INFORMATIONAL AND COST NUDGES IN THE COMMUNITY COLLEGE LOAN
ACCEPTANCE PROCESS: A BEHAVIORAL APPROACH TO REDUCE OVER-
BORROWING

By

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<td>ISIR</td>
<td>Institutional Student Information Records.</td>
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<td>MPN</td>
<td>Master Promissory Note.</td>
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<td>NASFAA</td>
<td>National Association for Student Financial Aid Administrators.</td>
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<td>NSLDS</td>
<td>National Student Loan Data System.</td>
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<td>PROSPER Act</td>
<td>Promoting Real Opportunity, Success and Prosperity Through Education Reform Act.</td>
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INFORMATIONAL AND COST NUDGES IN THE COMMUNITY COLLEGE LOAN ACCEPTANCE PROCESS: A BEHAVIORAL APPROACH TO REDUCE OVER-BORROWING

By

Kayla Bannister Charles

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Chair: Dennis A. Kramer II
Major: Higher Education Administration

Utilizing an experimental design, this study builds on the growing literature that advocates the applicability of behavioral “nudges” in assisting students to make better long-term college-going and financial decisions. Informational asymmetries and the complexity of the student loan process likely prevent students from making optimal borrowing decisions. I exploit the online student loan acceptance process at a large community college to test how access to information on college cost and loan details, presented at the primary decision point of the student loan process, impacts loan take-up decisions and the rate of over-borrowing. I define a metric for measuring over-borrowing that prorates the federal annual loan limits by enrollment status to determine if a student is taking more loans than is optimal for their circumstances.

Whether or not a student had already registered for classes at the time of making their loan decision was found to be an important pre-commitment behavior and had a significant influence on how students responded to the interventions. Among students not yet registered for classes – the true experimental group – the provision of descriptive loan information, without cost, had the greatest likelihood of reducing loan take-up. The information-only messaging reduced the probability of accepting the entire amount of loans offered, a common student
behavior, by four percentage points. Reductions were primarily seen in take-up of the more expensive unsubsidized loan and resulted in $161 less in the average amount accepted per term. Average cost figures may induce borrowing, and the way cost is presented has an impact on borrowing decisions.

The results of this study show that simple informational interventions might be effective in reducing community college student borrowing at little administrative cost. However, students viewing the interventions that led to reduced borrowing also enrolled at a lower rate and attempted fewer credit hours on average. Before implementing changes to the student loan choice architecture, administrators and policymakers will need to weigh the benefits of reduced borrowing against the costs associated with negative enrollment and persistence outcomes.
CHAPTER 1
INTRODUCTION

College affordability and rising levels of student debt have become major concerns for American families, higher education scholars, and policymakers. Increases in how much the average student pays for college, coupled with shifts in how college is priced, have contributed to the perception that college is no longer affordable for all who want to attend (Akers & Chingos, 2014). Both perceived and real difficulty paying for college negatively impacts postsecondary attainment (Kelchen, Goldrick-Rab, & Hosch, 2016; Goldrick-Rab, Kelchen, Harris, & Benson, 2016; Dynarski & Scott-Clayton, 2013). The use of federal student loans more than doubled between 2000 and 2011 as demand for higher education increased and families sought to fill the growing share of income needed to cover college costs (Dynarski, 2014; College Board, 2017a).

Approximately one-third of undergraduates borrow from the federal government to finance their education (College Board, 2017b) and over 42 million Americans have outstanding student debt, totaling over $1.4 trillion.¹ Student loans are now second only to mortgages in consumer debt – greater than total automotive or household credit card debt.² Over the past two decades, the federal government has shifted its student aid strategy away from grants (i.e. Pell Grants), which represent true discounts on the price of higher education, towards loans to both students and parents – both of which must be repaid upon graduation or ceasing enrollment (College Board, 2017b; Hillman, 2014; Gross, Cekic, Hossler, & Hillman, 2010; Price, 2004).

The share of federal student aid funding fulfilled by grants fell from 42% in 1990-1991 to a low

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¹ See https://studentaid.ed.gov/sa/about/data-center/student/portfolio for full data on the federal student loan portfolio from the U.S. Department of Education.

² See data on outstanding consumer debt from the Federal Reserve Bank of New York: https://www.newyorkfed.org/microeconomics/databank.html.
of 26% in 2006-2007, and now sits at just 34%. Instead, the majority of federal aid dollars (51%) provided to undergraduate and graduate students now come from the federal loan programs (College Board, 2017b) ³.

The federal loan programs were designed to provide the liquidity needed in the present to access the future high returns related to completing a college degree. However, as with any investment, borrowing for college involves a certain amount of risk (Barrow & Malamud, 2015; Heller, 2008). Incurring educational debt can diminish the returns students receive from higher education and some research suggests this could ultimately affect future career decisions or delay investment in assets such as homes (Consumer Financial Protection Bureau, 2013; Avery & Turner, 2012). Other concerns surround the consequences associated with student loan default. Student loan default is an expensive side effect of the federal loan programs, and is costly for taxpayers, colleges, and students. One in four student borrowers ultimately default on their loans at some point within 12 years of college entry (Miller, 2017; Scott-Clayton, 2018).

Despite the growing concerns around student borrowing, scholars have documented the persistent and substantial long-term earnings premium associated with a college degree (Avery & Turner, 2012; Looney & Yannelis, 2015; Barrow & Malamud, 2015). Students who have the most repayment difficulty are generally those who leave college without a degree, forgoing the increased future earnings that would allow them to successfully repay their loans (Toutkoushian, Shafiq, & Trivette, 2013; Gladieux & Perna, 2005; Avery & Turner, 2012; Dynarski, 2016; Looney & Yannelis, 2015).

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³ Total undergraduate student aid for 2016-2017 broken down by source: 30% Federal student loans, 24% institutional grants, 20% Federal grants, 8% education tax benefits, 6% private and employer grants, 5% state grants, 5% non-federal loans, and 0.4% Federal Work Study funds for a total of $191 billion. See https://trends.collegeboard.org/student-aid/figures-tables/total-undergraduate-student-aid-source-and-type-over-time for breakdown of aid programs over time.
Many of the students most vulnerable to the risks of non-completion and experiencing student loan default begin their educations at publicly funded, primarily two-year degree granting institutions, also known as community colleges (Looney & Yannelis, 2015; Scott-Clayton, 2018; Hillman, 2014). Despite historically low rates of borrowing and the lowest prices among all higher education sectors, average annual borrowing at the community college level has risen 177% in constant dollars between 1996 and 2012 (Baker & Doyle, 2017). Default rates for students attending public community colleges are double those of students who attended public four-year institutions (U.S. Department of Education, 2017).

Community colleges play a vital role in the American higher education landscape. Their geographic proximity, open access policies, and lower cost provide a pathway to postsecondary education for many students who would otherwise not have the opportunity to participate (Baum & Ma, 2016; Cohen, Brawer, & Kisker, 2014). The 1,103 community colleges in the United States served a total of 7.1 million undergraduate students in the fall of 2016, representing 41% of all enrolled undergraduates (American Association of Community Colleges, 2018). Many of these students are considered “non-traditional”, in that they are older, financially independent from their parents, come from lower-income backgrounds, and attend part-time. Community colleges also serve a large proportion of minority and first-generation students (Baum & Ma, 2016). However, many of these students never earn a degree or credential. Just 34% of community college students complete a degree or certificate within six years (Baum & Ma, 2016).

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4 Published tuition and fees for the two-year public sector averaged $3,570 in 2017-2018 compared to $9,970 for the four-year sector. Average net tuition and fees after taking into account grant and scholarship aid for the two-year sector were actually -$380. Net tuition and fees plus room and board were $8,070. At the four-year public level, net tuition and fees plus room and board were $14,940 (College Board, 2017a).
Despite the obvious importance of these institutions to the social and economic development of the nation, they are often neglected by policymakers and the research literature.

Starting in 2005-2006 and lasting through the end of the recession in 2011-2012, the distribution of loan funding began to shift from the four-year sectors to the public two-year and proprietary sectors, consistent with enrollment trends during this time period (College Board, 2015). Community college cohort default rates increased from just 13% in 2001 to a peak of 25% after the recession in 2011 (College Board, 2015). The three-year default rate for community college borrowers entering repayment in 2014 is 18.3%\(^5\) (U.S. Department of Education, 2017).

**Purpose and Research Questions**

Non-traditional students attending community colleges are at a higher risk of default and experience more difficulty during repayment. This is due to a combination of lower labor market outcomes (Avery & Turner, 2012; Barrow & Malamud, 2015; Looney & Yannelis, 2015) and other non-traditional student characteristics such as lower socio-economic status (Looney & Yannelis, 2015; Hillman, 2014) and decreased likelihood of completing a degree (Looney & Yannelis, 2015; Baum & Ma, 2016).

A growing number of researchers suggest that part of the reason for poor borrowing outcomes is the complexity of the loan origination process and the fact that students make borrowing decisions without having complete information (Barr, Bird, & Castleman, 2017; Dynarski & Scott-Clayton, 2006; Dynarski & Scott-Clayton, 2013). Low-income and households with no previous college participation are particularly prone to biased perceptions about the costs

\(^5\) See [https://www2.ed.gov/offices/OSFAP/defaultmanagement/schooltyperates.pdf](https://www2.ed.gov/offices/OSFAP/defaultmanagement/schooltyperates.pdf) for a full breakdown of 2014 CDRs by institution type. Rates attributed to community colleges are classified under Public 2-3 yrs. The public 4-year rate is just 7.5% compared to the community college rate of 18.7%, despite 1.7 million borrowers entering repayment from the public 4-year sector compared to just 921,537 from the community college sector.
and benefits of college. These students tend to underestimate the economic returns of a college degree while overestimating the cost (Bleemer & Zafar, 2015). Many students, especially those from traditionally underserved populations, do not have adequate information accessible to them to make optimal borrowing decisions (George-Jackson & Gast, 2011; Perna, 2008; Heller, 2008; Soria, Weiner, & Lu, 2014), nor do they understand their loan debt and responsibilities after making the decision to borrow (Andruska, Hogarth, Fletcher, Forbes, & Wohlgemuth, 2014; Akers & Chingos, 2014).

Research in the growing field of behavioral economics seeks to gain a better understanding of how individuals behave in the face of such complex and unfamiliar decisions. Common behavioral biases, including a tendency to over-weigh immediate costs compared to future benefits, and a bias toward going along with the perceived default option, may explain why students make seemingly irrational decisions in the present that do not maximize their future well being (Thaler & Sunstein, 2009; Madrian, 2014; Castleman, Baum, & Schwartz, 2015). Researchers have studied behaviorally-informed policy changes in assisting students to make more informed decisions during the college selection process (Hoxby & Turner, 2016), while applying for financial aid (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2012; Castleman & Page, 2014; Dynarski & Scott-Clayton, 2006), and the student borrowing process (Darolia, 2016; Marx & Turner, 2016; Barr et al., 2017). The prior studies applying informational interventions to the student borrowing process provided information via electronic letters (Darolia, 2016) or text messages (Barr et al., 2017) at times near when loan decisions would be made. However, scholars have not yet examined the effects of providing information at the exact time when initial loan acceptance decisions occur.
The government sets annual and lifetime borrowing limits for the federal loan programs that are designed to provide an acceptable amount of debt for bachelor’s degree recipients. Loan limits are the same for all undergraduate students regardless of institution type, credential level, or enrollment status (i.e. students enrolled part-time). Colleges are not permitted to reduce loan disbursements based on student or program characteristics. However, colleges do have some autonomy in how they communicate the availability of loans to students. Institutional decisions surrounding the presentation of loan information and how decisions are framed may exacerbate students’ behavioral biases (Marx & Turner, 2016).

In this study, I use empirical methods to test the impact of providing loan and cost information at a critical decision point in the federal student loan process on the borrowing choices of community college students. The focus on community college students is purposeful given the lack of research on this population and their growing vulnerability to suboptimal student loan borrowing practices. Additionally, I developed a metric for measuring the rate of borrowing relative to enrollment status that might assist institutions in evaluating the appropriateness of debt levels during enrollment, as opposed to lagging measures of indebtedness such as default and repayment rates. Specifically, this study aims to answer the following research questions:

- **R1**: To what extent does access to information on college cost and loan details, presented at the primary decision point of the student loan process, influence community college student loan borrowing?

- **R2**: Do variations in the way college cost information is framed impact student loan borrowing to different degrees?

- **R3**: To what extent do mitigating factors impact the salience of cost information for community college students?

- **R4**: To what extent does cost information at the time of loan decision have an unintended impact on the enrollment and retention behaviors of community college students?
Historical Overview of Federal Loan Policy

Student loans have been part of the federal government’s higher education strategy since they first appeared as part of the National Defense Education Act of 1958. Their role as a primary mechanism for federal support of higher education was solidified with the creation of a Guaranteed Student Loan Program (renamed the Stafford loan program in 1988) under Title IV of the Higher Education Act (HEA) of 1965. The availability of federally regulated education loans helped to address the market failure created by the reluctance of private lenders to support an investment secured only by the borrower’s future earnings (Dynarski, 2014).

There are currently four federal loan options available to undergraduate students: subsidized Stafford loans, unsubsidized Stafford loans, the Parent Loans for Undergraduates program (PLUS), and Perkins loans. Private lenders also provide loans to finance higher education, but credit requirements and higher interest rates generally make these an unfavorable option compared to federal loans, and as such they make up just 11% of total student loan volume. This study focuses on the largest source of student loans, the federal Stafford loan program, which makes up 67% of all loans provided to students (College Board, 2017b).

Over time, multiple revisions and additions to the loan programs have created the complex system that exists today. One of the most significant changes was the transition away from the original mission of the Stafford loan program to serve only low-income students. The Stafford loan program was originally designed as a need-based program that was a joint venture of the public and private sectors, referred to as the Federal Family Education Loan (FFEL) program (Dynarski, 2014). Private lenders supplied capital for loan funds and processed applications and disbursements, while the government determined eligibility and acted as a guarantor, promising to repay the loan in the event of default. In addition to providing loans at
below market rates, the federal government would further subsidize the debt by paying accrued interest while the student was in school. This type of loan will be referred to as a “subsidized loan” in this study.

In 1978, the Middle-Income Assistance Act expanded eligibility to middle and upper class families by making subsidized loans available to all undergraduates, regardless of need. The elimination of the need requirement led to an explosion in loan disbursements, as families seeking cheap credit flooded the market. The need requirement was reinstated just three years later in 1981 to contain costs (Dynarski & Scott-Clayton, 2013).

The 1992 reauthorization of the HEA established the unsubsidized Stafford loan option (henceforth referred to as “unsubsidized loans”) and created increases in annual loan limits for sophomores, juniors, seniors, and graduate students. The unsubsidized loan is available to all students regardless of need. These loans, however, do not carry the in-school interest subsidy or always have interest rates as low as their subsidized counterparts. Both loan versions, however, offer attractive interest rates, forbearance protections, and flexible repayment options compared to private student loans (U.S. Department of Education, 2016).

In 2007, changes from the Higher Education Reconciliation Act (HERA) of 2005 went into effect, increasing the annual loan limits for freshmen and sophomores by approximately $1,000 each. In 2008, Congress passed the Ensuring Continued Access to Student Loans Act

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6 Interest rates on federal Stafford loans are set by Congress, and have varied much over time. Currently, interest rates are tied to Treasury bills. Rates only differ by the year in which the loan was initiated and are then fixed for the life of the loan. See https://studentaid.ed.gov/sa/types/loans/interest-rates for a detailed description of loan interest rates.

7 A full description of the current repayment options offered by the U.S. Department of Education can be found at https://studentaid.ed.gov/sa/repay-loans/understand.

8 See Appendix B for details on loan limits by year. Effective 2007-2008, the annual limit for freshmen increased from $2,625 to $3,500 and the limit for sophomores increased from $3,500 to $4,500.
ECASLA in response to deteriorating credit conditions. The act allowed the U.S. Department of Education to provide needed capital to private lenders to ensure the availability of student loans during the recession. In addition, ECASLA added an additional $2,000 in annual unsubsidized loan eligibility for all undergraduates (U.S. Department of Education, 2012). The act left subsidized loan limits untouched, broadening access to the non-need based unsubsidized option and increasing lifetime aggregate limits by $8,000 (Woo & Horn, 2016). Appendix B shows the increases seen in the annual and aggregate loan limits over the years. As a result of these changes, the majority of federal loans are now unsubsidized, and therefore more expensive. The percentage of federal loans made up by the subsidized loan decreased to just 20% in 2016-2017, compared to 53% in 1996-1997 (College Board, 2017b).

The government began the Federal Direct Loan Program in 1994, alongside the FFEL program, as a means to offer Stafford loans without the private intermediary. Colleges chose which program to utilize, though 75% of new loan volume still originated from the FFEL Program as of 2009. In 2010, due mainly to the impact of the recession on the liquidity of private lenders, the Direct Loan Program became the sole source of Stafford loans with the passage of the Health Care and Education Reconciliation Act. The private sector still participates in the loan programs but in the role of servicing contractor to the Department of Education (U.S. Department of Education, 2012). These “servicers” continue to collect payments and communicate with a particular portfolio of borrowers allocated to them by the Department of Education (Dynarski, 2014).

9 See the Department of Education 2010 budget summary for details on the distribution between the FFEL and Direct Loan programs: https://www2.ed.gov/about/overview/budget/budget10/summary.
The Student Debt “Crisis”

Between 2000 and 2011, the number of student loan borrowers more than doubled to reach 12.2 million, outstanding student debt surpassed $1 trillion, and default rates rose to their highest levels in 20 years (College Board, 2017b; Looney & Yannelis, 2015). The media often refers to this explosion of student debt as a crisis (Looney & Yannelis, 2015; Dynarski, 2014; Scott-Clayton, 2018). However, the research literature argues that the large increase in cumulative outstanding student debt is driven mostly by increases in enrollment in higher education over the same period (Scott-Clayton, 2018; Dynarski, 2014). College enrollment increased by 32% between 2001 and 2011 (College Board, 2012). While the average amount of loans borrowed per student also increased by 8% during this period, future earnings from a college degree were rising as well, enough to allow the average degree completer to successful repay their debt (College Board, 2012; Akers & Chingos, 2014; Avery & Turner, 2012; Dynarski, 2014). Instead, scholars suggest that to the extent there is a crisis, it is concentrated among underrepresented minorities (Miller, 2018) and non-traditional student borrowers, mainly in the for-profit sector and community colleges (Looney & Yannelis, 2015; Scott-Clayton, 2018).

Non-traditional borrowers are considered to be older, attend part-time, live independently of their parents, come from lower-income backgrounds, and live in disadvantaged areas (Looney & Yannelis, 2015). Students with these characteristics disproportionately attend community colleges. Forty-four percent of first and second year students at community colleges are over the age of 25, compared to just 20% in the four-year sectors (Baum & Ma, 2016). Sixty-three percent of community college students attend part-time, 34% are eligible for federal need-based grants allocated to low-income students, and 36% are the first in their family to go to college (AACC, 2018). Historically, few of these students borrowed. However, beginning with the 2008
recession, non-traditional students grew to represent almost half of new student loan borrowers across all higher education sectors (Looney & Yannelis, 2015). The majority of these students entering higher education during this time chose non-selective institutions, causing community college enrollment to grow from 5.7 million to 7.9 million during the 10-year period from 2000 to 2010 (Baum & Ma, 2016).

The combination of increased enrollment due to a weak economy and shorter enrollment durations led to a flood of non-traditional borrowers entering repayment just after the recession. These students generally experienced poor labor market outcomes and had other background characteristics that made them vulnerable to repayment difficulties, leading to a surge in default rates. Approximately 30% of non-traditional borrowers entering repayment in 2011 defaulted within three years, compared to just 13% among traditional student borrowers (Looney & Yannelis, 2015).

**Borrowing Limits**

The government places annual and aggregate (lifetime) loan limits on the federal loan program. Appendix B contains a table of the annual and aggregate loan limits for the federal Stafford loan program as they have evolved with policy changes over the years. Annual loan limits are set separately for subsidized and combined subsidized and unsubsidized loan totals. Subsidized loan limits are also capped by unmet financial need as calculated by the institutional cost of attendance less the student’s Estimated Family Contribution (EFC) and other grant and scholarship aid. Lifetime aggregate limits are based on the annual maximums combined over four to five years. Subsidized eligibility is also capped at a lifetime $23,000 limit.10

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10 Subsidized loan eligibility is also capped at 150% of the published length of the student’s program of study. See https://studentaid.ed.gov/sa/types/loans/subsidized-unsubsidized#eligibility-time-limit for an explanation of these regulations.
Students must enroll in a minimum of six credit hours per semester to be eligible for federal loans. Beyond six credit hours, loan limits remain the same regardless of enrollment status. This can mean that the many part-time community college students who take the maximum annual amount might reach their aggregate limits at the two-year degree mark, leaving them with nothing to complete the remaining credits for a bachelor’s degree.

Loan limits are also the same regardless of institution type or type of degree sought. Limits are only impacted by a student’s class level (annual amount increases as students complete more credits) dependency status (independent students are eligible for more than dependent students who are assumed to receive parental support11) and the institutional cost of attendance. Dependent freshman students are eligible for up to $5,500 annually. Up to $3,500 of this can be subsidized depending on their amount of unmet need. For independent students, this amount increases to $9,500 per year, though the maximum subsidized eligibility does not change. Dependent second year students with at least 28 earned credit hours are eligible for an additional $1,000 and second year independent students are eligible for an additional $2,000 (only $1,000 of which can be subsidized). Dependent undergraduate students have a lifetime aggregate limit of $31,000 and independent students have a limit of $57,500 – amounts that are approximately the annual limits for four to five years.

**Cost of Attendance**

Published tuition and fee prices have been rising faster than the rate of inflation for decades. The published in-district tuition and fees for community colleges increased 2.6% in

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11 Undergraduate students are considered independent for federal aid purposes if they: (1) will be at least 24 years old by the end of the calendar year, (2) are married, (3) have dependents of their own, (4) were in foster care or a ward of the court since age 13, (5) are an emancipated minor, (6) are homeless or an unaccompanied youth, or (7) are currently active duty or a veteran of the U.S. military. See [https://studentaid.ed.gov/sa/fafsa/filling-out/dependency](https://studentaid.ed.gov/sa/fafsa/filling-out/dependency) for more information.
inflation-adjusted dollars over the past decade, and 2.5% in the decade prior to that (Baum & Ma, 2016). However, after accounting for increases in grant aid and education tax benefits, the average net tuition and fees students pay has actually decreased over time. In 2016-2017, the average full-time community college student received $3,900 in grant aid and education tax benefits, $330 more than enough to cover the published tuition and fee price of $3,570 (College Board, 2017a).

However, tuition and fees do not represent the full picture of how much college costs for an individual student. Under the Higher Education Act of 1965, colleges are required to calculate and publish the full Cost of Attendance (COA), which includes allowances for room and board, transportation, books and supplies, and personal expenses. Tuition and fees constitute just 30% of the COA at community colleges (Kelchen et al., 2016). Most types of financial aid, including federal loans, can be applied to cover any expenses in the COA, not just tuition and fees (College Board, 2017a; National Association of Student Financial Aid Administrators, 2018).

The average COA for in-district students at community colleges was $17,580 in 2016-2017 (College Board 2017a). While the average community college student receives enough aid from Pell and other state and institutional grants to cover the average tuition and fee amount, many still struggle to cover living expenses while in school (College Board, 2017a; Baum & Ma, 2016). For example, a low-income student receiving the maximum Pell Grant award of $5,875 for the 2016-2017 year would still have a gap of $11,705 to cover the full cost of college for a year (College Board, 2017a).

College financial aid administrators have considerable autonomy in constructing COA estimates, and substantial variation exists between institutions, even those with similar tuition and fee prices (Kelchen et al., 2016). A principle – and in some cases the largest – component of
the COA is an estimate of cost of living expenses. In general, colleges calculate a living-cost allowance for students who live on-campus, those who live off-campus on their own, and those who live at home with family (Kelchen, et al., 2016). Kelchen, Goldrick-Rab, and Hosch (2016) found that nearly half of all colleges base their COA estimates on living-cost allowances that are at least 20% above or below county-level living expenses.

The COA is used in combination with the EFC calculated by the Department of Education to determine the amount of financial need for each individual student. This need amount is used for awarding institutional and state need-based grant aid, subsidized Stafford loan eligibility, and can affect the total amount of aid students are eligible for. This means that variations in living-cost allowances have a significant impact on both net prices and on maximum borrowing limits. Colleges that set low living-cost allowances might do so in order to portray lower net prices or in an effort to reduce borrowing (Kelchen, et al., 2016).

Cost of attendance figures are also affected by enrollment status. The tuition and fees and books and supplies portion of the COA is prorated based on full-time (defined as 12 credit hours per semester), three-quarter time (9-11 credit hours), half-time (six credit hours), and less-than-half time (less than six credit hours) status. Students attending less-than-half time generally do not have an allowance for room and board (NASFAA, 2018).

**Institutional Choice Architecture**

With the full-time cost of attendance averaging $17,580, even community college students who receive more than the average $3,900 in grant aid or enroll part-time are likely to be eligible for the full amount of student loan eligibility ($6,500 for dependent second year students, and $10,500 for second year independent students). The federal government does not permit institutions to decrease loan amounts based on student or program characteristics. If an institution opts to participate in the federal Stafford loan program, they must allow students to
receive the full loan eligibility up to the annual and aggregate loan limits, bounded by the institutional cost of attendance. However, institutions have some control over how they present loan offers to students. I refer to this institutional discretion in the presentation and process for accepting federal loans as the institutional “choice architecture.”

Most four-year institutions include the full amount of loan eligibility in initial aid offers. Community colleges are more divided in their approach, with some including the full loan eligibility in initial award offers, some including partial loan amounts (for example, only presenting subsidized amounts), and others that do not include loan amounts in initial award letters but instead have a separate loan request process (Marx & Turner, 2016).

Increased responsibility and accountability measures are being placed on institutions to keep rates of student default down. Recent legislative updates surrounding the cohort default rate (CDR) have placed community colleges at a higher risk of losing Title IV funding. Changes in the structure of the federal student loan program have removed private resources for default management programs, leaving the full burden on colleges with little resources for additional programming. Due to concerns over sanctions for high default rates and creating excessive debt for students, efforts to reduce borrowing have been most pronounced within the community college sector (Marx & Turner, 2016).

Community colleges that do not offer loans in initial aid packages likely do so in an effort to discourage student loan borrowing (Marx & Turner, 2016). These institutions do have lower rates of loan take-up, but default rates remain relatively the same (Marx & Turner, 2016). As an extreme reaction, 237 community colleges have actually chosen to opt-out of the federal loan program altogether to protect themselves from sanctions, despite the fact that only three public community colleges have ever been sanctioned by the Department of Education (Cochrane &
Szabo-Kubitz, 2014; Marx & Turner, 2016). Students attending these colleges, 8.5% of all community college students, have no access to federal loan funding (Cochrane & Szabo-Kubitz, 2014). Recent research at the community college level indicates that efforts to reduce borrowing by opting out of the federal loan program have a negative impact on enrollment and persistence outcomes (Wiederspan, 2015; Dunlop, 2012). Community colleges must consider that efforts to avoid default rate sanctions and repayment difficulties for some students might limit attainment for others for whom access to loan funds would increase their chances to benefit from higher education.

**Significance of the Study**

Federal student loan policy is clearly directed toward the traditional full-time student attending a four-year university, as is much of the research literature. Federal student loan policy is one area, however, where the differences between the two sectors make having unilateral policies problematic. Despite the fact that tuition costs, time to degree, and potential future earnings are much lower for an associate’s degree or certificate than a bachelor’s degree, annual and aggregate student loan limits are the same. Colleges are required to provide the entire amount available to the student, and the majority of undergraduate borrowers tend to accept the maximum amount offered to them (Woo & Horn, 2016; Wei & Skomsvold, 2011; Marx & Turner, 2016).

The maximum loan amount offered to a student per federal guidelines may not be the optimal amount of loan funding for students’ personal circumstances and preferences. Making optimal decisions regarding whether to borrow and how much, as well as navigating the borrowing process itself, requires substantial information about the requirements of a complex financial instrument as well as expected future outcomes regarding degree completion and future wages (Avery & Turner, 2012). Prior studies highlight the problem of information gaps
regarding financial aid and student loans and how these gaps complicate any rational cost-benefit analysis about whether to and how much to invest in college, especially for disadvantaged students (Bettinger et al., 2012; Darolia, 2016; Marx & Turner, 2016; Barr et al., 2017; Bleemer & Zafar, 2015; Dynarski & Scott-Clayton, 2006; George-Jackson & Gast, 2015; Akers & Chings, 2014; Baum & Schartz, 2015). In the absence of revised loan policy directed toward community college students, who are particularly vulnerable to the risks of excessive borrowing and default (Looney & Yannelis, 2015; Hillman, 2014), there is a need to explore alternative methods that might help students make more informed borrowing decisions, as attempted in this study.

While many studies suggest that the complexity of the student loan programs and the federal financial aid system as a whole undermines their goal of increasing access and success (Baum & Schwartz, 2015; Bettinger et al., 2012; Castleman & Page, 2015; Dynarski & Scott-Clayton, 2006; Castleman et al., 2017), there is limited research regarding the impact and effectiveness of student loan programs overall (Dynarski & Scott-Clayton, 2013; Wiederspan, 2015; Dunlop, 2012; Baker & Doyle, 2017) and even less surrounding the specific borrowing choices of students (Dynarski & Scott-Clayton, 2013; Darolia, 2016; Marx & Turner, 2016; Barr et al., 2017).

This study complements a growing body of experimental research applying behavioral economic principles to college choice (Hoxby & Turner, 2014), applying for financial aid (Dynarski & Scott-Clayton, 2006; Bettinger et al., 2012; Castleman & Page, 2014), and student loan processes (Dariolia, 2016; Marx & Turner, 2016; Barr et al., 2017). Behavioral frameworks suggest that using targeted informational nudges might be successful in reducing the tendency to over-borrow (Barr et al., 2017). In the absence of policy improvements, community college
administrators could apply the results of this study to modify their student loan choice architecture to increase the salience of loan information and assist students in making better borrowing decisions. These changes might result in an improved financial future for students, while in the process reducing the likelihood of federal sanctions for high institutional default rates. Any reduction in debt burden could alleviate societal concerns surrounding the impact of the student debt “crisis.” However, it will also be important to understand how any reductions in borrowing impact long-term student success. Findings could also inform federal policy that aims to simplify the financial aid process and ensure information is more accessible for students. If successful in reducing even a small amount of suboptimal borrowing, the low costs associated with these initiatives would make them worthwhile (Baum & Schwartz, 2015; Marx & Turner, 2016; Barr et al., 2017).

The remainder of my dissertation is organized into the following chapters: Chapter 2 contains a review of the relevant literature pertaining to an analysis of community college borrowing and nudging strategies related to college choice and financial aid, as well as a discussion of the behavioral economic principles used to conceptualize this study. Chapter 3 discusses the research design, including the research site, sample, interventions, and randomization technique. Chapter 4 presents the results of the study, and Chapter 5 discusses conclusions, policy implications, and recommendations for continued research.
CHAPTER 2
LITERATURE REVIEW

In order to understand the borrowing behavior of community college students, I begin the discussion of the literature by reviewing what is known about the impact of student loans on access, persistence, and completion. It is also important to define and expand upon the sometimes-misunderstood concept of over-borrowing and the consequences of suboptimal borrowing decisions. A primary focus of this study is on the role of information on the choices students make en route to a college degree. Therefore, a thorough discussion of the research surrounding student perceptions of college costs and returns, as well as the complexity of the financial aid and student borrowing process is included. Next, I review recent experimental studies investigating borrowing behavior, which I expand upon in this study. Finally, I conclude the literature review by describing the behavioral economic framework that motivates the interventions tested in this study.

Impact of Student Loans on Access and Success

Researchers have used a variety of theoretical and methodological approaches to analyze questions surrounding the impact of loans on access, persistence, and success. However, scholars have yet to agree fully on the effect of student borrowing on various outcomes related to college attainment (Perna, 2006a; Dowd, 2008; Heller, 2008; Goldrick-Rab, Harris & Trostel, 2009). Generally, research on the impact of loan programs has an overall positive effect on first-time enrollments (Dowd, 2008; Dynarski, 2003). However, the literature is mixed on whether loans positively or negatively affect persistence and degree attainment (Yu, 2014; Dowd, 2008). Dynarski and Scott-Clayton (2013) point out the difficulty in isolating the effectiveness of financial aid programs due to the variety of characteristics used to determine aid eligibility, such as income and academic performance, which may independently affect college access and
completion. While statistical models can be used to control for observable differences that may impact student success, there are also unobservable differences between students who take loans and those who do not that make this research particularly difficult (Dynarski, 2003; Dynarski & Scott-Clayton, 2013).

Analyzing the effects of the federal loan programs is made even more difficult because there are no arbitrary regulations or eligibility cut-offs, as with other programs such as the Pell Grant (Dynarski & Scott-Clayton, 2013; Heller, 2008). Dynarski (2003) exploited a change in federal student aid regulations in 1992 to estimate the effects of increased access to subsidized Stafford loans on college student choice. The Higher Education Act of 1992 removed home equity from the student aid formula, effectively increasing aid eligibility for homeowners. Dynarski (2003) found that for each $1,000 gained in subsidized loan eligibility due to reduction of assets, college attendance rose by 1.7 percentage points.

Looking specifically at community college students, Dowd and Coury (2006) found that borrowing negatively affected college persistence. The authors suggest that community college students are continually evaluating their investment in education, and that those who rely on student loans are more likely to become dissatisfied and withdraw from college (Dowd & Coury, 2006). Baker and Doyle (2017) also found negative results for credit completion for community college students who borrow within two years of first enrolling (2.1 fewer credits completed). However, the authors conclude that borrowing at the community college level is not always negative but should be done with caution (Baker & Doyle, 2017). On the other hand, recent studies have also found positive impacts on persistence at the community college level (Wiederspan, 2015; Marx & Turner, 2016; Dunlop, 2012).
Wiederspan (2015) analyzed the effect of borrowing within a state community college system where a significant number of colleges recently chose to opt out of the federal loan program. Using a difference-in-difference approach, results indicate that Pell eligible students who borrow attempted more credits in their first year of enrollment and were more likely to attempt and complete math and science courses than non-borrowers (Wiederspan, 2015). As noted by Baker and Doyle (2017) the difference in results between their findings and Wiederspan’s (2015) is likely due in part to state variation. Because community college funding structures and costs vary significantly by state, borrowing levels and needs can also be very different depending upon where the student happens to live and attend college (Baker & Doyle, 2017).

Using a nationally representative sample from the Beginning Postsecondary Student Study of 2004 and controlling for state in the analysis, Dunlop (2012) compared outcomes for community college students who were eligible and attended colleges that offered Stafford loans to those who were eligible but attended a college that did not offer loans. Dunlop (2012) found that students who had access to Stafford loans were 5.6 percentage points more likely to transfer for a four-year college, and this effect was larger (7.6 percentage points) for high-need students.

Marx and Turner (2016) also found that students induced to borrow by a non-zero loan offer in their award package also experienced modest short-term increases in credit completion and GPA points. Given the recent evidence of a positive relationship between loan availability and take-up with short-run enrollment gains, it will be important to understand more about the long-term effects of loans on long-term academic outcomes and degree attainment, so that these might be weighed against the negative consequences of student loan debt for community college students.
Over-borrowing – How Much Debt is Too Much?

The problem with defining over-borrowing or excessive debt is that it is primarily measured relative to future earnings, which are influenced by a myriad of other factors. There is no magic number beyond which repayment is made difficult. While it might seem counter-intuitive, students with loan balances under $5,000 have a higher likelihood of ending up in default than students borrowing more than $100,000 (Dynarski, 2016; Looney & Yannelis, 2015; Scott-Clayton, 2018). Students on the higher end of the student debt spectrum tend to be graduate students who spent more time in school at elite institutions and therefore have higher earnings and lower unemployment, allowing them to repay substantial loan balances (Looney & Yannelis, 2015; Scott-Clayton, 2018). In contrast, students with low loan balances are more likely to be those who attended non-selective institutions, such as community colleges, and who left without earning a degree, leaving them without the earnings premium that would have paid off their investment in higher education (Looney & Yannelis, 2015). In this sense, over-borrowing is more appropriately defined by the challenges experienced during repayment than by a specific amount.

The Cohort Default Rate

The primary policy lever for assessing overall student loan repayment difficulty is the federal Cohort Default Rate (CDR). The CDR has been used by the Department of Education for over two decades as a high-profile indicator of whether institutions are providing a quality education, with high rates signifying that institutions are failing to prepare students for jobs that would allow them to pay off their student debt (Looney, 2011; Lederman, D., 2009). CDRs represent the percent of borrowers who default on their loans within three years of entering
Approximately one in 10 federal student loan borrowers default on their loans within three years of entering repayment. That rate nearly doubles, to 18.3%, for community colleges, despite their low cost and lower total loan volume (U.S. Department of Education, 2017). CDRs for public community colleges increased from just 13% in 2001 to a peak of 25% after the recession in 2011 (College Board, 2012).

Student consequences of default include wage garnishment, seizure of tax refunds, collection costs, diminished credit score, and restriction from receiving additional student aid or social security benefits. Managing the risks of student loan default also costs borrowers, taxpayers, and postsecondary institutions additional time and money, making it an undesirable consequence of the federal government’s reliance on a loan-based financial aid system (Hillman, 2014).

Colleges and universities are held accountable for their institutional CDR. Rates above 30% place colleges at risk of losing all Title IV aid eligibility, including Pell Grant and federal loan funding, which constitutes a significant portion of community college revenues (U.S. Department of Education, 2016). Unfortunately, many institutions do not begin addressing default rates until they reach critical levels and are at risk of federal sanctions. The primary strategies for managing CDRs include the reactionary tactics of challenges and appeals as well as more proactive approaches which attempt to alter student behavior via financial literacy and

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1 A loan is considered in default when it becomes 270 days delinquent. See https://ifap.ed.gov/DefaultManagement/guide/attachments/CDRQuickReferenceGuide.pdf for a guide on how the U.S. Department of Education calculates Cohort Default Rates, as well as how institutions are held accountable for them.

2 See https://www2.ed.gov/offices/OSFAP/defaultmanagement/schooltyperrates.pdf for a full breakdown of 2014 CDRs by institution type. Rates attributed to community colleges are classified under public 2-3 yrs. The public 4-year rate is just 7.5% compared to the community college rate of 18.7%, despite 1.7 million borrowers entering repayment from the public 4-year sector compared to just 921,537 from the community college sector.
retention programs (Looney, 2011; Gross, et al., 2010). These methods require financial and human resources that many colleges may not have. Prior to the elimination of the FFEL Program in 2010, lenders and state guarantor agencies handled a lot of the default management activities (U.S. Department of Education, 2012). In the era of the Federal Direct Student Loan Program, institutions are now responsible for these tasks, and have received little additional help from federal or state governments.

In order to avoid sanctions and the loss of all Title IV aid for their students, some community colleges are opting out of the loan program altogether. A total of 237 community colleges had opted out of the federal loan programs as of 2014 (Cochrane & Szabo-Kubitz, 2014). The phenomenon of opting out of the loan program is cause for concern, especially given the positive impacts to college access and success found in recent studies at the community college level (Wiederspan, 2015; Marx & Turner, 2016; Dunlop, 2012).

Other community colleges choose not to offer student loans as part of the financial aid award package, requiring students to submit a separate request for a loan instead. Despite this effort to reduce borrowing and therefore avoid sanctions for high CDRs, Marx and Turner (2016) found that default rates are comparable among institutions that package both subsidized and unsubsidized loans and those who do not include federal loan amounts in the initial award offer (18.6% versus 18.9% respectively).

Factors Influencing Default and Delinquency

**Race and ethnicity.** African American and Hispanic students are at greater risk of default compared to white students, even after controlling for post-graduation earnings and institution type (Hillman, 2014; Gross, et al., 2010). Based on the Baccalaureate & Beyond Longitudinal Survey, 1997 follow-up, Price (2004) found that students from lower-income backgrounds, as well as black and Hispanic students, have a significantly greater risk of
excessive student debt burden. Price (2004) measured educational debt burden based on the proportion of monthly income required for loan repayment. Any amount over 8% was determined to be excessive (Price, 2004). Even after controlling for income, being black still had an independent effect on debt burden in 1997 (Price, 2004). More recent descriptive analysis of long-term data from the 2003-2004 Beginning Postsecondary Students cohort reveal that 49% of black students and 36% of Hispanic students defaulted on at least one loan within 12 years compared to just 21% of white students (Miller, 2018). This disparity persists even for degree completers, particularly among black students. Thirty-three percent of black students who received an associate’s degree and 23% of those who received a bachelor’s degree still ended up in default within 12 years, compared to 17% of white associate’s degree recipients and just 6% of white bachelor’s degree recipients (Miller, 2018).

**Socioeconomic status.** Multiple studies confirm the inverse relationship between family income and default, showing that as family income levels rise the odds of defaulting steadily decline (Gross et al., 2010; Hillman, 2014; Looney & Yannelis, 2015). Family structure also plays a role. The greater the number of dependents claimed by a student, the greater the likelihood of loan default. Additionally, first generation students are also at higher risk of default than students with parents who have attained a degree (Hillman, 2014; Gross et al., 2010).

Given that over half of community college students nationwide are minority, 36% are first-generation, and 34% receive federal grant aid (AACC, 2018), community college students are highly vulnerable to repayment difficulties based on these student level factors alone.

**Loan balance.** There has been conflicting literature surrounding whether or not default is a function of high debt levels (Choy & Li, 2006; Woo, 2002). Hillman (2014) posits that the reason for these mixed results is that the relationship between debt amounts and default is
actually nonlinear. According to this model, debt and default have a gradual “u-shape” form, with higher levels of default both for students with extremely low loan balances and extremely high balances. Recent analysis of long-term data from the 1995-1996 and 2003-2004 Beginning Postsecondary Students cohort confirm that defaults are higher among those who borrow relatively small amounts (Scott-Clayton, 2018). According to Looney and Yannelis (2015) the reason for this distinction is that students with higher loan balances tend to have attended elite private institutions and/or graduate school and these students are the least likely to default due to high future incomes and family background, whereas students at low-cost community colleges tend to borrow less over a shorter amount of time but have worse labor market outcomes.

**Degree completion.** Leaving college without a postsecondary credential has been identified as the single largest predictor of student loan default, regardless of institution type (Gross, et al., 2010; Hillman, 2014). Hillman (2014) found that degree completion and employment are not only statistically significant predictors of default, but the magnitude of these variables is larger than any of the other variables considered in his model. Among student loan borrowers who entered repayment in 2011-2012, nine percent of those who completed their programs ended up in default, compared to 24% for non-completers (College Board, 2017b). Analysis of the most recent College Scorecard repayment data confirm the substantial repayment gap between college completers and non-completers, showing students who earn a degree are at least 20 percentage points more likely to begin paying down their loan balance than students who enter repayment without earning a credential (Itzkowitz, 2018).

Given that just 34% of students who start at a community college complete a degree or certificate within six years (Baum & Ma, 2016), compared to 59% of those seeking a bachelor’s degree (NCES, 2015), it is important that any efforts to analyze or alleviate repayment distress
start with these students. Some risk factors for leaving postsecondary education without a degree include delaying enrollment in postsecondary education; being financially independent, a single parent, or enrolled part-time; having dependents other than one’s spouse; and working full-time while enrolled. Not surprisingly, these same characteristics have also been shown to increase the likelihood of default on their own (Gross, et al., 2010). Low-income Pell Grant recipients at community colleges have a higher risk of having these characteristics than those attending four-year institutions (Wei & Horn, 2002). For students who begin college but do not graduate, the issue is not high debt amounts, but rather the absence of any significant earnings premium associated with a college degree (Avery & Turner, 2012; Toutkoushian, et al., 2013; Looney & Yannelis, 2015).

**Institution type.** Initial analysis by Hillman (2014) showed that community college students are three times more likely to default compared to those attending four-year public institutions. However, after accounting for non-traditional student demographics and academic profiles, these differences disappear. Prior research summarized by Gross et al., (2010) was consistent with this finding. Looney and Yannelis (2015) analyzed the role of institutions and labor market outcomes on the increases in default rates between 2000 and 2011 using a unique dataset merging administrative records on loan debt and earnings information from de-identified tax records. Decomposition analysis revealed a substantial portion of the increase in default could be attributed to the influx of non-traditional borrowers into the student loan market, many of which attended community colleges or for-profit institutions. Approximately 30% of non-traditional borrowers who entered repayment in 2011 defaulted within three years, compared to

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3 Looney and Yannelis (2015) define non-traditional borrowers as those who are older, attend school part-time, live independently of their parents, come from lower-income backgrounds, and live in disadvantaged areas.
just 13% among traditional undergraduate borrowers (Looney & Yannelis, 2015). Recent analysis of long-term default trends looking at all students entering college by year of entry reveals that default rate increases over time are largely attributed to the for-profit sector (Scott-Clayton, 2018).

**Future earnings potential.** For those who do graduate, what they studied in school and the degree they earned also has an impact on the likelihood of default. Effects are not due to the students’ major choice directly, but rather to the amount of debt incurred to receive the degree, and the post-graduation earnings related to their field of study (Gross, et al., 2010; Avery & Turner, 2012; Looney & Yannelis, 2015). Community college students, who generally receive an associate’s degree or vocational certificate, have weaker labor market outcomes than bachelor’s degree recipients (NCES, 2015; Avery & Turner, 2012; Barrow & Malamud, 2015). Bachelor’s degree recipients in 2014 had a median annual income of $49,880 while associate’s degree recipients earned $34,970, a difference of $14,910. This difference is greater than the income gap between associates’ degree recipients and those with only a high school diploma, who earn $30,000 per year, just $4,970 less than associates degree recipients (NCES, 2015).

Looney and Yannelis (2015) also analyzed labor market outcomes for borrowers entering repayment by institution type. This analysis includes both degree recipients and those who did not complete their degrees. Between 2002 and 2013, median earnings for non-traditional employed borrowers from community colleges actually declined from $30,100 to $25,900, while median earnings of more traditional borrowers at four-year institutions increased over the same period. Unemployment rates were also higher for borrowers who began at a community college compared to the four-year sector, and these students experienced a disproportionate increase in the unemployment rate during the recession (Looney & Yannelis, 2015).
Other Borrowing Trends of Concern

While increasing default rates are cause for concern, they are but one measure of student loan distress. Many students may never have a loan that becomes more than 270 days delinquent, but suffer repayment challenges nonetheless. Default rates also do not count students who take advantage of alternative payment plans or deferment and forbearance options to suspend payments during difficult times.

Negative amortized debt. Student borrowers who attended a community college are also experiencing disproportionate increases in negative amortized debt compared to the four-year sectors. Negative amortized debt occurs when a borrower owes more on a loan two years after entering repayment than when they first entered repayment. This happens when interest continues to accrue but payments are not being made, and would include students in default as well as students in deferment or forbearance. Community college rates increased from 38% in 1996 to 64% in 2012 (Looney & Yannelis, 2015).

Cumulative debt of community college students. The percentage of associate’s degree recipients graduating with $30,000 or more in debt (in 2012 dollars) increased from 1% in 2003-2004 to 8% in 2011-2012. A total of 3% of certificate program graduates now graduate with over $30,000 in debt, compared with 0% just 5 years ago (College Board, 2017b). Once all students enrolled in associate’s degree programs at community colleges in 2011-2012 are accounted for, rather than just those who actually graduated, 21.9% had borrowed over $15,000, and 7.6% had loan balances in excess of $25,000 to cover the cost of a community college degree, that may or may not have yet been completed (author’s calculation, 2017) 4. That

4 Author’s calculations using PowerStats (https://nces.ed.gov/datalab/powerstats) and the 2012 National Postsecondary Student Aid Study (NPSAS) dataset.
amount, $25,000 represents 81% of the lifetime undergraduate borrowing limit for dependent students and 43% for independent students. For the purposes of this study, these students are considered to be over-borrowing.

**Borrowing at the maximum.** Another trend that is alarming, especially at the community college level, is that undergraduate borrowers tend to take the maximum amount of loans available to them on an annual basis. Woo and Horn (2016) calculate that 55% of undergraduate borrowers took out the individual annual maximum allowed in subsidized and unsubsidized loans in 2011-2012. Despite the low cost of tuition, 43.3% of community college borrowers also took out the maximum amount available. While the rate of all undergraduate borrowers taking the maximum actually declined by about 6% between 2008-2009 and 2011-2012, the rate of community college students taking the maximum remained stagnant, indicating an increased propensity of community college students to take out the individual maximum offered to them compared to all borrowers. The number of community college students who took out the annual maximum nearly doubled between 2008-2009 and 2011-2012, reaching 625,300. This spike was due in large part to the increase in total community college enrollment and overall borrowing during this time (Woo & Horn, 2016). Even more concerning, Woo and Horn (2016) also found that of all undergraduate borrowers, 47% of borrowers who accepted the maximum amount attended part-time. More recently, results of a randomized controlled trial at a community college also found that students tend to accept the maximum loan amount offered to them as part of their aid package (Marx & Turner, 2016).

**Over-borrowing Summary**

All of the currently analyzed measures of over-borrowing are lagging indicators, meaning we don’t know whether students are in trouble until after they are in repayment. Given the importance of future income on the ability to repay loans, some of this is unavoidable (Looney &
Yannelis, 2015). Despite a shorter time to degree and decreased earnings potential, federal loan limits are the same for a two-year degree and four-year degree programs, increasing the potential for over-borrowing for community college students, who are already at higher risk of default based on demographic characteristics alone (Hillman 2014; Looney & Yannelis, 2015).

We can reject the claim that borrowing is too high across the board (Avery & Turner, 2012; Looney & Yannelis, 2015). However, as noted by Looney and Yannelis (2015), to the extent that there is a crisis, it is among non-traditional students, many of which attend community colleges. Despite having the lowest borrowing levels among all higher education sectors, rates of default are disproportionately high within the community college sector. As community college borrowing increases, this trend is likely to continue without policy intervention (Looney & Yannelis, 2015; U.S. Department of Education, 2017; College Board, 2017b).

Given the current financing structure of higher education, access to student loans is important in order to achieve societal goals of increasing educational attainment and equity. However, as I propose in this study, further measures can be taken to help community college students make better borrowing decisions and improve long-term well-being. I also propose a metric to measure over-borrowing relative to current limits set by the federal government and enrollment status that might help institutions monitor student borrowing and be more proactive in preventing delinquency and default.

**Complexity and Information Gaps**

The college selection and financial aid system has become increasingly complex over the last few decades. A fairly substantial body of research and policy work has been devoted to this complexity and how it contributes to apparent irrational decision-making related to college attendance, especially for disadvantaged populations (Dynarski & Scott-Clayton, 2006; Dynarski
& Scott-Clayton, 2013; Bettinger et al., 2012; Bleemer & Zafar, 2015; Baum & Schwartz, 2015; Castleman et al., 2015).

**College Selection and Affordability**

While the rising cost of higher education is outpacing increases in family income (College Board, 2017a; Heller, 2011), the returns to higher education are increasing at a higher rate (Avery & Turner, 2012; Barrow & Malamud, 2015). The earnings premium for a bachelor’s degree has increased by 23% since 1995 (NCES, 2015). However, enrollment is not increasing at the rate we would expect if students and families were making optimal decisions, especially for low-income students whose returns from a college education are magnified due to a combination of a lower starting point and lower net price due to government subsidies and financial aid (Bleemer & Zafar, 2015; Dynarski & Scott-Clayton, 2013).

Further exacerbating the apparent information gap on the benefits of college is the shift in how college is priced. College costs are increasingly individualized, with growing gaps between published prices, known as sticker prices, and what families actually pay once scholarships and grants are applied, which is known as the net price (Dynarski & Scott-Clayton, 2006; College Board, 2017a; Baum & Ma, 2016). Financial aid amounts are generally not provided until after a student applies, is accepted by a specific college, and fills out required paperwork. Many low-income and first-generation students may not understand the difference between the published sticker price and net price and may fail to apply to college as a result (Akers & Chingos, 2014; Bleemer & Zafar, 2015). Federal policy efforts are underway to make college costs more transparent, including the College Scorecard, Net Price Calculator, and standardized Financial
Aid Shopping Sheet\(^5\) (Castleman, 2015; Akers & Chingos, 2014). However, recent research highlights why simply providing additional sources of information is not enough.

Bleemer and Zafar (2015) conducted two randomized information experiments and found that 75% of families underestimate college returns, while 60% overestimate college costs. Higher income respondents had a better understanding of the returns to a college education compared to lower income and first-generation households. The researchers also embedded informational interventions on college costs and returns within the January 2015 Survey of Consumer Expectations (SCE). The informational intervention that specified the returns to a college education had a significantly positive impact on parents’ responses regarding sending their child to college as well as on recommending college for a friend’s child. The impact was also substantially larger for disadvantaged households. Interestingly, the intervention detailing the cost of college had no significant impact on responses (Bleemer & Zafar, 2015).

Hoxby and Turner (2016) investigated the seemingly irrational college-going decisions of low-income, high-achieving students who often self-select into institutions that do not meet their academic potential. Because low-income, high-achieving students are atypical, low-income students find very little information oriented to their unique situation. In their experimental trial, Hoxby and Turner (2016) provided a sample of such low-income, high-achieving students with semi-personalized information and fee-waivers and found that these low-cost interventions helped highly prepared low-income students apply and enroll in more selective colleges. The study also evaluated academic outcomes and found that the students who did elect to attend the

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more academically challenging institutions did just as well in terms of grades as the control
group of students who attended income-typical institutions (Hoxby & Turner, 2016).

Even after successfully navigating the application process, accepted students must still
navigate a number of tasks prior to matriculating, including institutional and financial aid
paperwork, payment, and travel considerations. As a result, this transition period results in an
alarming rate of summer “melt”, the phenomenon where accepted students fail to actually
matriculate on campus in the fall (Castleman & Page, 2014). Castleman and Page (2014)
established that strategies of personalized text messages and peer mentor outreach could
substantially reduce summer melt and increase the likelihood of matriculating. In an extension of
text-based interventions to reduce summer melt, Page and Gehlbach (2017) implemented a
conversational artificial intelligence platform that integrated with an institutions student
information system to provide targeted assistance for pre-matriculation steps. In comparison to
previous summer melt interventions, the artificial intelligence platform could be implemented at
significantly reduced cost due to a lesser need for individual counselor outreach, while being just
as effective in preventing summer melt (Page & Gehlbach, 2017).

Financial Aid Process

Prior research has documented the fact that students and parents do not have accurate
awareness of financial aid and that uncertainty about availability of aid and complexity of the
process places the greatest burdens on underrepresented students who are supposed to benefit
most from aid programs (Dynarski & Scott-Clayton, 2006). This uncertainty has been found to
be particularly problematic for college enrollment of students attending middle and low resource
high schools, who have less access to college counseling (Perna & Steele, 2011). The goal of aid
programs is to increase access, but as noted by Dynarski and Scott Clayton (2006) students
cannot respond to a price subsidy if they do not know it exists.
Based on a literature review on financial awareness and preparedness between 2000 and 2013, George-Jackson and Gast (2015) identified three main sources of information that are important for students’ financial awareness: (1) parents; (2) secondary school counselors and teachers; and (3) the websites of higher education institutions and other internet sources. Parents were found to be the most important source, and disparities exist across race, ethnicity, income, and education level (George-Jackson & Gast, 2015).

The first step in the financial aid process for almost all federal, state, and institutional aid programs is completing the Free Application for Federal Student Aid (FAFSA). The length, complexity, and uncertainty surrounding the outcome of the FAFSA application undermines the efficacy of the federal aid system by deterring the students it supposedly targets from receiving aid and enrolling or succeeding in college (Dynarski & Scott-Clayton, 2006; Bettinger, 2012; Page & Scott-Clayton, 2015). Just 70% of college students nationwide file the FAFSA. Of the 30% who don’t, it is estimated that one-third would qualify for Pell Grants (Page & Scott-Clayton, 2015). One in six college freshmen who received a Pell Grant and who were in good academic standing failed to successfully re-file the FAFSA in subsequent years (Bird & Castleman, 2014). After filing the FAFSA, approximately one-third of students must fill out additional paperwork to verify income and asset information they put on their application, which can further delay the receipt of aid notifications from colleges they have applied to (Castleman & Page, 2014).

In the widely known “FAFSA Experiment,” Bettinger, Long, Oreopoulos, and Sanbonmatsu (2012) conducted a randomized experiment in which low-income families were randomly assigned to receive immediate personal assistance with the FAFSA and information on financial aid awards and cost of attending nearby colleges at the time they received tax
preparation services at an H&R Block office. The personalized services significantly increased FAFSA submission rates and ultimately college attendance, persistence, and aid receipt. One of the treatment groups in the experiment received only information on their estimated aid eligibility and tuition costs and were encouraged to file the FAFSA without direct assistance in doing so. The information-only group did not experience the improved outcomes of the direct assistance group (Bettinger et al., 2012).

**Student Loans**

Once students overcome the hurdle of completing the FAFSA and subsequent documents required by the college, they still have many steps to complete and choices to make regarding borrowing to finance their education. For most students, this will be their first major investment decision and their first interaction with a formal loan (Avery & Turner, 2012). Avery and Turner (2012) describe the college enrollment process from a financial perspective as “equivalent to signing up for a lottery with large expected gains… but it is also a lottery with significant probabilities of both larger positive, and smaller or even negative, returns” (p. 188).

The most complicated piece of the student borrowing process is deciding the appropriate amount to borrow. Even without considering cognitive biases or other externalities, “the choice of how much to borrow requires substantial information about expected collegiate attainment and the future path of earnings under alternative educational attainment scenarios” (Avery & Turner, 2012, p. 168). Information constraints may lead to under-borrowing if students do not avail themselves of borrowing opportunities, or to over-borrowing if students overestimate the return to education (Avery & Turner 2012).

Though the focus of this study is to prevent community college students from incurring more debt than they need, another consequence of information gaps is the tendency to avoid debt even when incurring it would actually maximize utility. Debt aversion refers to the idea that debt
carries a psychic cost, apart from any of the explicit costs associated with the loan. Because individuals fear losses more than they value equivalent gains, they may hesitate to take this risk (Baum & Schwartz, 2015). In the case of student borrowing, the need to rely on loans may discourage debt-averse students from taking the risk of incurring significant debt and therefore cause them to decide not to enroll in college. Low-income and underrepresented students are especially likely to place too much weight upon the risks associated with student debt and undervalue uncertain future income gains (Baum, 2003; Perna, 2008; Baum & Schartz, 2015). Expanding the usage of Income-based repayment (IBR) plans would likely counter some debt aversion by eliminating some of the uncertainty regarding the returns to college and assuring students in advance that repayment should not exceed their ability to pay (Baum & Schwartz, 2015; Barrow & Malamud, 2015).

Cadena and Keys (2013) find that one in six full-time undergraduate students offered interest-free subsidized Stafford loans at four-year universities turned them down. Cadena and Keys (2013) hypothesize that students should accept all need-based aid offered, including subsidized loans, based on the assumption that the rational consumer would not turn down interest free loans and increased liquidity while in school. The authors suggest their findings regarding an aversion to taking on subsidized loan debt are evidence that students are not making entirely rational borrowing decisions (Cadena & Keys, 2013).

Federal loan borrowers are required to go through a “loan entrance counseling” session to help them understand the costs and benefits associated with their program of study, as well as information regarding the repayment responsibilities associated with student loans. Despite all loan borrowers having received this counseling, multiple studies find that borrowers are still disturbingly uninformed regarding student loans (Akers & Chingos, 2014; Andruska et al., 2014;
Fernandez, 2015). The majority of colleges utilize the online loan entrance counseling tool provided by the Department of Education (Fernandez, 2015). While the online counseling tool is the easiest way for colleges to meet the administrative burden of providing required loan counseling, it is likely not effective in its current form. In an interview and observation-based study, Fernandez (2015) discovered that students found the online content complex, tedious, and unhelpful and as such tended to skim and skip much of the material.

Studies using institutional and national datasets have confirmed that entrance and exit counseling requirements are not meeting their goals of informing students about their responsibilities regarding their student debt. In an analysis of traditional undergraduate borrowers at Iowa State University, 37% could not accurately estimate the amount of loans they owed, and nine percent underestimated their loan amounts by more than $10,000 (Andruska et al., 2014). Thirteen percent reported having no loans despite having a loan on record. Interestingly, the evidence suggests that the more financially constrained are more likely to know they have debt and be less debt-confused than those who are generally more financially stable (Andruska et al., 2014).

Using nationally representative data, Akers and Chingos (2014) found similar results. About half of all first-year students underestimate how much student debt they have. Among students with federal loan debt on record, 28% reported having no federal loan debt, and 14% reported having no student debt at all. Given these misconceptions about borrowing levels during college, it is no surprise that students have difficulty when they enter repayment (Akers & Chingos, 2014).

**Influencing Borrowing Behavior**

Darolia (2016) conducted an experiment in which students at a four-year university were randomly assigned to receive a personalized electronic letter about their borrowing choices. The
electronic letter was also made available via the existing student online portal with which students regularly interacted for registration and other administrative components of the university. Darolia (2016) found only modest effects of the information overall, suggesting that the strategy of providing information alone was insufficient to create systematically different borrowing choices. However, the letter had an increased effect on borrowing for certain high-risk student subgroups, including students with low GPAs. The letter also positively affected information-seeking amongst recipients, prompting additional contact financial aid office staff (Darolia, 2016).

In a recent working paper, Marx and Turner (2016) hypothesize that student loan offers as part of the financial aid award package, which may or may not reflect a student’s actual eligibility or need, “may nudge students into borrowing more or less than is right for their circumstances” (p. 2). The authors tested this hypothesis via a randomized controlled trial at a large community college, where students were randomly assigned to receive either a zero loan offer or their subsidized loan cap ($3,500 for freshmen and $4,500 for sophomores). Results show that students who received a nonzero loan offer were 40% more likely to borrow than those who received the zero loan offer and most of these accepted the exact amount offered to them.

Forty-three percent of community college borrowers accept their maximum loan eligibility (Wei & Horn, 2016). The findings of Marx & Turner (2016) suggest that this may be because students perceive the amount offered to them as the default and they then accept funds they do not really need to cover their educational expenses. The study also found an overall positive impact on educational attainment for those who were induced to borrow by a nonzero offer (Marx & Turner, 2016). Marx and Turner’s (2016) findings support the importance of the timing of information provision and argue that even small nudges at the point in time when
students make borrowing decisions can be particularly impactful. The authors also provide cost-benefit estimates of borrowing and caution colleges about weighing the trade-offs between the costs of increased borrowing versus the benefits borrowing has on short-term educational attainment (Marx & Turner, 2016).

Barr et al. (2017) conducted a randomized controlled trial combining text message nudging and access to one-on-one financial aid counseling targeted specifically at helping community college students make more informed and active borrowing decisions. Students who filled out the required loan application at the Community College of Baltimore County (CCBC) for the spring 2014 or fall 2015 semester were randomly assigned to receive a month-long text messaging campaign designed to reduce complexity, overcome status quo bias, increase salience of future costs and benefits of borrowing, and mitigate the lack of availability of personal assistance. The major effect was on students’ likelihood to take-up the unsubsidized loan and was concentrated in a group of students who were considered to have lower levels of financial literacy, including females, minorities, and students with lower GPAs. Barr et al. (2017) speculate that the exaggerated effect on non-traditional students may explain the lack of impact of other informational studies in the flagship university context, such as was discovered by Darolia (2016), where information gaps are less acute. The effect was also higher for students who applied for a loan earlier in the cycle, prior to the CCBC financial aid priority filing date.

Interestingly, treatment was estimated to have a negative impact on academic success outcomes, indicating the information induced some students to withdraw prior to the semester starting (Barr et al., 2017). However, the authors suggest that negative academic outcomes were

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6 Students who received text messages were 3.1% less likely to borrow the unsubsidized loan, borrowing $90 less during the semester of intervention. Prior to priority filing date the result was $242 less.
found mainly in students on the margins of academic success, causing them to revise their academic plans a semester earlier than they would have otherwise. The results found by both Marx & Turner (2016) and Barr et al. (2017) reinforce the idea that access to information can influence borrowing decisions, but leaves it unclear about whether or not this is beneficial to students and society as a whole. Efforts that reduce the tendency to borrow might not be beneficial if academic success is negatively impacted in the process (Barr et al., 2017; Marx & Turner, 2016).

These experimental studies all focused on simplifying the complex college choice and financial aid process for students. Results highlight the applicability of low-cost behavioral policy approaches to increasing the effectiveness of programs designed to improve a broad range of student outcomes.

**Conceptual Framework**

The traditional economic framework applied to research regarding college choice and financial aid is human capital theory (Jabbar, 2011; Goldrick-Rab et al., 2009). As it relates to higher education, human capital theory assumes that individuals are rational actors who decide to invest in college because they believe the expected lifetime monetary and non-monetary benefits will exceed the costs associated with attending, given their personal preferences (Becker, 1962, 1993; Perna, 2006; Barrow & Malamud, 2015; Dynarski & Scott-Clayton, 2006). The most significant benefit to those who invest in a college degree is the gain in lifetime earnings. However, other non-pecuniary benefits include more fulfilling work environments, better health, longer life, more informed purchases, lower probabilities of unemployment, as well as the short-term benefits associated with involvement in learning and extra-curricular activities and enhanced social status (Barrow & Malumud, 2015; Avery & Turner, 2012; Goldrick-Rab et al., 2009; Perna, 2006). The costs associated with higher education include direct costs of attendance
and opportunity costs of foregone earnings and time (Barrow & Malamud, 2015; Goldrick-Rab et al., 2009). The availability of federal student loans within the rational cost-benefit model serves to reduce liquidity constraints, thereby reducing the immediate cost of attendance, but this also creates additional uncertainty in any calculation of future returns (Barrow & Malamud, 2015).

Researchers across a variety of public policy disciplines are finding that the assumptions of the purely rational human capital model do not always hold (Perna, 2006; Dynarski & Scott-Clayton, 2006; Goldrick-Rab et al., 2009). Rational models erroneously assume that students have access to complete information about the costs and benefits of postsecondary education as well as an unbiased understanding of the options that are available to them (Castleman, et al., 2015; Bleemer & Zafar, 2015; Dynarski & Scott-Clayton, 2006). As evidenced by the studies in the preceding sections, we know that not all students have access to complete information about the costs and benefits of a college education or how to finance it (Dynarski & Scott-Clayton, 2006; Bleemer & Zafar, 2015; Akers & Chingos, 2014), and many are not making optimal postsecondary decisions (Bettinger et al., 2012; Hoxby & Turner, 2016; Marx & Turner, 2016; Barr et al., 2017). This is especially true of disadvantaged and first-generation students who attend community colleges (Baum & Schwartz, 2015; Scott-Clayton, 2015, Perna, 2006; Castleman, et al., 2015).

**Behavioral Economics**

To better understand why community college students may not always make optimal borrowing decisions and to inform policy that might improve outcomes, this study is guided by the emerging field of behavioral economics. Behavioral economics extends the traditional cost-benefit model to incorporate psychology-guided insights into how individuals make decisions and why they are prone to making seemingly irrational decisions in the present that do not
maximize their long-term well being (Thaler & Sunstein, 2009; Madrian, 2014; Castleman et al., 2015). Behavioral economists recognize and incorporate the concept of bounded rationality, the idea that individuals do not always know their preferences, as an alternative to rational-agent models (Jabbar, 2011). Preferences are least well defined when choices involve complexity, limited personal experience, third-party marketing, and costs and benefits that occur across different time frames (Scott-Clayton, 2015).

Even if students did know their preferences regarding college attendance and how to finance it, another aspect of bounded rationality is pure cognitive overload – when there are simply too many choices (Scott-Clayton, 2015). Traditional economic models hold that there is no such thing as too many choices; behavioral economic models argue the opposite – there is such a thing as too much choice if you want real people to be able to make good decisions. Cognitive overload has been shown to lead to mistakes in financial planning, and college planning is arguably even more complex, because it involves financial and academic choices simultaneously (Scott-Clayton, 2015).

Under the assumption that individuals are not completely rational, behavioral economists identify particular systematic biases that cause individuals to make suboptimal decisions. Knowledge of these systematic biases and the simplifying tools individuals used to overcome them are used to offer guidance on how information delivery can be improved to mitigate poor decision-making in a variety of contexts (Castleman, 2015). In the following sections, I describe the key behavioral economic concepts and biases used to develop the informational interventions used in this study.

**Choice Architecture**

Behavioral economic frameworks suggest that the design of the environment in which people make choices matters, and implies that policymakers can influence choices through subtle
changes in that environment, known as choice architecture (Thaler & Sunstein, 2009; Madrian, 2014). One of the primary policy applications of behavioral economics is known as the “nudge,” as popularized by the best-selling book of the same name by the economists Richard Thaler and Cass Sunstein (2009). A nudge is defined as “any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives” (Thaler & Sunstein, 2009, p. 6).

In the case of student borrowing, institutions are considered to be choice architects responsible for organizing the context in which students make loan decisions. While the federal government prescribes many aspects of the loan process, including maximum annual and aggregate borrowing and cost of attendance regulations, institutions still maintain some autonomy regarding how to package and present loan information, and in setting institutional cost of attendance amounts. In their discussion of the role of the choice architect, Thaler and Sunstein (2009) note that there is no such thing as a “neutral” design. Small and seemingly insignificant details can have major impact on behavior. In this study, I collaborate with a college as the choice architect for student borrowing decisions, experimenting with informational changes to understand the impact they have on student borrowing decisions. As Thaler and Sunstein (2009) caution, nudges can be used by policy-makers to improve long-term well being, but they can also lead to decisions that make individuals worse off. It is important, therefore, to not only measure the impact of the interventions on outcomes related to borrowing, but also any unintended negative impact on academic outcomes, as was found in prior studies (Marx & Turner, 2016; Barr et al., 2017).

**Framing Effects**

Changes in the context in which choices are made can influence how individuals evaluate costs and benefits of different choice outcomes. This concept is referred to as framing, or
framing effects, within the behavioral economic literature (Jabbar, 2011). Framing effects occur when “extensionally equivalent descriptions lead to different choices by altering the relative salience of different aspects of the problem” (Kahneman, 2003 p. 1458). In a lab experiment, Tversky and Kahneman (1981) presented the problem of a disease that was expected to kill 600 people and proposed two alternative programs to combat the disease for respondents to choose from: “If Program A is adopted, 200 people will be saved,” or “If Program B is adopted there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.” In this scenario, a substantial majority of respondents favored Program A, indicating an inherent aversion to risk. Respondents preferred a guaranteed 200 lives saved over an uncertain 600.

In a second scenario, the same problem is framed with the following two options: “If Program A is adopted, 400 people will die,” or “If Program B is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.” In this version, the majority of respondents favor Program B, the more risk-seeking option. The change in terminology from people being saved to how many will die evokes different associations and therefore different choices, even when the true meaning of the options are the same (Kahneman, 2003).

When communicating financing options, student loans can be framed as a subsidy and a benefit, or as being particularly risky. In response to increasing default rates, community colleges, more than any other sector, have been making changes in the choice architecture and in their messaging to students with the goal of reducing borrowing (Marx & Turner, 2016). By removing student loans from award packages and focusing more on the negative consequences of student lending, some community colleges are intentionally framing borrowing negatively.
(Marx & Turner, 2016). However, gains in attainment associated with increased borrowing indicate that these changes may not actually be beneficial in the long run (Marx & Turner, 2016).

**Loss Aversion**

The Tversky and Kahneman (1981) example also highlights another behavioral economic concept: prospect theory, or loss aversion. Prospect theory proposes that individuals are twice as sensitive to losses as they are to gains of equal magnitude, and gains and losses are evaluated at endogenously chosen reference points (Scott-Clayton, 2015; Jabber, 2011; Kahneman, 2003). The practical use of this concept is that choice architects can influence behavior by framing a particular option as a loss as opposed to a gain.

When implementing strategies grounded in prospect theory, policymakers must keep in mind the reference point of the populations they are working with. For example, in contrast to their more affluent peers, low-income and first-generation students are more likely to see a high school diploma as the reference point for educational attainment and may not see the lack of postsecondary education as a loss (Baum & Schwartz, 2015). When creating messaging surrounding student borrowing at the community college level, institutions and policymakers should bear in mind the high concentration of first-generation and low-income students viewing those messages. If framed in a way that might appeal to traditional college students whose reference points are different, messaging could have a negative impact on the underrepresented students administrators most likely want to target.

The inclusion of an award offer itself may trigger loss aversion in students. The act of declining loan funds which have been offered may feel like a loss (Marx & Turner, 2016). In a related example, Baum and Schwartz (2015) discuss how some institutions are using student loss aversion to their advantage by offering grants framed as the total amount for all four years so that students view leaving school before they complete their studies as a financial loss.
Status Quo Bias

Some of the most successful policy applications of behavioral nudges come from the use of automatic default settings. Individuals have a strong tendency to go along with the status quo, or the default setting. Studies have found that simply changing the default from an opt-in that requires an individual to take action, to an opt-out policy, has a significant impact on outcomes. Changes in default options have been successful in the development of policy related to finance, health care, and most notably retirement savings decisions (Bhargava & Loewenstein, 2015; Madrian, 2014; Beshears, Choi, Laibson, & Madiran, 2009; Thaler & Sunstein, 2009).

Most companies traditionally require an active election to participate in employer provided retirement savings plans. In other words, if the employee does nothing, the default is that they will not be enrolled in the plan at all (Beshears et al., 2009). Simply changing the plan to an opt-out, meaning all new employees are automatically enrolled and must take action to un-enroll, dramatically increases take-up. In one company example, the change amounted to a 35-percentage point increase at three months of tenure – a participation rate of approximately 95% (Beshears et al., 2009). The high impact of default settings given the small transaction cost to change them proves just how impactful small changes in the choice architecture can be (Beshears et al., 2009).

In the context of higher education, Pallais (2015) also found evidence that students are strongly affected by default choices by exploiting a change in the number of free score reports provided by the ACT college placement testing service. Despite a minimal fee ($6) for a fourth score report prior to the policy change, after the fourth score report became free, students applied to more colleges, and low-income students were more likely to enroll in more selective colleges and experienced better post-college outcomes. Pallais (2015) proposes that these results show
that students interpreted the number of free score reports as the default recommendation of how many colleges they should apply to.

In the case of student loans, packaged loan amounts can appear as the default setting, making it appear that the amount presented is in some way endorsed by the choice architect, in this case the institution. Work by Marx and Turner (2016), as discussed in the preceding section, highlights just how impactful the status quo presentation of loan offers to community college students are on borrowing decisions. The simple inclusion of a loan offer in the initial award package increased take-up by 40%. The fact that such a simple change at the time of loan decision can have such a pronounced effect on borrowing decisions is evidence that students are not making active or optimal decisions for their circumstances (Marx & Turner, 2016; Barr et al., 2017).

As with student loan decisions, deciding how much to contribute and how to allocate savings for retirement is an extremely unfamiliar and complex task. As discussed, automatic enrollment is effective for getting employees to start saving for retirement. However, it is less effective in motivating employees to make well-planned decisions about how much to save for retirement. Most simply stick with the default contribution rate, which is usually quite low and not likely to be optimal for all individuals, especially over the long run (Beshears et al., 2009; Thaler & Sunstein, 2009). This tendency to stick with the amount presented rather than adjusting for individual needs – that are difficult to calculate – is analogous to the difficulty students have in choosing how much to borrow from the student loan programs.

Given the fact that default options are so influential on behavior and that the default option may not always be the best option for a given individual, behavioral economists have more recently advocated for the concept of active choice (Thaler & Sunstein, 2009). Because
preferences in most cases are highly individualized, favoring an opt-out over an opt-in or vice versa means that someone is always losing out. Active choice counters the procrastination often caused by complex choices while still respecting diversity of preferences (Madrian, 2014).

It is important that adequate information on the options available accompany active choice models to assist in optimal decision-making. Requiring active choice for complex decisions without providing context will likely not improve outcomes. Framing effects can also be a powerful tool in active choice methods, as a way of swaying individuals toward or away from certain options. This study requires active choice, and provides accompanying informational nudges to provide context and assist in optimal decision-making. However, as evidenced by Marx & Turner (2016), the simple appearance of the offered loan amount in the award package may be perceived as the default option, or at least an indication of the amount that should be borrowed if the student chooses to do so. The informational nudges would need to overcome this bias in order to create a true active choice scenario.

**Anchoring**

In the face of decisions we do not know the precise answer to, individuals also use heuristics, or rules of thumb, to guide their decision-making. For example, when asked the cost of something you do not really know the answer to, you are likely to base an estimate on a similar item you do know and adjust that figure up or down as appropriate. This is known as “anchoring.” Anchoring can be problematic, especially when dealing with important financial decisions because the adjustments made are usually insufficient (Thaler & Sunstein, 2009). Marx and Turner (2016) hypothesize that loan amounts offered on the financial aid award letter act as anchors themselves, thereby nudging students toward borrowing more or less than is right for their circumstances.
Present Bias

Individuals have a tendency to place less weight on the future relative to the present than would be predicted by time discounting models, leading them to make decisions today that might adversely affect their future well-being (Madrian, 2014; Thaler & Sunstein, 2009). Under traditional economic models, individual decisions are thought to be time consistent. However, experimental evidence continues to show the trade-offs we are willing to make differ depending on when the decision occurs (Castleman, 2015).

Gurantz (2015) suggests that present bias is found to influence community college student registration behaviors. Students who must engage in registration activities months in advance of the start of the term in order to reap the delayed rewards of an optimal schedule may procrastinate. Students who procrastinate registering for classes attempt fewer credits and are less likely to persist through the following semester. Even continuing students familiar with the registration process continued to procrastinate.

In the case of student borrowing, the choice of how much to borrow at the individual level requires substantial information about expected college returns that are difficult to predict before a student even steps foot in a classroom. This may lead a student to accept loans they will be unable to repay in the future (Avery & Turner, 2012). This study seeks to understand whether providing upfront information about the costs and responsibilities associated with student loans can help students better understand the future costs of student debt, thereby influencing their borrowing behavior.

Applying Behavioral Economic Concepts

Taken together, an understanding of these cognitive biases can assist the choice architect in their attempt to influence decision-making. While these biases can negatively impact any individual’s postsecondary decisions, community college financial aid recipients may be
particularly vulnerable to these cognitive biases (Castleman, et al., 2015; Scott-Clayton, 2015). Equipped with the knowledge that students are not unboundedly rational and fall prey to the cognitive biases and simplifying strategies described above, policymakers can use tools such as simplification, decision aids, personalized information, and pre-commitment devices to overcome biases that might lead to suboptimal decision-making (Madrian, 2014).

**Simplification.** The most easily applied strategy to overcome the biases previously discussed is simplifying the choice architecture and the information that is needed to make informed decisions. As discussed, the biggest deterrent to financial aid and the student borrowing process is complexity. While most research regarding complexity and simplification has been devoted to the FAFSA form (Dynarski & Scott-Clayton, 2006; Bettinger et al., 2012), results of studies such as the Bettinger et al. (2012) FAFSA experiment highlight just how effective simplifying the financial aid process can be.

**Decision aids.** When a choice is complicated, giving individuals access to tools or decision aids can facilitate selection of the best option from a larger choice set (Madrian, 2014). Current federal aid policy acknowledges the need for information, as evidenced by efforts such as the College Scorecard, Net Price Calculator, and online loan counseling tools. However, the behavioral economic literature goes further to explain that just providing more sources of information is not enough (Castleman, 2015; Baum & Schartz, 2015). Most information about student loans is passive, meaning students and families have to go seek it out. Informational tools assume students and families know about their existence and that they will set aside time to make

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use of them (Castleman, 2015). As evidenced by experimental studies such as the Bettinger et al. (2012) FAFSA experiment and the Darolia (2016) loan disclosure letter experiment, simply providing information about the availability of loans and the repayment responsibilities associated with them either before or after loan take-up is not enough to impact decisions. The better question is how can we make this information more salient (Castleman, 2015)?

**Personalized information.** The financial aid and student borrowing process is highly individualized. Even if students are able to estimate the return to a college education on average, there is substantial heterogeneity between individual students, such that while the average returns may be high, they may not be favorable for all students (Avery & Turner 2012). Given the nature of the process, there is a need for personalized information to help students understand their own personal situation and make optimal decisions given their personal circumstances. Castleman and Page (2014) successfully helped students navigate the period of “summer melt” using personalized and timely text messages about steps in the financial aid and enrollment process. Debt letters showing the amount of debt a student owes with a breakdown of what repayment will look like are one attempt at personalizing loan information. However, debt letters alone do not appear to influence future borrowing decisions (Darolia, 2016).

**Summary**

With proper understanding of behavioral economic principles, policymakers can take advantage of what might be considered common errors in judgment to help improve market efficiency. This can be done without encroaching on individual choice or the need for strict policy mandates that might prove costly and controversial (Thaler & Sunstein, 2009). Behavioral insights do not negate the importance of cost-benefit analyses or financial incentives, but rather enrich and complicate the picture (Castleman, 2015).
Behavioral economic principles have only recently been applied to higher education, but a growing body of experimental research based on behavioral concepts contributes greatly to our understanding of how students make decisions en route to a college degree. Behavioral interventions may not be able to substitute for the social capital that helps more affluent students navigate the path to college, but they may be able to help students make more informed decisions along that path which would be an important step towards reducing inequalities in who goes to and succeeds in college (Castleman, et al., 2015). Findings from behavioral studies regarding the role of status quo bias in community college loan decisions (Marx & Turner, 2012) and the impact of informational text nudges on enrollment and on borrowing behavior (Castleman & Page, 2014; Barr et al., 2017) inform the interventions applied in this study.
CHAPTER 3
METHODOLOGY

This research was motivated by the desire to understand student borrowing decisions, especially those of students enrolling at community colleges where borrowing is on the rise and students are at a high risk of default and repayment challenges (Gross, et al., 2010; Hillman, 2014; Looney & Yannelis, 2015). Prior studies highlight the role of information on FAFSA completion (Bettinger et al., 2012; Dynarski & Scott-Clayton, 2006; Castleman & Page, 2015). There is a small but growing body of research applying behaviorally-informed strategies to the student loan process. These studies show that timely information-based interventions can influence borrowing behavior (Barr et al., 2017; Marx & Turner, 2016). This dissertation complements these studies by focusing on the role of similar informational interventions in assisting students within the student loan borrowing process. As is true across the variety of postsecondary institutions, students must actively engage in the student loan choice process at least once. This study is able to exploit the online acceptance process at a community college to answer the following overarching research question:

- **R1**: To what extent does access to information on college cost and loan details, presented at the primary decision point of the student loan process, influence community college student loan borrowing?

Price information is often presented to students in different ways, adding additional complexity to determining the costs and benefits of attending college and how to finance it (Dynarski & Scott-Clayton, 2013). In order to understand how the framing of college cost impacts borrowing behavior, this study tests the impact of general loan information and three variants of college pricing – 1) per-credit hour cost, 2) full and half-time tuition and fees, and 3) full institutional cost of attendance, broken down based on enrollment status and living situation.
– on student loan acceptance. The multiple cost presentations inform my second research question:

- **R2:** Do variations in the framing of college cost information impact student loan borrowing to different degrees?

  Prior studies have also discussed the role of timing and other mitigating factors impacting financial aid behaviors (Barr et al., 2017; Marx & Turner, 2016) and ultimately student enrollment (Gurantz, 2017). I also seek to understand what broad environmental factors might mitigate the role of information on borrowing decisions, leading to a third research question:

- **R3:** To what extent do mitigating factors impact the salience of cost information for community college students?

  The literature also suggests that access to student loan funding (Wiederspan, 2015; Dunlop, 2012; Baker & Doyle, 2017) and information during the loan application process can impact enrollment and persistence (Marx & Turner, 2016; Barr et al., 2017). I also examine the indirect effects of the interventions on enrollment and credits attempted in the subsequent fall and spring terms, in order to answer the final question:

- **R4:** To what extent does cost information at the time of loan decision have an unintended impact on the enrollment and retention behaviors of community college students?

  The remainder of Chapter 3 describes the methodological design and empirical strategy of this research study. First, I discuss the institutional setting for the research project. Second, I discuss the data and sample, followed by an in depth discussion of the experimental interventions and random assignment methods employed in the study. Finally, I discuss the target outcomes and the empirical strategy used to analyze the impact of the interventions on the target outcomes.

  **Research Site**

  The study was conducted at a large public two-year primarily associate’s degree granting community college located in the southeast, henceforth referred to as CC. CC operates five
campuses in its district and has an annual enrollment of over 43,000 students. The CC student population is diverse and representative of community college students nationwide in many ways. The average age of a CC student is 26.8 years, compared to 28 years nationally. Fifty-six percent of students are non-white minority, compared to 49% nationwide (AACC, 2018). The college is a Hispanic serving institution (HSI), and the Hispanic population has increased 4.2% over the last 5 years.

Published tuition and fee prices at CC are low even amongst its peers. Average annual full-time tuition and fees are $2,506 compared to $3,570 at public community colleges nationally (College Board, 2017a). Average total net price is $4,845.¹ Sixty-seven percent of CC degree-seeking students apply for federal aid, compared to 62% of community college students nationally (AACC, 2018). Federal Pell Grant funding was disbursed to 41% of undergraduates in 2015-2016, compared to 34% of all community college students nationally (AACC, 2018).

<table>
<thead>
<tr>
<th>Table 3-1. Research site summary</th>
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<tbody>
<tr>
<td>Total Unduplicated Headcount (2015-2016)</td>
</tr>
<tr>
<td>Undergraduate Degree-seeking (2015-2016)</td>
</tr>
<tr>
<td>Graduation Rate (First-time in college, 150% of normal time to complete, 2013 cohort)</td>
</tr>
<tr>
<td>Non-white minority</td>
</tr>
<tr>
<td>% Receiving Pell (Low-income)</td>
</tr>
<tr>
<td>% Receiving Federal Loans</td>
</tr>
<tr>
<td>Annual loan volume (2014-2015)</td>
</tr>
<tr>
<td>Average total debt for degree completers</td>
</tr>
<tr>
<td>Cohort Default Rate (FY2014)</td>
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</tbody>
</table>

Source: Administrative data and IPEDS Data Feedback Report

¹ Average net price is generated by subtracting the average amount of federal, state/local government, or institutional grant or scholarship aid from the total cost of attendance. Total cost of attendance is the sum of published tuition and required fees (lower of in-district or in-state), books and supplies, and the weighted average for room and board and other expenses.
CC Borrowing Trends

**Loan volume.** Prior to the 2012-2013 academic year, the college did not offer federal loans as part of the initial financial aid award package. Instead, students had to fill out a separate application for the purpose of receiving federal loans. After loans became part of the initial award package, loan volume increased by nearly 50%, reaching $55.4 million in 2012-2013. This spike is consistent with the increased propensity of students to take-up loans when presented with them in the initial award offer (Marx & Turner, 2016). The cohort default rate has increased from 14.5% for fiscal year (FY) 2011 to 16.2% for FY2014.

**Part-time enrollment.** Sixty-six percent of CC students attend less than full-time. In order to receive a federal Stafford loan, students must enroll in at least six credit hours. Nearly half of CC loan borrowers (47%) enroll part-time. These students are offered the same amount of student loan funding as full-time students in their initial award package. Because award packages are provided prior to enrollment, all students are awarded under a full-time cost of attendance. The cost of attendance is reduced only after the drop-and-add period is over and loan funding is reduced by the financial aid office only if necessary at that time.

**Evidence of over-borrowing.** Despite lower than average tuition costs, nearly half of CC students (49%) utilize federal student loans, compared to just 13% of community college students nationwide (AACC, 2018). Thirty-six percent of CC students who had or were currently borrowing federal loans in the fall of 2017 had already taken more than $10,000 in loans, 25% had loan balances in excess of $15,000, and 11.8% had borrowed in excess of $25,000 prior to
the completion of an associate’s degree. These figures are representative of national community college borrowing trends (author’s calculation, 2017)\(^2\).

Further evidence of over-borrowing by CC students can be found on Institutional Student Information Records (ISIR) provided by the Department of Education. ISIR records from CC indicate that 783 out of the total population of fall 2017 degree-seeking students (n=24,593) had already borrowed 50% or more of their entire undergraduate loan limits. Furthermore, 251 students are were flagged by the National Student Loan Data System (NSLDS) as being close to, at, or had already exceeded their total combined aggregate loan limits for the subsidized Stafford loan, and 187 were close to, at, or had already exceeded their total combined aggregate loan limit for an undergraduate student. This means that they had utilized $31,000 (for dependent students), or $57,500 (for independent students), but they had not yet earned their two-year associate’s degree.

**CC Loan Acceptance Process**

In order to be awarded a federal loan, students must complete the FAFSA along with any required supplemental documents. Once a student’s financial aid file is complete (meaning all required documents are turned in and necessary corrections to the FAFSA have been processed) the CC financial aid office evaluates students’ eligibility for federal, state, and institutional aid daily in a process called packaging. Within the packaging process, loans are awarded last after grant, scholarship, and work-study funds are awarded up to the institutional cost of attendance.

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\(^2\) Among associate’s degree students at community colleges in 2012, 35.9% had debt in excess of $10,000, 21.9% had over $15,000, and 7.6% had taken over $25,000 in loans to cover the cost of a public two-year degree, that may or may not have yet been completed. Author’s calculations using PowerStats (https://nces.ed.gov/datalab/powerstats) and the 2012 National Postsecondary Student Aid Study (NPSAS) dataset.
Once awarded, the student receives an email asking them to log into the college’s online portal to view their award and make a decision to accept or reject any loans offered. The online portal contains a section for “Financial Aid.” Underneath that header are multiple options, one of which is “Accept or reject my financial aid awards.” This page will only display awards that require a decision. In the case of CC, the only awards that require a decision are Federal work-study and loans. No other aid, including Pell Grant or scholarships, shows up on this page. To view their total award package, students must select either the “Financial aid award letter” or “Financial aid status by term” option from the main Financial Aid menu. To view their billing information students must select the “Account Summary by Term” option under the Financial Information header on the portal landing page.

It is important to note that the billing webpage will not contain any information if the student has not yet registered for classes, and many times students are making financial aid decisions prior to enrolling (39% of the experimental sample in this study made borrowing decisions prior to enrolling in classes). Even if students are accessing the portal after registration, their tuition charges will display, but loan amounts will not be deducted until the student accepts them, registers for at least six credit hours, and submits all other required documents. This process makes it nearly impossible for a student to get any sense of their net cost until decisions have already been made. At that time the student would need to contact the financial aid office directly to make any changes in their loan amounts.

**Intervention Design**

As previously discussed, informational asymmetries are associated with suboptimal student financial decision-making (Dynarski & Scott-Clayton, 2006; Bettinger et al., 2012; Castleman & Page, 2014; Marx & Turner, 2016; Barr et al., 2017). Building on the work of Marx
and Turner (2016), as well as Barr et al. (2017), this study develops four interventions and presents them within the choice architecture of the student borrowing process. Providing information at the time of decision-making is important; research suggests that the effects of informational interventions can be particularly pronounced when presented at the most salient time (Marx & Turner, 2016; Stango & Zinman, 2014). Therefore, unlike previous experimental information-based studies (Darolia, 2016, Barr et al., 2017), this study displays the informational interventions on the same screen at the point in which students are making loan acceptance decisions, which is as close to the time of decision as possible. The full text of each intervention can be found in Appendix A.

Group 1 – Control

The control group, the primary counterfactual group, serves as the business as usual condition. For this group, no modifications were made to the presentation of loan options or the decision-making screen. Students assigned to the control group may access information on costs through a variety of channels (e.g. Department of Education Net Price Calculator, College Scorecard, CC website, CC Financial Aid Office), however, these resources are available to all students and are often times hard to access or may not align with the way students prefer to communicate (Castleman, 2015). Students assigned to the control group do not receive any additional information about their loans or cost estimates on their decision portal screen.

Group 2 – Information-only

The information-only group received information about the differences between the subsidized and unsubsidized loans (i.e. interest accrual) and a direct link to more information on the loan decision-making screen. The information about the two types of loans was positioned above the loan decision, thus increasing the likelihood that students would read it. Information
was presented as briefly as possible, given the tendency of students to skim long textual information regarding student loans (Fernandez, 2015). The information provided outlined the interest rate accrual for subsidized and unsubsidized loans and intentionally framed the unsubsidized loan as less desirable and more costly than the subsidized loan. The information-only group was formed to determine whether information had a unique influence apart from cost figures on borrowing decisions.

**Groups 3 – 5 – Cost Variants**

Evidence suggests that students tend to overestimate the cost of college (Bleemer & Zafar, 2015). Any calculation of appropriate borrowing amounts is already clouded with uncertainty regarding future outcomes (Avery & Turner, 2012). Will the student complete college? What job will they get, and how much money will they make? This uncertainty, combined with the fact that many college students do not know the true cost of attending college until after borrowing decisions are made, makes it nearly impossible for students to make an informed decision regarding how much to borrow.

The transaction cost of having to contact the financial aid office, combined with other cognitive biases such as present bias, loss aversion, and status quo bias, likely deter students from rejecting loan offers after initial action is taken. To mitigate these factors, I provided average cost information upfront for students to see when making borrowing decisions to see if this might help students better calculate how much loan funding was appropriate for their circumstances, rather than simply accepting the entire amount offered to them (Marx & Turner, 2016). An alternative possibility based on the behavioral economic literature and prior research is that the presentation of cost figures may act as an anchor for students as they decide how much loan funding to accept (Marx & Turner, 2016; Thaler & Sunstein, 2009).
The cost interventions displayed generic information on tuition costs to students on the same screen utilized to make initial decisions to accept or decline subsidized and unsubsidized loans being offered. Cost information was displayed three different ways: the per-credit treatment, the FT/PT tuition treatment, and the COA treatment. These options are described below.

**Group 3 – Cost per credit hour (Per-credit treatment).** In addition to receiving the informational condition offered to Group 2, Group 3 received cost information displayed as the in-state per-credit hour rate ($104). The per credit method showed the lowest dollar figure, but required students to independently calculate their individual projected tuition costs based on the number of credits they planned to enroll in or had already registered for. This calculation is likely easier for students who have already registered in classes at the time they are making their borrowing decisions because they know the number of credits they will need to pay for.

**Group 4 – Tuition and fees (FT/PT Tuition treatment).** Group 4 received the informational condition along with cost information displayed as the average cost of tuition and fees for half-time ($626) and full-time ($1,253) enrollment per term (also at in-state rate). The decision to present the information at the in-state rate was done given the overwhelming number of students enrolled at CC paying the in-state tuition rate.

**Group 5 – Cost of attendance (COA treatment).** The final treatment group (Group 5) received the loan information condition as well as the total Cost of Attendance (COA) ranges based on enrollment and housing (between $8,332 and $4,034). The cost of attendance is the full amount used to calculate a students’ net price, since tuition and fees do not represent all necessary expenses students need to cover while in school. The COA includes allowances for room and board, transportation, books and supplies, and other personal expenses, in addition to
tuition and fees. The COA is also used by the financial aid office to calculate the maximum amount of aid that can be awarded to a student. This presentation of the total COA coincides with the current U.S. Department of Education regulations that require postsecondary institutions to provide students with access to cost of attendance estimates.

I hypothesize that presenting information to students at the time they make initial loan decisions will decrease the rate and amount of loan take-up, especially in the unsubsidized loan, similar to the findings of Barr, et al. (2017). Drawing from behavioral economic principles and prior research, I also hypothesize that the presentation of cost information will act as an anchor for students as they decide how much loan funding to accept, rather than simply accepting the entire amount offered to them (Marx & Turner, 2016).

Data

Data for this study was obtained from CC’s administrative student record system that routinely collects and stores information on student financial aid and enrollment information. No new data collections were required to complete the evaluation of the interventions. In order to remove any potential for bias, data was only provided to the researcher after the intervention period had ended. Upon completion of the intervention period, data on loan take-up decisions and amounts, Pell Grant amounts, and demographic variables including race/ethnicity, gender, and age were provided from the administrative dataset. Additional variables were sourced from Institutional Student Information Records (ISIR) provided by the Department of Education, including dependency status, total family income, first generation status, and cumulative loan balance information. College academic characteristics including year in college, attempted credits, and fall-to-spring retention were also provided. All student identifiers were removed from final data released to the researcher.
Sample Selection

This study is unobtrusive and did not require recruitment. All participants would engage in the awarding and online acceptance process regardless of the study. The sample is comprised of all students at CC who were offered federal loans for the fall 2017 and spring 2018 semesters, and subsequently logged onto the student portal to make a decision to accept or reject those loans during the experimental intervention window. Experimental interventions began on February 1, 2017 and continued through August 25, 2017, resulting in a total of 206 days. The start date coincided with the date CC began awarding students for the fall 2017 and spring 2018 semesters and continued through the add/drop deadline for the fall 2017 semester. This timeline provided opportunity for the majority of students who were offered loans for the fall 2017 and spring 2018 semesters to participate. The final sample included 6,996 individual students. Loan decisions are made for each semester (fall/spring). This provided a total of 12,928 observations.

Group Assignment Strategy

Block Randomization

Due to limitations of the CC online decision-making system (student portal), simple student-level random assignment was not possible. Other studies focusing on influencing borrowing behavior (Marx & Turner, 2016; Barr et al., 2017) have been able to use random assignment at the student level based on loan package date. However, in this study, messaging was not presented in an award letter that was sent out based on date of package (Marx & Turner, 2016) or via separate text messaging outreach (Barr et al., 2017) but rather was displayed on the web portal in which students made decisions. No additional systems or technology resources were devoted to this project, which meant that the messaging had to be the same for all students accessing the site at a particular time. The date students decide to access the webpage cannot be
controlled by the institution or the researcher. Due to these restrictions, the optimal randomization option available was to randomize by date blocks and to manually change the messaging every day during the intervention period\(^3\).

Using this method, I randomly assigned each of the 206 dates to the four treatments and control groups prior to the beginning of the study. Table 3-2 shows the number of individual dates (between February 1, 2017 and August 25, 2017) that were assigned to each group prior to the beginning of the study. Table 3-3 shows the number of observations assigned to each group based on the date the observation was made.

<table>
<thead>
<tr>
<th>Table 3-2. Date blocks</th>
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<tbody>
<tr>
<td>Group</td>
<td>Freq.</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Information only treatment</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Per-credit treatment</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Tuition treatment</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>COA treatment</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>206</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3-3. Group assignment</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1,675</td>
<td>12.96</td>
<td>12.96</td>
</tr>
<tr>
<td>Information only treatment</td>
<td>3,082</td>
<td>23.84</td>
<td>36.80</td>
</tr>
<tr>
<td>Per-credit treatment</td>
<td>2,425</td>
<td>18.76</td>
<td>55.55</td>
</tr>
<tr>
<td>Tuition treatment</td>
<td>3,122</td>
<td>24.15</td>
<td>79.70</td>
</tr>
<tr>
<td>COA treatment</td>
<td>2,624</td>
<td>20.30</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>12,928</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

\(^3\) The four informational messages were coded into the student information system prior to the start of the intervention period. Once the intervention period started, the researcher updated one data field in the student information system that changed the message text to one of the five group options per the pre-assigned group for that particular date. The change was made at 8 a.m. every day. The researcher then logged into the decision-making student portal to verify the appropriate change had been made. The exact time of update was recorded in the event something prevented the change from being made at 8 a.m. Any other timing exceptions, such as system down time, were recorded and taken into account when compiling the final dataset at the end of the intervention period.
The assignment variable for observations was the date the student accessed the webpage to make their financial aid decision. This means that students were assigned to a block depending on when they decided to go through the acceptance process. The timing for students to access the webpage was essentially random, though there was variation based on time of the financial aid and academic cycle, which I controlled for in the subsequent analyses. Students are eligible to make a decision once they have been awarded, as described above in the CC Loan Acceptance Process section. Students might decide to make a decision immediately upon receiving their award notification, anytime thereafter, or may opt never to enter the loan acceptance process at all. It is important to note that the packaging process is not based on any particular student characteristics other than the timing of FAFSA and document submission, making the packaging process itself somewhat random. Even the likelihood of responding immediately upon receiving the award notification should be evenly distributed across the treatment conditions.

**Disqualified Participants**

A total of 17,738 students were awarded a federal Stafford loan through August 25, 2017. Of these, 7,303 logged onto their online account to make a decision on at least one loan for the fall semester during the timeframe of the experiment, generating 13,527 unique observations. Due to the limitations of the CC student information system and manual process required to update the web messaging daily, 599 observations (307 individual students) had to be disqualified and removed from the final sample. The final sample was comprised of 12,928 observations, representing 6,996 individual students.

**Timing.** One hundred sixty observations (86 individual students) had to be eliminated because they could not be assigned to a treatment group with certainty due to the timing of the decision being in close proximity to the intervention text being updated. The database only
recorded the time the student made an actual decision rather than the time the student accessed the webpage. Therefore I could not be certain whether a student saw the updated treatment messaging for the new day or the prior day’s treatment. The default timeout on the student web portal is 30 minutes. I used this as the baseline for disqualification. Student decisions that were made within 30 minutes of the intervention messaging being changed were disqualified to ensure treatment groups were assigned accurately.

**Assigned to multiple treatments.** It is also possible for an individual student to log into the portal and submit a decision on multiple dates. For example, a student might accept or decline the subsidized loan on one day, leaving the unsubsidized loan in an offered status, and then log in on a future date to make a decision on the unsubsidized loan. This means some students were assigned to multiple treatments, which would contaminate the results. It was also not possible to retain only the first decision if only one loan type was acted upon, because it is important that subsidized and unsubsidized take-up were aggregated together at the semester level for the purposes of analysis. Therefore, I eliminated a total of 439 observations (221 individual students) from the sample due to this behavior.

**Power Analysis**

Following the guidance of Raudenbush, Martinez, and Spybrook (2007), I analyzed power based on the actual sample sizes of the treatment and control groups. Within the pooled analysis, combining each of the treatment groups and control, there were a total of 12,928 loan decision observations. I utilized these sample numbers for the purposes of the power calculations and focused on the minimum detectable treatment effects for a power threshold of .80. For the purpose of these calculations, I focused on the impact on loan take-up.

I utilized the *PowerUP* tool (Dong & Maynard, 2013) to conduct the power analyses. I
calculated power assuming a two-tailed blocked (blocked by date of decision) randomized design. I considered power across a range of effect size variability from low (0.01) to high (0.10), and across a range of intra-class correlations from low (0.01) to high (0.20). I conducted the power analyses assuming one pooled treatment group and one control group with 20 percent of the dates assigned to the control group. Finally, we assumed that the month indicator would account for an additional 10 percent of variance explained. Assuming these parameters, and in an attempt to achieve a power of 0.80, the pooled sample size yielded a minimum detectable effect size (MDES) of 0.02. For each individual treatment group, I had an MDES of 0.06 to determine individual treatment effects compared to the control group. Focusing on the impact of accepting all loans offered I had the power to detect a 5.5% change in each treatment group relative to the control group mean of 64.4%.

It is important to note that these calculations should be viewed as conservative estimates and only include explanatory power of covariates at 30%. Results from this power calculation provided significant evidence that this project would yield significant and meaningful results, if a true relationship existed.

**Measures**

To evaluate the impact of the loan and cost information interventions on student decision-making, I analyzed information on loan take-up, loan amount, and enrollment. The primary outcomes are described below.

**Direct Outcomes – Loan Take-up**

1. **Loan take-up** - A binary indicator for whether or not a student accepted any portion of their loans. Loan take-up was also measured for each loan type – subsidized and unsubsidized. While both the subsidized and unsubsidized loans carry below-market interest rates, the
government covers the interest on the subsidized loan while the student remains enrolled at least half-time, making it the cheaper option. Students who were offered both a subsidized and unsubsidized loan (the majority of students⁴) should accept the need-based subsidized loan first. For the few that do not, the CC financial aid office corrects it prior to disbursement.

2. Total dollar amount of loans accepted – In addition to the binary indicator of whether a student opted to borrow at all, continuous measures of how much students chose to borrow at the time treated were also analyzed. Dollar amounts were also broken down by loan type.

3. Accepted all loans offered – A binary indicator to measure whether the student accepted all loans offered to them, including subsidized and unsubsidized. If a student was packaged for both a subsidized and unsubsidized loan, they would only be coded as a yes if they accepted both loan types. However, if a student was only packaged for an unsubsidized loan, for example, they would be coded as a yes if they accepted the unsubsidized loan only, being that it was the only loan available.

Over-borrowing metric

A key assumption of this study was that community college students may over-borrow given program cost, time to degree, and tendency to enroll part-time. While over-borrowing is typically measured using lagging indicators such as default and repayment rates, this study evaluates over-borrowing while the student is in school by determining if the student received more than 100% of their annual loan limit when pro-rated by enrollment status. Students who attend half-time (6-8 credit hours), for example, should only receive half of the annual limit in

⁴ For all undergraduate students enrolled in 2016-2017, 20% borrowed both unsubsidized and unsubsidized loans, compared to just 5% only having subsidized loans and another 5% only borrowing the unsubsidized loan (College Board, 2017b).
order to prevent them from borrowing their full undergraduate amount at the two-year degree level. For the purpose of this study, I calculated the over-borrowing rate at the semester level to determine whether students were borrowing more per semester than is intended per the annual and aggregate loan limits currently in use by the federal government (see Appendix B for detailed information on these limits.)

While I focused the take-up and amount analyses on the immediate action to accept or decline a loan at the time treated, the over-borrowing metric was based on the total amount of loans actually disbursed to the student. Disbursement occurs after the start of classes, and is contingent upon follow-through actions including half-time enrollment in courses that apply towards the student’s degree and the completion of required loan entrance counseling and MPN. It is the disbursed amount that will need to be repaid which is why it is utilized for determining the rate of over-borrowing.

5. **Over-borrowing indicator** – A binary indicator for whether the student has borrowed in excess of 100% of their annual limit, when pro-rated by enrollment status. For example, a first year dependent student would have $5,500 available to them for the year, which would mean $2,750 per semester. If this student attended full-time, and received $2,750 for the fall semester, their borrowing rate would be 100%. Likewise, if this student attended three-quarter time, and received $2,750, their borrowing rate would be in excess of 100% (amount borrowed at this level should be $2,063 or less). If the student attended half-time, they would be considered to be over-borrowing if they accepted more than $1,375 in a single semester.

**Indirect outcomes**

7. **Fall enrollment** – A binary indicator of whether the student was enrolled by the end of the drop-and-add period for the fall semester. This is an indirect outcome of the treatment itself.
8. Spring enrollment – A binary indicator that shows whether the student was enrolled by the end of the drop-and-add period for the spring semester.

9. Attempted credits – The number of credit hours attempted for the semester. Data are collected for both the fall and spring terms.

10. Fall to spring retention rate – A binary indicator of whether or not students enrolled in the fall term subsequently re-enrolled for the spring term as a measure of persistence.

Covariates

1. Total family income – The combined amount of student, spousal, (if independent) and parental (if dependent) Adjusted Gross Income (AGI) as reported on the FAFSA form. Total family income is selected as the indicator of socio-economic status for the purposes of this study.

2. Race/ethnicity – Students are designated as white, black, Hispanic, other race, or unknown based on self-reported data provided to the institution, generally via the admissions application process. Data are classified based on the Integrated Postsecondary Education Data System (IPEDS) requirements. The Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander categories are grouped together as “other”. The black, Hispanic, and other categories are included in covariate analyses to ensure results are consistent across minority groups.

3. Gender – A binary indicator is generated for Female based on student self-reported gender to the institution.

4. Dependency status – A binary indicator generated for Independent students. Dependency status is determined by the Department of Education and provided to the institution.

5 See https://nces.ed.gov/ipeds/Section/collecting_re for a detailed description of IPEDS race and ethnicity data.
on the ISIR based on the student’s responses on the FAFSA. Independent students are generally either 24 years of age or older, married, or have dependents of their own.⁶

5. **Year in college** – A binary indicator generated if the student is in their first-year of college, as determined by completed credit hours being less than 28. This is consistent with prior studies on community college borrowing behavior (Marx & Turner, 2012).

6. **First-generation status** – A binary indicator generated if the student is the first in their family to earn a college degree. Data is sourced from the student’s responses to parental education level questions on the FAFSA as reported to the institution on the ISIR.

7. **First-time borrower status** – A binary indicator of whether the student has any prior loan debt, whether it is from prior terms at CC or other institutions. Data is generated based on students’ aggregate loan amounts as reported on the students’ ISIR.

8. **Award period** – A categorical variable differentiating fall 2017 and spring 2018 loan decisions. Student decisions were captured for both semesters at the same time. Decisions could be different between terms (e.g. accept fall and reject spring disbursement) as a way of reducing the amount borrowed, but decisions captured were made for both terms at the same time for students. Students who made decisions on fall and spring term loans on different days were excluded from the sample to remove possibly contaminated results generated by the student viewing multiple treatment messages.

9. **Month of decision** – A categorical variable indicating the month the decision was made between February and August 2017. Approximately 60% of loan decisions made during the analytical sample were in the last two months of the experiment. This is consistent with

community college student registration behavior (Gurantz, 2015). However, due to the imbalance of observations by month and the fact that there are many possible exogenous factors that might make a student who goes through the process in February different than one who does it in August, I controlled for month of decision.

Subgroups

I also looked for heterogeneous effects based on subgroups of particular importance at the community college level. These included dependency status and differences in prior borrowing experience.

1. Dependency status – Independent students were evaluated separately. Independent students typically represent the non-traditional students that make up the majority of community college enrollments. Prior studies have found larger effects of information on independent students (Bettinger et al., 2012, Darolia, 2016; Marx & Turner, 2016).

2. First-time borrower status – Students who have not borrowed before are assumed to have less information on student loans and the process, and could possibly be more easily influenced by the information provided. Barr et al. (2017), found that the informational text messaging campaign led to the greatest reduction in unsubsidized borrowing for students with high debt levels.

Empirical Strategy

Given the use of a randomized design, initial data analysis simply involved comparing mean outcomes between the treatment and control groups. Given the decision to randomly assign dates rather than individuals, I decided to specify a regression-based model that would allow me to control for the timing of the decision as well as other mediating covariates. A formal test of
group equivalence can be found in Chapter 4. I used the following to estimate the intent-to-treat effects:

\[ Y_i = \beta_1 + \beta_2(INFO_i) + \beta_3(CRED_i) + \beta_4(TUIT_i) + \beta_5(COA_i) + \gamma X_i + \epsilon_d \] (3-1)

where \( y \) is the outcome of interest for individual \( i \), \( INFO \) is an indicator for assignment to the information-only treatment, \( CRED \) represents the per-credit treatment, \( TUIT \) represents the tuition treatment, and \( COA \) represents the cost of attendance treatment. \( \gamma X \) is a vector of student-level covariates, which includes total family income, minority status, dependency status, first generation status, prior borrowing history, gender, and age. Finally, \( \epsilon_d \) is the date-clustered robust standard error.

In Equation 3-1 above, coefficients for each treatment group were compared with the control group to estimate the causal impact of each information and cost condition against the business as usual. Negative and statistically significant estimates were interpreted to indicate that the messaging presented led to a decrease in the likelihood that a student accepted a loan offered to them. Conversely, positive estimates increased the amount or likelihood of the outcome.

I also modeled the three cost interventions separate from the information-only treatment. Because all of the cost treatment groups also received the informational messaging received by the information-only group, it became necessary to compare the coefficients for each cost treatment (\( CRED, TUIT, \) and \( COA \)) to the coefficient of the information-only group. I utilized the below regression equation to investigate the incremental impact of the cost treatments:

\[ Y_i = \beta_1 + \beta_2(CRED_i) + \beta_3(TUIT_i) + \beta_4(COA_i) + \gamma X_i + \epsilon_d \] (3-2)

Additionally, extensions of Equations 3-1 and 3-2 were utilized to model the impact of each treatment on sub-samples of students to determine if there are heterogeneous effects of any treatment by dependency status and prior borrowing experience.
CHAPTER 4
RESULTS

Descriptive Statistics

Table 4-1 displays sample means by group for the set of baseline characteristics in order to establish baseline equivalence and to ensure the randomization reduced any selection bias. The final sample includes 6,996 individual students who made a total of 12,928 individual decisions on their loans between February 1, 2017 and August 25, 2017. Consistent with the distribution of students within the entire CC population, over half of these students were black or Hispanic (29% each) and roughly two-thirds were female. The mean age was 26 and over half were considered independent for financial aid purposes. Just over half were also the first in their family to go to college. Prior to the fall 2017 semester, 44% of students in the sample had never received a federal student loan before. Among the 3,856 students who had previously borrowed, the average amount borrowed was $14,936. Overall 61% of the sample was already enrolled in classes at the time they made their loan decision. However, just 45% of the control group was already enrolled, meaning that more students in the control group were not yet registered in classes than the treatment groups.

Group Equivalence

As shown in Table 4-1, there is relatively little variation in observable demographic, academic, and prior borrowing related characteristics across the control and treatment groups. I formally tested group equivalence using standard linear probability regression models. The p-values for the tests are displayed in Table 4-2. I also compared each treatment group to the control group, and also within treatment using the information-only group for comparison. There are five indicators with statistical significance at the 5% level. However, given that 5% confidence interval, we would expect that 5% of the estimates would be attributed to errors. I
find the sample well balanced across race, family income, prior borrowing levels, and first generation status and I am therefore confident that students were equally distributed among the treatment and control groups at baseline. In an effort to improve the precision of treatment effect estimates, I included the year in college, gender, and dependency status, along with other student characteristics, as covariates in all regression models presented later in this chapter. These inclusions, combined with the randomization procedure, should limit the amount of selection bias present within this study.

**Loan Take-up**

**Mean Outcomes**

Figures 4-1 and 4-2 plot the unadjusted mean outcomes for the rate of loan take-up and total amount of loans accepted. The overall rate of taking up any loan is similar across groups, ranging from 77% for the information-only group to 79% for the per-credit and tuition groups. Students are considered to have accepted any loan funding if they made an active accept decision on any portion of the loans offered to them for the semester. In terms of overall amount accepted by term, students in the control group accepted the largest loan amounts ($2,956) and students seeing information without cost accepted the least overall ($2,745).

The lines shown in all figures represent the upper and lower confidence intervals based on the covariate unadjusted means. When comparing two groups, if the lower bound of one group’s mean is higher than the upper bound of another group’s mean, this suggests a possible statistically significant difference in the outcomes between the two groups – something that I formally tested through a covariate-adjusted regression model presented later in this chapter. The boundaries of the bands for the control and information-only group in Figure 4-2 indicate a
statistically significant difference in the total amount of loans accepted between these two groups.

The overall rate of accepting all loans offered is displayed in Figure 4-3. The control and COA group means were almost equal at approximately 64%, compared to 62% for the other three treatment groups.

Breaking the means down further between subsidized and unsubsidized amounts in Figures 4-4 and 4-5 reveals that the increased rate of accepting all loans offered in the control and COA groups were generated from increased unsubsidized take-up ($1,623 and $1,571 respectively) compared to the other treatment group means (ranging from $1,491 to $1,503). Subsidized borrowing varied less but was highest for the per-credit and tuition groups. It is expected that take-up and amount trends for those who accept all loans offered and unsubsidized loan take-up would be similar because students should accept the cheaper subsidized loan before the more expensive unsubsidized loan. Therefore increases seen in the “accept all loans offered” category would correlate to increases in unsubsidized take-up.

In this study, I proposed a metric for measuring the rate of over-borrowing at the semester level, adjusted for enrollment status. Because annual and aggregate loan limits are the same regardless of whether a student is enrolled part-time or full-time, part-time students are at a higher risk of reaching their lifetime loan limits before they are able to earn a four-year degree. Forty-three percent of community college students accept the maximum amount of loan funds available, and of all undergraduate borrowers who take the maximum, about half of these enroll part-time (Woo & Horn, 2016).

While all other outcomes reported in this study are based on the initial decision to accept or decline a loan at the time the student views the informational intervention, the over-borrowing
measures are based on disbursed amounts rather than accepted amounts. The over-borrowing rate, therefore, is a trailing measure to the intervention itself. Students might accept loan funding only to have it not disburse at all, either due to their decision to reject the loans at a later date, the decision not to enroll at all or at least half-time in an eligible program, or, for first-time borrowers, not to complete the loan entrance counseling or MPN. In the base model, students in these scenarios are measured as not over-borrowing, and count the same as a student who receives loans within their determined limits.

Mean rates of over-borrowing did not vary much by group in the base model, as shown in Figure 4-6. Consistent with take-up, the information-only group over-borrowed at a lower rate than the per-credit and FT/PT tuition groups, with a rate of 21%. Students in the control group over-borrowed the most, at a rate of 23%. Interestingly, despite accepting the largest amount of loans of all the treatment groups, the COA group over-borrowed at a slightly lower rate than the other groups who received an intervention.

**Loan Take-up Regression Estimates**

Tables 4-3 and 4-4 represent the base linear probability model comparing loan take-up rates and amount accepted by treatment group to the business-as-usual control group. All outcome models are presented with robust standard errors and control for the following covariates: total family income, race/ethnicity, gender, year in college, dependency status, first-time borrower status, first-generation status, month of decision, and award period.

Though the results of the base model lack statistical significance and are imprecisely estimated, general trends in the directionality of take-up outcome coefficients indicate that presenting information on loans coupled with the per-credit cost or FT/PT tuition cost, induces subsidized loan take-up by approximately 2 percentage points (p<.10) compared to the control
group ($33.10 and $25.61 more on average respectively). Displaying information-only decreased borrowing, mainly in the unsubsidized loan, though again, these results lack statistical significance. Take-up rates for the individual loan types take into account whether the student was offered that particular type of loan. If a student was not offered a subsidized loan due to not demonstrating enough need, for example, they were not included in the analysis of subsidized loan take-up.

Panel (5) in Table 4-3 displays the likelihood of over-borrowing by treatment group compared to the control group. Similar to the other take-up outcomes, the interventions appear to have had little impact on the rate of over-borrowing. The COA information appears to have had the most influence on over-borrowing, though this is inconsistent with the findings on loan take-up. None of these findings were statistically significant at the p<0.05 level.

Overall, the lack of statistically significant findings and small magnitude of coefficients in the base model indicate that the addition of the informational nudges employed in this study had relatively little impact on student borrowing decisions in the aggregate.

**Impact of Cost Nudges Compared to Information-Only**

The basic information on the difference between subsidized and unsubsidized loans and links to further information about responsibilities and repayment were included in all four intervention messages. The three cost variants were essentially layered on top of the information-only intervention. Similar to Bettinger et al. (2012), I intended to isolate the purely informational intervention from the more active nudge, in this case the inclusion of cost figures. It was therefore necessary to compare the cost intervention groups to the information-only group in order to determine the heterogeneous effects of the three levels of cost.
While there were almost no significant findings in the base model reported in Tables 4-3 and 4-4, when the cost intervention groups were compared against the information-only treatment as displayed in Tables 4-5 and 4-6, significant differences were observed in loan take-up and amount accepted for the per-credit and FT/PT tuition cost groups. This indicates that the presentation of cost information itself has a significant influence on borrowing behavior, and appears to mitigate the reductions in borrowing triggered by the information-only messaging. Students viewing the per-credit and FT/PT tuition information were 2-3 percentage points more likely to accept a loan when compared to the students seeing loan information but no cost amounts. This increase was almost entirely in the subsidized loan. These findings are significant at the p<0.05 level.

In terms of loan amounts, students viewing the per-credit amount accepted $53 more in subsidized loans than those in the information-only group. Students viewing the FT/PT tuition cost information accepted $71 more in loans overall, with $55 of that being subsidized. As in the base model, students did not experience a significant change in the rate of over-borrowing when compared to information-only.

The presentation of the full cost of attendance breakdown on top of loan information does not appear to impact take-up compared to the information-only group. There could be many reasons for the apparent lack of significance in the COA group results. This might indicate that the presentation of higher enrollment costs (up to $8,332) mitigated any reluctance to accept loans based on the informational messaging. Alternatively, students may not have understood the more complex presentation of costs in the COA group, where multiple values were presented based on housing and enrollment status, and therefore, they ignored the cost messaging altogether.
Mitigating Factors

Registration Timing

Prior studies have discussed the role of timing in college-related decisions, including registration and financial aid tasks, and its importance in the analysis of academic and borrowing outcomes (Barr et al., 2017; Marx & Turner, 2016; Gurantz, 2015; Castleman & Page, 2014). I began the experimental interventions in February 2017, very early in the fall 2017 enrollment cycle for a community college, whose students tend to register closer to the beginning of the term (Gurantz, 2015). The base model already accounts for timing effects by including month-of-decision as a covariate. However, registration timing is also important to consider in the context of the influence of information on decision-making. Students who had not yet registered for classes were assumed to have less information about the cost of enrollment and to be less committed to attending.

In a similar discussion on the role of informational nudges to assist students with matriculation from high school to college, Castleman and Page (2014) found that their interventions had a much more pronounced effect on students who had not yet completed a FAFSA prior to graduation. They interpreted this finding to mean that additional information and outreach are more effective for students who were not as far along in the college planning process or who were less engaged (Castleman & Page, 2014). In my analysis, I found the point of registering for classes to be an indicator of commitment to attending. Prior enrollment and greater levels of commitment might also indicate that students have already received competing information from advising and orientation sessions, for example. Prior enrollment, therefore, has the potential to mitigate the effect of the informational nudges on borrowing behavior.
Mean Outcomes Based on Registration Timing

A total of 2,702 out of the 6,996 students (39%) in the sample were not yet registered at the time they made their loan decisions. Figure 4-7 and 4-8 plot the unadjusted mean outcomes of total loan amount accepted between those students who had not yet registered for classes and those that had registered at the time of decision. Descriptively, we see that registration status at the time of decision impacted how students reacted to the information and cost interventions. As shown in Figure 4-7, students who were not yet registered for classes and received no messaging accepted the most in loans ($3,259 on average per term and an 81% take-up rate) while the information-only group accepted the least ($2,962 on average per term and a take-up rate of 77%). Average amount taken for the three cost groups trended upward as the level of cost displayed also increased.

Students who had already enrolled in classes, as shown in Figure 4-8, borrowed less on average across groups. However, in contrast to the not yet registered students, the control group actually borrowed the least ($2,577), and the per-credit treatment borrowed the most ($2,737). The boundaries of the bands in Figure 4-8 indicate that this difference may not be statistically distinguishable.

Take-Up Estimates Based on Registration Timing

Tables 4-7 and 4-8 display regression estimates of the impact on loan take-up and accepted amounts conditional on fall course registration status. With few exceptions, mainly in the COA group, treated students who had not yet registered for at least one class at the time of their loan decision showed negative effects across groups, whereas students who had already registered showed positive coefficients. The sharp differences between registered and non-registered students helps to explain the small magnitude of results in the base model.
I hypothesized that the addition of information would reduce borrowing, especially in the unsubsidized loan. This hypothesis holds for students who have not yet registered for classes. The greatest reduction occurs in the information-only group, who accepted $161 less in total loans, $128 of which was unsubsidized. This amounted to a four-percentage point reduction in the likelihood they would accept all loans offered. Not registered students viewing the per-credit treatment borrowed $132 less overall, $95 of which was in the unsubsidized loan. These results are consistent with the research of Barr et al. (2017) who found that informational text messaging about the borrowing process decreased unsubsidized borrowing by $90, but had an increased effect on students who went through the process earlier in the cycle, prior to the financial aid priority due date ($242 less in unsubsidized borrowing).

For students who were already registered, however, the per-credit and FT/PT tuition messaging increased overall borrowing, but amount and take-up coefficients indicate that increases were more evenly split between the subsidized and unsubsidized loans. These findings are statistically significant at a minimum p<0.10 level. The largest effect for already registered students occurred within the per-credit treatment, where students were 4.2 percentage points more likely to accept any loans ($172 more in total loans accepted) and 4.2 percentage points more likely to accept the subsidized loan at the 5% confidence level. Given that the presentation of the per-credit rate required students to know how many credits they would register for in order to calculate total tuition costs, it makes sense that this presentation was most salient for students already registered for classes. However, it is interesting that students who made these calculations believed they would need more loan funding than those viewing the other cost treatments.
The significant differences between the prior enrolled versus not enrolled groups is evidence that prior commitment in the form of registration activity significantly influences borrowing behavior. While my findings cannot explain why registration had such a large impact on loan take-up, it is likely that students who have registered are already more active in the process and further, this indicates the introduction of competing information into the borrowing process. For this reason, I focus the remainder of the take-up outcome analyses on students who were not yet registered for classes. These students were assumed to have the least amount of information about student loans and tuition costs, and were least likely to have received competing information from other sources. Any impact of the interventions should be observed most clearly within this subgroup.

**Impact of Cost Nudges Compared To Information-Only – Students Not Yet Registered**

The base model comparing treatment to the control group is important for understanding the borrowing reductions created by the presentation of information-only compared to no messaging. However, in order to isolate the effect of the cost variants, it is again necessary to compare them using the information-only group as the control. Tables 4-9 and 4-10 model the take-up and accepted amount outcomes for the three cost treatments compared to the information-only group, specifically for non-registered students. Coefficients for the three cost groups were again positive and trended upward as the level of cost increased, showing that the cost amounts mitigated the impact the information had on reducing the tendency to borrow. The reductions are further eroded at each level of cost displayed, culminating in increased overall loan take-up of 3.6 percentage points ($173), a 4.3 percentage point increase in the likelihood of accepting all loans offered, and a 4.4 percentage point increase in the likelihood of accepting the...
unsubsidized loan ($141) when the student viewed the treatment with the highest cost figures, the COA group.

**Dependency Status**

Consistent with community colleges nationwide, over half of the CC student body and the sample utilized in this study were considered financially independent for the purposes of financial aid. While dependent students tend to be younger and more like the traditional college students, individuals who meet the qualifications to be classified independent are assumed to be non-traditional students (Bettinger et al., 2012). Non-traditional students are most susceptible to the risks of default (Hillman, 2014; Looney & Yannelis, 2015) and likely had fewer informational resources from parents and school counselors (Grubb, 2006; Perna, 2008; Bettinger et al., 2012). Consequently, I wanted to understand the heterogeneous effect of the informational nudges on this population. Results for this population create more generalizable evidence for the non-traditional students at community colleges.

Not yet registered independent students were more sensitive to the information-only and per-credit messaging when compared to the control group across take-up outcomes. The receipt of the information-only treatment led to a 6.7 percentage point reduction in the tendency to accept all loans offered, compared to 4 percentage points in the overall population. As expected, this was reflected in reductions in unsubsidized take-up. These findings are statistically significant at the p<.01 level.

The information-only messaging also reduced the rate of over-borrowing by 4.6 percentage points for independent students. The per-credit treatment also reduced the tendency to accept all loans, but by a slightly lesser extent (5.7 percentage points). As seen in Panels (9) and (10) in Table 4-11, the total amount borrowed was also significantly less for independent
students in the information-only and per-credit groups. However, because independent students are offered higher loan amounts than dependent students, it is more accurate to analyze take-up outcomes as opposed to amount for this subgroup.

**First-Time Borrowers**

Another indicator of student loan awareness may be a prior history of borrowing. We know that students do not always understand past borrowing (Akers & Chingos, 2014, Andruska et al., 2014), but it is still assumed that students who have borrowed before, and therefore had to have completed federally required loan entrance counseling and the MPN, know more about student loans than students who are completely new to the process (Fernandez, 2015). Looking at first-time borrowers separately, as shown in Table 4-12, the linear probability models reveal the treatment messaging in which cost figures were presented, particularly the COA figures, had a significant impact on these students across take-up outcomes compared to the overall student sample. First-time borrowers who viewed the COA messaging were six percentage points more likely to accept any loan, nine percentage points more likely to accept all loans offered to them, and 9.2 percentage points more likely to accept the unsubsidized loan when compared to the control group who received no messaging. The over-borrowing rate, however, was about the same as the overall sample.

This finding was particularly interesting given that the COA group tended to behave like the control group in terms of mean take-up rates and probabilities in the base model. The impact of the COA messaging only revealed itself in prior models when compared to the information-only group. Replicating the within-treatment analysis with the first-time borrower subgroup again reveals that the COA messaging had a distinct impact on all take-up outcomes when compared to the information-only. As shown in Table 4-13, when compared to the information-
only treatment, students receiving the COA messaging were 8.6 percentage points more likely to accept any loan, 12.6 percentage points more likely to accept all loans offered, and 12.9 percentage points more likely to accept the unsubsidized loan. Non-registered first-time borrowers viewing the COA messaging accepted $349 more in loan funding than the information-only group. These findings are significant at least at the p<0.01 level.

**Indirect Effects on Enrollment and Persistence**

Financial aid programs have been successful at increasing enrollment and persistence in college by removing cost barriers for low and middle-income students (Dynarski & Scott-Clayton, 2013). However, complexities in the process have also been found to deter students from qualifying for aid and therefore enrolling and persisting in college (Castleman & Page, 2015; Dynarski & Scott-Clayton, 2013). At the community college level, access to federal student loans has been found to increase enrollment and persistence in some cases (Wiederspan, 2015; Dunlop, 2012; Marx & Turner, 2016). Sensitivity to aid application processes and receipt mean that any changes introduced to the financial aid and loan application processes could have an unintended impact on the enrollment and persistence of students. Barr et al. (2017) found that their efforts to provide simplified information about the student loan process and access to assistance actually reduced short-term course completion and performance, in addition to reducing borrowing levels.

I also explored the indirect impact my informational interventions might have by examining attempted credits for the fall and upcoming spring semester, as well as the overall likelihood of enrolling and retaining fall to spring. As with the take-up outcomes, I also broke down the enrollment outcomes by subgroup of students who were already registered for classes at the time they made their loan decision and those who were not yet registered. Figure 4-9
shows the mean likelihood of enrolling for fall 2017 by group for students who had not yet registered for classes. Consistent with the mean take-up outcomes and prior research that shows a positive relationship between borrowing and academic outcomes (Barr et al., 2017; Marx & Turner, 2016; Wiederspan, 2015; Dunlop, 2012), fall enrollment was highest for the control group where average borrowing was highest (77% enrolled). It was lowest for the information-only and per-credit groups where borrowing levels were lowest (just 70% of students in these groups enrolled). In contrast, amongst students already enrolled in classes, approximately 99% remained enrolled for the fall semester. This rate was consistent across all groups, as shown in Figure 4-10.

Table 4-14 displays the results of the linear probability model for all enrollment and persistence outcomes, conditional on registrations status. Consistent with the descriptive models above, all statistically significant impacts on enrollment outcomes occur within the subgroup of students who had not yet registered for classes when viewing the informational treatments. This indicates that the information provided did not change the minds of students who were already enrolled, but did influence the future registration decisions of students who had not yet taken registration action.

Table 4-14 shows that across all treatment groups, students who had not yet registered for classes and saw any of the intervention messaging were less likely to enroll and retain than their counterparts in the control group. For students in the information-only treatment group, fall enrollment declined by approximately 6.7 percentage points and an average of 0.785 credit hours. Spring enrollment also declined by 6.9 percentage points and approximately 0.5 credit hours. These findings were significant at the p<0.001 level, but no statistically significant findings were observed in the fall to spring retention rate. Students viewing the per-credit cost
messaging were 5.6 percentage points less likely to enroll in fall and 7.4 percentage points less likely to enroll in spring, but no significant findings were found on attempted credits or retention rate. Students viewing the FT/PT tuition treatment were 4.4 percentage points less likely to enroll in fall at the 5% confidence interval, but all other enrollment estimates lacked precision for this group. Students viewing the COA treatment were 3.5 percentage points less likely to enroll in fall and 5.3 percentage points less likely to enroll in spring compared to the control group. These findings are statistically significant at least at the p<.10 level.

While enrollment tends to fall across the board for students viewing any treatment who were not yet enrolled, the per-credit and FT/PT cost treatments did increase the number of credit hours registered for when compared to information-only, as displayed in Table 4-15. Students viewing the per-credit treatment registered in 0.557 more credits on average than the information-only group, and the FT/PT credit group attempted 0.487 more credit hours.

Overall, the findings on enrollment and persistence reinforce the assertion that registering for classes is an important pre-commitment behavior. While not intending to influence enrollment, the loan nudges did reduce enrollment for students who had not yet made the commitment to registering for the upcoming term, but did not influence students who were already enrolled. The FT/PT cost group appears to have the least impact on enrollment and retention. This treatment messaging was framed around part-time and full-time enrollment levels, which may have acted as a signal to students to enroll in more credit hours. Findings also support prior research highlighting the positive impacts that loan take-up has on enrollment and persistence (Barr et al., 2017; Marx & Turner, 2016; Wiederspan, 2015).
Table 4-1. Statistics by treatment group: Baseline characteristics

<table>
<thead>
<tr>
<th></th>
<th>(1) Control</th>
<th>(2) Info-only</th>
<th>(3) Per-credit</th>
<th>(4) Tuition</th>
<th>(5) COA</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>0.34</td>
<td>0.34</td>
<td>0.32</td>
<td>0.31</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.47)</td>
<td>(0.47)</td>
<td>(0.46)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>Black</td>
<td>0.29</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(0.45)</td>
<td>(0.45)</td>
<td>(0.45)</td>
<td>(0.46)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.28</td>
<td>0.29</td>
<td>0.31</td>
<td>0.30</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(0.45)</td>
<td>(0.46)</td>
<td>(0.46)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
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<td>(0.27)</td>
<td>(0.27)</td>
<td>(0.28)</td>
<td>(0.26)</td>
</tr>
<tr>
<td>Unknown race/ethnicity</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.11)</td>
<td>(0.12)</td>
<td>(0.13)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>First year (&lt;28 credits)</td>
<td>0.51</td>
<td>0.57</td>
<td>0.56</td>
<td>0.56</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>Female</td>
<td>0.65</td>
<td>0.62</td>
<td>0.65</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>(0.48)</td>
<td>(0.49)</td>
<td>(0.48)</td>
<td>(0.48)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>Independent</td>
<td>0.60</td>
<td>0.54</td>
<td>0.56</td>
<td>0.53</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.49)</td>
</tr>
<tr>
<td>First generation</td>
<td>0.57</td>
<td>0.55</td>
<td>0.54</td>
<td>0.51</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>Aggregate loan debt</td>
<td>9059.91</td>
<td>7868.60</td>
<td>7788.42</td>
<td>7908.32</td>
<td>9049.68</td>
</tr>
<tr>
<td></td>
<td>(12313.99)</td>
<td>(11105.54)</td>
<td>(11051.77)</td>
<td>(11821.41)</td>
<td>(11999.67)</td>
</tr>
<tr>
<td>First-time borrower</td>
<td>0.39</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
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<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.50)</td>
<td>(0.49)</td>
</tr>
<tr>
<td>Age</td>
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<td>25.99</td>
<td>26.05</td>
<td>26.10</td>
<td>26.79</td>
</tr>
<tr>
<td></td>
<td>(8.83)</td>
<td>(8.62)</td>
<td>(8.33)</td>
<td>(8.67)</td>
<td>(8.98)</td>
</tr>
<tr>
<td>Total family income</td>
<td>37321.45</td>
<td>41255.37</td>
<td>39710.58</td>
<td>40601.92</td>
<td>36735.30</td>
</tr>
<tr>
<td></td>
<td>(38332.59)</td>
<td>(46579.76)</td>
<td>(48154.66)</td>
<td>(43772.00)</td>
<td>(35673.37)</td>
</tr>
<tr>
<td>Pell Grant amount</td>
<td>1853.53</td>
<td>1746.84</td>
<td>1813.38</td>
<td>1758.57</td>
<td>1829.40</td>
</tr>
<tr>
<td></td>
<td>(1315.41)</td>
<td>(1353.58)</td>
<td>(1336.31)</td>
<td>(1350.75)</td>
<td>(1330.24)</td>
</tr>
<tr>
<td>Registered before decision</td>
<td>0.45</td>
<td>0.64</td>
<td>0.68</td>
<td>0.64</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.48)</td>
<td>(0.47)</td>
<td>(0.48)</td>
<td>(0.49)</td>
</tr>
<tr>
<td>N</td>
<td>887</td>
<td>1660</td>
<td>1314</td>
<td>1706</td>
<td>1411</td>
</tr>
</tbody>
</table>

Source: Administrative data from the 2017-2018 year.

Notes: The table reports sample means for assigned group. To avoid duplication, means were summarized by individual student, rather than individual observation, as baseline characteristics are on the student level. There may be up to two observations per student in the complete sample. Standard errors are reported in parentheses.
Table 4-2. Logistic regression testing baseline equivalence

<table>
<thead>
<tr>
<th></th>
<th>Comparison to control group</th>
<th>Within treatment group comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control vs. Info</td>
<td>Control vs. Per-Credit</td>
</tr>
<tr>
<td>Total family income</td>
<td>0.076</td>
<td>0.053</td>
</tr>
<tr>
<td>Black</td>
<td>0.246</td>
<td>0.773</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.482</td>
<td>0.134</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>0.507</td>
<td>0.505</td>
</tr>
<tr>
<td>Unknown race/ethnicity</td>
<td>0.740</td>
<td>0.975</td>
</tr>
<tr>
<td>First year (&lt;28 credits)</td>
<td>0.499</td>
<td>0.264</td>
</tr>
<tr>
<td>Female</td>
<td>0.007*</td>
<td>0.128</td>
</tr>
<tr>
<td>Independent</td>
<td>0.448</td>
<td>0.001*</td>
</tr>
<tr>
<td>First generation</td>
<td>0.317</td>
<td>0.086</td>
</tr>
<tr>
<td>First-time borrower</td>
<td>0.113</td>
<td>0.794</td>
</tr>
<tr>
<td>Aggregate loan debt</td>
<td>0.248</td>
<td>0.056</td>
</tr>
<tr>
<td>Registered before decision</td>
<td>0.887</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Notes: * denotes statistically significantly difference at the \( p<0.05 \) level.

---

Figure 4-1. Mean overall loan take-up by group
Figure 4-2. Mean overall total loan amount accepted by group

Figure 4-3. Mean rate of accepting all loans offered by group
Figure 4-4. Mean unsubsidized amount accepted by group

Figure 4-5. Mean subsidized amount accepted by group
Figure 4-6. Mean rate of over-borrowing by group

### Table 4-3. Base model – Overall take-up outcomes

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any loans</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.002</td>
<td>-0.007</td>
<td>-0.005</td>
</tr>
<tr>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.013)</td>
<td>(0.014)</td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>Accept all</td>
<td>0.018</td>
<td>-0.004</td>
<td>0.021</td>
<td>-0.002</td>
<td>-0.006</td>
</tr>
<tr>
<td>(0.012)</td>
<td>(0.015)</td>
<td>(0.013)</td>
<td>(0.015)</td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>Sub. accept</td>
<td>0.015</td>
<td>-0.005</td>
<td>0.020+</td>
<td>-0.004</td>
<td>0.003</td>
</tr>
<tr>
<td>(0.011)</td>
<td>(0.014)</td>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>Unsub. accept</td>
<td>-0.009</td>
<td>0.000</td>
<td>-0.003</td>
<td>-0.001</td>
<td>-0.020</td>
</tr>
<tr>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>Over-borrow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Info-only</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.002</td>
<td>-0.007</td>
<td>-0.005</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>0.018</td>
<td>-0.004</td>
<td>0.021</td>
<td>-0.002</td>
<td>-0.006</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.015</td>
<td>-0.005</td>
<td>0.020+</td>
<td>-0.004</td>
<td>0.003</td>
</tr>
<tr>
<td>COA</td>
<td>-0.009</td>
<td>0.000</td>
<td>-0.003</td>
<td>-0.001</td>
<td>-0.020</td>
</tr>
<tr>
<td>N</td>
<td>12928</td>
<td>12928</td>
<td>11693</td>
<td>12928</td>
<td>12928</td>
</tr>
<tr>
<td>r2</td>
<td>0.180</td>
<td>0.139</td>
<td>0.190</td>
<td>0.140</td>
<td>0.073</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up measures by treatment group when compared to the control group. Over-borrowing indicates the likelihood that students will borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01,*** p<0.001.
Table 4-4: Base model – Loan amount accepted outcomes

<table>
<thead>
<tr>
<th></th>
<th>(1) Total loans</th>
<th>(2) Subsidized</th>
<th>(3) Unsubsidized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info-only</td>
<td>-38.258</td>
<td>-13.482</td>
<td>-16.985</td>
</tr>
<tr>
<td></td>
<td>(49.049)</td>
<td>(24.967)</td>
<td>(37.083)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>11.646</td>
<td>33.100</td>
<td>-19.785</td>
</tr>
<tr>
<td></td>
<td>(50.134)</td>
<td>(25.396)</td>
<td>(38.342)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>28.109</td>
<td>35.610</td>
<td>1.509</td>
</tr>
<tr>
<td></td>
<td>(47.365)</td>
<td>(24.265)</td>
<td>(35.999)</td>
</tr>
<tr>
<td>COA</td>
<td>-16.512</td>
<td>-18.677</td>
<td>8.405</td>
</tr>
<tr>
<td></td>
<td>(49.494)</td>
<td>(25.083)</td>
<td>(37.382)</td>
</tr>
<tr>
<td>N</td>
<td>12928</td>
<td>11693</td>
<td>12928</td>
</tr>
<tr>
<td>r2</td>
<td>0.340</td>
<td>0.210</td>
<td>0.316</td>
</tr>
</tbody>
</table>

Notes: Regression means for average loan amount accepted measures by treatment group when compared to the control group. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Table 4-5. Within treatment effect on take-up outcomes – Information-only as control

<table>
<thead>
<tr>
<th></th>
<th>(1) Any loans</th>
<th>(2) Accept all</th>
<th>(3) Sub. accept</th>
<th>(4) Unsub, accept</th>
<th>(5) Over-borrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per-credit cost</td>
<td>0.026*</td>
<td>0.003</td>
<td>0.025*</td>
<td>0.006</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.013)</td>
<td>(0.011)</td>
<td>(0.013)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.023*</td>
<td>0.002</td>
<td>0.024*</td>
<td>0.003</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>COA</td>
<td>-0.000</td>
<td>0.007</td>
<td>0.002</td>
<td>0.007</td>
<td>-0.016</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.011)</td>
<td>(0.012)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>N</td>
<td>11253</td>
<td>11253</td>
<td>10158</td>
<td>11253</td>
<td>11253</td>
</tr>
<tr>
<td>r2</td>
<td>0.172</td>
<td>0.135</td>
<td>0.183</td>
<td>0.138</td>
<td>0.076</td>
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</tbody>
</table>

Notes: Regression means for loan take-up outcome measures by assigned cost treatment group compared to the information-only group. Over-borrowing indicates the likelihood that students will borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Table 4-6. Within treatment effects on amount accepted outcomes – Information-only as control

<table>
<thead>
<tr>
<th></th>
<th>(1) Total loans</th>
<th>(2) Subsidized</th>
<th>(3) Unsubsidized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per-credit cost</td>
<td>55.558</td>
<td>52.631*</td>
<td>-1.434</td>
</tr>
<tr>
<td></td>
<td>(42.710)</td>
<td>(22.118)</td>
<td>(32.971)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>71.331+</td>
<td>55.310**</td>
<td>19.259</td>
</tr>
<tr>
<td></td>
<td>(39.271)</td>
<td>(20.768)</td>
<td>(30.403)</td>
</tr>
<tr>
<td>COA</td>
<td>31.158</td>
<td>3.955</td>
<td>28.648</td>
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<tr>
<td></td>
<td>(43.144)</td>
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<td>(32.718)</td>
</tr>
<tr>
<td>N</td>
<td>11253</td>
<td>10158</td>
<td>11253</td>
</tr>
<tr>
<td>r²</td>
<td>0.335</td>
<td>0.203</td>
<td>0.312</td>
</tr>
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</table>

Notes: Regression means for average loan amount accepted measures by cost treatment group when compared to the information-only group. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Figure 4-7. Mean values for total loan amount accepted by group for students not yet registered for classes
Figure 4-8. Mean values for total amount accepted by group for students who were already registered
Table 4-7. Impact of interventions on loan take-up by registration status at time of decision

<table>
<thead>
<tr>
<th></th>
<th>Any loans</th>
<th>Accept all</th>
<th>Sub. accept</th>
<th>Over-borrow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not registered</td>
<td>Registered</td>
<td>Not registered</td>
<td>Registered</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Info-only</td>
<td>-0.023</td>
<td>0.015</td>
<td>-0.040*</td>
<td>0.035+</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>-0.007</td>
<td>0.042*</td>
<td>-0.030</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.018)</td>
<td>(0.021)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.005</td>
<td>0.032+</td>
<td>-0.022</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.019)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>COA</td>
<td>0.007</td>
<td>-0.012</td>
<td>-0.002</td>
<td>0.018</td>
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<tr>
<td></td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>r2</td>
<td>0.197</td>
<td>0.174</td>
<td>0.142</td>
<td>0.135</td>
</tr>
<tr>
<td>N</td>
<td>5136</td>
<td>7792</td>
<td>5136</td>
<td>7792</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up outcome measures by treatment group when compared to the control group. Not registered refers to students who had not yet registered for any classes for the fall 2017 term at the time of borrowing decision. Over-borrowing indicates the likelihood that students will borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Table 4-8. Impact of interventions on loan amount accepted by registration status at time of decision

<table>
<thead>
<tr>
<th></th>
<th>Total loans</th>
<th></th>
<th>Subsidized</th>
<th></th>
<th>Unsubsidized</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not registered</td>
<td>Registered</td>
<td>Not registered</td>
<td>Registered</td>
<td>Not registered</td>
<td>Registered</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Info-only</td>
<td>-160.633*</td>
<td>115.278</td>
<td>-32.610</td>
<td>17.828</td>
<td>-127.914*</td>
<td>108.515*</td>
</tr>
<tr>
<td></td>
<td>(70.223)</td>
<td>(70.216)</td>
<td>(34.488)</td>
<td>(37.164)</td>
<td>(52.939)</td>
<td>(52.807)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>-131.690+</td>
<td>171.605*</td>
<td>-29.741</td>
<td>87.165*</td>
<td>-94.816+</td>
<td>82.263</td>
</tr>
<tr>
<td></td>
<td>(74.755)</td>
<td>(70.087)</td>
<td>(37.106)</td>
<td>(36.494)</td>
<td>(50.034)</td>
<td>(51.546)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>-43.282</td>
<td>144.954*</td>
<td>-3.287</td>
<td>78.922*</td>
<td>-52.103</td>
<td>87.371+</td>
</tr>
<tr>
<td></td>
<td>(67.596)</td>
<td>(67.498)</td>
<td>(34.019)</td>
<td>(35.592)</td>
<td>(51.260)</td>
<td>(51.134)</td>
</tr>
<tr>
<td></td>
<td>(68.901)</td>
<td>(71.079)</td>
<td>(33.945)</td>
<td>(37.377)</td>
<td>(52.632)</td>
<td>(53.229)</td>
</tr>
<tr>
<td>r²</td>
<td>0.342</td>
<td>0.333</td>
<td>0.211</td>
<td>0.212</td>
<td>0.333</td>
<td>0.298</td>
</tr>
<tr>
<td>N</td>
<td>5136</td>
<td>7792</td>
<td>4685</td>
<td>7008</td>
<td>5136</td>
<td>7792</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan accepted amount outcome measures by treatment group when compared to the control group. Not registered refers to students who had not yet registered for any classes for the fall 2017 term at the time of borrowing decision. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Table 4-9. Impact of cost nudges compared to information-only on loan take-up for students not yet registered at time of decision

<table>
<thead>
<tr>
<th></th>
<th>Any loans</th>
<th></th>
<th>Sub. accept</th>
<th></th>
<th>Unsub. accept</th>
<th></th>
<th>Over-borrow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Credit Cost</td>
<td>0.019</td>
<td>0.012</td>
<td>0.016</td>
<td>0.014</td>
<td>-0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.020)</td>
<td>(0.019)</td>
<td>(0.020)</td>
<td>(0.018)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FT/PT Cost</td>
<td>0.031*</td>
<td>0.020</td>
<td>0.029+</td>
<td>0.022</td>
<td>0.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.019)</td>
<td>(0.016)</td>
<td>(0.019)</td>
<td>(0.017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COA</td>
<td>0.036*</td>
<td>0.043*</td>
<td>0.040*</td>
<td>0.044*</td>
<td>-0.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.019)</td>
<td>(0.017)</td>
<td>(0.019)</td>
<td>(0.017)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r²</td>
<td>0.189</td>
<td>0.134</td>
<td>0.195</td>
<td>0.135</td>
<td>0.066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4204</td>
<td>4204</td>
<td>3826</td>
<td>4204</td>
<td>4204</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up measures by cost treatment group when compared to the information-only group for students who had not yet registered for any classes for the fall 2017 term. Over-borrowing indicates the likelihood of students to borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Table 4-10. Impact of Cost Interventions compared to Information Only on Loan Amount Accepted for students not yet registered at time of decision

<table>
<thead>
<tr>
<th></th>
<th>Total loans (1)</th>
<th>Subsidized (2)</th>
<th>Unsubsidized (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Credit Cost</td>
<td>39.126 (74.443)</td>
<td>10.663 (36.681)</td>
<td>39.061 (54.832)</td>
</tr>
<tr>
<td>FT/PT Cost</td>
<td>128.991+ (65.979)</td>
<td>38.718 (33.025)</td>
<td>79.420 (50.133)</td>
</tr>
<tr>
<td>COA</td>
<td>172.759* (68.724)</td>
<td>55.963+ (33.583)</td>
<td>141.352** (51.802)</td>
</tr>
<tr>
<td>r²</td>
<td>0.332</td>
<td>0.203</td>
<td>0.325</td>
</tr>
<tr>
<td>N</td>
<td>4204</td>
<td>3826</td>
<td>4204</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan accepted amount measures by cost treatment group when compared to the information-only group for students who had not yet registered for any classes for the fall 2017 term. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Table 4-11. Heterogeneous effect of take-up on not registered Independent students

<table>
<thead>
<tr>
<th></th>
<th>Any loans</th>
<th>Accept all</th>
<th>Unsub. Accept.</th>
<th>Total loans</th>
<th>Over-borrow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (1)</td>
<td>Indep. (2)</td>
<td>All (3)</td>
<td>Indep. (4)</td>
<td>All (7)</td>
</tr>
<tr>
<td>Info-only</td>
<td>-0.023</td>
<td>-0.037*</td>
<td>-0.040*</td>
<td>-0.067**</td>
<td>-0.040*</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.023)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>-0.007</td>
<td>-0.055**</td>
<td>-0.030</td>
<td>-0.057**</td>
<td>-0.028</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.021)</td>
<td>(0.021)</td>
<td>(0.025)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.005</td>
<td>0.003</td>
<td>-0.022</td>
<td>-0.034</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.023)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>COA</td>
<td>0.007</td>
<td>0.003</td>
<td>-0.002</td>
<td>-0.029</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.019)</td>
<td>(0.022)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>N</td>
<td>5136</td>
<td>3218</td>
<td>5136</td>
<td>3218</td>
<td>5136</td>
</tr>
<tr>
<td>r2</td>
<td>0.197</td>
<td>0.130</td>
<td>0.142</td>
<td>0.093</td>
<td>0.143</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up measures by treatment group when compared to the control group for students who had not yet registered for any classes for the fall 2017 term. Indep. columns indicate means for the independent student subgroup. Over-borrowing indicates the likelihood that students will borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.00
Table 4.12. Heterogeneous effect of take-up on not registered students with no prior borrowing history

<table>
<thead>
<tr>
<th></th>
<th>Any loans</th>
<th>Accept all</th>
<th>Sub. accept</th>
<th>Unsub. accept</th>
<th>Over-borrow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>FTB</td>
<td>All</td>
<td>FTB</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Info-only</td>
<td>-0.023</td>
<td>-0.016</td>
<td>-0.040*</td>
<td>-0.035</td>
<td>-0.016</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.033)</td>
<td>(0.019)</td>
<td>(0.034)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>-0.007</td>
<td>0.057+</td>
<td>-0.030</td>
<td>0.022</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.034)</td>
<td>(0.021)</td>
<td>(0.036)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.005</td>
<td>0.032</td>
<td>-0.022</td>
<td>-0.021</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.031)</td>
<td>(0.019)</td>
<td>(0.033)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>COA</td>
<td>0.007</td>
<td>0.060+</td>
<td>-0.002</td>
<td>0.090**</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.033)</td>
<td>(0.019)</td>
<td>(0.034)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>N</td>
<td>5136</td>
<td>2001</td>
<td>5136</td>
<td>2001</td>
<td>4685</td>
</tr>
<tr>
<td>r2</td>
<td>0.197</td>
<td>0.223</td>
<td>0.142</td>
<td>0.180</td>
<td>0.203</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up measures by treatment group when compared to the control group for students who had not yet registered for any classes for the fall 2017 term. FTB columns indicate means for the first-time borrower subgroup. Over-borrowing indicates the likelihood of students to borrow more than their annual limits when prorated by enrollment status. Students can only over-borrow if they ultimately enrolled at least part-time and loan funding was disbursed. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001
Table 4-13. Within treatment heterogeneous effect of take-up on not registered students with no prior borrowing history – Information-only as control

<table>
<thead>
<tr>
<th></th>
<th>Any loans</th>
<th>Accept all</th>
<th>Sub. Accept</th>
<th>Unsub. Accept</th>
<th>Total loans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (1)</td>
<td>FTB (2)</td>
<td>All (3)</td>
<td>FTB (4)</td>
<td>All (5)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>0.019</td>
<td>0.075*</td>
<td>0.012</td>
<td>0.058+</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.032)</td>
<td>(0.020)</td>
<td>(0.034)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.031*</td>
<td>0.053+</td>
<td>0.020</td>
<td>0.012</td>
<td>0.029+</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.029)</td>
<td>(0.019)</td>
<td>(0.031)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>COA</td>
<td>0.036*</td>
<td>0.086**</td>
<td>0.043*</td>
<td>0.126***</td>
<td>0.040*</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.031)</td>
<td>(0.019)</td>
<td>(0.032)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>N</td>
<td>4204</td>
<td>1681</td>
<td>4204</td>
<td>1681</td>
<td>3826</td>
</tr>
<tr>
<td>r2</td>
<td>0.189</td>
<td>0.216</td>
<td>0.134</td>
<td>0.176</td>
<td>0.195</td>
</tr>
</tbody>
</table>

Notes: Regression means for loan take-up measures by cost treatment group when compared to the information-only group for students who had not yet registered for any classes for the fall 2017 term. FTB columns indicate means for the first-time borrower subgroup. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Figure 4-9. Mean fall 2017 enrollment by group – students not yet registered

Figure 4-10. Mean fall 2017 enrollment by group – students already registered at time of decision
Table 4-14. Impact on enrollment and retention by registration status

<table>
<thead>
<tr>
<th></th>
<th>Fall enrolled</th>
<th>Spring enrolled</th>
<th>Fall credits</th>
<th>Spring credits</th>
<th>Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not registered</td>
<td>Registered</td>
<td>Not registered</td>
<td>Registered</td>
<td>Not registered</td>
</tr>
<tr>
<td>Info-only</td>
<td>-0.067***</td>
<td>-0.003</td>
<td>-0.069**</td>
<td>-0.018</td>
<td>-0.785***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.004)</td>
<td>(0.022)</td>
<td>(0.018)</td>
<td>(0.233)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>-0.056**</td>
<td>-0.003</td>
<td>-0.074**</td>
<td>-0.016</td>
<td>-0.246</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.004)</td>
<td>(0.024)</td>
<td>(0.019)</td>
<td>(0.257)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>-0.044*</td>
<td>-0.005</td>
<td>-0.031</td>
<td>-0.014</td>
<td>-0.252</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.004)</td>
<td>(0.022)</td>
<td>(0.018)</td>
<td>(0.228)</td>
</tr>
<tr>
<td>COA</td>
<td>-0.035+</td>
<td>-0.004</td>
<td>-0.053*</td>
<td>-0.029</td>
<td>-0.424+</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.004)</td>
<td>(0.022)</td>
<td>(0.019)</td>
<td>(0.231)</td>
</tr>
<tr>
<td>r2</td>
<td>0.028</td>
<td>0.004</td>
<td>0.023</td>
<td>0.023</td>
<td>0.035</td>
</tr>
<tr>
<td>N</td>
<td>5136</td>
<td>7792</td>
<td>5136</td>
<td>7792</td>
<td>5136</td>
</tr>
</tbody>
</table>

Notes: Regression means for enrollment and retention measures by treatment group when compared to the control group. Not registered refers to students who had not yet registered for any classes for the fall 2017 term at the time of borrowing decision. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
Table 4-15. Within treatment impact on enrollment and retention for not registered students – comparing cost to information-only  

<table>
<thead>
<tr>
<th></th>
<th>Fall enrolled</th>
<th>Spring enrolled</th>
<th>Fall credits</th>
<th>Spring credits</th>
<th>Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Per-credit cost</td>
<td>0.011</td>
<td>-0.010</td>
<td>0.557*</td>
<td>0.074</td>
<td>-0.041+</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.023)</td>
<td>(0.254)</td>
<td>(0.256)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>FT/PT cost</td>
<td>0.016</td>
<td>0.030</td>
<td>0.487*</td>
<td>0.367</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.021)</td>
<td>(0.224)</td>
<td>(0.230)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>COA</td>
<td>0.021</td>
<td>0.004</td>
<td>0.259</td>
<td>0.071</td>
<td>-0.031</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.022)</td>
<td>(0.231)</td>
<td>(0.241)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>r2</td>
<td>0.036</td>
<td>0.025</td>
<td>0.042</td>
<td>0.032</td>
<td>0.024</td>
</tr>
<tr>
<td>N</td>
<td>4204</td>
<td>4204</td>
<td>4204</td>
<td>4204</td>
<td>3014</td>
</tr>
</tbody>
</table>

Notes: Regression means for enrollment and retention measures by cost treatment group when compared to the information-only group for students who had not yet registered for any classes for the fall 2017 term at the time of borrowing decision. Robust standard errors are reported in parentheses. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.
CHAPTER 5
CONCLUSIONS AND IMPLICATIONS

Interpretation of Findings

If administrators and policymakers want to minimize the amount of loans borrowed by community college students, the results of this study demonstrate that presenting not yet registered students with information about subsidized and unsubsidized loan options at the time of decision may be the most effective strategy. Among students who had not yet enrolled in classes, the information-only messaging reduced the tendency to accept all loans offered by four percentage points – something that prior research shows is a common default behavior (Marx & Turner, 2016; Woo & Horn, 2016). Reductions were primarily seen in the unsubsidized loan, which may be a desired behavior due to the increased cost (i.e. interest accrual) associated with unsubsidized loans. However, the question still remains as to whether or not reduced borrowing maximizes long-term well being at the individual student level given that the results of this and prior studies document the positive effect student borrowing has on indicators of educational attainment (Marx & Turner, 2016; Barr et al., 2017; Wiederspan, 2015).

Effect of Loan Information on Borrowing Behavior

Providing loan details and links to further information about student borrowing, without any cost figures, resulted in a four percentage point reduction in unsubsidized loan take-up compared to the control group mean of 71%, and $161 less in the total average amount of loans accepted per term. As we have learned from the behavioral economic literature, the context and wording used when framing choices matters (Thaler & Sunstein, 2009; Kahneman, 2003). The results of this study indicate that students may have responded differently due to the negatively framed messaging attached to the unsubsidized loan description. It is also possible the effect was simply due to the additional information provided. Without the descriptions, students may not
have been aware of the differences in the interest accrual between the two types of loans, and the information presented may have caused them to reconsider borrowing the entire amount offered, therefore rejecting the unsubsidized portion. This study aligns with the findings of Barr et al. (2017) in concluding that informational interventions are effective in reducing student loan borrowing, particularly in the unsubsidized loan. The results of the text messaging and personalized assistance interventions tested by Barr et al. (2017) reduced unsubsidized take-up by 3.1 percentage points, a reduction of $90 less on average.

The reduction in unsubsidized take-up is also expected given the additional unsubsidized loan eligibility available to all students with the passage of the ECASLA legislation in 2008. The $2,000 increase in unsubsidized loan eligibility was made across the board for all undergraduate students, within the confines of COA. The increase may have been an appropriate step to compensate for rising prices in the four-year sectors, but the additional loan funding might not be optimal for many community college students. Given the tendency of community college students to accept the total amount of loans offered (Marx & Turner, 2016; Woo & Horn, 2016), students may be taking loan funding they do not need. Once students see they have an additional $2,000 in loan funding available, and seemingly endorsed by the institution, it may be harder to select the “reject” option due to loss aversion and status quo bias. This is a particularly risky behavior for the two-thirds of community college students who do not earn a credential within six years, and therefore have the highest risk of defaulting on their loans (Baum & Ma, 2016).

In an effort to minimize this additional borrowing, some community colleges only present the subsidized loan offer to students in award notifications (Marx & Turner, 2016). For example, the community college within which Marx and Turner (2016) tested the effect of loan offers in award packages chose to present an amount without the additional $2,000 in
unsubsidized loans (i.e. $3,500 for dependent freshmen as opposed to the full $5,500 they were eligible for). Another valuable contribution to the literature would be to re-create that experiment presenting the entire loan offer including the additional $2,000 in unsubsidized loans. Findings of such a study might better inform policy discussion regarding the additional unsubsidized eligibility for community college students.

The effect of the information-only messaging was more pronounced for independent students, who represent the non-traditional student population most at risk of student loan default (Looney & Yannelis, 2015). These students have less access to financial aid information from parents and school counselors (Perna, 2008; Bettinger et al., 2012). Not yet registered independent students were 6.7 percentage points less likely to accept all loans offered to them. Increased sensitivity among independent students is consistent with the findings of Marx and Turner (2016), and adds to the literature supporting the increased benefit of informational interventions on non-traditional populations (Marx & Turner 2016; Barr et al., 2017).

**Effect of Cost Information on Borrowing Behavior**

A number of studies have tested the impact of information on student borrowing decisions (Darolia, 2016; Barr et al., 2017; Marx & Turner, 2016). This study expands upon this body of research by also looking specifically at the role of community college cost information on decision-making. The presentation of the first two cost variants (the per-credit hour rate and FT/PT tuition estimates) increased borrowing when compared to the information-only condition for students not yet registered in classes. This means that students viewing the combined information and cost estimates borrowed less than students who received no information (control group), but they borrowed more than the students who saw information-only without any cost figures. This is evidence that the presentation of cost itself has a significant influence on
borrowing behavior, and that cost amounts in any form increase average borrowing by a modest amount.

Given that students tend to overestimate the cost of attending college (Bleemer & Zafar, 2015), it was hypothesized that the low community college prices presented might reduce borrowing. However, it appears that even the lowest cost presented ($104 per-credit rate) induced borrowing by a small amount, at least when compared to information-only. As the principles of framing and anchoring would predict (Thaler & Sunstein, 2009), the larger FT/PT tuition cost amount induced students to borrow more than the lower per-credit figure for students who were not yet registered. Not registered students viewing the per-credit treatment saw reductions of only a slightly smaller magnitude than the information-only group. Reductions for the per-credit treatment were more pronounced among the independent student subgroup, indicating that the per-credit messaging was more salient for non-traditional students.

An alternative explanation is that for not yet registered students, the per-credit $104 figure was less meaningful, since they had no baseline figure for number of credit hours in order to calculate future total tuition charges. Evidence for this explanation lies within the results for already registered students, who borrowed the most when viewing the per-credit messaging ($172 more than the control group). Students who were enrolled at the time of loan decision responded most strongly to the per-credit presentation of costs, likely due to being able to calculate total charges based on registered credits. Because this method of presenting cost has such a disparate effect on students conditional on registration timing, and that registered students who made calculations using the per-credit rate seemed to overestimate their needs, it might be a risky option to use across the board.
An unexpected finding was the null effect between students receiving the COA condition (the largest presented cost estimates) and the control group (no information). There was a lack of effect for the COA group for both already registered and not yet registered students, but again I focus this discussion on the not registered student group. Compared to the information-only group, students viewing the full COA amounts were 3.6 percentage points more likely to accept any loan ($173 total loan amount accepted), 4.3 percentage points more likely to accept all loans, and 4.4 percentage points more likely to accept the unsubsidized loan than the information-only group ($141). However, when compared to the control group, there were no consistent effects. This suggests that the presentation of the higher COA cost estimates either eliminated any reluctance to borrow the full amount triggered by the informational messaging, or that the combined COA figures and messaging were too confusing and were therefore ignored altogether. Students have been shown to skim and skip information that is overly complex and confusing, specifically as it relates to information on college costs and borrowing (Fernandez, 2015).

Students who had never borrowed a student loan before also reacted differently to the COA messaging than those with a prior history of borrowing. In contrast to the null effect on the overall sample, first-time borrowers viewing the COA messaging actually borrowed more when compared to those who saw no messaging at all. First-time borrowers viewing the COA messaging showed a six percentage point increase in the likelihood to accept any loan, a nine percentage point increase in the likelihood of accepting all loans offered, and a 9.2 percentage point increase in unsubsidized loan take-up, when compared to the control group. Increases were even larger and more precisely estimated when compared to the information-only group, with increases up to 12.6 percentage points in the likelihood of accepting all loans offered and $350 more in total loans.
First-time borrowers generally are inexperienced and uncertain with regard to financial aid, loans, and college in general (Fernandez, 2015). At this point in the student borrowing process, they would not even have gone through the online loan entrance counseling session. Fernandez (2015) found that first-time borrowers understood the need to minimize borrowing, and felt it important to learn more about student loans and financial aid. Students interviewed prior to going through the online loan entrance counseling session were eager to learn strategies for reducing costs and borrowing (Fernandez, 2015). While these same students became disengaged through the lengthy and complex online counseling session, it is possible that these students were more interested in reading the messaging within the loan acceptance process and paid more attention to the COA figures, causing them to borrow more due to the high dollar figures presented. First-time borrowers were influenced to borrow more by the per-credit and FT/PT tuition cost messaging as well, but to a lesser extent. Students with prior-borrowing history, on the other hand, should already have some understanding of the loan and cost concepts. These students likely had gone through the loan acceptance process at CC in prior years, making the content less engaging and therefore they simply clicked quickly through the process without reading. Given the length and complexity of the COA messaging, students with prior borrowing experience may have gleaned less from it than the other treatment messages.

Prior studies have also found a difference in behavior between students with and without prior borrowing history (Marx & Turner, 2016; Barr et al., 2017). However, the pronounced increase in loan take-up by first-time borrower students viewing treatment messaging is not necessarily consistent with findings of prior studies. Marx and Turner (2016) found that while first-time borrowers were induced to borrow more by a non-zero loan offer (6 percentage point increase), students who had prior borrowing experience borrowed even more (12 percentage
point increase). The authors suggest that this is evidence that these types of nudges do more than just correct information gaps about loan eligibility. Barr et al. (2017) found that their interventions generated the largest reductions among students who already had high levels of accumulated student debt. The authors suggest that the messages regarding active choice in how much to borrow were particularly salient for students who already had debt. While these results are not totally in line, the results of this study and the existing literature are evidence that first-time borrowers do respond differently to informational interventions during the borrowing process.

**Enrollment as Pre-commitment**

Perhaps the most interesting finding of this study was the influence of course registration timing on students’ responsiveness to the various treatment conditions. Overall, students who were not yet registered for classes borrowed more on average than students who were already enrolled. Average borrowing per term for students in the control group who were not yet registered averaged $3,259 (81% take-up rate) but already registered students in the control group averaged just $2,577 (74% take-up rate). However, with the exception of the COA group, students who had not registered for any classes at the time they viewed the intervention messaging showed negative coefficients across treatment groups and outcomes (i.e. they borrowed less), whereas students who were already enrolled borrowed more when compared to the control group. For example, for students viewing the information-only messaging, those who were not yet registered borrowed $128 less in the unsubsidized loan on average, whereas students who were already registered borrowed $109 more.

The differences found between enrolled and not enrolled students were likely due to the fact that students who were already enrolled had made a prior commitment to attend and pay for
college, and also had a more concrete understanding of the costs of attending because they knew how many credit hours in which they were enrolling. For these students, viewing the cost information at the time of borrowing decision was particularly meaningful, especially the per-credit hour rate, which makes sense given that in order to utilize the per-credit figure to calculate tuition costs, the student would need to know how many credits they would enroll in.

While prior experimental studies on financial aid have not explicitly examined the impact of registration status, Barr et al. (2017) did find that the effects of their interventions were magnified for students who went through the process earlier, prior to the priority filing date for financial aid. Because community college students have a tendency to register later in the enrollment process, rather than when registration first opens for a given term, this group might be similar to the not-registered subgroup analyzed in this study (Gurantz, 2015).

In an analysis of community college registration behavior in California, Gurantz (2015) suggests that students who register late do so either due to low commitment to pursuing their college education, having a weaker understanding of how to navigate the system, or are simply prone to procrastinate. Other indicators of commitment are filing the FAFSA and completing additional required documents to be awarded a loan. Castleman and Page (2014) found increased effects of informational nudges for students who were not as far along in the college matriculation process, as measured by FAFSA completion.

Providing informational messaging to students prior to enrollment was most effective in reducing the tendency to borrow. However, for students who were already enrolled in classes, providing loan details and per-credit or FT/PT tuition cost information at the time of loan acceptance slightly increased loan take-up. Had these increases in borrowing also been correlated with increases in enrollment and persistence, the effect on already registered students might be
viewed as optimal behavior. However, as will be discussed the next section, already registered students did not alter their enrollment patterns due to the treatment messaging.

**Indirect Impact on Enrollment and Persistence**

Most studies on behaviorally-informed policy interventions discuss the overall welfare implications of their results. Because changes in the choice architecture could benefit some and do harm to others, it is important to weigh the trade-offs for these types of interventions (Castleman, 2015). Consistent with the findings of Barr et al. (2017) and Marx and Turner (2016), results from this study indicate that the interventions associated with decreased borrowing also led to decreases in enrollment by 6.7 to 3.5 percentage points, depending on the treatment group. Subsequent spring enrollment and fall and spring average attempted credit hours were also negatively impacted.

It is important to note that the interventions in this study only impacted enrollment decisions for students who had not yet registered for at least one class at the time they made their loan decision. For students who were already registered in at least one course, enrollment and future attempted credits were unaffected by the interventions, even though borrowing actually increased for students who were already registered and viewed the information-only, per-credit, and FT/PT tuition messaging. In the case of already registered students, it appears that the presentation of cost amounts was made more salient based on a more concrete understanding of how many credits they would enroll in and their prior level of commitment to attending. This may have driven increases in borrowing for students who otherwise would not have accepted loans, at least at this point in the enrollment process. In contrast, for students not yet registered, borrowing, or lack thereof, drove subsequent enrollment decisions.
The positive relationship between borrowing and short-run attainment is consistent with prior literature on informational interventions in the community college context (Marx & Turner, 2016; Barr et al., 2017) and access to loan funding in general (Wiederspan, 2015; Dunlop, 2012). Marx and Turner (2016) estimate a trade-off whereby $1,000 of additional loans generated by a non-zero loan offer buys short-run increases of approximately one credit completed and 0.16 GPA points. Results of their cost-benefit analysis suggested that as long as student loan receipt leads to increases in long-run degree completion, the large gain in earnings make loans financially beneficial from the perspectives of both the government and the student (Marx & Turner, 2016). Barr et al. (2017) found that their interventions aimed at reducing borrowing also reduced short-term academic performance (Barr et al., 2017).

While institutions might benefit the most from low-cost initiatives like these that reduce borrowing, thereby bringing down default rates, the question becomes which trade-off serves students better? If reduced debt burden results in avoiding the negative consequences of default, but at the same time reduces educational attainment for some students, what do institutions and policymakers choose?

Limitations

While this study presents a rare opportunity to analyze the effects of informational interventions on student loan decision-making, it is not without its limitations. While most threats to internal validity are controlled for by the randomized design, true experiments are still at risk to threats of external validity (Creswell, 2001). As discussed in Chapter 3, limitations of the CC student loan acceptance process and technology system did not allow for randomization at the student level. Instead, randomization occurred at the date level, with students being assigned to a treatment or control group based on the date they decided to login to the loan
acceptance portal to make their decision. While every effort was made to reduce selection bias, group equivalence could not be tested prior to the start of the study. However, regression tests of group equivalence after data collection demonstrated that students were generally equally distributed among groups at baseline.

Because the study was conducted at a single institution, findings may not be generalizable to community college students nationwide. However, CC’s size and demographic diversity still make the findings important and relevant to other community colleges that seek to mitigate excessive borrowing. Additionally, subgroup analysis showing pronounced effects on the CC independent student population support generalizability to the non-traditional students served by community colleges nationwide.

Another limitation in the data collection was the fact that the college administrative system did not allow for the reduction of loan amounts during the acceptance process. The only reduction options available to students at the time were to reject the unsubsidized portion of the loan and accept the subsidized portion or to reject a disbursement for a single term while accepting a disbursement for another. Students could contact the financial aid office via email or in person to request a reduction in the amount of either the subsidized or unsubsidized loan. These requests were tracked manually. However, data was found to be inconsistent and the lag between the student receiving the informational intervention and making the request made attributing reductions to interventions uncertain, so this data could not be analyzed. Since the conclusion of data collection, the college has implemented a new online portal that allows students the option to reduce loan amounts at the time of decision.
Policy Implications – Recommendations for Practice

Despite the fact that tuition costs, credit hours, and potential future earnings are much lower for an associate’s degree or certificate than a bachelor’s degree, federal annual and aggregate loan limits are the same. There is no current policy to prevent a part-time student from exhausting their entire undergraduate student loan eligibility in pursuit of an associate’s degree, or worse, before they attain any degree or certificate. Current policy actually promotes this behavior, or incentivizes community colleges to opt-out of loan programs altogether to avoid sanctions for high default rates. Colleges are not permitted to prorate loan receipt based on enrollment status, and the majority of colleges present the maximum annual amount to students in initial aid offers (Marx & Turner, 2016). Because borrowers tend to accept the maximum amount offered to them (Woo & Horn, 2016) and tend to view the amount presented in aid offers as the default amount (Marx & Turner, 2016), already vulnerable part-time community college students are at a higher risk of taking more loan funding than they need or was desired by policymakers when loan limits were established.

Approximately 22% of students in the sample borrowed more than the optimal amount based on annual and aggregate loan limits when taking enrollment status into account. When narrowed to only students who completed all requirements to have a loan disburse, 40% of loan recipients over-borrowed. According to CC administrative data, 3.2% of fall 2017 degree-seeking students had already borrowed 50% or more of their lifetime loan limits. There is a need to balance providing access to student loan funding and the potential negative consequences of excessive debt and default (Baker & Doyle, 2017). One mechanism to achieve this goal would be to create loan limits that are based on degree sought or prorated based on enrollment status. This option has been promoted by advocacy organizations such as the National Association for
Student Financial Aid Administrators (NASFAA) for some time, and has recently gained traction with policymakers. A provision allowing institutional discretion to prorate annual loan amounts based on enrollment status and credential level is part of House Republicans’ current proposal to restructure the federal loan programs (NASFAA, 2018).

**Current Policy Actions**

Over the last decade, financial aid policy and legislative actions have focused on reducing complexity within the financial aid system. The FAFSA process has been simplified by integrating with the Internal Revenue Service (IRS) to import tax data directly from tax returns\(^1\). In addition, effective the 2017-2018 year, the FAFSA filing year was moved up so students can apply earlier and use tax data from two years prior, allowing award offers to be made much earlier in the enrollment process\(^2\). In summer 2018, the FAFSA was also made available via a user-friendly mobile application so students can apply via more accessible channels\(^3\). All of these initiatives help to streamline the financial aid application process, but do nothing to improve the student borrowing process.

**Legislative action**

Recent legislative proposals for the impending reauthorization of the Higher Education Act of 1965 involve simplifying the FAFSA form, restructuring the student aid programs, and adding further information provisions with the goal of making college costs and student debt

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1. The IRS Data Retrieval Tool (DRT) was first made available for the 2009-2010 year. Its usage has been expanded since, though data security issues made it unavailable for the majority of the 2017-2018 year. It is also available to assist students applying for income-driven student loan repayment plans. See http://www.finaid.org/ fafsa/irsdataretrievaltool.phtml for a description of the tool.

2. See https://studentaid.ed.gov/sa/sites/default/files/fafsa-dates-17-18.pdf for more information on changes to the FAFSA filing date and income information.

outcomes more transparent. Both the House Democrats’ Aim Higher Act (AHA)\(^4\) and Republican’s Promoting Real Opportunity, Success and Prosperity Through Education Reform (PROSPER) Act\(^5\) would require loan entrance counseling to be completed annually, prior to the disbursement of any loan funding for the award year, rather than just once as a first-time borrower, as is required now. The proposals also recognize the need for personalization – requiring individualized loan repayment amounts and dates to be provided during loan exit counseling, which is completed upon graduation or ceasing enrollment. Both bills also recognize the need for more active borrowing choices by requiring students to make an active acceptance decision on their loan amount each year (NASFAA, 2018). Currently, some institutions will continue to disburse loan amounts in subsequent years based on the students’ original decision to accept a loan.

The AHA also proposes changing the current CDR regulations to include the usage of a new adjusted CDR, which would now take into account the percentage of the institution’s students who borrowed. Because the rate of borrowing at community colleges is lower than other sectors (College Board, 2017b), this change would benefit them the most. It could mean that community colleges may no longer feel the need to remove loan amounts from initial award offers or opt-out of the loan programs altogether, a change that might increase enrollment and persistence outcomes (Wiederspan, 2015; Dunlop, 2012; Marx & Turner, 2016).

If passed in its current form, the PROSPER Act would have the largest impact on student borrowing and postsecondary federal financial aid more broadly. The bill proposes the

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elimination of the Federal Direct Loan Program to be replaced by the Federal ONE Loan program. Federal ONE Loans would eliminate the need-based subsidized option and make all federal loans similar to the current unsubsidized option (NASFAA, 2018). While this would make the loan programs more expensive for low-income students by eliminating the interest rate subsidy, there could be a benefit to the reduced complexity of the loan programs, making it easier for students to understand and easier to qualify for (Baum & Schwartz, 2015).

Under the PROSPER Act, annual and aggregate loan limits would also increase. However, the bill also includes a provision that would allow institutional discretion to prorate or reduce loan limits institution-wide or by academic program based on certain conditions including part-time enrollment and credential level (NASFAA, 2018). If adopted, community colleges would be permitted to revise loan eligibility for associate’s degree and certificate seeking students or part-time students so that they would not run the risk of borrowing their full undergraduate loan limits in pursuit of degrees of two-years or less.

Both bills also simplify the overly complex set of student loan repayment options by creating one standard repayment plan and one income-based repayment (IBR) plan, though each defines these plans differently. Currently, there is a confusing array of repayment options and take-up rates of IBR plans are suboptimal (Dynarski, 2014). While simplification of repayment options and easier access into IBR plans would provide important repayment relief for borrowers (Baum & Schwartz, 2015), alleviating repayment challenges on the back-end is not all that can be done. The results of this study can be applied to ease repayment difficulty for students by helping them make better borrowing decisions on the front-end.
Focus on transparency

Outside of modifications to repayment plans, most policy responses to the rhetoric surrounding student debt have thus far been informational. The Department of Education maintains a number of informational tools to make the cost of college more transparent, including the College Scorecard, College Navigator, Net Price Calculator, and Financial Aid Shopping Sheet. In addition, current applications of student loan “debt letters” at the institution and state policy level prove the willingness of policymakers to implement informational strategies to address the problems associated with student debt (Kennedy, 2015; Darolia, 2016). However, experimental evidence shows informational debt letters to be largely ineffective in generating systematic changes in borrowing choices without being combined with more intensive personalized counseling services (Darolia, 2016).

Policy attention to the challenges created by student debt is important. However, these policy efforts are taking place while still little is known about how students process information and make choices regarding student loans (Darolia, 2016). Behavioral economists would caution us to stop and think about how potential students are likely to access and interpret information before we simply rush to provide even more sources of information regarding college costs and student loans (Castleman, 2015). Information, as with financial aid itself, is only useful if students know it exists and can process it effectively. Policymakers would also be well advised to consider the fact that simple differences in the channels by which information is communicated can affect students’ postsecondary decisions (Castleman et al., 2015). They should be sure to take into account the research that has been done showing the effectiveness of more salient channels, including text messaging, as well as the time and place of where this

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6 See https://collegecost.ed.gov/ for links to these resources.
information is presented (Castleman & Page, 2014; Barr et al., 2017; Darolia, 2016; Stango & Zinman, 2014).

**Recommendations for Community College Administrators**

In their efforts to avoid sanctions for high CDRs, some community colleges are opting out of the federal loan programs altogether, or choosing not to include loan amounts in initial aid offers. This is an undesirable consequence of CDR regulations given the evidence that restricting access to loan funds via these methods decreases enrollment and persistence (Wiederspan, 2015; Dunlop, 2012; Marx & Turner, 2016). While reducing borrowing for some students might benefit them in the long run, it will likely harm others that need access to loan funding to attend college. One of the core tenets of the behavioral economic framework is to structure policy to help individuals most easily maximize well being without restricting their choices via strict mandates (Thaler & Sunstein, 2009).

While the PROSPER Act contains a few measures that might help community colleges provide optimal loan funding to students, it is important to keep in mind that the Higher Education Act of 1965 was due to be reauthorized back in 2013. At this point it is uncertain when reauthorization will take place, or when it does if these provisions will be included. In the absence of federal policy improvements, community college administrators could utilize the results of this study to take action themselves by enhancing the choice architecture of the student loan acceptance process in a way that helps students make more informed borrowing decisions, while remaining compliant with federal law and not restricting access to loan funding.

This study tested four different ways of presenting loan and cost information at the primary decision point of the borrowing process. Based on the results of this study and prior work, the recommended method of presenting loan eligibility to students is to include the full
amount of eligibility in financial aid award offers, thereby not restricting access to loan funding, but to combine it with the information-only messaging utilized in this study to help students understand that they have a choice of how much to borrow, and that there is a difference in interest accrual between the subsidized and unsubsidized loan types. It is important that the information to help guide student decision-making be placed in the most accessible place and time within the borrowing process, ideally within an online system for loan acceptance. Despite the modest effects of the interventions, one of the most important aspects of this technique is that it can be implemented at zero or minimal cost to the college. This makes informational messaging at the point of loan decision an extremely cost effective way of managing debt levels and default rates, while adding some simplification to an overly complex process.

It is important to note that the benefits of reduced borrowing may come at the cost of decreases in enrollment and credit completion. The information-only messaging recommended also led to a decrease in the likelihood that not yet registered students – 39% of the sample – would ultimately enroll in the fall semester by 6.7 percentage points. The enrollment and persistence outcome measures analyzed in this study were only for the current academic year, and no academic performance indicators (e.g. GPA) were included in the dataset that would determine whether students who did not enroll were on the margins of academic success, as found by Barr et al., 2017. Further research on the long-term impact of the interventions on academic outcomes would be needed to understand the true impact on attainment. Given the empirical information we do have regarding the mounting repayment issues experienced by non-traditional students at community colleges, especially those who never complete a degree, it is still recommended that community colleges implement informational efforts to assist students in making optimal borrowing decisions.
Administrators should also bear in mind the distinct effects informational interventions may have conditional on enrollment status when designing future programming to assist students through the college matriculation and financial aid process. What might benefit one group may harm another. One of the reasons the information-only condition is recommended is due to the fact that the per-credit and FT/PT cost treatments induced more borrowing amongst already registered students, without any associated increases in short-term attainment measures. Colleges may want to consider targeting informational messaging to those least informed, who would benefit the most, or carefully design nudges that will help all groups make optimal long-term decisions.

**Leveraging Technology to Reduce the Cost of Personalization**

It is likely that no fixed amount of loan offer is best for all students. Larger amounts will nudge some students toward over-borrowing, while smaller amounts will nudge others toward lower educational attainment (Marx & Turner, 2016). Ideally, the policy and choice architecture surrounding student borrowing decisions would lead to the exact right amount of debt for each individual student, and prior research has found that personalized information tailored to each student’s circumstances is important for optimal decision-making regarding college enrollment and financial aid (Bettinger et al., 2012; Darolia, 2016; Castleman & Page, 2014; Scott-Clayton, 2015; Castleman, 2015). Recent studies implementing personalized assistance via text messaging (Barr et al., 2017; Castleman & Page, 2014) still require staff time to respond to messaging, which for community colleges may be too high of a cost. The difficulty community colleges have in providing individualized financial counseling and advising services due to resource constraints is already documented in the research literature (Scott-Clayton, 2015) and noted by other researchers (Darolia, 2016).
Prior studies that involved additional staff resources for personal counseling were able to do so thanks to additional funding provided to support the research (Barr et al., 2017; Castleman & Page, 2014). For colleges where this is not an option, an alternative is to leverage technology to provide personalized and targeted information to students via automated systems. As an example, recent research by Page and Gehlbach (2017) experimented with artificial intelligence that analyzed student metadata to provide targeted outreach and automatically respond to student questions without staff member intervention. The technology has the capability to learn over time, requiring less and less staff interaction. Page and Gehlbach (2017) estimated the cost of their intervention at $7 to $15 per student per year (in addition to set-up costs of the platform). Prior interventions requiring individual counselor outreach were estimated at $100 to $200 per student (Page & Gehlbach, 2017; Castleman & Page, 2014). Barr et al. (2017) included a full-time staff member to respond to text messages in their campaign, and estimated the cost per student at $35.

This study simply modified the messaging displayed in the current student portal where students made their loan decisions, making it a no cost technology solution. Darolia (2016) also implemented an electronic informational intervention via the existing online student portal without additional technology system support resources. Innovations involving technology such as the usage of automated text messaging systems, online advising and counseling systems, and artificial intelligence (Page & Gehlbach, 2017) have the ability to provide personalized assistance in navigating complex pre-enrollment and financial aid tasks, without costly expenditures of staff time. As technology continues to influence how colleges deliver academic and student services, administrators should consider other low-cost ways of leveraging technology to provide personalized information regarding student loans.
Recommendations for Further Research

Behaviorally-informed policy interventions have the potential to greatly improve student outcomes, but there is also the risk that nudges may make some worse off (Thaler & Sunstein, 2009). Further study is needed varying the design of informational nudges and how they can be applied in new contexts (Baum & Schwartz, 2015; Madrian, 2014). There are a plethora of possible combinations for what, how, and when to say things, and each may have a different end result. It is important that we understand when and where a particular intervention works, and when and where it backfires (Baum & Schwartz, 2015). For example, if the interventions tested in this study were applied in the traditional four-year public or non-profit institutional context, it is possible the results would be completely different due to the differences in student characteristics, needs, and access to information. Institutions and policymakers should make sure nudges are rigorously tested in the appropriate environments before introducing changes to the choice architecture.

Complementing the recommendations of Madrian (2014), additional research is needed that compares the various behaviorally-informed policies to each other as well as to traditional policy. For example, is it more effective to provide information at the time of the loan decision, as developed in this study, or to provide informational text messages to students encouraging them to get through the process and to select optimal loan amounts prior to their initial decision, as developed by Barr et al. (2017)?

Most behaviorally-informed studies in the higher education context have been conducted relatively recently, so the long-term impact on degree attainment and student loan repayment is unknown. The experimental sample from this and prior studies should be followed long-term to determine the long-run effects of informational interventions. Long-run data on academic
outcomes and degree attainment is especially necessary in order to complete a comprehensive
cost-benefit analysis of efforts to reduce borrowing for community college students. A more
immediate extension of this research would be to conduct a follow-up survey, similar to those
conducted by Barr et al. (2017). Follow-up studies can provide insight regarding why students
respond to interventions in a certain way. For example, a follow-up survey for this study might
have revealed whether students viewing the more complex COA treatment did not read or
understand it, leading to the lack of statistical difference from the control group, or whether they
truly responded to the increased dollar amounts presented.

This study tested the presentation of information in an easy-to-access location and
delivered at a time when it would be most salient to the student. However, the cost information
was displayed as the average published price, rather than the individualized net price the student
would pay once actual tuition and fees for their courses were calculated and grant aid was
applied. An enhanced version of this study would employ personalized information, which most
behavioral researchers agree is more effective in influencing behavior, but influencing it in a way
that is more beneficial for the student (Madrian, 2014; Castleman & Page, 2015; Bettinger et al.,
2012; Barr et al., 2017). With personalized information on net price, the student could more
easily calculate the amount of loan funding they would need based on their circumstances and
personal preferences.

Part of this study involved developing the over-borrowing metric that allows the
measurement of borrowing levels relative to annual and lifetime limits while in school. While the
application of the over-borrowing metric in this study did not yield significant results, it could be
applied to the analysis of borrowing levels and default outside of the informational interventions
to determine its applicability as an additional monitoring device that could be used by institutions or policymakers.

**Conclusion**

Earlier in this dissertation, I proposed four research questions. The primary purpose of this research was to understand the extent to which access to information on college cost and loan details influences community college student borrowing decisions. Results of this study contribute to the evidence found in the literature that community college borrowing can be reduced at little administrative cost utilizing behaviorally-informed nudges during the loan acceptance process.

Prior studies have not explored the impact of utilizing cost information to influence borrowing levels. Results regarding my second research question indicate that students do, in fact, respond to cost figures presented at the time of loan decision, and that the way price is framed (per credit, average tuition and fees, and full cost of attendance) matters. This finding, in particular, is evidence that the behavioral economic principles of framing and anchoring do apply in the higher education context.

I also explored what factors might mitigate the role of the information. I expected and did find increased sensitivity within certain subgroups, namely independent students and first-time borrowers. However, the most significant mitigating factor discovered was the role of registration timing on how students responded to the interventions. Any implementation of informational interventions into the borrowing process should take into account the fact that cost information is likely interpreted differently by students who are not as far along in the enrollment process, compared to students who have already committed to attending by registering for classes.
Findings regarding my last research question are also important for policymakers to consider. Consistent with prior research at the community college level, interventions that led to a reduction in borrowing also led to reductions in short-term indicators of attainment, including attempted credits in the subsequent two terms. Given this information, any efforts to reduce community college student loan borrowing must be weighed against possible decreases in enrollment and persistence. There is still an important gap to be filled within the research literature that fully explores the long-run impact of student debt and efforts to reduce borrowing on academic outcomes and degree completion.
APPENDIX A
INTERVENTION TEXT

1. Control

If you would like to accept only a partial amount of a loan, please accept the full amount here and email email@cc.edu from your CC email account with your name, student ID number, and the amount of the loan you would like to accept.

2. Information Only Treatment

The following is a description of the loans you might be awarded. Please make your decision to accept or reject these loans below. More information on the requirements for receiving and repaying student loans can be found on our Loan Information webpage.

- Federal Direct Subsidized Loan – Interest is paid by the government while you are enrolled at least half-time and during the 6 month grace and periods of deferment.
- Federal Direct Unsubsidized loan – Interest begins accruing immediately upon disbursement

If you would like to accept only a partial amount of a loan, please accept the full amount here and email email@cc.edu from your CC email account with your name, student ID number, and the amount of the loan you would like to accept.

3. Per Credit Treatment

When deciding to accept your loans, keep in mind tuition for in-state students is only $104.39 per credit hour.

The following is a description of the loans you might be awarded. Please make your decision to accept or reject these loans below. More information on the requirements for receiving and repaying student loans can be found on our Loan Information webpage.

- Federal Direct Subsidized Loan – Interest is paid by the government while you are enrolled at least half-time and during the 6 month grace and periods of deferment.
- Federal Direct Unsubsidized loan – Interest begins accruing immediately upon disbursement

If you would like to accept only a partial amount of a loan, please accept the full amount here and email email@cc.edu from your CC email account with your name, student ID number, and the amount of the loan you would like to accept.

4. Tuition Treatment
When deciding to accept your loans, keep in mind average tuition and fees per semester for in-state students is only $1,253 for full-time and $626 for half-time enrollment.

The following is a description of the loans you might be awarded. Please make your decision to accept or reject these loans below. More information on the requirements for receiving and repaying student loans can be found on our Loan Information webpage.

- Federal Direct Subsidized Loan – Interest is paid by the government while you are enrolled at least half-time and during the 6 month grace and periods of deferment.
- Federal Direct Unsubsidized loan – Interest begins accruing immediately upon disbursement.

If you would like to accept only a partial amount of a loan, please accept the full amount here and email email@cc.edu from your CC email account with your name, student ID number, and the amount of the loan you would like to accept.

5. Cost of Attendance Treatment

When deciding to accept your loans, keep in mind the full cost of attendance as listed below:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time, Living on own</td>
<td>$8,333</td>
</tr>
<tr>
<td>Half-time, Living on own</td>
<td>$6,362</td>
</tr>
<tr>
<td>Full-time, Living at home</td>
<td>$6,005</td>
</tr>
<tr>
<td>Half-time, Living at home</td>
<td>$4,034</td>
</tr>
</tbody>
</table>

The following is a description of the loans you might be awarded. Please make your decision to accept or reject these loans below. More information on the requirements for receiving and repaying student loans can be found on our Loan Information webpage.

- Federal Direct Subsidized Loan – Interest is paid by the government while you are enrolled at least half-time and during the 6 month grace and periods of deferment.
- Federal Direct Unsubsidized loan – Interest begins accruing immediately upon disbursement.

If you would like to accept only a partial amount of a loan, please accept the full amount here and email email@cc.edu from your CC email account with your name, student ID number, and the amount of the loan you would like to accept.
# APPENDIX B
## ANNUAL AND AGGREGATE STAFFORD LOAN MAXIMUMS FOR UNDERGRADUATE STUDENTS

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Dependent Students</th>
<th>Independent Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subsidized</td>
<td>Unsubsidized/SLS</td>
</tr>
<tr>
<td>1st-year</td>
<td>$2,625</td>
<td>†</td>
</tr>
<tr>
<td>2nd-year</td>
<td>2,625</td>
<td>†</td>
</tr>
<tr>
<td>3rd-, 4th-, 5th-year</td>
<td>4,000</td>
<td>†</td>
</tr>
<tr>
<td>Cumulative total</td>
<td>17,250</td>
<td>†</td>
</tr>
</tbody>
</table>

| 1993–94 to 2006–07   |            |                  |          |            |              |          |
| 1st-year             | 2,625      | 2,625            | 2,625    | 2,625      | 4,000        | 6,625    |
| 2nd-year             | 3,500      | 3,500            | 3,500    | 3,500      | 7,500        | 7,500    |
| 3rd, 4th, 5th-year   | 5,500      | 5,500            | 5,500    | 5,500      | 10,500       | 10,500   |
| Cumulative total     | 23,000     | 23,000           | 23,000   | 23,000     | 46,000       | 46,000   |

| 2007–08              |            |                  |          |            |              |          |
| 1st-year             | 3,500      | 3,500            | 3,500    | 3,500      | 7,500        | 7,500    |
| 2nd-year             | 4,500      | 4,500            | 4,500    | 4,500      | 8,500        | 8,500    |
| 3rd-, 4th-, 5th-year | 5,500      | 5,500            | 5,500    | 5,500      | 10,500       | 10,500   |
| Cumulative total     | 23,000     | 23,000           | 23,000   | 23,000     | 46,000       | 46,000   |

| 2008–09 - 2017-2018 (Current) |            |                  |          |            |              |          |
| 1st-year             | 3,500      | 5,500            | 5,500    | 3,500      | 9,500        | 9,500    |
| 2nd-year             | 4,500      | 6,500            | 6,500    | 4,500      | 10,500       | 10,500   |
| 3rd-, 4th-, 5th-year | 5,500      | 7,500            | 7,500    | 5,500      | 12,500       | 10,500   |
| Cumulative total     | 23,000     | 31,000           | 31,000   | 23,000     | 57,500       | 57,500   |

† Not applicable.

1. Until 1992–93, only independent students (and some dependent students with exceptional need) could take out a Supplemental Loan for Students (SLS), which was an unsubsidized student loan. Beginning in 1993–94, the SLS program was phased out and unsubsidized Stafford loans were made available to all students regardless of need.

2. Dependent students whose parents are denied the PLUS Loan are allowed the additional unsubsidized amounts available to Independent Students.

Sources: Wei & Skomsvold, 2011; FinAid.org
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Kayla Bannister Charles earned her Bachelor of Arts degree in Spanish with a minor in public administration from the University of South Florida in 2007 and a Master of Business Administration from The University of Tampa in 2010. While working on her MBA at The University of Tampa, she had the opportunity to begin her career in higher education administration, starting in the role of financial aid counselor. In 2014, she decided to continue her education in her career field and began the doctorate in the Higher Education Administration program at the University of Florida.

Over the course of her career in higher education, Kayla has worked in both the private non-profit and public two-year sectors in the areas of enrollment management and information technology. She plans to continue her career in enrollment management, combining her practical skills and experience with the research and policy knowledge she has gained in her doctoral studies.