consider private borrowing decisions. Despite these limitations, the present study provides rigorous empirical evidence that can inform financial aid policy and practice regarding proposed changes in the delivery of aid.

CHAPTER 5

FINDINGS

In this chapter, I first discuss descriptive statistics for enrollment and borrowing behavior of students assigned to treatment and control conditions. I then turn to results from the analytic models that estimated the intent-to-treat effects of the shopping sheet. Finally, I discuss findings from models that examined whether the enrollment and borrowing decisions of low-income students (as indicated by Pell eligibility status) were more sensitive to receipt of the shopping sheet than those of their higher-income peers.

Descriptive statistics for outcomes

Admitted students

Table 6 provides descriptive statistics for outcome variables by treatment and control status among the sample of students who had been admitted to the participating university. Forty-six percent of students in the treatment group enrolled at the study university during the 2013-2014 academic year. In the control group – those who did not receive the shopping sheet – 48% enrolled. The two-percentage point difference in enrollment, which is examined further in analytic models, was not statistically significant.

Nearly half of students (49%) who received the shopping sheet borrowed to finance their education while 46% of students in the control group borrowed. The difference in the percent of students who borrowed in treatment and control groups was not statistically significant. Finally, students in the treatment group borrowed an average of $3,300 during the 2013-2014 academic year while students in the control group

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borrowed nearly $3,500 on average to finance their education; again, this difference was

not statistically significant.

Table 6. *Descriptive statistics for outcomes (admitted sample)*

	Treatment group mean (n=1100 for enrollment; n=503 for borrowing)	Control group mean (n=1555 for enrollment; n=740 for borrowing)	Difference in means
Enrollment	0.46	0.48	-0.02
	(0.02)	(0.01)	(0.02)
Borrowing	0.49	0.46	0.03
	(0.02)	(0.02)	(0.03)
Amount	3308.70	3489.77	-181.06
borrowed	(206.55)	(210.54)	(306.96)

Standard errors in parentheses.
+ $p<0.10$ * $p<0.05$ ** $p<0.01$

Enrolled students

Table 7 presents descriptive statistics for outcome variables by treatment and

control status for the sample of students who were enrolled in their first year of study at

the participating university when the study was conducted. Because nearly all of the

students in this sample re-enrolled at the study university during the 2013-2014 academic

year, only borrowing behavior was examined for this sample. Similar to the admitted

student sample, a higher percentage of students borrowed in the treatment group than the

control group. Forty-six percent of students who received the shopping sheet borrowed

while forty-three percent in the control group borrowed. This three-percentage point

difference was not statistically significant. Among the sample of enrolled students, those

who received the shopping sheet borrowed more, on average, than those who did not

receive the shopping sheet. Students who received the shopping borrowed an average of $3,660 during the 2013-2014 academic year while those who did not borrowed around $2,800 on average. This difference of nearly $850 was marginally significant at the .10 level. The examination of differences in pre-treatment covariates means by treatment and control group in the previous chapter revealed that students who were selected to receive the shopping sheet had previously borrowed more on average than students in the control group. The difference between groups in previous financing behavior may explain some of the difference in borrowing observed between groups during the 2013-2014 academic year. In other words, the $850 difference in borrowing between treatment and control groups may not be entirely attributable to assignment to receive the shopping sheet but rather could also relate to previous financing decisions. This is examined in closer detail in the analytic models presented in the following section.

Table 7. *Descriptive statistics for outcomes (enrolled sample)*

	Treatment group mean (n=437)	Control group mean (n=384)	Difference in means
Borrowing	0.46	0.43	0.03
	(0.02)	(0.03)	(0.03)
Amount borrowed	3664.97	2828.29	836.68+
	(267.26)	(227.33)	(355.95)

Standard errors in parentheses.
+ p<0.10 * p<0.05 ** p<0.01

Intent-to-treat effects

Admitted students

I turn next to regression analyses to examine the how being assigned to treatment influenced the enrollment and borrowing decisions of admitted students. Table 8 presents results from models estimating these intent-to-treat effects. I first estimated a simplified model using only assignment to receive the shopping sheet to predict outcome variables and then estimated the same model with the inclusion of pre-treatment academic, socioeconomic, financial, and demographic covariates to provide more efficient, precise estimates of intent-to-treat effects. Importantly, because none of the pre-treatment covariates was associated with assignment to treatment, intent-to-treat effects remained consistent across models for each outcome.

Because the shopping sheet is intended to simplify information about costs and aid, I hypothesized that receipt of the shopping sheet would be associated with increased likelihood of enrollment. By comparing institutional data from the participating university to other primarily bachelor's degree granting institutions, I also expected receipt of the shopping sheet to lead to an increased likelihood of borrowing. The shopping sheet also may have been associated with larger amounts borrowed because the borrowing data provided to students suggested that the average student at the participating university fared about the same as students nationally when it came to paying back loans. Overall, however, results suggest that information provided in the shopping sheet did not influence admitted students' decisions regarding whether to enroll, whether to borrow, or how much to borrow. Assignment to receive the shopping sheet was associated with a slight decrease in the likelihood of enrollment at the participating

university during the 2013-2014 academic year, but the effect was not statistically

significant. When it came to decisions concerning college financing, receipt of the

shopping sheet was associated with an increase in the likelihood of borrowing but also

with a lower dollar amount borrowed. Again, the effects were not significant.[13] As a

result, these findings provide little evidence to suggest the shopping sheet influenced the

enrollment and borrowing decisions of admitted students.

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[13] In an analysis of the amount borrowed *among admitted students who borrowed*, receipt of the shopping sheet was associated with an approximately $770 decrease in amount borrowed, controlling for covariates. This finding suggests that although information in the shopping sheet did not affect whether students borrowed, it might have led students who did borrow to borrow less on average. This finding was marginally significant at the .10 level and was limited in statistical power.

Table 8. *Intent-to-treat effects (admitted sample)*

	Enrollment *Odds Ratio*		Borrowing *Odds Ratio*		Amount Borrowed *OLS Coefficient*	
Shopping sheet	0.93	0.92	1.13	1.19	-181.06	-142.51
	(0.79-1.08)	(0.79-1.08)	(0.90-1.41)	(0.93-1.51)	(294.94)	(278.31)
High school GPA		1.19+		0.45**		-1732.32**
		(0.98-1.45)		(0.33-0.63)		(548.08)
ACT score		1.03**		0.96*		-136.85*
		(1.01-1.06)		(0.92-1.00)		(56.64)
Pell eligible		1.22*		2.21**		159.35
		(1.03-1.45)		(1.59-3.06)		(402.52)
Parent with college degree or higher		0.99		0.74*		-338.57
		(0.84-1.17)		(0.57-0.96)		(326.34)
Grant aid				1.00**		-0.21**
				(1.00-1.00)		(0.04)
Male		0.99		0.86		-170.12
		(0.84-1.16)		(0.66-1.10)		(314.45)
Minority		0.85+		1.04		401.34
		(0.71-1.03)		(0.77-1.40)		(360.90)
Intercept	0.91+	0.25**	0.86*	61.91**	3489.77**	14181.95**
	(0.82-1.00)	(0.13-0.47)	(0.75-1.00)	(20.17-190.04)	(210.57)	(1670.33)
Observations	2655	2636	1243	1242	1243	1242
R-squared	0.00	0.01	0.00	0.10	0.00	0.11

Robust standard errors in parentheses.
+ p<0.10 * p<0.05 ** p<0.01

Enrolled students

Table 9 presents findings from the same analyses for students who were already enrolled at the participating university when the study took place. Among this sample of students, receipt of the shopping sheet was not associated with a change in the likelihood of whether a student borrowed. Assignment to receive the shopping sheet, however, was associated with an increase in the dollar amount that students borrowed to finance their education. Specifically, students who were selected to receive the shopping sheet borrowed an average of just over $800 more in direct student loans during the 2013-2014 academic year than those in the control group.

When controlling for academic, socioeconomic, financial, and demographic covariates, this finding became weaker but was still marginally significant. In this model, the shopping sheet resulted in an approximate $330 increase in the amount students borrowed to finance their education.[14] Students who received the shopping sheet on average had previously relied more heavily on loans and therefore may have been more likely to rely on loans to finance their education during the 2013-2014 academic year. In other words, the differences outlined earlier between treatment and control groups in previous borrowing behavior may have accounted for a large part of the intent-to-treat effect observed in the simplified model, which explains why the effect was smaller in the full model.

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[14] Again, I estimated a model for the total dollar amount borrowed *among enrolled students who borrowed.* In this analysis, receipt of the shopping sheet had a stronger effect on borrowing: receipt of the shopping sheet was associated with a $660 increase in the amount borrowed, controlling for covariates. Interestingly, this finding differed from the same analysis of the admitted student sample in which assignment to receive the shopping sheet was associated with a decrease in the amount borrowed among students who used loans to finance their education.

Overall, results for enrolled students demonstrated that the shopping sheet did not affect the decision to borrow. Findings provide some evidence to suggest receipt of the shopping sheet led to a small increase – just over $300 – in the amount that students borrowed. This finding, however, must be interpreted with caution because of its sensitivity to alternate model specifications.[15] Although theory and previous research indicates that reducing complexity can lead to changes in students' educational decisions, findings provided limited evidence to support these hypotheses for admitted students.

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[15] When the dollar amount borrowed and other continuous variables were logged, the effect was no longer statistically significant. Similarly, when parent PLUS loans were excluded from the total amount borrowed, the effect was no longer significant.

Table 9. *Intent-to-treat effects (enrolled sample)*

	Borrowing Odds Ratio		Amount Borrowed OLS Coefficient	
Shopping sheet	1.13	0.93	836.68*	328.70+
	(0.86-1.49)	(0.59-1.47)	(350.87)	(188.33)
High school GPA		1.10		12.17
		(0.62-1.96)		(352.62)
ACT score		0.96		-27.87
		(0.90-1.04)		(33.56)
Previously taken >15 credit hours		0.99		102.45
		(0.63-1.55)		(192.51)
Pell eligible		2.40**		370.15
		(1.35-4.27)		(288.12)
Parent with college degree or higher		0.66		154.12
		(0.40-1.09)		(215.66)
Grant aid		1.00*		-0.05
		(1.00-1.00)		(0.04)
Amount previously borrowed		1.00**		0.84**
		(1.00-1.00)		(0.03)
Male		0.91		-92.44
		(0.55-1.53)		(202.57)
Minority		1.94+		432.36
		(0.94-4.03)		(350.70)
Intercept	0.75**	0.44	2828.29**	1150.48
	(0.61-0.91)	(0.05-3.81)	(227.31)	(1101.19)
Observations	821	737	821	737
R-squared	0.00	0.53	0.01	0.74

Robust standard errors in parentheses.
+ p<0.10 * p<0.05 ** p<0.01

Heterogeneous intent-to-treat effects

Admitted students

Results from models examining whether the enrollment and borrowing decisions of Pell eligible students were more sensitive to information provided in the shopping sheet than those of their higher-income peers are presented in Table 10. Because low-income students face greater informational barriers surrounding college costs and financial aid, I hypothesized that this subpopulation of students would be more sensitive

to information in the shopping sheet. If this were the case, I would expect the interaction

of treatment status and Pell eligibility – one proxy for low-income status – to be

significant and positively related to enrollment and borrowing behavior. Across all

models, however, the coefficient associated with this interaction term was not statistically

significant, suggesting there was no heterogeneous intent-to-treat effect of receipt of the

shopping sheet on enrollment and borrowing decisions of Pell eligible students. [16]

Contrary to hypotheses concerning heterogeneous intent-to-treat effects for the

subpopulation of low-income students, then, Pell eligible students were not more

sensitive to information in the shopping sheet than higher-income students.[17] Estimates of

heterogeneous intent-to-treat effects were robust to the inclusion of pre-treatment

covariates, suggesting again that observable characteristics were not related to

assignment to treatment or control conditions.

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[16] Because an interaction term cannot be interpreted in isolation but rather must be
considered along with the variables that make up the interaction (in this case, treatment
status and Pell eligibility status), I conducted an *F*-test to determine whether the
interaction term and its associated parts were jointly significant predictors of enrollment
and borrowing decisions. In the two models predicting whether a student borrowed, the
variables were jointly significant at the .01 level. In these models, the effect of
assignment to treatment conditions appeared larger among the subpopulation of Pell
eligible students; however, joint significance of variables yields little insight into which
variable influenced the outcome (Wooldridge, 2009).
[17] When expected family contribution of zero was used as a proxy for low-income status,
results for the interaction term were the same in signs and significance to those presented.

Table 10. *Heterogeneous intent-to-treat effects (admitted sample)*

	Enrollment Odds Ratio		Borrowing Odds Ratio		Amount Borrowed OLS Coefficient	
Shopping sheet	0.98	0.98	1.02	1.08	-516.47	-421.05
	(0.79-1.21)	(0.79-1.21)	(0.74-1.40)	(0.78-1.51)	(453.95)	(426.60)
Shopping sheet*Pell eligible	0.89	0.88	1.26	1.22	717.93	597.53
	(0.65-1.21)	(0.64-1.20)	(0.79-1.99)	(0.75-1.99)	(580.78)	(549.71)
High school GPA		1.19+		0.45**		-1711.68**
		(0.98-1.44)		(0.33-0.63)		(544.57)
ACT score		1.03**		0.96*		-137.28*
		(1.01-1.06)		(0.92-1.00)		(56.58)
Pell eligible	1.13	1.29*	1.63**	2.04**	-339.26	-84.56
	(0.93-1.38)	(1.05-1.60)	(1.22-2.18)	(1.39-2.98)	(413.82)	(488.92)
Parent with college degree or higher		0.99		0.73*		-351.63
		(0.84-1.18)		(0.56-0.96)		(327.40)
Grant aid				1.00**		-0.21**
				(1.00-1.00)		(0.04)
Male		0.98		0.86		-161.76
		(0.84-1.16)		(0.67-1.10)		(314.23)
Minority		0.85+		1.04		422.92
		(0.71-1.02)		(0.77-1.41)		(363.11)
Intercept	0.86*	0.24**	0.69**	63.40**	3649.77**	14238.38**
	(0.75-0.98)	(0.13-0.46)	(0.56-0.84)	(20.66-194.49)	(332.74)	(1677.75)
Observations	2655	2636	1243	1242	1243	1242
R-squared	0.00	0.01	0.02	0.10	0.00	0.11

Robust standard errors in parentheses.

+ p<0.10 * p<0.05 ** p<0.01

Enrolled students

Table 11 presents results from analyses of heterogeneous intent-to-treat effects for

the sample of students who were enrolled in their first year at the participating university

when the study was conducted. These analyses focused solely on borrowing decisions –

whether a student borrowed and how much a student borrowed – because nearly all

students in this sample re-enrolled at the study university during the 2013-2014 academic

year. In interpreting the findings from these analyses, I focused primarily on the full

model that included pre-treatment academic, socioeconomic, financial, and demographic

covariates because the examination of treatment and control groups for equality in

expectation indicated differences between treatment and control groups in previous

borrowing behavior and parents' educational attainment. In the model for whether a

student borrowed, findings suggested that Pell eligible students who were selected to

receive the shopping sheet were no more (or less) likely to borrow to finance their

education relative to higher-income students who received the shopping sheet and Pell

eligible students who did not receive the shopping sheet.[18] Similarly, assignment to

receive the shopping sheet among Pell eligible students was not a statistically significant

predictor of the amount borrowed.[19,20] Overall, findings demonstrate that, contrary to

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[18] When expected family contribution of zero was used as a proxy for low-income status, results for the interaction term were the same in signs and significance to those presented.

[19] When parent PLUS loans were excluded, selection to receive the shopping sheet was associated with a statistically significant increase in amount borrowed by Pell eligible students.

[20] Tests of joint significance for the full models indicated that the interaction term and its associated components were jointly significant predictors of whether a student borrowed at the .05 level. In the full model for whether a student borrowed, the effect of assignment to treatment conditions was larger among the subpopulation of Pell eligible students; however, joint significance does not indicate which variable influenced the outcome (Wooldridge, 2009).

hypotheses, selection to receive the shopping sheet did not have a heterogeneous effect

on the borrowing decisions of Pell eligible students.

Table 11. Heterogeneous *intent-to-treat effects (enrolled sample)*

	Borrowing *Odds Ratio*		Amount Borrowed *OLS Coefficient*	
Shopping sheet	1.08	0.67	869.56+	143.40
	(0.75-1.57)	(0.37-1.19)	(459.36)	(235.09)
Shopping sheet*Pell eligible	1.18	2.09	-30.11	455.51
	(0.67-2.07)	(0.83-5.25)	(708.10)	(396.07)
High school GPA		1.12		11.81
		(0.62-2.00)		(352.11)
ACT score		0.96		-27.15
		(0.90-1.04)		(33.59)
Previously taken >15 credit hours		0.99		113.61
		(0.63-1.56)		(191.45)
Pell eligible	1.84**	1.66	781.99+	121.02
	(1.22-2.77)	(0.79-3.45)	(463.70)	(301.04)
Parent with college degree or higher		0.64+		140.29
		(0.39-1.05)		(213.76)
Grant aid		1.00*		-0.05
		(1.00-1.00)		(0.04)
Amount previously borrowed		1.00**		0.84**
		(1.00-1.00)		(0.03)
Male		0.91		-90.19
		(0.54-1.53)		(201.51)
Minority		1.97+		431.39
		(0.93-4.19)		(349.60)
Intercept	0.57**	0.49	2494.31**	1233.42
	(0.43-0.75)	(0.06-4.29)	(289.06)	(1090.98)
Observations	821	737	821	737
R-squared	0.02	0.53	0.01	0.74

Robust standard errors in parentheses.
+ p<0.10 * p<0.05 ** p<0.01

Summary of the findings

Taken as a whole, the findings presented in this chapter provided little evidence to support hypotheses that receipt of the shopping sheet would lead to increased likelihood of enrollment and borrowing at the participating university. Rather, the shopping sheet did not appear to influence students' decisions regarding whether to enroll and whether to borrow to finance college. For admitted students, receipt of the shopping sheet did not influence the amount students borrowed to finance their education. Among the sample of students who were enrolled at the participating university when the study was conducted, however, receipt of the shopping sheet led students to borrow a larger amount to finance college. Although the effect on amount that students borrowed was marginally significant and sensitive to model specification, it proved consistent with hypotheses predicting the shopping sheet would increase borrowing and suggests the shopping sheet may reduce aversion to borrowing and could aid students in persisting in higher education.

I also found little evidence to support hypotheses concerning low-income students' sensitivity to information provided in the shopping sheet. Importantly, however, it must be noted that heterogeneous intent-to-treat effects were limited in statistical power. Just over 230 admitted students and 175 enrolled students were eligible to receive the Pell Grant, resulting in reduced statistical power to detect an effect on behavior. Although these sample sizes provided sufficient power to detect a relatively small effect on behavior according to Cohen's (1992) useful but limited categorization, it is possible that a study with a larger sample size would have detected different effects for low-income students. Apart from this limitation, receipt of the shopping sheet appeared to

have had a limited effect on the enrollment and borrowing decisions of students,

including low-income students, at the participating university.

CHAPTER 6

DISCUSSION

This chapter provides a review of the present study, highlighting the statement of the problem, methods used to evaluate the problem, and the findings that emerged from the research. The chapter concludes with a discussion of directions for future research as well as the implications of the present study for theory and policy.

Review of the present study

One way to reduce complexity in the financial aid system is to provide a financial aid award notification that communicates information about costs and aid to students and their families. Award notifications that students receive from colleges and universities, however, can be difficult to interpret and to compare costs across institutions (Kantrowitz, 2010; Whitsett & O'Sullivan, 2012). In July 2012, the US Department of Education and Consumer Financial Protection Bureau released a model financial aid award notification, or "shopping sheet," intended to simplify and standardize the information that students receive from colleges and universities about their financial aid awards. The more than 2,000 colleges and universities that have adopted the shopping sheet for some or all students enroll more than 40% of undergraduate students in the United States, amounted to more than 8 million students who attend an institution that uses the shopping sheet in awarding financial aid (US Department of Education, 2013). Legislation has been introduced as part of the upcoming reauthorization of the Higher

Education Act that would require institutions to use the shopping sheet or another standardized format in awarding aid (Higher Education Reauthorization Act, 2014). Yet prior to the present study, we knew little about how this federal policy effort would influence students' educational decisions.

This study used a randomized control trial at a public university to examine how these proposed changes in the delivery of financial aid affected students' enrollment and borrowing decisions. Randomized controlled trials often are considered the "gold standard" of quantitative analyses for their usefulness in identifying the causal effect of policy on behavior. Results demonstrate that the shopping sheet has a relatively limited effect on students' educational decisions. Specifically, the shopping sheet did not influence whether students enrolled or borrowed at the participating university. Although the shopping sheet did not influence the decision to borrow, it was associated with a shift in the dollar amount students borrowed, leading to a small increase in the amount that enrolled students borrowed. This finding was sensitive to model specification, but nonetheless warrants closer consideration of how information affects students' decisions about how to finance education. The enrollment and borrowing decisions of low-income students, those who face particularly high informational barriers surrounding costs and aid, were not more sensitive to information in the shopping sheet than those of their higher-income peers.

The limited effect of the shopping sheet found in the present study is not entirely surprising, and there are several possible explanations for these findings. The first and perhaps the simplest explanation is that human capital theory and behavioral economics do not fully explain why students underinvest in higher education or demonstrate

aversion to borrowing to finance their education. Human capital theory and behavioral economics suggest that more and better information about financial aid award notifications will clarify expected costs and benefits and reduce complexity. Previous research, however, has also demonstrated that information by itself is not always enough to alter decisions. Rather, information when paired with assistance navigating the complex financial aid system can lead to increased enrollment and other positive outcomes for students (Bettinger et al., 2012). How students perceive and use information also is influenced by a number of environmental and cultural characteristics (e.g., De La Rosa, 2006; Tierney & Venegas, 2009). The present study provides further evidence that influences beyond information alone must be considered in designing a financial aid system that is able to more equitably and efficiently deliver aid to students.

Second, the participating university already provided a relatively detailed financial aid award notification with a description of each type of financial aid a student was awarded. As a result, the shopping sheet may not have provided enough new information to change students' decisions about whether to enroll and how to finance their education. In other words, a relatively small contrast between the information provided in the shopping sheet and the information provided in the university's traditional award notification could explain why the shopping sheet had a limited effect on students' educational decisions in the present study.

The information that is provided to students and their families in financial aid award notifications also may come too late in the college enrollment and financing process to alter decisions. By the time students receive their financial aid award notifications in the spring and summer prior to enrollment, they may have already

decided where to attend college or find their other college options limited because admissions and priority aid deadlines have passed. Likewise, students and their families have little time once they receive a financial aid award notification to change savings or work behavior that could influence whether and how much they have to borrow to finance their education at a given institution.

Finally, the present study assumed that the information provided in the shopping sheet was simplified and easy for students and their families to understand. Although a great deal of effort on the part of the US Department of Education and Consumer Financial Protection Bureau went into developing the shopping sheet, information in it may not have been easy to understand. A report commisioned by the National Association of Student Financial Aid Administrators (NASFAA, 2013) indicated that students and their families still had questions about college costs and financial aid terminology after reviewing the shopping sheet as well as alternate award notification formats. Together, these potential explanations for the shopping sheet's limited behavioral effects highlight the research community's need to better understand how to reduce complexity associated with interpreting and comparing institutional award notifications.

Directions for future research

The present study provides an early evaluation of proposed changes in the delivery of financial aid and opens the door to further examination of this critical stage of the financial aid process. While this study focused on one public university, future research might consider how efforts to simplify and standardize financial aid award

notifications influence students' educational decisions at a wider range of institutions. The adoption of the shopping sheet by 500 colleges and universities after its initial release arguably provides a natural experiment in which treatment (the shopping sheet) was assigned to students at some institutions and not to students at other institutions. Quasi-experimental studies may use the adoption of the shopping sheet by this initial group of institutions to examine the generalizability of the present study's findings to other colleges and universities that share similar cost and enrollment figures to the participating university. Likewise, it provides an opportunity to consider how students at other types of institutions may respond to information in the shopping sheet to gain a better understanding of whether simplification and standardization efforts lead to shifts in educational decisions within the diversity of higher education institutions in the United States. For example, studies may examine enrollment and borrowing responses of students at community colleges because these institutions enroll a population that may be particularly open to more and better information about costs and aid. Community colleges serve as an important access point to higher education for a number of underrepresented student populations, including low-income students who face higher informational barriers surrounding costs and aid than their higher-income peers, providing an interesting site at which to examine how information shapes educational decisions.

Such studies will provide a better understanding of how proposed reforms in the delivery of financial aid affect student enrollment and financing decisions at particular institutions. They yield little insight, however, into how information might influence students' choices about which college to attend. In addition to simplifying information in

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financial aid award notifications, the shopping sheet was intended to allow students to more easily compare costs and financing options *across* institutions. Future research might consider whether the shopping sheet is associated with shifts in enrollment, for example, from higher net cost institutions to lower net cost institutions. Institutional data provided in the shopping sheet also could encourage students to enroll at institutions with higher graduation rates and lower median borrowing or loan default rates. Likewise, future studies may use individual pieces of information from the shopping sheet to more clearly identify how information can be used to help students evaluate their college enrollment and financing options.

      While the future research directions described thus far focus on student behavior in response to simplified and standardized information about financial aid awards, they do not indicate whether information leads students to make more optimal educational decisions. Both human capital theory and behavioral economics suggest that complexity and incomplete information can lead to suboptimal decisions from a cost-benefit perspective. Federal policy efforts, including the shopping sheet, have focused on providing more information to consumers to help them make more informed financial decisions (Supiano, 2014). If students are provided with more and better information about college costs and financing options, their decisions should lead to more optimal outcomes, such as an increased likelihood of graduating and being able to pay back student loans. In the coming years, the first class of students that received the shopping sheet for all four years of college will graduate. With their graduation comes an opportunity to examine whether the shopping sheet results in more optimal educational decisions. For example, increases in institutional graduation rate or decreases in loan

default rate after the adoption of the shopping sheet may indicate that students are making enrollment and borrowing decisions that increase their likelihood of graduating and ability to pay back student loans.

Finally, the present study examined students' decisions but sheds no light on how students arrived at these decisions. Data on how students use, interpret, and respond to information in financial aid award notifications is scarce yet would provide insight into what information is most helpful to students as they evaluate college enrollment and financing options. Future research – particularly qualitative studies – would help in developing a financial aid system that provides simple, salient, and timely information to students and their families. Together, such studies will provide a more complete picture of how information shapes educational decisions, will inform federal policy relating to proposed changes in the delivery of financial aid, and ultimately will contribute to broader efforts to simplify the financial aid system to more equitably and efficiently deliver aid to students.

Implications for theory and policy

Higher education finance in the United States couples high tuition levels with financial aid targeted to students on the margin of college attendance (McPherson & Schapiro, 1998). Targeting financial aid to students on the margin of college attendance, however, requires a certain level of complexity to measure students' ability to pay for college. Such a finance system must strike a careful balance between accuracy in targeting scarce public resources to the neediest students and simplicity in accessing financial aid (Long, 2008). Recent policy, research, and advocacy attention has focused

on how complexity in the design and delivery of financial aid may contribute to disparities in educational attainment (e.g., ACSFA, 2005; Bettinger et al., 2012; Castleman, 2013; Dynarski & Scott-Clayton, 2006, 2007, 2008; Long, 2010; Scott-Clayton, 2012; TICAS, 2013; Whitsett & O'Sullivan, 2012).

Much of this recent research focuses on "last-mile" reforms – small changes in the complex financial aid system that make the system operate more equitably and efficiently (Dynarski & Wiederspan, 2012). Previous research demonstrates that informational interventions in many cases can reduce barriers surrounding college application, enrollment, and financing options and can lead to improved outcomes for students. Minor shifts in the way financial aid is designed and delivered has led to large changes in students' college expectations and enrollment in a number of settings (e.g., Bettinger et al., 2012; Castleman & Page, 2014; Oreopoulos & Dunn, 2013).

Similarly, federal policy efforts have focused on increasing students' awareness of college options. The 2008 Higher Education Opportunity Act and the Obama Administration's emphasis on college affordability and transparency has resulted in the development of a number of tools – including the shopping sheet – designed to help students and their families evaluate and compare colleges on several measures. Many of these efforts are aimed at providing more information to students and their families to help them make more informed financial decisions. While such policies may be politically palatable because they are low-cost and make changes at the margins in consumer choices, they may not address more fundamental concerns in higher education finance. Informational interventions and disclosure policies often rely on behavioral economics to understand the complexity costs that are associated with evaluating choices,

such as college enrollment and financing. But as Loewenstein and Ubel, both researchers whose work is influenced by behavioral insights, noted in a *New York Times* Op-Ed (2010):

> The field [of behavioral economics] has its limits. As policymakers use it to devise programs, it's becoming clear that behavioral economics is being asked to solve problems it wasn't meant to address. Indeed, it seems in some cases that behavioral economics is being used as a political expedient, allowing policymakers to avoid painful but more effective solutions rooted in traditional economics (p. A31).

This raises an important point concerning whether the focus on simplifying a complex financial aid system overlooks a more fundamental flaw in the financing of higher education: that college simply is unaffordable for many students even with targeted financial aid programs. In this scenario, the US higher education finance system can deliver aid efficiently and equitably, but either rising tuition levels or inadequate funding for financial aid – or the combination – prevent many students who would benefit from a college degree from ever enrolling in higher education. If college is simply unaffordable for many students, economics would indicate that enrollment can be supported by increasing funding for financial aid or holding tuition levels down. Thus, rather than informational interventions alone, reform in the financing of higher education would be necessary to support college enrollment and persistence.

With little indication of large reform in funding levels for student financial aid on the horizon,[21] however, "last-mile" efforts are increasingly important because they represent perhaps the most cost effective way to increase college attendance (Dynarski, Hyman, & Schanzenbach, 2011). The present study focuses on one such reform relating to how colleges and universities communicate financial aid awards to students and their families. While much research has focused on the financial aid application process, far less has focused on financial aid award notifications. This represents an important stage in the process of enrolling and persisting in higher education because this is the point at which students learn how much it will cost to attend a given institution and what their specific options are for financing their education. As the present study demonstrates, however, information alone may not be enough to reduce complexity at this stage of the financial aid process. Rather, more research is necessary to determine what information is most helpful to students as they evaluate college choices and make enrollment and financing decisions. As Sunstein (2012) notes regarding information and disclosure for consumers:

> Of course it is also true that the design of a disclosure policy should be based on an understanding of how people process information, and that a sensible approach to simplification will require an understanding of whether and why complexity can create problems and of what kinds of simplification can eliminate those problems (p. 15).

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[21] Notably, there has been little discussion during the current reauthorization of the Higher Education Act concerning increased funding for federal student aid programs (Kantrowitz, 2015).

Although the present study suggests that the shopping sheet has had a limited effect on students' educational decisions, it does not imply that this effort to simplify and standardize information provided to students and their families in financial aid award notifications is unnecessary. Rather, increased transparency and better information surrounding financial aid award notifications may ensure "truth in advertising" by increasing transparency of college costs and financial aid. Accordingly, this information may be worth providing to students and their families regardless of the limited behavioral effects found in this study.

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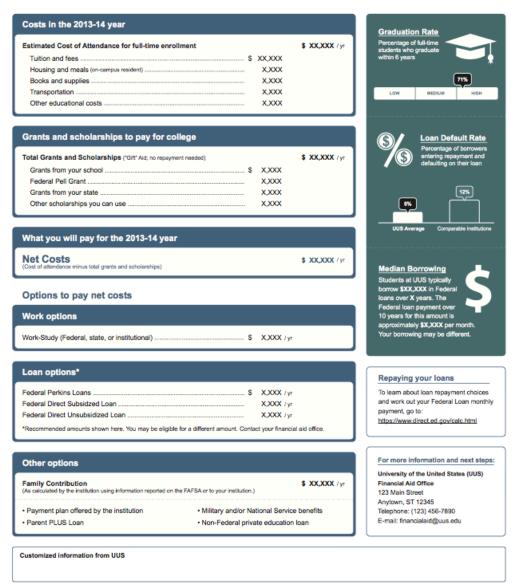
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APPENDIX A

US DEPARTMENT OF EDUCATION SHOPPING SHEET

Costs in the 2013-14 year

Estimated Cost of Attendance for full-time enrollment		$ XX,XXX / yr
Tuition and fees	$ XX,XXX	
Housing and meals (on-campus resident)	X,XXX	
Books and supplies	X,XXX	
Transportation	X,XXX	
Other educational costs	X,XXX	

Grants and scholarships to pay for college

Total Grants and Scholarships ("Gift" Aid; no repayment needed)		$ XX,XXX / yr
Grants from your school	$ X,XXX	
Federal Pell Grant	X,XXX	
Grants from your state	X,XXX	
Other scholarships you can use	X,XXX	

What you will pay for the 2013-14 year

Net Costs $ XX,XXX / yr
(Cost of attendance minus total grants and scholarships)

Options to pay net costs

Work options

Work-Study (Federal, state, or institutional) ... $ X,XXX / yr

Loan options*

Federal Perkins Loans	$ X,XXX / yr
Federal Direct Subsidized Loan	X,XXX / yr
Federal Direct Unsubsidized Loan	X,XXX / yr

*Recommended amounts shown here. You may be eligible for a different amount. Contact your financial aid office.

Other options

Family Contribution $ XX,XXX / yr
(As calculated by the institution using information reported on the FAFSA or to your institution.)

- Payment plan offered by the institution
- Parent PLUS Loan
- Military and/or National Service benefits
- Non-Federal private education loan

Customized information from UUS

Graduation Rate
Percentage of full-time students who graduate within 6 years

71%

LOW   MEDIUM   HIGH

Loan Default Rate
Percentage of borrowers entering repayment and defaulting on their loan

5%   12%

UUS Average   Comparable Institutions

Median Borrowing
Students at UUS typically borrow $XX,XXX in Federal loans over X years. The Federal loan payment over 10 years for this amount is approximately $X,XXX per month. Your borrowing may be different.

Repaying your loans
To learn about loan repayment choices and work out your Federal Loan monthly payment, go to:
https://www.direct.ed.gov/calc.html

For more information and next steps:
University of the United States (UUS)
Financial Aid Office
123 Main Street
Anytown, ST 12345
Telephone: (123) 456-7890
E-mail: financialaid@uus.edu

Notes: To maintain the confidentiality of the participating university, only general information is provided here. Graduation rate at the participating institution was in the low end of the "high" range, loan default rate was slightly above the national average, and median borrowing was around $14,000 with a federal loan payment over 10 years of around $150 per month.

APPENDIX B

PARTICIPATING UNIVERSITY AWARD NOTIFICATION