How do student loans impact the American Dream?
Exploring the implications of federal, private and parent PLUS student loan debt on homeownership

by

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AN ABSTRACT OF A DISSERTATION

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DOCTOR OF PHILOSOPHY

School of Family Studies and Human Services
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Abstract

The importance of homeownership for individuals and society is well documented in the literature. Real estate plays a significant role in the portfolios of households and as the largest single component of U.S. GDP, the strength of the nation's economy, and others across the globe, are heavily affected by the health of U.S. real estate markets(Yun, 2015, 2016; Yun et al., 2022; Yun & Evangelou, 2016). Despite its importance, homeownership rates in the U.S. have been declining since the 1980's, particularly among younger households, and there is a growing body of evidence suggesting that student loans are a significant obstacle to home purchases (Glassman et al., 2019; National Association of Realtors, 2021; National Association of Realtors Research Division & American Student Assistance, 2017; Prudential Research & Perspectives, 2019)

Federal student loans are the most common type of student loan and offer the most flexible and affordable payment options. However they are subject to borrowing limits, which have not kept pace with the cost of tuition, forcing many borrowers and their families to turn to less flexible and more expensive parent PLUS and private loans to finance higher education expenses. Total outstanding student loan debt topped $1.75 trillion by the third quarter of 2022, with private student and PLUS loans accounting for roughly 7.24 and 5.5% of the total, respectively (Board of Governors of the Federal Reserve, 2023; Enterval Analytics, 2023). (Fletcher & Webster, 2020; Kreighbaum, 2019). Unlike other forms of consumer debt, student loans are rarely dischargeable in bankruptcy and the penalties for default are particularly harsh.

Recent economic indicators including rising interest rates, wavering consumer confidence, and stagnant real wages, point to early signs of weakening housing markets. Given its importance in the overall health of the nation's economy, these trends are of particular concern. Furthermore, the recent resumption of federal student loan payments after more than 3

years of deferment during the COVID-19 pandemic is already raising concerns among experts for the impact they will have on consumer budgets and their ability to qualify for a mortgage, adding particular urgency and relevance to this research (Colomer, 2023; Sheffey, 2023; Sor, 2023).

While previous research has generally shown that student loans have a negative impact on homeownership, most of the relevant literature has only measured the effects the *presence* student loan debt has on homeownership rather than considering the *size* or *type* of the debt in the analyses. Because debt payments, rather than total outstanding debt are a central factor in mortgage underwriting decisions, including student debt payments is essential for thorough analysis of housing tenure decisions. By shedding light on the relationships between various types of student loans, homeownership, and borrowing behavior this study fills an important gap in the literature as it relates to types of student loan debt, homeownership, and mortgages.

Following the neoclassical theory of housing demand, this research utilizes the 2019 Survey of Consumer Finances to examine these relationships with four different models. First, a logistic regression model was used to assess the impact of student loans on homeownership, next a selection model was developed to analyze the impact between student loans and a household's mortgage debt burden. Finally, the relationships between student loans and mortgage types, specifically, adjustable-rate and federally insured/guaranteed mortgages, were examined.

Results confirm previous findings that student loans generally reduce the likelihood of homeownership, increase mortgage burdens, and lead borrowers towards riskier or costlier mortgage options. Importantly, this research also unveils new insights regarding the impact of different types of student loans on homeownership. Federal loan holders, for instance, are less likely to own a home than households without student loan debt but have a higher likelihood of

homeownership compared to borrowers with private or parent PLUS student loans.

The research also shows that the amount of student loan debt is a significant factor affecting homeownership, with various types of loans having different effects. Further, results indicate student loan payment burdens affect the monthly cost of a mortgage as well as the type of mortgage a borrower qualifies for, differing across student loan types and independent of other household characteristics. Student loan borrowers are more likely to secure adjustable-rate and federally backed mortgages in general, with federal loan borrowers having a higher probability of holding a federally backed mortgage than private loan holders, who in turn had a higher probability of holding a federally backed mortgage than parent PLUS loan borrowers. Having private loans also increases the probability of having an adjustable-rate mortgage, while increasing private and parent PLUS loan balances and payment burdens also increase the probability of having an adjustable-rate mortgage.

In summary, this research offers compelling evidence that student loans overall, student loan payment burden, as well as the type of student loan held, play substantial roles in shaping homeownership outcomes for student borrowers with existing loans (results may not accurately capture the outcomes of those that previously borrowed but no longer have student loan debt). These findings contribute to a deeper understanding of the dynamics between student loans, homeownership, and mortgage choices, shedding light on critical factors that influence housing tenure decisions.

Keywords: Student loans, federal student loans, private student loans, PLUS student loans, homeownership, mortgage burden, mortgage type, housing tenure, housing demand

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Stuart J. Heckman

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Dedication

This dissertation is a testament to the collective effort and sacrifices made by my family, whose unwavering love, support, and encouragement have been my guiding light throughout my academic journey. With profound pride and sincere gratitude, I dedicate this work to you.

To my husband, Dylan Usrey, for standing by my side through the ups and downs of graduate school, believing in me when my faith faltered and encouraging me to chase my dreams above all else, I truly could not have done it without you.

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Chapter 1 - Introduction

A charming home in the suburbs with a white picket fence, vibrantly green grass and friendly neighbors waving as you return home from a day at the office has been the quintessential image of the American Dream for quite some time. Historically homeownership has also served as an important driver of wealth accumulation, yet homeownership rates have returned to nearly the same levels seen nearly four decades ago. In 1980, 65.5% of Americans were homeowners, just slightly below homeownership rates at the beginning of 2023, when 66% of Americans owned their home (U.S. Census Bureau, 2023). While nearly 78% of Americans in a recent survey reported that homeownership is an important part of the American Dream, a growing number are losing confidence they will ever be able to achieve it, and for Millennials, the dream feels particularly out of reach (Mynd Consumer Insights, 2022). According to a 2022 survey of Millennials (respondents between the ages of 25 and 40 at the time of the survey) nearly half were unsure if they would ever be a homeowner (de Jong, 2022). Reasons behind the decline in homeownership rates and pessimism among would be first time homebuyers are varied; while many cite affordability, access to credit, low wages and debt in general as barriers to achieving their homeownership goals, student loan debt is often noted to be particularly burdensome (de Jong, 2022; Legal & General, 2021; Nilaj, 2021; Ostrowski, 2023).

By the end of 2022, total student loan debt (federal and private) in the U.S. topped $1.75 trillion (Board of Governors of the Federal Reserve System, 2023b). As interest rates continue to rise and real wages fail to keep up with the country's record-breaking inflation, the budgets of most American households have suffered (Board of Governors of the Federal Reserve System (US), 2023; U.S. Bureau of Labor Statistics, 2023; World Bank, 2023). Delinquencies on auto loans and credit cards have risen, the balances Americans carry on their credit cards are growing

at a rate not seen in over twenty years, and while experts have yet to agree on when the U.S. economy will enter an official recession, the rising delinquencies and shaky consumer confidence reports foreshadow the pain of economic contraction that appears to have already begun taking hold (Federal Reserve Bank of New York, 2022; Haughwout et al., 2022; The Conference Board, 2022, 2023; Federal Reserve Bank of New York, 2022; Haughwout et al., 2022; The Conference Board, 2022, 2023).

Since March 2020, federal student loan payments and interest have remained frozen, a byproduct of the COVID-19 pandemic that has served to soften the financial blow for the 45 million Americans with currently outstanding federal student loan debt (Helhoski & Haverstock, 2023; U.S. Department of Education, n.d.-a). During the payment pause, student loan borrowers were able to make headway on other financial goals, with many taking advantage of the extra savings to pay down credit card debt, shore up emergency funds and improve their credit scores (Ghoshal-Datta et al., 2022). Private student loan borrowers have not benefited from the same reprieve. Interest rates on private loans continue to rise, currently as high as 16.43% (as of January 25, 2023), driving up borrower payments and contributing to private loan delinquencies (Amir et al., 2021; Medine & Pimplaskar, 2023). Experts have been referring to the enormous amount of education debt as the "next bubble to burst," since at least 2008, and with good reason. Unlike other forms of consumer debt, student loans are rarely dischargeable in bankruptcy, and defaulted federal student loans have particularly harsh penalties allowing the federal government to withhold tax refunds and other federal benefits, garnish wages, and even garnish social security retirement and disability benefits from defaulted borrowers (U.S. Department of Education, n.d.-c).

Student loan forgiveness, reform and other changes are gaining traction in political circles, but much of the proposed legislation is solely focused on providing relief to borrowers with federal student loans; completely ignoring the millions of borrowers currently carrying Parent PLUS and private student loan debt (Minsky, 2021). While federal student loan balances currently make up the majority of outstanding student loan debt, legislation that fails to address the other types of student loan debt is akin to fixing a hole in a sinking ship with duct tape.

With student debt levels rising faster than other types of consumer debt and growing evidence of the burdens associated with student loan repayment, understanding the multi-faceted relationship between homeownership and student loan debt is becoming increasingly important (Beamer, 2020; Board of Governors of the Federal Reserve System, 2023a).

Financial Benefits and Costs of Higher Education

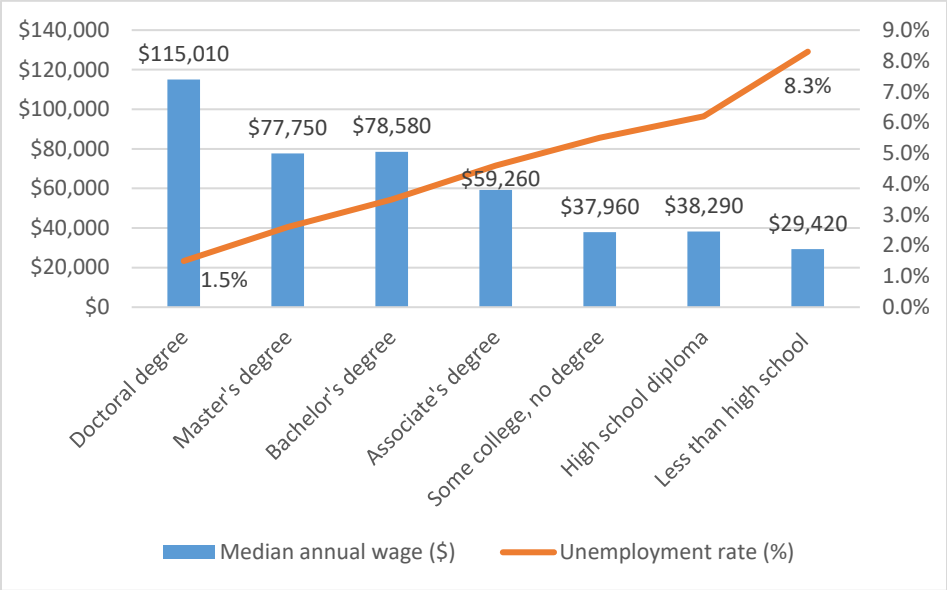
Financial Benefits of Higher Education

While higher education is certainly not the only path to high income and wealth, it is widely considered to be a significant contributing factor in one's financial success. Often referred to as the "college wage premium," the relationship between higher income and higher levels of education that is not explained by external factors is well supported in the literature with many authors finding connections between increasing levels of education and higher income and lifetime earnings (Carnevale et al., 2011; Nadworny, 2019; Scopelliti, 2020; Tamborini et al., 2015; Wolla & Sullivan, 2017). One such analysis showed that median lifetime earnings increase with each level of educational attainment; median lifetime earnings were 25% higher when comparing those with associate degrees to high school graduates, 75% higher for individuals with a bachelor's degree (as compared to those with only high school diplomas) and 43% higher for individuals with a doctorate as compared to those with only a bachelor's

degree(Carnevale et al., 2021). Bhuller et al. (2014) estimated that each additional year of education generated a 10% internal rate of return (after accounting for income taxes and pensions), while Abel and Deitz (2014) calculated the internal rate of return for a college degree and found that both associate and bachelor's degrees generated returns of about 15% (though the authors did note that the lifetime earnings for bachelor's degree holders were significantly higher than those for holders of associate degrees). A 2019 College Board study examining the benefits of higher education found that college graduates with a bachelor's degree earn about 66% more than their peers with only a high school diploma over a 40-year working life(Ma et al., 2020) There is also a large amount of evidence demonstrating the payoff to individuals for obtaining advanced degrees in terms employment and wealth.

Recent salary data published by the U.S. Bureau of Labor Statistics (BLS) illustrates the relationship between educational attainment, median annual earnings and unemployment which can be seen in Figure 1.1. College graduates are generally perceived as having more marketable skills than workers that did not graduate from college, consequently, college graduates tend to benefit from better work opportunities and more job security. During the Great Recession, college graduates experienced fewer job losses and as the U.S. recovered from the recession, they also experienced significantly greater job gains than non-college educated individuals. According to researchers at Georgetown University's Public Policy Institute, nearly 80% of job losses that occurred during the Great Recession were concentrated among those who did not have any higher education, and as the economy recovered, more than half of the employment gains were concentrated among candidates with bachelor's degrees or higher(Carnevale et al., 2012).

Figure 1.1 Unemployment rates and earnings by educational attainment (2021)



Note. The data for unemployment rate and median annual wage by educational attainment is from *Current Population Survey: Education*, by United States Census Bureau, 2021 (https://www.census.gov/programs-surveys/cps.html).

Not only are college graduates less likely to be unemployed, they also tend to secure more jobs with employer benefits such as health insurance and employer sponsored retirement plans and are more likely to receive promotions (Carnevale et al., 2015; Carnevale & Rose, 2015). Access to employer benefits is particularly valuable for the financial stability they can offer workers and some research has found evidence that a lack of insurance coverage is related to lower household wealth (Gropper & Kuhnen, 2021). In a 2018 Report from the Federal Reserve Bank of St. Louis, family wealth, or net worth was 18% higher among households whose head was a college graduate, than those of non-college graduates. Further, after accounting for inheritance/endowment effects, they found that the higher household wealth of college graduates could be entirely attributed to their own educational accomplishments(Kent et al., 2018).

While some of the reasons behind these findings can easily be identified (as one's income increases it becomes easier to accumulate savings, avoid and/or pay down debt, contribute to retirement accounts and invest in a variety of assets for example), studies that have controlled for variables that could influence lifetime earnings and wealth still find a significant difference in household wealth by educational attainment(Daly & Bengali, 2014; Kuhn et al., 2020; Wolla & Sullivan, 2017). In a 2020 analysis, researchers analyzed data from the Survey of Consumer Finances comparing households with and without college education; between 1971 and 2016 the average real income for college educated households increased by 50%, while household wealth for this population grew by more than 300% during the same time period (Bartscher et al., 2020). Although the future financial benefits of obtaining a college degree can be profound, students and their families must also consider the personal and financial costs of obtaining such an education. Because most students require at least partial financial support in the form of student loans, the affordability of their education after graduation is a crucial factor that should be considered during the decision-making process.

Student Loans

For many Americans, student loan debt can feel like a necessary evil. Most students do not have the financial means to attend college without the use of student loan debt. Results from the Federal Reserve Board's 2021 Survey of Household Economics and Decision Making revealed that nearly 40% of Americans used some form of debt to pay for their own college education, and 8% of respondents had taken on education debt in the form of a loan or co-signing on a loan to pay for someone else's education(Board of Governors of the Federal Reserve System, 2022). There is a tradeoff to be made; student loans mean a higher debt burden upon graduation, but receiving a higher education means a potentially higher income upon graduation.

Striking a balance between higher levels of debt and the potential for higher income associated with attending college is difficult for many reasons and has led some students to avoid attending college altogether. By the end of 2020, college enrollment had reached its lowest level in thirteen years, and the trend continued with undergraduate enrollment dropping 9.4% heading into the fall semester of 2021, followed by a further 4.7% decline in enrollment between the fall semester of 2021 and the spring semester of 2022(National Student Clearinghouse Research Center, 2022). While the pandemic likely contributed to a portion of the decrease, enrollment in U.S. colleges and universities was already declining several years before the pandemic even began. The high cost of college tuition and fear over being saddled with unaffordable student loan debt has frequently been cited as major considerations when individuals and their families are assessing the value of obtaining a college degree(Camera, 2022; Nadworny, 2019, 2022).

Federal Student Loans

Federal student loans are funded by the U.S. government with loan terms and conditions that are set by law. These loans are characterized by fixed interest rates, have a variety of repayment options and multiple programs that can eventually lead to partial or full loan forgiveness for qualified borrowers. Most federal student loans are issued directly to the student whose education they are intended to finance. While there are different categories of federal student loans depending on a borrower's financial need and the type of degree being sought, these loans do not have income or credit requirements. The U.S. Department of Education's website studentaid.gov contains up-to-date information on the types of financial aid available for a borrower's education. Students must be enrolled at least half-time in a degree seeking program to qualify, and payments are typically deferred until six months after borrowers graduate or drop below half-time status.

These loans are generally considered to be the most flexible and affordable, with fixed interest rates, a variety of repayment options and the availability of loan forgiveness programs for certain qualified borrowers. Unsubsidized loans, or loans that are not awarded based on financial need will accrue interest even during periods of deferment, so if borrowers do not make interest payments the interest will be capitalized, causing loan balances to grow over time. The exact amount a student can borrow is determined by the cost of attendance at their particular school and their financial circumstances (or that of their family's if the student is still considered a dependent for income tax purposes), but there are limits on the total amount students can borrow in each academic year and overall.

For dependent undergraduate students, borrowing is capped at $5,500 for first-year students; in the second year of enrollment the amount increases to $6,500 and for students in their third year or more the annual limit is $7,500. In total, undergraduate students may not borrow more than $31,000 for their education (U.S. Department of Education, n.d.-d). Federal student loan borrowing limits have not kept up with the speed at which tuition bills continue to climb, forcing many students to choose between finishing their degree or seeking alternative financing through Parent PLUS loans or private loans(Berman, 2017; Robb et al., 2020).

Parent PLUS Loans

When a student's cost of attendance is greater than the amount of financial aid they can receive on their own (the total of grants, scholarships, and student loans borrowed in their own name), parents can finance the remainder on behalf of their child. These federal loans are not made to the student (so they do not appear on the student's credit report) leaving parents solely

responsible for the debt. PLUS[1] loans are credit based, meaning parents must not have an adverse credit history to be approved, but they do not have a borrowing limit, nor do they take the parents' income into account. Unlike loans made directly to the student, PLUS loans charge an origination fee of 4.228% of the loan amount, which is deducted from each disbursement (essentially charging parents interest on the loan fees), for comparison, origination fees on new federal direct loans are currently just 1.057%(U.S. Department of Education, 2023b) .

Interest rates are generally higher than those for student borrowers and interest begins to accrue immediately after disbursement, while payments can only be deferred upon request. Additionally PLUS loans are generally not eligible for the variety of flexible repayment and loan forgiveness options available to student borrowers, leaving parents at greater risk of being saddled with payments they may not be able to afford, and responsibility for the loans cannot be transferred to the child, at any point, leaving parents solely responsible for the debt (U.S. Department of Education, 2023b).

Both the borrowing volume and outstanding balances of Parent PLUS loans have grown in recent years, with PLUS loans currently accounting for roughly 25% of all new undergraduate student loan debt issued by the federal government each year (Fletcher & Webster, 2020; Kreighbaum, 2019). Between 2014 and 2019, outstanding PLUS loan balances grew by 36% reaching $96.1 billion dollars by the end of 2019 (Fletcher & Webster, 2020). Many PLUS

[1] Direct PLUS Loans are federal loans that are made to graduate or professional students and parents of dependent undergraduate students. A "Direct PLUS Loan is commonly referred to as a parent PLUS loan when made to a parent, and as a grad PLUS loan when made to a graduate or professional student" (U.S. Department of Education, 2023d). So while the technical definition of a PLUS loan could include loans made to graduate students for their own education, for the purposes of this analysis the term PLUS loan is specifically used in reference to parent PLUS loans, i.e. loans obtained for someone else's education. Loans obtained to pay one's own graduate education (or a spouse's graduate education) are included in the federal loan category for these analyses.

borrowers approaching retirement are still carrying student loan debt for which they are solely responsible for repaying. According to the most recent data available, between 2005 and 2015, the number of Parent PLUS borrowers over the age of 50 doubled and the number of borrowers over the age of 65 more than tripled (Berman, 2017). With many near-retirement households lacking sufficient retirement savings, those that also carry student loan debt after leaving the workforce will be impacted particularly hard (Bawden, 2016; Rhee & Cruz, 2013; Walsemann & Ailshire, 2017). Evidence of financial strain has already started to appear, with recent data showing nearly 10% of PLUS borrowers were in default by 2019 (Krupnick, 2021).

Private Student Loans

While most students borrow to finance their education, borrowers who opt to use private loans take on additional risk. Private student loans are funded by private organizations with terms set by the lender (U.S. Department of Education, n.d.). Historically, private student loans have had fewer and less flexible repayment options, higher interest rates and no forgiveness options as compared to federal student loans, often leaving student borrowers in a difficult position when their loans go into repayment (College Raptor Staff, 2018).

Private loans typically have variable interest rates; some do have fixed rates, but the rates are high. As of February 6, 2023, Sallie Mae was advertising a fixed interest rate on undergraduate private loans as high as 14.83% (Sallie Mae, 2023). By comparison, the interest rate for unsubsidized federal student loans was 4.99% for undergraduates and 6.54% for graduate students (U.S. Department of Education, 2023g). Private student loans also do not have the variety of repayment options designed to help borrowers avoid default, such as financial hardship deferment, income-based repayment or loan forgiveness (The Institute for College Access and Success, 2016). Despite having the characteristics of other forms of consumer debt, such as

credit cards, private student loans are much more difficult to discharge in bankruptcy thanks to the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (The Institute for College Access and Success, 2016; DeNicola, 2018). The lack of flexibility in repayment options, high interest rates and resulting high payments are likely behind the greater default rates on private student loans- as high as 25% on private loans disbursed prior to 2007 (Kamenetz, 2017). Delinquent private student loans totaled more than $1.3 billion at the end of the third quarter of 2021(Amir et al., 2021).

Despite the less favorable terms, private student lending has started to play larger role in student and family finances; between the third quarter of 2010 and the third quarter of 2021, private loan originations increased by more than 104% (Amir et al., 2021). A vast majority of private student loans are cosigned, and recent data suggests these loans affect a large number of borrowers as they near retirement age; 57% of private loan cosigners are over the age of 55, and on average, these borrowers have private loan balances of $20,490 (Student Borrower Protection Center, 2020). The private student loan market is rife with complaints of borrower abuse, as of April 6, 2023, the Consumer Finance Protection Bureau received an average of 4.5 complaints about private student loan servicers every day; such complaints accounted for nearly 44% of all student loan servicer complaints received in the previous three years (Consumer Financial Protection Bureau, 2023) .

Even more alarming, due to a lack of federal reporting requirements, there is a large amount of private loan debt that is not accurately being reported and tracked alongside other student debt statistics (Student Borrower Protection Center, 2020). Because of this, the full scope of the private student lending market is unknown. As of 2019, an estimated $38.2 billion in private student loans were part of the “shadow education finance market,” a term used to refer to

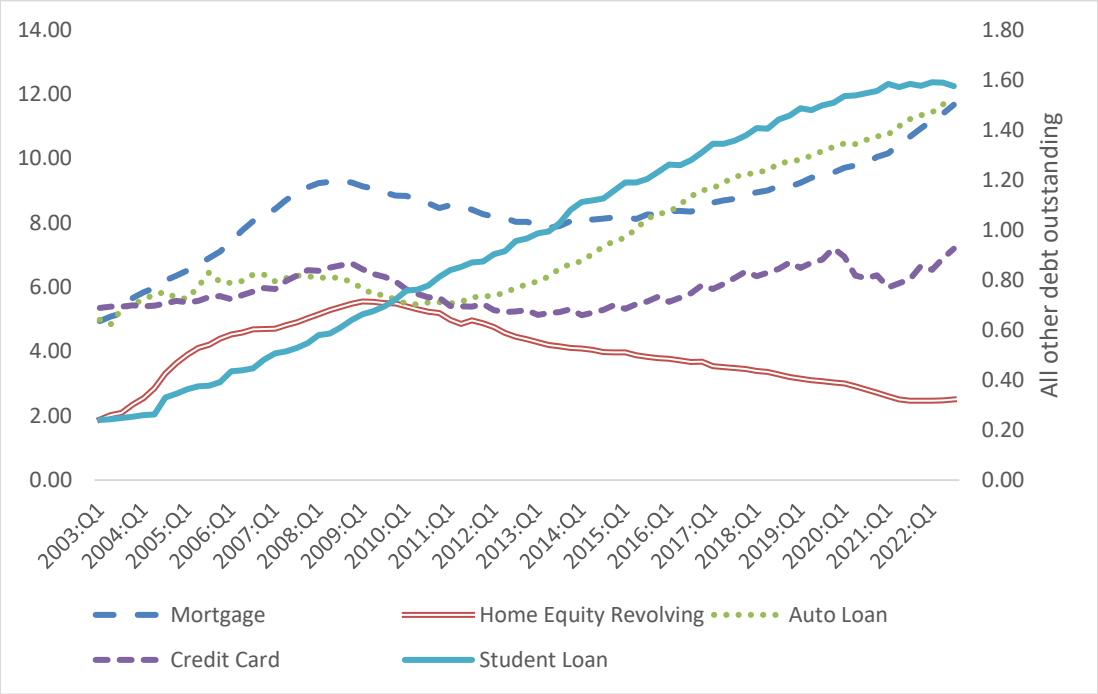
loans that do not meet the legal definition[2] for a private education loan, but nonetheless, are marketed to students and their families as an option for financing higher education(Student Borrower Protection Center, 2020) .

Trends in Student Loan Borrowing

Between 1991 and 2021, tuition and fees at public universities in the United States increased by an astounding 225% after adjusting for inflation, while real median family income grew by just 27%(Ma & Pender, 2022). With the price tag for a college degree growing faster than median family income in the United States over the last 30 years, it is little surprise that student borrowing has played an important role in filling the funding gap for obtaining a higher education. Figure 1.2 shows the composition of total outstanding consumer debt over time. Beginning in 2013, student loan borrowing began to surpass all other types of outstanding debt, topping $1.75 trillion by the third quarter of 2022, with private student loans accounting for 7.24% of the total(Board of Governors of the Federal Reserve, 2023; Enterval Analytics, 2023). Although this increase could partially be explained by an increase in college enrollment during this time, the number of students and parents that took out loans for college and the average amount they borrowed also grew during this time(Congressional Budget Office, 2020).

[2] In 2009, the Federal Reserve Board of Governors revised the legal criteria for meeting the definition of a "private education loan" under the Truth in Lending Act (Federal Reserve System, 2009).

Figure 1.2. Outstanding Debt by Type (in trillions)



Source: New York Fed /Equifax Consumer Credit Panel

The Consequences of Student Loan Debt

Debt Burden

Despite the positive influence a college degree has on income and lifetime earnings, many borrowers report that student loans are a major source of financial stress(Prudential Research & Perspectives, 2019). Borrowers with debt payments have more difficulty than non-borrowers in accumulating savings, as the required loan payments reduce their disposable income, and studies show that student loan borrowers are less likely to have emergency savings (Dettling et al., 2022; Dew & Yorgason, 2010; Magwegwe et al., 2022). Prudential's, 2019 survey of college students and graduates, revealed that 55% of college graduates that were actively making student loan payments felt that the expense was affecting their ability to save for

emergencies, while 38% reported experiencing financial struggles. Additionally, nearly two-thirds of borrowers felt their student loans were an "emotional burden"(Prudential Research & Perspectives, 2019, p. 6). Similar results were found in the Federal Reserve's 2020 study of the economic well-being of U.S. households, with lower levels of financial well-being reported among adults with student loan debt, and after controlling for education level, student loan borrowers were also less likely to describe themselves as "doing okay financially" (Board of Governors of the Federal Reserve System, 2021).

The pain of student loan debt is not limited to only low- or average-income borrowers, even those with high incomes are not immune to the negative effects of student loan debt (Nahvi, 2018). According to the Association of American Medical Colleges, median student loan debt for medical school graduates was $200,000 in 2019 (the most recent year for which data was available), while median annual income for physicians and surgeons was $208,000 per year (U.S. Bureau of Labor Statistics, 2022). The U.S. Department of Education categorizes student debt burden by the monthly loan payment amount relative to borrower gross monthly income; a debt burden of 8% or a less is considered low, between 8 and 14% is considered medium, and a debt burden above 14% is considered high by these standards (Lew, 2015). Under a standard ten-year repayment plan at 6.54% (the current interest rate for federal graduate student loans), student loan payments for the typical new doctor would represent about 13% of their gross monthly income, putting them just one% shy of meeting the definition for having a high debt burden under these guidelines. Student loan borrowers are also more likely to accumulate other types of consumer debt, further straining household finances and putting them at greater risk of negative financial outcomes (Lew, 2015).

Delinquency

A borrower is generally considered to be delinquent on a debt when they are 30 days or more behind on a payment and it is reported to the national credit bureaus, however for federal student loans, borrowers are considered delinquent the first day after missing a payment (Akin, 2020; U.S. Department of Education, n.d.-c). Delinquent payments can haunt borrowers in a multitude of ways as poor credit can affect an individual's chances of being approved for new financing, rental homes, or even certain jobs. Borrowers that get too far behind on payments are also at risk of having the financed items repossessed, judgements placed on their credit reports and having wages and/or bank accounts garnished to repay the debt. Because most federal and private student loans are not dischargeable in bankruptcy, the consequences of being delinquent on student loan payments are particularly punitive (Consumer Financial Protection Bureau, 2022; Krupnick, 2021). Prior to the federal student loan payment pause that was implemented as a result of the COVID-19 pandemic, roughly 16% of federal student loan borrowers with loans in repayment status were at least 30 days behind on their payments (U.S. Department of Education, 2023a). During this time, approximately 18% of federal student loan borrowers were not required to make payments because their loans were in deferment, forbearance or under a grace period status, so these figures likely understate the number of borrowers experiencing financial difficulties related to their student loans (M. Brown et al., 2012). Defaulted federal student loans are particularly painful for borrowers due to the government's ability to seize borrowers' federal benefits to repay the debt. Information on social security offsets specifically for student loans (a term that refers to government garnishment of social security benefits), is not regularly made public, but in 2016, the Government Accountability Office issued a report that contained several revelations: in 2015 the government garnished social security benefits from 114,000 delinquent

borrowers over the age of 50, nearly one-third of borrowers subject to offsets were still in default after 5 years of garnishment and for some borrowers, loan balances continued to increase during this time (Bawden, 2016). Many older Americans rely on social security benefits as their primary source of income, so any reductions in their monthly benefits can create significant financial hardship (Bawden, 2016).

Delinquencies on student loans may also be related to delinquencies on other debt payments. Brown et al. (2015) analyzed the role of student debt on household balance sheets and concluded that there was a positive relationship between student loans and other types of debt such as auto loans and revolving credit card balances (M. Brown et al., 2015). Additionally, they found that borrowers who were delinquent on their student loan payments were also more likely to be behind on other debts; 17% were delinquent on auto loans, 35% were delinquent on credit cards and 28% were delinquent on mortgage payments (M. Brown et al., 2015). Similarly, research by Lee et al. also found evidence of a positive relationship between having student loans and being delinquent on debt payments (Lee et al., 2019). Gicheva and Thompson (2015) analyzed connections between student loans and long-term financial stability using six waves of SCF data collected between 1995 and 2010. They found that for every $1,000 increase in student loans, the probability of a borrower filing for bankruptcy increased by 0.8 percentage points, and among households where the respondent and their spouse/partner attended college, but at least one of them did not complete a degree, the probability of being 60 days of more behind on at least one bill in the previous five years increased by two percentage points for every additional $1,000 in total student loan debt (Gicheva & Thompson, 2015).

Even when borrowers are able to make on-time student loan payments, many report that the loans have interfered with their ability to reach major life milestones, such as moving out of

their parents' home, getting married and starting a family, as well as making discretionary purchases, dining out or taking a vacation (Nadworny, 2022; Prudential Research & Perspectives, 2019; Tamborini et al., 2015). Furthermore, student debt does not only cause immediate hardship for borrowers; its impact on household finances can also have long term consequences for borrowers.

Retirement Savings

When distinguishing between households with and without student loans several analyses found no difference in the likelihood of participation in employer-sponsored retirement plans, however there is evidence that those with student loan debt lag behind their non-borrower counterparts in terms of savings amounts (generally in the range of 40-50% less) and age at retirement or expected age at retirement (Butrica & Karamcheva, 2013, 2018; Dettling et al., 2022; Rutledge et al., 2016) . Another analysis by AARP showed that borrowers who waited to start saving for retirement would need to work anywhere from two to seven years longer in order for their retirement savings to catch up with peers that did not have student loan debt (Trawinski et al., 2019).

Net Worth

Net worth, often used interchangeably with the term wealth in the literature, can be defined as the difference between the value of one's assets and their liabilities, and is considered to be a reliable indicator of a household's overall financial health (Gadanecz & Jayaram, 2008; U.S. Census Bureau, 2022). Dettling et al. created lifecycle wealth profiles to examine the impacts of education and student loan debt on the trajectory of a family's wealth over their lifecycle. Their results indicate that median wealth for college-educated families with student debt lagged behind the trajectory of wealth for families that never borrowed for education across

the lifecycle and in particular, as borrowers age, those that are still paying for student debt are not better off than those that never attended college (Dettling et al., 2022). Several other studies report similar findings, with net worth for holders of student loan debt lagging behind those without student loans (Cooper & Wang, 2014; Rutledge et al., 2016). The results of a 2018 study by Young Invincibles show that individuals with college degrees and student loan debt had a negative median net worth of - $1,900 as compared to 2013 when median net worth was approximately $7,000 and 1989 when that number was $89,143 (Allison, 2018). Fry (2014) came to similar conclusions, finding lower net worth among holders of student loan debt, particularly for those who attended college but failed to graduate (Fry et al., 2014).

While there has yet to be a consensus in the literature on specific reasons student borrowers tend to lag behind peers in terms of net worth, research related to student loan debt's impact on homeownership can shed some light on the situation. In 2017, the National Association of Realtors published a research study in which 63% of respondents said they would put the money they were spending on student loans towards buying a home and 83% reported that student loan debt was preventing them from buying a home (National Association of Realtors Research Division & American Student Assistance, 2017). These findings are noteworthy because of the large role home equity plays in most American's portfolios, the stability it can offer during both inflationary time periods and retirement, as well as providing numerous benefits for the macroeconomy and society overall.

The Importance of Homeownership

Although there are certainly instances where owning a home may not be appropriate or desirable for a particular individual or household, overall homeownership is beneficial for many reasons. Historically, ownership of a home has opened the door for building wealth, with

residential real estate being the largest asset category in household portfolios (Ling & Archer, 2018). According to Lawrence Yun, Chief Economist for the National Association of Realtors, the median net worth of homeowners was 45 times higher than that of renters in 2015 and similar anecdotal evidence of a relationship between homeownership and net worth can be found in data from the 2019 Survey of Consumer Finances, where the median value of assets for non-homeowners was just $3,100 (Yun, 2015). The median asset value for homeowners was estimated to be just under $400,000, with approximately 57% of that value being accounted for by their primary residence. While homeownership is not the only reason these households could have higher wealth, the literature agrees that it is a central component of wealth building for most households (Yun, 2015, 2016; Yun et al., 2022; Yun & Evangelou, 2016) . Given the relationship between homeownership and net worth, it is not surprising that home equity is the largest component of household wealth and therefore, one of the largest sources of retirement security for most Americans in several ways.

Indirectly, homeownership is a source of retirement security because owning a home with no mortgage frees up a large portion of income for retirees to cover living expenses. Homeownership can also directly support retirement due to the owners' ability to sell the home (that presumably will have a significant amount of equity by the time it is needed), or through leveraging the equity via the use of a reverse mortgage or home equity line of credit that can be used to cover living expenses. Hiltonsmith (2013) estimated the effects of student debt on growth of household income and assets, including retirement savings, liquid savings, and home equity. Using average student loan debt burden for a dual-headed household with bachelor's degrees, the author found that student debt would reduce lifetime wealth by about $208,000, with one third of the amount directly attributed to reduced home equity (Hiltonsmith, 2013). Similarly, studies by

Dettling, Reber and Goodman and Elliott and Lewis also found evidence that home equity is higher among households without student loans (Dettling et al., 2022; Elliott & Lewis, 2015).

Not only has homeownership long served as the primary asset in most American's financial portfolios, it provides a host of other benefits for both homeowners and society (Ma et al., 2020; Yun & Evangelou, 2016). For the nearly 84 million homeowners in the U.S., real estate provides a hedge against inflation that most other assets cannot; in inflationary periods rents tend to rise, mitigating the erosion of purchasing power for landlords, but also providing a financial cushion for individuals who otherwise would be renting in a marketplace characterized by low vacancy rates and rising rents (L. S. Goodman & Mayer, 2018; U.S. Census Bureau, 2021b).

On a macroeconomic scale, homeownership plays a crucial role in the health of the nation's economy as the largest single component of gross domestic product. The sheer size of real estate as an asset class means that when housing markets become unstable, the economic impacts ripple throughout markets around the globe (Feldstein, 2009). Even as the 2008 foreclosure crisis continues to fade in our review mirror, economic conditions appear to be shaping up for what could become another perfect storm. Average federal student loan balances now top $35,000, roughly the equivalent of a 20% down payment on a $175,000 house (The College Board, 2022). The implications of this amount of debt are extraordinary, not just because of the burden it can place on college graduates starting out in their careers, but because of the ramifications on housing markets and the economy at large.

Student Loans and Homeownership

The relationship between student loan debt and homeownership is not necessarily a new topic of interest among researchers, and most studies have shown that student loans have a

negative impact on homeownership (Bleemer et al., 2017; Cooper & Wang, 2014; Gicheva & Thompson, 2015; Letkiewicz & Heckman, 2018; Mezza et al., 2017; Robb et al., 2020). However, to date, most of the relevant literature has only measured the effects the *presence* student loan debt has on homeownership rather than considering the *size* of the debt in the analysis, and only one other study separately studied federal and private student loan debt in their model(Robb et al., 2020). In their paper the authors tested federal and private student loan amounts, cumulatively and separately, on the likelihood of a college graduate to purchase a home within the first four years after earning their bachelor's degree. However, the analysis had some limitations that this research will specifically address.

One important limitation of the study relates to the time period during which the analysis took place (2008-2012), as there was significant turmoil in U.S. housing markets and particularly restrictive lending standards in place during this timeframe. Further, while the study does consider differential effects of federal and private student loans on homeownership, it does not include the effects of Parent PLUS loans in the analysis. Additionally, the study specifically evaluated the effects of student loan debt on recent four-year degree graduates' decisions to purchase a home for the first time, rather than the effects of student loan debt on homeownership for borrowers at other life stages, with different degree completion status, or that were current homeowners at the time of graduation.

Further, the authors measured the relationship between student loans and homeownership using loan balances (cumulatively and separately by loan type), but the data used did not have details on loan terms, so the amount of the student loan payments was not considered (Robb et al., 2020). This is an important limitation of the study because debt payments play a major role in mortgage qualification. Of the main criteria used by mortgage underwriters when qualifying

home loan applicants for a mortgage, the borrowers' debt-to-income (DTI) ratios are perhaps the most important measures of their ability to repay the debt, and therefore qualify for the loan. While cumulative loan balances may be a factor in some instances, more often the monthly payment amount is a stronger determinant of mortgage qualification, and the student loan payment amount may not be directly related to the total loan balance in many cases.

Federal student loans, for example, offer a variety of repayment options, allowing borrowers to qualify for a lower monthly loan payment than they would receive under a standard repayment plan. In these situations, the likelihood of qualifying for a mortgage would not typically be directly related to the loan balance, but rather the size of their monthly loan payment (along with other debt payment obligations) relative to their gross monthly income. Additionally, the type of home loan a borrower can obtain will vary by their overall creditworthiness, so borrowers with higher debt to income ratios may not qualify for conventional home loans, and instead opt for federally insured mortgages (with more flexible DTI requirements but added mandatory private mortgage insurance premiums and therefore overall higher monthly mortgage expenses) or alternative loan types, such as adjustable-rate mortgages (which carry greater risk for the borrower).

Student Loans and Adjustable-Rate Mortgages

In some ways, the household's decision to use private student loans with their characteristically riskier features is very much like the decision to finance a home purchase using an adjustable-rate or balloon mortgage over a fixed rate, fully amortizing traditional mortgage. Traditional fully amortizing mortgages are characterized by fixed interest rates, fixed monthly payments and higher credit score and down payment requirements (Ling & Archer, 2021).

Adjustable-rate mortgages (ARMs) expose the borrower to more uncertainty by containing provisions that allow the interest rate to change over time.

The specific terms, and therefore riskiness, can vary substantially, with some ARMs beginning with a fixed interest rate for a specific period of time before adjusting and/or incorporating limits, known as caps, to interest rate adjustments, payment adjustments, or both (Ling & Archer, 2021). These loans can be fully amortizing, partially amortizing with a required balloon payment at the end of the loan term, non-amortizing, requiring the borrower to only make periodic interest payments during the loan term followed by a balloon payment at the end of the term, or even negatively amortizing, which can result when payments are capped at an amount that does not fully cover accruing interest.

The risk to borrowers lies in the difficulty in predicting changes in future payment amounts when rates are subject to change, as well as the need to have an ability to make a large balloon payment at the end of the loan term (if the loan was not amortizing). Because these loans shift a portion of the risk from the lender to the borrower, they typically have more flexible borrower requirements, such as lower credit score thresholds, lower down payment provisions and even fewer (or no) income verification requirements (Hoffman, 2007; Zhao, 2023).

The riskiest of these loans were made famous for their role in the foreclosure crisis, as many borrowers grossly underestimated their ability to afford payments once they began to change, either by not accurately predicting how high the payments would become, by anticipating that they would have higher income by the time the payments changed, or both. Further adding to the problem was an expectation commonly cited by borrowers that they "could always just refinance" before the payments became unmanageable or the balloon payment came due (Vikas, 2007). By the time these loans began to adjust, and refinancing became necessary,

lending criteria had tightened, and home values had started to decrease, leaving many of these borrowers unable to refinance when they needed to, forcing unprecedented numbers of borrowers into loan default and ultimately foreclosure (Randazzo & Young, 2010; The Majority Staff of the Joint Economic Committee, 2007).

Understanding the characteristics and risk associated with different mortgage types, as well as the role the riskier ARMs played in the foreclosure crisis is important in this analysis for two reasons. ARMs share many traits with private student loans; particularly due to the variable interest rates they use, and the impact rising rates can have on future payments. These loans historically attract borrowers with higher risk tolerance and more financial constraints (Coulibaly & Li, 2009; Hullgren & Söderberg, 2013). With mortgages, the borrowers' financial constraints are typically related to less savings available for a down payment, higher DTI ratios (making qualifying for fixed rate mortgages more difficult) and less disposable income, making the lower initial payments an attractive option. In much the same way, private student loan borrowers are likely to turn to these loans because they lack the financial resources necessary to cover the gap in funding left by federal student loan borrowing limits. While private student loans are credit based, they are only able to truly assess the borrower's credit health at the time of loan approval. Overtime the borrower's credit could decline, particularly as payments for the loans increase and federal loan payments that were deferred during college enrollment begin to come due. Homeowners that have private student loans may be more likely to have ARMs because of the easier lending standards and lower initial payment amounts, as well as their ability to tolerate higher levels of risk.

The second reason ARMs are explicitly discussed in this analysis is related to their significant role in the 2008 financial crisis. Experts have been sounding the alarm for several

years over worries that the student loan bubble could easily be responsible for another historic financial crisis in the United States (Avila, 2012). It is important for policy makers to understand the similarities between ARMs and private student loans when developing policy addressing the growing student loan crisis if they hope to avoid a similar financial meltdown because, as Edmund Burke so famously said, “those who don't know history are doomed to repeat it.”

Research Purpose, Questions and Hypotheses

In October 2022, mortgage interest rates reached their highest point since the early 2000’s, and housing markets began to show signs of softening(Mortgage News Daily, 2023). In January 2023, housing starts (widely considered to be a leading economic indicator) reached their lowest level since June 2020, making this research particularly relevant and timely for serving today’s policy makers and financial advisors (National Association of Home Builders, 2023). Furthermore, with outstanding private and Parent PLUS loan balances increasing, and pervasive use of alternative federal student loan repayment plans, there is an important and relevant gap in the research to be filled (Freddie Mac, 2023; Ostrowski, 2022).

This paper extends the current research by explicitly considering the unique impacts of student loans on homeownership using the Survey of Consumer Finances (SCF), a nationally representative dataset that includes detailed information on U.S. households and their finances. This dataset allows for more nuanced analysis of the relationship between student loans and homeownership, particularly by including data on private loans, whose education the loan was obtained for (which captures the effects of Parent PLUS loan debt), income-based repayment and expected loan forgiveness, original and current loan balances, as well as loan payment amounts. The detailed information contained within the SCF also allows for this study to capture effects of student loan debt held by non-graduates, married households where one or both spouses have

student loan debt, and debt for other borrower types, such as loans obtained for someone else's education or for advanced degrees. Analysis is also possible for households with dependent children, which is an important consideration given that finances for a family may be more constrained than those for single borrowers or borrowers without children.

By using the SCF dataset, this research is able to provide unique insight into relationships that prior literature has not been able to address. Specifically, this study will investigate the relationships between types of student loans, homeownership, mortgages, and a household's debt burdens, using the neoclassical theory of housing demand to analyze the following research questions:

Research Questions:

1) Does the presence, type, or amount of household student loan debt (federal, private, or PLUS) impact homeownership?
2) Does the presence, type, or amount of household student loan debt affect a household's mortgage debt burden?
3) Does the presence, type, or amount of household student loan debt affect the type of mortgage financing the household has?

Hypotheses

This analysis will empirically test these relationships with four different sets of hypotheses deriving from each of the research questions. The following hypotheses were tested in order to answer the research question, does the presence, type or amount of household student loan debt impact homeownership?

H1a: Student loan debt will be negatively associated with homeownership, ceteris paribus.

H1b: Federal student loan debt will be negatively associated with homeownership, ceteris paribus.

H1c: Private student loan debt will have a stronger negative association with homeownership than federal student loan debt, ceteris paribus.

H1d: PLUS student loan debt (debt for someone else's education) will have a stronger negative association with homeownership than federal student loan debt (debt for one's own education), ceteris paribus.

H1e: As the balance of student loan debt increases, the likelihood of homeownership will decrease, ceteris paribus.

H1f: There will be a negative relationship between the balance of federal student loan debt and the likelihood of homeownership, ceteris paribus.

H1g: As the balance of private student loan debt increases, there will be a larger negative effect on the likelihood of homeownership than for increases in the balance of federal student loan debt, ceteris paribus.

H1h: As the balance of PLUS student loan debt increases, there will be a larger negative effect on the likelihood of homeownership than for increases in the balance of federal student loan debt, ceteris paribus.

Because mortgage qualification depends in part on a borrower's debt payment ratios and student loan payments are not always directly related to the amount of student loan debt a borrower has, three alternative hypotheses were tested to analyze whether the size of a household's monthly student loan payment relative to their income (student loan payment burden) has an effect on homeownership by loan type:

H1i: As a household's student loan payment burden increases, the likelihood of homeownership will decrease, ceteris paribus.

H1j: As a household's federal student loan payment burden increases, the likelihood of homeownership will decrease, ceteris paribus.

H1k: As a household's private student loan payment burden increases, there will be a larger negative effect on the likelihood of homeownership than for increases in federal student loan payment burden, ceteris paribus.

H1l: As a household's PLUS student loan payment burden increases, there will be a larger negative effect on the likelihood of homeownership than for increases in federal student loan payment burden, ceteris paribus.

In order to answer the research question, does the presence, type, or amount of household student loan debt affect a household's mortgage debt burden? The following hypotheses were tested:

H2a: Households with student loan debt will have a higher mortgage debt burden than households without student loan debt, ceteris paribus.

H2b: Federal student loan debt will be positively associated with mortgage debt burden, ceteris paribus.

H2c: Households with private student loan debt will have a higher mortgage debt burden than households with only federal student loan debt, ceteris paribus.

H2d: Households with Parent PLUS student loan debt will have a higher mortgage debt burden than households with federal student loan debt, ceteris paribus.

H2e: As the balance of student loan debt increases, a household's mortgage debt burden will increase, ceteris paribus.

H2f: There will be a positive relationship between the balance of federal student loan debt and a household's mortgage debt burden, ceteris paribus.

H2g: As the balance of private student loan debt increases, the household's mortgage debt burden will increase by a larger amount than for increasing balances of federal student loan debt, ceteris paribus.

H2h: As the balance of PLUS student loan debt increases, the household's mortgage debt burden will increase by a larger amount than for increasing balances of federal student loan debt, ceteris paribus.

H2i: A household's mortgage debt burden will be positively related to the household's monthly student loan payments, ceteris paribus.

H2j: There will be a positive relationship between a household's monthly federal student loan payment and their mortgage debt burden, ceteris paribus.

H2k: As a household's monthly private student loan payments increase, there will be a larger positive effect on the household's mortgage debt burden than for increases in federal student loan payments, ceteris paribus.

H2l: As a household's monthly PLUS student loan payments increase, there will be a larger positive effect on the household's mortgage debt burden than for increases in federal student loan payments, ceteris paribus.

In order to answer the research question does the presence, type, or amount of student loan debt a household has affect the type of mortgage financing the household has, the following hypotheses were tested:

H3a: Households with student loan debt will be more likely to have adjustable-rate mortgages than households with no student loan debt, ceteris paribus.

H3b: There will be a positive relationship between the presence of federal student loan debt and the likelihood of having an adjustable-rate mortgage, ceteris paribus.

H3c: Households with private student loan debt will be more likely to have adjustable-rate mortgages than households with only federal student loan debt, ceteris paribus.

H3d: Households with PLUS student loan debt will be more likely to have adjustable-rate mortgages than households with only federal student loan debt, ceteris paribus.

H3e: As the balance of household student loan debt increases the likelihood of having an adjustable-rate mortgage will increase, ceteris paribus.

H3f: There will be a positive relationship between the likelihood of having an adjustable-rate mortgage and a household's federal student loan debt balance, ceteris paribus.

H3g: As the balance of household private student loan debt increases, the likelihood of having an adjustable-rate mortgage will be greater than that for increasing federal student loan balances, ceteris paribus.

H3h: As the balance of household PLUS student loan debt increases, the likelihood of having an adjustable-rate mortgage will be greater than that for increasing federal student loan balances, ceteris paribus.

H3i: A household's student loan burden will be positively related to the household's likelihood of having an adjustable-rate mortgage, ceteris paribus.

H3j: There will be a positive relationship between a household's federal student loan payment burden and the likelihood of having an adjustable-rate mortgage, ceteris paribus.

H3k: As a household's private student loan payment burden increases, there will be a larger positive effect on the likelihood of having an adjustable-rate mortgage than for increases in federal student loan payment burden, ceteris paribus.

H3l: As a household's PLUS student loan payment burden increases, there will be a larger positive effect on the likelihood of having an adjustable-rate mortgage than for increases in federal student loan payment burden, ceteris paribus.

H4a: Households with student loan debt will be more likely to have a federally guaranteed mortgage than households with no student loan debt, ceteris paribus.

H4b: There will be a positive relationship between the likelihood of having a federally guaranteed mortgage and having federal student loan debt, ceteris paribus.

H4c: Households with private student loan debt will be more likely to have a federally guaranteed mortgage than households with only federal student loan debt, ceteris paribus.

H4d: Households with PLUS student loan debt will be more likely to have federally guaranteed mortgages than households with only federal student loan debt, ceteris paribus.

H4e: As the balance of household student loan debt increases the likelihood of having a federally guaranteed mortgage will increase, ceteris paribus.

H4f: There will be a positive relationship between a household's federal student loan balance and the likelihood of having a federally guaranteed mortgage, ceteris paribus.

H4g: As the balance of household private student loan debt increases, the likelihood of having a federally guaranteed mortgage will be greater than that for increasing federal student loan balances, ceteris paribus.

H4h: As the balance of household PLUS student loan debt increases, the likelihood of having a federally guaranteed mortgage will be greater than that for increasing federal student loan balances, ceteris paribus.

H4i: A household's student loan payment burden will be positively related to the likelihood of having a federally guaranteed mortgage, ceteris paribus.

H4j: There will be a positive relationship between a household's federal student loan payment burden and the likelihood of having a federally guaranteed mortgage, ceteris paribus.

H4k: As a household's private student loan payment burden increases, there will be a larger positive effect on the likelihood of having a federally guaranteed mortgage than for increases in federal student loan payment burden, ceteris paribus.

H4l: As a household's PLUS student loan payment burden increases, there will be a larger positive effect on the likelihood of having a federally guaranteed mortgage than for increases in federal student loan payment burden, ceteris paribus.

Potential Research Implications

Student loan debt has been a growing topic of interest among policy makers and currently is at the forefront of many political discussions. While most politicians agree that addressing student loan debt is an important policy goal, there is considerable debate surrounding what the most efficient and appropriate policy changes are. So far, most proposals have mainly been targeted towards relieving debt burdens related to student loans borrowed directly from the federal government. This narrow focus largely ignores the millions of borrowers with other types

of student loans including federal loans issued prior to July 1, 2010[3], Parent PLUS loans, and private student loans. Although direct federal loans make up the bulk of student loan debt, the other types of loans have fewer, and in some cases no relief options for borrowers experiencing temporary or permanent financial difficulties, harsh penalties, and terms and conditions that strongly favor financial institutions rather than protect borrowers from lending practices that in many other contexts would be considered predatory by the even the most moderate definitions (Consumer Financial Protection Bureau, 2013a, 2021).

Even among supporters of student loan reform and/or forgiveness, there is considerable debate about how best to implement and apply relief. Much of the criticism surrounding loan forgiveness centers around the cost to taxpayers of implementing the policy, as well as the overall "fairness" of providing the relief. While the exact cost to taxpayers of providing blanket loan forgiveness is still up for debate, there is little doubt that forgiving billions, or trillions of dollars in outstanding debt will be costly, so designing policy that provides the most benefit relative to the overall cost is of utmost importance.

The Biden-Harris Administration's Student Debt Relief Plan currently being reviewed by the nation's courts, proposes loan forgiveness for borrowers based on their annual adjusted gross income, with the intention being to target relief towards lower and middle-income households so that the benefit is only given to borrowers that are in most need of assistance (U.S. Department of Education, 2023f). There are several potential problems with implementing a policy that applies student loan relief based solely on household income, as well the second component of

[3] Federal student loans borrowed prior to July 1, 2010, were issued under the FFEL (Federal Family Education Loan) program, which were guaranteed but not funded by the federal government, so these loans are generally ineligible for federal student loan relief programs (U.S Department of Education, 2023)

the policy, that limits forgiveness to only $10,000 of federal student loan debt (or in some cases $20,000) per qualified borrower. Proponents argue that this approach will help the most vulnerable Americans at a time when so many are struggling financially, and in turn, help the entire American economy (Biden, 2022). However, what is not being widely considered in the mainstream discussion is that targeting forgiveness based on income without regard for debt size, payment amount, or loan type does little to actually mitigate the problem the policy is intended to address.

As stated in a 2022 White House Press Release, the goal of the President Biden's currently proposed student loan forgiveness policy is to provide relief to borrowers struggling under the weight of their debt (which will also promote economic growth because these borrowers can then direct income that was previously going to student loan payments, to other things) without "unfairly" benefitting high-income borrowers (The White House, 2022). What is largely missing from the public discussion, and the academic literature in general, is information on what truly constitutes "struggling under the burden of student loan debt." On the surface, assuming that lower income households are struggling the most with student loan debt payments makes sense to most people, but the nature of these loans and the nuances between the different types of loans is a critical, yet largely missing piece of information that is needed to truly determine if a household is considered to be "struggling" due to their student loan payments.

Nearly one third of federal direct loan borrowers in repayment, deferment or forbearance status have loans that are considered to be part of some type of income-based program, and among these households, 66% were receiving a partial financial hardship payment reduction[4]

[4] The U.S. Department of Education defines as partial financial hardship as "an eligibility requirement under the Income-Based Repayment (IBR) and Pay As You Earn Repayment (PAYE) plans. It is a circumstance in which the

prior to the COVID-era federal loan payment pause (U.S. Department of Education, 2023e). The lowest income households in these types of repayment programs receive additional benefit because payment amounts can be set as low as $0, while still counting towards the required number of payments for eventual loan forgiveness (U.S. Government Accountability Office, 2020). Lower income households also often have access to other social programs and resources that relieve their overall financial burdens (qualification criteria varies by family composition, location and program), but the current policy proposals exclude these types of benefits from calculations when determining financial need as it relates to qualifying for student loan forgiveness.

As research suggests, student loan burden does not necessarily discriminate by income; even households with high incomes may not be faring well financially after accounting for the impact their student loan debt payments have on total household expenditures, and to add insult to injury, these households may easily have a student loan burden that is equal to or greater than that of households earning lower income, but who are eligible for income based repayment plans, yet they are generally not eligible for other types of need based aid like housing, food, utility or medical expense assistance. Differentiating student loan relief solely by income shifts the burden of the debt squarely onto the shoulders of higher income borrowers and their families who may be equally constrained but face a lack of outside resources to help with those other expenses. In fact, recent analysis of student loan borrowers revealed that nearly three quarters of all student

annual amount due on your eligible loans, as calculated under a 10-year Standard Repayment Plan, exceeds 15% (for IBR) or 10% (for Pay As You Earn) of the difference between your adjusted gross income (AGI) and 150% of the poverty line for your family size in the state where you live"(U.S. Department of Education, 2023c).

debt payments are being made by borrowers from high income households(Baum & Looney, 2020).

While there is no doubt low-income households experience financial hardship, targeting student loan forgiveness solely based on household income may not actually accomplish the overall goal of providing relief to borrowers struggling under the weight of their debt (because income, rather than the relative burden of their debt is the measure being used to qualify them for assistance), nor will it necessarily have the desired effect of promoting homeownership and economic growth, at least not in the most efficient manner, because it is largely middle to high earning households that make the majority of student loan payments. If a household is not making required student loan payments, then forgiving their debt will not relieve them of an expenditure that could free up income for other things, including purchasing a home. Similarly, forgiving a portion of direct federal student loan debt balances will not necessarily help.

While some federal borrowers will be relieved of payments, most will still be saddled with loans that continue to cause financial hardship and affect their overall financial health (albeit with a slightly lower balance), and borrowers with other types of loans will see no relief under the current proposal. In August 2022, President Biden gave a speech in which he said the goal of his student loan debt relief plan was to help borrowers "… crawl out from under that mountain of debt to get on top of their rent and their utilities, [and] finally think about buying a home, starting a family or starting a business, [which ultimately will make the] whole economy better off" (Biden, 2022).

Indeed, homeownership is an important contributor to most Americans' financial stability and financial portfolios and, given that real estate is the largest single driver of the nation's GDP, it makes sense to create policy that will have an impact on such a major component of the

economy since it would generate the most benefit from a single change. However, if the policy goal is to provide relief that is effective at alleviating the payment burden felt by student loan borrowers, then it is also critical to consider how all loan types affect borrower finances rather than just direct federal loans, particularly as they relate to homeownership, yet this information has largely been missing from the academic literature.

For these reasons, this research is particularly relevant and timely for policy makers as they work to address not only current student loan debt, but also ongoing changes that can be designed to address future student borrowing policies. The student debt crisis is multi-faceted and finding long term solutions will require addressing not only existing student debt, but also the reasons the debt became so large and unmanageable for borrowers in the first place. Politicians and the media are giving a lot of attention to existing loan borrowers, but underneath the debate surrounding loan forgiveness or restructuring, changes to the fundamental way in which higher education expenses are managed and financed is equally important.

Students and their families have responsibility for understanding their options for funding higher education and their ability to afford the debt obligations when repayment begins, yet an alarming number of borrowers know very little about their student loans. In Prudential's 2019 study, over half of undergraduate borrowers did not know how much their monthly loan payments would be or what% of their income would be going to pay down the debt upon graduation, 74% did not know how long their repayment would take and 25% were unsure if their loans were federal or private. Over half of all borrowers (current students, graduates with loans in repayments and graduates that had finished repaying their loans) had no idea if their loans had been cosigned by someone else (Prudential Research & Perspectives, 2019). These findings reveal serious shortcomings, and therefore opportunities, for better educating students

and their families on higher education borrowing. Financial advisors have a particularly important role to play in helping their clients navigate these challenges, whether they are helping young families develop a comprehensive financial plan that includes saving for their children's education, assisting clients who have student loan debt select an appropriate loan repayment program and develop a strategy for paying down the debt alongside pursuing other financial goals, or advising clients nearing retirement that either have loans of their own, or that have taken on Parent PLUS loans for a child's education, that will need to consider the debt as part of their overall retirement plan.

Not only will this research be useful for financial advisors by providing important insight into how the various types of student loans affect debt burdens, homeownership, and mortgages, it can provide them with relevant information needed to encourage a generational change in the way financing higher education expenses is approached moving forward. By educating clients on the impacts student loan debt can have on their children's major life goals, including homeownership, as well as the effect of student debt burden on household finances, planners can inspire families to prioritize saving for higher education expenses in their overall financial plans, so future generations do not end up saddled by such significant amounts of student loan debt.

Chapter 2 - Literature Review

Following the academic literature on housing tenure decisions, this study will use the neoclassical theory of housing demand as a framework for empirical specification and analysis. Rooted in traditional neoclassical consumer demand theory and adapted for the unique components of housing decisions, the neoclassical theory of housing demand is the most common choice of economic theory for research related to consumer housing decisions (Megbolugbe et al., 1991). This section begins with a brief overview of the neoclassical theory of demand. Next, discussion turns to the adaptation of this theory for specifically modelling housing tenure decisions. This chapter concludes with discussion on empirical research as it relates to specific determinants of housing demand.

Neoclassical Theory of Demand

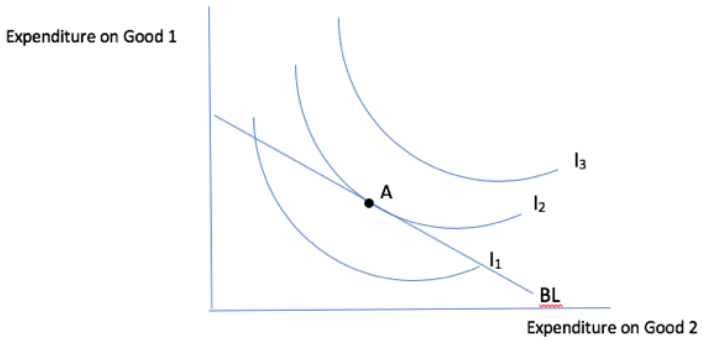
Traditional neoclassical demand theory states that a rational consumer chooses a bundle of goods and services in such a way that maximizes their utility (well-being) subject to their tastes and preferences, income, and the prices of the goods and services in the economy, represented in the model by a budget constraint or budget line (Krugman & Wells, 2013). A budget constraint (or budget line) is a "set of consumption bundles that represent the maximum amount the consumer can afford," given the consumer's income and the prices of the goods or services (Mateer & Coppock, 2014, p. 514). A consumer is said to be consuming optimally when they are choosing a combination of goods and services that is directly on the budget line as opposed to under the budget line (if they are under the budget line, they could be made better off by consuming more) (Krugman & Wells, 2013).

The second component of the neoclassical model of consumer demand is the indifference curve. Indifference curves represent the various combinations of goods and services that provide

equal levels of satisfaction (Krugman & Wells, 2013). They illustrate a trade-off the consumer must make between two goods or services; as a consumer moves along the indifference curve, they are consuming different amounts of each good/service, but their total utility remains the same. It is worth noting that one can develop a model in which the consumer chooses between more than two goods and services by modelling a bundle of goods and services, such as a consumer choosing between housing and all other goods and services.

Combining the budget constraint and indifference curves, one can determine the consumer optimum. The consumer optimum is the "highest level of affordable satisfaction" and can be found by locating the point of tangency between a consumer's indifference curve and their budget line (Mateer & Coppock, 2014). See Figure 2.1 below for an illustration.

Figure 2.1. Neoclassical Theory of Demand: Budget Lines and Indifference Curves



Where: I= Indifference curves

BL= Budget Line

A= Consumer Optimum

Changes to the prices of either good (or bundle of goods) will affect the slope of the budget line, through a change in the relative price of the goods (the price of one good expressed in terms of the other), whereas changes in income will cause a parallel shift of the budget line, revealing the change in consumption possibilities at every relative price (Krugman & Wells, 2013).

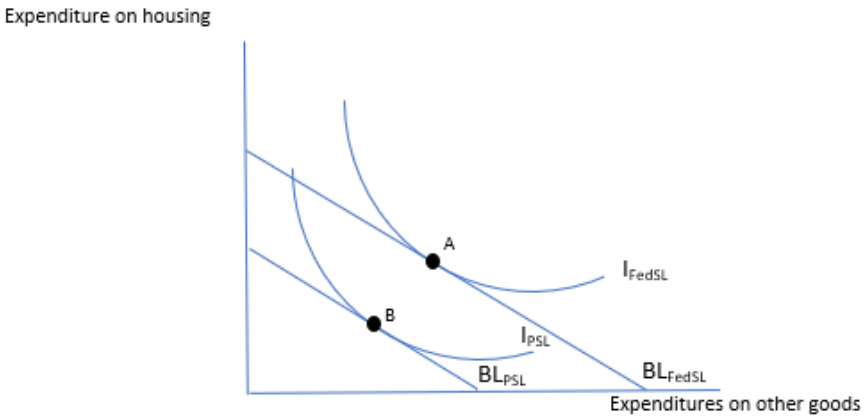
Neoclassical Theory of Housing Demand

The neoclassical theory of housing demand adds to the neoclassical theory of demand by assuming that one of the goods in the consumption bundle is housing. This allows for a distinction to be made between housing and "all other goods and services." Additionally, the model considers the household's consumption decisions rather than an individual consumer's consumption decisions (Megbolugbe, Marks, & Schwartz, 1991). The model assumes that the household consumes housing and other goods and services in such a way that maximizes their utility subject to financial constraints determined by the household's income, liquid assets and borrowing ability (Bajari et al., 2010; A. C. Goodman, 1988; Megbolugbe et al., 1991a). Therefore, the budget constraint represents all consumption bundles available to the household after accounting for constraints on household resources (Krugman & Wells, 2013).

The neoclassical theory of housing demand is useful for analyzing the impact of student loans on homeownership because of the effects student loan debt can have on a household's ability to qualify for a mortgage, as well as their total monthly expenditures. The greater the borrower's monthly student loan payments are, the greater the impact the debt will have on the household's ability to save for a downpayment, their credit score(s), and debt to income (DTI) ratios, which limits the amount the household will be able to borrow, and therefore spend, on both housing and other goods and services (which lowers their budget constraint). Private and PLUS student loans have historically had fewer and less flexible repayment options, and generally come with higher interest rates than federal loans. Therefore, one can expect that the resulting student loan payments will be higher than federal student loan payments, in which case the household with private or PLUS student loans will end up on a lower budget constraint,

consuming less in housing and all other goods compared to the household with only federal student loans. This relationship is graphically depicted in Figure 2.2.

Figure 2.2 Neoclassical Theory of Housing Demand: Budget Lines and Indifference Curves for Households with Federal Student Loans and Households with Private or PLUS Student Loans



Where: I_{FedSL}= Indifference curve for households with federal student loans

I_{PSL}= Indifference curve for households with private or PLUS student loans

BL_{FedSL}= Budget line for households with federal student loans

BL_{PSL}= Budget line for households with private or PLUS student loans

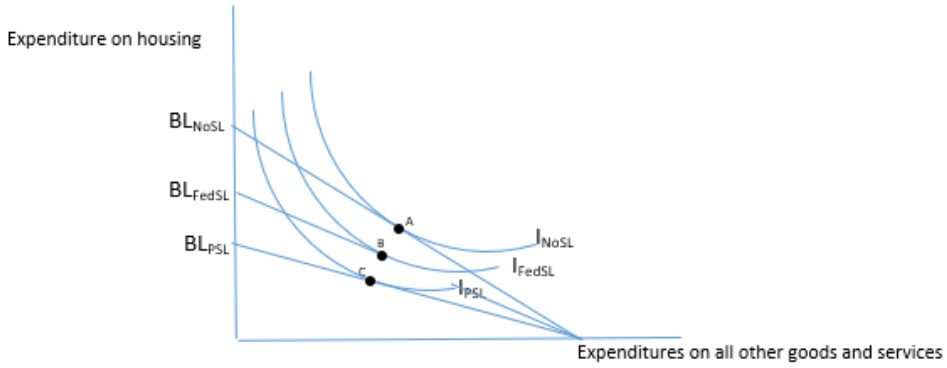
A = Consumer optimum with federal student loans

B- consumer optimum with private or PLUS student loans

This reduction in consumption possibilities will still result when comparing two households with identical financial resources (i.e. holding income, liquid assets and borrowing constant) because student loan debt payments are part of the household's expenditures. As student loan payments increase, the amount of money left for the household to spend on housing and all other goods will decrease. In this case, the budget constraint rotates to reflect the different "price" between the types of student loans. The household with private or PLUS loans will still be subject to the lower budget constraint (because of the higher "price" of these loans),

consuming less in housing and all other goods (point B) than the household with only federal loans (point A) in Figure 2.3.

Figure 2.3. Neoclassical Theory of Housing Demand: Comparing the Impact of Student Loans on Consumer Optimums



Where: I_{NoSL}= Indifference curve for households with no student loans

I_{FedSL}= Indifference curve for households with federal student loans

I_{PSL}= Indifference curve for households with private or PLUS student loans

BL_{NoSL}= Budget line for households with no student loans

BL_{FedSL}= Budget line for households with federal student loans

BL_{PSL}= Budget line for households with private or PLUS student loans

A= Consumer optimum for households with no student loans

B= Consumer optimum for households with federal student loans

C= Consumer optimum for households with private or PLUS student loans

The neoclassical theory of housing demand suggests that student loans will negatively affect homeownership through the impact the debt has on their budget constraint. Further, the theory also suggests that less affordable student loans (loans with higher interest rates, and no income-based repayment options) will have a larger impact on the household's budget constraint than federal student loans.

Determinants of Housing Demand

This research models homeownership as a function of the main determinants of housing demand that have widely been identified in the empirical literature. Specifically, the analysis models housing tenure as a function of factors that are grouped into three main categories: financial and economic characteristics, behavioral and psychographic characteristics, and demographic characteristics (Megbolugbe et al., 1991b).

Financial Characteristics

Financial characteristics are factors that affect a household's ability to pay for a house. The most obvious of these is the household's income, as it is the primary means by which the household pays for housing and related expenses, and also is related to the household's ability to save for a downpayment. Additionally, housing is expensive, and most households do not have enough savings to simply purchase a house outright. Therefore, the ability to qualify for a mortgage strongly affects the borrower's ability to purchase a home. Mortgage qualification criteria is multi-faceted, and student loan debt affects several of the qualification requirements. For this reason, student loan debt can be considered a borrowing constraint and should be considered in the analysis of housing demand.

Mortgage underwriting is the process lenders use when evaluating the risks of giving a mortgage to a particular borrower and ultimately deciding whether to offer them a loan (Ling & Archer, 2021). The process involves evaluating multiple factors, several of which can be impacted by student loan debt. Traditionally, mortgage underwriting has rested on three elements, sometimes referred to as the "Three C's," collateral, creditworthiness, and capacity (Ling & Archer, 2021). Collateral is measured by the amount of the loan relative to the value of the property. The size of the borrower's down payment will determine the loan to value ratio (a

higher downpayment results in a lower loan to value ratio), while the value of the property is determined by an appraisal. Creditworthiness is evaluated using the borrower's credit score and history, while capacity assesses the borrower's ability to pay, measured by their debt-to-income ratios.

As a result of the 2008 financial crisis, legislation was implemented to protect consumers from predatory mortgage lenders. Known as the "Ability to Repay Rule," the regulation requires lenders follow specific guidelines when assessing a borrower's ability to repay the debt obligation (Consumer Financial Protection Bureau, 2013b). In order to qualify for a mortgage, a borrower must meet certain criteria, including downpayment and liquid reserves requirements, minimum credit score requirements and debt-to-income ratio limits (Fannie Mae, 2023). Student loans can impact all of these measures.

Downpayments and Liquid Reserves

A down payment is the portion of a home's purchase price that borrowers are expected to contribute at the time of purchase. Downpayment requirements vary by loan type and borrower creditworthiness, but generally speaking, borrower's will be expected to contribute a minimum of 3% of the home's price towards the purchase, while traditional conventional mortgages require borrowers to contribute 20% of the home's value towards their purchase (Ling & Archer, 2021). There is a strong inverse relationship between a borrower's loan to value ratio (the amount of a borrower's loan relative to the value of the home) and their likelihood of mortgage default (Elul et al., 2010; Hakim & Haddad, 1999). Because of this, borrowers that are able to make a larger downpayment are considered less risky from the lender's point of view, and therefore tend to receive more favorable loan terms. In situations where the borrower is unable or unwilling to make a downpayment of 20% on their home purchase, mortgage insurance is

required to help protect lenders from the risk of borrower default (Ling & Archer, 2021). Mortgage insurance adds to the borrower's overall expenses and can take different forms depending on the type of loan. For conventional mortgages, private mortgage insurance (PMI) premiums are added to both the borrower's closing costs (in the form of an upfront premium paid at the time of loan closing), as well as their monthly mortgage payments (Consumer Financial Protection Bureau, 2020). FHA loans also require mortgage insurance premiums (MIP), with the upfront portion of the insurance premium typically financed into the loan and additional monthly premiums added to the borrower's monthly housing payments (Ling & Archer, 2021).

In addition to a borrower's downpayment, liquid reserves are also an important determinant in mortgage approval. Liquid reserves are savings set aside in the form of cash or an investment that can be quickly converted into cash without a significant loss in value, providing an important safety net for covering unexpected expenses or decreases in income (Ling & Archer, 2021). For the purposes of loan qualification, a borrower is required to have several months' worth of housing expenses (including mortgage principal, interest, property insurance, homeowner's insurance, and HOA payments) readily available (Fannie Mae, 2023). The exact number of months' worth of reserves that are required will vary by lender and loan type, but typically they range anywhere from a few months to a full year's worth of housing expenses(Miller, 2019). Research has shown that borrowers with outstanding debt obligations typically have more difficulty accumulating savings than households without debt (Stavins, 2021; Toussaint-Comeau, 2021).

Non-housing debt has also been shown to have a significant negative impact on housing tenure choice. Anderson, et al. (2021) used longitudinal data to investigate the relationship between various household characteristics and the likelihood of homeownership, finding a

significant negative relationship between unsecured debt and the likelihood of transitioning to homeownership. Similar research also found a negative correlation between household indebtedness and housing tenure (Anderson et al., 2021; Boehm, 1993; Larrimore et al., 2016; Rothenberg, 1991). While less extensively covered in the literature, there is also evidence that student loan borrowers are less likely to have accumulated savings than peers without student loan debt (Dettling et al., 2022; Dew & Yorgason, 2010; Magwegwe et al., 2022).

Credit Scores

The second factor used by underwriters to qualify a borrower for a mortgage is creditworthiness, which stems from the borrower's credit score and their credit history. Credit scores are created by statistical models designed to assess a borrower's creditworthiness by creating a single number that is meant to quantify the likelihood a borrower will become seriously delinquent on their debt obligations (Board of Governors of the Federal Reserve System, 2007). The most widely used credit score model is known as the FICO score, and while the model specification itself is proprietary, it is generally comprised of characteristics in five individually weighted categories: (1) length of credit history, (2) types of credit used, (3) payment history, (4) credit utilization (the amount of outstanding debt relative to the borrower's credit limit), and (5) age of accounts (Fair Isaac Corporation, 2022). FICO scores range between 300 and 850, with a borrower's estimated creditworthiness increasing as the score rises (Board of Governors of the Federal Reserve System, 2007).

The ability of credit scores to predict loan default is well documented in empirical literature, with lower credit scores associated with higher probabilities of loan default (Demyanyk & Van Hemert, 2011; Dornhelm et al., 2019; Fair Isaac Corporation, 2022; Furstenberg, 1969). Credit scores are used in the majority of mortgage application decisions and

significantly impact both the borrower's ability to qualify for a loan as well as the interest rate they will be offered (Fair Isaac Corporation, 2022; Fannie Mae, 2023; Ling & Archer, 2021). Even seemingly small differences in credit scores can have large impacts on the mortgage rates a borrower is charged, affecting monthly payments and the amount of interest paid over the life of a loan.

For example, as of February 15, 2023, the average mortgage rate for borrowers with a credit score of 760 or higher, was 6.06%, whereas the average mortgage rate for borrowers with a credit score in the range of 640-659 was 7.11% (Yale, 2023). For a $300,000, 30-year fixed rate mortgage, the difference in monthly payment between these two interest rates is approximately $208 per month, excluding private mortgage insurance, taxes, or other holding expenses[5]. This may not appear to be a large difference, but when considering the interest paid over the life of the mortgage, those with the higher credit score will have paid $26,539 *less* than the borrowers in the lower score group.

In general, student loans will impact borrower credit in the same way as other installment loan debt, through a borrower's payment history, credit mix and length of credit history. Large student loan debt payments can cause financial strain that affects the borrower's ability to meet other debt obligations or cause them to go further into debt to make ends meet, which would have a negative impact on their credit score. Research provides evidence of increased financial strain on student loan borrowers (Conkling et al., 2022; Conkling & Gibbs, 2022). Gicheva and Thompson (2013) showed a positive relationship between student loan debt and reduced

[5] Borrowers with credit scores below 620 generally are not eligible for conventional mortgages though the minimums vary by borrower and loan characteristics; FHA borrowers are required to obtain private mortgage insurance (PMI) regardless of their down payment amount. The terms vary, so monthly premiums are excluded from these calculations, however it is important to note that the estimates provided are understated as they do not account for this mandatory expense (Fannie Mae, 2023).

borrower creditworthiness as did Brown and Caldwell (2013), who found that credit scores for thirty-year-old non-student loan borrowers were on average 24 points higher than credit scores for student loan borrowers. Further, research by Allison (2018) revealed that 24% of college graduates believe that college expenses have had a negative impact on their credit score and/or ability to obtain loans.

Student loans also have an indirect impact on borrowers' finances, as many borrowers report that the burden of student loans has caused them to incur additional debt in the form of credit cards and auto loans (Prudential Research & Perspectives, 2019). Even if borrowers are current on their consumer debt payments, the mere presence of this additional debt can interfere with a borrower's ability to qualify for a mortgage by its impact on both their credit score and debt to income ratio calculations that are used by mortgage lenders when determining a borrower's eligibility for a home loan.

Capacity

The third factor used by mortgage underwriters to qualify a borrower for a home loan is known as capacity, which is related to the borrower's ability to afford the mortgage loan payment and associated monthly housing expenses. Capacity consists of two ratios, typically referred to as the front-end ratio and the back-end ratio. The front-end ratio, sometimes referred to as the housing expense ratio, represents the amount of a borrower's gross monthly income that will go to housing expenses each month and is calculated by dividing the borrower's total housing expenses (monthly principal and interest mortgage payments, mortgage insurance premiums (when applicable), property taxes, homeowner's insurance premiums and HOA dues) by their gross monthly income(Ling & Archer, 2021).

The back-end ratio, or debt to income ratio, assesses the borrower's ability to afford existing debt payments in addition to their housing expenses, and represents the amount of a borrower's gross income dedicated to monthly debt payments each month. This ratio is calculated by dividing the borrower's total monthly recurring debt payments (such as student loan, auto loan and credit card payments), PLUS housing-related expenses, by their gross monthly income (Ling & Archer, 2021). The maximum front and back-end ratio amounts vary by loan type, borrower creditworthiness and lender specific requirements.

For FHA mortgages (loans that are insured by the Federal Housing Administration), the standard limits for the borrower's front and back-end ratios are 31% and 43% respectively (Ling & Archer, 2021). For conventional mortgages, the caps are even lower, at 28% for front-end ratios, and 36% for back-end ratios (Ling & Archer, 2021). Student loan payments are included in calculations for back-end ratios, so they can impact a borrower's ability to qualify for a mortgage. In a 2021 survey of student loan debt holders conducted by the National Association of Realtors, 51% of non-homeowners reported that their student debt was currently delaying them from buying a home, while 72% believed student debt would delay their ability to purchase a home in the future; 26% reported that they had been declined for a mortgage because of their debt-to-income ratio (The National Association of Realtors, 2021).

Though availability of precise figures for back-end ratios specifically for student borrowers is very limited, one 2012 study did find that on average, a single individual with student loan debt had a debt-to-income ratio of 49% (Mishory & O'Sullian, 2012). As student loan payments continue to climb, this number is likely to rise, pushing more student loan borrowers out of the housing market.

Behavioral & Psychographic Characteristics

Under the neoclassical theory of housing demand, housing tenure is not solely determined by a consumer's financial situation; tastes and preferences are also important determinants of housing consumption decisions. Tastes and preferences are typically determined by the household's perceptions and behaviors and are critical to forming a robust analysis of housing tenure decisions (Megbolugbe et al., 1991a). In fact, a 2007 analysis of housing tenure choice suggested psychological factors could potentially be stronger determinants of housing tenure than economic considerations (Ben-Shahar, 2007). Similarly, Case and Shiller (1988) concluded that real estate booms may not be purely driven by economic or rational consumer behaviors, finding evidence that there may also be social factors at play. The second category of housing demand determinants used in this analysis is comprised of behavioral and psychographic factors that may play a role in housing tenure decisions.

Risk Tolerance

In the context of finance, risk tolerance measures the degree of risk an individual is willing to take to reach a specific goal. The importance of incorporating risk tolerance in the analysis of investment and financial decisions is well documented in the literature (Grable, 2000; Letkiewicz & Heckman, 2018). One of the features of housing that differentiates it from other consumer goods is that it also can be looked at as an investment. Homeownership can be seen as both a way to mitigate risk (due to the certainty of housing costs, ability to have control over one's living arrangements and the overall view that real estate is a stable asset with tax advantages) or as more risky than renting (due to unexpected repair and maintenance expenses, restricted mobility if one has to quickly relocate, potential fluctuations in home prices and the general illiquid nature of real estate). Indeed, a large body of literature exists supporting this

notion that housing can function both as a consumer good and an investment (Case et al., 2012; Dusansky et al., 2012; Megbolugbe et al., 1991b).

Respondents in a 2007 survey by Ben-Shahar provided some insight into consumer perceptions of homeownership, with 57% of the respondents reporting that risk related to rent fluctuations made them more inclined to prefer homeownership, while a 2004 analysis by Diaz-Serrano found that risk aversion was positively associated with homebuying intentions in the European Union (Diaz-Serrano, 2004). A similar relationship was found by Barsky et al. (1997), who showed that risk tolerance was higher for renters than it was for homeowners. However, a 2017 analysis by Letkiewicz and Heckman demonstrated that willingness to take financial risk was positively associated with the likelihood of homeownership (Letkiewicz & Heckman, 2018). Le (2004) compared household risk preference and homeownership prior to and at the tail end of the foreclosure crisis. Le's results indicated that higher levels of risk preference were positively related to likelihood of homeownership during the economic downturn, and while homeownership rates declined across all households between the two time periods, there was a steeper decline in homeownership rates among households with lower levels of risk preference (Le, 2018).

The decision to pursue a higher education can also be considered a type of investment decision because it is a decision to invest in human capital. Therefore, risk tolerance is also an important component of analyses related to higher education decisions. Several studies have investigated the relationship between risk preferences and higher education enrollment, finding evidence that risk aversion reduces the likelihood of seeking a higher education (Belzil & Leonardi, 2007; Brown et al., 2006; S. J. Heckman & Montalto, 2018) . While the exact reasons for this relationship are unclear, it is possible that students see higher education as risky, given

that many students require student loan debt to cover the costs of higher education. For this reason, risk tolerance also likely plays a role in the decision by some borrowers to not only incur debt to pay for education expenses, but also in decisions about the type of student loan debt they ultimately obtain. Research related to risk tolerance and student loan borrowing is rather limited and for the most part quite generalized, and to my knowledge, there are no studies that specifically consider the unique relationships between risk tolerance and student loan types. A study by Hsu and Fisher (2016) found that 20.3% of households with education loans had higher risk tolerance, compared to 16.3% of households with no education loans. Similarly, when analyzing portfolio allocation between student loan borrower and non-borrower households, Dettling et al. found that the portfolios of student loan borrowers were slightly more allocated toward riskier assets that those without student loans (Dettling et al., 2022).

Financial Attitudes

Financial attitudes, beliefs and expectations regarding consumption decisions have been well studied in academic literature, however research into how these psychological attributes influence housing tenure and student borrowing decisions is less widely published. Because the decision to purchase a home typically also involves the decision to acquire debt (in the form of a mortgage), the literature surrounding attitudes and debt can however offer some important insights. Brown, et al. (2012), developed a model to study the influence of debt attitudes on secured, unsecured, and total debt of households, generally finding an inverse relationship between attitude towards debt and levels of debt. Other analyses have shown connections between favorable attitudes toward borrowing and materialism, financial wellbeing, and poor money management (Donnelly et al., 2012; Gardarsdóttir & Dittmar, 2012a, 2012b; Killins, 2017; Lea, 2021; Watson, 2003). Along similar lines, a 2005 analysis of British households,

found that financial expectations and financial optimism were positively related to levels of unsecured debt (S. Brown et al., 2005). Literature has also shown a positive association between financial optimism and levels of mortgage debt specifically (S. Brown & Taylor, 2008). Some research has found evidence that young adults may view the use of credit as necessary to establishing their independence and considering that purchasing a home can also provide a means to independence, there may be similarities between attitudes towards credit and attitudes toward homeownership (Lea, 2021; Mcneill, 2014).

The decision to borrow is ultimately one of intertemporal decision making; borrowing for consumption is essentially a "now or later" decision, and most people exhibit a preference for consuming now, even at the expense of incurring debt to do so (Lea, 2021). A large consensus exists in the empirical literature related to debt psychology and intertemporal choice; humans are notoriously impatient, and make (by economic standards) irrational decisions when it comes to time preference and risk/rewards, showing significant preference for earlier rewards despite irrationally high cost, and some researchers have also suggested a connection between this type of decision making and attitudinal traits (Ainslie, 1975; Andersen et al., 2014; Lea, 2021; Strickland & Johnson, 2020). This tendency toward hyperbolic discounting has also been used to relate a tendency for persistent debt to more tolerant attitudes towards debt in general, as well as a tendency to have multiple creditors (Aznar, 2009; George et al., 2018; Lea, 2021). These findings suggest that households with existing debt will generally have more favorable attitudes toward debt, and as such, will be more likely to incur future debt. In the context of student loans, a few studies have also found evidence of this phenomenon; as students incur higher education debt, they have a tendency to develop more favorable attitudes towards both student debt and unrelated debt in general (Callender et al., 2002; Haultain et al., 2010).

It is also possible that as perceptions of student loan debt as being unavoidable and "normal" become more prevalent, borrowers begin to have more favorable opinions of the debt. A 2017 analysis of debt aversion found that aversion to student loan debt decreased between 2002 and 2015, suggesting that overtime perceptions of student loan borrowing have become more favorable (Callender & Mason, 2017). While no research has specifically studied the relationship between private student loans and borrower attitudes, literature on "risky" borrowing (i.e. from sources known for predatory lending practices such as pay-day lenders) has shown a connection between financial difficulties and increased likelihood of borrowing from less favorable sources (Dearden et al., 2010; Walker, 1996). To the extent that private loans can be considered "risky" as well as necessary for students that find themselves facing financial difficulties (because they have exhausted all other options for financing their education), this research can provide some insight (Dearden et al., 2010; Lea, 2021).

Further, a 2020 analysis by researchers with the Federal Reserve noted that borrowers with adjustable-rate mortgages (ARMs) differed in their borrowing behaviors and attitudes towards the use of credit. They also found evidence that ARM borrowers were more likely to face borrowing constraints (Johnson & Li, 2014). Finke et al. (2005) came to similar conclusions in a cross-sectional analysis of mortgage borrowers between 1989 and 2001, in which they noted that more constrained households (those with lower income, wealth and creditworthiness) were more likely to have an ARM than less constrained borrowers (Finke et al., 2005). To the extent that student loans contribute to financial constraints within a household, it is reasonable to postulate that student loan borrowing as a whole may influence the type of mortgage a household uses, and also that households more constrained due to having less flexible student loan types

(i.e. Parent PLUS and private loans) will also have a tendency towards the use of ARMs over borrowers with only direct federal student loans.

Financial Knowledge/ Literacy

While the terms financial literacy and financial knowledge are often used interchangeably in the literature, Huston (2010) differentiates between the two terms; having financial knowledge is separate from appropriately applying the knowledge. Therefore, financial literacy can be thought of as the combination of both "knowledge and application of human capital specific to personal finance" (Huston, 2010, p. 307). A substantive amount of research related to financial literacy has revealed an overall consensus that financial knowledge/literacy in the U.S. is lacking. Limited financial knowledge has ramifications for many aspects of life and poor financial behaviors and outcomes (such as saving too little for emergencies or retirement, accumulating high levels of debt, delinquent payments, low wealth accumulation, improper estate planning and bankruptcy, all of which have all been linked to low levels of financial knowledge) (M. Brown et al., 2013, 2015; Hilgert et al., 2003; Lusardi et al., 2010; Lusardi & Mitchell, 2007, 2014; Mandell & Klein, 2009; Meier & Sprenger, 2010; Volpe et al., 2006). Higher levels of financial literacy are associated with an increased likelihood of homeownership, particularly among younger households, while poor financial literacy is associated with riskier mortgage choices, specifically higher loan to value and mortgage debt ratios and the use of adjustable-rate mortgages (Gathergood & Weber, 2017; Gerardi et al., 2010).

While financial literacy among young adults is particularly low, some research has suggested they have higher levels of financial knowledge when it relates to personal finance topics with which they have prior experience, such as purchasing auto insurance (Chen & Volpe, 1998; Laborde et al., 2013). These findings have important implications for student loan

borrowing; young adults are put in a position to make decisions about incurring substantial amounts of debt without having to prove prior experience responsibly managing debt, and in many cases, students make the initial decision to enroll in college (and incur debt) before they are old enough to have any legal responsibility and therefore experience using debt at all.

Indeed, survey data shows an alarming lack of knowledge about student loans among borrowers, one study found that the majority of students didn't know how long it would take to pay off their loans, what the payments would be, how much of their income would be going towards loan payments or if anyone had cosigned on their student loans, and one in four didn't know if their loans were federal or private (Prudential Research & Perspectives, 2019). Andruska, et al. (2014) studied students at Iowa State University and found that nearly 40% of students underestimate the amount of their student loan debt, about 13% reported having no student loan debt when in fact they did, and many did not understand that interest would cause their loan balances to grow over time (Andruska et al., 2014).

In the study of financial literacy, the importance of differentiating between actual financial knowledge and perceived financial knowledge has been a widely discussed topic of interest. Several studies have found that not only are individuals who perceive themselves as having high levels of financial knowledge less likely to seek out opportunities for increasing their financial understanding, perceived knowledge has a stronger influence on financial decision-making processes than actual financial knowledge (Goldsmith & Goldsmith, 1997; Huston, 2010; Laborde et al., 2013). Further, research has shown a connection between higher levels of perceived financial knowledge and poor money decisions (M. Brown et al., 2016). In a 2013 analysis of undergraduate college students researchers found that respondents typically reported higher levels of perceived financial knowledge than actual financial knowledge, and

exhibited poor debt-related behaviors, such as “maxing out” credit cards, not paying off the full balance on their credit cards each month, and not checking their credit reports (Laborde et al., 2013).

Demographic Characteristics

Household demographic characteristics can impact housing demand through two avenues; consumer tastes and preferences (which are typically unobservable), and purely demographic factors that can affect a desire or need for homeownership (and are observable). For example, as homeowners approach retirement they may have a desire to spend time travelling rather than maintaining a home, other things that may influence a homeowner’s decision to transition to renting are loss of a job, changes in health, relocation, divorce, or loss of a spouse (Mikolai et al., 2019; Painter & Lee, 2009). Similarly, marriage, having children, receiving a promotion, or graduating from college are all examples of life changes that may motivate a renting household to purchase a home. Economic models of housing demand normally account for consumer tastes and preferences by using demographic variables for proxies (Megbolugbe et al., 1991b). However, housing demand also depends on the household’s specific needs and circumstances, so it is important to incorporate variables that account for both household preferences and strictly demographic household characteristics in empirical models (Megbolugbe et al., 1991b).

Summary

The importance of homeownership for individuals and society is well documented in the literature. Real estate plays a significant role in the portfolios of households and while it is not the only factor affecting household wealth, literature supports the role of housing as a central component of wealth building (Yun, 2015, 2016; Yun et al., 2022; Yun & Evangelou, 2016).

Homeownership rates in the U.S. have been declining since the 1980s, particularly among younger households (Glassman et al., 2019). Though the reasons behind the trend are not entirely understood, many student debtors report that student loans are affecting their ability to purchase a home (National Association of Realtors Research Division & American Student Assistance, 2017; Prudential Research & Perspectives, 2019; The National Association of Realtors, 2021). When coupled with the rapid growth in student loan debt over the last decade, the need for understanding the role student loans play in homeownership is becoming increasingly relevant and timely.

Only one study to date has considered private student loans separately from federal student loans, but the analysis was limited to recent college graduates and the data did not allow researchers to consider the size of student debt payments on homeownership (Robb et al., 2020). Neoclassical economic theory provides the framework for analyzing consumer housing decisions through the lens of utility maximization. Under this theory, consumers seek to maximize their utility (wellbeing) subject to a budget constraint and their own tastes and preferences. The budget constraint and consumer tastes and preferences are some of the factors that determine demand for a good or service (Mateer & Coppock, 2014).

In the analysis of housing, determinants of demand can be grouped into three categories: financial characteristics, behavioral and psychographic characteristics, and demographic characteristics. Financial characteristics are factors that will affect a household's budget constraint, including income, liquid assets, and the household's ability to borrow. The majority of households require the use of mortgage financing for home purchases, and mortgage underwriters focus on three main factors when analyzing a borrower's loan application, (1) the size of a borrower's downpayment and liquid reserves, (2) the borrower's creditworthiness and

(3), the borrower's capacity for affording their current debt payments as well as payments related to the mortgage they are seeking. Student loan debt can influence all three of these factors, and therefore serves as a borrowing constraint in housing consumption decisions.

The second and third categories of housing demand determinants are factors that affect indifference curves. Indifference curves are central to the analysis of consumption decisions because they allow for the incorporation of consumer attitudes, tastes, and preferences into the models. Research has shown that psychological factors are strong determinants of housing demand, and in some cases, have more influence on housing tenure decisions than economic factors (Ben-Shahar, 2007). Risk preferences, financial attitudes and beliefs and financial literacy have all been shown to be important determinants in consumption and borrowing decisions, including mortgage use and student loan borrowing, as well as overall financial stability (S. Brown & Taylor, 2008; Grable, 2000; S. J. Heckman & Montalto, 2018; Le, 2018; Lea, 2021; Letkiewicz & Heckman, 2018; Mcneill, 2014; Megbolugbe et al., 1991a). Household characteristics also have been shown to influence housing demand because housing needs are driven in part by demographic factors such as age, marital status, the presence of children, and education levels, along with other sociodemographic traits that could also influence housing consumption decisions (Megbolugbe et al., 1991a; Mikolai et al., 2019; Painter & Lee, 2009).

While student loans and homeownership have been studied before, most researchers do not differentiate by student loan type, nor do they consider the effect the size of student loan payments can have on housing tenure decisions. Only one study to date has considered private student loans separately from federal student loans, but the analysis was limited to recent college graduates and the data did not allow researchers to consider the size of student debt payments on homeownership (Robb et al., 2020). Because debt payments (rather than total outstanding debt)

are a central factor in mortgage underwriting decisions, including student debt payments is essential for thorough analysis of housing tenure decisions. By shedding light on the relationships between various types of student loans, homeownership and borrowing behavior, results from this analysis can serve as an important foundation for the analysis of public policy decisions related to student loan reform. This study seeks to fill an important gap in the literature as it relates to types of student loan debt, homeownership, and mortgages using the neoclassical theory of housing demand.

Chapter 3 - Methods

Data and Sample Description

The data for this analysis comes from the Survey of Consumer Finances (SCF). Sponsored by the Federal Reserve Board, the SCF is a cross-sectional survey of U.S. families. Conducted every three years, the SCF looks at a variety of information including demographics, income, attitudes, real estate, loans made to others, educational loans (including whether a loan is a private loan or federal loan), financial assets, inheritances, and charity among other things. Multiple implicates are used in constructing the public version of the dataset to protect the privacy of survey respondents as well as improve efficiency and reduce the potential for nonresponse bias related to missing data. To account for this sample design, the analyses in this study use repeated-imputation inference (RII) methodology so parameter and variance estimates are accurate and unbiased (Lindamood et al., 2007; Montalto & Sung, 1996). Additionally, the survey design results in oversampling of higher wealth households, so weights are applied when calculating and reporting descriptive statistics (Lindamood et al., 2007).

In the 2019 SCF there were 5,777 households surveyed in total, of which 1,236 respondents had student loans. The first two variations of each model use the full sample, 5,777. The sample used in the second and third variations of each model is restricted to student loan holders. Modesl 2-A and 2-B use a sample restricted to households with income for the selection equations and for the outcome equations, the sample is further restricted to those with mortgages, resulting in samples sizes of 5,732 and 2,180, respectively. The selection equations for Models 2-C and 2-D are restricted to households with income and student loans (n = 1,047) and the outcome equations further limit the sample to mortgage holders (n=477). Models 3-A, 3-B, 4-A, and 4-B do not have any restrictions in the selection equations, but the outcome equations are

restricted to households with a mortgage, so the final sample size for these models is 2,204. Finally, Models 3-C, 3-D, 4-C, and 4-D are restricted to student loan holders in all equations, so the selection equation sample sizes are 1,053 and the outcome equation sample sizes are 478.

Empirical Models

Typically academic literature on housing tenure choice follows the neoclassical theory of housing demand, which postulates that a household's decision to own or rent stems from their consumption preferences (for housing and other goods) and financial constraints (income, liquid assets and borrowing ability) which restrict the tenure options available to the household. Following theory, the empirical model used for this analysis is operationalized beginning with the standard specification for a household's demand function for housing:

$$Q_{housing} = f\ (Y, P_h, P_o,)$$
$$where: Q_{housing} = \ housing\ expenditure$$
$$Y = household\ income$$
$$P_h = price\ of\ housing$$
$$P_o = price\ of\ all\ other\ goods\ and\ services$$

Under the utility maximization theory of consumer behavior, the household's consumption decision will be made in such a way that maximizes their utility, subject to their household preferences and constraints that affect their ability to access desired consumption choices (income, liquid assets, price of housing and price of other goods and services). Because quantifying household tastes and preferences is challenging, models of housing demand typically rely on the concept of revealed preferences, which assumes that the consumer's preferences for the goods or services being modelled are revealed by actual choices they have made in the past (Houthakker, 1950). In the context of housing tenure decisions (the decision to rent vs. own), the

household's current tenure can be thought of as the result of a decision that has already been made, and therefore can be assumed to reveal their preferences for renting or owning a home. Expanding on the approach used by Fu (2013) and Letkiewicz and Heckman (2018), the demand function in this analysis is then further adapted to include additional financial constraints, as well as other household characteristics that are known or suspected to influence housing tenure decisions, giving the following equation for housing demand used in this analysis:

$$Q_{housing} = f\ (Y, P_h, P_o, H)$$
$$where: Q_{housing} = housing\ expenditure$$
$$Y = household\ income\ and\ liquid\ assets$$
$$P_h = price\ of\ housing$$
$$P_o = price\ of\ all\ other\ goods\ and\ services$$
$$H = a\ vector\ of\ household\ characteristics$$

The models used in this analysis incorporate variables that represent the various components of the housing demand equation, adapted for the specific research questions of interest.

Model 1

The first set of regression models are binary logit regression models. These empirical models seek to answer the research question, does the presence, type or amount of student loan debt affect homeownership, by including variables measuring whether or not a household has student loans, whether or not the household has federal, private, and/or PLUS student loans, and the amount of each type of student loan debt a household has as key explanatory variables. These models begin by using the full sample of households for testing hypotheses 1-A through 1-D (n = 5,777). The sample is restricted to households with student loans for testing hypotheses 1-e through 1-l (n = 1,053). Two variations of Models 1-C and 1-D are run. The first variation

(shown in the equations for Models 1-C and 1-D below) use the total outstanding student loan balance and burden by type as the key explanatory variables, while the second variation replaces the variables for each loan type with the total outstanding student loan balance (1-C) and total student loan burden (Model 1-D) as key explanatory variables. This convention is used in all subsequent models as well. The regression equations consist of several control variables, as well as the various explanatory variables of interest and are shown below:

Model 1-A: Does the presence of student loan debt impact homeownership?

$$Homeownership = \beta_0 + \beta_1 HaveSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \varepsilon$$

$$where:$$

$$Homeownership = whether\ or\ not\ the\ household\ owns\ their\ residence$$
$$HaveSL = whether\ or\ not\ the\ household\ has\ student\ loans$$
$$C' = financial\ characteristic\ variables$$
$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$
$$D' = demographic\ variables$$

Model 1-B: Does the type of student loan debt a household has impact homeownership?

$$Homeownership = \beta_0 + \beta_1 FedSL + \beta_2 PvtSL + \beta_3 PlusSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \varepsilon$$

$$where:$$

$$Homeownership = whether\ or\ not\ the\ household\ owns\ their\ residence$$
$$FedSL = whether\ or\ not\ the\ household\ has\ a\ federal\ student\ loan$$
$$PvtSL = whether\ or\ not\ the\ household\ has\ a\ private\ student\ loan$$
$$PlusSL = whether\ or\ not\ the\ household\ has\ a\ PLUS\ student\ loan$$
$$C' = financial\ characteristic\ variables$$
$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$
$$D' = demographic\ variables$$

Model 1-C: Does the amount and type of student loan debt a household has impact homeownership?

$$Homeownership = \beta_0 + \beta_1\, FedBal + \beta_2\, PvtBal + \beta_3\, PlusBal + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \varepsilon$$

$$where:$$

$$Homeownership = whether\ or\ not\ the\ household\ owns\ their\ residence$$

$$FedBal = outstanding\ balance\ of\ the\ household's\ federal\ student\ loan\ debt$$

$$PvtBal = outstanding\ balance\ of\ the\ household's\ private\ student\ loan\ debt$$

$$PlusBal = outstanding\ balance\ of\ the\ household's\ PLUS\ student\ loan\ debt$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

Model 1-D: Does the size of a household's student loan payment relative to their monthly income (total and by type) impact homeownership?

$$Homeownership = \beta_0 + \beta_1\, FedBurden + \beta_2\, PvtBurden + \beta_3\, PlusBurden + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \varepsilon$$

$$where:$$

$$Homeownership = whether\ or\ not\ the\ household\ owns\ their\ residence$$

$$FedBurden = federal\ student\ loan\ payments\ /\ monthly\ income$$

$$PvtBurden = private\ student\ loan\ payments\ /\ monthly\ income$$

$$PLUSBurden = PLUS\ student\ loan\ payments\ /\ monthly\ income$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

Model 2

The second regression models seek to answer the question, does presence, type or amount of student loan debt affect a household's mortgage debt burden? These regressions consist of the same variables as the ones described above, with some modifications. The equations for estimating the determinants of relative mortgage burden are only based on households that have a mortgage on their primary residence, resulting in the potential for sample selection bias since some households may not have mortgage debt (whether by choice or inability to qualify). As a result, estimates obtained from a single-equation model could potentially be biased so these models are estimated following Heckman's two-step selection method (J. J. Heckman, 1979). In the first step, the likelihood of having a mortgage is estimated via a probit regression, with the dependent variable being a dummy variable equal to one if the household has a mortgage and zero if they do not, and control variables similar to those used in the first set of regression models. The Inverse Mills Ratio is calculated and included as a regressor in the final equation, which is estimated using ordinary least squares regression, with mortgage debt burden (as measured by the ratio of monthly mortgage payments to monthly income) as the dependent variable. As such, the sample for these models was restricted to households that have income and have a mortgage, resulting in a sample size of 2,180. To test hypotheses related to models 2-B, 2-C, and 2-D, the models are further restricted to only households with student loans when estimating the outcome equations, resulting in a sample size of 477. Finally, since income is in the denominator of the dependent variable, the outcome equation for Model 2-D uses monthly student loan payments rather than student loan burden as the key independent variables. The selection equation shown below is the same for all versions of this model, with the specific

student loan variables (presence, type, balance, and burden) changed as they relate to each research question). Equations for each of the outcome models follow.

Step 1: Selection Equation

$$Mortgage = \beta_0 + \beta_1 \boldsymbol{SL}' + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \varepsilon$$

$$where:$$

$$Mortgage = whether\ or\ not\ the\ household\ has\ a\ first\ mortgage\ on\ their\ primary\ residence$$

$$SL' = SL\ variables\ as\ related\ to\ each\ research\ question$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

Step 2: Outcome Equation(s)

Model 2-A: Does the presence of student loan debt impact a household's mortgage debt burden?

$$Mortgage\ Burden = \beta_0 + \beta_1\ HaveSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$Mortgage\ burden = monthly\ mortgage\ payments/monthly\ income$$

$$HaveSL = whether\ or\ not\ the\ household\ has\ student\ loans$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR)\ correction\ variable$$

Model 2-B: Does the type of student loan debt a household has impact their mortgage debt burden?

$$Mortgage\ burden = \beta_0 + \beta_1\ FedSL + \beta_2\ PvtSL + \beta_3\ PlusSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \cdots$$

$$\ldots + \lambda + \varepsilon$$

$$where:$$

$$Mortgage\ burden = monthly\ mortgage\ payments/monthly\ income$$

$$FedSL = whether\ or\ not\ they\ have\ a\ federal\ student\ loan$$

$$PvtSL = whether\ or\ not\ they\ have\ a\ private\ student\ loan$$

$$PlusSL = whether\ or\ not\ they\ have\ a\ PLUS\ student\ loan$$

$$C' = financial\ characteristic\ variables\ (excluding\ household\ income)$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 2-C: Does the amount of each type of student loan debt a household has impact their mortgage debt burden?

$$Mortgage\ burden = \beta_0 + \beta_1\ FedBal + \beta_2\ PvtBal + \beta_3\ PlusBal + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \cdots$$

$$\ldots + \lambda + \varepsilon$$

$$where:$$

$$Mortgage\ burden = monthly\ mortgage\ payments/monthly\ income$$

$$FedBal = outstanding\ balance\ of\ the\ household's\ federal\ student\ loan\ debt$$

$$PvtBal = whether\ or\ not\ the\ household\ has\ a\ private\ student\ loan$$

$$PlusBal = whether\ or\ not\ the\ household\ has\ a\ PLUS\ student\ loan$$

$$C' = financial\ characteristic\ variables(exclusing\ household\ income)$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 2-D: Does the size of a household's student loan payment relative to their monthly income impact their mortgage debt burden?

$$Mortgage\ burden = \beta_0 + \beta_1\ FedPayment + \beta_2\ PvtPayment + \beta_3\ PlusPayment + \ldots$$

$$\ldots + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$Mortgage\ burden = monthly\ mortgage\ payments/monthly\ income$$

$$FedPayment = federal\ student\ loan\ payments$$

$$PvtPayment = private\ student\ loan\ payments$$

$$PLUSPayment = PLUS\ student\ loan\ payments$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 3

The third set of regressions are also estimated using Heckman's two step approach, with models designed to answer the research question, "does the presence, type or amount of student loan debt a household has affect the type of mortgage financing the household has?" The selection equation is identical to the one used in the second regression models, and the outcome equations' binary dependent variable indicates whether or not a household has an adjustable-rate mortgage, estimated via probit regression. The independent variables are the same as the variables used in the other regressions, with variables measuring whether or not a household has student loans, the type of student loans the household has, the amount of debt in total and for each type of loan the household has and the household's student loan payment burden (in total and by loan type) as key explanatory variables, along with the same three categories of control

variables and the IMR correction variable. The sample for the selection equation used in models 3-A and 3-B contains the full sample of households (5,777), with the outcome equation restricted to those with a mortgage, for a sample size of 2,204. Models 3-C and 3-D restrict the selection equation to households with student loans (n=1,053) for the outcome equation and to households with a mortgage and student loans in the selection equations (n=478). The third set of regression model equations are shown below:

Model 3-A: Does the presence of student loan debt impact the type of mortgage financing the household has?

$$ARM = \beta_0 + \beta_1 HaveSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$ARM = whether\ or\ not\ the\ household\ has\ an\ adjustable\ rate\ mortgage$$
$$HaveSL = whether\ or\ not\ the\ household\ has\ student\ loans$$
$$C' = financial\ characteristic\ variables$$
$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$
$$D' = demographic\ variables$$
$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 3-B: Does the type of student loan debt a household has impact their mortgage debt burden?

$$ARM = \beta_0 + \beta_1 FedSL + \beta_2 PvtSL + \beta_3 PlusSL + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$ARM = whether\ or\ not\ the\ household\ has\ an\ adjustable\ rate\ mortgage$$
$$FedSL = whether\ or\ not\ they\ have\ a\ federal\ student\ loan$$
$$PvtSL = whether\ or\ not\ they\ have\ a\ private\ student\ loan$$
$$PlusSL = whether\ or\ not\ they\ have\ a\ PLUS\ student\ loan$$
$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 3-C: Does the amount of each type of student loan debt a household has affect the type of mortgage financing the household has?

$$ARM = \beta_0 + \beta_1\ FedBal + \beta_2\ PvtBal + \beta_3\ PlusBal + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$FedBal = outstanding\ balance\ of\ the\ household's\ federal\ student\ loan\ debt$$

$$PvtBal = woutstanding\ balance\ of\ the\ household's\ private\ student\ loan\ debt$$

$$PlusBal = outstanding\ balance\ of\ the\ household's\ PLUS\ student\ loan\ debt$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 3-D: Does the size of a household's student loan payment relative to their monthly income impact the type of mortgage financing a household has?

$$ARM = \beta_0 + \beta_1\ FedBurden + \beta_2\ PvtBurden + \beta_3\ PlusBurden + \cdots$$

$$\ldots + \boldsymbol{C}'\tau + \boldsymbol{P}'\pi + \boldsymbol{D}'\omega + \lambda + \varepsilon$$

$$where:$$

$$FedBurden = federal\ student\ loan\ payments\ /\ monthly\ income$$

$$PvtBurden = private\ student\ loan\ payments\ /\ monthly\ income$$

$$PLUSBurden = PLUS\ student\ loan\ payments\ /\ monthly\ income$$

$$C' = financial\ characteristic\ variables$$

$$P' = behavioral\ and\ psychographic\ characteristic\ variables$$

$$D' = demographic\ variables$$

$$\lambda = Inverse\ Mills\ Ratio\ (IMR) correction\ variable$$

Model 4

The final set of regression models are identical to those used in Model 3, with the dependent variable instead indicating whether or not a household has a federally insured or guaranteed mortgage. The estimation techniques, independent variables and sample sizes remain unchanged from Model 3.

Summary

Under the neoclassical theory of housing demand, the greater student loan payments (an expenditure) are, the less a household will be able to spend on housing and other goods and services, ceteris paribus. Historically private and PLUS student loans have had fewer and less flexible repayment options, further reducing the amount a household has available to spend on housing and other goods and services. Therefore, it was expected that households with student loans would be less likely to own their home than those without student loan debt, with an even more pronounced difference for households that have private or PLUS student loan debt, all else equal.

Furthermore, as a down payment is required for most home loans, households that must spend some of their income on student loans will not be able to save as much towards a down payment as a household without student loans. Since the household's budget constraint is determined by household income, liquid assets and borrowing ability, a reduction in savings will be reflected by an inward shift of the budget line because a lower down payment results in a higher house payment and therefore a higher mortgage debt to income ratio. Theoretically, we can expect to see a positive relationship between mortgage debt burden and student loans, as an increase in student loan debt will lead to an increase in the ratio of mortgage payments to monthly income, all else equal. Because of the variation in characteristics between federal,

private, and PLUS student loans, we can also expect to find higher mortgage debt burden for holders of private or PLUS student loans (as compared to holders of federal student loans), all else equal.

Adjustable-rate mortgages (ARMs) have historically attracted borrowers with higher risk tolerance and more financial constraints and have similar characteristics to private student loans. Parent PLUS loans also carry more risk for borrowers, so a similar relationship between ARMs and PLUS loans may also theoretically be expected. In addition, borrowers that face financial constraints due to their student loan payments may have higher DTI ratios, and therefore face more difficulty qualifying for a mortgage. ARMs are attractive to borrowers because they tend to have lower interest rates, and in cases where a borrower cannot meet DTI requirements with a fixed rate loan, selecting an ARM with a lower interest rate could reduce housing payments enough for them to qualify. For these reasons, we can also expect to find positive relationships between having an adjustable-rate mortgage and having student loans, while borrowers with private or PLUS student loans will have an even greater likelihood of having an ARM, ceteris paribus.

Along similar lines, it was also expected that households with student loan debt would be more likely to have mortgages that are federally guaranteed or insured because these loans accept borrowers with higher DTI ratios and lower credit scores than conventional mortgages and the relationship is expected to be more pronounced for borrowers with private or PLUS loans, all else equal.

Operationalization of Variables

Dependent Variables

The dependent variables used in the first two models are homeownership (defined as owning the property the respondent lives in (property type can include houses, condos, townhomes and co-ops), having a mortgage (a dummy variable indicating whether or not the household has a first mortgage on their primary residence) and mortgage debt burden, a variable measuring the ratio of monthly mortgage payments to monthly income (for the first mortgage only). Monthly income is calculated by dividing annual household income from all sources (wages, unearned income, etc.) by 12. The income variable includes income that was received by the household in 2018. The mortgage debt burden variable is logged in the regressions to adjust for skewness in its distribution. The dependent variables used in the third and fourth models are dummy variables created to identify the type of mortgage loan a household has, constructed to indicate if a loan has a fixed or adjustable interest rate (Model 3), and if the mortgage is a federally insured/guaranteed (Model 4). A summary of the measurement and coding for all variables is provided in Table 3.1 below.

Table 3.1 Variable Coding Scheme

Variables	Type	Description
Housing Tenure/Mortgage Variables		
Housing Tenure	Binary	= 1 if owns primary residence = 0 if does not own primary residence
Mortgage Status (among homeowners)	Binary	= 1 if household has a mortgage = 0 if household does not have a mortgage
Adjustable-Rate Mortgage (among mortgage holders)	Binary	= 1 if mortgage has adjustable-rate = 0 if mortgage has fixed-rate
Federally Backed Mortgage (among mortgage holders)	Binary	= 1 if mortgage is federally backed =0 if mortgage is not federally backed
Mortgage Type (among mortgage holders)	Categorical	= 1 if Federally Insured or Guaranteed = 2 if Conventional Mortgage = 3 if Conventional Mortgage with PMI = 4 if Adjustable-Rate Mortgage
Mortgage Burden	Continuous	= monthly mortgage payment/gross monthly income
Current mortgage rate	Continuous	
Original Loan to Value	Continuous	= original mortgage principal/original home value
Student Loan Variables		
Have Student Loans?	Binary	= 1 if household has student loans = 0 if household does not have student loans

Variables	Type	Description
Type of student loan (s)	Categorical	= 1 if household has Federal loans = 2 if household has Private loans = 3 if household has PLUS loans = 0 if household has no student loans
Total Student Loan Debt	Continuous	
Federal Student Loan Debt	Continuous	
Private Student Loan Debt	Continuous	
PLUS Student Loan Debt	Continuous	
Total SL Burden	Continuous	= total monthly SL payment/gross monthly income
Federal SL Burden	Continuous	= monthly federal SL payment/gross monthly income
Private SL Burden	Continuous	= monthly private SL payment/gross monthly income
PLUS SL Burden	Continuous	= monthly PLUS SL payment/gross monthly income
Total Monthly SL Payments	Continuous	
Monthly Federal SL Payments	Continuous	
Monthly Private SL Payments	Continuous	
Monthly PLUS SL Payments	Continuous	
Independent Variables: Financial Characteristics		
First home?	Binary	= 1 if Current home is first home = 0 if Current home is not first home
Creditworthiness	Binary	= 1 if Denied/thought would be denied = 0 if Not denied/did not need credit
Excess Spending	Binary	= 1 if Carries credit card balance/spends more than income = 0 if Doesn't carry CC balance/spends same/less than income

Variables	Type	Description
Debt to Income Ratio	Continuous	= monthly debt payments/gross monthly income
Monthly Consumer Debt Payments	Continuous	
Monthly Consumer Debt Payments (excl. SL)	Continuous	
Annual Household Income	Continuous	
Independent Variables: Behavioral/Psychographic Characteristics		
Risk tolerance	Categorical	= 0 if Risk Averse = 1 if Average Risk Tolerance = 2 if Above Average Risk Tolerance
Credit Attitude	Categorical	= 0 if Credit Averse = 1 if Credit Neutral = 2 if Credit Positive
Subjective Financial Knowledge	Continuous	
Independent Variables: Demographic Characteristics		
Children in household	Binary	= 0 if No Dependent Children = 1 if Dependent Children
Relationship Status	Binary	= 0 if Single = 1 if Couple
Race of respondent	Categorical	= 1 if White = 2 if Black = 3 if Hispanic = 4 if Other

Variables	Type	Description
Working Status of Household	Categorical	= 1 if Working = 2 if Retired = 0 if Unemployed/Disabled/Not in the labor force
Age of Household Category	Categorical	= 1 if Under 35 = 2 if 35 to 45 = 3 if 46 to 55 = 4 if 56 to 65 = 5 if 65 plus
Household Education Category	Categorical	= 1 if Less than High School = 2 if High School Graduate = 3 if Some College, No Degree = 4 if Associate Degree = 5 if Bachelor's Degree = 6 if Graduate School
Parent Education Category	Categorical	= 0 if Less than High School = 1 if High School Graduate = 3 if Some College = 4 if Bachelor's or Higher

Independent Variables

The models' independent variables include key explanatory variables related to student loans including the presence and type of student loans (whether or not a household has federal student loans, whether or not a household has private student loans and whether or not a household has PLUS student loans). The Survey of Consumer Finances does not directly ask if a student loan is a PLUS loan, however, the survey does ask whose education the loan was obtained for. Since PLUS loans (for the purposes of this analysis) are defined as loans obtained to finance someone else's education, the variable is constructed by using a dummy variable for whose education the loan was obtained for; if a respondent indicated that the loan was obtained to pay for the education of someone other than themselves or their spouse, it is considered to be a PLUS loan for the purpose of this analysis. Characteristics of the loans are also accounted for with variables for outstanding student loan balance (in total and by type), monthly student loan payments (in total and by type), and the ratio of a household's monthly student loan payments relative to their monthly income (also in total and by type of loan). The SCF does not ask specifically about the type of loan for the 7^{th} or higher student loan, so the 7^{th} or higher student loan information is not included in the calculations for variables related to the specific amount owed or payment amounts by loan type. These variables are also logged in the regressions as they are highly skewed.

Financial Characteristics Variables

The first category of independent variables contains information on the household's financial characteristics. This category includes household income, which is logged in the regressions, as it is heavily skewed, as well as monthly consumer debt payments, which are also logged for the same reason. Additionally, since the type of mortgages available to a buyer and

the ability to qualify for a mortgage in general depend in part on the mortgage rate, a variable for the current mortgage interest rate is included in the second, third and fourth regression models. Ideally the original rate at time of loan origination would be used instead, but that information is not available in the SCF, so the current mortgage rate is the next best alternative.

Because borrowing constraints can also affect one's ability to obtain a mortgage, variables related to creditworthiness are also included. The respondent's credit score is not available in the SCF dataset; however, a proxy variable can be constructed based on whether the respondent or their spouse was denied credit or given less credit than they applied for in the previous year because of their creditworthiness or debt to income ratios. Previous literature has found that the behavior of individuals that chose not to apply for credit because they *believed* they would be denied credit exhibited similar behavior to those that had actually applied for credit and were denied, so the creditworthiness variable also accounts for respondents that chose not to apply for credit because they thought they would be denied within the past year (Jappelli,1990). The original loan to value ratio, calculated as the original amount of the household's first mortgage loan relative to the original value of the home, and the household's debt to income ratio are also included. It should be noted that the outcome equations for Model 2 use the household's monthly consumer debt payments instead of DTI since income is a component of the dependent variable, and in Model 2-D, the consumer debt payment variable also excludes student loan payments as student loan payments are included individually in the equation. These variables are all logged in the regressions to account for skewness in their distributions.

Finally, a variable indicating whether or not this is the household's first home is included as first-time homeowners may have characteristics that are different from more experienced

homebuyers that could influence the size of their mortgage payment or their choice of mortgage type. For example, there are many first-time homebuyer programs with incentives designed to make homeownership more accessible or affordable. These buyers may also have a more limited credit history or lower credit scores or be in a different life stage than repeat homebuyers which could also affect the size or type of mortgage they are willing and able to afford. Collectively the financial characteristic variables are representative of a household's budget constraint.

Behavioral and Psychographic Variables

This category of variables relates to behavioral and psychological attributes and includes variables on risk tolerance, financial attitudes, and financial knowledge/literacy. To assess a household's level of risk tolerance, a categorical variable is created from an SCF question asking the respondent to describe their willingness to take financial risk when saving or making investments based on four answer choices ranging from "willing to take substantial risk" to "not willing to take any risks." The SCF does not have a direct measure of time preference, but previous research has found an association between smoking behavior and hyperbolic discounting, so a dummy variable for smoking status of the respondent and/or their spouse is used as a proxy for time preference (Scharff & Viscusi, 2011).

To account for financial attitudes, a dummy variable was created to indicate if the household spends more than their income and/or carries a balance on their credit card(s), and a categorical variable for the respondent's attitude towards the use of credit. If the respondent indicated that buying things with credit was a "bad idea", they were considered credit averse, if they responded that it was "good in some ways, bad in others," they were considered credit neutral, and if they responded that it was a "good idea", they were considered to have a favorable attitude towards credit. To assess financial knowledge, measures for both objective financial

knowledge and subjective financial knowledge are used. The objective financial knowledge variable is constructed from three SCF questions asking about stocks and diversification, compound interest and inflation. The variable can take on values ranging from 0-3, based on the number of questions the respondent answered correctly. The subjective financial knowledge variable comes from a question asking respondents to rate how knowledgeable they and their partner or spouse are about personal finance on a scale of 0-10, with zero being not at all knowledgeable and 10 being very knowledgeable about personal finance.

Demographic Variables

Finally, the third category of variables is made up of demographic variables including household age, which is the age of the respondent, or in cases where the respondent is married or has a partner, calculated as the average of their ages, and assigned to one of five age categories. Other variables include relationship status, if there are children under the age of 18 in the household, the household's highest level of education (measured as the highest level of education completed between the respondent or the spouse/partner), race of the respondent, highest level of completed education for the respondent's parents, and household working status, which is determined by the working status of the respondent and their spouse; if either of them are working, the household is considered to be working, if either is retired, the household is considered retired, and if either is unemployed, disabled, or otherwise not in the labor force, the household is coded as not in the labor force.

Chapter 4 - Results

This chapter provides results from each of the empirical analyses, beginning with the descriptive statistics for the sample. Next, results from each of the models and their associated research questions are presented.

Descriptive Statistics

Tables 4.1 through 4.5 contain sample descriptives for the variables used in the analyses and are organized by the variable categories, beginning with Table 4.1 which contains descriptive statistics for variables related to homeownership and mortgages.

Table 4.1: Weighted Descriptive Statistics: Homeownership/Mortgage Characteristics

		Total Sample		By Student Loan Status			
		(n= 5,777)		*No SL (n = 4541)*		*Has SL (n = 1236)*	
Variables	Variable Category/Type	Median	Proportion	Median	Proportion	Median	Proportion
Mortgage/Housing Tenure Characteristics							
Housing Tenure	Owns primary residence		58.26		59.81		52.55
	Does not own primary residence		41.74		40.19		47.45
Mortgage	Has a mortgage on primary residence		62.16		56.11		87.48
	Does not have a mortgage on primary residence		37.84		43.89		12.52
First home?	Current home is first home		58.01		60.97		45.6
	Current home is not first home		41.99		39.03		54.4
Mortgage Type	Adjustable-Rate Mortgage		4.11		3.83		3.48
	Federally Insured or Guaranteed		34.3		32.57		40.15
	Conventional Mortgage with PMI		18.26		17.22		21.67
	Conventional Mortgage		43.33		46.38		34.7
Mortgage Rate	Continuous	4.00		4.00		4.10	
Mortgage Burden	Continuous	15.17		15.25		14.92	
Original LTV	Continuous	94.77		93.54		96.55	

Source: 2019 Survey of Consumer Finances (all five implicates)

Of the total sample 58.26% of households owned their primary residence, 62.16% had a mortgage, and for 58.08% of households, it was their first home. Among mortgage holders, 43.33% had a conventional mortgage, 18.26% had a conventional mortgage with private

mortgage insurance (PMI), 34.3% had a federally insured or guaranteed mortgage and 4.11% had an adjustable-rate mortgage (ARM). The median mortgage interest rate for the household's first mortgage was 4.00%. The median household mortgage burden was 15.16% and the median original loan to value ratio for homeowners with a mortgage was 94.46%. For households with student loans, 52.55% owned their home, of which, 87.48% had a mortgage and 45.6% were first time homeowners. Those with mortgages had a median interest rate of 4.10%, a median mortgage burden of 14.92% and median original loan to value ratio of 96.55%.

Table 4.2 presents the descriptive statistics for student loans.

Table 4.2: Weighted Descriptive Statistics: Student Loan Characteristics (n=1,236)

Variables	Variable Category/Type	Median	Proportion
Student Loan Characteristics			
Student Loan Status	Has Student Loans		21.39
Loan Type	Federal Student Loan		70
	Private Student Loan		14.62
	PLUS Student Loan		15.38
Total Student Loan Debt	Continuous	$22,000	
Federal Student Loan Debt	Continuous	$22,300	
Private Student Loan Debt	Continuous	$12,000	
PLUS Student Loan Debt	Continuous	$20,000	
Total SL Burden	Continuous	19.36	
Federal SL Burden	Continuous	3.24	
Private SL Burden	Continuous	2.31	
PLUS SL Burden	Continuous	2.77	
Total Monthly SL Payments	Continuous	$200	
Monthly Federal SL Payments	Continuous	$200	
Monthly Private SL Payments	Continuous	$210	
Monthly PLUS SL Payments	Continuous	$200	

Source: 2019 Survey of Consumer Finances (all five implicates)

Just over 21% of all households had student loans, with the majority (70%) being federal student loans. About 14% were private student loans and 15.38% were PLUS student loans. It should be noted that households may have more than one type of student loan, so the total number of student loans across each type is larger than the number of total households with student loans. Households with federal loans had a median total student loan debt of $24,000, and a median balance of $22,300 for federal loans. For households that were making payments on their federal loans, the median federal student loan payment burden was 3.24%. Households with private loans had a median total balance of $23,500, a median private balance of $12,000 and for households that were making payments on their private loans, the median private loan burden was 2.31%. PLUS loan holders had a median total student loan balance of $24,000, a median PLUS balance of $20,000 and a median PLUS loan burden of 2.77% (among those that were making payments on their PLUS loans). Among households with student loan debt, the highest reported balances were $419,000 for federal loans, $356,000 for private loans and $192,000 for PLUS loans, and maximum payment burden ranged between 52.5% for private loans and 87.14% for federal and PLUS loans.

Descriptive statistics for financial characteristics can be found in Table 4.3 below. Regarding financial characteristics, 15.49% of respondents had been denied credit within the past year or chose not to apply because they thought they would be denied and 33.24% reported spending more than their income and/or carrying a balance on their credit cards. Median annual household income was $77,000, median monthly consumer debt payments were $416.25, and median monthly consumer debt payments, excluding student loans were $386.25. The median debt to income ratio was 2.57%. Among households with student loans, 25.07% reported having been denied credit (or feared being denied), 37.75% carried

Table 4.3: Weighted Descriptive Statistics: Financial Characteristics

		Total Sample		By Student Loan Status			
		(n= 5,777)		*No SL (n = 4541)*		*Has SL (n = 1236)*	
Variables	Variable Category/Type	Median	Proportion	Median	Proportion	Median	Proportion
Financial Characteristics							
DTI Ratio	Continous	2.57		8.18		8.45	
Monthly consumer debt payments	Continous	$ 416.25		$ 367.50		$ 555.00	
Monthly consumer debt payments (excl. SL)	Continous	$ 386.25		$ 367.50		$ 423.75	
Annual Income	Continous	$56,000.00		$52,000.00		$68,000.00	
Credit Worthiness	Denied/thought would be denied		13.74		12.89		25.07
	Not denied/did not need credit		86.26		87.11		74.93
Excess Spending	Carries CC balance/spends more than income		33.24		32.02		37.75
	Does not carry CC balance/spends same or less than income		66.76		67.98		62.25

Source: 2019 Survey of Consumer Finances (all five implicates)

balances on their credit cards and/or spent more than their income. The median annual household income for this group was $68,000, median monthly consumer debt payments were $555.00 overall and $423.75 when excluding student loan payments.

Descriptive statistics for the behavioral and psychographic characteristics variables are provided in Table 4.4. Across all households, 44.99% of respondents reported being neutral towards credit (they did not think it was good or bad), 28.86% thought the use of credit was "bad," while 26.15% reported viewing credit as "good." 39.24% were considered risk averse, 38.11% had average risk tolerance, 22.66% had above average risk tolerance. 20.61% of households were smokers. The median number of correct responses for questions measuring objective financial knowledge was 2 (out of 3 questions), and the median self-reported subjective knowledge score was 7 (on a scale of 1 to 10). For households with student loans, 47.68 were neutral towards the use of credit, 25.61% were averse to the use of credit and 26.70% had favorable attitudes towards credit use. 26.61% were risk averse, 46.19% had average risk tolerance and 27.19% had above average risk tolerance. 19.88% were smoking households, and

the median scores for objective and subjective financial knowledge were also 2 and 7, respectively.

Table 4.4: Weighted Descriptive Statistics: Behavioral/Psychographic Characteristics

		Total Sample		By Student Loan Status			
		(n= 5,777)		*No SL (n = 4541)*		*Has SL (n = 1236)*	
Variables	Variable Category/Type	Median	Proportion	Median	Proportion	Median	Proportion
Behavioral/Psychographic Characteristics							
Risk tolerance	Risk Averse		39.24		42.67		26.61
	Average Risk Tolerance		38.11		35.91		46.19
	Above Average Risk Tolerance		22.66		21.42		27.19
Credit Attitude	Credit Averse		28.86		29.75		25.61
	Credit Neutral		44.99		44.26		47.68
	Credit Positive		26.15		25.99		26.7
Objective Financial Knowledge (# correct)		2		2		2	
Subjective Financial Knowledge		7		7		7	
Smoking Status of HH	Smokes		20.61		20.81		19.88
	Does not smoke		79.39		79.19		80.12

Source: 2019 Survey of Consumer Finances (all five implicates)

Descriptive statistics for the final category of variables are presented in Table 4.5. For the full sample, 56.05% of households were a couple (married or living with a partner) and 38.64% had dependent children living in their home. Under the category of race, 68% of respondents were white, 15.65% were black, 10.93 were Hispanic and the remaining 5.42% were coded as "other." Most households were working (73.69%), 18.07% were retired, and 8.25% were unemployed, disabled or otherwise not in the labor force. The household age categories were Under 35 (23.32% of households), 35 to 45 (17.24% of households), 46 to 55 (17.21% of households), 56 to 65 (18.85% of households) and 65 PLUS (23.38% of households). 7.19% had not graduated high school, 19.49% had a high school education, 16.51% had attended college but not completed a degree, 13.28% had an associate degree, 23.34% had a bachelor's degree and 20.19% had attended graduate school. For the respondent's parents' highest level of education, most had completed high school (33.51%), 17.86% had not finished high school, 17.11% had

some college, and 31.53% had completed a bachelor's degree or higher. Among households with student loans, 61.15% were a couple, 52.5% had dependent children living in their home, 64.88% were white, 22.16% were black, 8.79% were Hispanic and 4.16% were in the "other" category. 93.43% of households were working, 1.83% were re tired and 4.74 were not in the labor force, disabled or unemployed. 44.68% of households were under the age of 35, 25.87% were between the ages of 35 and 45, 16.11% were between the ages of 46 and 55, 10.41% were between the ages of 56 and 65, and 2.93% were over the age of 65. 0.54% of households had not graduated high school, 5.08% had graduated high school but not attended college, 16.72% had some college, 15.41% had received an associate degree, 33.8% had a bachelor's degree and 28.45% had attended graduate school. 7.9% of respondents' parents had not graduated high school, 28.14% were high school graduates, 22.45% had attended some college, and 41.50% had at least a bachelor's degree.

Table 4.5: Weighted Descriptive Statistics: Demographic Variables

		Total Sample		By Student Loan Status			
		(n = 5,777)		*No SL (n = 4541)*		*Has SL (n = 1236)*	
Variables	Variable Category/Type	Median	Proportion	Median	Proportion	Median	Proportion
Demographic Characteristics							
Children in household	No Dependent Children		61.36		34.87		47.5
	Dependent Children		38.64		65.13		52.5
Relationship Status	Single		43.95		45.34		38.85
	Couple		56.05		54.66		61.15
Race of respondent	White		68		68.84		64.88
	Black		15.65		13.88		22.16
	Hispanic		10.93		11.51		8.79
	Other		5.42		5.76		4.16
Working Status of Household	Working		73.69		68.31		93.43
	Retired		18.07		22.48		1.83
	Unemployed/Disabled/Not in LF		8.25		9.2		4.74
Age of Household Category	Under 35		23.32		17.51		44.68
	35 to 45		17.24		14.89		25.87
	46 to 55		17.21		17.5		16.11
	56 to 65		18.85		21.15		10.41
	65 plus		23.38		28.95		2.93
Household Education Category	Less than High School		7.19		9		0.54
	High School Graduate		19.49		23.41		5.08
	Some College, No Degree		16.51		16.45		16.72
	Associate Degree		13.28		12.7		15.41
	Bachelor's Degree		23.34		20.5		33.8
	Graduate School		20.19		17.94		28.45
Parent Education Category	Less than High School		17.86		20.57		7.9
	High School Graduate		33.51		34.97		28.14
	Some College		17.11		15.65		22.45
	Bachelor's or Higher		31.53		28.81		41.5

Source: 2019 Survey of Consumer Finances (all five implicates)

Regression Results

Prior to finalizing models, diagnostic analyses and robustness checks were conducted to ensure multicollinearity was not present and that coefficients were stable between specifications. Variance Inflation Factors (VIF) were calculated to test for multicollinearity, and in all final specifications, VIFs were within acceptable limits (maximum VIF= 3.48). Additionally, residual versus fitted plots were examined for evidence of problematic outliers or leverage, and sensitivity analyses were performed using different variations of the models to ensure results were consistent. Analyses were performed using normalized weights and standard errors were corrected via RII techniques. Results for each of the models are discussed below.

Research Question 1: Student Loans and Homeownership

The first group of models assessed the relationship between student loans and homeownership, with having student loan debt, type of student loan debt, amount of student loan debt, and student loan payment burden as key explanatory variables. Results for Models 1-A and 1-B are presented in Table 4.6. Results from Model 1-C are presented in Table 4.7 and results from Model 1-D are presented in Table 4.8.

Model 1-A: Student Loan Debt and Homeownership

Hypothesis 1a predicted that the presence of student loan debt would be negatively associated with homeownership and was supported by the model's results as shown in Table 4.6. The presence of student loan debt was highly significant (p-value <0.001) and was inversely related to homeownership. The odds ratio for student loan debt was 0.887, indicating that the odds of homeownership for households with student loan debt were 0.887 times the odds of homeownership for households without student loan debt, holding all other factors constant. The financial characteristic variables were also significant. Creditworthiness was a significant

predictor of homeownership; the odds of homeownership for households that had been denied credit or did not apply out of fear of denial were 0.621 times the odds of homeownership for households that did not have a credit denial in the past 12 months. Contrary to expectations, the odds of homeownership for households that spent more than their income or carried a credit card balance were 1.213 times the odds of homeownership for households that did not spend more than their income or carry a credit card balance. A 10% increase in income was associated with approximately a 4.12% increase in the odds of owning a home, ceteris paribus. Households that had favorable attitudes towards credit were less likely to be homeowners than those that were credit averse (credit neutral was not significant in the model). As anticipated, the likelihood of homeownership increased as objective and subjective financial knowledge increased. Compared to risk averse households, those with above average risk tolerance had greater odds of homeownership, while those with average risk tolerance had lower odds of homeownership. Smoking households also had lower odds of homeownership than non-smoking households.

The odds of homeownership for married/partner households and households with children were 1.862 and 1.907 times the odds of homeownership for single households and those without children, respectively. Categorical variables for age and education were also significant with results consistent with expectations; the more educated the household was, the greater their odds of homeownership, and households in higher age categories had greater odds of homeownership relative to younger households, with only a slight decrease in the odds ratio for households over the age of 65 (from 2.946 for households age 56 to 65 to 2.926 for households over the age of 65) when compared to households age 36 to 45. Respondent parent education was significant only for those with parents that had a bachelor's degree or higher. If a respondent’s parents had a bachelor’s degree or higher, their odds of homeownership were 0.893

times the odds of homeownership for households with respondents whose parents had only a high school diploma. Minority households (black, Hispanic, or other) were all less likely to own their home than white households, while working households and retired households were more likely to own their homes than households that were unemployed, disabled or otherwise not in the labor force. The model's percent concordant was 82.96.

Model 1-B: Type of Student Loan Debt and Homeownership

The second model was designed to test hypotheses related to type of student loan debt and homeownership. Results from this model showed that the type of student loan debt a household had was a significant predictor of homeownership and results were consistent with expectations.

Households with federal, private, and PLUS student loans were less likely to own their home than households with no student loans (odds ratios 0.949, 0.642 and 0.861 respectively). The odds of homeownership for households with federal student loan debt were 0.949 times the odds of homeownership for households without student loans, ceteris paribus. The odds of homeownership for households with private student loan debt were 0.642 times the odds of homeownership for households with no student loan debt, ceteris paribus, while the odds of homeownership for households with PLUS student loans were 0.861 times the odds of homeownership of non-student indebted households, all else equal. Coefficients and significance levels for the other independent variables were all consistent and largely unchanged from the first model, with the exception of the above average risk tolerance category, which was not significant in this model. The percent concordant was 82.98.

Table 4.6: Models 1-A and 1-B Logistic Regression Results for Housing Tenure (n=5,777)

	Model 1-A				Model 1-B			
Variable	*Odds Ratio*	*β*	*SE β*	*p*	*Odds Ratio*	*β*	*SE β*	*p*
Intercept		-2.330	0.028	<.001		-2.327	0.028	<.001
Student Loans								
Has Student Loans	0.797	-0.227	0.007	<.001				
Type of Loan (Reference is Has No SL)								
Has Federal Student Loans					0.830	-0.186	0.006	<.001
Has Private Student Loans					0.593	-0.522	0.008	<.001
Has PLUS Student Loans					0.842	-0.173	0.014	<.001
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.557	-0.585	0.008	<.001	0.555	-0.589	0.008	<.001
Excess Spending/Has CC Balance	1.142	0.133	0.006	<.001	1.144	0.135	0.006	<.001
Log DTI	1.091	0.087	0.001	<.001	1.092	0.088	0.001	<.001
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	0.936	-0.066	0.005	<.001	0.936	-0.066	0.005	<.001
Neutral Attitude Towards Credit	1.000	0.000	0.007	0.961	0.998	-0.002	0.007	0.774
Financial Knowledge								
Objective Financial Knowledge (# Correct)	1.132	0.124	0.002	<.001	1.133	0.124	0.002	<.001
Subjective Financial Knowledge	1.074	0.071	0.002	<.001	1.075	0.072	0.002	<.001
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	1.154	0.143	0.008	<.001	1.152	0.141	0.008	<.001
Average Risk Tolerance	1.071	0.068	0.008	0.001	1.072	0.070	0.008	0.001
Smoking Status								
Smoking Household	0.664	-0.410	0.005	<.001	0.662	-0.413	0.005	<.001
Demographic Characteristics								
Relationship Status								
Couple	2.290	0.828	0.003	<.001	2.299	0.832	0.003	<.001
Dependent Children								
Dependent Children	1.983	0.684	0.003	<.001	1.978	0.682	0.003	<.001
Age (Reference is 36 - 45)								
Age 46-55	1.657	0.505	0.002	<.001	1.646	0.498	0.002	<.001
Age 56-65	2.819	1.037	0.008	<.001	2.797	1.029	0.008	<.001
Age 65 plus	2.768	1.018	0.010	<.001	2.749	1.011	0.010	<.001
Under 35	0.548	-0.602	0.003	<.001	0.552	-0.595	0.003	<.001
HH Education (Reference is High School)								
Less than HS	0.811	-0.209	0.019	<.001	0.812	-0.208	0.019	<.001
Some College, No Degree	1.055	0.054	0.015	0.024	1.102	0.097	0.014	0.002
Associates Degree	1.419	0.350	0.014	<.001	1.410	0.343	0.014	<.001
Bachelors	1.733	0.550	0.021	<.001	1.730	0.548	0.021	<.001
Graduate School	2.360	0.859	0.021	<.001	2.382	0.868	0.021	<.001
Respondent's Parent Ed (Reference is High School)								
Less than HS	0.901	-0.104	0.049	0.103	0.903	-0.102	0.050	0.110
Some College, No Degree	1.039	0.038	0.049	0.485	1.043	0.042	0.049	0.443
Bachelors or higher	0.929	-0.073	0.042	0.155	0.930	-0.072	0.042	0.160
Race (Reference is White)								
Black	0.554	-0.590	0.011	<.001	0.552	-0.595	0.010	<.001
Hispanic	0.633	-0.457	0.014	<.001	0.632	-0.459	0.014	<.001
Other	0.725	-0.322	0.018	<.001	0.720	-0.328	0.018	<.001
Working Status (Reference is Unemployed, Disabled, Not in the LF)								
Retired	2.286	0.827	0.010	<.001	2.278	0.823	0.011	<.001
Working	2.202	0.790	0.004	<.001	2.190	0.784	0.004	<.001
Percent Concordant	82.1				82.1			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 1-C: Amount of Student Loan Debt and Homeownership

Results from Model 1-C are presented in Table 4.7. This model tested the relationship between outstanding student loan balance (in total and by type of loan) and homeownership among households with student loan debt. For each additional% increase in total and PLUS loan balances the odds of homeownership increased, with odds ratios of 1.065 and 1.016 respectively, while a one% increase federal and private loan debt was associated with lower odds of homeownership, with odds ratios of 0.972 and 0.957, respectively.

Poor creditworthiness was associated with lower odds of homeownership, as households that had been denied credit or feared denial and those carrying a balance on credit cards/spending more than income had odds ratios less than one. Increases in income were positively associated with homeownership. Households that favorably viewed the use of credit had odds ratios slightly above one (compared to credit averse households). There were slight differences between the total debt and debt by type models for the neutral credit attitude category; in the total debt model, a neutral credit attitude was associated with an odds ratio of 0.981, while in the debt by loan type model the neutral credit attitude category had an odds ratio of 1.036. Objective financial knowledge was not significant in the student loan balance by type model but was significant and negatively related to the odds of homeownership in the total debt model.

Average and above average risk tolerance were significant in both models and had similar odds ratios (both were greater than one). Households that smoked had lower odds of homeownership than non-smoking households. Older households were all more likely to own a home than younger households, but the odds ratio decreased for the Age 65 PLUS category, going from 3.19 for ages 56 to 65 to 1.334 in the total debt model (the reference group was Age 36 to 45). This relationship was also seen in the debt by loan type model. Being a couple, having

children in the household and being a working or retired household versus unemployed, disabled or not in the labor force was also positively associated with homeownership. Compared to white households, minority households all had lower odds of homeownership in both models. In both models the associate degree category for household education was not significant, and in contrast to previous models, the categories for less than high school and some college, but no degree for the respondent's parents' education were both significant, while the category for bachelor's degree or higher was not significant in either version of this model. Respondents whose parents had not graduated high school or had attended college but not received a degree had higher odds of homeownership than respondents whose parents had completed high school, with odds ratios above one in both categories and in both versions of the model. The percent concordant for these models was similar to previous models, at 81.9 (debt by loan type) and 81.94 (total debt).

Table 4.7: Model 1-C Logistic Regression Results for Homeownership (n = 1,053)

	Model 1-C (Total Balance)				Model 1-C (Balance by Type)			
Variable	*Odds Ratio*	*β*	*SE β*	*p*	*Odds Ratio*	*β*	*SE β*	*p*
Intercept		-3.107	0.080	<.001		-2.834	0.043	<.001
Student Loans								
Balance								
Log Total Student Loan Debt	1.031	0.031	0.009	0.030				
Log Federal Student Loan Debt					0.954	-0.047	0.002	<.001
Log Private Student Loan Debt					0.957	-0.043	0.004	<.001
Log PLUS Student Loan Debt					1.027	0.027	0.002	<.001
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.469	-0.757	0.007	<.001	0.480	-0.734	0.006	<.001
Excess Spending/Has CC Balance	1.166	0.154	0.010	<.001	1.156	0.145	0.011	<.001
Log DTI	1.136	0.127	0.012	<.001	1.151	0.141	0.013	<.001
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	1.116	0.110	0.007	<.001	1.100	0.095	0.007	<.001
Neutral Attitude Towards Credit	0.973	-0.027	0.006	0.007	1.004	0.004	0.007	0.597
Financial Knowledge								
Objective Financial Knowledge (# Correct)	0.729	-0.316	0.004	<.001	1.053	0.051	0.009	0.005
Subjective Financial Knowledge	1.105	0.100	0.002	<.001	1.104	0.099	0.002	<.001
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	1.363	0.310	0.015	<.001	1.312	0.272	0.015	<.001
Average Risk Tolerance	1.244	0.218	0.008	<.001	1.215	0.195	0.007	<.001
Smoking Status								
Smoking Household	0.831	-0.186	0.017	<.001	0.865	-0.144	0.018	0.001
Demographic Characteristics								
Relationship Status								
Couple	2.296	0.831	0.011	<.001	2.378	0.866	0.011	<.001
Dependent Children								
Dependent Children	2.039	0.712	0.014	<.001	1.936	0.661	0.013	<.001
Age (Reference is 36 - 45)								
Age 46-55	1.577	0.455	0.009	<.001	1.506	0.409	0.011	<.001
Age 56-65	3.134	1.142	0.031	<.001	2.797	1.029	0.027	<.001
Age 65 plus	1.409	0.343	0.014	<.001	1.216	0.195	0.013	<.001
Under 35	0.622	-0.475	0.008	<.001	0.651	-0.429	0.008	<.001
HH Education (Reference is High School)								
Less than HS	1.176	0.162	0.016	<.001	1.335	0.289	0.017	<.001
Some College, No Degree	0.702	-0.354	0.022	<.001	0.761	-0.273	0.024	<.001
Associates Degree	1.061	0.059	0.020	0.038	1.108	0.102	0.023	0.010
Bachelors	1.274	0.242	0.031	0.001	1.440	0.365	0.036	<.001
Graduate School	1.702	0.532	0.020	<.001	2.101	0.742	0.026	<.001
Respondent's Parent Ed (Reference is High School)								
Less than HS	1.521	0.419	0.079	0.006	1.573	0.453	0.078	0.004
Some College, No Degree	1.186	0.171	0.065	0.059	1.221	0.200	0.062	0.033
Bachelors or higher	1.030	0.029	0.057	0.637	1.070	0.068	0.061	0.332
Race (Reference is White)								
Black	0.586	-0.534	0.037	<.001	0.603	-0.507	0.034	<.001
Hispanic	0.581	-0.543	0.022	<.001	0.599	-0.512	0.021	<.001
Other	0.637	-0.452	0.061	0.002	0.637	-0.452	0.058	0.002
Working Status (Reference is Unemployed, Disabled, Not in the LF)								
Retired	3.075	1.123	0.025	<.001	3.012	1.103	0.023	<.001
Working	3.172	1.154	0.011	<.001	3.311	1.197	0.013	<.001
Percent Concordant	81.36				81.28			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 1-D: Student Loan Burden and Homeownership

The final model related to Research Question 1 analyzed the relationship between student loan burden and homeownership. Results are provided in Table 4.8.

Total and federal student loan burden were significant predictors of homeownership with odds ratios of 0.938 and 0.964 respectively, while private student loan burden had an odds ratio of 1.074. The odds of homeownership were 1.074 times the odds of homeownership for those with one% less in private student loan burden, ceteris paribus. PLUS loan burden was not significant. Results remained generally consistent with previous models, as did the% concordant. However, there were a few differences to note. In both the total burden and burden by type models the variables for households that spent more than their income or carried a credit card balance and objective financial knowledge were not significant. The household education variables also revealed some interesting results. Compared to households with only a high school education, those with less than a high school education had higher odds of owning a home with odds ratios of 1.282 in the total burden model and 1.287 in the burden by type model. Households that had some college, but no degree had odds of homeownership of about 0.67 time those of high school educated households in both models, and households with an associate degree had odds of homeownership lower than one relative to households with only a high school diploma in both models (this category was not significant in Model 1-C). Households that had a bachelor's degree had higher odds of homeownership (1.183 in the total burden model and 1.144 in the debt by type model). For graduate education (compared to high school only), the odds of homeownership increased to 1.567 and 1.515 in the total burden and burden by loan type models, respectively.

Table 4.8: Model 1-D Logistic Regression Results for Homeownership (n=1,053)

	Model 1-D (Total Burden)				Model 1-D (Burden by Type)			
Variable	*Odds Ratio*	*β*	*SE β*	*p*	*Odds Ratio*	*β*	*SE β*	*p*
Intercept		-3.139	0.040	<.001		-3.130	0.037	<.001
Student Loans								
Burden								
Log Total Student Loan Burden	1.012	0.012	0.015	0.456				
Log Federal Student Loan Burden					1.011	0.010	0.011	0.395
Log Private Student Loan Burden					1.045	0.044	0.007	0.003
Log PLUS Student Loan Burden					0.937	-0.065	0.017	0.019
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.449	-0.801	0.016	<.001	0.448	-0.803	0.015	<.001
Excess Spending/Has CC Balance	1.116	0.110	0.010	<.001	1.117	0.110	0.010	<.001
Log DTI	1.174	0.161	0.013	<.001	1.178	0.164	0.013	<.001
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	1.012	0.012	0.007	0.143	1.111	0.105	0.006	<.001
Neutral Attitude Towards Credit	1.123	0.116	0.006	<.001	0.989	-0.011	0.007	0.163
Financial Knowledge								
Objective Financial Knowledge (# Correct)	1.063	0.061	0.008	0.001	1.062	0.060	0.008	0.001
Subjective Financial Knowledge	1.104	0.099	0.002	<.001	1.104	0.099	0.002	<.001
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	1.346	0.297	0.011	<.001	1.347	0.298	0.011	<.001
Average Risk Tolerance	1.247	0.221	0.006	<.001	1.243	0.217	0.006	<.001
Smoking Status								
Smoking Household	0.849	-0.163	0.017	0.001	0.848	-0.165	0.017	0.001
Demographic Characteristics								
Relationship Status								
Couple	2.395	0.873	0.010	<.001	2.390	0.871	0.011	<.001
Dependent Children								
Dependent Children	1.958	0.672	0.016	<.001	1.965	0.675	0.015	<.001
Age (Reference is 36 - 45)								
Age 46-55	1.541	0.432	0.010	<.001	1.562	0.446	0.010	<.001
Age 56-65	3.017	1.104	0.033	<.001	3.108	1.134	0.033	<.001
Age 65 plus	1.321	0.278	0.017	<.001	1.343	0.295	0.018	<.001
Under 35	0.628	-0.465	0.010	<.001	0.624	-0.471	0.008	<.001
HH Education (Reference is High School)								
Less than HS	1.478	0.391	0.027	<.001	1.492	0.400	0.027	<.001
Some College, No Degree	0.714	-0.336	0.025	<.001	0.708	-0.346	0.024	<.001
Associates Degree	1.064	0.062	0.025	0.064	1.057	0.055	0.024	0.078
Bachelors	1.326	0.282	0.040	0.002	1.317	0.276	0.038	0.002
Graduate School	1.806	0.591	0.033	<.001	1.785	0.579	0.029	<.001
Respondent's Parent Ed (Reference is High School)								
Less than HS	1.573	0.453	0.079	0.005	1.577	0.456	0.079	0.005
Some College, No Degree	1.192	0.176	0.060	0.043	1.192	0.175	0.060	0.043
Bachelors or higher	1.082	0.079	0.060	0.257	1.086	0.083	0.060	0.241
Race (Reference is White)								
Black	0.600	-0.511	0.034	<.001	0.597	-0.516	0.034	<.001
Hispanic	0.589	-0.530	0.019	<.001	0.585	-0.536	0.019	<.001
Other	0.656	-0.422	0.054	0.001	0.660	-0.416	0.054	0.002
Working Status (Reference is Unemployed, Disabled, Not in the LF)								
Retired	3.138	1.144	0.024	<.001	3.318	1.199	0.025	<.001
Working	3.232	1.173	0.016	<.001	3.269	1.184	0.015	<.001
Percent Concordant	81.82				81.86			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Research Question 2: Student Loans and Mortgage Burden

Models for the second research question tested hypotheses related to the impact of student loan debt on mortgage burden using Heckman's two step selection method. A selection equation was first used to estimate the likelihood of having a mortgage using probit regression. Next the Inverse Mills Ratio was calculated for use in the outcome equations, which were estimated using ordinary least squares regression, with corrected standard errors and RII techniques. Results for the selection equations for Models 2-A and 2-B can be found in Table 4.9 below, and results for the outcome equations are presented in Table 4.10. The selection and outcome equation results for Models 2-C are provided in Tables 4.11 and 4.12, while those for Model 2-D can be found in Tables 4.13 and 4.14.

Model 2-A: Student Loan Debt and Mortgage Burden

Selection Equation

In order to investigate Research Question 2, a Heckman Two-Step Selection Model was estimated. The selection equation predicted the probability of having a mortgage using the full sample for Models 2-A and 2-B and restricted to the sample of households with student loans for Models 2-C and 2-D. The results for Models 2-A and 2-B can be found in Table 4.9 below.

The presence of student loans, in general and by type was significant and positively related to the probability of having a mortgage. Other variables that were positively related to the probability of having a mortgage in these models included: first time home buyer status, poor creditworthiness (as measured by having been denied credit and carrying a credit card balance/excess spending), having a favorable or neutral attitude toward the use of credit (relative to being averse to credit), higher subjective financial knowledge, above average risk tolerance (relative to being risk averse), being a couple, having a dependent living in the home, being

between the ages of 46 and 55 (compared to being between the ages of 36 and 45) and being retired (compared to being unemployed, disabled or otherwise not in the labor force). The other age categories, all household education categories, being a minority and working were all negatively related to the probability of having a mortgage. None of the respondent's parent education level variables were significant. The percent concordant was about 86 for both models.

Table 4.9: Models 2A and 2B Selection Equation Regression Results for Mortgage Holding (n = 5,732)

	Model 2-A (Selection)			Model 2-B (Selection)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-1.145	0.026	<.001	-1.120	0.027	<.001
Student Loans						
Has Student Loans	0.023	0.005	0.008			
Type of Loan (Reference is Has No SL)						
Has Federal Student Loans				-0.062	0.005	<.001
Has Private Student Loans				-0.076	0.007	0.001
Has PLUS Student Loans				0.156	0.006	<.001
Financial Characteristics						
First Home	0.945	0.003	<.001	0.944	0.003	<.001
Credit Worthiness						
Denied Credit/Feared Denial	-0.023	0.008	0.043	-0.089	0.008	<.001
Excess Spending/Has CC Balance	0.163	0.005	<.001	0.164	0.005	<.001
Log DTI	0.140	0.005	<.001	0.144	0.005	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.063	0.002	<.001	0.061	0.002	<.001
Neutral Attitude Towards Credit	0.018	0.005	0.021	0.015	0.005	0.033
Financial Knowledge						
Objective Financial Knowledge (# Correct)	0.003	0.003	0.367	0.007	0.003	0.124
Subjective Financial Knowledge	0.020	0.001	<.001	0.020	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	-0.029	0.004	0.002	-0.025	0.006	0.013
Above Average Risk Tolerance	0.044	0.004	<.001	0.032	0.005	0.003
Smoking Status						
Smoking Household	-0.162	0.009	<.001	-0.165	0.009	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.235	0.006	<.001	0.238	0.006	<.001
Dependent Children						
Dependent Children	0.292	0.003	<.001	0.285	0.003	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.006	0.005	0.261	-0.006	0.005	0.326
Age 56-65	-0.136	0.005	<.001	-0.152	0.005	<.001
Age 65 plus	-0.371	0.010	<.001	-0.388	0.010	<.001
Under 35	-0.170	0.006	<.001	-0.162	0.006	<.001
HH Education (Reference is Graduate School)						
Less than HS	-0.545	0.020	<.001	-0.556	0.020	<.001
Some College, No Degree	-0.454	0.023	<.001	-0.464	0.023	<.001
Associates Degree	-0.277	0.017	<.001	-0.290	0.017	<.001
Bachelors	-0.128	0.009	<.001	-0.142	0.009	<.001
Graduate School	-0.090	0.010	0.001	-0.100	0.010	0.001
Respondent's Parent Ed (Reference is High School)						
Less than HS	-0.041	0.033	0.282	-0.040	0.033	0.303
Some College, No Degree	-0.006	0.023	0.801	-0.003	0.022	0.896
Bachelors or higher	0.059	0.024	0.065	0.061	0.024	0.061
Race (Reference is White)						
Black	-0.155	0.008	<.001	-0.152	0.009	<.001
Hispanic	-0.132	0.018	0.002	-0.133	0.018	0.002
Other	-0.136	0.020	0.002	-0.138	0.020	0.002
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.303	0.001	<.001	0.302	0.001	<.001
Retired	-0.144	0.008	<.001	-0.147	0.008	<.001
CreditDeny*HaveSL	-0.327	0.002	<.001			
Creditworth*FedSL				-0.350	0.005	<.001
Creditworth*PvtSL				-0.243	0.010	<.001
Creditworth*PLUSSL				-0.504	0.012	<.001
Percent Concordant	78.96			78.92		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

With an adjusted r-squared value of 16.57, Model 2-A explained 16.57% of the variation in mortgage debt burden after adjusting for degrees of freedom. The results from this model did support Hypothesis 2a, as the presence of student loan debt had a significant and positive impact on household mortgage debt burden. The presence of student loan debt was associated with a 13.9% increase in mortgage debt burden compared to households with no student loans, ceteris paribus. The variable for the household being a first-time homebuyer was not significant, but mortgage rate and original loan to value were both significant and positively related to mortgage burden. For each additional% increase in the mortgage rate, household mortgage burden increased by 2.2%, all else equal. A one percent increase in the household's original loan to value ratio was associated with approximately a 26% increase in the household's mortgage burden, ceteris paribus. Households with poor creditworthiness, as measured by having been denied credit (or fearing denial) and spending more than income/carrying a credit card balance had higher mortgage burdens than households without poor creditworthiness, while higher debt payments were associated with lower mortgage burdens, holding other factors constant. Both the credit attitude and risk tolerance categories of variables were not significant. Higher levels of objective and subjective financial knowledge were negatively related to mortgage burden, while being a smoking household was positively associated with mortgage burden. Working and retired households had lower mortgage burdens than households that were unemployed, disabled or otherwise not in the labor force. An interaction term was included for credit denial and the presence of student loans and was negative and significant in the model. Finally, the Inverse Mills Ratio (IMR) coefficient was significant, indicating that selection bias may have been present among mortgage holders.

Table 4.10: Models 2-A and 2-B OLS Regression Results for Mortgage Burden (n = 2,180)

	Model 2-A			Model 2-B		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-1.076	0.107	<.001	-1.075	0.107	<.001
Student Loans						
Has Student Loans	0.139	0.040	<.001			
Type of Loan (Reference is Has No SL)						
Has Federal Student Loans				0.111	0.041	0.007
Has Private Student Loans				0.054	0.071	0.451
Has PLUS Student Loans				-0.033	0.075	0.660
Mortgage Characteristics						
First Home	-0.045	0.032	0.152	-0.043	0.032	0.180
Mortgage Rate	0.022	0.012	0.074	0.022	0.012	0.081
Log LTV	0.259	0.034	<.001	0.260	0.034	<.001
Mortgage Type (Reference is Conventional)						
Federally Insured/Guaranteed	0.099	0.036	0.006	0.102	0.036	0.005
Conventional with PMI	0.133	0.047	0.006	0.139	0.047	0.004
ARM	-0.108	0.079	0.174	-0.100	0.079	0.206
Financial Characteristics						
Credit Worthiness						
Denied Credit/Feared Denial	0.199	0.059	<.001	0.134	0.051	0.009
Excess Spending/Has CC Balance	0.062	0.035	0.075	0.059	0.035	0.088
Log Debt Payments	-0.024	0.007	<.001	-0.022	0.007	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.038	0.040	0.343	0.039	0.040	0.338
Neutral Attitude Towards Credit	-0.015	0.036	0.681	-0.017	0.037	0.646
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.078	0.020	<.001	-0.076	0.021	<.001
Subjective Financial Knowledge	-0.029	0.008	<.001	-0.029	0.008	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	-0.042	0.039	0.277	-0.044	0.039	0.262
Above Average Risk Tolerance	-0.076	0.043	0.078	-0.078	0.043	0.073
Smoking Status						
Smoking Household	0.078	0.042	0.062	0.074	0.042	0.079
Demographic Characteristics						
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	-0.316	0.028	<.001	-0.314	0.028	<.001
Retired	-0.131	0.036	<.001	-0.129	0.036	<.001
CreditDeny*HaveSL	-0.259	0.094	0.006			
Creditworth*FedSL				-0.163	0.161	0.311
Creditworth*PvtSL				-0.488	0.352	0.166
Creditworth*PLUSSL				-0.249	0.259	0.335
Inverse Mills Ratio	0.000	0.000	0.008	0.000	0.000	0.008
Adjusted R-Squared	16.57			16.25		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 2-B: Type of Student Loan Debt and Mortgage Burden

Outcome Equation

The presence of federal student loans was associated with an 11.1% increase in a household's mortgage burden, holding other factors constant. None of the other student loan variables were significant predictors of a household's mortgage debt burden in this model. First time homeownership was also not significant, but mortgage rate and original loan to value ratio were both significant and positively related to mortgage burden. A one percent increase in a household's original loan to value ratio was associated with approximately a 26% increase in mortgage burden, ceteris paribus. Compared to households with conventional mortgages, those with federally insured/guaranteed loans or conventional loans with private mortgage insurance (PMI) had mortgage burdens that were 10.2 and 13.9% higher, respectively, than households with a traditional conventional mortgage (the ARM category was not significant). Poor creditworthiness was positively related to mortgage burden for both the credit denial and excess spending/credit balance variables, and a household's debt payments were negatively related to their mortgage burden. Credit attitudes were not significant in the model, while both subjective and objective financial knowledge were significant and negatively related to mortgage burden. Average risk tolerance (compared to being risk averse) was not significant, but having above average risk tolerance was associated with 7.8% decrease in mortgage burden, relative to risk averse households. Smoking households had mortgage burdens that were 7.4% higher than non-smoking households. Similar to Model 2-A, both working and retired households had lower mortgage burdens than households that were unemployed, disabled or otherwise not in the labor force. None of the interaction terms for credit denial and type of student loan debt were significant. As seen in Model 2-A, the Inverse Mills Ratio variable was significant, which

indicates that selection may have been present among mortgage holders. This model explained 16.25% of the variation in mortgage debt burden after adjusting for degrees of freedom, as indicated by the adjusted r-squared value of 16.25.

Model 2-C: Amount of Student Loan Debt and Mortgage Burden

Selection Equation

For Model 2-C, the sample was restricted to households with student loans. The percent concordant values for both variations of the model were 84.9 (total debt) and 84.8 (debt by type). Results, which can be found in Table 4.11 below, were largely consistent with those from Models 2-A and 2-B, with a few deviations. Higher amounts of student loan debt were positively associated with the probability of having a mortgage, while higher amounts of student loan debt by loan type were all negatively associated with the probability of having a mortgage. Having been denied credit was negatively related to the probability of having a mortgage, having less than a high school education was not significant in the total debt model, and being Hispanic was not significant in either model. Compared to high school graduates, the respondent's whose parents had less than high school or some college, but no degree had a higher probability of having a mortgage, but the category for parent education of bachelor's degree or higher was not significant.

Table 4.11: Model 2-C Selection Equation Regression Results for Mortgage Holding Among Student Loan Borrowers (n= 1,047)

	Model 2-C (Selection-Total Balance)			Model 2-C (Selection-Balance by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-2.009	0.066	<.001	-1.181	0.043	<.001
Student Loans						
Balance	0.066	0.005	<.001			
Log Total Student Loan Debt						
Log Federal Student Loan Debt				-0.009	0.002	0.015
Log Private Student Loan Debt				-0.010	0.001	0.001
Log PLUS Student Loan Debt				-0.004	0.001	0.004
Financial Characteristics						
First Home	1.427	0.006	<.001	1.421	0.006	<.001
Credit Worthiness						
Denied Credit/Feared Denial	-0.313	0.008	<.001	-0.302	0.008	<.001
Excess Spending/Has CC Balance	0.100	0.010	0.001	0.096	0.010	0.001
Log DTI	-0.049	0.003	<.001	-0.046	0.003	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.098	0.006	<.001	0.108	0.005	<.001
Neutral Attitude Towards Credit	0.091	0.005	<.001	0.114	0.005	<.001
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.011	0.003	0.014	-0.010	0.003	0.022
Subjective Financial Knowledge	0.055	0.001	<.001	0.051	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	0.110	0.004	<.001	0.089	0.004	<.001
Above Average Risk Tolerance	0.165	0.006	<.001	0.138	0.006	<.001
Smoking Status						
Smoking Household	-0.295	0.008	<.001	-0.293	0.009	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.392	0.010	<.001	0.397	0.010	<.001
Dependent Children						
Dependent Children	0.394	0.007	<.001	0.384	0.007	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.005	0.003	0.142	0.020	0.003	0.003
Age 56-65	-0.111	0.007	<.001	-0.106	0.005	<.001
Age 65 plus	-1.389	0.015	<.001	-1.396	0.014	<.001
Under 35	-0.106	0.004	<.001	-0.096	0.003	<.001
HH Education (Reference is Graduate School)						
Less than HS	-0.041	0.029	0.227	-0.114	0.027	0.013
High School Graduate	-0.062	0.017	0.022	-0.202	0.015	<.001
Some College, No Degree	-0.485	0.011	<.001	-0.579	0.009	<.001
Associates Degree	-0.085	0.011	0.001	-0.191	0.008	<.001
Bachelors	-0.099	0.011	0.001	-0.159	0.009	<.001
Respondent's Parent Ed (Reference is High School)						
Less than HS	0.301	0.061	0.008	0.288	0.060	0.009
Some College, No Degree	0.061	0.028	0.091	0.062	0.028	0.090
Bachelors or higher	0.047	0.026	0.144	0.052	0.026	0.119
Race (Reference is White)						
Black	-0.131	0.023	0.005	-0.119	0.022	0.005
Hispanic	-0.024	0.015	0.183	-0.025	0.014	0.150
Other	-0.228	0.035	0.003	-0.237	0.035	0.002
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.150	0.005	<.001	0.158	0.005	<.001
Retired	0.046	0.010	0.008	0.078	0.010	0.001
Percent Concordant	84.90			84.8		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

Hypothesis 2c predicted that student loan balances would be associated with higher mortgage burdens, however only one of the variables for student loan balance was significant in this model, as the results in Table 4.12 show. For every one percent increase in PLUS student loan debt, a household's mortgage burden decreased by 1.9%, ceteris paribus. Households that were first time homeowners had mortgage burdens that were 22.7% (total debt) and 20.9% (debt by loan type) higher than households that were repeat homeowners, and each additional percent increase in a household's monthly non-mortgage debt payments was associated with a decrease in mortgage burden of 8.6% and 7.4% in the total debt and debt by type models, respectively. Having been denied credit and carrying a balance on credit cards/spending more than income were both insignificant in the models. Mortgage rate, original loan to value ratio and mortgage type were also not significant, with the exception of the mortgage category for conventional loans with PMI, which was significant in both models. Households with a conventional loan with PMI had mortgage burdens that were 26.6% and 25.9% higher than households with a traditional conventional mortgage in the total debt and debt by type models, respectively. Additionally, subjective financial knowledge, credit attitude, risk tolerance and smoking status were not significant in either version of the model. For each additional objective financial knowledge question correctly answered, a household's mortgage debt burden decreased by 18.3% (total debt) and 17.8% (debt by type), ceteris paribus. Working households had lower mortgage burdens than unemployed, disabled or households otherwise not in the labor force, but retirement status was not significant in either version. The IMR variable was significant in the total debt model but was not significant in the debt by type model. The adjusted r-squared value was 19.82 in the total debt model and 19.65 in the debt by loan type model.

Table 4.12: Model 2-C OLS Regression Results for Mortgage Burden (n= 477)

	Model 2-C (Total Balance)			Model 2-C (Balance by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-0.936	0.353	0.008	-0.587	0.306	0.055
Student Loans						
Balance						
Log Total Student Loan Debt	0.035	0.026	0.172			
Log Federal Student Loan Debt				-0.006	0.013	0.647
Log Private Student Loan Debt				0.002	0.014	0.909
Log PLUS Student Loan Debt				-0.019	0.009	0.026
Mortgage Characteristics						
First Home	0.227	0.094	0.016	0.209	0.092	0.024
Mortgage Rate	0.002	0.030	0.951	0.011	0.031	0.718
Log LTV	0.044	0.115	0.699	0.065	0.116	0.571
Mortgage Type (Reference is Conventional)						
Federally Insured/Guaranteed	0.077	0.079	0.334	0.049	0.080	0.545
Conventional with PMI	0.266	0.094	0.005	0.259	0.096	0.008
ARM	0.043	0.178	0.808	0.062	0.178	0.728
Financial Characteristics						
Credit Worthiness						
Denied Credit/Feared Denial	-0.110	0.094	0.241	-0.113	0.094	0.227
Excess Spending/Has CC Balance	0.027	0.072	0.706	0.014	0.072	0.849
Log Debt Payments	-0.086	0.028	0.002	-0.074	0.028	0.008
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	-0.003	0.090	0.976	0.019	0.091	0.834
Neutral Attitude Towards Credit	0.071	0.079	0.365	0.080	0.080	0.316
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.183	0.042	<.001	-0.178	0.042	<.001
Subjective Financial Knowledge	0.021	0.019	0.284	0.013	0.019	0.496
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	-0.031	0.089	0.724	-0.051	0.089	0.568
Above Average Risk Tolerance	-0.055	0.101	0.584	-0.086	0.100	0.392
Smoking Status						
Smoking Household	0.039	0.094	0.680	0.029	0.094	0.757
Demographic Characteristics						
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	-0.380	0.069	<.001	-0.398	0.069	<.001
Retired	0.076	0.151	0.614	0.158	0.154	0.306
Inverse Mills Ratio	-0.008	0.003	0.020	-0.004	0.003	0.119
Adjusted R-Squared	19.82			19.65		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 2-D: Student Loan Burden and Mortgage Burden

The final model related to predictors of mortgage debt burden tested Hypothesis 2i, which postulated that student loan burden would be positively associated with mortgage debt

burden, and hypotheses 2j-2l, related to burden by loan type. Results can be found in Tables 4.13 and 4.14 below.

Selection Equation

The selection equation for Model 2-D was nearly identical to those for Model 2-C, so only differences will be mentioned here. The full table of results is provided below in Table 4.13.

Higher student loan payments, in total and by type of loan were all negatively related to the probability of having a mortgage, while having less than a high school education was significant and negatively related to having a mortgage in both the total payment and payment by loan type models (it was not significant in the total debt model). The% concordant values were 85.28 in the total payment model and 85.2 in the payment by type model.

Table 4.13: Model 2-D Selection Equation Results for Mortgage Holding Among Student Loan Borrowers (n=1,047)

	Model 2-D (Selection-Total Payment)			Model 2-D (Selection-Payment by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-1.368	0.043	<.001	-1.369	0.044	<.001
Student Loans						
Balance	-0.096	0.003	<.001			
Log Total Student Loan Debt						
Log Federal Student Loan Debt				-0.082	0.003	<.001
Log Private Student Loan Debt				-0.018	0.002	<.0014
Log PLUS Student Loan Debt				-0.034	0.004	<.0017
Financial Characteristics						
First Home	1.409	0.007	<.001	1.427	0.008	<.001
Credit Worthiness						
Denied Credit/Feared Denial	-0.324	0.007	<.001	-0.323	0.008	<.001
Excess Spending/Has CC Balance	0.068	0.011	0.003	0.076	0.011	0.002
Log DTI	-0.034	0.003	<.001	-0.038	0.003	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.102	0.006	<.001	0.113	0.006	<.001
Neutral Attitude Towards Credit	0.119	0.004	<.001	0.117	0.004	<.001
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.014	0.002	0.003	-0.016	0.002	0.003
Subjective Financial Knowledge	0.048	0.001	<.001	0.051	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	0.059	0.003	<.001	0.067	0.003	<.001
Above Average Risk Tolerance	0.118	0.006	<.001	0.128	0.005	<.001
Smoking Status						
Smoking Household	-0.251	0.009	<.001	-0.265	0.009	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.390	0.010	<.001	0.392	0.010	<.001
Dependent Children						
Dependent Children	0.379	0.008	<.001	0.385	0.006	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.060	0.004	<.001	0.049	0.005	0.002
Age 56-65	-0.111	0.007	<.001	-0.081	0.007	<.001
Age 65 plus	-1.341	0.012	<.001	-1.338	0.015	<.001
Under 35	-0.092	0.002	<.001	-0.108	0.002	<.001
HH Education (Reference is High School)						
Less than HS	-0.258	0.038	0.002	-0.124	0.036	0.024
Some College, No Degree	-0.565	0.009	<.001	-0.135	0.017	0.001
Associates Degree	-0.565	0.009	<.001	-0.550	0.009	<.001
Bachelors	-0.210	0.008	<.001	-0.205	0.008	<.001
Graduate School	-0.163	0.010	<.001	-0.160	0.009	<.001
Respondent's Parent Ed (Reference is High School)						
Less than HS	0.303	0.067	0.010	0.299	0.067	0.011
Some College, No Degree	0.061	0.028	0.097	0.064	0.029	0.088
Bachelors or higher	0.042	0.027	0.188	0.058	0.027	0.101
Race (Reference is White)						
Black	-0.096	0.021	0.011	-0.109	0.021	0.007
Hispanic	0.014	0.013	0.344	0.013	0.014	0.379
Other	-0.195	0.031	0.003	-0.204	0.031	0.003
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.112	0.006	<.001	0.121	0.005	<.001
Retired	0.070	0.009	0.001	0.077	0.009	0.001
Percent Concordant	85.28			85.2		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

Results from Model 2-D are provided in Table 4.14 below. Private student loan debt payment was not a significant predictor of mortgage burden, but federal, PLUS, and total student loan payments were significant. For each additional percent increase in total and federal monthly student loan payments, mortgage debt burden increased by 1.8% and 1.6% respectively, all else equal. For each additional% increase in PLUS student loan payments, mortgage burden decreased by 2.8% ceteris paribus. First time homeowners had mortgage burdens that were about 16% higher than repeat homeowners in both versions of the model, but mortgage rate and original LTV were not significant in either model. Households with conventional loans with PMI had mortgage burdens that were 26.8% and 27.3% higher than those with strictly conventional loans in the total payment and payment by loan type models respectively, but the federally insured/guaranteed mortgage and ARM categories were not significant. Higher non-mortgage debt payments were associated with lower mortgage burdens in both models, but the other creditworthiness variables were not significant in either version. Credit attitude, subjective financial knowledge, smoking status, and risk tolerance were also not significant in the models. Increased objective financial knowledge and being a working household were associated with lower mortgage burden in both variations of the model. The adjusted r-squared value for the total payment model was 19.41% and for the payment by loan type model it was 19.93%. The Inverse Mills Ratio coefficient was not significant in the payment by type model but was significant in the total payment model.

Table 4.14: Model 2-D OLS Regression Results for Mortgage Burden (n=477)

	Model 2-D (Total Payment)			Model 2-D (Payment by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-0.626	0.278	0.024	-0.863	0.257	<.0018
Student Loans						
Burden						
Log Total Monthly Student Loan Payments	0.018	0.017	0.291			
Log Federal Monthly Student Loan Payments				0.016	0.009	0.067
Log Private Monthly Student Loan Payments				0.002	0.011	0.881
Log PLUS Monthly Student Loan Payments				-0.028	0.014	0.044
Mortgage Characteristics						
First Home	0.166	0.083	0.044	0.162	0.074	0.030
Mortgage Rate	0.006	0.030	0.832	0.014	0.030	0.635
Log LTV	0.052	0.116	0.652	0.078	0.116	0.500
Mortgage Type (Reference is Conventional)						
Federally Insured/Guaranteed	0.070	0.080	0.383	0.057	0.080	0.476
Conventional with PMI	0.268	0.095	0.006	0.273	0.096	0.005
ARM	0.030	0.178	0.865	0.072	0.178	0.684
Financial Characteristics						
Credit Worthiness						
Denied Credit/Feared Denial	-0.089	0.095	0.350	-0.089	0.094	0.347
Excess Spending/Has CC Balance	0.010	0.071	0.887	0.031	0.073	0.666
Log Monthly Debt Payments	-0.081	0.031	0.009	-0.038	0.015	0.011
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.003	0.090	0.972	-0.001	0.089	0.989
Neutral Attitude Towards Credit	0.085	0.079	0.283	0.066	0.079	0.402
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.178	0.042	<.001	-0.176	0.042	<.001
Subjective Financial Knowledge	0.015	0.019	0.431	0.011	0.019	0.560
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	0.041	0.076	0.590	-0.082	0.088	0.347
Above Average Risk Tolerance	-0.036	0.086	0.679	-0.105	0.098	0.283
Smoking Status						
Smoking Household	0.058	0.093	0.534	0.065	0.093	0.487
Demographic Characteristics						
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	-0.412	0.066	<.001	-0.430	0.065	<.001
Retired	0.079	0.152	0.605	0.143	0.153	0.350
Inverse Mills Ratio	-0.004	0.002	0.058	-0.002	0.001	0.125
Adjusted R-Squared	19.41			19.93		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Research Question 3: Student Loans and Mortgage Type

Research Question 3 explored the relationship between student loans and mortgage type, and was also analyzed using Heckman's two-step selection model. Both were estimated via probit regression. Results from the models can be found in Tables 4.15 through 4.17.

Model 3-A: Student Loan Debt and Adjustable-Rate Mortgages

Selection Equation

The selection equation was modified to include income for estimating the probability of having a mortgage for Model's 3 and 4, and the household education reference category was changed to high school. No other changes were made to the equation and results, which can be found in Table 4.15, remained largely consistent when compared to those for Model 2, with a few exceptions that will be noted. As before, the presence of student loans in general and by loan type was positively associated with the probability of having a mortgage. Being a first-time homeowner was negatively associated with the probability of having a mortgage in Model 3A, as was having less than a high school education, while the remaining categories of household education were all positively related to the probability of having a mortgage (relative to having only a high school education). Working households were more likely to have a mortgage than households that were unemployed, disabled, or otherwise not in the labor force. Finally, higher levels of income were positively associated with the probability of having a mortgage. The% concordant was about 85 in both models.

Table 4.15: Models 3A and 3B Selection Equation Regression Results for Mortgage Holding (n = 5,777)

	Model 3-A (Selection)			Model 3-B (Selection)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-1.967	0.047	<.001	-2.747	0.049	<.001
Student Loans						
Has Student Loans	0.331	0.007	<.001			
Type of Loan (Reference is Has No SL)						
Has Federal Student Loans				0.236	0.006	<.001
Has Private Student Loans				0.195	0.011	<.001
Has PLUS Student Loans				0.379	0.011	<.001
Financial Characteristics						
First Home	-0.816	0.004	<.001	0.816	0.004	<.001
Credit Worthiness						
Denied Credit/Feared Denial	0.159	0.009	<.001	0.040	0.008	0.007
Excess Spending/Has CC Balance	0.182	0.003	<.001	0.183	0.003	<.001
Log DTI	-0.208	0.001	<.001	-0.208	0.001	<.001
Log Income	0.065	0.005	<.001	0.064	0.005	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.078	0.004	<.001	0.078	0.004	<.001
Neutral Attitude Towards Credit	0.067	0.005	<.001	0.063	0.005	<.001
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.028	0.003	<.001	-0.022	0.003	0.002
Subjective Financial Knowledge	0.017	0.001	<.001	0.016	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	-0.047	0.006	0.001	-0.048	0.006	0.001
Above Average Risk Tolerance	0.023	0.005	0.007	0.013	0.005	0.052
Smoking Status						
Smoking Household	-0.133	0.010	<.001	-0.137	0.009	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.300	0.006	<.001	0.303	0.006	<.001
Dependent Children						
Dependent Children	0.308	0.002	<.001	0.300	0.002	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.077	0.002	<.001	0.067	0.002	<.001
Age 56-65	-0.118	0.005	<.001	-0.136	0.005	<.001
Age 65 plus	-0.425	0.009	<.001	-0.446	0.009	<.001
Under 35	-0.134	0.006	<.001	-0.129	0.006	<.001
HH Education (Reference is High School)						
Less than HS	-0.128	0.014	<.001	-0.128	0.014	<.001
Some College, No Degree	0.123	0.008	<.001	0.114	0.008	<.001
Associates Degree	0.265	0.015	<.001	0.251	0.014	<.001
Bachelors	0.287	0.012	<.001	0.278	0.012	<.001
Graduate School	0.329	0.020	<.001	0.331	0.021	<.001
Respondent's Parent Ed (Reference is High School)						
Less than HS	-0.038	0.027	0.237	-0.035	0.027	0.272
Some College, No Degree	-0.004	0.014	0.795	0.000	0.013	0.980
Bachelors or higher	-0.012	0.021	0.590	-0.009	0.022	0.685
Race (Reference is White)						
Black	-0.199	0.010	<.001	-0.195	0.010	<.001
Hispanic	-0.066	0.010	0.003	-0.066	0.010	0.003
Other	-0.180	0.020	<.001	-0.176	0.020	<.001
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.481	0.004	<.001	0.481	0.004	<.001
Retired	0.179	0.007	<.001	0.175	0.007	<.001
CreditDeny*HaveSL	-0.473	0.010	<.001			
Creditworth*FedSL				-0.333	0.010	<.001
Creditworth*PvtSL				-0.302	0.010	<.001
Creditworth*PLUSSL				-0.618	0.019	<.001
Percent Concordant	85.04			84.94		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

Table 4.16 contains results for Models 3-A and 3-B. The first hypothesis for Model 3 predicted that households with student loans would be more likely to have adjustable-rate mortgages than those without student loans. The results from this model supported that prediction and had a percent concordant of 62.20.

The positive and significant coefficient for the presence of student loans suggests that for households with student loans the probability of having an adjustable-rate mortgage was higher than for households without student loan debt. In terms of the average marginal effect, having student loans was associated with a 0.25 percentage point increase in the probability of having an adjustable-rate mortgage, all else equal. First-time homeownership was associated with a 0.31 percentage point increase in the probability of having an ARM, while mortgage rate was not significant. Original LTV and income were also both significant in this model. For each additional percent increase in original loan to value, the probability of having an ARM decreased by 2.3 percentage points, ceteris paribus, and for each additional percent increase in income, the probability of having an ARM increased by 0.07 percentage points. Poor creditworthiness (as measured by having been denied credit (or fearing denial) and spending more than income/carrying a balance on credit cards were both positively related to the probability of having an ARM. Similarly, having a neutral or favorable attitude towards credit, and having above average risk tolerance (relative to being risk averse) was also positively associated with the probability of having an ARM (having average risk tolerance was not significant). For each additional objective financial knowledge question the respondent answered correctly, the probability of having an ARM increased, with an average marginal effect of 1.21 percentage points, ceteris paribus. Higher levels of subjective financial knowledge were associated with a

lower probability of having an adjustable-rate mortgage, however, when evaluating the average marginal effect, each successively higher level of subjective financial knowledge increased the probability of having an ARM by 0.1 percentage points, all else equal. This result may appear somewhat counterintuitive, however there was evidence of selection bias in this model (as indicated by the significant IMR coefficient), which means that while a negative relationship existed between subjective financial knowledge and the probability of having an ARM overall, once the selection process was considered, the positive relationship was tempered after accounting for the presence of selection bias in the model.

Finally, smoking households had a higher probability of having an ARM than non-smoking households and the interaction term for credit denial and having student loans was negative and significant. The IMR coefficient was also significant, indicating that selection bias may have been present among mortgage holders. The percent concordant was 62.20.

Table 4.16: Models 3-A and 3-B Probit Regression Results for Adjustable-Rate Mortgage (n = 2,204)

	Model 3-A				Model 3-B			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	-2.568	0.157	<.001		-2.504	0.156	<.001	
Student Loans								
Has Student Loans	0.136	0.005	<.001	0.003				
Type of Loan (Reference is Has No SL)								
Has Federal Student Loans					-0.034	0.010	0.028	0.002
Has Private Student Loans					0.323	0.013	<.001	0.012
Has PLUS Student Loans					0.161	0.016	<.001	-0.003
Mortgage Characteristics								
First Home	0.184	0.021	<.001	0.003	0.189	0.022	0.001	0.003
Mortgage Rate	0.041	0.023	0.140	0.015	0.040	0.023	0.153	0.015
Log LTV	-0.276	0.039	0.002	-0.023	-0.268	0.038	0.002	-0.023
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.131	0.016	0.001	0.022	-0.011	0.014	0.468	0.022
Excess Spending/Has CC Balance	0.070	0.009	0.002	0.004	0.057	0.009	0.003	0.004
Log DTI	-0.009	0.002	0.026	-0.003	-0.006	0.002	0.059	-0.003
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	0.126	0.005	<.001	0.019	0.124	0.005	<.001	0.019
Neutral Attitude Towards Credit	0.062	0.013	0.009	0.010	0.070	0.013	0.006	0.010
Financial Knowledge								
Objective Financial Knowledge (# Correct)	0.086	0.011	0.001	0.012	0.094	0.010	<.001	0.012
Subjective Financial Knowledge	-0.024	0.007	0.030	0.001	-0.027	0.007	0.021	0.001
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	0.147	0.010	<.001	0.018	0.150	0.009	<.001	0.018
Average Risk Tolerance	0.018	0.012	0.216	-0.001	0.018	0.013	0.231	-0.001
Smoking Status								
Smoking Household	0.137	0.013	<.001	0.000	0.141	0.013	0.000	0.000
Creditworth*HaveSL	-0.910	0.013	<.001	-0.072				
Creditworth*FedSL					-3.741	1.001	<.001	-0.060
Creditworth*PvtSL					-4.092	2.344	0.081	-0.793
Creditworth*PLUSSL					-3.722	1.687	0.027	-0.328
Inverse Mills Ratio	0.000	0.000	0.011		0.000	0.000	<.001	
Percent Concordant	62.20				61.68			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 3-B: Type of Student Loan Debt and Adjustable-Rate Mortgages

Outcome Equation

Hypotheses 3b-3d predicted that type of student loan would affect the likelihood of having an adjustable-rate mortgage. As the results in Table 4.17 show, federal, private, and PLUS student loans were all significant predictors of the probability of having an ARM. When interpreting the average marginal effects, the presence of both federal and private loans was associated with a higher probability of having an ARM relative to households with no student

loans. More specifically, in terms of average marginal effects, for households with federal student loans the probability of having an ARM was 0.23 percentage points higher than for households without student loans, and for households with private loans, the probability was 1.21 percentage points higher as compared to non-student loan indebted households, ceteris paribus. The presence of PLUS loans was positively associated with the probability of having an ARM (relative to households without student loans), although this effect was moderated once selection bias was considered as evidenced by the negative average marginal effect and significant IMR variable. Being a first-time homeowner, excessive spending/carrying a credit card balance and higher income were all positively associated with the probability of having an ARM, while original LTV was negatively associated with the probability of having an ARM. For each additional percent increase in original LTV, the probability of having an ARM decreased by 2.3 percentage points. Additionally, for each additional percent increase in a household's debt to income ratio, the probability of having an ARM decreased by 0.3 percentage points, all else equal. Mortgage rate, credit denial, and having average risk tolerance (relative to being risk averse) were not significant.

Neutral and favorable credit attitudes (relative to being credit averse) were positively related to the probability of having an ARM. As objective financial knowledge increased, the probability of having an ARM also increased, while higher levels of subjective financial knowledge were negatively associated with the probability of having an ARM. However, the average marginal effect was positive, so the effect was attenuated when considering the sample selection process. Households that had above average risk tolerance compared to risk averse households and those that were smokers also had higher probabilities of having an ARM. The interaction terms for credit denial and each type of student loan were all significant with negative

coefficients. The IMR coefficient was significant, indicating that selection bias may have been present among mortgage holders. The percent concordant for this model was 61.68.

Model 3-C: Amount of Student Loan Debt and Adjustable-Rate Mortgages

Selection Equation

The regression results (seen in Table 4.17) for the selection equation used in Model 3-C also remained largely unchanged from previous models, so only differences will be mentioned here. First time homeownership was negatively related to the probability of having a mortgage. Higher levels of income were positively related to the probability of having a mortgage, as was having less than a high school education, while having a graduate degree was negatively related to the probability of having a mortgage for the total debt model, but not significant in the debt by type model (relative to having only a high school diploma). The bachelor's degree category for highest level of parent education was not significant in the total debt model but was significant and positively related to having a mortgage in the debt by type model (relative to high school graduates). The percent concordant was about 86 for both models.

Table 4.17: Model 3-C Selection Equation Regression Results for Mortgage Holding Among Student Loan Borrowers (n = 1,053)

	Model 3-C (Selection-Total Debt)			Model 3-C (Selection- Debt by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-2.817	0.054	<.001	-2.175	0.033	<.001
Student Loans						
Balance						
Log Total Student Loan Debt	0.067	0.004	<.001			
Log Federal Student Loan Debt				-0.008	0.002	0.022
Log Private Student Loan Debt				-0.013	0.001	<.001
Log PLUS Student Loan Debt				-0.013	0.003	<.001
Financial Characteristics						
First Home	-1.420	0.006	<.001	-1.424	0.006	<.001
Credit Worthiness						
Denied Credit/Feared Denial	-0.283	0.008	<.001	-0.273	0.008	<.001
Excess Spending/Has CC Balance	0.122	0.011	<.001	0.122	0.011	<.001
Log DTI	-0.018	0.003	0.004	-0.013	0.003	0.010
Log Income	0.189	0.003	<.001	0.194	0.003	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.079	0.006	<.001	0.095	0.005	<.001
Neutral Attitude Towards Credit	0.093	0.005	<.001	0.118	0.004	<.001
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.012	0.002	0.005	-0.012	0.002	0.005
Subjective Financial Knowledge	0.055	0.001	<.001	0.051	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	0.037	0.005	0.001	0.013	0.004	0.023
Above Average Risk Tolerance	0.086	0.007	<.001	0.052	0.007	0.001
Smoking Status						
Smoking Household	-0.233	0.007	<.001	-0.242	0.008	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.366	0.004	<.001	0.377	0.004	<.001
Dependent Children						
Dependent Children	0.359	0.007	<.001	0.356	0.006	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.019	0.003	0.001	0.055	0.003	<.001
Age 56-65	-0.129	0.006	<.001	-0.075	0.003	<.001
Age 65 plus	-1.435	0.015	<.001	-1.389	0.015	<.001
Under 35	-0.074	0.004	<.001	-0.067	0.003	<.001
HH Education (Reference is High School)						
Less than HS	0.093	0.025	0.019	0.183	0.025	0.002
Some College, No Degree	-0.501	0.012	<.001	-0.473	0.014	<.001
Associates Degree	-0.118	0.009	<.001	-0.112	0.011	<.001
Bachelors	-0.156	0.014	<.001	-0.103	0.015	0.002
Graduate School	-0.081	0.016	0.007	0.026	0.014	0.140
Respondent's Parent Ed (Reference is High School)						
Less than HS	0.298	0.054	0.005	0.272	0.053	0.007
Some College, No Degree	0.068	0.029	0.081	0.070	0.031	0.084
Bachelors or higher	0.047	0.024	0.124	0.054	0.024	0.092
Race (Reference is White)						
Black	-0.141	0.023	0.004	-0.133	0.021	0.003
Hispanic	-0.025	0.013	0.126	-0.023	0.012	0.120
Other	-0.262	0.035	0.002	-0.274	0.035	0.001
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.544	0.013	<.001	0.582	0.013	<.001
Retired	0.735	0.022	<.001	0.791	0.023	<.001
Percent Concordant	85.52			85.640		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

The next outcome equation was designed to test hypotheses related to how the balance of student loan debt (in total and by type) would affect the likelihood of having an ARM, and results can be found in Table 4.18. Total student loan debt was significant and negatively related to the probability of having an ARM; in terms of average marginal effect, each percent increase in total student loan debt was associated with a 0.15 percentage point decrease in the probability of having an ARM, ceteris paribus. While the overall effect of increases in PLUS loan debt on the probability of having an ARM was positive, it was tempered once sample selection was considered as evidenced by the negative average marginal effect. In support of hypotheses 3f and 3g, the probability of having an ARM increased as federal and private student loan balances increased, and it was slightly higher for those with private student loans (each additional percent increase in federal student debt was associated with a 0.12 percentage point increase in the probability of having an ARM, while each additional percent increase in private student loan debt was associated with a 0.15 percentage point increase in the probability of having an ARM.

Being a first-time homeowner was positively related to the probability of having an ARM, but this was offset by a negative marginal effect in both versions of the model. Higher LTV ratios were negatively related to the probability of having an ARM; for each additional percent increase in original LTV, the probability of having an ARM decreased by 0.91 (total debt) and 0.94 (debt by type) percentage points. Mortgage rate was not a significant predictor in either version of this model.

As borrower creditworthiness decreased (measured by the credit denial, excessive spending, and DTI variables), the probability of having an ARM decreased, while increases in household income were associated with an increase in the probability of having an ARM.

Subjective financial knowledge was also significant and positive, indicating a greater probability of having an ARM for higher levels of subjective financial knowledge, as was having a neutral or favorable attitude towards credit (relative to being credit averse). As objective financial knowledge increased, the probability of having an ARM decreased by 0.66 percentage points, holding other factors constant in both models, and smoking households had a 0.44 and 0.39 percentage point lower probability of having an ARM compared to non-smoking households in the total debt and debt by type models, respectively. Interestingly, compared to risk averse households, higher levels of risk tolerance were associated with a lower likelihood of having an ARM. There was also evidence of selection bias in mortgage holding as evidenced by the significant coefficient for the IMR variable in both models. The percent concordant for these models were 69.18 (total student debt) and 69.48 (student debt by loan type).

Table 4.18: Model 3-C Probit Regression Results for Adjustable-Rate Mortgage (n= 478)

	Model 3-C (Total Balance)				Model 3-C (Balance by Type)			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	-2.791	0.127	<.001		-3.371	0.156	<.001	
Student Loans								
Balance								
Log Total Student Loan Debt	-0.051	0.003	<.001	-0.001				
Log Federal Student Loan Debt					0.028	0.001	<.001	0.001
Log Private Student Loan Debt					0.042	0.001	<.001	0.001
Log PLUS Student Loan Debt					0.011	0.004	0.041	0.000
Mortgage Characteristics								
First Home	0.509	0.035	<.001	-0.014	0.601	0.043	<.001	-0.017
Mortgage Rate	0.009	0.060	0.886	0.012	0.008	0.060	0.897	0.012
Log LTV	-0.296	0.118	0.065	-0.009	-0.327	0.108	0.038	-0.009
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	-0.994	0.010	<.001	-0.047	-0.984	0.012	<.001	-0.046
Excess Spending/Has CC Balance	-0.031	0.006	0.004	0.002	-0.044	0.009	0.007	0.002
Log DTI	-0.069	0.004	<.001	-0.002	-0.067	0.003	<.001	-0.002
Log Income	0.137	0.019	0.002	0.017	0.112	0.017	0.003	0.016
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	0.358	0.014	<.001	0.004	0.321	0.014	<.001	0.003
Neutral Attitude Towards Credit	0.448	0.028	<.001	0.012	0.414	0.027	<.001	0.010
Financial Knowledge								
Objective Financial Knowledge (# Correct)	-0.187	0.017	<.001	-0.007	-0.181	0.016	<.001	-0.007
Subjective Financial Knowledge	0.017	0.002	0.001	0.001	0.012	0.002	0.006	0.001
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	-0.375	0.024	<.001	-0.015	-0.406	0.027	<.001	-0.015
Average Risk Tolerance	-0.481	0.022	<.001	-0.022	-0.489	0.026	<.001	-0.022
Smoking Status								
Smoking Household	-0.098	0.018	0.005	-0.004	-0.079	0.020	0.017	-0.004
Inverse Mills Ratio	0.004	0.000	<.001		0.007	0.001	<.001	
Percent Concordant	69.18				69.48			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 3-D: Student Loan Burden and Adjustable-Rate Mortgages

Selection Equation

The selection equation used in Model 3-D was similar to that used in Model 2-D but included student loan burden (in total and by type) rather than student loan payment amounts (in total and by type), as well as income as explanatory variables. Increasing total and federal loan burden were both negatively related to the probability of having a mortgage, but the private and PLUS loan burden variables were not significant. Remaining results were similar to those found in Model 3C and can be found in Table 4.19 below.

Table 4.19: Model 3-D Selection Equation Regression Results for Mortgage Holding Among Student Loan Borrowers (n = 1,053)

	Model 3-D (Selection-Total Burden)			Model 3-D (Selection- Burden by Type)		
Variable	*β*	*SE β*	*p*	*β*	*SE β*	*p*
Intercept	-1.896	0.042	<.001	-2.005	0.044	<.001
Student Loans						
Burden						
Log Total Student Loan Burden	-0.077	0.003	<.001			
Log Federal Student Loan Burden				-0.066	0.003	<.001
Log Private Student Loan Burden				0.000	0.002	0.901
Log PLUS Student Loan Burden				-0.004	0.004	0.347
Financial Characteristics						
First Home	-1.406	0.007	<.001	-1.425	0.008	<.001
Credit Worthiness						
Denied Credit/Feared Denial	-0.294	0.008	<.001	-0.291	0.008	<.001
Excess Spending/Has CC Balance	0.092	0.011	0.001	0.102	0.011	<.001
Log DTI	-0.012	0.003	0.020	-0.013	0.003	0.011
Log Income	0.144	0.004	<.001	0.162	0.004	<.001
Behavioral/Psychographic Characteristics						
Credit Attitude (Reference is Credit Averse)						
Favorable Attitude Towards Credit	0.088	0.005	<.001	0.100	0.005	<.001
Neutral Attitude Towards Credit	0.119	0.003	<.001	0.117	0.003	<.001
Financial Knowledge						
Objective Financial Knowledge (# Correct)	-0.012	0.002	0.002	-0.013	0.002	0.003
Subjective Financial Knowledge	0.050	0.001	<.001	0.052	0.001	<.001
Risk Tolerance (Reference is Risk Averse)						
Average Risk Tolerance	0.003	0.003	0.388	0.006	0.003	0.121
Above Average Risk Tolerance	0.055	0.006	<.001	0.056	0.006	<.001
Smoking Status						
Smoking Household	-0.210	0.008	<.001	-0.226	0.007	<.001
Demographic Characteristics						
Relationship Status						
Couple	0.368	0.004	<.001	0.370	0.004	<.001
Dependent Children						
Dependent Children	0.353	0.007	<.001	0.360	0.006	<.001
Age (Reference is 36 - 45)						
Age 46-55	0.063	0.004	<.001	0.062	0.005	<.0011
Age 56-65	-0.125	0.007	<.001	-0.084	0.007	<.0011
Age 65 plus	-1.394	0.014	<.001	-1.377	0.017	<.001
Under 35	-0.071	0.003	<.001	-0.082	0.002	<.001
HH Education (Reference is High School)						
Less than HS	0.003	0.038	0.939	0.133	0.033	0.015
Some College, No Degree	-0.460	0.014	<.001	-0.483	0.015	<.001
Associates Degree	-0.108	0.010	<.001	-0.147	0.013	<.001
Bachelors	-0.087	0.017	0.006	-0.127	0.018	0.002
Graduate School	0.055	0.014	0.016	0.008	0.018	0.681
Respondent's Parent Ed (Reference is High School)						
Less than HS	0.299	0.058	0.007	0.298	0.059	0.007
Some College, No Degree	0.068	0.030	0.089	0.075	0.031	0.073
Bachelors or higher	0.045	0.024	0.135	0.064	0.025	0.064
Race (Reference is White)						
Black	-0.110	0.021	0.006	-0.125	0.021	0.004
Hispanic	0.010	0.011	0.449	0.005	0.012	0.667
Other	-0.232	0.032	0.002	-0.246	0.033	0.002
Working Status (Reference is Unemployed, Disabled, Not in the LF)						
Working	0.807	0.021	<.001	0.813	0.020	<.001
Retired	0.566	0.012	<.001	0.557	0.013	<.001
Percent Concordant	85.78			85.760		

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Outcome Equation

Table 4.20 presents results from the final models testing the relationship between likelihood of having an ARM and student loan burden. Based on the results, this model found that higher levels of total student loan burden were associated with a higher probability of having an ARM, while the probability of having an ARM was lower for federal loan burden. In terms of average marginal effects, each additional percent increase in federal student loan burden was associated with a 0.46 percentage point decrease in the probability of having an ARM, while each additional% increase in total student loan burden was associated with an increase in the probability of having an ARM of 0.11 percentage points, all else equal. Increases in PLUS and private loan burden were both associated with an increase in the probability of having an ARM, and the average marginal effect calculations showed a 0.19 and 0.26 percentage point increase in the probability of having an ARM for each additional percent increase in PLUS and private loan burden holding other factors constant, respectively. Findings for the remaining variables were similar to those in Model 3-C, with the exception of the excessive spending/carrying a credit card balance variable which was not significant in the total burden model and the subjective financial knowledge variable, which was not significant in the burden by loan type model. The percent concordant for the model with total student debt burden was 68.98, and for the model with burden by loan type, the percent concordant was 69.18. There was also evidence of selection bias in this model, with a significant IMR coefficient in both versions.

Table 4.20: Model 3D Probit Regression Results for Adjustable-Rate Mortgage (n = 478)

	Model 3-D (Total Burden)				Model 3-D (Burden by Type)			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	-3.341	0.164	<.001		-3.240	0.247	<.001	
Student Loans								
Burden								
Log Total Student Loan Burden	0.037	0.006	0.004	0.001				
Log Federal Student Loan Burden					-0.105	0.004	<.001	-0.005
Log Private Student Loan Burden					0.038	0.014	0.056	0.003
Log PLUS Student Loan Burden					0.032	0.005	0.003	0.002
Mortgage Characteristics								
First Home	0.514	0.034	<.001	-0.018	0.425	0.040	<.001	-0.013
Mortgage Rate	0.011	0.061	0.870	0.012	0.027	0.061	0.682	0.012
Log LTV	-0.332	0.121	0.052	-0.010	-0.293	0.124	0.077	-0.009
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	-0.999	0.012	<.001	-0.047	-1.015	0.012	<.001	-0.048
Excess Spending/Has CC Balance	-0.002	0.005	0.718	0.002	-0.021	0.003	<.001	0.002
Log DTI	-0.068	0.005	<.001	-0.002	-0.074	0.004	<.001	-0.002
Log Income	0.151	0.015	<.001	0.016	0.135	0.010	<.001	0.015
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	0.362	0.012	<.001	0.003	0.358	0.017	<.001	0.004
Neutral Attitude Towards Credit	0.429	0.027	<.001	0.010	0.509	0.032	<.001	0.014
Financial Knowledge								
Objective Financial Knowledge (# Correct)	-0.185	0.018	<.001	-0.006	-0.167	0.017	<.001	-0.006
Subjective Financial Knowledge	0.014	0.002	0.002	0.001	0.003	0.002	0.301	0.000
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	-0.392	0.027	<.001	-0.015	-0.377	0.029	<.001	-0.015
Average Risk Tolerance	-0.487	0.024	<.001	-0.022	-0.487	0.027	<.001	-0.022
Smoking Status								
Smoking Household	-0.093	0.019	0.007	-0.004	-0.086	0.020	0.013	-0.003
Inverse Mills Ratio	0.004	0.001	0.003		0.001	0.001	0.044	
Percent Concordant	68.98				69.18			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 4-A: Student Loan Debt and Federally Insured/Guaranteed Mortgages

Selection Equation

The Selection Equations used in all versions of Model 4 were identical to those used in Model 3. As such, the results are not reported here as they were identical to those previously reported under Model 3.

Outcome Equation

Table 4.21 contains results from Models 4-A and 4-B. The presence of student loan debt was significant and positively related to the probability of having a federally insured or

guaranteed mortgage, so Hypothesis 4a was supported. Households with student loans had a 3.64 percentage point higher probability of having a federally insured/guaranteed mortgage than those without student loans. Being a first-time homeowner and having a higher LTV ratio was positively associated with having a federally insured/guaranteed loan; for each additional percent increase in a household's original LTV ratio, the probability of having a federally insured/guaranteed loan increased by 1.67 percentage points holding other factors constant. Poor creditworthiness (as measured by the credit denial, excessive spending/credit card balance, and DTI ratio variables) was positively related to having a federally backed mortgage. Similarly, for each additional percent increase in income, the probability of having a federally backed mortgage increased by 0.04 percentage points, ceteris paribus. Having a neutral or favorable attitude towards credit (relative to being credit averse), higher levels of objective and subjective financial knowledge and higher levels of risk tolerance relative to being risk averse were all significant and negatively associated with having a federally insured/guaranteed loan in the model. Smoking households were also more likely to have a federally insured or guaranteed loan. The interaction term for credit denial and having a student loan was not significant, but there was evidence of selection bias as shown by the significant IMR coefficient. The% concordant was 72.86.

Model 4-B: Type of Student Loan Debt and Federally Insured/Guaranteed Mortgages

Outcome Equation

As shown in the results provided in Table 4.21 in the second version of this model, the probability of having a federally backed mortgage increased by 4.47 percentage points for households with federal student loans (relative to households without student loans) ceteris

paribus, in favor of Hypothesis 4b. Hypotheses 4c and 4d predicted that the likelihood of having a federally insured or guaranteed mortgage would be greater for households with private and PLUS student loan debt than those with federal student loan debt, but the presence of private loans was not significant in this model, and the presence of PLUS loans were negatively related to the probability of having a federally backed mortgage. Being a first-time homeowner was positively related to the probability of having a federally insured/guaranteed mortgage, but mortgage rate was not significant in the model.

Each additional percent increase in original LTV was associated with a 1.64 percentage point increase in the probability of having a federally backed mortgage. Similarly, having been denied credit, or excessive spending/carrying a credit card balance was also positively related to the probability of having a federally backed mortgage. Higher levels of DTI were positively associated with the probability of having a federally insured or guaranteed mortgage, but this effect was tempered after considering sample selection, as shown by the negative marginal effect value. Income was not significant in this model. Households with more favorable attitudes towards credit, higher objective and subjective financial knowledge and higher levels of risk tolerance had lower probabilities of having a federally insured/guaranteed loan. Smoking households had a 0.19 percentage point higher probability of having a federally backed mortgage than non-smoking households, all else equal. However, considering selection bias mitigated this effect. Similarly, having average, or above average risk tolerance relative to being risk averse was negatively associated with the probability of having a federally backed mortgage, but once selection bias was considered, the effect again diminishes. All of the interaction terms for credit denial and type of student loan were significant, as was the IMR variable. The percent concordant was 73.22.

Table 4.21: Models 4-A and 4-B Probit Regression Results for Federally Backed Mortgage (n = 2,204)

	Model 4-A				Model 4-B			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	0.289	0.122	0.077		0.263	0.123	0.100	
Student Loans								
Has Student Loans	0.117	0.019	0.003	0.036				
Type of Loan (Reference is Has No SL)								
Has Federal Student Loans					0.166	0.017	<.001	0.045
Has Private Student Loans					-0.044	0.037	0.294	0.020
Has PLUS Student Loans					-0.093	0.016	0.004	-0.040
Mortgage Characteristics								
First Home	0.110	0.018	0.003	0.007	0.094	0.018	0.007	0.009
Mortgage Rate	-0.016	0.009	0.143	0.043	-0.013	0.009	0.200	0.043
Log LTV	0.188	0.025	0.002	0.017	0.193	0.025	0.002	0.016
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.455	0.023	<.001	0.046	0.384	0.016	<.001	0.047
Excess Spending/Has CC Balance	0.139	0.018	0.002	0.035	0.145	0.019	0.002	0.035
Log DTI	0.033	0.003	<.001	0.001	0.033	0.003	<.001	0.000
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	-0.075	0.015	0.008	-0.010	-0.073	0.016	0.009	-0.009
Neutral Attitude Towards Credit	-0.055	0.009	0.003	-0.005	-0.064	0.009	0.002	-0.005
Financial Knowledge								
Objective Financial Knowledge (# Correct)	-0.155	0.009	<.001	-0.009	-0.158	0.010	<.001	-0.009
Subjective Financial Knowledge	-0.020	0.002	<.001	-0.002	-0.020	0.002	<.001	-0.002
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	-0.351	0.024	<.001	-0.034	-0.356	0.024	<.001	-0.033
Average Risk Tolerance	-0.303	0.031	<.001	-0.031	-0.300	0.031	<.001	-0.032
Smoking Status								
Smoking Household	0.109	0.017	0.003	0.002	0.109	0.018	0.004	0.002
Creditworth*HaveSL	-0.080	0.043	0.137	-0.009				
Creditworth*FedSL					0.586	0.168	0.025	-0.021
Creditworth*PvtSL					0.138	0.039	0.023	0.009
Creditworth*PLUSSL					-0.169	0.026	0.003	0.039
Inverse Mills Ratio	0.000	0.000	0.018		0.000	0.000	0.042	
Percent Concordant	72.86				73.22			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 4-C: Amount of Student Loan Debt and Federally Insured/Guaranteed Mortgages

Outcome Equation

Results from this model (found in Table 4.22) did support the hypothesis that higher total student loan debt would increase the likelihood of having a federally insured/guaranteed mortgage with a positive and significant coefficient and average marginal effect of 0.0003. However, as student loan balances individually increased, the probability of having a federally

backed loan decreased (as evidenced by the negative coefficients and average marginal effects for each loan type).

Higher original LTV ratio was associated with an increase in the probability of having a federally backed mortgage in both models. In the total debt model, the mortgage rate variable was significant and negatively related to the probability of having a federally insured/guaranteed loan in general, but the effect was mitigated when considering selection bias and mortgage rate was not significant in the debt by type version of the model. Households that had been denied credit and those with higher DTI levels had a higher probability of having a federally insured or guaranteed mortgage. In the total debt model, households that spent more than their income/carried a credit card balance generally had a lower probability of having a federally backed mortgage, but the effect was tempered once selection was considered, and this variable was not significant in the debt by type model. Income was not a significant predictor of the probability of having a federally backed loan in the total debt model but was significant and positive in the debt by type model. Higher levels of objective and financial knowledge, having favorable attitudes towards credit, higher levels of risk tolerance and being a smoking household were all negatively associated with the probability of having a federally backed mortgage in both version of the model. The IMR coefficient was also significant in both versions of this model and the percent concordant was 74.16 (total debt) and 74.86 (debt by loan type).

Table 4.22: Model 4-C Probit Regression Results for Federally Backed Mortgages (n = 478)

	Model 4-C (Total Balance)				Model 4-C (Balance by Type)			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	2.617	0.176	<.001		1.631	0.103	<.001	
Student Loans								
Balance								
Log Total Student Loan Debt	0.023	0.009	0.066	0.000				
Log Federal Student Loan Debt					-0.012	0.002	0.003	-0.001
Log Private Student Loan Debt					-0.020	0.003	0.004	-0.002
Log PLUS Student Loan Debt					-0.048	0.001	<.001	-0.008
Mortgage Characteristics								
First Home	0.129	0.024	0.005	-0.057	-0.208	0.024	0.001	0.058
Mortgage Rate	-0.040	0.012	0.027	0.005	-0.016	0.008	0.124	0.069
Log LTV	2.088	0.079	<.001	0.295	1.320	0.045	<.001	0.141
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.626	0.030	<.001	0.162	0.326	0.025	<.001	0.039
Excess Spending/Has CC Balance	-0.087	0.011	0.001	0.006	-0.018	0.010	0.140	0.011
Log DTI	0.235	0.024	<.001	0.050	0.097	0.011	<.001	0.011
Log Income	0.006	0.008	0.536	-0.013	0.044	0.008	0.004	0.017
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	-0.898	0.036	<.001	-0.179	-0.504	0.022	<.001	-0.059
Neutral Attitude Towards Credit	-0.094	0.032	0.043	-0.052	-0.044	0.020	0.089	-0.007
Financial Knowledge								
Objective Financial Knowledge (# Correct)	-0.322	0.009	<.001	-0.036	-0.220	0.006	<.001	-0.013
Subjective Financial Knowledge	-0.119	0.005	<.001	-0.017	-0.074	0.003	<.001	-0.006
Risk Tolerance (Reference is Risk Averse)								
Average Risk Tolerance	-0.902	0.054	<.001	-0.196	-0.507	0.031	<.001	-0.083
Above Average Risk Tolerance	-0.891	0.022	<.001	-0.171	-0.538	0.011	<.001	-0.084
Smoking Status								
Smoking Household	-0.835	0.087	<.001	-0.115	-0.529	0.047	<.001	-0.064
Inverse Mills Ratio	0.002	0.000	<.001		-0.009	0.001	<.001	
Percent Concordant	74.16				74.86			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Model 4-D: Student Loan Burden and Federally Insured/Guaranteed Mortgages

Outcome Equation

Results from Model 4-D did support hypotheses 4i, 4k and 4l (see Table 4.23 below). There was a positive and significant relationship between the total, private and PLUS student loan burden variables and the likelihood of having a federally insured or guaranteed mortgage. Hypotheses 4k and 4l postulated that the effect of increasing loan burden for private and PLUS student loans on the probability of having a federally insured/guaranteed mortgage would be larger than for increasing federal student loan burdens, but federal loan burden was not significant in the model. For each additional percent increase in total student loan burden, the

probability of having a federally backed mortgage increased by 0.27 percentage points, ceteris paribus. For increasing private student loan burden, the probability of having a federally backed mortgage increased by 0.63 percentage points and for PLUS loan burden, the probability increased by 2.4 percentage points, all else equal.

With the exception of the excessive spending/credit card balance variable, all other variables were significant in both models. Households with poor creditworthiness (as indicated by having been denied credit, and higher DTI ratios) had a higher probability of having a federally insured/guaranteed loan. Having been denied credit (or fearing denial) was associated with a 4.05 (total burden) and 4.32 (burden by type) percentage point increase in the probability of having a federally backed mortgage ceteris paribus, while each additional percent increase in a household's DTI ratio was associated with a 1.24 and 1.19 percentage point increase in the probability of having a federally backed loan in the total burden and burden by type models, respectively, holding other factors constant. Increases in income were positively associated with the probability of having a federally insured/guaranteed loan. An inverse relationship was found for first time homeowner status and mortgage rate (although it was tempered by selection bias with positive marginal effects). Neutral and favorable attitudes towards the use of credit (relative to credit aversion), higher levels of objective and subjective financial knowledge, having average and above average risk tolerance levels (compared to being risk averse) and being a smoking household were all negatively related to the probability of having a federally backed mortgage. Selection bias may have been present in both versions of the model as evidenced by the significant IMR variables, and the percent concordant was 74.3 (all loan types) and 75.08 (total loan burden).

Table 4.23: Model 4-D Probit Regression Results for Federally Backed Mortgages (n=478)

	Model 4-D (Total Burden)				Model 4-D (Burden by Type)			
Variable	*β*	*SE β*	*p*	*Avg. ME*	*β*	*SE β*	*p*	*Avg. ME*
Intercept	2.501	0.113	<.001		1.159	0.061	<.001	
Student Loans								
Burden								
Log Total Student Loan Burden	0.047	0.009	0.007	0.003				
Log Federal Student Loan Burden					0.001	0.004	0.756	-0.002
Log Private Student Loan Burden					0.074	0.002	<.001	0.006
Log PLUS Student Loan Burden					0.143	0.003	<.001	0.024
Mortgage Characteristics								
First Home	-0.095	0.032	0.042	0.032	-0.105	0.023	0.010	0.037
Mortgage Rate	-0.050	0.010	0.009	0.069	-0.019	0.007	0.051	0.070
Log LTV	2.044	0.079	<.001	0.125	1.320	0.043	<.001	0.139
Financial Characteristics								
Credit Worthiness								
Denied Credit/Feared Denial	0.600	0.035	<.001	0.040	0.357	0.024	<.001	0.043
Excess Spending/Has CC Balance	-0.020	0.011	0.135	0.008	-0.014	0.007	0.129	0.011
Log DTI	0.182	0.019	<.001	0.012	0.094	0.010	<.001	0.012
Log Income	0.057	0.010	0.005	0.015	0.066	0.005	<.001	0.018
Behavioral/Psychographic Characteristics								
Credit Attitude (Reference is Credit Averse)								
Favorable Attitude Towards Credit	-0.915	0.037	<.001	-0.068	-0.499	0.021	<.001	-0.057
Neutral Attitude Towards Credit	-0.092	0.031	0.042	-0.011	-0.068	0.020	0.027	-0.009
Financial Knowledge								
Objective Financial Knowledge (# Correct)	-0.328	0.008	<.001	-0.011	-0.203	0.006	<.001	-0.011
Subjective Financial Knowledge	-0.120	0.006	<.001	-0.005	-0.076	0.004	<.001	-0.006
Risk Tolerance (Reference is Risk Averse)								
Above Average Risk Tolerance	-0.794	0.053	<.001	-0.075	-0.525	0.032	<.001	-0.086
Average Risk Tolerance	-0.841	0.023	<.001	-0.076	-0.545	0.012	<.001	-0.086
Smoking Status								
Smoking Household	-0.855	0.084	<.001	-0.059	-0.540	0.048	<.001	-0.065
Inverse Mills Ratio	-0.010	0.001	0.001		-0.006	0.001	0.002	
Percent Concordant	74.30				75.08			

Source: Weighted analysis of the 2019 Survey of Consumer Finances using all 5 implicates and RII technique.

Chapter 5 - Discussion

This study investigated the relationships between types of student loans, homeownership, mortgages, and a household's mortgage debt burden. These relationships were examined through four different models, each designed to analyze specific research questions. First, a logistic regression model was used to assess the impact of student loans on homeownership, next a selection model was developed to analyze the impact between student loans and mortgage debt burden via probit and OLS regressions. The third and fourth models also used selection models to examine the relationship between student loans and mortgage types, specifically, adjustable-rate and federally insured/guaranteed mortgages via probit regression models. This chapter is organized into four parts, beginning with a summary and analysis of key research findings. Second, discussion regarding the implications of such findings in the context of the financial planning field, and as well as how this study's findings relate to broader policy decisions is provided. The third section examines limitations of the study and suggestions for research while the final section contains concluding remarks.

Research Findings

Model 1: Student Loans and Homeownership

Research Question 1 analyzed the relationship between student loans and homeownership. Hypotheses 1a through 1d predicted a negative relationship between the presence of student loans and homeownership, as well as the type of student loan debt held by a household and homeownership, with private and PLUS loans expected to have a larger negative effect on homeownership than federal student loan debt. The first analysis supported Hypothesis 1a, with a negative and significant relationship found between the presence of student loans and homeownership. More specifically, households with student loans had 11.3% lower odds of

homeownership than those without student loans, holding other factors constant. These results are consistent with both the neoclassical theory of housing demand, which predicts that student loans will negatively impact homeownership through the impact the debt has on the household's budget constraint, and prior literature, with most studies reaching similar conclusions (Bleemer et al., 2017; Cooper & Wang, 2014; Gicheva & Thompson, 2015; Letkiewicz & Heckman, 2018; Mezza et al., 2017; Robb et al., 2020).

The second variation of this model was designed to assess the relationship by student loan type, predicting that all types of student loans would be negatively associated with homeownership, with private and PLUS loans having a larger negative association with homeownership than federal student loans. The results from Model 1-B did provide evidence in support of hypotheses 1b, 1c and 1d, as households with federal, private, and PLUS loans were all less likely to own their home compared to non-student indebted households. For households with federal student loans, the odds of homeownership were 0.949 times those of households without student loan debt, households with private loans had 0.642 times the odds of homeownership than households without student loans, and for households with PLUS loans, the odds of homeownership were 0.861 times those of households without student loans, holding other factors constant.

Next, Model 1 was further adapted to consider how the size of student loan debt in total and by type of loan might impact a household's likelihood of homeownership. Model 1-C included total loan balance and loan balance by type of student loan as independent regressors. Hypotheses 1e through 1h postulated that the amount and type of student loan debt would negatively impact the likelihood of homeownership among households with student loans. The model's results supported Hypotheses 1f and 1g; the balances of federal and private student loan

debt were both significant and negatively associated with the likelihood of homeownership. A one% increase in federal student loan debt was associated with lower odds of homeownership (odds ratio = 0.972). Similarly, the odds ratio for private student loan debt was 0.957. Contrary to expectation, total student loan debt and PLUS student loan debt were both positively related to the likelihood of homeownership, with odds ratios of 1.065 for total student loan debt, and 1.016 for PLUS loan balances. While these findings may seem counterintuitive, it is also important to keep in mind that student loan payments are not always entirely driven by student loan balance, particularly for higher amounts of student debt for several reasons. Federal loans, including PLUS loans, can be placed in deferment or forbearance status, so a borrower could have a student loan balance, but not be required to make payments on the loan[6]. The availability of different payment plans also affects the relationship between loan balance and payment amount. Since mortgage qualification depends on debt payment ratios rather than size of debt, the impact of student loan balance on homeownership could be different than the impact of student loan payments on homeownership. The final set of hypotheses were designed to test this possibility.

In the final variation of Model 1, the relationship between student loan burden and homeownership was negative for total student loan burden and federal loan burden, and insignificant for PLUS loan burden, while a positive relationship was found between private loan burden and homeownership. The change in findings for PLUS loans (from having a positive impact on homeownership when considering the total balance of PLUS loans to an insignificant impact on homeownership for PLUS loan burden) could be evidence in support of the theory that

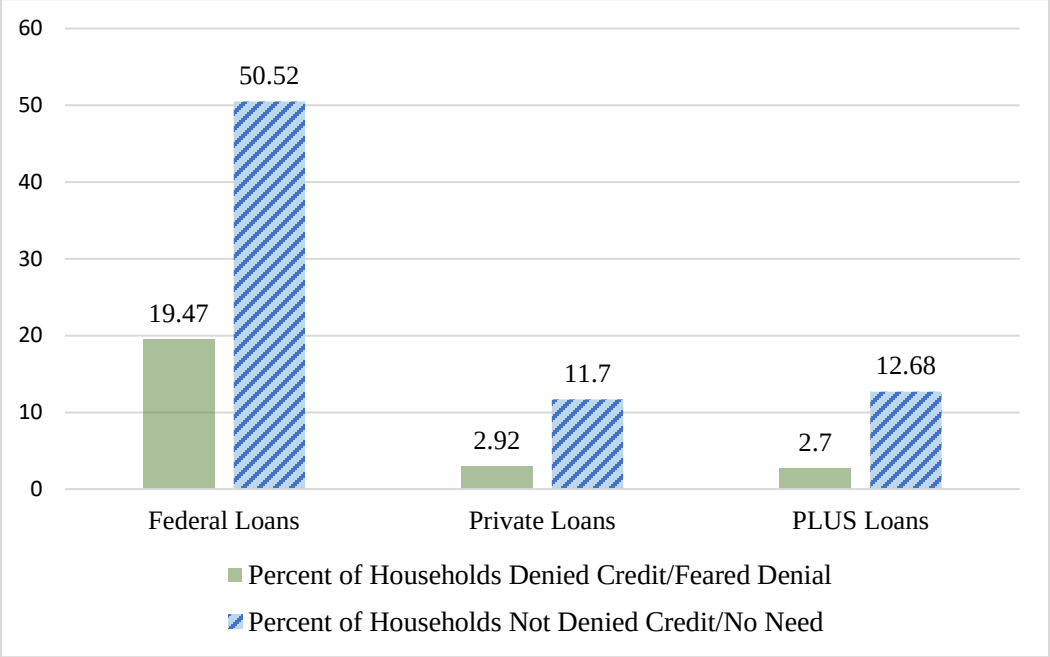
[6] PLUS loans can sometimes be placed in deferment or forbearance status but it must be requested by borrowers and is only granted for certain situations and periods of time, and interest will continue to accrue (U.S. Department of Education, 2023b).

payment burden is a better indicator of the ability to qualify for a mortgage than loan balance. While the change in homeownership odds for federal student loan holders was small between the two model variations (for total federal debt the odds ratio was 0.972 and for federal loan burden it was 0.964), it does offer some indication that this explanation is plausible.

Mortgage qualification is multi-faceted but ultimately based on the lender's assessment of the borrower's ability to repay the debt (Ling & Archer, 2021). Several factors are considered in assessing a borrower's loan application, but in the context of outstanding debt obligations, it is the amount of the debt, and more specifically, the size of the payments relative to income that affect a borrower's likelihood of mortgage approval. Given that private and PLUS student loans generally do not offer flexible repayment terms or deferment or forbearance options, it is not entirely surprising that there was a change between the model variations for loan balance and burden. This is especially true once creditworthiness is considered since creditworthiness is a significant factor in approval for mortgages as well as for private and PLUS student loans.

Private student loans are credit based, meaning borrowers must qualify for the loans (this is not the case for federal loans). PLUS loans are also credit based, although their qualification standards are more relaxed than those of private lenders. In the model creditworthiness was indeed a significant predictor of homeownership with the odds of homeownership for households that had been denied credit or that chose not to apply for credit out of fear of denial being about 48% lower than for households that had not been denied credit. Furthermore, as the descriptive statistics showed, among student loan borrowers, the lowest reports of having been denied credit (or choosing not to apply out of fear of being denied) occurred among households with PLUS loans (2.7%) followed by private loans (2.92%). By comparison, 19.47% of federal student loan borrowers reported that they had been denied credit (or did not apply out of fear of denial).

Figure 5.1: Creditworthiness by Student Loan Type (Weighted)



Source: 2019 Survey of Consumer Finances, all five implicates

Other Results of Interest

In the full sample version of Model 1, the relationship between education and homeownership performed as expected; the more educated a household was, the more likely they were to own a home. However, an interesting relationship emerged once the sample was restricted to student loan borrowers in Models 1-C and 1-D. Households that had attended college, but not received a degree were less likely to own a home than their high school educated counterparts, while the likelihood of homeownership increased for those that had completed their degree (associate degree was not significant in model 1-C but was in 1-D). Since these models were restricted to those with student loans, the results suggest a connection between the

importance of completing a degree, particularly when student loans are being used to pay for the education.

Households that have student loans, but did not complete college, are particularly impacted by the debt since they generally have lower incomes but are still obligated to repay the loans (Carnevale et al., 2021). In both the total balance and loan burden versions of the model, households with some college but no degree had a lower likelihood of homeownership than high school educated households. In the burden version of the model, this relationship also held when considering households with higher levels of education (the category for associate degree was not significant in the balance versions of the model but was in the burden versions). Not only was the likelihood of homeownership higher for households with a bachelor's degree or graduate education relative to those with only a high school education, with each successively higher level of education the likelihood of homeownership increased. However, education did not have a positive impact on homeownership until reaching the level of bachelor's degree. This suggests that if someone is going to use student loans to pay for their education, it is important that they complete their education, and while having an associate degree helps improve the odds of homeownership for a household, a bachelor's degree is required before homeownership becomes more likely than if the household had not attended college at all. Taken in the context of how education affects income, this may be evidence of the tradeoff between education when debt is required and the potential for higher earnings. In terms of homeownership, it appears that debt financed education does not benefit the borrower unless they complete at least a bachelor's degree. While not the focus of this analysis, these findings certainly offer an interesting extension for future research.

Interestingly, in Models 1-A and 1-B, respondents with parents that had received a bachelor's degree or higher had lower odds of homeownership compared to those with parents whose highest level of education was high school (the categories for less than high school and some college, but no degree were not significant in these models). One possible explanation for this is the relationship between parental resources and the need for student borrowing. More educated households generally have higher income and net worth, which would suggest that having college educated parents would benefit students (presumably because their parents would have more financial resources to pay for college). However, if the parents had student loans from their own college education(s), they may not have been able to adequately save for their children's education, resulting in a need for borrowing by subsequent generations.

This could also explain the lower likelihood of homeownership for households with PLUS student loans in Model 1-B. If parents have their own student loans, it could not only reduce their likelihood of homeownership, but also (presumably) their ability to save for their children's education. As a result, these parents would also be more likely to need financial assistance in the form of PLUS student loans to help their children attend college. The SCF does not provide data on parent financial resources, so it is not possible to formally test this hypothesis, but theoretically it is a plausible explanation for these findings.

Model 2: Student Loans and Mortgage Burden

The second regression model was designed to evaluate Research Question 2, "does presence, type or amount of student loan debt affect a household's mortgage debt burden?" Mortgage debt burden is affected by a household's income, as well as the household's monthly mortgage expense, which depends on several factors including the type of mortgage a borrower has, the loan to value ratio for the home being purchased, borrower creditworthiness and the

household's debt to income ratios (Fannie Mae, 2023). Federally insured/guaranteed mortgages have more flexible requirements for approval and require smaller downpayments but require additional mortgage insurance premiums that increase the overall cost of the loan (and therefore increase monthly mortgage expense). Borrowers that qualify for a conventional loan, but do not have the traditional 20% downpayment, are typically required to have private mortgage insurance (PMI) which also adds to their monthly mortgage expense (Ling & Archer, 2021). Households with outstanding debt obligations generally have more difficulty building savings than those without debt, and prior research has shown that non-housing debt negatively affects homeownership (Anderson et al., 2021; Boehm, 1993; Larrimore et al., 2016; Rothenberg, 1991; Stavins, 2021; Toussaint-Comeau, 2021). Additionally, creditworth affects both the ability to qualify for a mortgage in general and the type of mortgage a borrower is able to obtain, as well as the interest rate borrowers are offered (which affects the monthly cost of the loan), and previous studies have shown a relationship between student loans and reduced creditworthiness (Allison, 2018; M. Brown & Caldwell, 2013; Fair Isaac Corporation, 2022; Fannie Mae, 2023; Gicheva & Thompson, 2015; Ling & Archer, 2021). Student loans may also affect a household's mortgage expenses through the impact of the payments on the household's debt to income ratios which also influence the type of mortgage and interest rate a borrower is able to qualify for (Ling & Archer, 2021; Mishory & O'Sullivan, 2012; The National Association of Realtors, 2021).

Following the literature, the hypotheses for Models 2-A and 2-B predicted that student loans would be positively related to a household's mortgage debt burden, with private and PLUS loans being associated with higher mortgage debt burdens than federal student loans. Results from Model 2-A were consistent with expectations. The presence of student loans was associated with an increase in mortgage burden of 13.9%, when holding other factors constant. Hypothesis

2b was also supported, as the presence of federal student loans was associated with an 11.1% increase in mortgage burden, all else equal, but variations of the model designed to test hypotheses 2c through 2h (which postulated that the impact on mortgage burden would vary by loan type and balance) did not reveal a significant relationship between student loan debt (total or by type), with one exception. PLUS loan debt was a significant predictor of mortgage burden, but the impact was negative, which was counter to the hypothesized relationship. When analyzed in the context of student loan payments, the results were slightly more informative. While total and private student loan payment variables were not significant, the federal and PLUS loan burden variables were significant. Federal loan payments were positively related to mortgage burden as expected, but PLUS loan payments had a negative effect on mortgage burden, so only Hypothesis 2l was supported.

As previously mentioned, student loan balance is not necessarily the best measure of a borrower's ability to qualify for a mortgage, particularly for federal student loans due to the number of repayment programs available. These results appear to support that premise, especially in the context of mortgage burden by student loan type. With federal loans offering several types of repayment options that are directly related to a household's income, it makes sense that federal loan payments would be a better predictor of mortgage burden than the amount of federal student loan debt a household has.

Other Results of Interest

Being a first-time homeowner was not a significant predictor of mortgage burden in Models 2-A and 2-B, but in subsequent variations of the model that were restricted to student loan holders mortgage burden for first time homeowners increased in the range of 16.2% to 21.9%, depending on the specific variation of the model. The median original loan to value ratio

was lower for households without student loans (93.5%) than those with student loans (96.5%). Given that first-time homebuyers tend to have smaller downpayments than repeat homebuyers that can use home equity towards their new purchase, and that student loans have been shown to affect a household's ability to save, these findings are in line with expectations and provide evidence of some reasons for why mortgage burden could be higher among student debtors. Contrary to expectation, the impact of non-mortgage debt payments on mortgage burden was negative and larger for the models restricted to student loan holders. However, there are several possible explanations. During the home purchase process, buyers are cautioned against incurring additional debt (either in the form of new loans or by increasing revolving credit balances) as any change to a borrower's credit situation could prevent them from receiving final loan approval. The SCF does not provide information on when these debt payments began, so it is possible that household did not incur the debt until after their loan closing. Additionally, debt payments are a large component of mortgage qualification, so borrowers with higher debt obligations generally will qualify for a lower mortgage amount than a borrower without other debt obligations. Since the size of a household's mortgage payment is determined in part by the amount borrowed, it is possible that the negative relationship seen in these results is revealing evidence that debt payments reduce the amount a borrower can qualify for, thereby reducing the size of the mortgage burden. Ideally this relationship would be examined using DTI ratio rather than payments, but that was not possible in this analysis due to income being a component of the dependent variable in these models.

Model 3: Mortgage Choice and SL

Adjustable-Rate Mortgages

Model 3 tested hypotheses related to the type of mortgage a household has and student loans. The first set of regressions evaluated relationships between adjustable-rate mortgages and student loans. One of the key features of adjustable-rate mortgages is the inherent riskiness in choosing a loan with uncertainty regarding interest rates and the associated change in future mortgage payments once the rate adjusts. Because of these features, ARMs are typically more attractive to borrowers that are willing to tolerate financial risks, experiencing financial constraints and/or unable to qualify for a more traditional fixed rate mortgage(Coulibaly & Li, 2009; Hullgren & Söderberg, 2013; Johnson & Li, 2014). As previous research has shown, borrowers with adjustable-rate mortgages are more likely to face borrowing constraints, and to the extent that student loans contribute to financial strain, it was expected that households with student loans would be more likely to have ARMs. Moreover, private, and PLUS student loans share some of the same characteristics as adjustable-rate mortgages as they commonly have variable interest rates and do not offer the same flexibility in repayment terms, also exposing borrowers to greater uncertainty than federal student loans (College Raptor Staff, 2018; The Institute for College Access and Success, 2016; U.S. Department of Education, n.d.-b).

Since ARMs are typically associated with more forgiving qualification requirements and having lower payments, it was expected that households with student loans would have a greater probability of having an ARM than households without student loans, while households with federal student loans would have a lower probability of having an ARM than those with private and PLUS loans. Results overall supported Hypotheses 3a and 3c with significant and positive relationships between the presence of student loans in general, as well as for the presence of private student loans, indicating a greater probability of having an ARM among those borrowers. The probability of having an ARM increased by 2.5 percentage points for student loan holders in

general, and by 1.21 percentage points for private loan holders relative to those without student loans, ceteris paribus. Federal loans overall were negatively related to the probability of having an ARM, but had a positive marginal effect, indicating that while the overall impact of having federal student loans on the probability of having an ARM (compared to households with no student loans) was negative, the relationship was less pronounced when the selection process was considered, so Hypothesis 3b was not supported. Moreover, the results also did not fully support Hypothesis 3d, as the PLUS loan variable had a positive impact on the probability of having an ARM, but the average marginal effect was negative.

In Model 3-C, increasing total student debt balance was associated with a decrease in the probability of having an ARM, while increasing balances of federal, private, and PLUS student loans were associated with an increase in the probability of having an ARM. When analyzed in the context of burden the relationships changed slightly. Higher total, private and PLUS loan burdens were positively related to the probability of having an ARM. A 10% increase in private burden was associated with about a 0.37 percentage point increase in the probability of having an ARM, all else equal, while increases in federal burden had a negative impact on the probability of having an ARM and a negative marginal effect.

One potential explanation for these somewhat counterintuitive results is that while ARMs shift interest rate risk from the lender to the borrower, and therefore tend to attract borrowers with more borrowing and financial constraints, they do not carry insurance or federal insurance/guarantees, so there is no safety net for the lender in the event of borrower default. Given that previous research has shown a relationship between student loans and credit and financial constraints, it is possible that ARMs are still more difficult for borrowers to qualify for if they are exhibiting credit constraints, have lower downpayments or are otherwise considered to

be a “high risk” borrower (M. Brown & Caldwell, 2013; Conkling et al., 2022; Conkling & Gibbs, 2022; Gicheva & Thompson, 2015; Hoffman, 2007; Zhao, 2023). Further, ARMs can have a variety of features, with some considered far riskier (to either the borrower or the lender) than others (Ling & Archer, 2021). Without knowing the full details of the type of ARMs held by households in the sample, it is difficult to tease apart the nuances of these loans to identify loans that may traditionally be associated with high-risk borrowers. In other words, not all adjustable-rate mortgages are created equal, and it is possible that differences in ARM terms were driving some of the unexpected results.

Federally Insured/Guaranteed Mortgages

The second set of models under Research Question 3 evaluated the impact of student loans on the likelihood of having a federally insured/guaranteed loan. Federally insured/guaranteed loans help to mitigate lender risk in the event of a borrower default, so it is often easier for borrowers with weaker credit or low downpayments to qualify for these loans. Hypothesis 4a predicted that the presence of student loan debt would increase the probability of a borrower having a federally insured/guaranteed loan, and the results supported this expectation; borrowers with student loans had a higher probability of having a federally insured/guaranteed loan than those without student loans. The variation of the model testing the impact of loan presence by type on the probability of having a federally backed mortgage did not fully support this model’s hypotheses. The presence of federal student loans was significant and positively related to the probability of having a federally backed mortgage (relative to households with no student loans) and the average marginal effect was also positive, in support of Hypothesis 4b, but private loan presence was not significant and PLUS loans had a negative impact on the probability of having a federally backed mortgage, so Hypotheses 4c and 4d were not supported.

Given that higher student loan balances typically increase a borrower's student loan payments (particularly in the case of private and PLUS loans), borrowers with higher balances were expected to be more likely to have federally backed mortgages with their more forgiving back-end ratios (relative to lender requirements for conventional mortgages) under hypotheses 4e through 4h. Results from the first variation of the model designed to test these hypotheses supported this notion, as higher total student loan debt was associated with a greater probability of holding a federally insured/guaranteed mortgage, but increasing balances for each of the specific types of student loans were negatively related to the probability of having a federally backed mortgage. However, the magnitude of the effect was smaller for rising federal student loan balances than private and PLUS student loan balances (when comparing the average marginal effect values in absolute terms), indicating that while the probability of having a federally backed mortgage decreased as loan balances grew for all types of loans, federal borrowers had a higher probability of having a federally backed mortgage than private student loan borrowers, and private student loan borrowers were more likely to have a federally backed loan than PLUS student loan borrowers as their student loan balances grew.

Since federally backed mortgages are theoretically the easiest loans to qualify for, these results were not entirely consistent with expectations, but as previously discussed, loan balances do not necessarily affect a borrower's DTI ratios in cases where payments are not a direct reflection of the balance, particularly in instances where loans are being repaid under one of the alternative repayment programs or when student loans are not yet in repayment. The final set of models more closely examined this idea and results were fully in line with all hypothesized relationships.

As student loan payment burden increased, both overall and when considered for private and PLUS loans, the probability of having a federally backed mortgage increased (federal loan burden was not significant in this model). Furthermore, there was also a significant and positive relationship between the household's DTI and original LTV ratios and the probability of having a federally backed mortgage in both contexts. Given that federally backed mortgages also have more flexible credit requirements, it was also not surprising to find that households that had been denied credit (or chose not to apply out of fear of denial) also had a higher probability of having a federally backed mortgage in the final variations of the model. Considered in the framework of theoretical expectations, as well as the awareness of how student loans are known to affect mortgage qualification, these results offer strong evidence that it is indeed the size of a borrower's student loan payment burden, rather than the balance itself, that most likely influences the probability of households with higher student loan debt burdens using a federally backed mortgage to purchase their home.

Limitations and Future Research

Despite the high level of detail and information available in the Survey of Consumer Finances overall, the dataset imposes some limitations on this analysis, particularly regarding details on homeownership, student loans and mortgages. First and foremost, as the old adage goes, "Location, Location, Location;" the importance of the location of a home is critical to real estate analyses. Home prices vary by location, yet this data is not available in the public version of the SCF dataset. While the original price of the respondent's home is available and included in the analyses in the context of the LTV variable, it would be ideal to also have information on the geographic location to capture the effects of location more fully in the models.

To the extent that rental and owner-occupied homes can be considered substitute goods, the analysis could further be improved if it were possible to account for the prices households face when making the purchase versus rent decision. Having location information would allow for the inclusion of relative rent prices to paint a more complete picture of the housing market/conditions faced by respondent households.

In terms of student loans, the SCF only asks specific details on the household's first six student loans, so for households with seven or more loans, information on the specific type of student loan is not available. However, there are only 20 households with more than six loans in the sample, so while analyses related to specific student loan types are somewhat limited in their ability to fully paint a complete picture of how each type of loan impacts homeownership and mortgage characteristics, the impact is presumably negligible on the overall results. Further, student loan information is only available for households that currently have outstanding student loan debt, so it is not possible to account for borrowers that previously had student loans but paid them off prior to completing the survey. As a result, the findings from this research should be interpreted with the understanding that results are not necessarily reflective of all student borrower experiences and therefore do not capture the full effect of student borrowing on homeownership across all circumstances. Having information on student borrowing history, including situations where the household no longer has a student loan balance, would improve the generalizability of the study.

Additionally, information on the respondent's parents' finances is not available. In terms of familial resources or student loans held by prior generations, it is not possible to ascertain if there is any impact on student borrowing if a respondent's parents had loans of their own, or if the respondent had full or partial financial support separately from student loans available to

cover the expense of attending college. Though this does not negate the results of this analysis, it would certainly offer an important perspective in assessing the true impact of student debt on a household's financial circumstances, particularly from a generational standpoint.

Regarding mortgage characteristics, the SCF only contains information on the current interest rate for the mortgage, so in cases where a borrower originally purchased their home with a different mortgage there is not information on what the original interest rate or payment was. Since mortgage qualification depends on the borrower's financial situation at the time of application, knowing the original interest rate and payment amount would improve the quality of analysis. Similarly, knowing the borrower's credit score at time of mortgage approval would also help to provide a complete picture of their creditworthiness at time of application. It would also be beneficial to know if a respondent had student loans at the time of mortgage application and what the balance/type of loan was. This information would be particularly beneficial in the context of PLUS loans, as PLUS borrowers may have already owned their home prior to taking out the loans. Along the same lines, knowing the amount of debt a household has, and its associated payments at the time of mortgage application would also be helpful.

Another limitation of the study is that wealthy households are oversampled. It is likely that lower income households have higher mortgage debt burdens or are unable to purchase a home altogether, but they are not equally represented in this dataset. Weighting the analysis does attempt to account for this, but it would be better to have actual samples from those households. Finally, the SCF does not have a lot of household expenditure data, which would be useful when analyzing results under the framework of the neoclassical theory of housing demand.

Despite these limitations, this research makes a significant contribution to the literature in its novel consideration of how each type of student loan affects homeownership and mortgages,

rather than only considering the impact in aggregate. Evidence was found in support of findings from prior literature, while results also offered important insights into the nuances of the relationship between various types, balances, and payment burdens of student loans on homeownership and mortgages that previously has been unexplored. This research serves as an important starting point for further analysis and provides a framework for research moving forward.

Implications

Overall, the results of this study show that the relationship between student loans and homeownership is multi-faceted and complex. This study supports the findings of prior research as all models showed that student loans overall reduce the likelihood of homeownership, contribute to higher mortgage burdens and lead borrowers to riskier or more costly mortgage options when they can qualify for a loan. However, perhaps even more valuable are the findings that fill gaps in the literature by offering new insights regarding the different types of student loans and the unique ways in which they affect homeownership.

There is little doubt that homeownership plays an important role in providing financial stability and the opportunity to build wealth for individual households, and as the largest single driver of GDP, it is also critical to the overall health of the nation's economy. With recent increases in interest rates, faltering consumer confidence and stagnating real wages, U.S. housing markets have already begun to show signs of softening (Board of Governors of the Federal Reserve System (US), 2023; World Bank, 2023; Yun et al., 2023). At the same time, student loan payments recently resumed on a staggering $1.75 trillion in outstanding student debt (Board of Governors of the Federal Reserve System, 2023b; Federal Student Aid, 2023). Experts have been sounding the alarm on what has been referred to as "the next bubble to burst" for some time, and

current economic conditions foreshadow what could become the perfect storm of circumstances. While the seriousness of the situation has garnered the attention of policy makers, most proposals are narrowly focused on providing limited relief to a subset of federal student loan borrowers, framed in the context of aiding low-income households struggling under the weight of the debt (Biden, 2022; The White House, 2022; U.S. Department of Education, 2023f). As this research has shown, the burden of student loans is not isolated to low-income households with only federal student loan debt; student loans reduce the likelihood of homeownership even after controlling for household income. Mortgage lenders qualify borrowers based on their ability to afford the mortgage payments, so simply reducing the balances of some federal student loans will not necessarily be the magic solution policy makers are hoping for, at least to the extent that homeownership/affordability is the policy goal. This is particularly true if that relief is restricted to lower income households, as they may not qualify for a mortgage even after the balance is reduced (or have payments that are already very low, or in some cases set to zero if they are in an income-based repayment plan). Further, student loan payment burdens affect the cost of the mortgage and the type of mortgage a borrower has across all student loan types and independent of other household characteristics. This research shows that policies limiting relief to a subset of student loan borrowers likely will not have the desired effect and given that nearly 75% of student debt payments are made by borrowers from high income households (those with annual household incomes of $74,000 of higher), policies will need to address the larger population of student borrowers if the goal is truly to promote homeownership and economic growth (Baum & Looney, 2020).

Separate from the policy implications, the results from this study are also relevant and informative for financial planning professionals. For example, when helping clients navigate the

various student loan repayment options, financial planners should educate their clients on the impact the payments will have on their ability to achieve other financial goals. For example, while repayment may be extended if a client chooses an income-based repayment plan (which could result in higher interest expense over the life of the student loan), it could make a difference in the client's ability to purchase a home at all, which means they would be giving up the potential for building wealth through appreciation of a home, at least until the loans are paid off, as well as the peace of mind that comes from knowing housing expenses will not change (landlords often raise rent over time to keep pace with market conditions and rising ownership and management costs). Even if the client can qualify for a mortgage, if the higher student loan payment increases their DTI ratio too much, they could end up with a more costly mortgage and higher monthly payments if the client must use a federally backed mortgage or obtain private mortgage insurance to qualify for the loan.

Moreover, this study also found evidence of a potential connection between level of education, student loans, and homeownership, for both the borrowers and their parents. Financial planners can use this research to encourage a generational change in the way financing higher education expenses is approached moving forward. By providing clients with relevant information on the impacts student loan debt can have on their own lives, as well as their children's ability to reach major life goals, planners can inspire families to prioritize saving for higher education expenses in their overall financial plans. In doing so, it may be possible for future generations to avoid the financial strain and resulting delays to achieving homeownership and other milestones that can result from beginning their adult life saddled with student loan debt.

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