

DISSERTATION

GENDER AND RACIAL INEQUALITY IN U.S. CREDIT MARKETS

Submitted by

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ABSTRACT

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Outstanding household debt in the U.S. has grown dramatically since the 1980s, and households' borrowing activity is on track to return to levels unseen since the 2008 Financial Crisis. There has been limited research in economics on how patterns of credit use reflect and reproduce inequality by gender and race. In this study, I apply an intersectional feminist lens to household finance with four empirical investigations of women's position in credit markets. The papers are situated in an historically informed theoretical framework positing that women have been subject to three interconnected phenomena as consumers of credit: stigmatization, conditional inclusion, and exclusion. Chapter 2 investigates the relationship between borrowing from friends or family and financial exclusion, motivated by work in sociology suggesting that such informal borrowing has long-run costs and may be disproportionately used by women. I find that Black women are two to three times more likely than White respondents to plan on using informal borrowing as their primary coping strategy in the case of an emergency expense. Unobserved factors such as access to bank branches appear to link financial exclusion and informal borrowing. Chapter 3 explores differences by gender and race in U.S. high school students' aversion to borrowing for college and in the impacts of debt aversion. Female students and Black students are more likely to have a low but positive willingness to borrow for college than other groups. Moderate debt aversion is linked to lower levels of college enrollment, less borrowing, and lower costs of attendance, while strong debt aversion reduces the probability of enrolling in college for men only. Chapters 4 and 5 identify gendered and racialized trends in the growth of household debt surrounding the 2008 Financial Crisis. The results provide mixed evidence that high-cost mortgage lending targeted women or Black or Hispanic respondents. These groups experienced greater growth in consumer debt levels and debt burden relative to income than other groups post-crisis.

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DEDICATION

To my parents and my husband, for their unending support and patience.

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Chapter 1

Introduction

1.1 Growth of household borrowing in the U.S.

Since the 1980s, households have experienced a dramatic increase in outstanding mortgage and consumer debt. These trends have been driven in part by the progressive deregulation of investment and commercial banks, rising housing prices, and greater marketing and use of consumer credit products such as credit cards (Dymski, Hernandez, and Mohanty 2013; Guttman and Plihon 2010; Watkins 2000). In the aftermath of the housing bubble collapse and the 2008 Financial Crisis, the consequences of growing indebtedness for macroeconomic volatility and even long-run stagnation have garnered growing attention. A large and growing literature has established a link between high household leverage in the aftermath of the Financial Crisis and persistent unemployment driven by decreased consumption expenditures (e.g., Mian and Sufi 2012). This excessive household leverage may be a source of ongoing sluggish growth as households pay off existing debt (Krugman 2014).

Beyond these macroeconomic implications, there are equally important concerns about the direct implications of rising leverage on households' financial stability and social mobility. In this context, debt is a double-edged sword. The life-cycle theoretical framework predicts that access to credit allows liquidity-constrained households to engage in welfare-enhancing consumption-smoothing and to invest in productive assets.¹ This is particularly important in regard to educational debt and human capital investment. Borrowing is often the only means for students to obtain a college degree and resulting earnings premium, a premium that is even greater at higher-cost institutions (Thomas and Zhang 2005). There is some evidence, albeit mixed, that credit constraints serve as a barrier to college attendance (e.g., Belley and Lochner 2007; Cameron and Taber 2004),

¹See Browning and Crossley (2001) for a review and assessment of the life-cycle theory literature.

and anticipated credit constraints post-graduation may affect the outcomes of recent bachelor's degree recipients (Minicozzi 2005; Rothstein and Rouse 2011).

At the same time, over-leveraged households face growing risk of default. This situation can stem from several sources: a Minskian process wherein strong consumer confidence fuels borrowing (Guttman and Plihon 2010), external habits and other-regarding preferences (Petach and Tavani 2019), and growing reliance on debt to cope with income shocks, particularly among low-income households with few assets (Baker 2014). Figure 1.1 illustrates the growth in credit liabilities on the balance sheets of households and non-profit organizations as a percentage of U.S. nominal disposable income. Between 1960 and the peak of the 2000s credit expansion in 2007, outstanding mortgage debt grew from about 36% of total disposable income to nearly 100%. Non-mortgage consumer debt (credit card, automobile, student loan, non-revolving, and other debt) also increased substantially during the period, from 14.5% to 24%.

Unlike mortgage debt, other forms of household debt fell only mildly post-recession and have since continued to increase. Student loan and automobile debt are major components of this trend (Federal Reserve Bank of New York 2017). Consumer demand continues to grow for other credit products as well. As shown in Figure 1.2, the number of credit card accounts per member of the U.S. non-institutionalized population grew substantially in the 2000s before falling dramatically with the Financial Crisis. The effects of the post-recession credit crunch and household deleveraging have begun to reverse, however, with a notable sustained increase in credit card accounts as job growth and household incomes have recovered.

In the aftermath of the Financial Crisis, household finance and credit demand remain critical and multifaceted issues from a policy perspective. Despite the wide range of work done in this area, there has been surprisingly little recent attention paid to the role that variation in access to or use of mortgage and consumer credit may have on inequality across social groups. Since the credit expansion and crisis, some work specific to mortgage lending has highlighted inequality in access to quality credit with a focus on minority applicants (Baker 2014; Baradaran 2015; Dymski, Hernandez, and Mohanty 2013; Wyly and Ponder 2011). Less work has focused on the ways in

which gender has interacted with these racialized processes of debt growth or on how male and female borrowers have been positioned in credit markets more generally (Dymski, Hernandez, and Mohanty 2013; Fishbein and Woodall 2006). Much of the earlier work on gender and race has been limited to addressing differences in lender-imposed credit rationing and, to a lesser extent, self-rationing (e.g., Crook 1999, 2001; Hawley and Fujii 1990, 1991; Jappelli 1990).

This study contributes to the sparse literature by proposing a gendered analysis of household indebtedness and consumer borrowing that recognizes the complicated role of gender in the context of industrialized economies where credit is increasingly ubiquitous. Such a lens has yet to be fully applied in the economics literature and only somewhat in the sociology literature (e.g., Dwyer 2018), yet an expansion of such analyses is well overdue. In the chapters that follow, I argue that women's position as consumers in credit markets is best characterized by three interconnected phenomena: stigmatization, exclusion, and conditional inclusion, as illustrated in Figure 1.3.² The historical co-evolution of these forms of inequality are discussed in the remainder of this section, followed by an overview of the dissertation chapters in the context of the three-part argument.

1.2 Women's position in credit markets

The obligations for household management faced by both married and single women positioned them as some of the first consumers of credit. In her survey of historical work on consumer credit in the U.K., Burton (2008) notes that between the 1300s and 1700s, coverture virtually eliminated the legal rights of women upon marriage, but the "law of necessities" allowed a married woman to borrow under her husband's name. This law recognized the role of women as household managers whose task it was to ensure the week-to-week survival of the household. As a result, women could enter into credit agreements in order to procure necessities, and husbands would be legally bound to repay these debts. Single and widowed women also had access to credit and, in the U.K., access

²A notable omission in this framework is the role of women as *lenders* of credit. Historical work has largely debunked the assumption that women were strictly excluded from lending in the early years of consumer credit (Burton 2008; Calder 2009; Lemire, Pearson, and Campbell 2002). Differences in the representation of women among lenders in modern Western credit markets, such as in venture capital and small business lending, remain an important issue but are beyond the scope of this study.

to county courts and other legal resources to enforce repayment of debts. The feminization of consumer credit accelerated as installment credit was introduced in the late 19th and early 20th centuries (Calder 2009). By the 1930s, Burton (2008) cites estimates that about 80% of consumer credit was held by women (37).

Yet the multifaceted inclusion of women into credit markets came tied to social norms reinforcing patriarchal social structures. At the outset, women's use of borrowed funds was heavily scrutinized through the lens of sexual control. Only married women who were thought to be "chaste" could claim the right to credit through the law of necessities, and the moral standing of single women who borrowed was particularly questioned, reflecting the Victorian Era link between "female consumer activity and female sexual transgression" (Burton 2008, 23). Single female debtors were liable to imprisonment, often with their children. Men's responsibility for the debts incurred by wives may have also contributed to later views of women as profligate spenders and irresponsible borrowers. In some cases, such excessive borrowing did occur, but as a strategy women used to circumvent their lack of legal power. Records suggest that, in the case of unsatisfactory marriages, upper-class women would accumulate large debts under the guise of the law of necessities, prompting their husbands to leave them (Burton 2008).

The myth of the "female credit abuser" was fully established with the emergence of installment credit in the United States (Calder 2009). This image combined growing concerns about the moral degeneracy of borrowing on credit with the assumption that women, as the primary consumers of such credit, were financially illiterate and illogical. An 1884 editorial in *Scientific American* described women's "peculiar" reasoning as supposed "psychological fact," arguing that a woman would choose to pay more through installment payments to purchase a sewing machine rather than pay the full sum outright (Calder 2009, 182). An English visitor to New York similarly commented in 1897 that "In New York, almost everybody lives above his income. Women, many people will tell you, are especial offenders" (Calder 2009, 218). According to such reasoning, women lacked an ability to delay gratification and think "economically" as men would. Later popular writing portrayed consumer credit as destructive of previous generations' monetary morality, describing credit

as an “ally of the devil” and the “great tempter” to whose temptations women were particularly vulnerable (Calder 2009, 215).

This history sheds light on the relationship between conditional inclusion and stigmatization that has long characterized women’s position in Western credit markets. When they have been granted access to credit, it has not been as a right, but as an expectation, given their role as household manager and, thus, as household consumer. As consumers, they in turn became the target of marketers as new financial products were developed, from installment credit in the late 1800s to, as this study will explore, subprime lending today. Yet in being cast in this role, they become the scapegoat for social anxieties about the consequences of borrowing—the image of the thriftless and vain borrower who wants to live beyond her means. Evidence suggests that this image remains prevalent today and has been internalized by women in ways that may influence their borrowing behavior. Today, women continue to perceive themselves and to be perceived as less financially literate than men (Chen and Volpe 2002; Danes and Haberman 2007), despite evidence from credit bureaus that women have equivalent or slightly higher credit scores on average than men (Experian 2013).

How has the stigmatization of female borrowers translated into a seemingly paradoxical status of exclusion from certain credit markets? At the same time that women were early users of consumer credit, U.S. women’s independent access to credit on the basis of their own income has a history of being restricted, even after the elimination of explicit restrictions like coverture. Legal work and Congressional hearings in the early 1970s documented systematic sex discrimination in lending in the United States (Brown 1973; Gates 1974; Lally 1973). Banks discounted the earnings of married women, assuming that they would leave the labor force to raise children (Lally 1973). Married women also continued to be unable to apply for credit in their own name, limiting their ability to develop an individual credit history (Lally 1973). In line with the myth of the female credit abuser, banks claimed that these restrictions were in response to women’s lower creditworthiness, despite little evidence to support such an assertion.

Since then, such blatant sex discrimination in credit markets has been mitigated by two key developments. First and most directly, Congress passed the Equal Credit Opportunity Act (ECOA) in 1974. The act prevented banks from collecting application data relevant to protected group identities. These identities included sex and marital status and, starting in 1976, race, national origin, age, receipt of public assistance income, and the exercise of consumers' rights as established in the Consumer Credit Protection Act. Banks were also restricted from treating applicants in these protected groups less favorably than other applicants unless this lending practice passed the "effects test" under disparate impact doctrine. To successfully prove discrimination under this doctrine, a plaintiff must first prove that he or she was treated differently from "otherwise identical" borrowers (National Consumer Law Center 2013). If the bank can show that the lending practice bears a substantive relationship to applicants' creditworthiness, then the burden of proof returns to the plaintiff, who must present a less discriminatory lending criterion.

Second, a widespread shift towards automated credit scoring has mitigated opportunities for discriminatory lending. The use of what the ECOA terms "empirically-derived credit scoring systems" should provide limited scope for direct bias against female borrowers compared to "subjective systems" (Hsia 1978). Some work has suggested that credit scoring systems in the post-ECOA context could counter-intuitively lead to reduced borrowing opportunities for women. Chandler and Ewert (1976) note that the observable characteristics of high and low credit risk borrowers could differ between men and women. For example, suppose that creditworthy female borrowers were found to have fewer credit references than the average creditworthy male borrower. If the sample consists mostly of male borrowers and no distinction between applicants can be made by gender, the estimated model will lead to the rejection of creditworthy female applicants with few credit references.

Despite these legal and technological developments, inequities in women's access to credit on equal terms remain relevant and substantial. Most generally, the nature of disparate impact doctrine means that the ripple effects of structural gender inequality can lead to legally permissible differences in the treatment of male and female borrowers. It is well known that women have lower

average wages and wealth accumulation than men in the U.S. (Pressman 2003, 1988; Schmidt and Sevak 2006) and that women are disproportionately represented among bankruptcy filers, in part due to greater financial distress in the case of divorce (Burton 2008; Calandra 2008). Banks can legally offer different terms to male and female credit applicants on the basis of these differences in their current financial situation and financial history. In addition, there is a long literature noting the redlining of low-income, predominantly minority neighborhoods.³ In these neighborhoods, high-cost borrowing may be the only feasible possibility, and previous work suggests that households headed by women of color may be disproportionately affected by these credit constraints (Dymski, Hernandez, and Mohanty 2013; Wyly and Ponder 2011).

There is also clear evidence of gender differences in credit access within certain segments of credit markets, most notably venture capital and small business lending. Female small business owners have been shown to self-ration due to their expectation that they will be rejected credit (Mijid and Bernasek 2013). New female-owned businesses are also more likely to receive loans that are smaller than requested relative to new male-owned businesses (Mijid 2015), and female entrepreneurs on average ask for and receive less financing than male entrepreneurs, pay higher rates for financing, and have lower credit scores than male entrepreneurs (Hecht et al. 2016).

These studies do not posit a particular source of gender differences in access. Weiler and Bernasek (2001) argue that women may be excluded from informal networks of entrepreneurs and venture capitalists, limiting their access to funds. There is also some evidence that the stigmatization of women regarding financial and business literacy plays a limiting role as well. Kanze, Huang, Conley, and Higgins (2018) find that investors tend to ask male entrepreneurs “promotion-related” questions (i.e., as stated in the title of the article “ask[ing] men to win”), while they ask female entrepreneurs “prevention-related” questions (i.e., asking “women not to lose”). Prevention-related questions are found to in turn result in lower levels of funding. The divergence between these questions appears to reveal an underlying gender bias: the assumption that female entrepreneurs will fail *unless* they manage to prevent it. The internalization of these messages of female financial

³See Hillier (2003) for an empirical investigation and a survey of this literature.

ineptitude may contribute to the likelihood of these business owners to self-ration. In fact, some evidence suggests that self-rationing is a more relevant form of credit constraint for women than bank rejection in a broader set of borrowing contexts outside of venture capital (e.g., Hawley and Fujii 1991).

Examples like these point to how these interconnected forms of credit market inequality continue to operate for female borrowers. Stereotypes surrounding women's financial literacy may serve to restrict their access to certain types of credit or credit at reasonable terms. This exclusion may sometimes be externally imposed (as in venture capital) and in others may be self-imposed through discouragement (deciding not to apply for credit due to predicted rejection). Some work has further argued that women have been excluded from traditional credit products only to become "superincluded" in others (Dymski, Hernandez, and Mohanty 2013). The marketing of high-cost credit to vulnerable households, particularly female-headed households in low-income neighborhoods, perpetuates the historical pattern in which new forms of credit are marketed to women with few alternative options. Moreover, images of women in popular media continue to portray womanhood as being associated with both household management and the maintenance of an ideal self (physical appearance, dress, etc.). As a result, consumption to meet these dual goals create a space in which "compulsive consumption" funded by debt remains gendered, serving as a "major leisure activity and a form of self-expression" (Burton 2008, 39-40). This in turn sets the stage for continued stigmatization of the supposedly irresponsible female borrower.

Any analysis of gender-based credit market inequality would be incomplete without meaningfully engaging intersectional identities. Race-based inequities have a particularly long history in U.S. credit markets (Baradaran 2015; Hillier 2003). It is well known that Black communities were and continue to be systematically excluded from equal access to mortgage credit and low-cost consumer credit, leaving such communities more likely to rely on high-cost lending (Carr and Schuetz 2001; Morgan-Cross and Klawitter 2011). When consumer credit grew in popularity—particularly among White women—during the late 1800s and early 1900s, Black families had more limited access to store credit than installment credit (Olney 1998). The former relied heavily on relation-

ship lending, while the latter relied on collateral. Olney (1998) suggests that merchants' prejudice against and stereotypes of Black families may have limited their willingness to lend to these families, citing comments by national trade groups expressing doubt about the financial literacy of Black borrowers.

Black women were at the forefront of attempts to expand access to credit for Black families in the U.S., addressing inequities at the intersections of class and race. During the 1960s "Welfare Movements," activists demanded that major retailers such as Sears extend store credit to predominantly female, Black and African-American recipients of income support (Kornbluh 2016). The activists noted that restrictions on welfare recipients' access to credit empowered White lenders in Black neighborhoods to charge extortionate financing fees. The experiences of these women point to the larger role that exclusion from credit access has played for women of color than for White women, the importance of class in mediating both reliance on and access to credit, and the impact of stigmatization on perceived creditworthiness.

This analysis of U.S. credit market inequality draws on two theoretical foundations. On one hand, it draws from the political economy tradition and from stratification economics specifically (Darity Jr., Hamilton, and Stewart 2014). Discrimination in economic analysis is often seen as the direct or indirect result of idiosyncratic preferences. Stratification economics suggests that racial (and, by extension, gender and intersectional) inequality results from the exercise of power by dominant groups in order to maintain their group benefits. In many of the empirical chapters that follow, I follow authors such as Dymski, Hernandez, and Mohanty (2013) in arguing that financial actors were often able to extract rents from predominantly minority communities and from female-headed households by leveraging and maintaining existing economic inequality.

At the same time, it is clear that modern credit markets and women's position within those markets are complicated. In many segments of those markets, lending may be largely "gender blind," and all forms of inequality will not be salient for all women in all contexts. Moreover, I do not assume that individual agency is completely eclipsed by gender hierarchies. In these senses, I draw heavily from the "structures of constraint" approach of Folbre (1994). Folbre argues

that the effects of gender, race, and other group memberships in society cannot be understood from either a purely individualistic perspective (e.g., neoclassical economic theory) nor a purely structural perspective (e.g., Marxian theory). Group membership does not place members in iron-clad roles, but instead places them within certain structures of constraint—combinations of norms, assets, preferences, and rules that limit the ways in which members can exercise their agency. The empirical work in this study is premised on this middle ground. While the motivating theories often draw implicitly or explicitly on the individualistic framework of static or dynamic utility optimization, I discuss where structures of constraint may enter into the analysis by influencing perceived costs, benefits, or choice sets. Such an approach is critical to recognizing the role of variations in social power without attributing to women only a passive role in their own economic lives.

1.3 Overview of the study

In the three chapters that follow, I present an empirical analysis of these forms of gender inequality in specific credit markets. Each chapter roughly corresponds to one of the three stages, although the recursive relationship makes a full distinction between stages somewhat artificial and incomplete.

Chapter 2 investigates the impact of exclusion from banking services on households' financial coping strategies and explores variation in this impact by gender and race. Beginning in the 1990s, rapid growth in alternative financial services such as payday lending prompted greater interest in identifying households without bank accounts and bringing them into the financial mainstream. Much of this work assumes that alternative financial services are the only short-term borrowing options available to unbanked households. However, borrowing from friends and family, or informal borrowing, is one widely used alternative to high-cost finance that has been underexamined in the financial exclusion literature. Informal borrowing can incur long-run costs in terms of households' financial security. Evidence from the sociology literature suggests that the use of such borrowing and its costs may in turn be unequally distributed by gender, race, and class. This study uses data

on individuals' strategies for coping with an emergency expenditure to identify predictors of informal borrowing use and to investigate whether informal borrowing is related to financial exclusion. The direct and latent relationships between these two outcomes are estimated using a recursive bivariate probit model. Respondents who are younger, have lower levels of education, and have larger households are more likely to use informal borrowing. After controlling for these characteristics, Black women are twice as likely as White respondents to use informal borrowing as their sole coping strategy, and similar gaps exist for other women of color. The results also suggest that reliance on informal borrowing is jointly determined with financial exclusion. This latent relationship varies with income and by race and ethnicity. Lower relative costs of informal borrowing in communities with limited bank access may help explain this variation.

Chapter 3 focuses on educational borrowing in the United States and seeks to better understand variation in high school students' hesitancy to take on student loan debt, known as "debt aversion." The explosive increase in tuition costs since the 1970s and declines in grant-based financial aid have made student borrowing a key requirement and, therefore, potential barrier to college enrollment. In the study, I explore the determinants and impacts of debt aversion, where debt aversion is measured using an ordinal willingness to borrow variable, unlike previous work. I apply a propensity score matching strategy to estimate the effects of debt aversion on the college choices of high school students independent of factors affecting students' valuation of college and their ability to pay for college. More debt-averse students are less likely to enroll in college, borrow less if they do enroll, and generally attend lower cost colleges. The second half of the analysis splits the sample by gender and by race and ethnicity. Despite a long-run trend of growing female enrollment in U.S. universities, the results suggest that women and Black students are more likely to report a low willingness to borrow than other similarly-situated students. Strong debt aversion results in lower college enrollment only for men and White students, while women and Black and Hispanic students appear to respond by reducing borrowing more than other groups. For women, this reduction may result from greater parental financial support, but the same does not appear to be the case for Black and Hispanic students. The debt aversion that is observed among female students

and students of color in the sample may have important implications for their college outcomes, as some of these students may be accommodating their debt preferences in ways that are more or less conducive to college success.

In Chapters 4 and 5, I broaden my focus to gendered trends in both mortgage and educational lending. As discussed in Section 1.1, the period between approximately 2002 to 2008 was characterized by a dramatic increase in household indebtedness that was driven largely by the housing bubble and a corresponding expansion of subprime lending. At the same time, households were increasingly taking on educational debt, with an acceleration of that growth during the recession and early recovery. While such trends were seemingly widespread, these two studies test the hypothesis that female-headed households as well as households with Black or Hispanic household heads may have experienced greater growth in debt during the credit expansion period and greater persistence in that debt post-crisis. Variation in household financial fragility is an underexamined dimension of economic inequality and increasingly relevant as consumer borrowing returns to pre-crisis levels. Evidence suggests that deregulated mortgage lenders may have targeted economically marginalized households as part of efforts to increase originations of high-cost loans, while growing reliance on borrowing to cope with market risk may have driven rising consumer indebtedness among these households post-crisis. In Chapter 4, published in the *Forum for Social Economics*, I use data from the Survey of Consumer Finances to test for evidence of differential trends, with specific focus on female- and male-headed households. Chapter 5 expands this analysis to address differences by race and ethnicity and to incorporate additional measures of financial fragility using data from the PSID. While the evidence of predatory mortgage lending is mixed, results from both datasets suggest that consumer debt—in levels and relative to income—rose more post-crisis for female-headed households and for households with Black household heads. This disparity appears to be primarily driven by rising student debt.

These four chapters address at times disparate areas of credit markets with two goals in mind. First, the results seek to shed light on a broad landscape of women's borrowing experiences that have heretofore gone relatively unexplored in the economics literature. No single description of

women’s position in credit markets holds for all types of borrowing, each of which has a different institutional structure. Second, these chapters also seek to be of interest for the broader household and educational finance literatures. The policy recommendations that come out of these studies are intended to be relevant not only to women but to all consumers. For instance, a better understanding of the implications of debt aversion can inform whether student outcomes would benefit from a return to increased grant funding in financial aid packages.

1.4 Figures

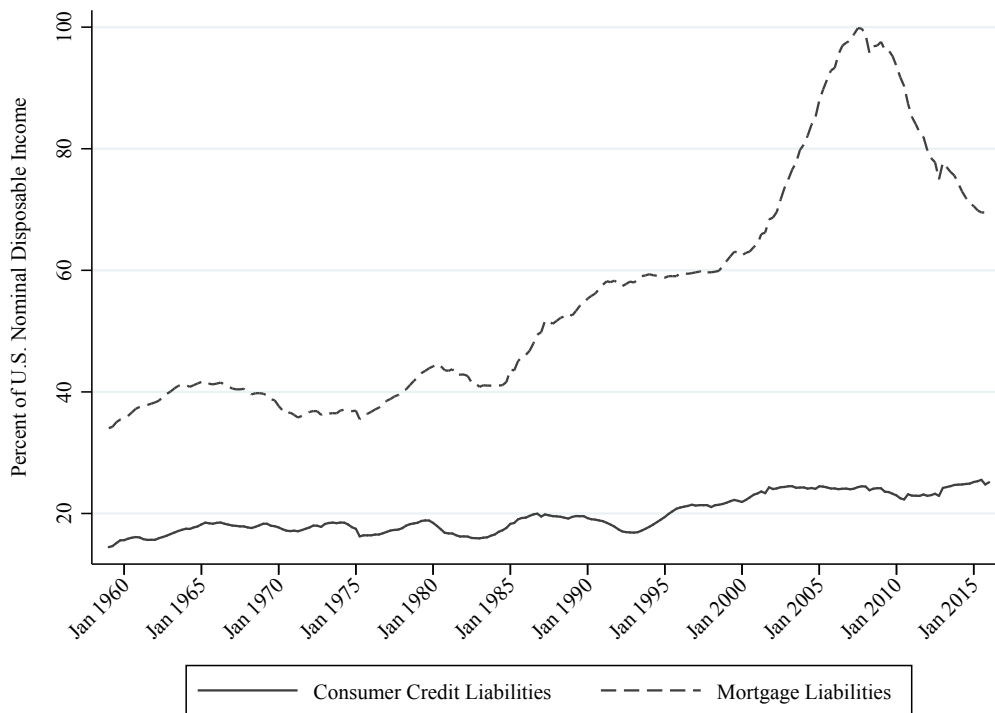


Figure 1.1: Household and non-profit organization consumer credit and mortgage liabilities as percentage of U.S. disposable income

Source: Federal Reserve Bank of St. Louis FRED Economic Data

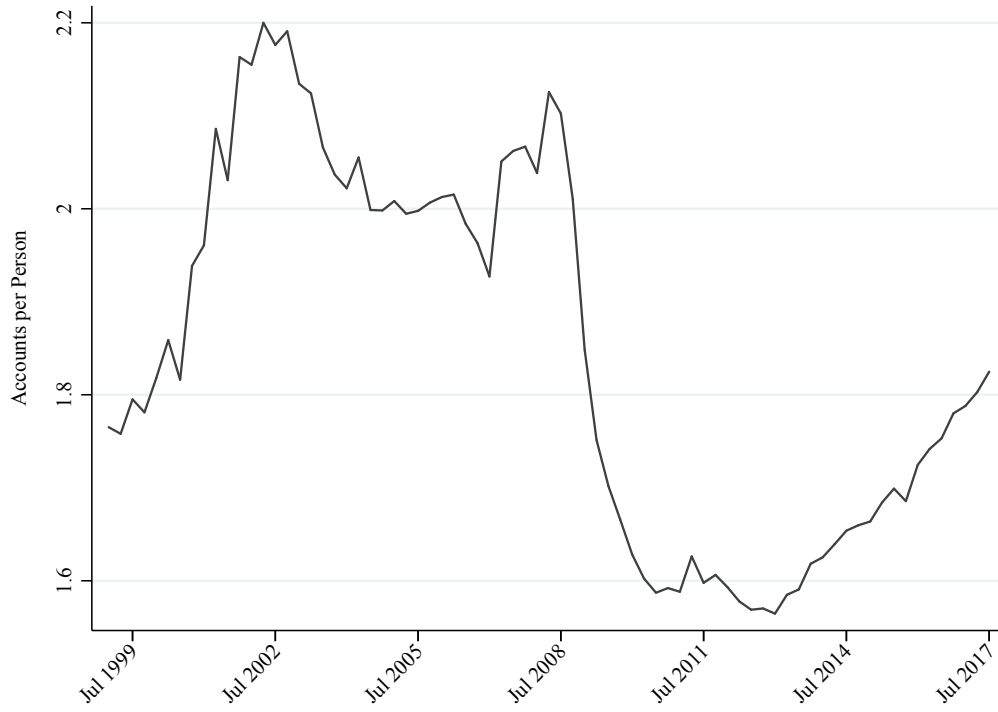


Figure 1.2: Average number of credit card accounts per capita (non-institutionalized population)
Source: Federal Reserve Bank of St. Louis FRED Economic Data

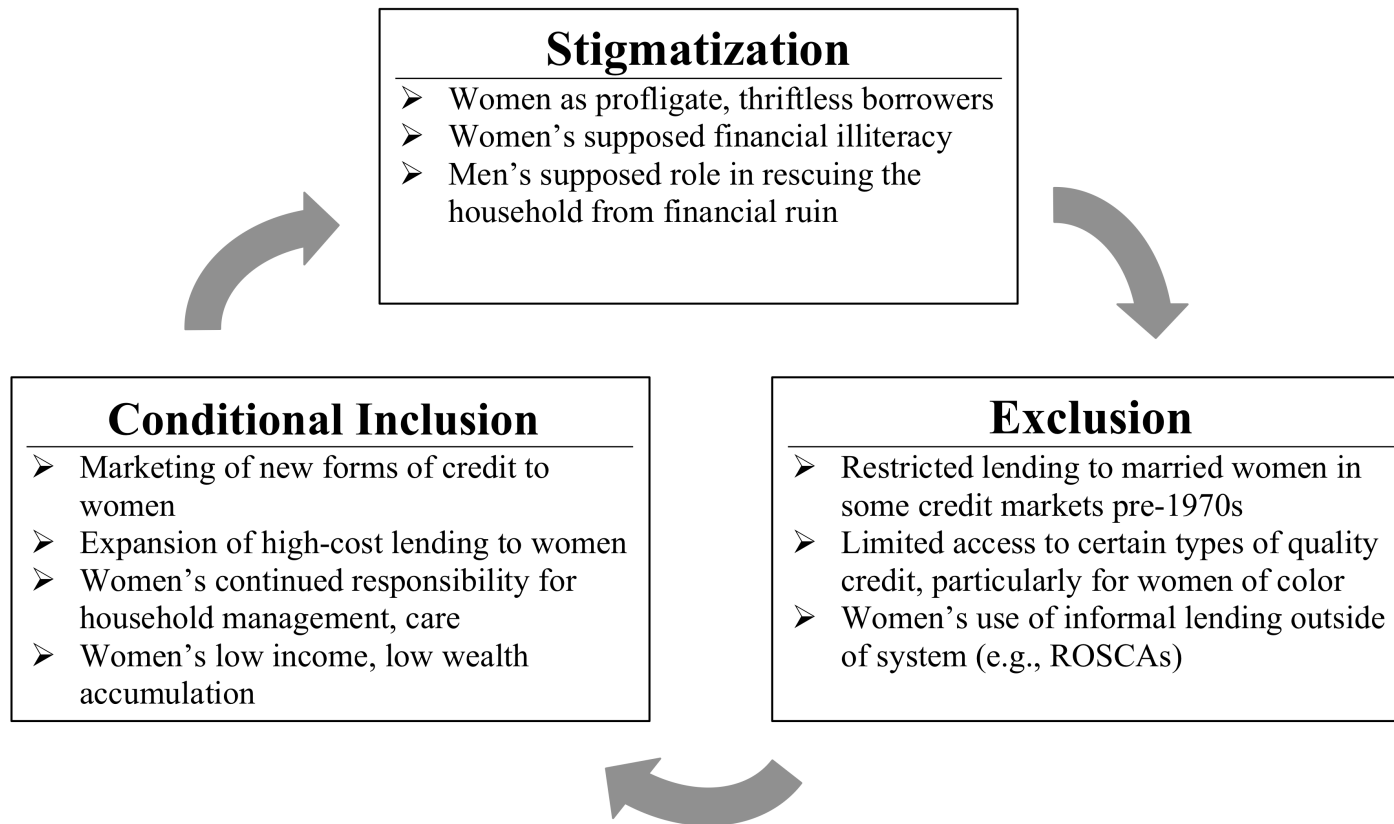


Figure 1.3: Interconnected forms of gender inequality in credit markets

Chapter 2

The Relationship between Informal Borrowing and Financial Exclusion: Locating the Invisible Unbanked at the Intersections of Race, Gender, and Class

2.1 Introduction

Without access to mainstream banks and credit unions, the unbanked end up using fringe financial service entities to conduct routine transactions... Without traditional credit, individuals are vulnerable to exploitation by abusive lenders offering high-cost mortgages, high-interest short-term loans, and very expensive rent-to-own products.

–Senator Paul S. Sarbanes, May 2, 2002, *Bringing More Unbanked Americans into the Financial Mainstream: Hearing before the Committee on Banking, Housing, and Urban Affairs*

Throughout the 1990s and early 2000s, a dramatic expansion in the volume of check cashing outlets, payday lenders, and other alternative financial services prompted growing interest in financial inclusion (Carr and Schuetz 2001). Policymakers and researchers sought to identify “unbanked” households, or households that do not own bank accounts, and to bring these households into the financial mainstream. Despite misgivings about the value of bank services to low-to-moderate income households following the 2008 Financial Crisis (Servon 2017), financial inclusion continues to be recognized as an important policy goal (Weissman 2018). Advocates for such policies note that unbanked households that rely on alternative financial services incur larger fees per transaction and face higher interest rates than those with access to bank services.⁴

In this discourse on financial inclusion, the options available to households are framed as a choice between bank and alternative financial services, as the above quote from Senator Sarbanes illustrates. This dichotomy is a reasonable description of the market for transactions services: Most

⁴There is some debate over the actual cost of alternative financial transaction services for consumers, as discussed in more detail in Section 2.2.1. Some authors note that competition has led to the emergence of new and lower-cost services, such as free check cashing at grocery stores (Dunham 2001; Stanley and Bhattachara 2008).

households without bank accounts must rely on check cashing services and money orders to cash payroll checks and pay bills, either through fringe lenders or at grocery stores and other businesses that increasingly provide transaction services.

However, households' options for short-term credit are more complicated than a choice between bank and alternative sources. In particular, this overlooks borrowing from friends and family—also called “informal borrowing”—as a means of satisfying short-term credit needs.⁵ Informal borrowing is far from being an infrequently used coping strategy. By some estimates, as many as 95% of low-to-moderate income households lend to or borrow from friends and family over the course of a year (Morduch and Schneider 2015), and households without sufficient savings are as likely to rely on kin and extended networks in an emergency as to use alternative or bank credit (Lusardi, Schneider, and Tufano 2011).

As a result, a sizable group of unbanked and other liquidity-constrained individuals who rely neither on alternative nor on formal banking services are “invisible” in policy debates (Lusardi et al. 2011). This omission matters because, like alternative finance, reliance on informal borrowing incurs significant long-run costs, including the effects of limited credit histories and lack of access to secure savings instruments (Barr, 2004). Informal borrowing may also incur costs at the level of the family or community. The sociology literature points to restrictions on social mobility within neighborhoods or kinship networks as a result of reciprocal support expectations similar to those that often accompany informal borrowing and lending (Bond and Townsend 1996; Domínguez and Watkins 2003).

Moreover, evidence suggests that informal credit use is characterized by both racial and gender gaps. Informal borrowing has been most commonly documented within immigrant communities and communities of color (Bond and Townsend 1996; Morduch and Schneider 2015; Stack 1974), and women and female-headed households are more likely to use network resources to cope with

⁵Some work on financial inclusion refers to any use of non-bank transaction or credit services—including alternative financial services—as “informal finance” (e.g., Stanley and Bhattachara 2008). In this paper, “informal borrowing” will be used to refer exclusively to borrowing from friends and family as in Bond and Townsend (1996), Chase, Gjertson, and Collins (2011), and Lee and Persson (2016).

economic shocks, especially when “disconnected” from formal support systems such as cash assistance programs (Domínguez and Watkins 2003; Edin and Lein 1997; Hogan, Hao, and Parish 1990; Seefeldt and Sandstrom 2015; Semuels 2015). These gaps represent important forms of inequality in access to financial services and may reproduce existing economic inequality, such as low levels of wealth accumulation among women and Black and Hispanic households (Darity Jr., et al. 2018; Schmidt and Sevak 2006).

This paper contributes to a growing body of work that attempts to paint a clearer picture of low-to-moderate income households’ financial strategies and their relationship to financial exclusion (Lusardi et al. 2011; Morduch and Schneider 2015; Rhine et al. 2006). I pool data from four recent waves of the Federal Reserve’s Survey of Household Economics and Decisionmaking, which elicits information on households’ financial situation and on the coping strategies that they would use to deal with an unexpected emergency expense, including formal credit products, alternative credit, non-loan options, and informal borrowing. Using this data, I investigate which households are most likely to use informal borrowing in the case of an emergency expenditure 1) as their sole *substitute* for other coping strategies and 2) as a *complement* to other coping strategies. Households that rely solely on informal borrowing may do so because they have few other low-cost coping strategies available, such as savings or traditional bank credit. At the same time, if friends and family have funds to lend, informal borrowing is often a preferable alternative to high-cost strategies such as selling assets or using a payday loan.

I also examine whether unbanked households are more likely to use informal borrowing as a coping strategy, both as a direct result of being unbanked and as a result of latent constraints, perceptions, or neighborhood characteristics that influence both outcomes. I follow Rhine et al. (2006) and Stanley and Bhattachara (2008) in modeling the household decision to use informal borrowing and its bank account ownership status as jointly determined using a recursive bivariate probit analysis. If use of informal borrowing is directly or latently linked to unbanked status, then informal borrowers represent a group of unbanked households that are underexamined in the

current work on financial inclusion yet that incur many of the same long-run costs as households that rely on alternative finance, in addition to possible effects at the community level.

The results suggest that households that make use of informal borrowing with or without other coping strategies are younger, are more likely to be single, have lower levels of education, and have lower household income on average. These factors as well as not being a homeowner and having high income volatility are predictive of being unbanked. Black and Hispanic respondents are disproportionately likely to be unbanked even after controlling for observable characteristics. Exclusive reliance on informal borrowing to cope with an emergency expenditure is more strongly correlated with certain measures of economic disadvantage (e.g., low levels of educational attainment) than use of informal borrowing in combination with other strategies.

My analysis also brings attention to the unbanked and informal borrowers at intersections of identity that have been previously underexamined in order to understand how financial exclusion may reflect and reproduce structural inequality. Black women and other Non-Hispanic, Non-White women specifically are most likely to plan on using informal borrowing as their primary emergency expenditure coping strategy. Specifically, Black women are about twice as likely to rely on informal borrowing exclusively, compared to White respondents, and they are more than three times more likely to jointly be unbanked and rely on informal borrowing than White respondents. These gaps primarily exist among lower income households, and there is suggestive evidence that women of color in higher income groups are disproportionately likely to be unbanked.

Interestingly, unbanked households are no more likely to rely solely on informal borrowing than banked households, *ceteris paribus*. In fact, the majority of individuals who would solely use informal borrowing in the case of a \$400 expense have a savings or checking account. This result suggests that there is a large and unrecognized group of the “underbanked” among informal borrowers, a finding that challenges the conventional understanding of the underbanked as those who use high-cost alternative finance despite having bank accounts. Unbanked households are more likely to use informal borrowing as a complement to other coping strategies than banked house-

holds, possibly because households with fewer mainstream financial resources such as savings and bank credit are more likely to bundle strategies of any kind.

By contrast, I find statistically significant latent correlation between sole use of informal borrowing and unbanked status. This correlation points to the presence of unobserved variation in constraints or preferences that make households more likely both to rely on informal borrowing and to be unbanked. This latent correlation is primarily accounted for by Black respondents in the survey and by lower income households. Importantly, accounting for discouragement (a respondent's belief that she would be rejected for bank credit if she were to apply) as a proxy for a respondent's subjective view of banks does not explain this latent correlation. After considering alternative explanations such as variation in financial literacy, I argue that this latent variation may reflect lower social costs of or greater access to network resources in low-income communities, which at the same time have more limited access to bank branches.

The paper proceeds as follows. I begin by presenting a brief overview of the theory and qualitative evidence on financial exclusion and informal borrowing from economics and sociology. I then introduce the dataset, describe the empirical strategy, and present summary statistics that are suggestive of gender and racial gaps in informal borrowing use. Regression results, robustness checks, and discussion follow. I conclude by considering the implications of the results for research and policy.

2.2 Background and literature review

2.2.1 Financial exclusion and alternative financial services

The literature on financial exclusion conventionally identifies three groups of households. The “unbanked” consist of households that have neither a checking nor a savings account at a formal financial institution such as a bank, thrift, or credit union—generally referred to using “bank” as an umbrella term (FDIC 2009). The “underbanked” may have a checking and/or savings account but continue to make use of alternative financial services such as check cashing services, payday lenders, and title lenders (high-cost lending that uses the borrower's vehicle title as collateral). The

remaining households are considered “fully banked”: They have a checking or savings account and do not use alternative financial services.

The exact proportion of American households that are unbanked and underbanked varies greatly by demographic and socioeconomic group. Recent estimates suggest that about 7% of households are unbanked and another 20% are underbanked, but the proportion of unbanked households ranges from only 3% of White household to 18% of Black households (FDIC 2015). Younger households are also disproportionately likely to be unbanked (FDIC 2015). These figures have fallen since the 1990s and early 2000s, when as many as 9% of households were unbanked (Rhine et al. 2006). Legislative actions that sought to reduce the number of unbanked and underbanked households may have contributed to this decline. The Electronic Funds Transfer provision of the 1996 Debt Collection Improvement Act required most federal government payments to occur electronically and thereby encouraged participation in the financial mainstream (Prescott and Tatar 1999). Similarly, the Community Reinvestment Act provided incentives for banks to lend in low-income communities that had previously been regarded as unprofitable customer bases (Kroszner 2008).

Since the 2008 Financial Crisis, the discourse around financial inclusion in the U.S. has shifted. The central role played by mainstream banks and financial institutions in subprime lending, questionable underwriting practices, and opaque fee structures have all raised questions about the value of bank services to low-to-moderate income households (Baradaran 2015; Rexrode and Grossman 2014). Waning confidence in banks may have contributed to a temporary decline in account ownership following the 2008 Financial Crisis that was only partly explained by the effects of the Financial Crisis on household incomes and employment (FDIC 2015; Servon 2017). A growing body of recent work thus calls for changes to bank practices (e.g., Baradaran 2015; Dymski, Hernandez, and Mohanty 2013; Morduch and Schneider 2015), and some see alternative financial services as the lesser of two evils (Servon 2017).

Surveys suggest that households which *choose* to operate without bank accounts generally do so in order to minimize short-run costs. Although the costs per transaction for check cashing and money orders are typically higher than the costs for the same services at a bank, consumers who

face a high probability of overdrafts and who risk falling below minimum account balance requirements may prefer these predictable fixed costs (Morduch and Schneider 2015; Servon 2017). As a result, households with low or volatile incomes are the most unlikely to hold bank accounts (Carr and Schuetz 2001; FDIC 2015; Servon 2017; Stanley and Bhattachara 2008). Non-pecuniary costs and distrust of conventional financial service providers also discourage account ownership. Nearly 11% of respondents in a 2015 FDIC survey responded that they are unbanked primarily because they “don’t trust banks” and another 3.4% cited privacy concerns. The same report suggests that a disproportionate number of unbanked households feel that banks are not “interested in serving households like theirs” (FDIC 2015, 3).

Other households face constraints that make it difficult or impossible to be banked. Households with accounts previously closed for reasons such as insufficient funds may simply be prevented from opening accounts (Barr 2004), and the paucity of branches in low-income areas is well-documented (Avery et al. 1997; Baradaran 2015). Bank closures after the 2008 Financial Crisis may have contributed to growth in the number of unbanked households (Morgan 2016). Despite the growing use of online banking services, about 28% of bank account owners continue to access their accounts primarily by visiting a bank branch (FDIC 2015).

Unbanked households and households with poor credit histories or low incomes have limited access to bank services. Alternative financial services provide non-bank substitutes, generally at higher prices than the equivalent bank services. Unbanked and underbanked households are more likely to use alternative financial services, although the relationship varies by the type of service (Barr 2004; Morgan-Cross and Klawitter 2011; Rhine et al. 2006; Stanley and Bhattachara 2008). Alternative financial transaction services are those that facilitate payments and receipts, including check cashing and money order services (Morgan-Cross and Klawitter 2011). As many as 45% of unbanked households that receive income via check or money order make use of non-bank institutions such as check cashers to cash checks, and 35% of unbanked households use money orders to pay bills (FDIC 2015). Alternative credit services provide high-cost, short-term credit. These services include payday lenders as well as pawnshops and title lenders, and their use is

much more common among unbanked and underbanked households. About 32% of underbanked households use credit that is made up exclusively of non-bank credit or a mix of bank and non-bank credit (FDIC 2015). Unbanked households cannot make use of certain alternative credit services that require a bank account (e.g., payday loans). Despite this restriction, the use of other forms of alternative credit remains high among the unbanked. About 16% of unbanked households (about 67% of all unbanked households with some credit) hold exclusively non-bank credit compared to 14.4% of the underbanked (20% of all underbanked households with credit) (FDIC 2015).

The evidence on the total costs of alternative financial services is mixed. By some estimates, alternative credit and transaction services together cost households hundreds of dollars per year for services that are often offered for free to bank account holders. Some work suggests that check cashing and bill-paying fees alone can cost \$250 to \$500 per year, and the APR for alternative credit can exceed 400% (Barr 2004; Carr and Schuetz 2001; Snarr Jr. 2002). The overall costs of alternative financial services have been estimated at up to \$15,000 over a lifetime (Stanley and Bhattachara 2008). Others suggest that the costs of alternative financial transaction services are much lower than generally believed. Using data from a survey of low-to-moderate income neighborhoods in two urban areas, Dunham (2001) reports that only 17% of unbanked households spent more than \$100 per year for check cashing and money order services. The relative costs of alternative financial transaction services may be falling as the supply of these services have increased and as conventional bank fees have continued to grow (Servon 2017).

Notwithstanding the debate over the financial costs of alternative financial services, concerns remain that the unbanked and underbanked may face additional costs. Most importantly, those who rely on non-bank credit have no opportunity to develop a credit history (Barr 2004; Stanley and Bhattachara 2008). Using credit cards to regularly pay for purchases allows consumers to develop a credit history, while paying rent or utility bills on time is not reported in credit scores. Even if customers can meet their short-term credit needs through alternative sources of credit, long-run credit for large investments such as homes generally requires a bank loan and a robust credit score, and credit scores are often used in employment and leasing decisions.

2.2.2 Informal borrowing

In the literature on financial inclusion, informal borrowing—or borrowing from friends or family—occupies an unusual space. It is frequently mentioned as a coping mechanism in the case of an emergency expenditure, alongside other alternatives such as savings, bank borrowing, and alternative credit services. Yet informal borrowing is rarely subject to systematic empirical analysis in the same way as these other options. For instance, in the 2015 *FDIC National Survey of Unbanked and Underbanked Households*, the analysis of household credit use includes data on “bank credit” and “non-bank credit” but excludes informal borrowing.

Informal borrowing is a broadly defined, fluid, and highly heterogeneous financial tool, which may help explain its omission from empirical analysis. Most applied uses of the term include both friends and family as possible lenders, although empirics suggest that the latter is much more common overall (Lusardi et al. 2011). Informal borrowing can be unstructured, with little in the way of credit terms. Informal loans often have no set date of repayment and no interest fees, blurring the line between lending and gift giving (Morduch and Schneider 2015). On the other hand, more structured informal borrowing systems exist. The most prominent in the U.S. are rotating savings and credit associations (ROSCAs), in which a group of participants contributes periodically to a pool of funds and each person take turns borrowing from it (Leyshon and Thrift 1996). Expectations of repayment are strict and enforced through social proximity (Besley, Coate, and Loury 1993; Morduch and Schneider 2015; Mushinski 1999).

Despite the multiplicity of forms which informal borrowing may take, its prevalence as a tool for short-run borrowing is one reason that it deserves close attention alongside others like alternative financial services. In fact, survey data suggest that informal borrowing of all types is quite common, particularly in certain communities. One survey of low-to-moderate income households finds that 9% of respondents participated in a ROSCA, primarily migrant households, and a remarkable 95% of respondents reported engaging in informal borrowing, lending, or both over the past year (Morduch and Schneider 2015). In an examination of household coping strategies when faced with a \$2,000 emergency expense, Lusardi et al. (2011) find that a third of respondents who

say they could cope with the expense would do so by borrowing from friends or family, making it the second most widely cited coping mechanism after drawing on savings. Such borrowing is also common among those who would rely on a combination of strategies (e.g., savings plus informal borrowing).

An important pre-condition for adopting informal borrowing as a coping strategy is the existence of a network through which funds are available. These networks have received formal attention primarily in the sociology literature, where they are broadly termed “survival networks” (Domínguez and Watkins 2003) or “private safety nets” (Seefeldt and Sandstrom 2015). In addition to borrowed (or gifted) funds, survival networks provide other forms of social support, such as childcare services and access to information or job opportunities (Domínguez and Watkins 2003; Edin and Lein 1997). Larger networks mean that more resources are available for sharing (Högnäs 2010), and the strength of kinship ties can also be a determining factor of the existence of support networks (Sarkisian and Gerstel 2004). Social networks sometimes extend to geographically extensive spaces through kinship networks, but most of the literature has associated them with dense, urban communities. One notable exception is Nelson (2000), who finds qualitative evidence of reliance on extensive social networks among low-income women in rural Vermont.

Consistent with the fluid terms of informal borrowing discussed above, survival networks are characterized by what Högnäs (2010) terms “generalized exchange” rather than dollar-for-dollar or strictly in-kind repayment expectations. Givers and receivers tend to share an understanding that some form of support will be rendered in the future in return for the loan or service provided—i.e., when the current giver is in need. The social proximity of lenders and borrowers in these networks enables the screening of potential recipients and the enforcement of reciprocity (Högnäs 2010).

Conditional on funds being available from friends or family, theory and empirics point to several reasons why households might turn to informal borrowing rather than or in addition to other borrowing methods. First, informal borrowing has lower financial costs than both alternative and bank credit—even zero in some cases. As a result, banked households that have access to bank credit may turn to informal borrowing, similar to “underbanked” households that use alternative

financial services. Many borrowers turn to friends and family even when they have not exhausted credit cards and other credit products (Morduch and Schneider 2015). On the other hand, borrowers may lack access to bank credit because they are unbanked, have used all available bank credit, or are discouraged from applying for additional credit, believing that they will be rejected. Reliance on informal borrowing is associated with various measures of “economic disadvantage,” including low wealth accumulation, unemployment, and low educational attainment (Lusardi et al. 2011), factors that are also linked to unbanked status (FDIC 2015; Rhine et al. 2006). One long-acknowledged strength of informal borrowing, especially in the development literature, has been its ability to deal with asymmetric information (Kotlikoff and Spivak 1981; Lee and Persson 2016). Households that are poor credit risks on paper may in fact be creditworthy based on behaviors observed only by friends and family. Informal lenders can also leverage the effects of social proximity and pressure to ensure repayment, as has been widely recognized in the development literature on microcredit (Besley, Coate, and Louny 1993).

Despite the advantages, informal borrowing is not typically costless. Like borrowers who rely on alternative finance, those who rely exclusively on informal borrowing have few opportunities to develop or improve their credit history. Moreover, informal borrowing may create network effects that reproduce poverty within low-to-moderate income neighborhoods. The sociology literature has debated whether the short-run support provided by survival networks outweighs potential harm (e.g., see Domínguez and Watkins 2003; Freeman and Dodson 2014). Engaging in informal borrowing creates reciprocal expectations of support that later put strain on the same households that benefited from network funds (Högnäs 2010). Chiteji and Hamilton (2002) document these tangible economic costs of financial assistance within kinship networks. They find that part of the persistent wealth gap between Black and White individuals in the U.S. can be explained by differences in the provisioning of financial support to lower income family members by race and ethnicity.

Interviews have suggested that psychological costs can also accompany the lack of privacy that comes with asking friends or family for borrowed funds, compared with the more impersonal

process of applying for bank credit. Nelson (2000) describes subjects in her study as experiencing self-reported “shame and humiliation” in the course of making use of support systems (313). In the context of small business borrowing, Lee and Persson (2016) argue that informal financial arrangements are less common than their low financial costs would lead one to expect partly due to the uncomfortable social proximity of lenders. Business owners who borrow from friends or family are more risk averse and have greater fear of failure due to the heightened emotional and relational costs of failure.

Finally, there are limits to the availability of informal borrowing. Much as alternative credit services cater mostly to short-run rather than long-run credit needs, friends and family are more often able to provide small loans, not the larger loans needed to invest in, for example, a home, car, or other large expense. The Morduch and Schneider (2015) study of low-to-moderate income households finds that the median household in most of their survey areas borrowed about \$1,500 a year from family and friends, a finding supported by other case studies (Bond and Townsend 1996).

2.2.3 Race, gender, and financial informality

With few exceptions (e.g., Bond and Townsend 1996; Lusardi et al. 2011), the economics literature provides scant evidence on how reliance on informal borrowing varies by race and gender in the United States. By contrast, research has repeatedly shown that race and ethnicity are relevant predictors of other indicators of financial exclusion even after controlling for other relevant characteristics such as socioeconomic status. Black and Hispanic households are more likely to be unbanked (Dunham 2001; FDIC 2015; Rhine et al. 2006) and to use alternative financial services with or without a bank account (Carr and Schuetz 2001; Morgan-Cross and Klawitter 2011). Low banked rates in communities of color may result from limited access to bank branches, expectations of discrimination, and documentation concerns (e.g., Rhine et al. 2006; Stanley and Bhattachara 2008). To the extent that financial inclusion is beneficial to financial security, these

trends by race and ethnicity may help explain pervasive economic inequality by race, such as low wealth accumulation among Black households (Darity Jr., et al. 2018).

Less attention has been paid to gender in the existing literature on financial exclusion, and the work that does exist has generally found few differences in outcomes. Most evidence suggests that women are no more likely than men to be unbanked or use alternative financial services (Klawitter and Fletschner 2011; Rhine et al. 2006), although Klawitter and Fletschner (2011) find some heterogeneity in the determinants of unbanked status by gender within households. The paucity of gender differences in financial inclusion is somewhat unexpected: Women have significantly higher poverty rates and lower levels of wealth accumulation than men (Schmidt and Sevak 2006; Stevens 2011), and their greater responsibilities for care may increase the transaction costs (e.g., time) associated with accessing a local bank branch (Turner and Grieco 1998).

However, many studies do not consider inequality in access to financial services at the intersection of race and gender, and the sociology literature gives good reason to believe that intersectional inequalities may be particularly prevalent among those who rely on informal borrowing as an alternative to bank credit. Lusardi et al. (2011) find that women are more likely to use friends and family as a coping strategy, no more likely to rely on alternative finance, and less likely to sell belongings. It is not clear whether these results hold for both White women and women of color. Social networks have repeatedly been found to be an important resource in low-income communities and particularly for women in these communities, possibly serving to facilitate their use of informal borrowing. In a seminal ethnographic study on the topic, Stack (1974) argues that low-income African-American families are more likely to rely on a support system in which norms of reciprocity provide insurance against income shocks. Edin and Lein (1997) examine the coping strategies of single mothers in the context of 1996 TANF welfare reform. They find that these female-headed households would cope with low income flows and shrinking welfare benefits in part by seeking out assistance from friends and family.

Sarkisian and Gerstel (2004) investigate differences in network support among Black and White men and women, while critiquing both sides of what they term the “superorganization vs

disorganization” debate regarding Black family structure. They note that researchers have tended to argue either that extensive kinship networks are particularly robust and important support systems for Black families or that these networks are weak and ineffective. These extremes either “romanticize or pathologize” Black families and paint an exceedingly homogeneous picture of Black family ties (815). Empirical work by Sarkisian and Gerstel (2004) points to a more complicated story in which Black family ties are more conducive to certain forms of non-monetary support (e.g., child care) than White families but less conducive to monetary or emotional support. Equally importantly, the authors find that gender differences are significant both within and across race, with Black women being more likely to provide child care, transportation, and household work support than White women.

Independent of differences in use of network resources by race and gender, existing structural inequalities may push women of color into non-bank alternatives of which informal borrowing is one option. It has been widely documented that women and single women specifically experience greater financial insecurity. They are more likely to report difficulties coping with an unexpected expenditure (Lusardi et al. 2011), have lower wealth accumulation and savings (Schmidt and Sevak 2006), higher rates of poverty (Pressman 2003; Stevens 2011), and greater exposure to expenditure shocks such as caregiving responsibilities (Bahn and Weller 2017). These factors together suggest that women are more likely to experience an unexpected expenditure and to rely on coping strategies beyond savings.

2.3 Data and methods

2.3.1 Survey of Household Economics and Decisionmaking

In this analysis, I pool data from the 2013, 2015, 2016, and 2017 Surveys of Household Economics and Decisionmaking (SHED) conducted by the Federal Reserve.⁶ The survey includes less detailed financial information about households than the longer-running and more widely used Sur-

⁶The 2014 survey omits a key control variable of interest (income volatility) and is subsequently omitted from the analysis.

vey of Consumer Finances (SCF). However, the SHED offers significant advantages over the SCF for the research questions of interest due to its novel sampling design and survey questions that elicit information about respondents' household head status as well as credit use and borrowing decisions.

The 2013 SHED sampling design produced a nationally representative sample with weights to provide correction for non-response bias. Subsequent survey waves were not nationally representative due to purposeful oversampling and the rotating panel design. Each new sample included 1) a fresh random sample of respondents, 2) a re-interview sample, and 3) a "lower income oversample" (consisting of households with annual household income of less than or equal to \$40,000). There is no overlap between the oversample in one year and the re-interview group in the next year. The lower income oversample makes the SHED a valuable dataset for understanding a broader range of financial decision-making in comparison to the SCF, which oversamples higher income households. Sample weights are applied in all regressions and analyses using Stata 14's *Svy* module in order to account for the SHED's rotating panel structure and oversampling.⁷

The SHED questionnaire also provides more information on gender variation in credit use than previous surveys. The ability to make gender inferences is limited in most household finance surveys. For instance, the SCF defines the household head using fixed rules based on household structure, gender, and (in the case of same-sex couples) age. For households with two cohabiting or married opposite-sex adults, the household head is defined as the male by default. At the same time, all data on borrowing outcomes are defined at the household level in the SCF, so gender can only be meaningfully related to outcomes for single-headed households.

The SHED therefore differs from the SCF in two important ways. First, respondents are not necessarily household head. This introduces potential variation in the relationship between respondent demographics and household financial choices. Second, the definition of household head is left completely open to respondents. As a result of these two characteristics of the survey, the un-

⁷I do not explicitly use clustered standard errors in the analysis. Instead, the effect of repeated observations of the same sampling unit (households that appear multiple times in the rotating panel) is accounted for with the Stata 14 *Svyset* command. The "Case ID" of each individual is used to specify the primary sampling unit.

weighted sample pooled across all four survey years is approximately 50% female. Women are less likely to report being married or cohabiting than male respondents (56.5% compared to 64.6%) and among this group, 87.3% of women consider themselves “household head,” compared to 92.4% of men. Surprisingly, there is greater variation in household head status among respondents who report being *neither* married nor cohabiting (i.e., widowed, divorced, separated, or never married). More than a quarter of these respondents do not consider themselves head of household (27.1% of men and 23.6% of women).

The question of how respondents interpret the term “household head” is an important one that may be relevant to the meaning of the regression results. Given that respondents are asked to complete a survey on household finances, respondents may assume that household head status implies self-perceived responsibility for financial decision-making. The 2013 SHED Survey includes questions eliciting the respondent’s self-reported responsibility for financial decision-making in two specific areas: “paying monthly bills” and “managing the household’s savings and investments.” As shown in Table 2.1, household head status appears to be related to financial decision-making responsibility, although there is some asymmetry in the effects. Household heads are generally much more likely to report having “all or almost all” the financial responsibility, while non-heads are more likely to report that these responsibilities are “shared equally” or that they have “none or almost none” of the responsibility. Single, widowed, or separated respondents show the clearest distinctions in financial responsibility by household head status.

As a result of the substantial variation in household head status across household structures, I include both dual- and single-headed households in the main analytical sample, allowing for male and female household heads in each category. The literature surveyed above suggests that gender variation may be more meaningful in the context of single-headed households, but I do not impose this restriction. However, as a robustness check, I consider specifications that restrict the sample to respondents who consider themselves head, regardless of household structure or marital status.

2.3.2 Variables of interest

In each survey year, the SHED includes a question that elicits respondents' plans for coping with a hypothetical emergency expense. Respondents are asked the following and provided with the following non-exclusive options:

Suppose that you have an emergency expense that costs \$400. *Based on your current financial situation*, how would you pay for this expense? If you would use more than one method to cover this expense, please select all that apply.

1. Put it on my credit card and pay it off in full at the next statement
2. Put it on my credit card and pay it off over time
3. With the money currently in my checking/savings account or with cash
4. Using money from a bank loan or line of credit
5. By borrowing from a friend or family member
6. Using a payday loan, deposit advance, or overdraft
7. By selling something
8. I wouldn't be able to pay for the expense right now
9. Other⁸

I aggregate and label these options as follows:

- Options 1, 2, 4: Respondent would use a bank credit product.
- Option 3: Respondent would use savings.
- Option 5: Respondent would rely on informal borrowing.

⁸The freeform comments entered by respondents who selected this option is not available in the public version of the SHED dataset. While it is not clear what respondents mean when they select "other," one notable omission that is included as an option in other empirical papers is "working additional hours" (Lusardi et al. 2011).

- Option 6: Respondent would use an alternative credit product.⁹
- Option 7: Respondent would sell an asset or possession.
- Option 8: Respondent would be unable to cover this income shortfall.
- Option 9: Respondent would use any other coping strategy.

About 15% of the full sample selects Option 8: They would be unable to pay for the emergency expenditure. This proportion is greater among Black respondents (28.7%), Hispanic respondents (19.2%), and the lowest-income households (44.7% of households earning less than \$15,000 per year). Option 8 should imply a negative response to all other options, but many respondents who report that they would be unable to cover the expense do select other options. The fewest (about 2% of all “unable” respondents) indicate that they would take out a bank loan, while the largest portion (18%) would use informal borrowing. Respondents who are unable to cope with a shock presumably face constraints such that they cannot choose between coping mechanisms, and theory does not provide a clear indication of how to interpret contradictory responses. As a result, I omit all respondents who selected Option 8 from the final analysis.¹⁰ I test a specification in Section 2.5.1 which includes respondents who would be unable to cover this income shortfall as a robustness check.

Each survey year also includes information on the banked status of the respondent’s household. The SHED asks respondents whether the household (“you and/or your spouse/partner”) currently has a checking, savings, or money market account. Although money market accounts are not typically considered in the determination of banked status, it is unlikely that a household would lack a checking or savings account but hold a money market account. I consider all households that indicate that they do not have a checking, savings, or money market account to be “unbanked.”

⁹Option 6 conflates strategies that are traditionally termed alternative credit products (payday loans and deposit advances) with strategies that would fall under the definition of a bank service (overdraft). Despite this aggregation, I label the option “alternative credit products” to the extent that the options included are all high-cost relative to formal credit products.

¹⁰I also designate respondents who responded negatively to all of the available options as being unable to cope with the emergency expenditure.

2.3.3 The “pecking order” of household coping strategies

In the context of mutually non-exclusive choices, it is important to distinguish between respondents who indicate that they would rely *exclusively* on a single strategy to deal with a \$400 emergency expenditure and respondents who indicate that they would use this strategy *in combination* with one or more others. As discussed in Lusardi et al. (2011), households that choose one coping strategy when faced with an expenditure shock differ in systematic ways from those who choose several. Choosing one strategy can be associated with financial security. For instance, households can choose to simply spend out of savings if they have sufficient savings on hand, while more financially insecure households may have to use a bundle of alternative strategies to cope with a single shock (Lusardi et al. 2011). On the other hand, using one strategy alone can also be symptomatic of constraints, as in a liquidity-constrained household who can only sell assets in the case of a shock.

Lusardi et al. (2011) find evidence of a “pecking order” of choices that reflects the influence of constraints, costs, and benefits on households’ financial choices. When households are asked how they would cope with an unexpected expense of \$2,000 to be paid within 30 days, savings appear to be the preferred option. While the survey does not elicit rankings, the authors note that “savings is the most commonly used coping method overall, it is the coping method most commonly used in isolation, it is associated with greater certainty in being able to cope, and it is associated with greater economic and demographic advantage and stability” (18). The second-most common coping strategy is bank credit for certain households and informal borrowing for others. The authors conclude that some households find bank credit to be costlier or less readily accessible than informal borrowing (e.g., financial costs, credit rationing, etc.), while others consider informal borrowing more costly or difficult to obtain than bank credit (e.g., stigma or lack of social networks). Other strategies such as selling possessions or alternative borrowing are much less common, tend to be used by economically disadvantaged households, and are infrequently used as the sole coping strategy. Respondents who use bundles of strategies more generally are less likely to express confidence in their ability to cope with the emergency expenditure.

The lessons from this empirical work can be applied to informal borrowing in the current analysis. Respondents who rely exclusively on informal borrowing likely differ in their financial constraints and opportunities from those who use informal borrowing as just one strategy in a bundle of strategies. On one hand, households that are liquidity-constrained and/or unbanked will have limited options for coping with expenditure shocks. If formal credit and savings are ideal but unavailable, informal borrowing may be preferable to relatively high-cost options such as alternative credit or selling an asset. This reliance on networks as the only feasible, lowest-cost option is reminiscent of the literature on single mothers who are “disconnected” from both work and TANF benefits and rely on social networks for resources (Edin and Lein 1997; Loprest and Nichols 2011; Seefeldt and Sandstrom 2015). Yet this use of networks is conditional on friends and family having funds to lend and being willing to do so. From a policy perspective, respondents who rely on informal borrowing are most likely to experience the long-run costs associated with informal borrowing, such as fewer opportunities to develop a credit history. It is also more likely to be a response to financial exclusion in light of the pecking order described above: If savings were available, households would seemingly avail themselves of those savings rather than entail the social costs of borrowing from friends and family.

Bundles that include informal borrowing alongside other strategies are more difficult to place in the pecking order. Taking the Lusardi et al. (2011) pecking order as given, these bundles may indicate a variety of situations. If informal borrowing is used together with savings, the household is presumably able to use savings to cover only part of the expense and would need to supplement that strategy with informal borrowing. If informal borrowing is bundled with a strategy such as bank credit, the household may face a binding constraint for either bank credit or informal borrowing. It is not clear *a priori* that all households would prefer bank credit to informal borrowing. The implications for household financial wellbeing of using informal borrowing as a complement to other strategies are therefore somewhat ambiguous. When bundled with certain strategies (e.g., bank credit), informal borrowing may not indicate financial exclusion or long-run costs. If bundled

with high-cost options, informal borrowing is more likely to be related to financial exclusion and the long-run costs that accompany it.

Following Lusardi et al. (2011), Table 2.2 presents the proportion of respondents who selected each coping strategy by the number of total strategies adopted, conditional on being able to cope with the emergency expense. The use of bank credit and savings are the most widely adopted strategies for dealing with the emergency expense (57.9% and 52.6%, respectively). Informal borrowing follows, being used by 10.8% of respondents. Among households that report only one coping strategy, bank credit remains the preferred option, followed by savings and informal borrowing. Options such as selling assets or using high-cost forms of bank and non-bank credit are rarely used except among those who would use the greatest number of different strategies. Informal borrowing also becomes a more common strategy among households that select two or more options. These findings are reminiscent of the pecking order of Lusardi et al. (2011), but the use of savings is not as clearly favored as it is in their results. Informal borrowing is also less prevalent than in their analysis, where they found that nearly one-third of respondents would use informal borrowing. One reason for this difference may be the size of the emergency expense (\$400 in the SHED questionnaire compared to \$2,000 in Lusardi et al.). With a relatively small expense, the fixed costs of approaching friends or family for a loan may outweigh the financing costs of borrowing on a credit card.

These overall results conceal substantial heterogeneity by race and ethnicity. Bank credit is preferred over savings among White respondents, and almost 50% of respondents select at least one of these two options. By contrast, Black and Hispanic respondents are much more likely to use alternative strategies, and bank credit and savings are used by only 35% to 45% of respondents. Nearly 20% of Black respondents and 17% of Hispanic respondents would use informal borrowing, and this figure is nearly unchanged or increases when focusing on those respondents who would only use informal borrowing (compared to 8.2% of White respondents).

One particularly striking result is that Black respondents are the only group that is more likely to use savings than bank credit. Only 46.0% of all Black respondents and 35.4% of those who

would use one strategy report that bank credit would be (one of) their chosen strategies, lower than both White households and Hispanic households. This gap is surprising in light of the extensive literature documenting lower average wealth among Black households, regardless of income or education (Darity Jr., et al. 2018; Weller and Hanks 2018). These data suggest that Black respondents in the sample are subject to greater constraints or perceived costs of formal borrowing that lead them to prefer other coping strategies, such as informal borrowing.

Selected coping strategies are then cross-tabulated by bank account ownership. Much of the aforementioned variation by race and ethnicity appears to be driven by the banked rather than the unbanked. Informal borrowing rates are greater among banked Black and Hispanic respondents than banked White respondents, but this gap narrows among unbanked respondents. About 34.7% of this group would use informal borrowing, making this the most common coping strategy for the unbanked. Alternative borrowing (including overdrafts) would only be used by 4.6% of the unbanked, and 25.2% would sell an asset.

These summary statistics are suggestive of several important trends in informal borrowing use that will be explored in more detail below. First, informal borrowing is a quantitatively important coping strategy for the unbanked and for those without sufficient savings to deal with the expenditure shock. This provides evidence in support of the notion that financial inclusion policies focusing on alternative finance miss a large portion of the unbanked. Second, informal borrowing is also very prevalent—even as the *sole* coping strategy—among banked Black and Hispanic respondents. In particular, almost one in ten Black or Hispanic respondents would prefer informal borrowing over all other options as their primary coping strategy, and about 18% of banked Black and Hispanic respondents would use informal borrowing either alone or in a bundle with other strategies. The prevalence of informal borrowing among banked Black and Hispanic respondents points to an “underbanked” community relying primarily on informal credit arrangements. For these households, informal borrowing appears to rank higher in the pecking order of options or to be more readily available than bank credit or savings. This finding is consistent with high perceived costs of formality, credit constraints, and/or low non-pecuniary costs associated with accessing network

resources. This is in contrast to White respondents, for whom the link between financial exclusion and informal borrowing use—exclusively or in combination with other strategies—is stronger.

Finally, women of color are disproportionately represented among those who use informal borrowing, particularly when they fall outside of the financial mainstream, as shown in Figure 2.1. There is no evidence of gender gaps in informal borrowing use among most banked respondents, with the exception of Black respondents and other Non-Hispanic respondents. Black women who report that their household has a bank account are about twice as likely as Black men and more than twice as likely as White respondents to choose informal borrowing as their primary coping strategy. Unbanked status is associated with significant jumps in the use of informal borrowing as a primary coping strategy, particularly for Non-White and Hispanic women. As many as one quarter of Hispanic, unbanked women report informal borrowing as their only coping strategy in the case of an emergency expense. There is less evidence of a consistent gender gap among unbanked respondents regarding informal borrowing as a complement to other coping strategies. As noted in the sociology and economics literature, unbanked women may have more access to social support networks than men while also being less likely to have access to other coping strategies such as savings or bank credit.

2.3.4 Empirical strategy

To formally test the relationship between being unbanked and informal borrowing, I develop a model informed by consumer choice theory in which each decision—to own a bank account and to use informal borrowing—can be seen as an observed discrete choice resulting from a latent decision-making process.¹¹ For example,

¹¹Importantly, framing unbanked status as a “decision” risks suggesting that external constraints such as a paucity of local bank branches are not relevant to this outcome. The model acknowledges the important role of household agency in selecting between making use of banking services, but it does not eliminate the possibility that some households may face binding and potentially unobserved constraints, as discussed in more detail below.

$$InfBorrow^j = \begin{cases} 1 & \text{if } InfBorrow^{*j} > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$\forall j \in exc, comb$$

where $InfBorrow^{*exc}$ (or $InfBorrow^{*comb}$) is the net perceived benefit to the respondent of using informal borrowing exclusively (or in combination with other options). $InfBorrow^{exc} = 1$ (or $InfBorrow^{comb} = 1$) if the respondent plans to use informal borrowing exclusively (or in combination with other options), and $InfBorrow^j = 0$ otherwise. Let $Unbanked^*$ analogously represent the net perceived benefit of being unbanked, $Unbanked = 1$ the outcome of being unbanked, and $Unbanked = 0$ the outcome of being banked. If constraints on bank access (and/or informal borrowing use) are binding, I assume that this also results in observing $Unbanked = 1$ (and/or $InfBorrow^j = 0$).

The two decisions can then be modeled as

$$Pr(Unbanked = 1) = \Phi(\beta'_1 \mathbf{X}_1 + \beta'_{r1} \mathbf{RaceEth} + \gamma_1 Female + \gamma'_{rg1} \mathbf{RaceEth} * Female) \quad (2.1)$$

$$Pr(InfBorrow^j = 1 | InfBorrow^{-j} = 0) = \Phi(\beta'_2 \mathbf{X}_2 + \beta'_{r2} \mathbf{RaceEth} + \gamma_2 Female + \gamma'_{rg2} \mathbf{RaceEth} * Female + \alpha Unbanked) \quad (2.2)$$

$$\begin{bmatrix} \epsilon_1 \\ \epsilon_2 \end{bmatrix} \sim \mathcal{N}_2 \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right)$$

where \mathbf{X}_i is a set of covariates, $\Phi(\cdot)$ is the CDF of the normal distribution, and ϵ_1 and ϵ_2 are the errors terms of the latent decision-making processes associated with $Unbanked$ and $InfBorrow^j$,

respectively. In the informal borrowing equation, unbanked status is allowed to have a direct effect on the probability of using informal borrowing in the case of an emergency expense. Note that for each type of informal borrowing use—exclusively or in combination with other options—the model is estimated excluding individuals who would make use of informal borrowing in the other way. For example, when estimating the probability that a respondent would exclusively use informal borrowing, all respondents who would instead use informal borrowing in combination are omitted from the estimation.

As discussed in Section 2.2, inequalities in access to and use of formal banking across race have been well-documented, and there is mixed evidence suggesting that women—particularly women of color—may be overrepresented among informal borrowers. In the specification above, **RaceEth** is a set of race and ethnicity covariates (Black, Hispanic, or other racial self-identification¹², where White is the reference category) and *Female* is the corresponding gender dummy. I also test specifications in which the model is estimated conditional on race and ethnicity, allowing for heterogeneous effects of the covariates on both outcomes of interest. These specifications are limited to White, Non-Hispanic respondents only and Black, Non-Hispanic respondents only.¹³

Following Rhine et al. (2006), I use a bivariate probit model to estimate the determinants of respondents' plans to use informal borrowing and their unbanked status while allowing for the possibility that these decisions are jointly determined.¹⁴ That is, the error terms of the two estimation equations may be jointly normally distributed with tetrachoric correlation coefficient ρ . If ρ is statistically different from zero, then estimating a bivariate probit model is more efficient than

¹²The SHED does not provide more detailed information on the “Other, Non-Hispanic” category of respondents except to distinguish between “Other, Non-Hispanic” and “2+ Races, Non-Hispanic.” I collapse these two categories.

¹³Parameter estimates and standard errors cannot be determined for Hispanic and Other Non-Hispanic respondents due to small sample size, a low proportion of unbanked and informal borrowers, and many sparse indicator variables among the fixed effects. These factors lead to multicollinearity and cause the variance-covariance matrix to be highly singular.

¹⁴As noted in Greene (2003) and Rhine et al. (2006), a recursive bivariate probit that includes an endogenous right-hand side variable can be consistently estimated using the same maximum likelihood function as the non-recursive model.

estimating two univariate probits. If not, the two equations can be estimated separately (Greene 2003).

This latent relationship ρ is in addition to the direct relationship between being unbanked and informal borrowing captured by the coefficient α in the model above.¹⁵ A positive and statistically significant estimate of α would be consistent with evidence that being unbanked leads households to have less access to bank credit. On the other hand, a positive and statistically significant estimate of ρ would capture the effect of constraints, perceptions of banks, neighborhood characteristics, or other latent factors that are associated with a greater probability of both being an informal borrower and being unbanked, independent of the respondent's actual banking status. In their study of the household's decision whether to use check cashing outlets and to hold bank accounts, Rhine et al. (2006) observe that ρ is statistically different from zero for Black and Hispanic respondents, but not for White respondents. They attribute this result to unobserved variation in the perceived relative price of banks and alternative financial services, distrust of banks due to histories of discrimination, and liquidity preferences. Stanley and Bhattachara (2008) use a similar approach to model the relationship between banking choices and the decision to send remittances in a U.S. Hispanic community and also find evidence of unobserved correlation that they attribute to similar sources as Rhine et al. (2006).

It is expected that the magnitude and direction of ρ as well as the direct effect of unbanked status may vary based on whether informal borrowing is chosen as the exclusive coping strategy or as a complement to other coping strategies. If unbanked status is associated with few opportunities to save and more limited access to bank credit, then unbanked households will determine which coping strategy or strategies to choose based on 1) the availability of alternatives and 2) the ranking of each strategy in the "pecking order" discussed in Section 2.3.3. To the extent that informal

¹⁵Importantly, the signs of ρ and α may differ. In a regular bivariate probit model, the parameter ρ is equivalent to the conditional tetrachoric correlation of the two outcome variables of interest. However, in a recursive bivariate probit, the parameter no longer has this meaning. Instead, if the model is properly specified, it allows the researcher to separate the "structural" component of the effect from the "spurious" component contained in the residuals (the effect of an omitted variable). See Filippini, Greene, Kumar, and Martinez-Cruz (2018) and Arendt and Larsen (2006) for more details.

borrowing is preferred in the short-run to other alternatives, unbanked households may be more likely to rely on informal borrowing as much as possible. However, some households may be unable to do so or may face high social costs, leading them to prefer other bundles of coping strategies. The relative costs, benefits, and availability of these bundles (with or without informal borrowing) can be difficult to identify in this analysis *a priori*. I predict unbanked status to be a positive and significant predictor of exclusive use of informal borrowing, while the relationship may be less clear regarding informal borrowing as part of a bundle of strategies.

In this dataset, novel information on consumer perceptions allows me to more directly assess which unobserved factors may influence ρ . While the SHED does not provide full information on households' perceptions of banks, it does elicit information on whether households were "discouraged borrowers" at some point in the past year. Discouraged borrowers are those who did not apply for credit on at least one occasion because they thought they were likely to be rejected credit. This indicator may be a useful proxy for unobserved factors in the model. First, it may reflect respondents' credit scores and other unobserved, objective characteristics that are relevant to credit access. It is likely that households that are discouraged from borrowing do on average face greater credit constraints, conditional on having positive credit demand. However, respondents' perceptions of their credit scores are likely far from a mirror image of their actual creditworthiness. As a result, discouragement may pick up a second source of variation in bank credit use: overall perceptions of and trust in banks. As noted previously, about 10% of households that are unbanked report distrust of banks as a primary reason for not having a bank account (FDIC 2015). Therefore, an additional specification of the model will incorporate discouragement as a covariate to determine whether it explains unobserved correlation between the outcomes.¹⁶ If it does not, then variation in

¹⁶In every year except 2013, the SHED asks two sets of questions related to discouragement. First, respondents who report having applied for credit in the last year are asked whether, at some point in that time, he/she or his/her spouse were turned down for credit, did not receive as much credit as requested, or "put off applying for credit because [he/she] thought [he/she] might be turned down." Second, respondents who report that they did not apply for credit are asked whether they had desired credit at some point in the past year. A follow-up question then identifies the subset of this group that was discouraged ("Was this [decision not to apply for credit made] because you thought that you might be turned down or denied credit?").

The 2013 survey does not make this distinction. Instead, all individuals (regardless of whether they ultimately

financial literacy, bank access, or access to network resources may be more probable explanations of financial exclusion than household perceptions.

2.3.5 Controls and summary statistics

Three sets of control covariates are used in the model described above: Some that are expected to influence both unbanked status and informal borrowing, some that are expected to have a direct influence only on informal borrowing, and others that should affect only unbanked status. In all three cases, I draw on theoretical and empirical insights from the literature on financial inclusion and support networks and from Rhine et al. (2006) and Stanley and Bhattachara (2008) specifically.

In addition to race and gender, age and education controls are common to both equations. Previous work has found that younger individuals and individuals with lower levels of educational attainment are more likely to be unbanked (FDIC 2015). Moreover, younger individuals have had fewer opportunities to develop a credit history, leading them to rely more on non-bank credit sources such as informal lending. Married or cohabiting individuals have more non-borrowing opportunities to insure themselves against risk than single, widowed, or separated individuals (e.g., multiple income sources), and single-headed households are also more likely to be unbanked (Klawitter and Fletschner 2011). State, year, and metro/non-metro fixed effects are also included in both equations.

Two variables are hypothesized to primarily affect a household's probability of owning a bank account. First, following Rhine et al. (2006), homeownership is used as a proxy for wealth and as a predictor of having previously acquired a mortgage loan from a bank. Second, the influence of income volatility on a household's decision to own a bank account is widely documented in the financial inclusion literature. Households with incomes that vary substantially month-to-month are more likely to incur overdraft fees which may ultimately be costlier than the fixed fees associated with alternative financial services. Recent work has suggested that income volatility is common

applied for credit) are asked whether they experienced discouragement at some point in the past year, using the same wording as the survey question above. Due to this inconsistency in survey instruments, I combine both discouraged credit applicants and non-applicants.

even at relatively high levels of income. Morduch and Schneider (2015) find that households with incomes greater than two times the local poverty line experienced spikes and dips in their monthly income over the course of the year equal to on average 45% of their average monthly income (30). Others suggest that this volatility and changing bank practices have encouraged many with even moderate levels of income to leave banks entirely (Servon 2017). It is less clear that volatility would push households into informal borrowing specifically among the other options available. Households that experience substantial income volatility may turn to bank credit, savings, or alternative credit instead. Of course, other observable and unobservable characteristics of these households may play a role in restricting their set of feasible choices.

Household income has been used in previous work as a determinant of the use of non-bank financial services, independent of the effect of being unbanked itself (Rhine et al. 2006). I follow this work by including income only as a determinant of informal borrowing use.¹⁷ As reviewed in Section 2.2.2, the literature on support networks suggests that low-income communities are more likely to make use of such networks (e.g., Högnäs 2010). Therefore, households with lower incomes may be more likely to rely on networks for borrowing rather than higher-cost alternative or bank credit. Low-income households are also more likely to be unbanked. However, income is strongly correlated with other covariates in the unbanked equation, including homeownership and income volatility. Given this ambiguity, I test whether the econometric results vary across income groups in Section 2.5.1.

The total number of children and adults in the household is used to control for household expenditures in the informal borrowing equation: Large households spend a greater portion of their income on necessities and are more financially fragile than a smaller household with the same income. In addition, household size is a proxy of the size of kinship networks. Households that include many extended family members or parents may do so in part because kinship ties are stronger than those of other households. Finally, household head status is included in the informal

¹⁷Income is defined in the SHED as the pre-tax income from all sources that is earned by the respondent and his or her spouse/partner, if present.

borrowing equation. While it is not possible to determine exactly how households interpret the “head of household” question, as discussed in Section 2.3.1, this status should have more of an impact on financial planning (i.e., the respondent’s planned use of informal borrowing versus other coping strategies) than on unbanked status, which is reported at the household level, after accounting for other household characteristics. For instance, a respondent who considers him- or herself household head may feel more pressure to fit into a “breadwinner” role for the household and face greater stigma in asking friends and family for financial assistance.

Overall summary statistics for the controls by bank account ownership and informal borrowing use are presented in Table 2.3. In addition to the demographic trends noted previously, both unbanked respondents and those who choose informal borrowing as a coping strategy are younger, more likely to be single, and have lower degrees of educational attainment than other respondents, consistent with previous literature (e.g., FDIC 2015; Klawitter and Fletschner 2011). Substantial income volatility is also associated with being unbanked, with 23.3% of this group experiencing significant changes in income from month to month, compared to 7.6% of banked respondents. Those with a higher yearly income are on average more likely to be banked and less likely to use informal borrowing, but the latter relationship is less clear. For instance, about the same proportion of those who would use informal borrowing and those who would not report incomes between \$40,000 and \$99,000 (41.1% and 40.5%). Respondents in this income range are nearly twice as likely to be banked as unbanked, however, suggesting that there is far from a one-to-one correspondence between reliance on informal borrowing and access to formal banking services.

2.4 Results

2.4.1 Exclusive use of informal borrowing

Parameter estimates for the baseline specification where informal borrowing is defined as using informal borrowing exclusively are presented in Table 2.4, and average marginal effects are

presented in Table 2.5.¹⁸ Separate regressions are run for the full sample as well as the sample restricted to White, Non-Hispanic respondents and Black, Non-Hispanic respondents.

The controls in each equation behave largely as expected. Older respondents, married respondents, and respondents with higher levels of education are the least likely to be unbanked. Greater wealth as proxied by homeownership as well as low income volatility are associated with being banked. Among the categorical covariates, higher levels of educational attainment have the largest negative effect on the probability of being unbanked: Individuals with at least a bachelor's degree are 10 percentage points less likely to be unbanked, relative to a sample mean of about 3.4%.

In the baseline specification, Black and Hispanic respondents are 3.4 percentage points and 2.4 percentage points more likely, respectively, to be unbanked relative to White respondents. This result is in line with the literature on the unbanked (Barr 2004; FDIC 2015; Morgan-Cross and Klawitter 2011; Rhine et al. 2006). Gender does not have a statistically significant effect on the probability of being unbanked. However, the gender coefficient is positive and larger in magnitude when the model is estimated on the subsample of Black respondents, although it remains statistically insignificant.

As with the likelihood of being unbanked, respondents who are younger, are single, and have lower levels of educational attainment are generally more likely to report informal borrowing alone as their sole method of dealing with an emergency expense. Lower income and larger households are also more likely to report plans to use only informal borrowing, as are those who report that they are not the head of household.

¹⁸Ai and Norton (2003) note that the calculation of marginal effects for interaction terms differs from that which is appropriate for a single variable. The marginal effect should be calculated as the cross-derivative of the predicted probability with respect to the two interacted variables, rather than the derivative of the predicted probability with respect to the interaction term. If calculated correctly, the marginal effect will vary across the values of each interacted variables, and the incorrectly calculated marginal effect can be misleading. The average marginal effects reported in this analysis do not take account of this correction for two reasons. First, the entire range of possible marginal effects are essentially explored in the graphs of the predicted joint probabilities that follow (see Figure 2.2). Second, alternative specifications in which there are no interaction terms present qualitatively equivalent and quantitatively similar results. That is, the results do not change if I remove the restriction that Black women experience an effect of being Black and of being female that is shared with Black men and White women.

Consistent with the evidence from the sociology literature, there are statistically and economically significant differences in reliance on informal borrowing at the intersection of race and gender. Black, Hispanic, and Non-Hispanic women with a racial self-identification other than White are more likely to report that they would rely on informal borrowing. This result holds for Black women when the sample is limited to Black respondents. While the average marginal effect is about 6.3 percentage points for Black women, this represents a large effect size relative to the sample mean: Only 4.1% of respondents in the full analytical sample indicate that informal borrowing would be their sole means of coping with an emergency expenditure. The effect size of this intersectional difference is similar to that of having yearly income of less than \$40,000 compared to an income of more than \$100,000.

Surprisingly, plans to primarily use informal borrowing are not directly correlated with unbanked status. The estimate is negative and statistically indistinguishable from zero, although the magnitude of the estimate is much larger and positive for White respondents than Black respondents. Theory would suggest a positive and statistically significant relationship between being unbanked and relying on informal borrowing because the unbanked generally have fewer opportunities to use bank credit or to draw from savings.

As noted in Section 2.3.3, the correlation coefficient ρ measures the latent correlation between each equation's error term. A value of ρ that is statistically distinguishable from zero would point to unobserved variation (e.g., differences in perceived costs/benefits, constraints, or preferences) that influences both the conditional probability of being unbanked and of using informal borrowing, suggesting that the outcomes are jointly determined. As shown in Table 2.4, the estimate of ρ is positive and statistically significant. Rhine et al. (2006) report a similar result in their analysis of the use of check cashing at currency exchanges among the banked and unbanked, but they find ρ to be significant only for Black and Hispanic respondents. I find similar heterogeneity by race. The magnitude of ρ is much greater for Black respondents than for White respondents, although both estimates are insignificant. The overall result appears to be driven by the sample of Black respondents (and possibly other Non-White and Hispanic respondents), considering the

small and insignificant estimate of ρ for White respondents. This result is suggestive of constraints, discouragement, or network effects that lead respondents away from formal banking entirely and towards informal borrowing as a substitute for bank credit. I conduct further analysis of ρ in Sections 2.4.4 and 2.5.1.

2.4.2 Informal borrowing in combination with other options

Tables 2.6 and 2.7 report the parameter estimates and average marginal effects, respectively, of the specifications in which the dependent variable equals one if the respondent indicated that they would use informal borrowing as one strategy within a bundle of at least one other coping strategy (e.g., bank credit, alternative credit, savings, etc.).

Because the sample is largely unchanged, the estimates on the unbanked equation are virtually identical. However, there are important differences in the determinants of using informal borrowing in combination with other strategies as compared to the determinants of reliance on informal borrowing alone. Education has a much weaker relationship with informal borrowing use in this context: Only attaining a post-secondary degree is associated with a reduction in the probability of using informal borrowing of about 3 to 6 percentage points compared to 5 to 8 percentage points for exclusive use of informal borrowing. This difference in effect sizes is economically more meaningful relative to sample means of 7.3% for informal borrowing in combination with other coping strategies and 4.1% for exclusive informal borrowing. Income exhibits a qualitatively similar but stronger effect on informal borrowing use as part of a bundle. The highest income households are 10 percentage points less likely to use informal borrowing combined with other strategies than the lowest income households, possibly preferring coping strategies such as savings or bank credit. This represents about a 1.3 times lower probability of using informal borrowing relative to the sample mean, which is very similar to the relative effect of income on exclusive use of informal borrowing.

Gender is not a statistically significant predictor of using informal borrowing among other strategies. Again, the gender coefficient is positive and of twice the magnitude for Black respon-

dents, but the result is statistically insignificant. Black respondents are more likely to use informal borrowing in a bundle of other strategies, and characteristics such as marital status, age, and education are not significant predictors of informal borrowing among Black respondents. Income remains a significant predictor of informal borrowing use across race and ethnicity.

Unlike the previous specification, being unbanked has a positive effect on the use of informal borrowing, but only among White respondents. At the same time, the correlation coefficient ρ is negative and marginally significant for White respondents. This suggests that the unobserved factors that appear to encourage both financial exclusion and primary use of informal borrowing (particularly among Black respondents) are actually associated with more (or less) financial exclusion and less (or more) use of informal borrowing as part of a bundle of strategies. Possible interpretations of this result are discussed in Section 2.6.

2.4.3 Joint outcomes by race and gender

A motivating question for this analysis was whether informal borrowing is one of many coping strategies used by a wide range of households (in addition to bank credit, savings, etc.) or whether it is disproportionately used by households “disconnected” from formal finance. This disconnected group would be likely to incur more of the long-run costs associated with financial informality and has been largely overlooked in policy discussions surrounding financial inclusion.

Summarizing the results from Sections 2.4.1 and 2.4.2, Figure 2.2 presents predicted probabilities for four joint probabilities relevant to this research question, disaggregated by race and gender. The first two graphs represent the probabilities of a respondent indicating that they would use informal borrowing exclusively (top) or in a bundle (bottom) and being banked. The second two graphs present analogous joint probabilities for each type of informal borrowing and being unbanked.

These predicted joint probabilities point to two important conclusions: First, informal borrowing—and even complete reliance on such borrowing to cope with an emergency expense—is not limited to the unbanked. In fact, given the low probability of being unbanked overall, very few households

are likely both to plan on using informal borrowing and to be unbanked (about 2 to 4 percent) compared to being banked informal borrowers (about 5% would use only informal borrowing and about 8% would use informal borrowing as one of several strategies). This suggests that there is an important portion of respondents who are “underbanked” despite not being included in the traditional definition of the term: They turn to friends and family for funds when faced with liquidity constraints rather than bank or alternative credit.

Second, women of color are the most likely to use informal borrowing as their primary coping strategy both when banked and unbanked. Race and gender gaps in the use of informal borrowing with other strategies remain insignificant after controlling for other variables, whether banked or unbanked, but these gaps *do* exist in reliance on informal borrowing as a sole coping strategy. Black women are more likely than both Black men and White men and women to primarily use informal borrowing, whether banked or unbanked. They are about 1.8 times more likely to be banked but use informal borrowing than White respondents (predicted probabilities of 7.5% and about 4.0%, respectively) and more than three times more likely to be unbanked and use informal borrowing exclusively (predicted probabilities of 2.3% and 0.7%, respectively). The predicted probabilities are suggestive of similar gaps among other women of color, although the estimates are imprecise. This result is consistent with the sociology literature on survival networks and identifies one key group that may fit into the “disconnected” group of policy interest as discussed above.

2.4.4 Results with discouragement control

As previously noted, the measure of cross-equation correlation ρ was found to be statistically significant in models that focused on exclusive reliance on informal borrowing, while being negative and statistically significant regarding informal borrowing as a complement to other strategies. I also find suggestive evidence that these correlations differ by race and ethnicity. The presence of latent correlation between the equations suggests that unobserved constraints, preferences, neighborhood effects, or costs that are associated with a higher probability of being unbanked are also associated with a greater probability of relying on informal borrowing and a lower probability of

using informal borrowing as one of several strategies. Rhine et al. (2006) suggest that unobserved correlation between unbanked status and the use of check cashing outlets may be linked to greater perceived costs of using formal banking services, the need for immediate liquidity, or broader distrust of banks. Several similar factors could be relevant in the context of informal borrowing. These may include neighborhood effects (e.g., a paucity of bank branches lead to neighborhood-wide reliance on informal finance) or credit constraints.

I test one of these possibilities by incorporating a control for discouragement in the baseline specifications. As described in Section 2.3.4, discouraged borrowers are prospective borrowers (i.e., individuals with positive credit demand) who nonetheless do not apply due to the existence of transaction costs combined with a sufficiently high subjective probability of rejection. To the extent that discouragement captures both credit constraints and respondents' belief that banks are uninterested in serving them, then it may explain some of the unobserved correlation. If it does not account for the unobserved correlation, then the relationship between financial exclusion and informal borrowing may instead be linked to constraints to bank access. For example, neighborhoods with few bank branches may have low demand for bank loans and develop alternative mechanisms for coping with short-term credit needs such as alternative credit and informal borrowing.

Tables 2.8 and 2.9 present marginal effects for these specifications. Discouragement is a statistically and economically significant predictor of informal borrowing (both primarily and within bundles), but not of being unbanked in the full sample. It also has a minimal effect on the other relationships of interest and on the correlation coefficient ρ . Interestingly, discouragement is a marginally significant predictor of unbanked status when the sample is disaggregated by race and ethnicity. Discouraged White respondents are about 0.7 percentage points more likely to also be unbanked, while discouraged Black respondents are 3 percentage points less likely to be unbanked, although the latter result is not robust to minor changes in the sample across informal borrowing regressions.¹⁹

¹⁹Parameter estimates available upon request.

These results provide suggestive evidence that neighborhood-level constraints explain more of the unobserved correlation than subjective beliefs about banks. Many White respondents may have positive demand for credit but choose not to hold bank accounts and do not plan on applying for bank credit out of a high predicted probability of rejection—possibly linked to the sentiment that “banks are not interested in serving them.” This may not be a causal relationship, of course: Not holding a bank account could also result in discouragement. However, the relationship between discouragement and bank account ownership is the opposite for Non-White households. The literature on financial inclusion has noted the lack of physical access to banks in certain low-income, predominantly minority communities (e.g., Barr 2004). In these communities, credit demand may be low given limited access to banks or high costs of bank credit (e.g., financing charges). An individual who has no *a priori* demand for bank credit cannot be discouraged from applying, leading to a negative relationship between the outcomes.

2.5 Robustness checks

2.5.1 Alternative analytical subsamples

As noted in Section 2.3, several groups have been included or excluded from the analysis, choices that may introduce bias into the estimation results. In this section, I estimate several alternative specifications to assess the sensitivity of the results. First, a surprising number of respondents report that they are not head of household, including as many as 65% of single, separated, or widowed respondents. While it is clear that household head status captures some unobserved characteristics of households, there is evidence that household head status is related to financial decision-making responsibility (see Table 2.1). Household heads also appear less likely in most specifications (1.5 to 3 percentage points) to report that they would use informal borrowing. Given these results, it is important to assess whether the results hold among household heads alone. If non-heads are less likely to actually make financial decisions for the households, including non-heads in the estimation may attenuate estimates of the effect of demographic and other individual characteristics on the chosen coping strategies.

Second, the baseline specifications exclude respondents who indicate that they would be unable to cope with the emergency expense. The analytic sample is narrowed in this way to fit the consumer choice framework. Individuals who would be unable to cope with an emergency expense must have no coping mechanisms from which to choose. However, to the extent that respondents who can cope with the expense differ in systematic ways from those who would be unable to cope, excluding this group leads to selection bias in the estimates. Moreover, as discussed in Section 2.3, the respondents who indicated that they would be unable to pay for the expense include some who also indicate that they would use informal borrowing or other options. In the preferred specification, these households are counted as if they only indicated “unable” as a response. (For example, a respondent who selects only “unable” and “informal borrowing” would be excluded from the sample.) An additional robustness check would be to check whether the results hold when all “unable” respondents are included in the analysis.

Additional models are thus estimated conditional on the respondent being household head, regardless of whether the respondent indicated that they could cope with the emergency expense.²⁰ The variables of interest and the correlation coefficient ρ behave in qualitatively similar ways to the baseline results. Estimates using this alternative sample suggest that, as in the preferred specification, Black women are more likely to use informal borrowing as their primary coping mechanism. The magnitudes of effect sizes are also comparable across specifications.

2.5.2 Results for other coping strategies

Table 2.10 reports marginal effects for the same bivariate probit model where the outcome variables of the second estimation equation are exclusive use of bank credit or savings rather than informal borrowing. If unbanked status, race, or gender were to have counterintuitive relationships with these other outcomes, the previous results may be suspect.

The results of Table 2.10 are broadly consistent with the theory and previous empirical results. Unbanked households and Black respondents are less likely to use bank credit as their sole

²⁰Results available upon request.

response to an emergency expense. There is no evidence of variation in bank credit use by race and gender. Similarly, exclusive reliance on savings is less common among unbanked households. The direction of causality is unclear, but this relationship may reflect the lack of secure savings instruments for the unbanked. Black respondents are more likely to rely on savings, reiterating the surprising result from the summary statistics and pointing again to the lack of access to bank credit as a coping strategy.

The measure of latent correlation ρ is significant and positive for both the exclusive use of bank credit and of savings, although the coefficient is larger in magnitude and more precisely estimated for bank credit. These results are not necessarily contradictory to the corresponding result for informal borrowing. While theory suggests that the availability of social networks is a key omitted variable in the case of informal borrowing, other factors may lead to a positive latent correlation for these other coping strategies. For instance, the level of liquid wealth held by households is not captured in the model. Low levels of wealth may be common among both those who are unbanked (for the reasons discussed above) and those who rely on credit cards instead but are not in fact unbanked. This same variable would work in the opposite direction for exclusive use of savings, explaining the less positive ρ coefficient.

2.5.3 Income disaggregations

A final set of robustness checks include the role of income. Income has been found in previous work to be an important predictor of both unbanked status and the use of informal and alternative borrowing. Yet, it is difficult to determine whether income should be common to both equations or a predictor of one outcome in particular. Theory suggests that income volatility is more relevant to the household choice to be unbanked than to use informal borrowing, and Rhine et al. (2006) argue that neighborhood income is a stronger predictor of unbanked status than household income (while also likely being correlated with household income). Neighborhood income is not available in the public SHED data, although state and metro fixed effects are used to account for some of this geographic variation at a coarser level.

Given this uncertainty about how to model the effects of income, it is important to identify whether the results are sensitive to alternative approaches to controlling for income, such as disaggregating the sample by income group. In addition, theory and previous empirical work suggest that the impact of factors such as income volatility or race and gender may vary by income for substantive reasons of interest. Higher income households may have a greater ability to save than lower income households or live in communities with different levels of access to financial services. To better understand whether and to what extent there is heterogeneity in trends by income, I conduct regressions by income category. I aggregate the original 21 income categories into two categories roughly corresponding to those above and below the median of the income distribution, approximately \$60,000. I then run the same models as the baseline specification, omitting income controls, separately for each category of respondents. Tables 2.11 and 2.12 present these estimates.²¹

There is important heterogeneity in the determinants of unbanked status. Part of the motivation for the preferred specification—in which income only appears in the informal borrowing equation—was evidence suggesting that greater income volatility is associated with being unbanked, even at higher levels of income. Consistent with this argument, income volatility is an important predictor of unbanked status in both income groups (results not shown). Moderate income volatility is actually a stronger and more economically significant predictor of unbanked status for higher income households. It is associated with a 2.5 to 3 percentage point increase in the probability of being unbanked for higher income households relative to a weighted sample mean of about 1.7%. The analogous effect for lower income households is only 1.4 to 1.8 percentage points relative to a weighted sample mean of 6.8%. Consistent with the baseline findings, lower income Black and Hispanic respondents are also more likely to be unbanked, although these results suggest that women of color in higher income categories may be more likely to be unbanked than other groups.

²¹I also omit state fixed effects from these regressions due to reduced sample size and problems introduced by sparse indicator variables in estimating the variance-covariance matrix. In the baseline regressions, results were qualitatively unchanged when state fixed effects were omitted.

The previously identified gender and racial gaps in use of informal borrowing as the primary coping strategy appear to be most prevalent among households with incomes below the median of the sample distribution. To the extent that similar gaps appear regarding the use of informal borrowing as part of a bundle of strategies, they are more prevalent among higher income households. These results are largely consistent with previous work and the baseline estimates.

The direct and indirect links between unbanked status and informal borrowing use are also heterogeneous across income groups. Unbanked households at the low end of the income distribution are less likely to use informal borrowing as their only coping strategy, although the parameter estimate is not statistically significant, and unbanked households with above-median income are more likely to use informal borrowing as part of a bundle of coping strategies. At the same time, the estimate of latent correlation ρ between unbanked status and the use of informal borrowing shows the opposite trend. The correlation is positive and significant for those with below-median income when the outcome of interest is exclusive use of informal borrowing, and the correlation is negative and marginally significant for higher income households when the outcome of interest is use of informal borrowing in a bundle of coping strategies. The fact that the unobserved constraints are positive and marginally significant for the lower income group is broadly consistent with an interpretation of ρ that emphasizes restrictions to bank access. These results are interpreted in more detail in Section 2.6.

To test an alternative income-based disaggregation, I run the same specification on groups defined by the federal poverty line: those with income of less than 100% the federal poverty line, 100% to 200% of the poverty line, and more than 200% of the poverty line.²² Because the poverty line is based on household size, this approach better captures variation in purchasing power than a single income figure. However, it also leads to challenge for the purposes of inference. Each group no longer includes a similar number of observations. Instead, approximately 80% of the

²²Due to the categorical nature of the income data, these poverty line-based categorizations are approximate. I define the low-income groups conservatively: For a poverty line of x corresponding to a household of size y , a household of size y must fall into an income category with a maximum income level of less than x to be considered below that poverty line. For a household to have income of 100% to 200% of the poverty line, it must fall into an income category with a maximum income level of less than $2x$.

sample falls above 200% of the poverty line, only 12% are between 100% and 200% of the poverty line, and the remaining 8% are below the poverty line. The small samples of the last two groups significantly reduce the power of statistical tests for these regressions.

With these caveats acknowledged, Tables 2.13 and 2.14 present marginal effects for the poverty line-based disaggregations. Across all income groups, Black and African American women are more likely to plan on using informal borrowing exclusively as seen in the preferred specification, and the relationship is of a similar magnitude for each income group. However, the result is only statistically significant for respondents with household incomes of 200% or more above the poverty line, possibly due to the small sample size of the low-income groups. The correlation coefficient ρ is positive for all income groups but is greater in magnitude for the two lowest income groups, and it is statistically significant only for households earning 100% to 200% of the poverty line.

Surprisingly, respondents from unbanked households in this group are less likely to be informal borrowers based on the recursive element of the model. A behavioral explanation for this result is not obvious. The very large coefficient magnitudes suggest that the model—particularly the structural and latent estimates of financial exclusion’s impacts—is sensitive to changes in the size of the sample. The effect of the variables of interest on the expected use of informal borrowing in combination with other strategies is consistent with the previous income disaggregation. Unbanked status and demographics are linked to informal borrowing as part of a bundle primarily for higher income households.

2.6 Discussion

The results from Sections 2.4.1 through 2.5.1 raise important questions of interpretation in the context of the literature on support networks, financial exclusion, and the pecking order of household coping strategies. These questions cannot be conclusively answered with the present data and point to important areas of future research. Nonetheless, possible interpretations of the results that are consistent with the existing evidence are presented in this section:

(1) *Why are women of color disproportionately represented among those who would primarily use informal borrowing after controlling for income, household size, unbanked status, and other observable characteristics?* As discussed in Section 2.2.3, the literature on support networks has associated these networks with women and female-headed households in low-income, predominantly minority neighborhoods. Women appear more likely to be able to borrow from friends and family and may face lower social costs to do so—e.g., if men are expected to hold “breadwinner roles” that stigmatize reliance on others for financial assistance. At the same time, the SHED data allow for at best imprecise measurement of household wealth, so the intersectional gaps in informal borrowing may also reflect women’s lesser access on average to savings, which Lusardi et al. (2011) find to be households’ preferred coping mechanism when feasible.

It is worth noting that the literature on support networks and informal borrowing has focused on Black and Hispanic individuals, but the results of this analysis were suggestive of equally large differences in informal borrowing among other, Non-Hispanic women. Unfortunately, SHED data do not allow for a detailed disaggregation of this group. One possibility is that some immigrants may be disproportionately represented in this group, and the use of informal borrowing networks has been shown to be more common in immigrant communities (e.g., Morduch and Schneider 2015). While more work is needed in this area, there is some evidence that gender gaps in support networks would also be expected within many immigrant communities. Kibria (1990) cites the importance of kin and extended networks among communities of Vietnamese immigrants living in the United States in the 1980s. Resources were frequently exchanged within kin networks. In addition, “women’s groups” connecting female neighbors and family members were widespread and influential, despite women’s overall lack of economic power. Kibria writes that membership in such groups “signified an obligation to participate in exchange activities with others in the group and connecting network” and compared the reciprocity expectations to those of “low-income, urban, Black communities,” citing Stack’s (1974) work (14).

(2) *Why are unbanked respondents more likely to use informal borrowing as part of a bundle of other strategies but no more likely to use informal borrowing exclusively?* According to Lusardi et

al. (2011), borrowing from friends and family tends to rank higher in the pecking order of coping strategies than financially high-cost strategies such as selling assets or alternative borrowing. All else equal, this would suggest that households that 1) do not have the means to cope with an emergency expenditure through savings or bank credit but 2) can rely on friends and family will primarily use informal borrowing. Of course, not all unbanked respondents have access to friends and family, while some banked respondents may still lack the savings needed to cope with an emergency expenditure. Therefore, being unbanked is neither a sufficient nor necessary condition for using informal borrowing as the main means of coping with an expenditure shock. By contrast, informal borrowing as part of a bundle of strategies would be expected to be disproportionately common among the remaining unbanked respondents (those who would not solely use informal borrowing) if *all* bundles are more common among unbanked respondents. Lusardi et al. (2011) associate the use of multiple coping strategies with greater financial insecurity and lower certainty about being able to deal with an emergency expenditure. As long as the unbanked are no less likely to use informal borrowing, the result of being unbanked would be a greater likelihood of using bundles that happen to include informal borrowing. Moreover, given that informal borrowing appears to be preferred to other high-cost coping strategies such as selling assets, bundles including informal borrowing are likely preferred (if available) to other bundles.

(3) *Which unobserved variables could make respondents both more likely to be unbanked and more likely to plan on exclusively using informal borrowing?* Broadly speaking, latent variables that explain this trend in a consumer choice framework would need to link high perceived costs (or low perceived benefits) of banking formality with low perceived costs (or high perceived benefits) of informality in borrowing arrangements. High costs could come in the form of constraints that limit bank access, a possibility explored further below. Another possibility is that low perceived benefits of banking formality could be linked to low financial literacy, which previous work has shown to be a key reason why many households rely on high-cost alternative borrowing (Lusardi and Scheresberg 2013). Unbanked households may be unaware that banks offer low-cost financial services or underestimate the long-run benefits of having bank accounts. Similarly, respondents

with lower financial literacy may turn to informal borrowing to avoid the short-term costs associated with account ownership but overestimate those short-term costs or underestimate the long-run costs of such an approach. The evidence does not suggest that this the case, however. Households appear to be aware of the relative costs and benefits of banks (Dunham 2001), and the effects of variation in financial literacy would not exhibit the heterogeneity by race and ethnicity and income that are observed.

Rather than focusing on characteristics of individuals, it is possible that neighborhoods in which access to banking is low differ in systematic ways that influence access to informal borrowing. Specifically, the sociology literature on social support networks has documented these networks primarily in low-to-moderate income, urban neighborhoods. These same neighborhoods are also more likely to have fewer accessible bank branches (Avery et al. 1997; Baradaran 2015). In fact, Vermilyea and Wilcox (2002) find that living in a predominantly Black or Hispanic neighborhood is associated with being unbanked, while the race and ethnicity of the individual is not a predictor of unbanked status. In this analysis, the estimates only account for geographic variation at the state level, making it likely that the effects of neighborhood characteristics are at best imprecisely accounted for. Therefore, the positive and statistically significant estimate of ρ —primarily accounted for by Non-White individuals in the sample—may mean that the social costs associated with informal borrowing are lowest for individuals in the same neighborhoods in which traditional bank services are the least accessible.

(4) *Which unobserved variables could make respondents both more likely to be unbanked and less likely to use informal borrowing as part of a bundle of coping strategies, particularly among White respondents?* This result (see Table 2.6) appears to contradict the previous finding and interpretation. It suggests that—conditional on not planning to use only informal borrowing—respondents perceive high costs (or low benefits) of banking formality and high costs (or low benefits) of informal borrowing as part of a broader coping strategy conditional on banked/unbanked status. One possibility is that there are differentials in the social costs of informal borrowing for unbanked individuals based on race and ethnicity due to neighborhood characteristics. It is well documented

that poverty tends to be more highly concentrated in communities of color. One recent study finds that 26.1% of poor White individuals lived in high-poverty neighborhoods between 2005 and 2009, compared to 33.0% of Hispanic individuals and 49.2% of Black individuals (Lichter, Parisi, and Taquino 2012). As noted previously, high-poverty neighborhoods are more likely to be characterized by support networks. The inverse may also be true: In neighborhoods where poverty is less concentrated, financial distress for the individual—such as being unbanked—may be associated with high social costs because such distress is less common and may be more often a source of stigma. In that case, the latent variable of social support availability is negatively related to the joint outcomes: More social support is associated with greater informal borrowing independent of unbanked status, but being unbanked in the context of less concentrated poverty makes households hesitant to access social networks. This would be most relevant among White households to the extent that poverty is less concentrated among White households. The negative and statistically significant estimate of ρ —this time accounted for by White individuals in the sample—may mean that the social costs associated with informal borrowing are greatest for individuals in the same neighborhoods in which traditional bank services are the most accessible.

Why would this latent relationship differ based on whether informal borrowing is used exclusively or as part of a bundle of strategies? The results may be influenced by selection bias. Respondents with the greatest access to network resources (low social costs) would be more likely to exclusively rely on informal borrowing rather than combine it with high-cost alternatives that appear to come lower in the pecking order of household coping strategies. Similarly, respondents who have equally low social costs for informal borrowing but would not use informal borrowing exclusively presumably do so because they have preferable alternatives (e.g., savings) that are less common among the unbanked. Therefore, social network support is more likely to be related to informal borrowing in the context of exclusive reliance on informal borrowing.

As noted in Section 2.5.1, robustness checks suggest that these heterogeneous relationships between informal borrowing use and unbanked status are systematically related to income. High-income households account for the positive direct relationship and negative latent relationship be-

tween unbanked status and informal borrowing in combination with other strategies. Low-income households account for the negative or insignificant direct relationship and positive latent relationship between unbanked status and informal borrowing reliance. These findings are broadly consistent with the interpretations above. Unbanked status for low-income households may represent limitations to bank access while unbanked status is more likely to represent an adverse financial shock for high-income households, and the social costs of relying on informal borrowing as a response may vary according to each situation.

2.7 Conclusions

This analysis used data from the Survey of Household Economics and Decisionmaking to identify households that plan to make use of or rely on informal borrowing as an emergency coping strategy and to determine whether such use is linked to financial exclusion. While informal borrowing has short-run benefits for liquidity-constrained households, it also risks incurring long-run costs. Some of these are shared with alternative finance, such as fewer opportunities to develop a credit history. Others are unique to informal borrowing. There may be community-wide effects on social mobility if the use of funds within the support network is not accompanied by opportunities to accumulate wealth or even works at cross-purposes to those efforts. There has been limited systematic analysis of informal borrowing in economics beyond the development literature. As a result, those who are disproportionately represented among informal borrowers may be missed in U.S. policy debates surrounding non-bank credit options and financial inclusion.

The results provide evidence that a broad cross-section of households—especially but not exclusively those with lower income and educational attainment—are likely to use informal borrowing in some way. For some households, borrowing from friends and family represents only one of many coping strategies. Consistent with the existing literature, the bundling of several coping strategies including informal borrowing is associated with lower income, lower educational attainment, and financial insecurity more broadly (Lusardi et al. 2011). However, others report that friends and family would be their only financial tool for dealing with an emergency expense. Women of color

are disproportionately represented in this group, even after controlling for income and other household characteristics: Black women and other Non-White, non-Hispanic women are about two to three times more likely to report plans to use informal borrowing as their sole coping strategy than White men and women.

These intersectional gaps persist among those who would conventionally be termed “banked” as well as the unbanked. However, unobserved factors appear to simultaneously push many individuals away from banks and to encourage reliance on informal borrowing. An extension of the baseline model incorporating a measure of discouragement suggests that exclusionary constraints such as minimal physical access to banks and other neighborhood effects play an important role in explaining this relationship. Specifically, unbanked households in low-income communities—which also tend to have fewer bank branches—may experience lower social costs associated with informal borrowing compared to unbanked households in relatively high-income communities. Reliance on networks for short-run borrowing needs thus appears to be associated with financial exclusion while also being characteristic of many respondents who would traditionally be considered banked.

The data used for this analysis provide important insights on household coping strategies and credit use, but there are also several limitations for the purposes of this paper. First and foremost, the key variable of interest captures respondents’ planned coping strategies rather than their actual behavior. Bond and Townsend (1996) find important discrepancies between preferences regarding bank and non-bank credit given a hypothetical borrowing situation and their actual use in their study of a predominantly Hispanic Chicago neighborhood. However, their results suggest that respondents tended to *underestimate* their actual reliance on friends and family. Therefore, the results of the current analysis may actually understate the extent of informal borrowing, although discrepancies in the other direction are possible as well.

Second, the results of this analysis are limited to household coping strategies for a short-term emergency expense of a relatively small amount (\$400). While my results are broadly consistent with work that has focused on coping strategies in response to a larger expense (\$2,000 in Lusardi

et al. [2011]), there are still limits to the generalizability of these results. Households that plan to rely on friends and family for a \$400 expense may still use bank or alternative credit for much smaller or much larger expenses.

Finally, an important policy question would be to directly estimate whether underbanked and unbanked households are more likely to turn to informal finance or to alternative financial services. The SHED data preclude an analysis of this sort, however, by combining plans to use fringe lenders with plans to use (high-cost) bank services such as overdraft fees and by limiting fringe lenders to payday lenders. Households may in fact plan on using other alternative credit sources such as title loans, but this is only captured under “other.”

Households relying solely on friends and family for emergency expenses fall well short of the ideal of financial inclusion that is referenced in the literature. Policies that seek to use financial inclusion to address the substantial and pervasive economic inequality that exists—especially along the lines of race and gender—should expand the notion of the underbanked to include those who fall outside of all paid credit services, whether provided by banks or fringe lenders. The question of which policies would be most effective merits further research. Possibilities include initiatives like the Mission Asset Fund, which seeks to bridge community resources with opportunities to build a credit score and participate in formal financial markets, or postal banking, a long-discussed concept that has recently been reintroduced to U.S. policy debates (Weissman 2018). In addition, these results suggest that constraints to bank access continue to play an important role in pushing respondents away from bank credit and towards non-bank options, of which informal borrowing is an underexamined option. Further research is needed to understand the extent to which both these constraints and the availability of support networks influence households’ financial choices. Interviews and other qualitative work are important potential avenues to better understand the latent factors that can only be indirectly assessed in this quantitative analysis. Ensuring that bank account ownership and low-cost credit products are available to low-income consumers should be an ongoing policy priority.

2.8 Tables and figures

Table 2.1: Responsibility for financial decision-making by household head status and marital status

<i>Responsibility for...</i>	Single, widowed, or separated		Married or cohabiting		
	Not head	Head	Not head	Head	
Paying bills					
None or almost none	34.4%	3.7% ***	14.4%	11.4%	
Some	23.7%	4.4% ***	14.2%	9.2%	*
Shared equally	17.6%	6.8% ***	38.8%	29.7%	**
Most	6.0%	4.5%	9.1%	11.9%	
All or almost all	18.3%	80.6% ***	23.5%	37.9%	***
Savings and investments					
None or almost none	54.3%	7.7% ***	19.4%	9.7%	***
Some	10.2%	3.2% ***	11.8%	9.2%	
Shared equally	14.4%	6.9% ***	39.3%	37.2%	
Most	5.6%	4.6%	11.0%	15.0%	
All or almost all	15.6%	77.6% ***	18.4%	28.9%	***
Proportion of households:	65.5%	36.6%	34.5%	63.4%	

Source: 2013 Survey of Household Economics and Decisionmaking

Notes: All proportions are calculated using sample weights. “Proportion of households” is proportion of respondents with given marital status who are head/not head. Asterisks indicate statistically significant difference in means at the * 10%, ** 5%, and *** 1% levels.

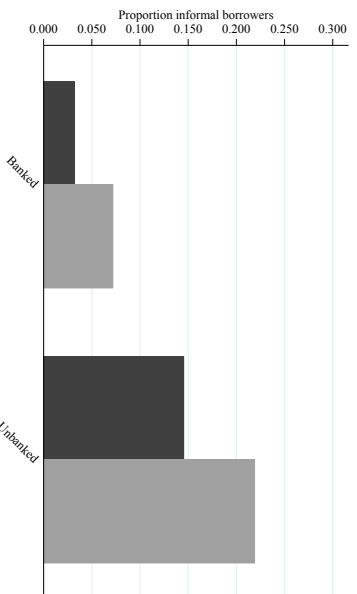
Table 2.2: Selected coping strategies by number selected and bank account ownership

	Number of strategies selected				Banked	Unbanked
	All	One	Two	≥ Three		
All respondents						
Bank credit	57.9%	48.6%	85.6%	76.9%	58.8%	34.0%
Savings	52.6%	42.0%	83.7%	78.1%	53.9%	20.8%
Informal borrowing	10.8%	5.2%	16.1%	74.0%	9.9%	34.7%
Alternative credit	1.9%	0.7%	2.2%	19.8%	1.8%	4.6%
Sale of assets	6.9%	1.7%	10.9%	68.8%	6.2%	25.2%
Other	1.8%	1.8%	1.6%	3.6%	1.6%	7.6%
<i>N</i>	24228	17587	5507	1134	23509	719
White, Non-Hispanic						
Bank credit	59.3%	49.6%	88.7%	81.0%	59.9%	35.5%
Savings	54.4%	43.5%	87.9%	78.8%	55.2%	21.9%
Informal borrowing	8.4%	3.9%	12.3%	70.5%	7.7%	37.5%
Alternative credit	1.1%	0.3%	1.1%	14.5%	1.0%	4.2%
Sale of assets	5.7%	1.3%	8.4%	72.0%	5.3%	22.2%
Other	1.5%	1.4%	1.5%	4.3%	1.4%	6.6%
<i>N</i>	18668	13640	4283	745	18333	335
Black, Non-Hispanic						
Bank credit	46.0%	35.4%	70.6%	77.0%	47.6%	28.2%
Savings	53.6%	46.3%	69.8%	78.7%	57.2%	15.0%
Informal borrowing	18.2%	9.2%	30.3%	76.3%	16.6%	34.9%
Alternative credit	5.6%	2.1%	8.8%	32.7%	5.4%	7.4%
Sale of assets	10.2%	3.4%	18.8%	56.7%	8.5%	28.4%
Other	2.9%	3.5%	1.6%	1.6%	2.3%	9.7%
<i>N</i>	1817	1269	412	136	1639	178
Hispanic						
Bank credit	54.1%	46.1%	79.8%	66.5%	55.5%	37.6%
Savings	47.5%	38.1%	72.4%	74.6%	49.6%	22.2%
Informal borrowing	17.5%	9.1%	24.2%	79.3%	16.2%	33.3%
Alternative credit	3.8%	1.4%	3.0%	27.4%	3.8%	3.3%
Sale of assets	11.1%	2.6%	18.5%	72.0%	10.0%	24.9%
Other	2.6%	2.8%	2.0%	1.8%	2.2%	7.7%
<i>N</i>	2293	1650	469	174	2135	158

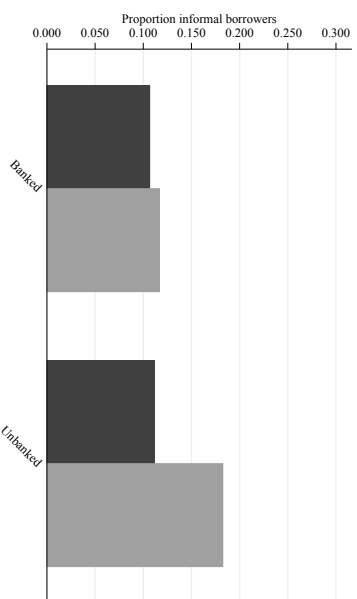
Source: 2013, 2015, 2016, and 2017 Surveys of Household Economics and Decisionmaking

Notes: All proportions are calculated using sample weights. *N* is unweighted number of observations for each column. Sample omits respondents who would be unable to cope with the emergency expense.

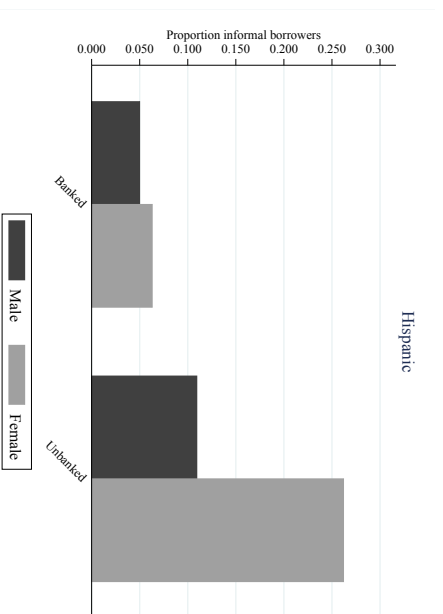
Informal borrowing exclusively



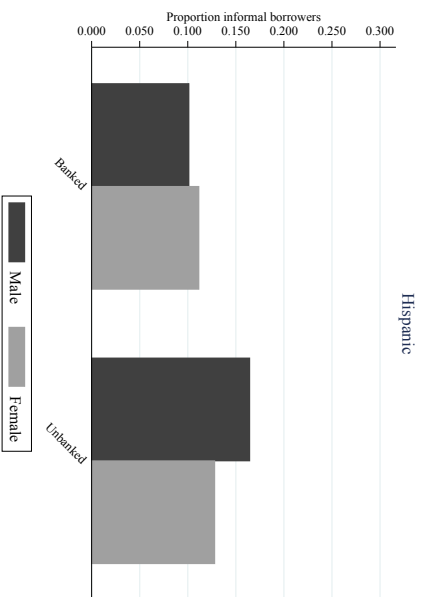
Informal borrowing in a bundle

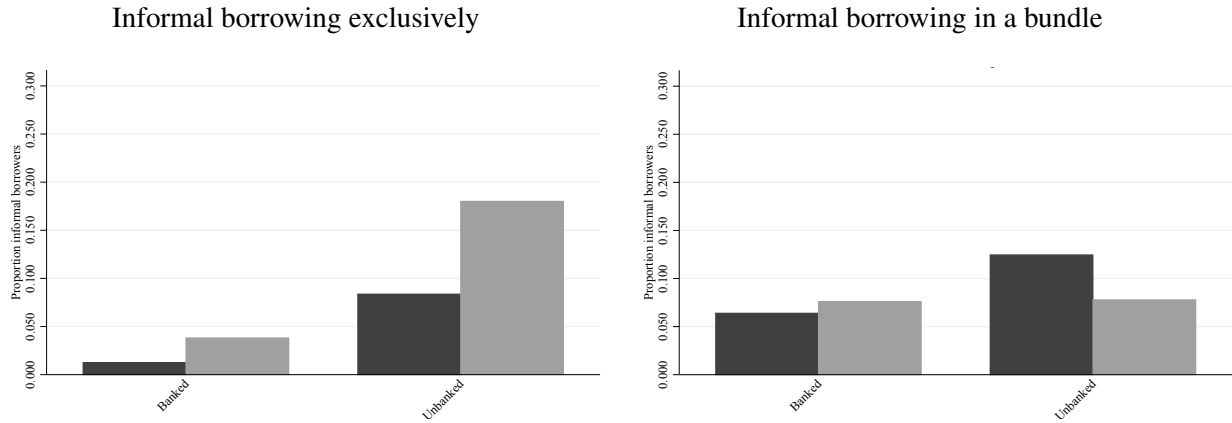


(a) Black, Non-Hispanic respondents

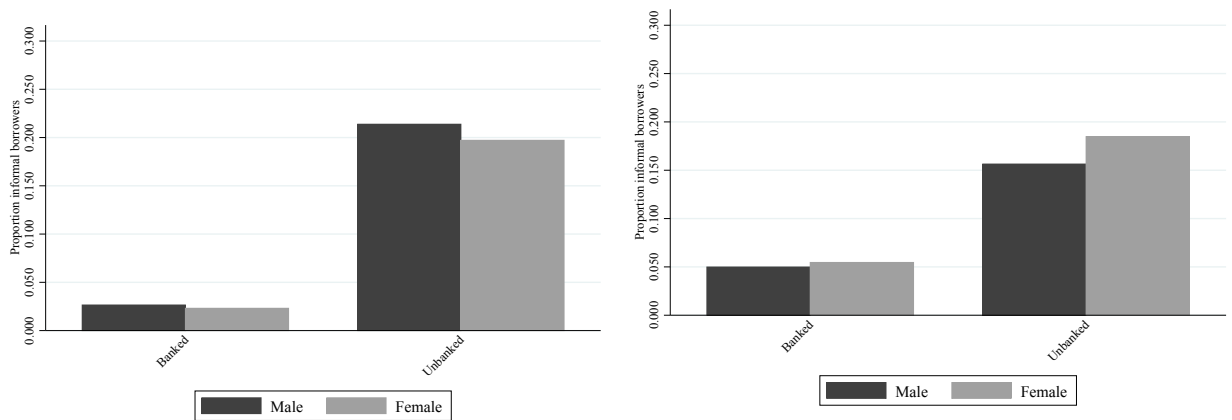


(b) Hispanic respondents





(c) Other, Non-Hispanic respondents



(d) White, Non-Hispanic respondents

Figure 2.1: Informal borrowing rates by gender, race/ethnicity, and bank account ownership

Source: 2013, 2015, 2016, and 2017 Surveys of Household Economics and Decisionmaking.

Notes: Proportions are calculated using sample weights and omit respondents who indicated they would be unable to cope with the emergency expense.

Table 2.3: Household characteristics by banked status and informal borrowing

Variable	By bank account ownership		By informal borrowing use	
	Banked	Unbanked	Would not use	Would use
<i>Race and ethnicity</i>				
White, Non-Hisp.	68.7%	40.2%	69.5%	52.3%
Black, Non-Hisp.	9.3%	22.2%	9.0%	16.5%
Hispanic	14.0%	30.3%	13.5%	23.6%
Other, Non-Hisp.	8.0%	7.4%	8.0%	7.5%
Female	51.2%	52.8%	50.9%	54.5%
Age	48.9 (17.3)	39 (14.1)	49.6 (17.3)	39.2 (14.622)
<i>Marital status</i>				
Married	59.5%	30.5%	61.3%	34.5%
Widowed	4.5%	3.2%	4.6%	3.6%
Divorced	9.4%	14.2%	9.3%	11.7%
Separated	1.1%	5.2%	1.1%	2.5%
Never married	19.9%	37.4%	18.4%	38.6%
Living with partner	5.6%	9.5%	5.3%	9.1%
Household size	2.65 (1.4)	2.93 (1.4)	2.6 (1.4)	3.14 (1.473)
<i>Educational attainment</i>				
Less than high school	4.8%	21.9%	4.6%	11.9%
High school/GED	26.5%	41.1%	26.4%	32.4%
Some college	18.5%	18.4%	17.6%	25.9%
Certificate/associate's	13.4%	9.0%	13.3%	12.7%
Bachelor's degree	21.3%	6.4%	21.8%	11.9%
Master's degree	9.9%	1.9%	10.3%	3.8%
Professional or doctoral	5.6%	1.3%	5.9%	1.4%
Homeowner	69.9%	33.3%	72.6%	35.6%
<i>Monthly income volatility</i>				
Roughly the same	72.0%	45.6%	72.5%	58.1%
Varies some months	20.5%	31.1%	20.1%	26.7%
Varies quite a bit	7.6%	23.3%	7.3%	15.2%
<i>Yearly income</i>				
Less than \$14,999	5.1%	34.6%	5.1%	15.1%
\$15,000 to \$39,999	17.8%	24.3%	16.9%	28.1%
\$40,000 to \$99,999	41.0%	29.8%	40.5%	41.1%
More than \$100,000	36.1%	11.3%	37.5%	15.7%
Household head	82.2%	57.4%	83.8%	60.1%
Lives in metro	86.3%	82.2%	86.3%	85.0%
<i>N</i>	23509	719	21978	2250

Source: 2013, 2015, 2016, and 2017 Surveys of Household Economics and Decisionmaking.

Notes: All proportions are calculated using sample weights.

Table 2.4: Exclusive use of informal borrowing and unbanked status: parameter estimates

Equation:	All		White Respondents		Black Respondents	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.0325 (0.0750)	-0.0255 (0.0629)	-0.0534 (0.0704)	0.0111 (0.0648)	0.114 (0.120)	0.525*** (0.138)
Black	0.403*** (0.106)	-0.0578 (0.133)				
Hispanic	0.311*** (0.113)	-0.0141 (0.117)				
Other	0.182 (0.162)	-0.187 (0.166)				
Female#Black	0.132 (0.139)	0.543*** (0.159)				
Female#Hispanic	0.157 (0.139)	0.277* (0.149)				
Female#Other	0.170 (0.206)	0.405* (0.215)				
Age	-0.0135*** (0.00223)	-0.0157*** (0.00202)	-0.0147*** (0.00300)	-0.0216*** (0.00273)	-0.0105** (0.00483)	-0.00981* (0.00545)
Widowed	0.329** (0.135)	0.282** (0.122)	0.528*** (0.136)	0.246* (0.138)	-0.617* (0.352)	0.686** (0.292)
Divorced	0.440*** (0.0858)	0.367*** (0.0834)	0.488*** (0.105)	0.325*** (0.104)	0.0613 (0.230)	0.479*** (0.177)
Separated	0.765*** (0.145)	0.522*** (0.170)	0.828*** (0.258)	0.891*** (0.225)	0.908*** (0.264)	-0.0346 (0.361)
Never married	0.121 (0.0863)	0.271*** (0.0740)	0.0660 (0.131)	0.313*** (0.0916)	0.156 (0.168)	0.172 (0.173)

Living with partner	0.233** (0.103)	0.123 (0.113)	0.256* (0.140)	0.144 (0.140)	0.0176 (0.234)	-0.250 (0.330)
High school/GED	-0.390*** (0.0983)	-0.279*** (0.105)	-0.595*** (0.146)	-0.186 (0.152)	-0.307 (0.214)	-0.365 (0.266)
Some college	-0.725*** (0.110)	-0.362*** (0.114)	-0.898*** (0.159)	-0.284* (0.163)	-0.703*** (0.233)	-0.548* (0.293)
Certificate/associate's	-0.826*** (0.123)	-0.462*** (0.126)	-0.905*** (0.181)	-0.375** (0.179)	-1.121*** (0.283)	-0.673** (0.329)
Bachelors	-1.098*** (0.122)	-1.010*** (0.134)	-1.190*** (0.172)	-0.894*** (0.185)	-1.301*** (0.278)	-1.255*** (0.394)
Masters	-1.140*** (0.152)	-0.865*** (0.155)	-1.307*** (0.191)	-0.944*** (0.207)	-1.046*** (0.325)	-0.717* (0.384)
Professional or doctoral	-1.126*** (0.175)	-1.042*** (0.203)	-1.165*** (0.238)	-0.853*** (0.283)	-0.987*** (0.364)	-1.429*** (0.448)
Homeowner	-0.351*** (0.0734)		-0.292*** (0.105)		-0.557*** (0.149)	
Moderate income volatility	0.326*** (0.0613)		0.305*** (0.0817)		0.310** (0.148)	
High income volatility	0.548*** (0.0713)		0.419*** (0.103)		0.627*** (0.168)	
Household size		0.0620*** (0.0166)		0.0572** (0.0237)		0.136*** (0.0408)

\$15,000 to \$39,999	-0.101 (0.0776)		-0.148 (0.100)	-0.0814 (0.177)
\$40,000 to \$99,999	-0.334*** (0.0838)		-0.424*** (0.111)	-0.341* (0.205)
More than \$100,000	-0.655*** (0.104)		-0.825*** (0.135)	-0.648** (0.260)
Unbanked	-0.00204 (0.245)		0.706 (0.569)	-0.0727 (0.460)
Household head	-0.374*** (0.0657)		-0.336*** (0.0835)	-0.498*** (0.161)
Rho (ρ)	0.267**	0.00357		0.302
<i>N</i>	22689	17716		1598

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would use informal borrowing in combination with another coping strategy. Dependent variable equals 1 if respondent would exclusively use informal borrowing and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Reference Group: Male, White (Non-Hispanic), married, less than high school education, not a homeowner, low income volatility, less than \$15,000 household income, banked, not household head.

Table 2.5: Exclusive use of informal borrowing and unbanked status: average marginal effects

Equation:	Unbanked	Informal		Unbanked	Informal
Female	-0.00252 (0.00584)	-0.00224 (0.00554)	Some college	-0.0830*** (0.0162)	-0.0442*** (0.0160)
Black, non-Hispanic	0.0339*** (0.0103)	-0.00505 (0.0113)	Certificate/associate's	-0.0893*** (0.0163)	-0.0533*** (0.0167)
Hispanic	0.0244** (0.00988)	-0.00126 (0.0105)	Bachelors	-0.102*** (0.0158)	-0.0845*** (0.0156)
Other, non-Hispanic	0.0130 (0.0128)	-0.0150 (0.0121)	Masters	-0.103*** (0.0161)	-0.0788*** (0.0163)
Female#Black	0.0110 (0.0124)	0.0628*** (0.0234)	Professional or doctoral	-0.103*** (0.0164)	-0.0856*** (0.0164)
Female#Hispanic	0.0132 (0.0126)	0.0280 (0.0172)	Homeowner	-0.0272*** (0.00591)	
Female#Other	0.0146 (0.0195)	0.0447 (0.0291)	Moderate income volatility	0.0257*** (0.00544)	
Age	-0.00104*** (0.000184)	-0.00137*** (0.000189)	High income volatility	0.0504*** (0.00835)	

Widowed	0.0265** (0.0131)	0.0241** (0.0122)	Household size	0.00544*** (0.00146)
Divorced	0.0383*** (0.00874)	0.0333*** (0.00880)	\$15,000 to \$39,999	-0.0121 (0.00955)
Separated	0.0826*** (0.0220)	0.0525** (0.0224)	\$40,000 to \$99,999	-0.0346*** (0.00965)
Never married	0.00841 (0.00602)	0.0230*** (0.00660)	More than \$100,000	-0.0560*** (0.00973)
Living with partner	0.0175** (0.00835)	0.00941 (0.00917)	Unbanked	-0.000179 (0.0214)
High school/GED	-0.0538*** (0.0159)	-0.0357** (0.0153)	Household head	-0.0362*** (0.00712)
<i>Sample mean:</i>	<i>3.4%</i>	<i>4.1%</i>	<i>N</i>	<i>22689</i>

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would use informal borrowing in combination with another coping strategy. Dependent variable equals 1 if respondent would exclusively use informal borrowing and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown.

Reference Group: Male, White (Non-Hispanic), married, less than high school education, not a homeowner, low income volatility, less than \$15,000 household income, banked, not household head.

Table 2.6: Use of informal borrowing in combination with other strategies and unbanked status: parameter estimates

Equation:	All		White Respondents		Black Respondents	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.0358 (0.0723)	0.0408 (0.0444)	-0.0391 (0.0700)	0.0491 (0.0454)	0.168 (0.123)	0.152 (0.102)
Black, non-Hispanic	0.347*** (0.106)	0.202** (0.0920)				
Hispanic	0.349*** (0.111)	0.0530 (0.0867)				
Other, non-Hispanic	0.168 (0.155)	0.108 (0.104)				
Female#Black	0.181 (0.136)	0.0721 (0.116)				
Female#Hispanic	0.0448 (0.137)	0.0205 (0.112)				
Female#Other	0.103 (0.201)	-0.0576 (0.144)				
Age	-0.0119*** (0.00222)	-0.0136*** (0.00141)	-0.0112*** (0.00283)	-0.0166*** (0.00170)	-0.0105** (0.00468)	-0.00588 (0.00402)
Widowed	0.227 (0.146)	0.218** (0.0970)	0.317** (0.146)	0.215* (0.117)	-0.297 (0.363)	0.290 (0.249)
Divorced	0.412*** (0.0861)	0.289*** (0.0584)	0.446*** (0.103)	0.288*** (0.0683)	0.183 (0.221)	0.00744 (0.153)
Separated	0.622*** (0.137)	0.278** (0.137)	0.571*** (0.214)	0.503*** (0.157)	0.865*** (0.291)	-0.584 (0.359)
Never married	0.118 (0.0817)	0.230*** (0.0551)	0.113 (0.117)	0.204*** (0.0674)	0.112 (0.171)	-0.00851 (0.140)

Living with partner	0.174*	0.301***	0.183	0.228**	0.243	-0.222
	(0.102)	(0.0764)	(0.142)	(0.0951)	(0.206)	(0.196)
High school/GED	-0.405***	-0.139	-0.453***	-0.222*	-0.272	-0.178
	(0.0973)	(0.0878)	(0.153)	(0.130)	(0.214)	(0.198)
Some college	-0.755***	-0.0713	-0.818***	-0.223*	-0.736***	0.300
	(0.107)	(0.0912)	(0.168)	(0.133)	(0.225)	(0.199)
Certificate/associate's	-0.780***	-0.208**	-0.809***	-0.217	-0.920***	-0.124
	(0.116)	(0.0947)	(0.174)	(0.136)	(0.274)	(0.223)
Bachelors	-1.087***	-0.287***	-1.063***	-0.375***	-1.122***	0.0504
	(0.122)	(0.0952)	(0.184)	(0.137)	(0.264)	(0.237)
Masters	-1.098***	-0.402***	-1.153***	-0.522***	-0.895***	-0.163
	(0.148)	(0.107)	(0.196)	(0.150)	(0.314)	(0.264)
Professional or doctoral	-1.105***	-0.481***	-1.021***	-0.577***	-0.947**	-0.569*
	(0.176)	(0.127)	(0.240)	(0.176)	(0.386)	(0.327)
Homeowner	-0.368***		-0.325***		-0.665***	
	(0.0670)		(0.0885)		(0.155)	
Moderate income volatility	0.299***		0.256***		0.321**	
	(0.0622)		(0.0837)		(0.138)	
High income volatility	0.551***		0.462***		0.527***	
	(0.0727)		(0.0984)		(0.169)	
Household size		0.0885***		0.0834***		0.113***
		(0.0136)		(0.0174)		(0.0350)

\$15,000 to \$39,999	-0.0602 (0.0616)	-0.177** (0.0759)	-0.00614 (0.142)
\$40,000 to \$99,999	-0.393*** (0.0644)	-0.560*** (0.0794)	-0.398** (0.158)
More than \$100,000	-0.746*** (0.0772)	-0.918*** (0.0936)	-0.806*** (0.197)
Unbanked	0.308 (0.243)	0.828*** (0.320)	0.616 (0.567)
Household head	-0.120** (0.0493)	-0.170*** (0.0606)	-0.331*** (0.123)
Rho (ρ)	-0.110	-0.231*	-0.307
<i>N</i>	23517	18258	1696

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Reference Group: Male, White (Non-Hispanic), married, less than high school education, not a homeowner, low income volatility, less than \$15,000 household income, banked, not household head.

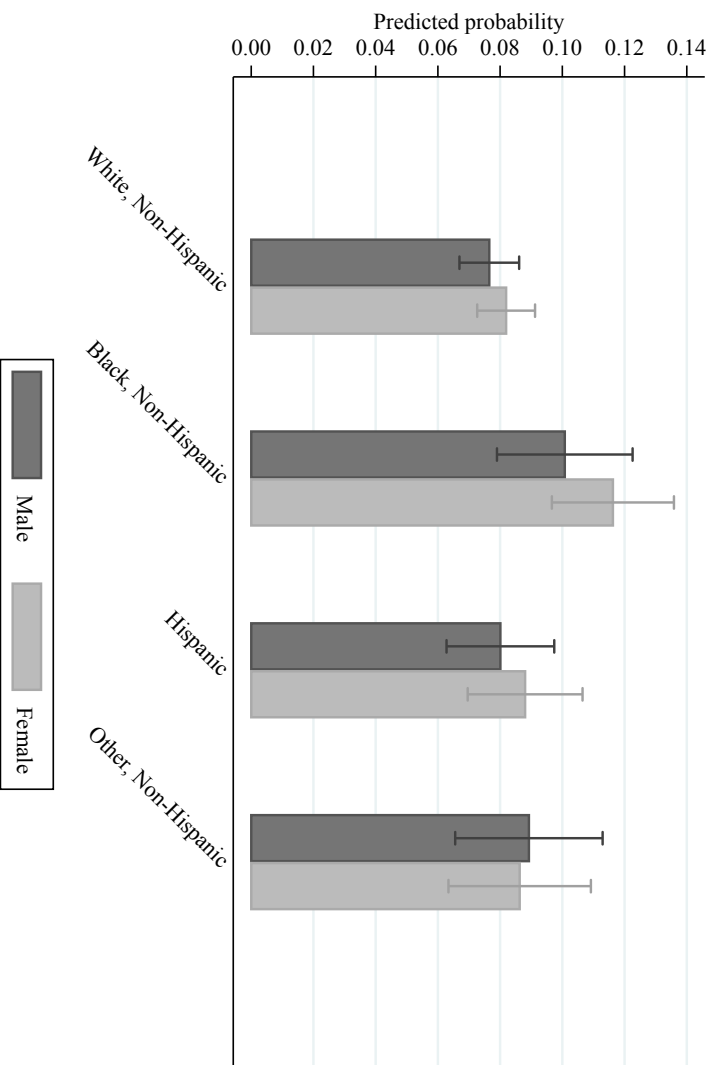
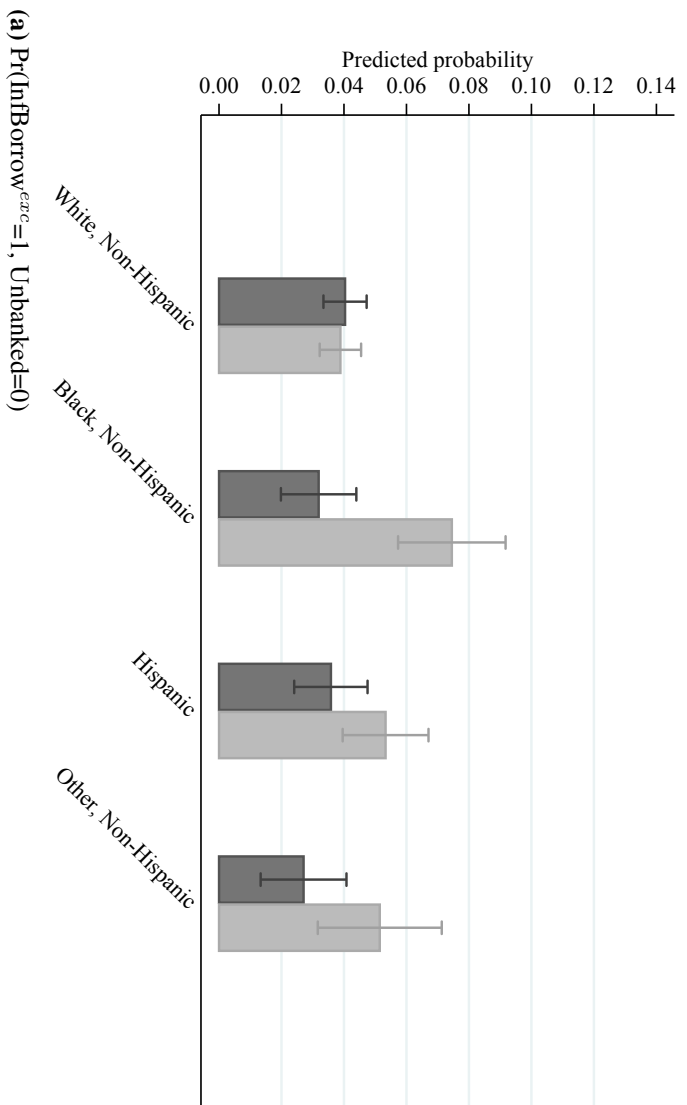
Table 2.7: Use of informal borrowing in combination with other strategies and unbanked status: marginal effects

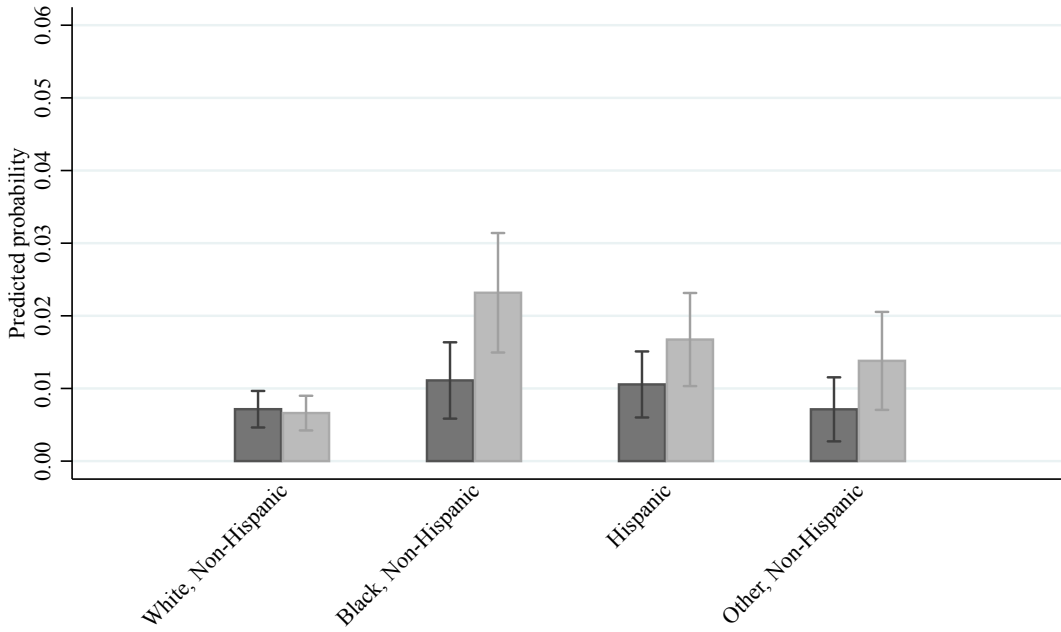
Equation:	Unbanked	Informal		Unbanked	Informal
Female	-0.00260 (0.00528)	0.00571 (0.00621)	Some college	-0.0807*** (0.0152)	-0.0117 (0.0154)
Black, non-Hispanic	0.0265*** (0.00920)	0.0303** (0.0149)	Certificate/associate's	-0.0822*** (0.0154)	-0.0318** (0.0154)
Hispanic	0.0266*** (0.00951)	0.00728 (0.0122)	Bachelors	-0.0959*** (0.0151)	-0.0420*** (0.0153)
Other, non-Hispanic	0.0112 (0.0113)	0.0153 (0.0155)	Masters	-0.0963*** (0.0153)	-0.0551*** (0.0158)
Female#Black	0.0145 (0.0121)	0.0105 (0.0174)	Professional or doctoral	-0.0965*** (0.0156)	-0.0630*** (0.0168)
Female#Hispanic	0.00334 (0.0105)	0.00290 (0.0160)	Homeowner	-0.0266*** (0.00502)	
Female#Other	0.00800 (0.0166)	-0.00784 (0.0190)	Moderate income volatility	0.0218*** (0.00508)	
Age	-0.000862*** (0.000170)	-0.00190*** (0.000206)	High income volatility	0.0484*** (0.00814)	

Widowed	0.0163 (0.0121)	0.0298** (0.0148)	Household size	0.0124*** (0.00191)
Divorced	0.0338*** (0.00836)	0.0413*** (0.00922)	\$15,000 to \$39,999	-0.0122 (0.0127)
Separated	0.0592*** (0.0176)	0.0396* (0.0224)	\$40,000 to \$99,999	-0.0673*** (0.0124)
Never married	0.00777 (0.00545)	0.0317*** (0.00797)	More than \$100,000	-0.105*** (0.0124)
Living with partner	0.0120 (0.00750)	0.0433*** (0.0124)	Unbanked	0.0501 (0.0456)
High school/GED	-0.0530*** (0.0152)	-0.0221 (0.0147)	Household head	-0.0174** (0.00742)
<i>Sample mean</i>	3.2%	7.3%	<i>N</i>	23517

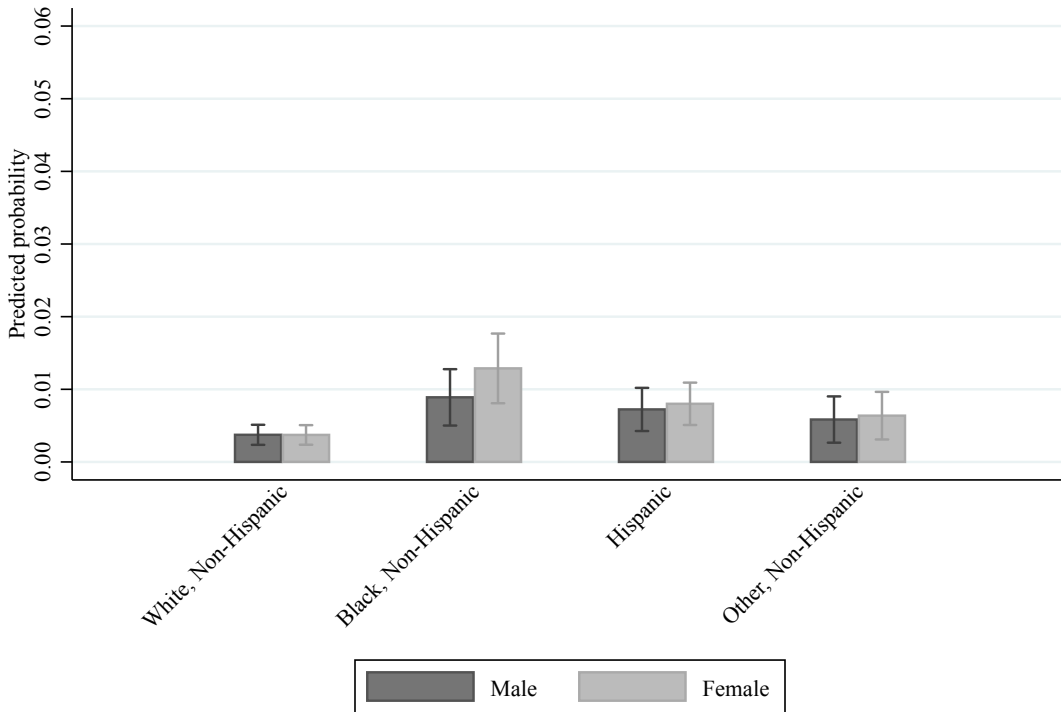
Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown.

Reference Group: Male, White (Non-Hispanic), married, less than high school education, not a homeowner, low income volatility, less than \$15,000 household income, banked, not household head.





(c) $\Pr(\text{InfBorrow}^{exc}=1, \text{Unbanked}=1)$



(d) $\Pr(\text{InfBorrow}^{comb}=1, \text{Unbanked}=1)$

Figure 2.2: Predicted probabilities of joint outcomes by race, gender, and informal borrowing outcome

Notes: Bars indicate predicted probability of joint outcome. Probabilities estimated using average marginal effects. Brackets indicate 90% confidence intervals.

Table 2.8: Discouragement's relationship to the exclusive use of informal borrowing and unbanked status: average marginal effects

Equation:	All		White Respondents		Black Respondents	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.00193 (0.00591)	-0.00237 (0.00562)	-0.00155 (0.00282)	0.000567 (0.00329)	0.0133 (0.0138)	0.0463*** (0.0149)
Black, non-Hisp.	0.0367*** (0.0106)	-0.00383 (0.0121)				
Hispanic	0.0248** (0.0100)	-0.00597 (0.0105)				
Other, non-Hisp.	0.0116 (0.0127)	-0.0152 (0.0127)				
Female#Black	0.00903 (0.0122)	0.0513** (0.0223)				
Female#Hispanic	0.0111 (0.0126)	0.0274 (0.0176)				
Female#Other	0.0153 (0.0200)	0.0427 (0.0290)				
Discouraged	0.00518 (0.00656)	0.0550*** (0.00935)	0.00780* (0.00422)	0.0284*** (0.00423)	-0.0329* (0.0182)	0.0521*** (0.0185)
Unbanked		-0.000988 (0.0209)		0.0271 (0.0289)		0.000670 (0.0539)
Rho (ρ)	0.301***		0.0966		0.293	
<i>N</i>	22183		17373		1541	

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would use informal borrowing in combination with other strategies. Dependent variable equals 1 if respondent would exclusively use informal borrowing and 0 otherwise. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown.

Table 2.9: Discouragement’s relationship to the use of informal borrowing in combination with other strategies and unbanked status: average marginal effects

Equation:	All		White Respondents		Black Respondents	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.00250 (0.00533)	0.00633 (0.00625)	-0.00134 (0.00267)	0.00495 (0.00438)	0.0174 (0.0133)	0.0147 (0.0175)
Black, non-Hisp.	0.0288*** (0.00939)	0.0248* (0.0145)				
Hispanic	0.0264*** (0.00962)	0.00106 (0.0117)				
Other, non-Hisp.	0.0103 (0.0112)	0.0164 (0.0161)				
Female#Black	0.0130 (0.0119)	-0.000058 (0.0164)				
Female#Hisp.	0.00295 (0.0106)	0.000778 (0.0158)				
Female#Other	0.00887 (0.0171)	-0.0117 (0.0185)				
Discouraged	0.00283 (0.00568)	0.126*** (0.0116)	0.00687* (0.00403)	0.0638*** (0.00600)	-0.0223 (0.0154)	0.123*** (0.0191)
Unbanked		0.0427 (0.0438)		0.0734** (0.0305)		0.119 (0.0867)
Rho (ρ)	-0.0920		-0.230*		-0.324	
<i>N</i>	22977		17894		1630	

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown.

Table 2.10: Exclusive use of bank credit and savings: average marginal effects

	<i>Bank Credit</i>		<i>Savings</i>	
	Unbanked	BankCr ^{exc}	Unbanked	Savings ^{exc}
Female	-0.00224 (0.00617)	0.000820 (0.0109)	-0.000173 (0.00647)	0.00601 (0.0107)
Black, non-Hisp.	0.0330*** (0.0112)	-0.117*** (0.0268)	0.0390*** (0.0113)	0.0835*** (0.0279)
Hispanic	0.0247** (0.0103)	0.0207 (0.0238)	0.0259** (0.0106)	0.0163 (0.0232)
Other, non-Hisp.	0.0171 (0.0152)	0.0634** (0.0316)	0.00557 (0.0121)	-0.0651** (0.0290)
Female#Black	0.0159 (0.0140)	0.00887 (0.0377)	0.0129 (0.0136)	-0.0228 (0.0348)
Female#Hispanic	0.0132 (0.0139)	-0.0395 (0.0326)	0.0114 (0.0135)	-0.0325 (0.0313)
Female#Other	0.0132 (0.0214)	-0.00419 (0.0411)	0.0220 (0.0229)	-0.00103 (0.0417)
Unbanked		-0.268*** (0.0668)		-0.339*** (0.0393)
<i>Rho</i> (ρ)	0.324***		0.338**	
<i>N</i>	18040		18179	

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would use bank credit/savings in combination with other strategies. Dependent variable equals 1 if respondent would exclusively use bank credit/savings and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown.

Table 2.11: Exclusive use of informal borrowing and unbanked status regressions by income group

Equation:	Less than \$60,000				\$60,000 or greater			
	Parameter Estimates		Marginal Effects		Parameter Estimates		Marginal Effects	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.0448 (0.0842)	0.0354 (0.0712)	-0.00415 (0.00784)	0.00418 (0.00836)	-0.102 (0.128)	-0.116 (0.106)	-0.00567 (0.00718)	-0.00806 (0.00745)
Black, non-Hispanic	0.577*** (0.130)	0.0915 (0.154)	0.0630*** (0.0178)	0.0111 (0.0198)	-0.497** (0.253)	0.137 (0.248)	-0.0211** (0.00948)	0.0109 (0.0208)
Hispanic	0.401*** (0.126)	0.161 (0.128)	0.0388*** (0.0140)	0.0205 (0.0175)	-0.0400 (0.201)	-0.240 (0.203)	-0.00237 (0.0118)	-0.0150 (0.0118)
Other, non-Hispanic	-0.0139 (0.201)	-0.253 (0.158)	-0.000998 (0.0143)	-0.0245* (0.0135)	0.289 (0.209)	-0.180 (0.275)	0.0217 (0.0182)	-0.0116 (0.0163)
Female#Black	0.0725 (0.163)	0.452*** (0.168)	0.00696 (0.0162)	0.0673** (0.0303)	0.956*** (0.345)	0.476 (0.304)	0.0972* (0.0561)	0.0420 (0.0334)
Female#Hispanic	-0.0134 (0.161)	0.205 (0.160)	-0.00123 (0.0147)	0.0270 (0.0230)	0.564** (0.264)	0.388 (0.283)	0.0438 (0.0277)	0.0329 (0.0288)
Female#Other	0.295 (0.259)	0.543** (0.231)	0.0324 (0.0333)	0.0863* (0.0474)	0.127 (0.295)	0.154 (0.364)	0.00761 (0.0193)	0.0117 (0.0302)
Unbanked		-0.502 (0.357)		-0.0458* (0.0271)		0.595 (0.570)		0.0559 (0.0726)
Rho (ρ)	0.588**				0.0254			
N	10529				12160			

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would use informal borrowing in combination with another coping strategy. Dependent variable equals 1 if respondent would exclusively use informal borrowing and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Table 2.12: Use of informal borrowing in combination with other strategies and unbanked status regressions by income group

Equation:	Less than \$60,000				\$60,000 or greater			
	Parameter Estimates		Marginal Effects		Parameter Estimates		Marginal Effects	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	0.0213 (0.0854)	0.0477 (0.0558)	0.00184 (0.00736)	0.00868 (0.0101)	-0.168 (0.122)	0.0250 (0.0699)	-0.00906 (0.00670)	0.00286 (0.00802)
Black, non-Hispanic	0.528*** (0.129)	0.166 (0.115)	0.0521*** (0.0156)	0.0317 (0.0234)	-0.339 (0.254)	0.428*** (0.143)	-0.0151 (0.00999)	0.0559** (0.0222)
Hispanic	0.459*** (0.127)	0.113 (0.105)	0.0430*** (0.0140)	0.0210 (0.0202)	-0.0914 (0.202)	0.200 (0.129)	-0.00491 (0.0105)	0.0227 (0.0158)
Other, non-Hispanic	0.0288 (0.185)	0.0302 (0.131)	0.00195 (0.0127)	0.00534 (0.0235)	0.266 (0.199)	0.190 (0.152)	0.0187 (0.0160)	0.0214 (0.0188)
Female#Black	0.0455 (0.160)	0.135 (0.139)	0.00403 (0.0145)	0.0263 (0.0287)	0.798** (0.323)	0.00182 (0.187)	0.0708 (0.0437)	0.000209 (0.0215)
Female#Hispanic	-0.213 (0.162)	-0.0711 (0.136)	-0.0165 (0.0112)	-0.0125 (0.0231)	0.530** (0.259)	0.0691 (0.175)	0.0391 (0.0254)	0.00819 (0.0214)
Female#Other	0.163 (0.249)	-0.0268 (0.181)	0.0156 (0.0262)	-0.00482 (0.0321)	0.111 (0.291)	-0.0624 (0.218)	0.00632 (0.0179)	-0.00693 (0.0235)
Unbanked		-0.0389 (0.291)		-0.00696 (0.0510)		1.123** (0.510)		0.223 (0.151)
Rho (ρ)	0.106				-0.418*			
N	11092				12425			

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Table 2.13: Exclusive use of informal borrowing and unbanked status regressions by income relative to poverty line

Equation:	< 100% of Poverty Line		100% to 200% of Poverty Line		> 200% of Poverty Line	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.000573 (0.0254)	0.0265 (0.0259)	-0.0127 (0.0141)	-0.0186 (0.0182)	-0.00542 (0.00591)	-0.00365 (0.00630)
Black, non-Hisp.	0.141*** (0.0485)	0.0665 (0.100)	0.0519* (0.0286)	0.0347 (0.0357)	-0.000387 (0.00945)	-0.000824 (0.0148)
Hispanic	0.0896** (0.0405)	-0.0237 (0.0570)	0.0102 (0.0191)	-0.00975 (0.0255)	0.0132 (0.00981)	0.00139 (0.0121)
Other, non-Hisp.	-0.0123 (0.0441)	-0.0149 (0.0625)	0.0184 (0.0416)	-0.0136 (0.0384)	0.0123 (0.0123)	-0.0192 (0.0124)
Female#Black	-0.00885 (0.0404)	0.0328 (0.0579)	-0.00589 (0.0263)	0.0690 (0.0546)	0.0357 (0.0254)	0.0561* (0.0301)
Female#Hispanic	-0.0229 (0.0379)	0.119 (0.0837)	-0.000456 (0.0261)	0.0568 (0.0470)	0.0190 (0.0159)	0.00955 (0.0180)
Female#Other	0.110 (0.109)	0.135 (0.137)	-0.0129 (0.0390)	0.0458 (0.0714)	0.00432 (0.0162)	0.0356 (0.0351)
Unbanked		-0.107 (0.116)		-0.113*** (0.00825)		0.0648 (0.0623)
Rho (ρ)	0.729		1.000**		0.0165	
<i>N</i>	1702		2721		18266	

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Table 2.14: Use of informal borrowing in combination with other strategies and unbanked status by income relative to poverty line

Equation:	< 100% of Poverty Line		100% to 200% of Poverty Line		> 200% of Poverty Line	
	Unbanked	Informal	Unbanked	Informal	Unbanked	Informal
Female	-0.00390 (0.0246)	-0.0102 (0.0298)	-0.000940 (0.0140)	0.0214 (0.0218)	-0.00639 (0.00531)	0.00563 (0.00681)
Black, non-Hisp.	0.0781** (0.0398)	0.0166 (0.0565)	0.0648** (0.0314)	0.0515 (0.0540)	-0.00175 (0.00890)	0.0460** (0.0186)
Hispanic	0.0961** (0.0418)	-0.00577 (0.0496)	0.0152 (0.0202)	0.0646* (0.0388)	0.00980 (0.00934)	0.0113 (0.0144)
Other, non-Hisp.	-0.0287 (0.0338)	-0.0119 (0.0626)	0.0311 (0.0398)	0.0460 (0.0631)	0.0115 (0.0115)	0.0141 (0.0163)
Female#Black	0.0235 (0.0449)	0.0263 (0.0640)	-0.0267 (0.0176)	0.0461 (0.0656)	0.0462* (0.0256)	0.00323 (0.0191)
Female#Hispanic	-0.0290 (0.0339)	-0.0122 (0.0572)	-0.0173 (0.0231)	-0.0653* (0.0355)	0.0107 (0.0132)	0.0175 (0.0209)
Female#Other	0.106 (0.0960)	0.0837 (0.102)	-0.0165 (0.0327)	-0.0784 (0.0508)	0.00103 (0.0142)	-0.00391 (0.0216)
Unbanked		-0.0985 (0.0824)		-0.133 (0.101)		0.246* (0.131)
<i>Rho</i> (ρ)	0.289		0.489		-0.380**	
<i>N</i>	1825		2933		18759	

Notes: Excludes respondents who would be unable to cope with emergency expenditure or who would exclusively use informal borrowing. Dependent variable equals 1 if respondent would use informal borrowing in combination with other strategies and 0 otherwise. Standard errors in parentheses. Asterisks indicate statistical significance at the * 10%, ** 5%, and *** 1% levels. State, year, and metro/non-metro fixed effects not shown. All parameter estimates are calculated using sample weights.

Chapter 3

Student Debt Aversion and Implications for College Choices: A Propensity Scoring Approach

3.1 Introduction

Since the 1970s, the cost of a four-year college degree has increased steeply, while federal grant-based financial aid packages have remained largely unchanged in real dollar terms. Average tuition at public four-year institutions increased by 271% between 1976 and 2016 (\$2,650 to \$9,840, in 2017 dollars), while average Pell Grant awards only increased by 17% in the same time period (\$3,200 to \$3,740, in 2016 dollars) (College Board 2017a,c). As a result, students and their families have increasingly turned to educational borrowing to fill the gap between the rising cost of attendance and their ability to pay.

The potential consequences of rising student debt have garnered attention in recent years. Much of this empirical work has addressed whether heavily indebted professional school graduates are less likely to choose public-service or generalist careers with lower pay (e.g. Kornhauser and Revesz 1995; Rosenthal, Marquette, and Diamond 1996) and whether undergraduate debt leads students to sacrifice amenities or long-term wage growth for higher initial wages (Minicozzi 2005; Rothstein and Rouse 2011). Others have explored the impact of high indebtedness on the probability of graduate school enrollment (e.g. Fox 1992; Millett 2003) and on the timing or probability of marriage and homeownership (Addo 2014; Andrew 2010; Baum and O'Malley 2003).²³

While the effects of borrowing on post-graduation outcomes are of clear relevance to educational policy, it is equally important to understand the determinants and effects of *not* borrowing for education. Economists often argue that the impact of a college degree on future earnings outweighs the costs of moderate educational debt for many students (Avery and Turner 2012), yet it is clear that college is not necessarily a prudent investment for all students. In particular, indebted

²³See Choi (2014) for a review of the literature concerning student debt, labor market outcomes, and human capital investment.

students who do not successfully complete their degree would bear a debt burden without receiving the college earnings premium. These students consequently have higher default rates on their student debt (AAUW 2017).

At the same time, prospective students may be hesitant to take on educational debt for psychological or cultural reasons that extend beyond the cost-benefit analysis of obtaining a degree. Students who are unfamiliar with the financial system, college, or educational lending may not know whether borrowing for college is worthwhile. For the marginal student who is indifferent between enrolling or not enrolling in college, this “debt aversion” will lead the student to elect not to enroll in college when doing so may have long-run benefits or to make debt-minimizing college choices that may threaten their chances of success in college.

Identifying characteristics associated with debt aversion will help policymakers better understand its role as a barrier to college enrollment and develop targeted grant-based (rather than loan-based) assistance or financial information. Previous work has suggested that between 5% and 20% of high school and college students are debt averse, although measures of debt aversion vary (Boatman, Evans, and Soliz 2017). Characteristics such as household income and parental education have been found to be related to the magnitude of student indebtedness and possibly to debt aversion (Burdman 2005; Institute for Higher Education Policy [IHEP] 2008).

In this limited literature, there is at best mixed evidence regarding differences in willingness to borrow by student gender or by race and ethnicity. The direction or existence of such gaps is not clear *a priori*. On one hand, rapid growth in the enrollment of women and students of color suggest that these groups are more willing to borrow on average than their male counterparts. The proportion of college students who are female increased from 48% in 1976 to 57% in 2014, and women hold about two-thirds of total student debt (American Association of University Women [AAUW] 2017). Black and Hispanic students are also among the most rapidly growing groups of college students. Black women in particular bear the greatest debt burdens to attend college (AAUW 2017).

However, these mean differences conceal other observable characteristics that are known to vary by demographics and are likely linked to their willingness to take on debt. The data used in this study support the stylized fact that female high school students on average exhibit superior overall high school performance (Buddin 2014). Among the college student population, women and students of color are also more likely to be non-traditional students with lower ability to pay and thus greater reliance on borrowing (AAUW 2017). Evidence from the psychology, labor economics, and household finance literatures point to additional factors that may result in greater aversion to borrowing for women and Black and Hispanic students, including average differences in financial risk aversion (Jianakoplos and Bernasek 1998), subjective expectations of success (Beyer and Bowden 1997), and experience with or confidence regarding the use of financial services (Chen and Volpe 2002; FDIC 2015; Institute for Higher Education Policy 2008).

This paper estimates the determinants of student debt aversion and its effects on the enrollment and college choices of high school students. The analysis makes several contributions to the existing debt aversion literature. First, I use a dataset that has not yet been applied to this topic, the High School Longitudinal Survey of 2009. Whereas most previous studies rely on cross-sectional survey data and observed borrowing, this survey directly elicits students' willingness to borrow, and I can link these preferences to their later college outcomes. The richness of the data on student attitudes allows me to separate variation in the expected net pecuniary benefit of education and other confounding factors from variation in psychological debt burden using a propensity score matching approach (Field 2006). Second, unlike previous work, these data allow for an ordinal rather than binary measure of debt aversion. Finally, I am attentive to heterogeneity in the impacts of debt aversion by race and gender. While the limited sample size of this dataset precludes a truly intersectional analysis, attention to both race and gender can provide suggestive evidence of outcomes for women of color.

The results suggest that students who report no willingness to borrow for college are about five percentage points less likely to enroll in college than students with a moderate willingness to borrow. Students who have a high willingness to borrow enroll in colleges with higher net costs of

attendance, and there is suggestive evidence that moderately debt-averse students attend colleges with a lower net cost as a debt-minimizing measure. The propensity scoring model also points to demographic differences between more and less debt-averse students. Women as well as Black, Non-Hispanic students are significantly more likely to be moderately debt averse, while men and White students are more likely to be on the extremes of the debt aversion distribution.

Students also respond differently to their debt preferences by gender and by race and ethnicity. Female and Black and Hispanic students with zero willingness to borrow are no less likely to attend college than less debt-averse students, but they appear to cut borrowing by more than other students conditional on enrollment. For women in this group, this appears to be partially offset by higher net cost of attendance, which may reflect greater parental contributions towards college costs. Meanwhile, similarly debt-averse male students are seven to eight percentage points less likely to attend college.

These results suggest that debt aversion narrowly defined (in addition to cost aversion more broadly) has real impacts on students' college choices and that these impacts vary by race and gender. Men are most deterred from college enrollment as a result of debt aversion, possibly playing a role in the underrepresentation of men on college campuses. At the same time, the disconnect between the stated preferences and observed enrollment behavior of women and some students of color points towards several interpretations. First, these groups may hold an overriding preference for college enrollment linked to gender norms or unobserved college benefits that lead them to attend college but simultaneously make debt-minimizing choices to avoid indebtedness. These choices may not be conducive to student success. Second, some women may report low willingness to borrow because parents are more likely to contribute to their education, pointing to an asymmetry in men's and women's access to college.

The paper begins with a brief review of the literature on debt aversion, followed by a theoretical model describing how students' and parents' expectations may influence their willingness to borrow. Section 3.4 describes the data and empirical methods, and results are presented in Section 3.5.

I conclude by discussing possible interpretations, noting limitations to the study, and suggesting avenues for future research.

3.2 Background and literature review

3.2.1 Defining debt aversion

Student debt aversion is ambiguously defined in the literature. In its broadest sense, debt aversion overlaps significantly with cost aversion and low monetary valuation of college enrollment. For example, the Institute for Higher Education Policy (2008) identifies “risk aversion” and “short-sighted loss aversion” as factors contributing to debt aversion (10). A more risk averse individual will perceive a lower expected payoff of a risky project such as pursuing a degree. Loss averse students will perceive the loss of future income to repay student loans as greater than future gains of equivalent discounted value. Other factors that are expected to influence willingness to borrow include expected returns to education and predicted probability of degree completion (see Section 3.3). Generally the returns to a college education over a lifetime are greater than the costs (Avery and Turner 2012), but high discounting may also lead to lower willingness to borrow if repayment must occur before equal benefits accrue.

All of these factors also affect overall willingness to pay. Whether educational costs are paid from current income or paid out of future income, students are funding a risky project where the expected returns to education, attitudes towards risk, discounting, and loss aversion will play a role. The only factors that can lower willingness to *borrow* specifically must be those linked to the additional perceived costs or risks associated with debt, namely the pecuniary costs of servicing debt, future credit constraints due to indebtedness (e.g., lower credit score [Minicozzi 2005]), and any psychological burden of holding debt (Field 2006). The educational financing decision and the influence of debt aversion specifically will be addressed in more detail in Section 3.3.

3.2.2 Literature

Three approaches to identifying debt aversion and the determinants of debt aversion are prevalent in the limited empirical literature. A first pass identifies groups of enrolled undergraduates with lower student debt and infers that these differences are primarily driven by differences in willingness to borrow. An (Institute for Higher Education Policy 2008) report finds that students from low-income and unbanked households, students from the highest-income households, and those enrolled in community colleges are the least likely to borrow. There is also evidence of variation by race and ethnicity and by parent immigrant status. The report notes that students who borrow less use a wide range of alternative strategies to fund their education. They are more likely to live at home, more likely to work, more likely to attend school part-time, and more likely to attend low-cost institutions. However, many of these same strategies seem to result in lower college persistence rates, pointing to an important trade-off between probability of completion and cost of attendance.

A second approach closer to the method used in this analysis is to elicit attitudes about borrowing for education directly. These data may provide clearer insight into the role of debt in student decision-making. In the first study of this type, Mortenson (1988) uses Federal Reserve System survey data regarding respondents' attitudes towards debt in general, including student debt. The surveys, administered periodically between 1959 and 1983, asked respondents whether they felt it was "all right for someone like [themselves] to borrow money to finance educational expenses," among a list of other possible investments and purchases. Mortenson uses cross-tabulations to look for suggestive trends rather than identify treatment effects. The results suggest that lower income respondents were least likely to view borrowing for education favorably but also saw the greatest increase in favorability during the sample period. Hispanic respondents were found to respond more favorably than other racial groups in the 1977 survey, but their rate of favorability falls dramatically to be lower than that of other groups by 1983.

However, this analysis is also outdated, lacks controls, and only captures respondent attitudes. As the author notes, the social psychology literature suggests that attitudes do not correlate per-

fectly with behavior. This is doubly concerning because the survey question is a hypothetical, rather than being posed to students facing a real borrowing decision. The question also places the decision to borrow for education in contrast to borrowing for other purchases often deemed by respondents to be less legitimate (e.g., buying furs and jewelry). This framing may elicit a different response than more neutral questions about willingness to borrow (Tversky and Kahneman 1981).

More recently, researchers have turned to survey work targeting specific populations, including high school students, undergraduates, and adults. Callender and Jackson (2008) conducted a survey of undergraduates at an English university. Respondents were asked whether concerns about cost affected the type or location of university chosen or their living situation during college. The survey instruments are novel in that they attempt to distinguish clearly between heterogeneity in cost aversion, the perceived financial and social benefits of college, and pure debt aversion. They assess debt aversion by asking students whether borrowing is wrong, in contrast to questions that elicit a pecuniary cost-benefit analysis (e.g., “Borrowing money to pay for a university education is a good investment” [414]). The authors find that debt aversion is associated with educational choices that lower cost or increase expected benefits, including choosing a university in a city with good employment prospects or low cost of living. These effects are mediated by household income level. Like the observational approach, this survey is limited by its sample of already enrolled students, precluding any analysis of the effects of debt aversion on enrollment.

Boatman, Evans, and Soliz (2017) conduct a survey with high school students as well as community college students and adults who are not enrolled in college. This survey points towards the challenges of capturing debt aversion in a qualitative fashion. Three debt aversion questions were asked. One set of questions elicited attitudes towards debt and borrowing (e.g., agreeing or disagreeing with the statement “Owing money is basically wrong.”). A second set followed Mortenson (1988) by asking whether borrowing for college specifically is acceptable, and a third set prompted respondents to make a series of choices between cash-based and loan-based financial aid packages to reveal debt preferences. The authors note that these measures of debt aversion were not strongly correlated overall. This suggests that individuals may or may not be debt averse

for a variety of reasons and depending on context. The approach of the present analysis—to isolate the effect of debt aversion on an ordinal measure of willingness to borrow—may help address this concern by making fewer assumptions about the sources of debt aversion, instead controlling for sources of variation in willingness to pay.

Burdman (2005) supplements this quantitative evidence by interviewing students, university administrators, and counselors on their attitudes towards student borrowing. Responses suggest that low willingness to borrow can result from students' perceptions of poor job prospects (low pecuniary benefits of college) as well from negative past family experiences with credit, overall lack of integration with the consumer financial system, and cultural aversion to borrowing. High school counselors and university staff often advise students to avoid taking on debt altogether. Burdman suggests improved communication, finance-focused retention programs, and no-loan programs as potential means of mitigating debt aversion.

Finally, a few studies have used experiments to isolate the effects of debt aversion. In one randomized experiment by Field (2006), students who applied to the NYU Law School were offered one of two financial aid packages of equivalent financial value, varying only in the level of debt burden. In the treatment group, students were given a partial tuition waiver, and the remaining tuition costs could be funded by borrowing. In the control group, students were given no tuition waiver, but all tuition costs could be funded by borrowing. In both cases, if students chose and remained in a public interest law career, all debts would be paid off by NYU Law School over a ten-year period following graduation. If students in the treatment group chose a private law career, the tuition waiver would be converted into debt for which the student was liable. The results confirmed the hypothesis that students experience a psychological burden of indebtedness that is independent of the cost of servicing debt or the financial value of the loan-based financial aid. This psychological cost led more students in the control group than the treatment group to choose a higher paying private law career over a public interest law career.

Eckel, Johnson, Montmarquette, and Rojas (2007) reach a different conclusion about debt aversion in a Canadian experiment. Participants were offered a series of choices between cash

payments or subsidized educational provision via various possible funding methods (grants, loans, matched savings, and income-sensitive repayment loans). They structured the choices so as to indirectly elicit differences in time preference and risk aversion, supplemented by survey information on debt aversion, financial literacy, attitudes towards the value of education, and demographics and family background. They conclude that while many observed characteristics are correlated with willingness to invest in education, there is no evidence of an effect of debt aversion and therefore no reason to be concerned that exclusively loan-based financial aid packages will reduce educational investment.

The contradiction between these two sets of experimental results may be partially tied to the different context of each experiment. In Field (2006), participants were applying for law school, attending, and making subsequent career choices, while in Eckel et al. (2007), participants were members of the general public ranging in age from 18 to 55. The broad sample in the latter experiment shifts the educational finance decision from an actual decision to a hypothetical one.

There has been relatively little work focused on identifying and explaining potential differences in willingness to borrow for education among demographic groups. Some of the work cited above has found differences in debt aversion by race and ethnicity. Hispanic students are generally less likely than White students to borrow for college or, in some studies, to approve of such borrowing (Boatman, Evans, and Soliz 2017; Institute for Higher Education Policy 2008; Mortenson 1988). The opposite trend or mixed results are found for Black or African-American students. However, only Boatman, Evans, and Soliz (2017) control for other observable characteristics of these students, such as family ability to pay.

Some of the general studies reviewed above include gender controls. The results do not indicate a significant gender difference and are not discussed at length (Callender and Jackson 2008; Eckel et al. 2007). Mortenson (1988) does find evidence of a gender difference in attitudes towards debt. He finds that 82% of men reported a favorable attitude towards borrowing for education compared to 75% of women. The prevalence of favorable attitudes fell among both men and women during the sample period, with a greater decrease among men. By contrast, Boatman,

Evans, and Soliz (2017) find that female respondents were less debt averse than men across most samples and measures.

With the limited literature explicitly discussing gender differences in willingness to borrow, most of the suggestive evidence comes from other strands of literature and their indirect effect. These influences will be discussed in the theory section below.

3.3 Theory

The decision whether to pursue a degree and how to fund that investment can be modeled as a two-stage, intertemporal utility maximization problem solved by the student. It is clear that parents pay an important role in the college decision-making process. While parents' financial contribution is discussed in the baseline model, I discuss a model with endogenous parental contributions and challenges for implementing such a model empirically in Section 3.3.4 below.

For tractability, I assume that students maximize utility over two periods: a post-high school/college enrollment period and a post-college period. I further assume that a subjective discount factor of β between 0 and 1 applies to costs and benefits incurred in the future period.

Students choose to maximize utility U^* by choosing whether to enroll in college, such that

$$U^* = \max[U^{s*}, U^n]$$

where U^{s*} is the expected lifetime utility of pursuing a college degree and U^n is the exogenous outside option (e.g., the lifetime value of entering the labor force directly). Students choose to go to college if $U^{s*} > U^{ns}$.

The expected lifetime utility of not pursuing a degree is assumed to be exogenous:

$$U^n = u(y_1) + \beta u(y_2)$$

where y_t is exogenous base income in each period and the utility function is monotonically increasing ($u'(c_t) > 0$).

The expected lifetime utility of pursuing a degree is itself a nested optimization problem, where students pick an optimal mode of educational financing in the initial period. The returns to college are realized in the second period and are probabilistic. Importantly, this probability does not need to be an accurate probability of success. In line with the literature on subjective expectations (Manski 2004), I do not assume rational expectations or perfect foresight. Instead, I assume that students have some beliefs about possible outcomes and that these beliefs are the basis for their decision-making. The student believes that they will successfully complete college with probability p and benefit from an additive earnings premium α . The student predicts not completing college with probability $1 - p$, in which case they receive no earnings premium.

Without loss of generality, the earnings premium and consumption can also be broadened to include non-pecuniary amenities. This allows for additional variation in the valuation of college by student background: Even if two students predict similar increases in earnings with a college degree, they may vary in the non-pecuniary value they attribute to college attendance (e.g., intellectual development, social interaction, etc.).

For simplicity of exposition, I assume that students must finance the entire, exogenous lump sum cost of attendance, TC , by spending s out of current income y_1 or borrowing d at a rate of interest of $1 + \theta_d$, $\theta_d > 0$. Parents can also finance education through out of pocket expenditure s_p or borrowing d_p . Any remaining income in each period is put towards consumption c_t .

In addition to the pecuniary cost of borrowing θ_d , Field's (2006) experimental results indicate the presence of non-pecuniary, psychological costs associated with holding debt. These non-pecuniary borrowing costs can be modeled as a source of disutility with utility function $v(d|\eta)$, where $v_d(\cdot) > 0$ and η is a vector of fixed observed and unobserved personal and community characteristics corresponding to factors that influence debt aversion, possibly including family income, race and ethnicity and gender (Institute for Higher Education Policy 2008; Mortenson 1988). I assume that these psychological costs are incurred in the second period and are subject to the same discount factor β . The utility function $v(\cdot)$ is assumed to be convex in d ($v''(\cdot) > 0$).²⁴

²⁴While little direct evidence exists to support this assumption, it seems reasonable to assume that the psychological costs of debt are convex. Students should experience less disutility from the first dollar of borrowing than from the ten-

3.3.1 Educational financing decision

In a simple model of the financing decision, the student solves the following problem:

$$U^{s*} = \max_{s,d} u(c_1) + \beta Eu(c_2) - \beta v(d|\eta)$$

subject to the period-specific budget constraints

$$y_1 = c_1 + s$$

$$y_2 = \begin{cases} c_2 + d(1 + \theta_d) - \alpha & \text{with probability } p \\ c_2 + d(1 + \theta_d) & \text{with probability } 1 - p \end{cases}$$

All parameters and choice variables are assumed to be non-negative.²⁵

Simplifying, the student's maximization problem can be written as

$$\max_{s,d} u(y_1 - s) + p\beta u[y_2 + \alpha - d(1 + \theta_d)] + (1 - p)\beta u[y_2 - d(1 + \theta_d)] - \beta v(d|\eta)$$

$$s.t. \quad TC = s + d + s_p + d_p$$

Based on the objective function U^s , a student's probability of pursuing a degree increases with greater earnings/non-pecuniary amenities premium α and greater subjective probability of success p . Meanwhile, lower total costs of attendance TC and higher parental contributions s_p and d_p also increase the probability of college attendance by lowering the need to pay.

As shown in the appendix, the sources of debt aversion specifically can be understood by examining the trade-offs between funding educational expenses out of current income versus borrowing.

thousandth dollar of borrowing. At least some of the existing empirical literature appears to support this supposition as well (e.g., Millett [2003] finds evidence of non-linear effects of undergraduate debt on graduate and professional school enrollment).

²⁵I also assume the following: $0 \leq TC - s_p - d_p \leq y_1 + \frac{y_2}{1+\theta_d}$. This constrains the parental contribution to be no greater than the total cost of attendance and assumes that total cost can be funded by the student through some combination of current expenditure and borrowing.

Given the assumption of a risk averse agent, a student with a greater cost of borrowing θ_d , lower discount factor β (higher discount rate), or greater psychological costs associated with the last dollar of borrowing will prefer relatively lower total borrowing.

3.3.2 Variable educational costs

If total educational costs TC are variable, students may seek lower-cost alternatives to reduce TC . The literature suggests that α or p may be functions of TC . For example, higher-cost post-secondary education may lead to a greater skill premium or better employment prospects (Thomas and Zhang 2005). Similarly, the decision to live at home during college as a cost-saving measure may reduce student engagement in the campus community and make successful degree completion more difficult (Institute for Higher Education Policy 2008). The decision to work during school to minimize borrowing could be modeled as a trade-off between higher current income y_1 and lower probability of success p . Students will choose a combination of cost-saving and/or income-enhancing measures, out-of-pocket spending, and borrowing to maximize utility. The appendix illustrates this intuition with an example.

One important implication of this model is that students with higher psychological debt aversion to the next dollar of debt may seek to reduce the total cost of attendance, increase out of pocket spending, or both in order to reduce total borrowing. In reality, however, many students are income constrained (so $TC - s_p - d_p > y_1$), leaving a reduction in the cost of attendance as the only remaining means of reducing d up to the point where the marginal reduction in the pecuniary and non-pecuniary costs of debt equal the marginal decrease in the probability of college completion. Therefore, the model predicts that students who report a lower willingness to borrow but who have similar preferences and family income levels as other students should be more likely to adopt cost-saving measures.

3.3.3 Debt aversion, gender, and race and ethnicity

This model does not directly speak to the role of gender or race and ethnicity on educational financing choices, but empirical evidence suggests that key parameters in the model may vary along these dimensions.

In regards to cost aversion broadly, three parameters of particular interest can be considered. First, women may exhibit greater risk aversion on average, although the literature is somewhat mixed on this topic. Jianakoplos and Bernasek (1998) find that women are less likely to express interest in taking on above average risk in the Survey of Consumer Finances.²⁶ Gender differences in risk aversion would predict differences in cost aversion through expected utility. An individual who is more risk averse, all else equal, will report lower expected utility from the same expected earnings than an individual who is less risk averse. Lower expected utility reduces the incentive to invest in education.

Second, the perceived probability of successful college completion p may differ by gender or race and ethnicity on average, although the direction of this difference is unclear *a priori*. On one hand, female students in the HSLs dataset used in this study have higher high school GPAs than male students on average (see Table 3.3), which may be expected to translate into greater college preparedness. Women—particularly Black and Hispanic women—have higher college graduation rates conditional on enrollment than their male counterparts (Shapiro et al. 2017). At the same time, Black and Hispanic students overall have lower graduation rates than White students (Shapiro et al. 2017).

These outcomes may or may not align with students' *confidence* about their ability to complete college. Beyer and Bowden (1997) find that women are significantly less likely on average to predict success in a task seen as masculine, whereas men and women's self-reported probability of success did not differ for feminine or neutral tasks. These results suggest that, on average, women may predict a lower probability of successful college completion (if college is seen as involving

²⁶Some work has argued that risk aversion differences are heavily dependent on context (Eckel and Grossman 2008; Schubert, Brown, Gysler, and Brachinger 1999). See Van Staveren (2014) and Charness and Gneezy (2012) for a review of other risk aversion studies.

a mix of task “types”), reducing the expected net gain of education and thus female students’ willingness to invest in education for a given α .

Finally, differences in the educational premium α would translate into different outcomes by gender as well as by race and ethnicity. The direction of this difference is again unclear. On one hand, female-dominated majors and occupations are well known to be lower paid than male-dominated occupations on average. For example, according to May 2016 BLS National Occupational Employment and Wage Estimates, workers in (male-dominated) computer and mathematical occupations earned an average annual income of \$87,890, whereas elementary and middle school teachers (female-dominated occupations) earned an average annual income of \$59,270.

On the other hand, a relevant question is also whether the net benefit of college is greater for male or female students on average within the same disciplines. Jacob (2002) finds that women’s greater likelihood of enrolling in college can partly be explained by greater average college premiums (measured by the difference between the median weekly earnings of college and high school graduates of the same gender, in the same state, and in the same occupation as the respondent). These two factors would both affect α and the expected net gain of education for a given p , albeit in different directions. Similarly, persistent racial wage gaps have been documented (Chetty, Hendren, Jones, and Porter 2018), and Black and Hispanic women face greater wage gaps than White, Non-Hispanic women relative to White men (Institute for Women’s Policy Research 2017a). Therefore, if college education provides a greater net return for Black or Hispanic students, they should be less cost averse than their White, Non-Hispanic counterparts (or vice versa).

These factors all influence cost aversion generally. As mentioned above, determinants of cost aversion should not be fully dismissed in the analysis of debt aversion because many students are income constrained and must borrow to cover at least part of educational expenses. Are there reasons to expect differences regarding aversion to debt specifically among female and male students? Most researchers have argued that the lifetime income effect of student debt should only be a trivial source of debt aversion. Even relatively high levels of student debt are low compared to lifetime earnings and the earnings premium associated with college education (Rothstein and Rouse 2011).

However, in the short-run, repayment constraints may lead to debt aversion, a mechanism that is not captured in this theoretical model. Students may fear that their income flow immediately after college (even if higher than what it would be without a college degree) will be insufficient to repay their debt while maintaining a desired level of consumption. In the presence of credit constraints, this could be enough to discourage borrowing (Minicozzi 2005; Rothstein and Rouse 2011). If female students or minority students predict lower levels of earnings post-college than other students, this concern is more likely to be binding.

Female students may also internalize social cues suggesting that women are less financially competent and may be more likely to lack self-confidence in regards to borrowing. As noted in the Introduction, the myth of the “female credit abuser” was widespread when installment credit was introduced in the United States and may remain prevalent today (Calder 2009). Several studies have found that women and female college students specifically continue to have less confidence in their personal financial literacy (Chen and Volpe 2002; Goldsmith, Goldsmith, and Heaney 1997). Others have cited women’s perceptions of stereotypes portraying women as unfit for financial decision-making (Danes and Haberman 2007). Consistent with the stereotype threat literature, this perception that household finances should be managed by men may result in a woman having lower financial literacy scores (e.g., Carr and Steele 2010). Hamilton and Darity Jr. (2017) argue that Black and Hispanic individuals are also stereotyped as financially illiterate when discussions of racial wealth gaps emphasize the role of individual choice.

Female high school students may be particularly susceptible to these social messages if they observe gender differences in financial decision-making at home. In fact, a study of about 250 undergraduate students found that students more often recalled fathers being responsible for, teaching, and modeling financial tasks more often than women, although the sample disproportionately represented students from a “traditional” family structure (90% were from two-parent homes, of which nearly 50% had a single male income earner) (Clarke, Heaton, Israelsen, and Eggett 2005). This difference in financial confidence and gendered views of financial decision-making could result in women experiencing greater psychological costs of borrowing. If making financing deci-

sions is seen as culturally masculine, doing so may be in conflict with young women's perceived group identity (Akerlof and Kranton 2000). In addition, there may be unobserved costs of debt on the marriage market. Addo (2014) finds gender differences in the relationship between credit card and student debt and the likelihood of marriage versus cohabitation. Women with educational debt are more likely to transition into cohabitation rather than marrying, while the same effect does not hold for men, potentially reflecting a marriage market penalty for indebtedness among women.

In explaining variation by race and ethnicity, previous work on debt aversion has also cited cultural differences in views of debt and concerns about immigrant status that discourage families and their students from engaging with financial services (Institute for Higher Education Policy 2008). The financial exclusion literature has documented some of these gaps, with Black and Hispanic households being two to three times more likely to be "unbanked" (i.e., to not hold checking or savings accounts) (FDIC 2015).²⁷ Limited familiarity or comfort working with financial services may be represented in the model as an unobserved, non-pecuniary cost of debt.

Women now represent a majority of U.S. college students and are the primary holders of student debt. Similarly, Black women are a rapidly growing portion of college students, and they hold the highest levels of student debt AAUW (2017). These contradictions between observed trends and debt aversion theory suggest that unobserved variation in other preferences beyond debt aversion clearly play an important role in college outcomes. In particular, a highly debt-averse female student may nonetheless be more likely to attend college than a less debt-averse, otherwise similar male student, if there is some overriding, possibly non-pecuniary preference for college attendance. Female students or students of color would then be more likely to make other cost-minimizing choices to accommodate those debt preferences without sacrificing enrollment. This possibility is discussed in more detail in Section 3.6 below.

²⁷See Chapter 2 for a review of this literature.

3.3.4 Parental spending and borrowing

In the above models, parental contributions towards the total cost of attendance are assumed to be exogenous to the student decision, and students are assumed to always choose a total cost of attendance that is higher than parental contribution. In reality, parents clearly play a role in the student's decision-making process and are also influenced by the student's preferences and beliefs. In the High School Longitudinal Survey data used in this analysis, 71.8% of students had one or more conversations with their parents about financial aid by 11th grade, and a plurality of students (44.8%) cite parents as the main influence on their educational plans after high school.

The basic intuition for a model that endogenizes parental educational spending can be described informally. Suppose that students' utility is a weighted sum of utility from their own consumption and their parents' utility in both periods and that students divide their second period income between discretionary consumption and gifts to parents in old age. Parents' utility is similarly a weighted sum of their own and their children's utility. Parents and students simultaneously solve their respective problems: Students choose total educational expense, funding via debt, funding via current expenditures, and gifts to parents in the second period. Parents choose funding via debt and funding via current expenditures. Two channels create an incentive for parents to invest in their student's education: the direct benefit to their child's utility as well as the indirect effects of educational investment on the probability of student success, which increases the child's expected earnings in the second period and thus their optimal contribution to parents, all else equal.

This model also suggests that parents may be less willing to borrow or spend for particular students. If female students or students of color on average have a lower (or higher) perceived probability of success p or educational premium α than other students (see evidence above) or if parents *perceive* this to be the case, the incentive for parents to invest in a female student's education is lower (higher), all else equal. Whether we would expect such a relationship to exist and its direction are empirical questions as discussed in the previous subsection. Therefore, the model does not make a clear *a priori* prediction regarding student gender differences in parental cost aversion but does speak to the possibility of such differences. Particularly high non-response

rates regarding parental willingness to borrow and ability to pay for education precludes a full recursive modeling of the relationship between student and parental willingness to borrow. In the reduced form specification, controls for family income and education should therefore serve as proxies for parental contribution (see Section 3.4 below). To the extent that parental perception of male or female students' probability of success varies from their children's perception, their degree of cost aversion may appear in the empirical analysis as unexplained student debt aversion.

3.4 Data and empirical strategy

3.4.1 High School Longitudinal Survey

The data for this study are drawn from the 2009-2013 waves of the High School Longitudinal Survey (HSLs), a study conducted by the National Center for Education Statistics. The survey has a stratified two-stage random sample design. In the first stage, schools were drawn randomly in proportion to the state's population from 48 region-school type-locale strata. This stage produced 1,889 eligible schools, of which 944 chose to participate. In the second stage, students were drawn randomly within four race strata in each school to purposefully oversample some students by race and ethnicity. This yielded a sample in the base year of 25,206 eligible students, of whom 21,444 students chose to participate.

The survey has a panel structure with four waves conducted so far. In the base year (2009), all students in the sample were 9th graders. Follow-ups were conducted in 2012 (11th grade), in 2013 (high school graduation) with high school transcripts added, and finally in 2016 when students were three years out of high school. Additional follow-ups are planned as part of the HSLs, including a 2025 follow-up augmented with postsecondary transcripts. The 2009 through 2013 waves are used in the present analysis.

Data are reported at the school and student levels, with questionnaires administered to students, parents, school administrators, math and science teachers, and school counselors. The questionnaires, augmented with transcript data, elicit information on a wide range of topics including detailed school characteristics, family background, student performance by course topic, student

expectations and knowledge about college, and student behaviors outside of the classroom (e.g., how often the student has read science books). Response rates from school officials and students are relatively high (between 85% and 95%), but the response rate is significantly lower among parents (67.5%).

To account for non-response bias and variation introduced by sampling design, the HSLs includes sampling weights. As discussed in more detail below, sampling weights are used in one specification to estimate the average treatment effect on the treated. However, because the literature on propensity score matching does not suggest using weights in the propensity scoring model, all summary statistics are also presented without the use of sample weights (DuGoff, Schuler, and Stuart 2014). As a result, caution should be taken before generalizing sample summary statistics to the population of U.S. high school students. Selected weighted summary statistics are reported in Appendix 3.1.

For this study, the HSLs has two key strengths. First, it directly elicits information on students' attitudes about borrowing and their other expectations, such as their expected income with various degrees. This subjective information allows for direct assessment of willingness to borrow rather than reliance on observed outcomes. Second, its panel structure allows me to connect student's *ex ante* expectations and preferences with their *ex post* outcomes.

3.4.2 Variables of interest

The key variable of interest is the student response to the following question from the 2012 follow-up (when students are in 11th grade) about his or her maximum "willingness to borrow" (WTB):

"What is the maximum amount you [are/would be] willing to borrow per year to pay for school or college?"

The possible responses are interval-valued. Respondents pick from categories ranging from "None," "\$1 - \$500", "\$501 - \$1,000," up to "More than \$35,000." Importantly, respondents can also report that they "don't know" their WTB. A large portion of respondents state that they don't

know their WTB (36.9% of student respondents and 44.3% of parent respondents in the subsample of respondents who have non-missing responses for the variables of interest and controls). All students are asked this question, and 86.8% of all surveyed students respond.²⁸

The histograms in Figures 3.1 through 3.3 present the unweighted distribution of student respondents' willingness to borrow conditional on knowing their WTB. Weighted histograms can be found in Appendix 3.1. Because the dependent variables of interest include both the college enrollment outcome and outcomes that are conditional on college enrollment, separate histograms are presented for the full analytical sample and the sample of enrolled students. The figure illustrates that students with lower WTB are less likely to enroll in college, although, for reasons discussed in more detail below, this is only suggestive of a negative enrollment effect of debt aversion.

Figures 3.2 and 3.3 present histograms of student respondents' willingness to borrow conditional on knowing their willingness to borrow by gender and by race and ethnicity.²⁹ Women are no more likely to respond that they "don't know" their willingness to borrow (37.2% of women and 36.63% of men, with $p = 0.601$ for the difference of means) despite being significantly more likely to have searched for college information (see Table 3.3 below). The gap by race and ethnicity is larger: 38.2% of White students and 33.9% of Black or Hispanic students do not know their willingness to borrow ($p = 0.002$).

The figures provide suggestive evidence that there are racial and gender gaps in WTB. A greater proportion of men and White students who know their willingness to borrow report a WTB of greater than \$5,000 than women and Black and Hispanic students, who are more represented in the lower end of the positive WTB categories. Importantly, however, men are also overrepresented among those with zero WTB. All of these differences are individually statistically significant at the 1% level, and the WTB categories are jointly significant predictors of both gender and race and ethnicity at the 1% level.

²⁸Parents respond to an analogous question, but due to low parental response (33.1%), parental WTB is not incorporated in the empirical model.

²⁹The racial component of this analysis focuses on Black and Hispanic students and White students due to the small sample size of other racial and ethnic groups.

The second research question of interest in this analysis involves how debt aversion impacts students' college choices. Specifically, do more debt-averse students 1) enroll in college at lower rates, 2) actually borrow less than their less debt-averse counterparts if they do enroll, and 2) make college choices that reduce the net cost of attendance? The 2013 follow-up offers detailed information on enrollment, borrowing, and college cost as of their first year post-graduation. Table 3.2 reports average unweighted outcomes for these variables of interest by gender and by race and ethnicity. Net cost of attendance is defined as the difference between the total cost of attendance (tuition, fees, and room and board) and any merit- or need-based grants or scholarships. Net cost may be negative if grant funding exceeds the cost of attendance. Both borrowing and net cost of attendance refer to expenses for the 2013-2014 academic year only.³⁰ Continuous variables are essentially top- and bottom-coded, with sparse values being approximated to similar values to limit disclosure risk.

Women and White students are the most likely to be enrolled in college and have higher costs of attendance. This gap is particularly large by race and ethnicity, with Black and Hispanic students attending colleges and universities that are on average 25% less expensive than those of White students. However, Black or Hispanic students *borrow* more: Their total borrowing is equal to 42% of the net cost of attendance on average, compared to 27.5% for White students, 29.9% for Women, and 26.6% for Men. Although the generalizability of these summary statistics is limited because sample weights are not used (see Section 3.4.1), this result is in line with previous work noting that Black students (and particularly Black women) borrow more for college than White students on average (AAUW 2017).

³⁰Sample sizes vary by outcome for two reasons. First, questions relating to the net cost of attendance and total borrowing are conditional on enrollment. Second, there is significant non-response to particular questions. While some respondents do not respond to any questions in a particular wave ("item non-response"), others indicate that they "don't know" the answer to a particular question or simply skip questions altogether ("missing"). For example, 43.05% of respondents in the full analytical subsample have a missing value for the amount borrowed for the 2013-2014 academic year: 14.19% skipped the question "legitimately" (i.e., they were not enrolled in college), 2.33% had "short interviews" that skipped this question (e.g., they agreed to complete abbreviated paper-and-pencil questionnaires rather than the web survey), 24.82% did not know the amount borrowed, and 1.71% were marked as missing. The HLSL imputes values for some variables to mitigate the data loss of non-response.

3.4.3 Identification strategy and empirical model

The theory outlined in Section 3.3 points to an immediate identification problem when connecting stated WTB as a measure of debt aversion to outcomes. Consider two students who have the same utility function, expect the same earnings premium, attribute the same non-pecuniary amenities to college enrollment, but experience different non-pecuniary costs to holding debt. The model illustrates that in the *ex ante* decision-making process, students simultaneously optimize over financing options and total cost. The relatively more debt-averse student will optimally choose lower total borrowing, possibly by choosing lower-cost educational options. Causality runs from exogenously determined and unobserved debt aversion to both borrowing and educational options.

However, in the HSLs data, the researcher does not observe the decision-making process, but rather the *ex post* outcome of that decision as embodied in willingness to borrow. It is possible that eleventh-grade students have already begun choosing lower-cost (higher-cost) options and that this choice is reflected in a lower (greater) *need* to borrow. To the extent that this stated WTB reflects existing plans that are driven by debt aversion, the negative correlation between WTB and outcomes is not spurious. By contrast, if (as theory suggests) WTB simultaneously reflects existing plans that *are* driven by the student's expected benefits from college, valuation of a college education, or exogenously determined probability of college enrollment, the correlation will be spurious as well as negative. Students who do not value higher education will be more likely both to not attend college and to report a low willingness to borrow.

An ideal identification strategy would develop an instrument to estimate the effect of WTB on outcomes: a student characteristic that is a determinant of debt aversion while being uncorrelated with the error term of the regression (i.e., uncorrelated with other college preferences). Neither theory nor previous empirical work suggest a valid instrument due to the strong interrelation between parental income and values, student income and values, and student college enrollment. In their study of the effect of debt aversion on observed borrowing among undergraduates, Oosterbeek and van der Broek (2009) use parental debt aversion as an instrument for student debt aversion and find a negative relationship between debt aversion and observed borrowing. As they note, this

strategy assumes that parental attitudes towards debt only influence student borrowing through the transmission of debt aversion.

Two considerations discourage the use of an analogous instrument in this case. First, high parental non-response means that use of this instrument would reduce the sample dramatically at the cost of statistical power. Second, the identifying assumption seems unlikely to hold among high school students. If parental WTB is influenced by their own views of the earnings premium or non-pecuniary amenities premium that will accrue with education, it is likely that parental WTB similarly confounds college preferences with debt aversion.

As a second-best, I adopt a propensity score matching approach. Typically, this approach corrects for non-random allocation of study participants to treated and untreated groups by matching individuals by their probability of being treated (propensity score). When the treatment is binary (treated or untreated), the propensity score is generated using predicted probabilities from a logit regression in which the covariates are factors that influence both probability of treatment and the outcome of interest. The average difference in outcomes between matched treated and untreated individuals is an estimate of the average treatment effect if the appropriate conditions hold, discussed in more detail in Section 3.5 below. The advantage of the propensity scoring model is that it makes less restrictive assumptions about how the covariates affect the outcome of interest and provides a single-dimensional basis for identifying “similarly situated” respondents.

In this study, the “treatment” is psychological debt aversion as measured by having a relatively low or high WTB. Low or high WTB is defined in terms of the four aggregated WTB categories discussed above. The four treatment groups are students with WTB of zero, \$1 to \$2,000, and more than \$15,000 as well as those students who “don’t know” their WTB. The control group in each case is made up of students with a WTB of \$2,001 to \$15,000. While formal dose-response models with ordinal treatments have been developed (Imai and Van Dyk 2004), they have not been operationalized, and Caliendo and Kopeinig (2008) note that a series of binomial models can be used to avoid the computational intractability of a multinomial model.³¹

³¹The four treatment groups were chosen in part on the basis of sample size. However, an alternative specification has been tested with additional treatment categories (i.e., zero WTB; \$1 to \$1,000; \$5,001 to \$15,000; \$15,001 to

For each binomial model, I calculate propensity scores using a logit regression model with covariates discussed below. Treated (more or less debt-averse) individuals are then matched to the five untreated observations who are “nearest neighbors” in terms of propensity score with replacement using the STATA module *teffects psmatch*.³² The difference in outcomes (e.g., college enrollment) between treated and untreated individuals in the matched sample is the estimate of the average treatment effect on the treated.

Comparing students’ stated WTB with their other plans for paying for college provides a first sense of the empirical relevance of confounding factors such as parental contributions. Table 3.1 reports the responses of students to a series of questions on how they will or would pay for college, disaggregated by WTB category. Students with low WTB are more likely than their control group and high WTB counterparts to report that they will pay for college out of their own earnings. We would expect students with low WTB to rely more on earnings or savings than those willing to take on more debt. However, this relationship does not hold for those with zero WTB. They are, by contrast, as likely as or more likely than other groups to rely on parental contributions and the least likely to use any form of loans. This suggests that students with zero WTB disproportionately includes students who have sufficient family resources to fund their education without incurring debt. This variation would confound the determinants and effects of debt aversion without the propensity score matching procedure to correct for family background. Students who do not know their WTB generally have plans that are reminiscent of those of the students with the lowest WTB, except that they are more likely to be uncertain of their payment plans than to respond negatively to each potential payment option.

3.4.4 Propensity scoring model covariates

In selecting variables for the propensity scoring model, I draw from the theory outlined in Section 3.3 and from previous empirical work regarding debt aversion, college enrollment, and

\$35,000; more than \$35,000; and “don’t know” as the treatment groups, and \$1,001 to \$5,001 as the control group) that produces many of the same results as the preferred specification.

³²A small number of observations in some models are matched to six nearest neighbors instead of five.

other college-related choices. Controls are listed in Tables 3.3 and 3.4. All controls are drawn from the base year or 2012 follow-up unless otherwise indicated.

Family background is expected to be an important determinant of overall pecuniary and non-pecuniary value attributed to college by students. Students from high-income families or whose parents have advanced degrees may be more likely to attend college and may place higher value on certain aspects of college choice (e.g., private over public, living on campus over living at home). These students may also have greater access to college and greater knowledge about college and financial aid opportunities. Subsequently, controls for family income, household size, parental education levels, and parent citizenship status are also included.

Theory suggests that the expected pecuniary benefits of college enter into students' financing and educational cost decisions. The HSLs includes rich data relevant to this point. I use students' expected earnings to construct two net expected return variables. First, expected return from higher education is calculated as expected earnings after graduation with a bachelor's degree minus expected earnings after receiving a high school degree. This assumes that all students would seek a four-year degree, when in fact some students may pursue two-year degrees or more advanced degrees which may influence their willingness to borrow. I also test specifications with a second measure of expected benefit that incorporates students' expectations about the highest degree they will pursue, although this narrows the sample to students who report plans to attend college. For a student who expects to earn a master's degree, the net return to education would be calculated as the difference between expected earnings with a master's degree and expected earnings with a high school diploma.

GPA plays an important mediating role on the influence of the expected earnings premium. Students with higher GPAs will likely have improved access to college and lower financial need due to scholarship funding. They also have a higher subjective expected probability of success. Therefore, students with high expected earnings premium and low GPA will likely continue to perceive lower need to borrow and be less likely to enroll in college than students with high expected

earnings premium and high GPA. I consequently include GPA as well as the interaction of GPA and expected earnings premium as covariates in the propensity scoring model.

The large proportion of students who report that they “don’t know” their WTB speaks to the importance of controlling for college knowledge. Burdman (2005) reports that many students do not complete the FAFSA and thus do not borrow because they do not know how to complete the form or what subsidized borrowing is available. Therefore, a lack of institutional and financial knowledge can be associated with greater hesitancy in borrowing. Moreover, female and male students exhibit important differences in college preparedness, as illustrated in the summary statistics below, which may confound observed differences in debt aversion. In the HSLs, students answer various questions relating to financial and college knowledge. I use students’ eleventh-grade (2012) responses to whether they have searched the Internet for college information.

When conducting the propensity score matching analysis for net cost of attendance and college borrowing, I also account for two additional sources of variation. The amount of merit- and need-based grant and scholarship funding captures variation in need to borrow. With this control, a reduction in the net cost of attendance, for instance, that is found to be associated with a particular debt aversion treatment can more readily be attributed to cost-reduction measures than to a larger financial aid package. I also include a binary control for whether the 2013 survey is completed by the parent or the student. Parents who answer the survey and are able to provide a (non-missing) response to the borrowing or net cost questions are more likely to have been involved in the student’s process of financial decision-making and even to have contributed to their financial costs through borrowing or out-of-pocket spending, all else equal.

Finally, I introduce geographic information in two dimensions (region of the U.S. and type of locality) in order to control for differences in community attitudes towards college as well as the cost of living. Locales are categorized according to the following Census Bureau definitions:

- *City*: territory inside an Urbanized Area (50,000 people or more) and inside a Principal City (largest incorporated place in a Census Bureau Statistical Area)
- *Suburb*: territory outside a Principal City and inside an Urbanized Area

- *Town*: territory inside an Urban Cluster (at least 2,500 but less than 50,000 people)
- *Rural*: Census-defined rural territory (i.e., not inside an Urbanized Area or a Urban Cluster)

Tables 3.3 and 3.4 present summary statistics of these controls by gender and by race and ethnicity. There are significant differences between male and female students that may be confounding the difference in unconditional mean WTB for men and women. Relative to male students, female students have, on average, higher GPAs, greater college preparation in terms of searching for college information, and lower self-predicted expected earnings premium. Most characteristics of Black and Hispanic students in the sample are statistically distinct from those of their White counterparts: Black and Hispanic students come from lower income families on average, are less likely to have parents with graduate or bachelor's degrees, are more likely to be in high schools in cities and suburbs, and have lower high school GPAs.

These covariates result in the following propensity scoring model:

$$Pr(WTB_i = 1|X) = F(\beta_G Gender_i + \beta'_R RaceEth_i + \beta'_F FamBG_i + \beta'_G Geo_i + \beta_{CK} CK_i + \beta_{EB} ExpBen_i + \beta_{GPA} GPA_i + \beta_{ExpGPA} ExpBen_i \times GPA_i)$$

The variables of interest for demographic differences are $Gender_i$ and $RaceEth_i$; $FamBG_i$ and Geo_i are row vectors of family background and geographic controls, respectively; CK_i is a dummy for having searched for college information; GPA_i is high school GPA; and $ExpBen_i$ is the expected earnings premium. For propensity score matching regressions corresponding to net cost and borrowing outcomes, grant/scholarship funding and whether the parent responded to the survey are included as covariates. The outcome variable WTB_i is a binary variable representing treatment status relative to the control group. The link function $F(\cdot)$ is the CDF of the logistic distribution. For each outcome, a separate logit regression is run for the three treatment groups previously discussed. The gender (race) analysis follows the same empirical model, but the sample is divided by gender (race and ethnicity).

3.5 Results

The results are presented in three sections. I first report results from the propensity scoring model on the determinants of willingness to borrow. This is followed by diagnostics to assess the quality of matching in the sample and then presentation of results on the effect of debt aversion on college outcomes from the matched and unmatched samples.

3.5.1 Logit regression results

Table 3.5 reports unweighted results from the logit regressions used to estimate propensity scores. Results are reported for the full sample of high school students as well as for the narrowed sample of students who enroll in college immediately after high school. The regression results for enrolled students presented here are those estimated using the sample of students with non-missing information regarding the net cost of attendance. There is some variation in sample size for the other outcome conditional on college enrollment due to apparently random non-response to the outcome-related survey question (see Section 3.4.2). The sample size shrinks by 8% to 17% if respondents with non-missing responses for the amount borrowed are used instead, and the results of the logit regressions are generally similar. As a result, these other regressions are not shown but are available upon request. In addition, results estimated using sample weights are included in Appendix C below.

The logit regression results suggest that female students in the sample are 8 to 10 percentage points more likely to have a low, positive WTB rather than to fall into the control group (relative to a mean proportion of students in the full sample with a low WTB of 25.4% when compared to the control group only). Notably, the estimate may be subject to selection bias, as female students in the sample are significantly less likely to report a known WTB. African American and Hispanic students in the sample are also more likely to report a low but positive WTB, in line with findings in the existing literature (Institute for Higher Education Policy 2008). These results are generally robust to the use of sampling weights, although the estimated effect of Hispanic ethnicity is smaller in magnitude and less precisely estimated.

Parental education and family income are also important predictors of WTB as theory would predict, but have differing effects across the WTB distribution.³³ In general, students with parents who have advanced degrees are more likely to have very high or zero WTB. These students may have a combination of strong college interest and high ability to pay that leads to low need but high willingness to pay, independent of concerns about indebtedness. Surprisingly, students from families with advanced degrees were more likely to be uncertain about their willingness to borrow. These students may not lack college information or financial confidence but may be waiting to learn about scholarship or grant funding. For example, students of parents in higher education may not have to pay for college *if* they enroll in the college where their parent is employed. The same result does not hold among students whose parent or parents have at most a bachelor's degree. These students are generally more likely to have a lower positive WTB rather than zero or high WTB.

Income plays a particularly important determining role in the middle of the WTB distribution. As family income increases, students become less likely to report a low but positive WTB rather than the control WTB (up to 10 percentage points less likely among the highest income groups), but this effect largely disappears when the sample is limited to students who enroll in college. Students from high-income backgrounds are also more likely to report zero WTB but not high WTB (above \$15,000). These results are less robust to the use of weights than other estimates (see Appendix C), although students from very high-income families remain more likely to have very low WTB.

Expected college benefits and college knowledge are also relevant. Students who actively searched for college information were significantly less likely to report a zero, low, or unknown WTB and were more likely to report a high WTB than a median WTB. In all cases, the estimate is of a greater magnitude among the full sample and appears to be less relevant among those who do enroll in college. Students who did not search for college information may have already had little

³³Parental education controls are collapsed for the enrolled regressions to avoid perfect prediction due to the smaller samples associated with those outcomes.

intention of enrolling. Students with a greater high school GPA were slightly less likely to report a low positive WTB than a median WTB, but GPA is less relevant to being at the high or low ends of the distribution.

3.5.2 Balance diagnostics

Two assumptions must be valid for the propensity score matching strategy to produce an unbiased estimate of the real treatment effect (i.e., for non-random selection into the treatment and control groups to be “strongly ignorable” [Rosenbaum and Rubin 1983]). First, the overlap condition (also called the common support assumption) requires that for every set of possible values of the covariates, there is a positive probability of being either treated or untreated in the unmatched sample. In other words, no combination of covariates can perfectly predict treatment or non-treatment in the sample.

The validity of this assumption can be tested by visual inspection of the density functions describing the distribution of propensity scores among the treated and untreated groups. The overlap condition may be violated if the maxima and minima of the distributions differ before matching or if the distribution of treatment and control groups are skewed in different directions (Caliendo and Kopeinig 2008). Trimming observations that fall outside of the range of common support is advised as long as dropped observations represent a small portion of the total sample.

Figure 3.2 presents these density plots estimated using the STATA *teffects psmatch* module’s default triangle kernel density, with density estimates calculated for every point in the unmatched and matched samples. Separate density functions are estimated for both of the enrollment-conditional outcomes due to minor differences in sample size across outcomes resulting from non-response. The densities of the unmatched (“raw”) samples illustrate that there are no major differences in the maxima, minima, or modes of the distributions. In addition, the user-created STATA module *psmatch2* reports that no observations fall outside of the region of common support for any of the outcome-treatment combinations (Leuven and Sianesi 2003).

The density functions for the matched samples also provide evidence of the general quality of matching, although the relevance of this indicator with respect to misspecification of the propensity scoring model is debated in the literature (Austin 2009). Nearly identical distributions of treatment and control group propensity scores in the matched sample indicate that the average propensity scores for control observations matched in nearest neighbors matching are relatively close to the propensity score of the treated observations. Notably, in the case of the low positive (\$1 to \$2,000) and zero WTB treatment groups, the quality of matching does appear to deteriorate somewhat at the high end of the propensity score distribution.

The second identifying assumption is conditional independence, which requires that, conditional on the propensity score, all covariates should be independent of the probability of treatment. If differences in the covariates persist across treated and untreated groups after matching, the propensity scoring model may be misspecified.

Several possible diagnostics for the validity of this assumption have been proposed (Austin 2009; Caliendo and Kopeinig 2008) and are presented in Table 3.6. First, t-tests can be used to test the statistical significance of differences in the means of each covariate between the treated and untreated groups. In the unmatched sample, most of these covariates should be significant, as theory suggests that they are predictors of treatment status. In the matched sample, few if any significant differences should be found. The number of covariates with statistically significant differences in means in the matched and unmatched sample are presented in Column 1 of Table 3.6.

Austin (2009) critiques this approach, arguing that a t-test is inappropriate for comparing matched and unmatched samples that have different sample sizes. Therefore, an insignificant difference in means for the matched sample may represent significant reduction in bias or simply a loss of statistical power. As a result, the author suggests instead comparing the standardized differences in means between the treated and untreated groups in the matched and unmatched samples. The standardized difference (also called standardized bias [Caliendo and Kopeinig 2008]) indicates the difference in a covariate across treated and untreated groups, scaled by the variance of

the covariate in both groups. Compared to t-tests, this approach avoids the problem of variation in sample size but lacks a widely agreed upon criterion for “excessive” bias. Caliendo and Kopeinig (2008) argue that generally “a bias reduction below 3% or 5% is seen as sufficient” (15), while Austin (2009) allows for up to 10% standardized bias. I adopt the 5% criteria as a moderately conservative cut-off point and report the number of covariates with standardized bias exceeding this threshold in Column 2 of Table 3.6. Column 3 presents mean standardized bias across all covariates for a more holistic appraisal of bias in the matched sample.

Finally, Austin (2009) uses evidence from Monte Carlo simulations to argue that the variance ratio of continuous covariates between the treated and untreated groups is a relevant criterion to assessing whether the propensity scoring model is properly specified. Continuous covariates that have low standardized bias in means but exhibit significant distributional differences may indicate a misspecification of the model that may be addressed by introducing interaction terms (Austin 2009). As noted above, three or four continuous covariates are used in the scoring model of this analysis depending on the outcome being considered (high school GPA, expected earnings premium from a degree, the interaction of these covariates, and the amount of grant/scholarship funding). The number of covariates with variance ratios significantly above or below one based on the appropriate F-distribution (implemented by the STATA module *psmatch2*) are reported in Column 4.

Overall, the various diagnostics suggest successful matching, with some important caveats. Regardless of outcome or treatment, none of the matched samples exhibit statistically significant differences in covariates, and mean standardized error is consistently below about 3%. As reported in Column 2, however, there are some covariates that maintain standardized differences of more than 5% across outcomes.³⁴ This occurs most commonly among the zero WTB group in each sample, specifically with covariates indicating family income, household size, and student race/ethnicity. In addition, variance ratios for some continuous covariates do exceed one, particularly for the zero and low positive WTB groups.

³⁴A detailed report on standardized bias by covariate for each outcome and treatment is available upon request.

Despite these concerns, there is reason to believe that they do not pose a critical problem for identification. First, in all these cases, the average standardized bias in the matched sample remains less than 5%. Second, in some cases, the covariates with higher standardized bias are not major predictors of treatment status. For example, household size is included in the propensity scoring model along with income to control for households' actual purchasing power. While the standardized bias of household size actually increases with matching, it is not statistically significant in the logit regressions discussed in Table 3.5, and a theoretical channel by which it would directly affect enrollment is unclear. As cited by Austin (2009), Ho, Imai, King, and Stuart (2007) argue that achieving balance as measured by very low standardized bias is most critical for covariates that are important predictors of outcomes. Third, some covariates that remain unbalanced are also those that have been hypothesized to be related to greater debt aversion in the literature. In some specifications, the negative bias in the representation of students whose parents are U.S. born among those in lower WTB treatment groups remains above 5% after matching. The Institute for Higher Education Policy (2008) report suggests that national origin may be related to cultural differences in attitudes towards debt or variation in experience using financial services, factors that are linked to debt aversion. As a result, some of the evidence of unsatisfactory matching may point to persistent differences that are in fact related to the treatment of interest (debt aversion).

3.5.3 Propensity score matching results

Figures 3.3 and 3.4 present three sets of estimated treatment effects for the four treatments relative to the control group. For all estimates, bars indicate 95% confidence intervals. The grey circles represent the difference in outcomes between the treated and untreated groups without matching or controls. This “naive” estimate should be seen as an upper bound on the true average treatment effect on the treated (ATET) due to the likely presence of confounding factors such as valuation of college and ability to pay.

The grey bar represents estimates using the preferred propensity score matching method with standard errors adjusted for the use of predicted values as described in Abadie and Imbens (2006, 2011) and operationalized in the STATA module *teffects psmatch*.

Finally, the third set of points (black squares) report the results from propensity score matching using sampling weights but not implementing the Abadie and Imbens standard errors. The appropriate use of sampling weights in propensity score matching techniques is not clear in the econometric literature, with few papers (Austin, Jembere and Chiu 2016; DuGoff, Schuler, and Stuart 2014) making explicit recommendations. The estimates presented here draw on the recommendations of DuGoff, Schuler, and Stuart (2014) by running the propensity scoring model without weights. Sample weights are not relevant to the matching procedure because the focus in that stage is on comparing attributes within the sample to form a counterfactual group rather than making population-level inferences. The regression of treatment group on outcomes in the matched sample is then conducted with sampling weights.

The estimates with sampling weights are the most conservative, generally with the smallest effect size and largest standard errors, although the direction of the estimated effect agrees in most cases with the unweighted estimates. In some cases (e.g., Figure 3.8), some of the results with sampling weights have been omitted to maintain the clarity of the diagrams. Such cases were limited to situations where the estimate was large but extremely imprecisely estimated and statistically indistinguishable from zero. The limited literature regarding sampling weights in propensity score matching leads me to prefer the Abadie and Imbens robust standard error (AI) estimates to the weighted estimates.

Much as the naive estimates can be seen as an upper bound on the effect size of debt aversion on each outcome, the AI estimates can be seen as a lower bound. The use of the matched sample has the advantage of mitigating the impact of confounding factors. However, as noted in Section 3.5.2, it may also eliminate some of the variation of interest. For example, family income is clearly correlated with ability to pay and thus need to borrow for education. Income may also be a predictor of pure debt aversion, if students from lower income families are more likely to

worry about debt or to be unfamiliar with financial services. As a result of these overlaps, the propensity score matching approaches should primarily capture idiosyncratic psychological debt aversion—any debt aversion that remains after matching on observables.

Figure 3.3 reports results for college enrollment outcomes. The naive estimates suggest that students with zero and low but positive WTB are about four percentage points less likely to be enrolled in college during the first year following high school graduation. Those with a high WTB are more likely than the control group to enroll in college in the unmatched sample. The negative effect on college enrollment for the zero WTB treatment group is robust to using the AI matched estimates, but the magnitude of the effect shrinks and becomes only marginally significant for the low WTB group. The mean proportion of enrolled students in the zero WTB treatment group compared to the control group alone is 84.0%, resulting in a relative treatment effect size for the zero WTB group of 5.6% of the mean.

Figure 3.4 reports results for the ATET of WTB on the net cost of attendance and amount borrowed, conditional on college enrollment. As expected, the naive estimates suggest that students with zero WTB attend higher-cost colleges, likely due to their family's ability to pay.³⁵ When family background is accounted for, however, the effect size falls to zero. By contrast, students with a low but positive WTB do appear to enroll in colleges with a net cost of about \$1,500 less than the control group, and those in the high WTB group pay about \$3,400 more than control group students. Students who did not know their WTB also attend higher-cost colleges.

Borrowing follows the expected pattern, with the most debt-averse students borrowing the least and the most debt averse borrowing more than the control group. These results are robust to matching. Students who do not know their WTB are similar to the control group, suggesting that their borrowing on average is similar to that of a student with a median WTB.

³⁵Family ability to pay may also reduce financial aid availability and lead to a higher net cost.

3.5.4 Analysis by gender and race and ethnicity

The same propensity score matching analysis as described above is conducted on the male and female subsamples separately as well as on the Black or Hispanic and White subsamples. Selected balance statistics are available in Appendix D. While the matching overall appears to be of good quality and average standardized bias remains below 5%, there are some subgroups in which there are several specific variables above the 5% standardized bias threshold. The quality of matching is worst for the zero WTB treatment group of Black and Hispanic students.

Figures 3.5 and 3.6 graphically present the propensity score matching results for college attendance by gender and by race and ethnicity. Female students' college attendance is less sensitive to strong debt aversion than that of male students. Men are 7.8 percentage points less likely to enroll in college if they report no willingness to borrow, even after matching on observed characteristics, while women exhibit no statistically significant effect. Similar results hold by race and ethnicity, with Black or Hispanic students showing less responsiveness to strong debt aversion than White students. However, the results are less precisely estimated, so the effect size for Black or Hispanic and White respondents overlap significantly. Together, the results suggest that Black and Latina women may be the least sensitive to stated debt preferences. Small sample size precludes a joint analysis of race and gender.

This result points to several possible interpretations. Female students and students of color who report a low willingness to borrow may experience more change in their preferences than other students between survey waves or may interpret the question differently. Alternatively, these students may be using different strategies to accommodate their debt preferences than male students. If female, Black, or Hispanic students have an overriding preference for college attendance or perceive greater gains from college attendance (e.g., marriage market or non-pecuniary benefits), then they may instead adopt cost-minimizing measures once enrolled or simply incur the psychological cost. The unobserved benefits of incurring debt may also extend to employment. Although the expected earnings premium is observed, White male students may feel more confident that they will be able

to obtain employment without a degree, compared to similarly situated women and students of color.

To investigate the possibility that these demographic groups adopt different cost-minimizing measures, the gender- and race-disaggregated propensity score matching analyses are repeated for the borrowing and net cost outcomes, and results are presented in Figures 3.7 and 3.8. Most effects are statistically indistinguishable by gender and by race and ethnicity. However, women with zero WTB who do enroll in college cut their borrowing by more relative to the control group than men: Women borrow about \$3,600 dollars less for their first academic year than the control group, compared to \$1,300 for men. There is suggestive evidence of a similar difference by race and ethnicity, but the gap is smaller. The average treatment effect of strong debt aversion (zero WTB) on the net cost of attendance is large in magnitude for Black or Hispanic students (about \$3,200), but is very imprecisely estimated.

For women with zero WTB, the reduction in borrowing is accompanied by an increase in the net cost of attendance of about \$1,800. The same effect does not hold for men, nor is there evidence of similar heterogeneity by race and ethnicity. If the goal of highly debt-averse students is to reduce borrowing conditional on college enrollment, it is not clear why debt-averse female students—who exhibit the largest response in terms of reduced borrowing—would also attend more costly colleges than female students in the control group after accounting for grant and scholarship funding. One possibility is that the treatment effect is capturing *parental* willingness to borrow or pay out of pocket for college. The effect may differ by gender if the parents of female students are more willing to contribute to their education financially than to that of male students (see Section 3.3.4). As a result, female students who appear to be very debt averse may actually have a low need to borrow due to unobserved parental contributions.

3.6 Conclusions and discussion

This analysis used longitudinal data on student willingness to borrow to isolate an ordinal measure of debt aversion, identify determinants of debt aversion, and examine the relationship

between debt aversion and college outcomes. While rising levels of student debt merit concern and research into their implications, some students may benefit from taking on moderate levels of debt to fund their education. The literature is as yet unclear on the measurement, prevalence, and impacts of debt aversion on the “marginal student” who would otherwise attend college if not for concern about indebtedness. Some evidence suggests that female students and Black or Hispanic students may be disproportionately likely to experience debt aversion, generating a potential barrier to college access.

In addition to being closely related to actual borrowing behavior, debt aversion was found to influence the probability of college enrollment immediately following high school and the net cost of attendance. Students with zero or low WTB are less likely to enroll in college at all, even compared to otherwise similar students. Borrowing responds as expected to variation in WTB and to debt aversion narrowly defined. The net cost of attendance is higher for those with high WTB and lower for those with low but positive WTB.

Female students and Black students exhibit a lower positive willingness to borrow on average than similarly situated White and male students, while the latter groups are more likely to have zero or high WTB. This demographic variation is not explained by the observed differences in college preparedness, expected net benefits of college attendance, or other covariates. The propensity score matching results from the gender and race analyses indicate that White and male students who report zero WTB drive the relationship between WTB and college enrollment. By contrast, female students and students of color with zero WTB may cut their borrowing by more than other students, and female students in the same treatment group attend higher-cost institutions.

These results raise the question of how variation in debt aversion and in responses to debt aversion relate to the observed trends of growing college enrollment among women and Black and Hispanic students. First, the high level of sensitivity to debt aversion among male students may be one contributor to this trend: Highly debt-averse men are more likely to avoid borrowing altogether by foregoing college enrollment. Although the analysis controls for expected earnings premiums, White men may feel more confident about their employment or marriage market prospects with-

out a college degree than other groups, increasing their responsiveness to their debt preferences. Alternatively, they may face less social pressure to enroll in college than other groups. As a college degree becomes an increasingly critical determinant of employment prospects, debt aversion may become a source of worsened economic outcomes for men. These students may benefit from initiatives that provide high school students with additional information about college enrollment, labor market outcomes, and student borrowing.

On the other hand, women and some students of color appear more likely to be debt averse in this study, despite other evidence indicating that these groups borrow more than others on average. There is circumstantial evidence suggesting that women who appear to be debt-averse may actually have low need to borrow due to unobserved parental contributions. Women's higher rates of success in college and greater college preparedness on average may be driving greater willingness to pay among parents. At the same time, this effect does not hold for students of color. It has been noted in previous work that the families of Black students contribute less to their education due to lower levels of wealth and less liquid wealth (Addo, Houle, and Simon 2016). Instead, these students may be making unobserved debt-minimizing decisions, such as working more hours during college, for example, which may negatively impact their probability of college success (Institute for Higher Education Policy 2008).

Although additional work in this area is needed, these results regarding women and particularly students of color point to high school students' need for more information about the costs and benefits of student borrowing. They also suggest that gendered and racialized stereotypes about financial literacy need to be challenged, as they may be contributing to lower willingness to borrow among these students. In addition, colleges should provide additional resources to help students find high-paying employment post-graduation. If women or students of color feel that they will be unable to repay student debt immediately after graduation due to insufficient early-career earnings, they may be less likely to enroll in college or make debt-minimizing choices that threaten their college completion or job market prospects.

The study is affected by data and identification limitations. The strong predicted relationship between willingness to borrow, college plans, and financial need pose challenges for identification that may not be fully addressed by matching on observables. Additional work is also needed to understand the attitudes towards debt of the large portion of students who “don’t know” their WTB. Without more qualitative or quantitative evidence about this group, it is difficult to explain results such as the higher net cost of attendance for this group relative to the control group. High parental non-response rates also preclude fully modeling the parent-student dynamic in educational finance choices. Nonetheless, the results provide some evidence that student choices are influenced by their financial plans and aversion to borrowing.

Additional information on student outcomes later in their college careers in subsequent waves of the HSLs promise to shed more light on this topic. In particular, the 2016 wave of the HSLs was released in mid-2018. This wave describes student outcomes three years after graduation, allowing researchers to assess differences in attrition rates, GPA, and delayed enrollment. As noted previously, students who take on debt in excess of their stated willingness to borrow may make cost-minimizing decisions or face greater psychological costs that are not conducive to successful college completion.

3.7 Tables and figures

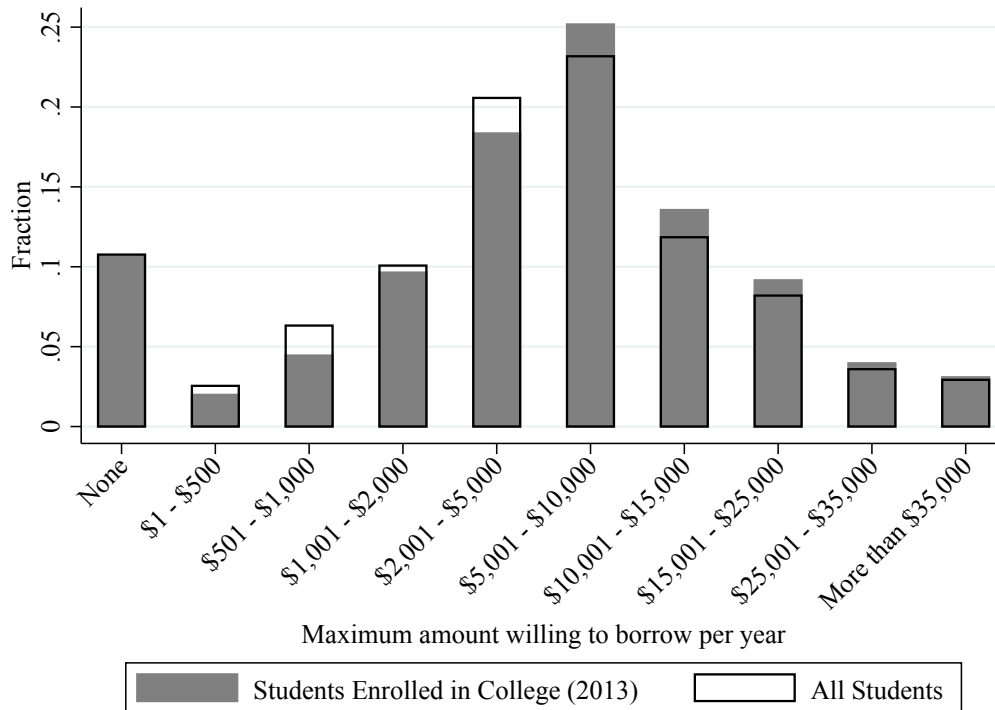


Figure 3.1: Unweighted histogram of willingness to borrow responses by sample

Notes: Proportions are unweighted and conditional on student knowing their WTB. Sample sizes are 7,599 for the full sample and 3,564 for the enrolled sample.

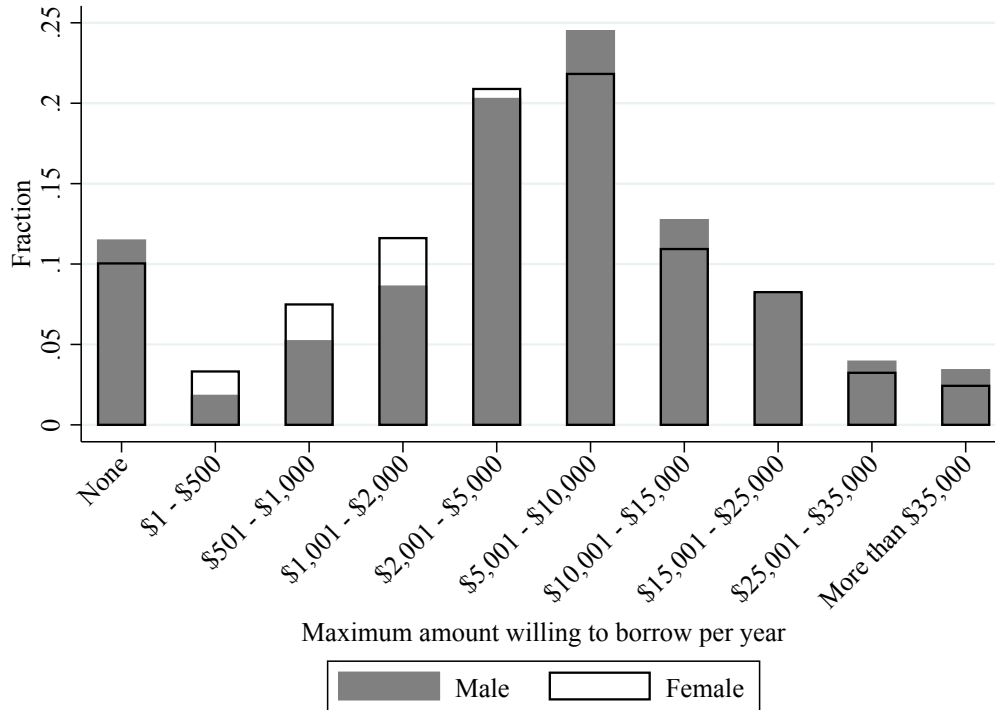


Figure 3.2: Histogram of stated willingness to borrow by gender

Notes: Proportions are unweighted and conditional on student knowing their WTB. Sample sizes are 3,744 for women and 3,855 for men.

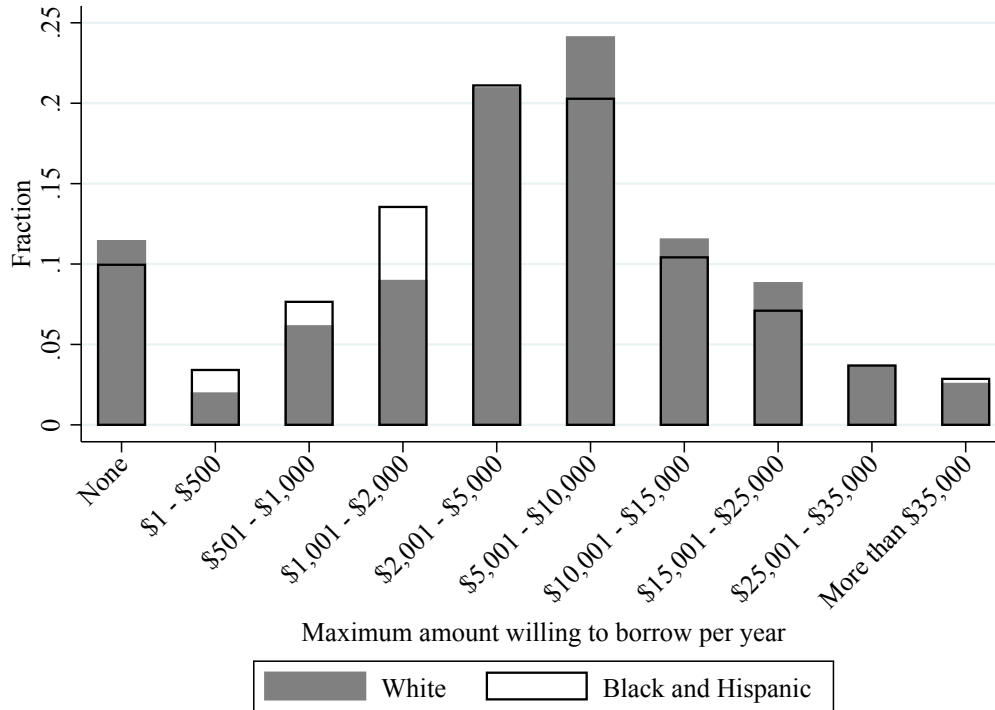


Figure 3.3: Histogram of stated willingness to borrow by race/ethnicity

Notes: Proportions are unweighted and conditional on student knowing their WTB. Sample sizes are 1,641 for Black or Hispanic students and 4,650 for White students.

Table 3.1: Student plans for paying for college by stated willingness to borrow

Willingness to Borrow:	Zero WTB	Low WTB	Control	High WTB	Don't Know
<u>Pay with own earnings/savings</u>					
Yes	48.78%	73.44%	69.18%	61.79%	53.73%
No	39.18%	15.07%	19.43%	24.57%	22.81%
Don't Know	12.04%	11.50%	11.39%	13.64%	23.46%
<u>Pay with parents' earnings/savings</u>					
Yes	60.98%	58.63%	60.36%	58.04%	55.19%
No	24.39%	22.09%	22.11%	25.32%	14.84%
Don't Know	14.63%	19.28%	17.54%	16.64%	29.97%
<u>Pay with grants/scholarships</u>					
Yes	71.49%	72.13%	78.81%	79.20%	69.05%
No	19.35%	13.49%	8.95%	8.40%	7.80%
Don't Know	9.16%	14.38%	12.24%	12.39%	23.15%
<u>Pay with government loans</u>					
Yes	7.36%	29.00%	47.43%	55.11%	28.04%
No	76.69%	38.30%	23.11%	21.59%	23.95%
Don't Know	15.95%	32.70%	29.46%	23.30%	48.01%

<u>Pay with private loan</u>					
Yes	4.09%	14.11%	26.04%	33.38%	12.40%
No	80.98%	54.65%	40.14%	36.66%	33.50%
Don't Know	14.93%	31.24%	33.82%	29.96%	54.10%
<u>Pay with private loan in parents' names</u>					
Yes	5.11%	13.53%	23.14%	27.49%	14.18%
No	79.35%	53.47%	41.78%	40.03%	31.04%
Don't Know	15.54%	33.00%	35.09%	32.48%	54.79%
<i>Approximate N</i>	<i>490</i>	<i>895</i>	<i>2645</i>	<i>700</i>	<i>2755</i>

Notes: All proportions are unweighted. Sample sizes are approximate due to minor variation in response rates by question.

Table 3.2: Unweighted summary statistics of selected college outcomes by gender and race/ethnicity

	Women			Men				Total		
	<i>N</i>	Mean [Max, Min]	SD	<i>N</i>	Mean [Max, Min]	SD		<i>N</i>	Mean [Max, Min]	SD
Enrolled in College (2013)	3744	0.889 [0,1]	0.3143	3855	0.828 [0,1]	0.3772	***	7599	0.858 [0,1]	0.349
Net Cost of Attendance (2013)	1874	15337.51 [-59000,64000]	13850.87	1690	15127.22 [-60000,64000]	14993.79		3564	15237.79 [-60000,64000]	14402.49
Total Amount Borrowed (2013)	1865	4745.31 [0,32000]	7393.02	1685	4253.41 [0,32000]	6925.50	**	3550	4511.83 [0,32000]	7178.11

	Black or Hispanic			White				Total		
	<i>N</i>	Mean [Max, Min]	SD	<i>N</i>	Mean [Max, Min]	SD		<i>N</i>	Mean [Max, Min]	SD
Enrolled in College (2013)	1641	0.834 [0,1]	0.373	4650	0.859 [0,1]	0.348	**	6291	0.852 [0,1]	0.355
Net Cost of Attendance (2013)	599	11722.04 [-59000,62000]	13774.79	2345	15637.1 [-60000,64000]	13935.34	***	2944	14840.52 [-60000,64000]	13989.59
Total Amount Borrowed (2013)	613	5130.51 [0,32000]	7546.54	2340	4490.171 [0,32000]	7196.051	*	2953	4623.10 [0,32000]	7273.53

Notes: All proportions and means are unweighted.

Table 3.3: Unweighted summary statistics of controls by gender

Variable	Women		Men		
	Mean	SD	Mean	SD	
<i>Race/ethnicity</i>					
African-American	9.19%		8.22%		
Hispanic	13.62%		12.19%		*
Asian	7.93%		8.15%		
White	60.39%		61.97%		
Other race/ethnicity	8.87%		9.47%		
<i>Highest parental education</i>					
Graduate degree	24.63%		25.81%		
Bachelor's degree	27.54%		28.51%		
Associate's degree	15.04%		15.56%		
Occupational training	3.31%		3.06%		
High school or less	29.49%		27.06%		**
Parents U.S. born	75.83%		75.93%		
<i>Family income in 2012</i>					
Less than \$15000	7.29%		6.87%		
\$15000 to \$55000	30.64%		27.86%		***
\$55001 to \$115000	37.13%		35.93%		
\$115001 to \$175000	14.10%		17.07%		***
\$175001 to \$235000	5.42%		6.04%		
Greater than \$235000	5.42%		6.23%		
<i>Household size in 2012</i>					
Two	7.13%		6.93%		
Three	26.20%		25.94%		
Four	31.12%		31.91%		
Five	20.19%		19.77%		
6 or more	15.36%		15.46%		

<i>Region of high school residence</i>					
Northeast	16.43%		14.71%		**
Midwest	26.79%		29.60%		***
South	39.56%		40.73%		
West	17.23%		14.97%		***
<i>Locale of high school residence</i>					
City	29.22%		29.44%		
Suburb	29.35%		29.60%		
Town	12.98%		12.06%		
Rural	28.45%		28.90%		
Searched for college info	93.19%	0.252	85.01%	0.357	***
High school GPA	3.343	0.777	3.074	0.835	***
	[0.25, 4.75]		[0.25, 4.75]		
Expected earnings premium (in \$1000s)†	29.268	29.614	32.156	29.871	***
	[-145, 145]		[-140, 145]		
Grants and scholarships received (in \$1000s)‡	9601.92	11473.26	8798.52	11172.16	**
	[0, 60]		[0, 60]		
Parent respondent‡	52.00%		58.46%		***
<i>N</i>	3,744		3,855		

Notes: All proportions and means are unweighted. Bracketed numbers indicate min/max for continuous covariates, and standard errors are listed for continuous covariates only. † Based on expected earnings for four-year degree in full sample and expected earnings for expected degree in enrolled sample (not shown). ‡ Reported for students who were enrolled in college in the 2013 Follow-Up ($n = 3,564$).

Table 3.4: Unweighted summary statistics of controls by race and ethnicity

Variable	Black or Hispanic		White Non-Hispanic		
	Mean	SD	Mean	SD	
Female	52.04%		48.62%		**
<i>Race/ethnicity</i>					
African-American	40.28%		0.00%		
Hispanic	59.72%		0.00%		
<i>Highest parental education</i>					
Graduate degree	16.39%		26.47%		***
Bachelor's degree	21.08%		30.17%		***
Associate's degree	17.37%		15.31%		*
Occupational training	4.20%		2.88%		***
Parents U.S. born	55.58%		92.73%		***
<i>Family income in 2012</i>					
Less than \$15000	12.74%		5.18%		***
\$15000 to \$55000	40.95%		24.97%		***
\$55001 to \$115000	31.32%		38.75%		***
\$115001 to \$175000	8.96%		17.96%		***
\$175001 to \$235000	3.72%		6.41%		***
Greater than \$235000	2.32%		6.73%		***
<i>Household size in 2012</i>					
Two	8.17%		6.62%		**
Three	23.64%		26.90%		**
Four	28.82%		32.24%		**
Five	19.93%		20.17%		
6 or more	19.44%		14.06%		***

<i>Region of high school residence</i>				
Northeast	14.56%		16.00%	
Midwest	25.05%		29.76%	***
South	41.38%		40.49%	
West	19.01%		13.74%	***
<i>Locale of high school residence</i>				
City	31.38%		27.94%	***
Suburb	32.36%		28.02%	***
Town	8.23%		14.92%	***
Rural	28.03%		29.12%	
Searched for college info	88.42%		88.88%	
High school GPA	2.858	0.824	3.290	0.775
	[0.25,4.75]		[0.25,4.75]	***
Expected earnings premium (in \$1000s)†	30.140	32.658	30.625	28.448
	[-140, 145]		[-145, 145]	
Grants and scholarships received (in \$1000s)‡	10536.73	12720.48	8748.20	10560.63
	[0, 60]		[0, 60]	**
Parent respondent‡	47.25%		60.85%	***
<i>N</i>	<i>1,641</i>		<i>4,650</i>	

Notes: All proportions and means are unweighted. Bracketed numbers indicate min/max for continuous covariates, and standard errors are listed for continuous covariates only. †Based on expected earnings for four-year degree in full sample and expected earnings for expected degree in enrolled sample (not shown). ‡Reported for students who were enrolled in college in the 2013 Follow-Up ($n = 2,944$).

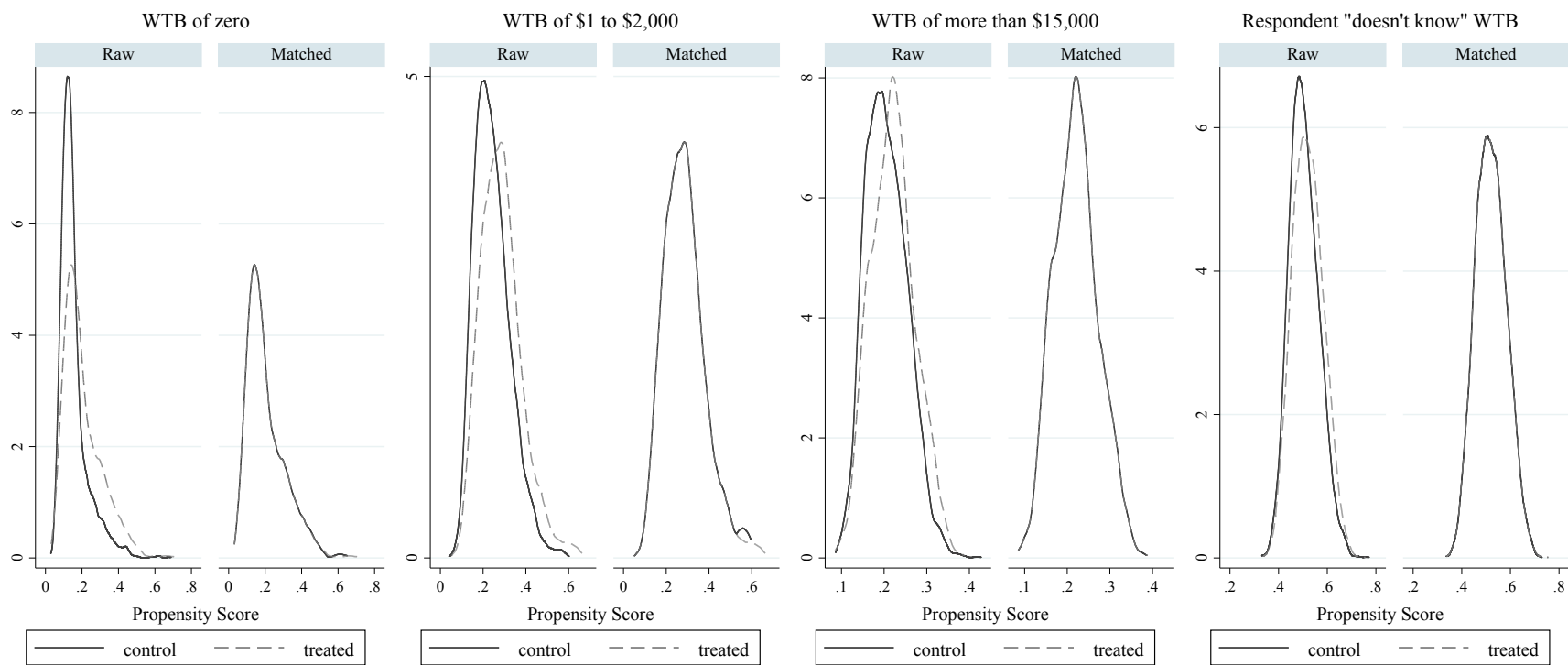
Table 3.5: Propensity score matching logit regression results: average marginal effects

Dependent = Pr(treatment)	Zero		\$1 to \$2,000		More than \$15,000		Don't Know	
	Full Sample	Enrolled	Full Sample	Enrolled	Full Sample	Enrolled	Full Sample	Enrolled
Female	0.00837 (0.0133)	0.0193 (0.0186)	0.0873*** (0.0147)	0.105*** (0.0202)	-0.0123 (0.0143)	0.00165 (0.0208)	0.0252* (0.0138)	0.0265 (0.0199)
<i>Race/ethnicity (Reference group: White)</i>								
African-American	0.0174 (0.0258)	-0.00616 (0.0391)	0.0734*** (0.0276)	0.0784* (0.0452)	0.00491 (0.0272)	0.0147 (0.0436)	-0.000675 (0.0258)	-0.0381 (0.0423)
Hispanic	0.0186 (0.0239)	0.00601 (0.0359)	0.0447* (0.0261)	0.101** (0.0420)	0.0165 (0.0258)	0.00370 (0.0389)	-0.0209 (0.0243)	-0.0749* (0.0383)
Asian	-0.0104 (0.0286)	0.0172 (0.0410)	-0.00296 (0.0336)	0.0163 (0.0477)	0.0379 (0.0328)	0.0220 (0.0453)	-0.0703** (0.0300)	-0.0616 (0.0423)
Other race/ethnicity	-0.00935 (0.0232)	-0.00111 (0.0338)	0.0251 (0.0265)	0.0337 (0.0381)	-0.0421* (0.0240)	-0.0621* (0.0342)	-0.00382 (0.0243)	-0.0796** (0.0365)
<i>Highest parental education (Reference group: high school or less)</i>								
Bachelor's degree or higher		0.0291 (0.0217)		0.0387* (0.0227)		0.0400* (0.0233)		0.0805*** (0.0233)
Graduate degree	0.0428* (0.0219)		0.00464 (0.0227)		0.0475** (0.0237)		0.0945*** (0.0210)	
Bachelor's degree	-0.00620 (0.0183)		-0.0403** (0.0192)		0.0199 (0.0205)		0.0341* (0.0192)	
Associate's degree	-0.00511 (0.0210)		-0.0118 (0.0213)		0.0184 (0.0237)		0.0514** (0.0213)	

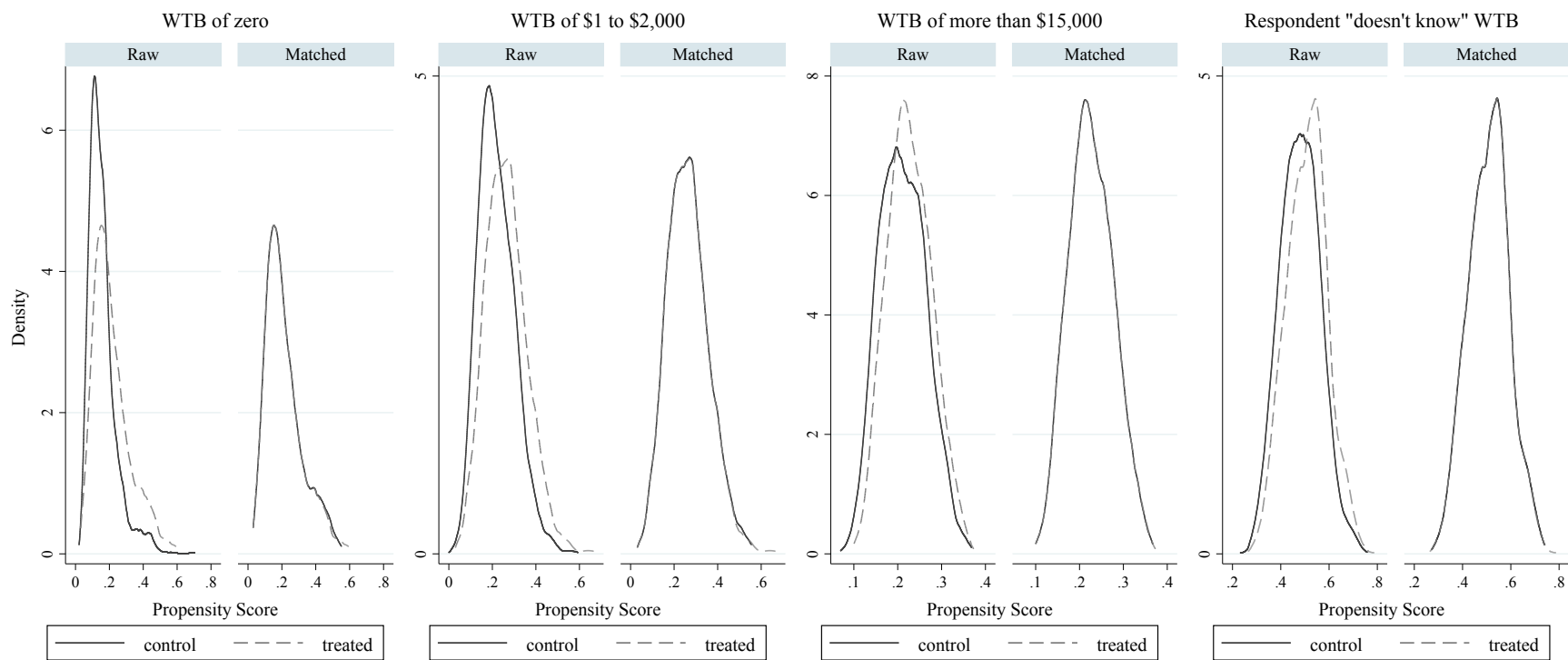
Occupational training	-0.0577*		-0.00384		0.0439		-0.00239	
	(0.0338)		(0.0376)		(0.0438)		(0.0405)	
Parents U.S. born	0.0294	0.0264	0.0131	0.0563**	0.0148	0.0204	-0.00667	0.0153
	(0.0185)	(0.0261)	(0.0213)	(0.0275)	(0.0209)	(0.0304)	(0.0202)	(0.0299)
<i>Family income in 2012 (Reference group: less than \$15000)</i>								
\$15000 to \$55000	-0.0135	-0.110**	-0.0523*	-0.0324	-0.0459	-0.0468	-0.0244	-0.0408
	(0.0267)	(0.0548)	(0.0300)	(0.0557)	(0.0316)	(0.0588)	(0.0291)	(0.0550)
\$55001 to \$115000	0.00870	-0.0485	-0.0622**	-0.0397	-0.0368	-0.0731	-0.0275	-0.0388
	(0.0272)	(0.0551)	(0.0309)	(0.0553)	(0.0318)	(0.0577)	(0.0294)	(0.0536)
\$115001 to \$175000	0.0222	-0.0442	-0.0771**	-0.0475	-0.0354	-0.0549	-0.00773	-0.0226
	(0.0308)	(0.0578)	(0.0352)	(0.0586)	(0.0353)	(0.0608)	(0.0328)	(0.0564)
\$175000 to \$235000	0.0532	0.00654	-0.103**	-0.109*	-0.0304	-0.0922	-0.0286	-0.0158
	(0.0390)	(0.0644)	(0.0429)	(0.0629)	(0.0423)	(0.0660)	(0.0402)	(0.0627)
Greater than \$235000	0.185***	0.145**	-0.0894*	-0.0191	-0.0396	-0.0619	0.0401	0.0699
	(0.0443)	(0.0706)	(0.0464)	(0.0689)	(0.0445)	(0.0698)	(0.0410)	(0.0630)
<i>Household members in 2012 (Reference group: Two)</i>								
Three	-0.00785	0.00211	-0.00662	0.0593	0.00332	0.0112	-0.0187	0.0700*
	(0.0290)	(0.0387)	(0.0304)	(0.0398)	(0.0308)	(0.0426)	(0.0290)	(0.0423)
Four	-0.0166	0.0175	-0.00620	0.0287	-0.0302	-0.0274	-0.0171	0.0519
	(0.0286)	(0.0379)	(0.0300)	(0.0386)	(0.0301)	(0.0411)	(0.0285)	(0.0416)
Five	-0.00606	0.0144	-0.00640	0.0456	-0.0187	0.00324	-0.0145	0.0625
	(0.0299)	(0.0402)	(0.0317)	(0.0416)	(0.0316)	(0.0438)	(0.0299)	(0.0438)
Six or more	-0.0151	0.00812	0.00808	0.0324	-0.0321	-0.0269	-0.0105	0.0513
	(0.0311)	(0.0425)	(0.0327)	(0.0438)	(0.0326)	(0.0457)	(0.0310)	(0.0461)
<i>Region of high school residence (Reference group: Northeast)</i>								
Midwest	0.0357*	0.0314	0.0329	0.0115	-0.0372	-0.00524	-0.0383*	-0.0471
	(0.0189)	(0.0252)	(0.0221)	(0.0296)	(0.0229)	(0.0317)	(0.0211)	(0.0293)

South	0.0723*** (0.0186)	0.0815*** (0.0261)	0.0859*** (0.0215)	0.0717** (0.0300)	-0.0890*** (0.0218)	-0.0599* (0.0309)	-0.0262 (0.0202)	-0.0151 (0.0289)
West	0.0541** (0.0225)	0.0453 (0.0317)	0.0799*** (0.0256)	0.0558 (0.0361)	-0.0299 (0.0266)	-0.0183 (0.0387)	-0.0187 (0.0241)	-0.0151 (0.0353)
<i>Locale of high school residence (Reference group: City)</i>								
Suburb	-0.0275 (0.0176)	0.0000183 (0.0244)	-0.00976 (0.0197)	0.00286 (0.0269)	0.0229 (0.0187)	0.0291 (0.0267)	-0.0173 (0.0179)	-0.0166 (0.0252)
Town	-0.0477** (0.0216)	-0.0470 (0.0302)	-0.0188 (0.0242)	0.000262 (0.0340)	-0.00693 (0.0233)	0.00432 (0.0342)	-0.0463** (0.0231)	-0.0570* (0.0338)
Rural	-0.0303* (0.0174)	-0.0191 (0.0246)	-0.0298 (0.0191)	0.00198 (0.0267)	0.0200 (0.0190)	0.0378 (0.0276)	-0.0351* (0.0181)	-0.0584** (0.0265)
Searched for college info.	-0.158*** (0.0265)	-0.0949** (0.0463)	-0.0503** (0.0257)	-0.0157 (0.0464)	0.0515** (0.0233)	-0.0185 (0.0471)	-0.0964*** (0.0218)	-0.0114 (0.0440)
High school GPA	-0.00271 (0.00892)	-0.00340 (0.0154)	-0.0276*** (0.00973)	-0.0230 (0.0173)	0.00401 (0.00988)	-0.0126 (0.0174)	0.0149 (0.00942)	0.00325 (0.0170)
Expected earnings premium (\$1000s)†	0.00023 (0.000208)	0.00048 (0.000307)	-0.0009*** (0.000255)	-0.00067* (0.000381)	-0.000063 (0.000245)	0.000061 (0.000373)	-0.00046** (0.000231)	-0.00062* (0.000354)
Grants and scholarships (\$1000s)		0.000552 (0.000817)		-0.000315 (0.000977)		-0.000461 (0.000981)		0.000712 (0.000926)
Parent responded to questionnaire		-0.000895 (0.0188)		-0.0126 (0.0207)		-0.0109 (0.0212)		0.0104 (0.0202)
<i>N</i>	3181	1540	3573	1662	3370	1665	5470	2588
<i>Pseudo R-squared</i>	0.051	0.060	0.037	0.040	0.015	0.013	0.011	0.019

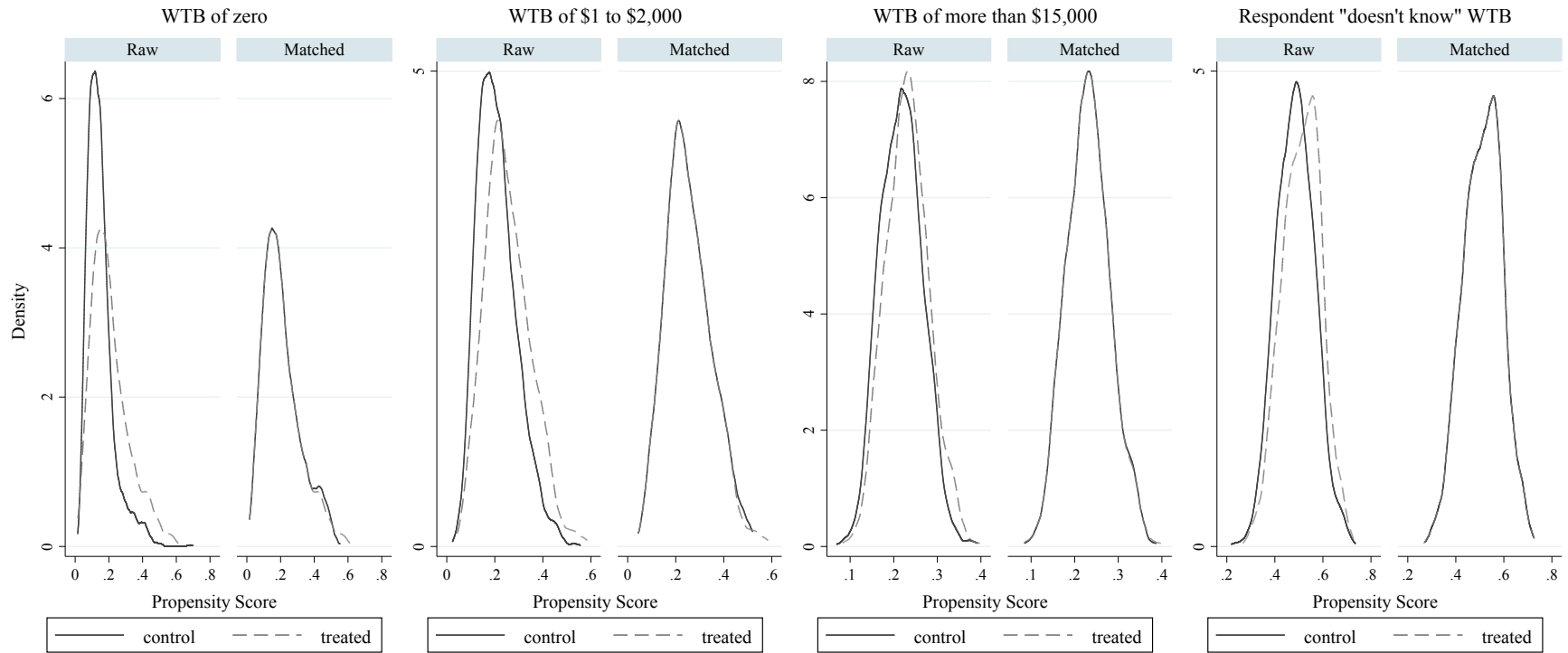
Notes: Stars indicate significance at the 10%, 5%, and 1% levels. Estimates are unweighted. “Enrolled” sample refers to observations with non-missing responses for net cost of attendance. Regressions also include interaction of GPA and expected earnings premium (not shown). †Based on expected earnings for four-year degree in full sample and expected earnings for expected degree in enrolled sample.



(a) College enrollment (2013)



(b) Amount borrowed (2013)



(c) Net cost of attendance (2013)

Figure 3.2: Estimated density functions for matched and unmatched samples

Table 3.6: Selected balance statistics

	(1) Covariates with statistically significant difference at 5% level (#)		(2) Covariates with standardized difference > 5% (#)		(3) Mean standardized difference (%)		(4) Continuous covariates with variance ratio ≠ 1 (#)	
	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
	<i>College enrollment</i>							
Zero	6	0	16	2	7.79	2.10	2	0
\$1 to \$2,000	13	0	17	0	7.96	1.44	0	2
More than \$15,000	4	0	10	0	4.21	1.18	0	0
Don't know	6	0	6	0	3.41	1.04	0	0
<i>Net cost</i>								
Zero	8	0	18	6	9.76	3.14	3	2
\$1 to \$2,000	6	0	15	3	6.94	1.79	0	0
More than \$15,000	1	0	9	0	3.95	1.95	0	1
Don't know	7	0	10	0	5.01	1.28	0	1
<i>Amount borrowed</i>								
Zero	9	0	21	4	9.90	2.93	3	2
\$1 to \$2,000	3	0	17	1	6.86	1.91	0	0
More than \$15,000	1	0	11	2	4.06	2.12	0	1
Don't know	8	0	11	0	5.22	1.15	0	1
<i>Total covariates</i>	<i>28/30</i>	<i>28/30</i>	<i>28/30</i>	<i>28/30</i>	<i>28/30</i>	<i>28/30</i>	<i>3/4</i>	<i>3/4</i>

Notes: Sample size for “College Enrollment” outcomes differs from sample size for other outcomes, which are conditional on college enrollment. Total covariates vary based on outcome. Larger totals hold for the net cost and borrowing outcomes.

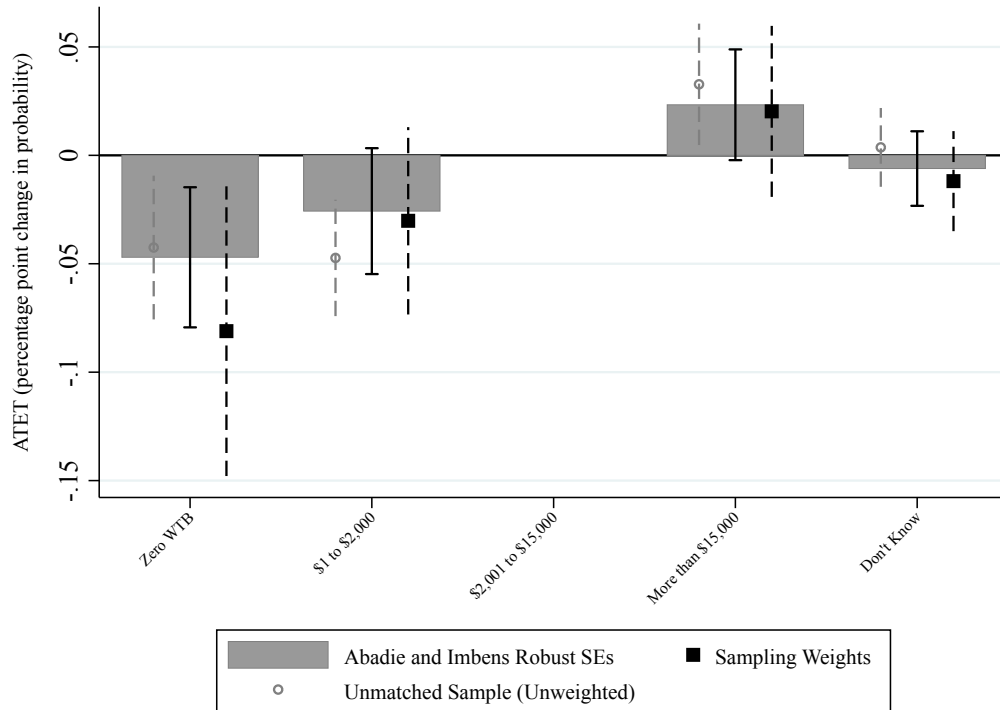


Figure 3.3: WTB and college enrollment: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.

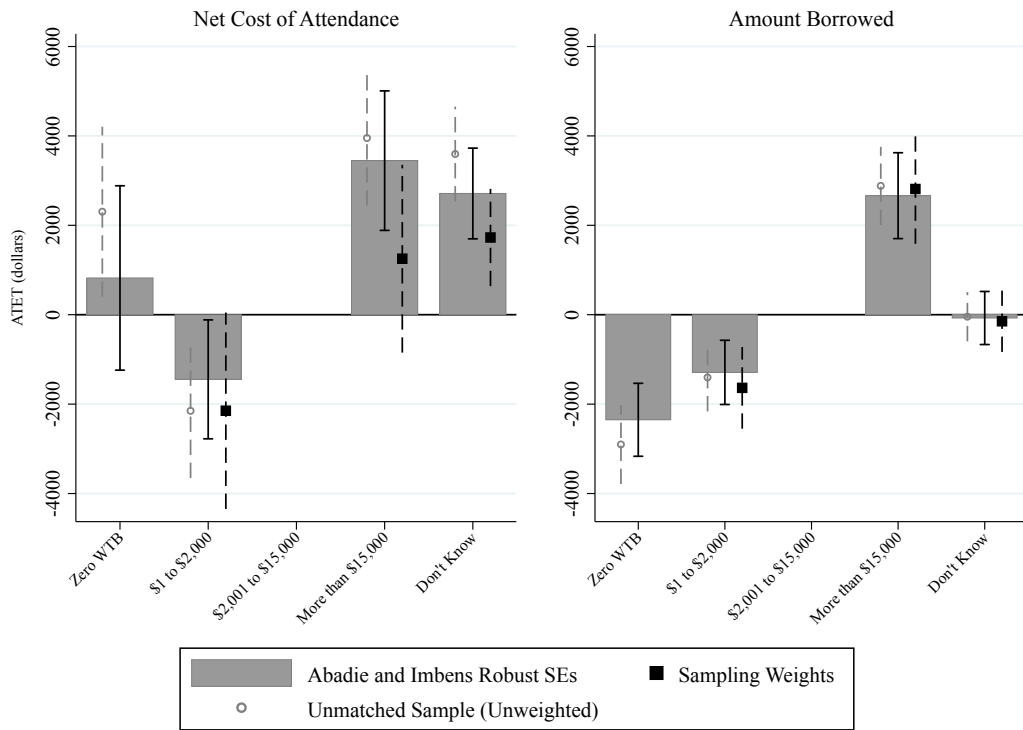


Figure 3.4: WTB and college outcomes conditional on enrollment: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.

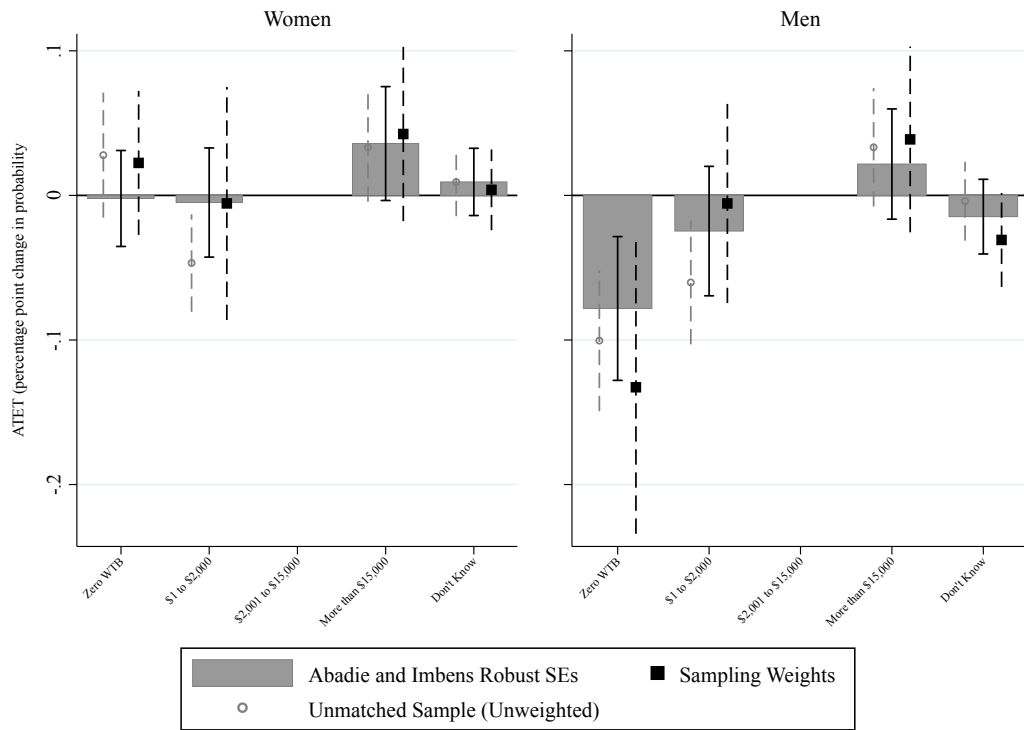


Figure 3.5: WTB and college enrollment by gender: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.

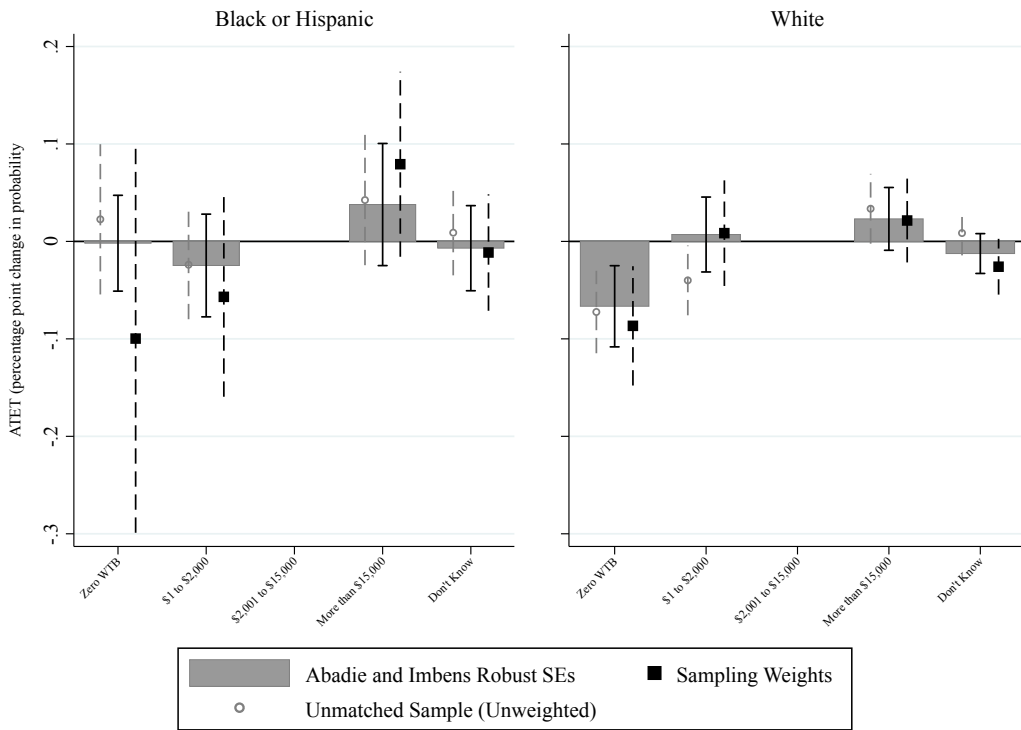
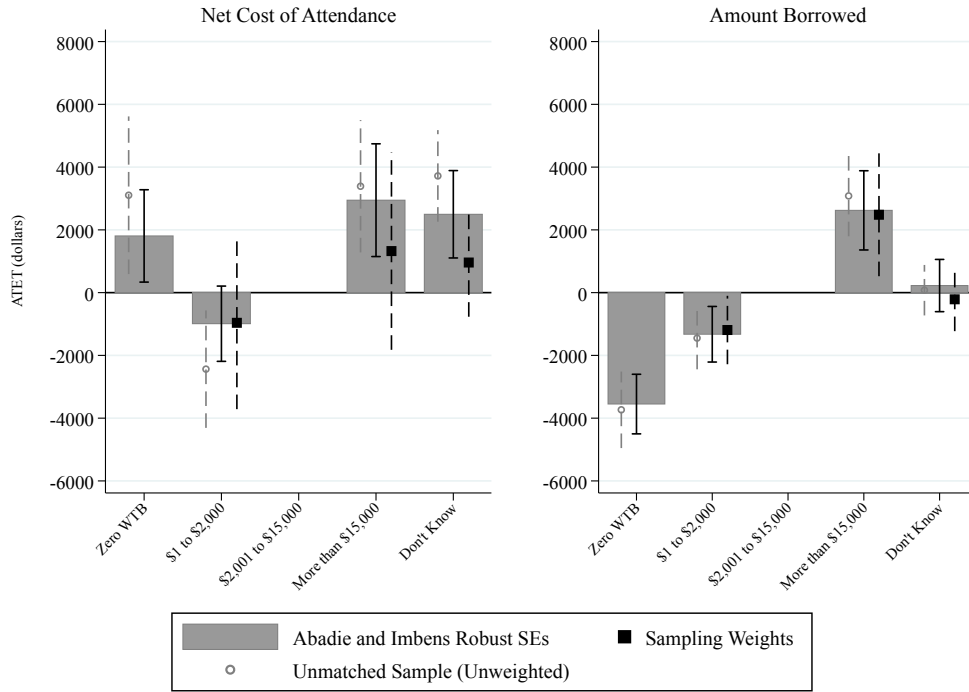
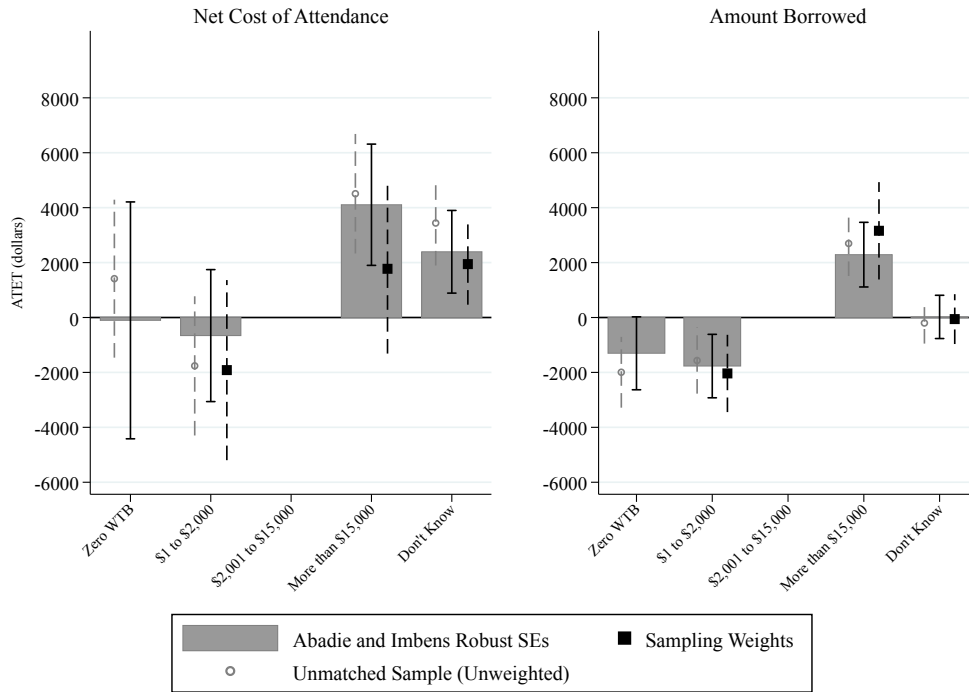


Figure 3.6: WTB and college enrollment by race and ethnicity: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.

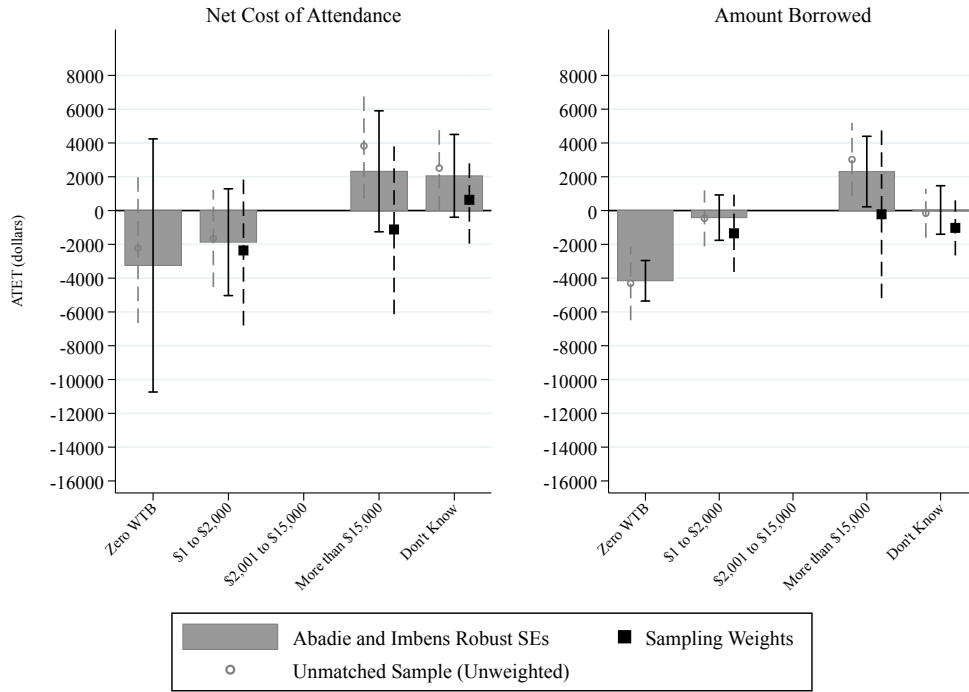


(a) Women

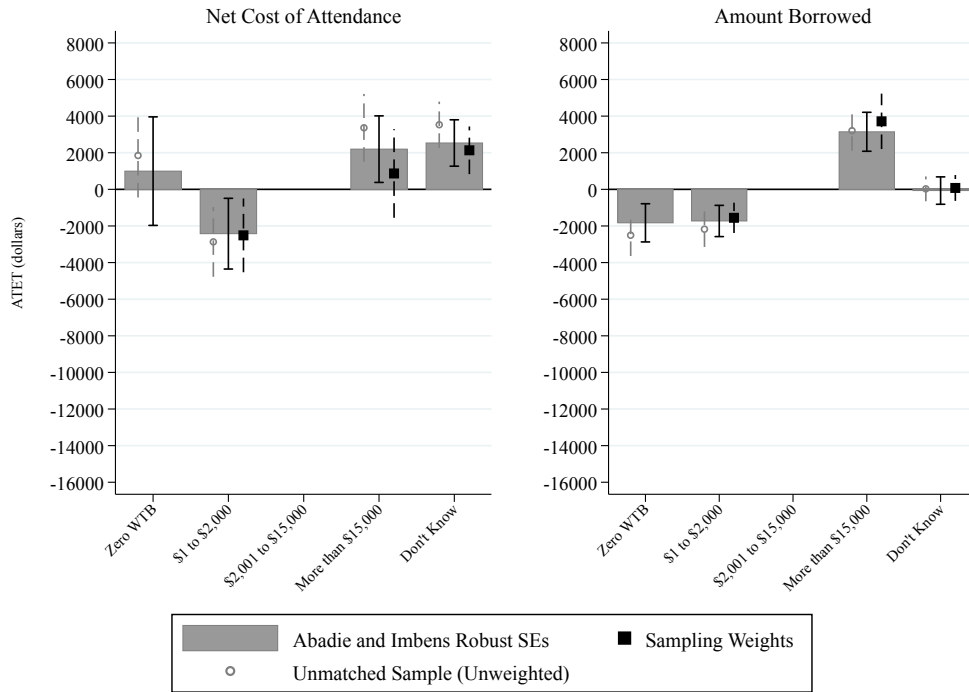


(b) Men

Figure 3.7: WTB and college outcomes by gender: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.



(a) Black or Hispanic



(b) White Non-Hispanic

Figure 3.8: WTB and college outcomes by race and ethnicity: average treatment effect on the treated
 Notes: Lines indicate 95% confidence intervals. Students with reported willingness to borrow between \$2,001 and \$15,000 serve as control group for all treatments.

Chapter 4

Pushed into the Red? Female-headed Households and the Pre-Crisis Credit Expansion

4.1 Introduction

Household debt in the United States doubled in the lead up to the 2008 Financial Crisis, growing from \$6.26 trillion at the start of 2002 to \$12.68 trillion in the third quarter of 2008 (Federal Reserve Bank of New York 2017).³⁶ Despite claims that expanded subprime lending would provide new opportunities for many borrowers (Chomsisengphet and Pennington-Cross 2006), household financial health suffered in the aftermath of the crisis due to overleveraging, the collapse of home equity, and falling incomes.

Concerns about these outcomes has been widespread (Bricker et al. 2012; Emmons 2009), and some work has studied the prevalence of high-cost credit and high indebtedness in predominately minority neighborhoods. However, less attention has been directed to differences in household debt trajectories by gender and among female-headed households in particular.³⁷

Identifying groups that emerged from the credit expansion and 2008 Financial Crisis heavily indebted is important for several reasons. A large literature has established a link between high household leverage in the aftermath of the Financial Crisis and persistent unemployment driven by decreased consumption expenditures (e.g., Mian and Sufi 2012). This excessive household leverage may be a source of ongoing sluggish growth as households pay off existing debt (Krugman 2014). Identifying groups that are suffering from debt overhang can provide guidance for developing debt forgiveness or renegotiation policies to address these problems. Previous work has shown such policies to be effective at increasing debt pay down rates and reducing foreclosures (Agar-

³⁶This chapter is based on a previously published article (Long 2018).

³⁷See Dymski, Hernandez, and Mohanty (2013) for a survey of work relevant to race and gender in the area of mortgage debt.

wal et al. 2012). While no direct short-run effects on consumption were found, increases may be observed from such policies in the long run.

Secondly, growing indebtedness among female-headed households is a phenomenon of inherent concern for its impact on household financial fragility. There have long been concerns about the high poverty rates and low wealth accumulation of women in the United States and of female-headed households specifically (Pressman 1988; Schmidt and Sevak 2006). Female household heads not only have lower wages on average due to occupational segregation, but they are also more likely to have care obligations that further decrease earning potential and increase expenses (Pressman 2003). As a result, these households often rely on borrowing. Borrowing may be a means of coping with income shortfalls but can also result in financial fragility, with income shocks potentially leading to further debt or to default. One report found that female-headed households had longer than average poverty spells and the highest probability of returning to poverty within four years of ending a spell (50% compared to an average probability of 36%) (Stevens 2011). Income and expenditure shocks can lead to a cycle of increasing debt or to default, with concerning implications for the wellbeing of the women and children in these households.

This analysis uses Survey of Consumer Finances data and a difference-in-differences empirical strategy to investigate whether female-headed households experienced a greater increase in mortgage and educational debt in the lead-up to the crisis and greater persistence in that debt post-crisis relative to male-headed households. I also assess whether growing indebtedness was accompanied by proportional increases in household wealth or income.

The results provide evidence that relatively low-income and younger female-headed households experienced disproportionate growth in mortgage and educational debt, respectively, during the credit expansion. Post-crisis, the evidence also points towards greater persistence in lower income women's mortgage debt and additional growth in educational debt among older women. For lower income female-headed households, these increases in debt also resulted in disproportionate growth in household leverage and financial fragility. These trends are consistent with explanations

focusing on exploitative mortgage lending and both secular and cyclical changes in educational investment.

I first discuss the existing literature on the growth in mortgage and educational indebtedness among female-headed households. The data and empirical strategy are discussed in Section 4.3, followed by results in Section 4.4. Conclusions and policy implications are presented in Section 4.5.

4.2 Background and literature

This analysis focuses attention on two components of household debt: mortgage debt and educational debt. Mortgage and educational debt together represent a major portion of all household debt (Federal Reserve Bank of New York 2017) and are of key policy relevance. Homeownership is widely perceived to be a powerful tool for social mobility, raising concerns about ensuring equal access to mortgage loans, although critics have pointed to limitations of homeownership for low-income households (Shlay 2006). Work in educational finance has also become increasingly concerned with the effects of student debt burden on future educational attainment and labor market outcomes (Choi 2014). Student loans are notoriously difficult to discharge in bankruptcy, potentially allowing them to have longer-lasting effects on household financial health.

This section begins with a discussion of institutional changes to mortgage lending that may be connected to growth in borrowing among female-headed households. Secular and cyclical trends in the growth of student loan debt are then considered.

4.2.1 Mortgage debt

Growth in mortgage debt was widespread during the credit expansion and the housing bubble. However, inequalities in the power and socioeconomic vulnerability of different groups may have also affected which groups were targeted with the most exploitative and costly mortgage debt. Dymski, Hernandez, and Mohanty (2013) argue that socially marginalized groups, including minorities and female-headed households, experienced a shift from being “excluded” from tradi-

tional mortgage markets to being “superincluded” in those markets via high-cost mortgages. They attribute this apparent paradox to financial deregulation, new financial products that changed lender behavior, and the continued lack of “social power” of low-income communities. The development of securities in the 1980s laid the foundation for an explosion of high-cost mortgage products in the 1990s and 2000s that brokers pushed on borrowers with few alternative choices.

While they focus much of their argument on racial segregation and discrimination in mortgage markets, Dymski, Hernandez, and Mohanty (2013) also argue that gender exacerbated racial differences in mortgage lending. Existing literature on gendered trends to subprime lending is limited. Wyly and Ponder (2011) fit quantitative evidence to anecdotal reports of predatory subprime loan pushing to African-American widows. Such borrowers constituted a vulnerable “cash-poor and equity-rich” group (Wyly and Ponder 2011, 533). Limited income flow meant that these borrowers were more willing to take on high-cost loans collateralized by existing assets. Anecdotes suggest that lenders would visit the homes of such individuals, unsolicited, and push high-cost loans (Wyly and Ponder 2011).

Female-headed households have also become increasingly reliant on debt, with social safety nets eroding and care obligations continuing to fall disproportionately on women (Baker 2014). In the 1990s, welfare reform further reduced resources available to these households by limiting access to social safety nets, of which the primary recipients were female headed-households with children (Rose 2000). Immediately prior to the Financial Crisis, women and particularly single mothers were more likely to report economic insecurity due at least in part to lower incomes combined with greater financial responsibilities (Lovell, Hartmann, and Williams 2008).

A disproportionate rise in indebtedness during the credit expansion would be less concerning moving forward if there was evidence that this trend reversed post-crisis—i.e., if female-headed households deleveraged more quickly than male-headed households. This outcome seems unlikely. Although women’s unemployment rates remained lower during the recession, their responsibility for dependents may have made it more difficult for them to walk away from underwater mortgages or to foreclose on a home. Gender trends in bankruptcy behavior may also lead to greater persis-

tence in debt. Calandra (2008) notes that women are more likely to file Chapter 13 bankruptcy than male filers. Under Chapter 13, debtors establish a payment plan rather than discharging debt.

The empirical evidence testing these arguments regarding the growth in indebtedness among women is relatively sparse. Some work has focused on differences in denial or origination rates in mortgage and other credit markets (Awoonor-Williams 2004; Dietrich and Johannsson 2005; Lindsey-Taliefero 2015), finding no independent effect of gender. However, denial rates are only indirectly related to the exclusion-to-superinclusion hypothesis. No studies have studied gender differences in the level of mortgage debt or originations during the credit expansion.

One direct test of the superexclusion hypothesis is to examine whether the average cost of mortgage loans among female borrowers was higher than during the credit expansion period. In one of the first studies to do this, Fishbein and Woodall (2006) use 2005 HMDA data and find that female mortgage borrowers are disproportionately likely to receive a subprime loan regardless of income. The discrepancy is greatest for women of color relative to White male borrowers. Wylly and Ponder (2011) test the hypothesis of predatory lending towards African American widows in particular. Analyzing a rich combination of data sources ranging from 1994 to 2008, they find strong evidence of a “feminization of risky credit” (543), particularly among older African American women, although evidence of gender differences within race and ethnicity is limited.

Most other studies find no independent effect of gender on the cost of credit. Using 2004 Survey of Consumer Finances data, Cheng, Lin, and Liu (2011) find that female mortgage borrowers have interest rates that are unconditionally 40 basis points higher. This difference disappears when the researchers control for variation in loan search efforts. Women in the sample are more likely to choose lenders based on “recommendation,” while men and dual-headed households are more likely to report shopping for the lowest rates. Similarly, Sen (2012) reports that female mortgage borrowers pay more for mortgages due to differences in the types of lenders they access. The empirical results provide no substantive evidence of discrimination among female and male borrowers using the same lenders.

Three important caveats should be raised concerning the apparent contradiction between these results and the exclusion-to-superinclusion hypothesis. First, the findings of Cheng, Lin, and Liu (2011) and Sen (2012) arguably do not contradict this hypothesis at all. Dymski, Hernandez, and Mohanty (2013) define the use of racial power (and, more broadly, social power) as a situation in which “[o]ne set of agents... can restrict the choices, constrain the freedoms, and/or impose additional costs on” another group (139). Minority or female borrowers who lack social power as well as economic resources may be subject to such constraints in the search for mortgage products. With few local branches available and predatory lending common in some low-income neighborhoods, individuals are faced with higher search costs and less access to mainstream mortgage products. In line with this interpretation, Sen (2012) appropriately terms differences in the types of lenders used as “institutional discrimination.”

Second, econometric specifications that seek a true counterfactual in comparing men and women’s outcomes risk shifting the focus of analysis towards sex as biologically defined rather than gender as socially defined. In other words, the question of whether female-headed households left the credit expansion more indebted than male-headed households should not be truly *ceteris paribus* question. As Wyly and Ponder (2011) note, the socioeconomic characteristics of female-headed households may themselves be the result of gender inequality, not differences to be controlled away. Nonetheless, it is important to identify and recognize which mechanisms may be driving gender differences, for which a robust identification strategy can be helpful, as discussed further in Section 4.3.

Finally, and on a related point, the superinclusion hypothesis implies that certain observable characteristics are themselves mediating factors. It would not be reasonable to assume that all female-headed households were equally vulnerable to or targeted for high-cost loans. Wyly and Ponder’s 2011 emphasis on how the “cash-poor and asset-rich” were targets of subprime lending

supports the notion that income or class could play a mediating role.³⁸ I return to this mediating variable in the empirical strategy of the paper.

4.2.2 Educational debt

Trends in student indebtedness are likely gendered for several reasons, many of which are unrelated to the dynamics of the credit expansion. One primary driver is growing college enrollment among women. The representation of women among college students grew from 48% in 1976 to 57% in 2014 (American Association of University Women [AAUW] 2017). All else equal, this enrollment difference should lead a greater proportion of women to hold student debt. It is not clear *a priori* whether enrolled female students take on more or less debt on average than male students. Single mothers were more likely to attend costlier for-profit institutions than other groups, and non-traditional students have lower average ability to pay (AAUW 2017; Institute for Women's Policy Research 2017b). At the same time, women have higher high school GPAs on average (Buddin 2014), possibly resulting in greater scholarship funding.

While this long-run trend is unsurprising, it is less immediately obvious how changes in educational debt could be related to the credit expansion. Most student debt held today is federal student debt. In 2012, federal student loans made up 88% of outstanding educational debt, and 93% of all student loans originated in 2010-11 were federal loans. Access to federal loans is based on ability to pay, cost of attendance, and federally mandated yearly and aggregate borrowing limits. This debt is not directly affected by the changes in lending behavior discussed in regards to mortgage debt.

However, the volume of outstanding private student loan (PSL) debt and PSL originations increased dramatically during the credit expansion. These loans made up 25% of all outstanding student loans in 2007-08 before sharply declining to 12% in 2008-09 (College Board 2017b). This

³⁸Interestingly, Fishbein and Woodall (2006) find that the disproportionate representation of women among subprime borrowers increases at higher income levels. They attribute this heterogeneity to variation in loan negotiation behaviors. Specifically, they suggest that gender and racial differences in borrowers' self-perceived financial literacy and in lenders' self-perceived bargaining power are more salient at higher levels of income. The direction of the relationship between class and gender differences in debt growth is therefore an empirical question.

growth is linked to the same dynamics as subprime mortgage lending (Consumer Financial Protection Bureau and U.S. Department of Education 2012). PSLs were packaged in the form of student loan asset-backed securities and sold to investment banks. Lenders reduced underwriting criteria and shifted to “Direct-to-Consumer” lending, marketing loans to students instead of working through financial aid offices. As a result, the number of students with private loans increased, despite the fact that average interest rates on these loans were higher than Stafford rates. Many students used PSLs despite being eligible for additional lower-cost federal loans, suggesting that students who took on these loans did not have full information about their potential options.

The connection between PSLs and the debt burden of female-headed households may result from the disproportionate enrollment of women (and particularly single mothers) in for-profit colleges. For-profit colleges served as an important nexus for PSL lending prior to the crisis. Undergraduates at for-profit colleges were three times more likely to hold a private student loan than the average undergraduate (Consumer Financial Protection Bureau and U.S. Department of Education 2012).

Although the volume of PSL originations plummeted with the Financial Crisis, educational debt overall increased at an even faster rate post-crisis. This increase may be tied to individuals returning to education in response to a tight labor market and may again show gendered dynamics. In a decomposition of labor force participation trends following the Financial Crisis, Van Zandweghe (2012) finds that 60% of the reduction in men’s labor force participation is explained by long-run trends, while the entirety of the reduction among women is attributable to the economic downturn. Other work has shown working-age women’s labor force participation to be more sensitive to cyclical changes (Aaronson et al. 2006). Such differences have been attributed to the lower opportunity cost of household work for women facing relatively lower wages than men and high childcare costs. Some of these women may have also been returning to school. Rampell (2011) highlights young women in their early 20s choosing to enroll in college as job growth proved stagnant, while men were more likely to remain in employment or to continue searching for employment due in part to breadwinner mentalities.

In attempting to distinguish between these long-run and cyclical patterns, age may be a relevant mediating factor. To the extent that long-run trends mainly explain gendered changes in educational indebtedness, most of the growth should occur among traditionally aged female students. Evidence of growing indebtedness among older female students in this period could be indicative of growing PSL debt or for-profit college enrollment, where these students are more prevalent. Post-crisis, growth of educational debt among female, non-traditionally aged students would be consistent with increased enrollment of this group in response to labor market conditions.

4.2.3 Household leverage and financial fragility

Indebtedness does not necessarily worsen long-run financial health. Borrowing can enable households to accumulate wealth and to acquire productive assets. However, the debt accumulated during the credit expansion is concerning if it did not lead to sustained wealth creation. The collapse of the housing bubble in 2007 combined with falling incomes during the recession and the prevalence of high-cost mortgage loans meant that many borrowers who had taken out mortgages during the credit expansion were left with assets that fell dramatically in value or lost their homes to foreclosure. As a result, growth in mortgage debt among female-headed households may not have funded lasting wealth.

The relationship between debt and wealth alone provides an incomplete picture of household financial health by overlooking financial fragility. In his analysis of firm leveraging and financial instability, Minsky (1977) argues that firms increase their debt commitments during periods of high economic confidence. As a result, any shock to cash flows or financing costs can push the firm into increasingly fragile financing models, culminating in Ponzi finance and potentially default. A similar notion of financial fragility can be applied to households. Households with a high debt-to-income ratio are at greater risk of defaulting in the case of an income shock. Because households may be unable to sell assets to address these shortfalls, the comparison of liabilities to income flows is an important additional measure of financial health.³⁹

³⁹See Chapter 5 for a more extensive review of measures of financial fragility.

4.3 Data and empirical strategy

The data used in this analysis comes from the Survey of Consumer Finances (SCF), a triennial cross-sectional survey conducted since 1983 that includes detailed information on the financial situation of households. I pool information from seven years of the SCF, between 1995 and 2013.⁴⁰

Two main truncations are made to the sample. First, I exclude all dual-headed households. Debt holdings are reported at the household level, so the gender of the loan signatory cannot be identified for dual-headed households. Second, I omit household heads under 18 and over 65 years of age. Notwithstanding the conclusions of Wyly and Ponder (2011), I expect older household heads to be less likely to borrow overall and to be unrepresentative of the gender dynamics of interest.

Three time periods are defined in order to identify possible differences in the growth of indebtedness by gender. The reference time period includes SCF surveys from 1995, 1998, and 2001. The period that arguably best captures the credit expansion leading up to the Financial Crisis extends from 2002 to 2007 and includes the 2004 and 2007 surveys. The 2009 SCF panel survey is not used in this analysis. Finally, the post-crisis period is 2008 and onward, which includes survey years 2010 and 2013.

The main dependent variable of interest is the total outstanding debt (in dollars) held by households as well as mortgage debt and educational debt specifically. Total debt may be higher in one household than another for many reasons beyond the ability or decision to take on a new loan. Lower ability to service debt or higher interest costs can lead to greater growth in outstanding debt over time.

Figures 4.1 and 4.2 present histograms of average total outstanding debt as well as mortgage and educational debt holdings for single-headed households. Overall, the increase in household debt during the credit expansion is clearly visible, as is the primary role played by mortgage debt. Post-crisis, there is clear evidence of a slowing in the growth of this debt and some deleveraging

⁴⁰The SCF uses a multiple imputation procedure to account for missing values. For this analysis, I do not adjust for the minor additional variance introduced by this technique and only use the first of the five imputates for each observation.

in mortgage debt, but educational debt continues to rise at a faster rate than during the credit expansion.

Household leverage is measured using the ratio of total household debt to gross household wealth. While debt-to-equity ratios are often used, many households in the sample report negative net wealth. The meaning of a one-unit change in the debt-to-equity ratio would subsequently be ambiguous in an empirical analysis. Financial fragility is measured using the ratio of total household debt to annual income. Summary statistics for these ratios are presented in Table 4.1.⁴¹

As the standard deviations suggest, very low wealth and income values combined with high debt result in inordinately large debt-to-wealth and debt-to-income ratios for a small number of observations. Regression results based on the full sample exhibit low explanatory power as measured by R-squared (see Table 4.7). As a result, a trimmed sample is also used in which observations in the top 0.5 percent of the debt-to-wealth ratio or debt-to-income ratio distributions are dropped, or about 1 percent of total observations.

The sample is separated by gender of household head in Table 4.2. In the pre-expansion period, male-headed households had more total and mortgage debt than female-headed households. Female-headed households experience a similar percent increase in mortgage and educational indebtedness as male-headed households in the credit expansion period. However, this similarity could be misleading due to significant income and wealth outliers among male-headed households (see Table 4.3 below). Educational debt increases much more quickly for female-headed households during this period. Post-crisis, female-headed households show a continued increase in mortgage debt, compared to a slight decrease for male-headed households. Educational debt again increases significantly for both groups.

As noted above, an analysis of the institutional constraints faced by female-headed households should arguably not strive for estimating a truly *ceteris paribus* treatment effect of sex, which

⁴¹This focus on debt-to-wealth and debt-to-income ratios neglects the role of educational borrowing on increased *future* income through human capital investment. The cross-sectional structure of this dataset precludes an analysis of the relationship between educational debt and income trajectories.

uproots gender from its social context. Nonetheless, two questions are relevant to constructing a robust empirical test of the institutional mechanisms described above.

First, are changes in indebtedness possibly explained by changes in observable characteristics of female- or male-headed households that might suggest alternative mechanisms? For example, if male-headed households were more likely to be unemployed or increasingly likely to leave the labor force during the credit expansion or post-crisis periods, they may exhibit a decline in demand for credit. Notably, if all such observable variation is controlled for, the resulting estimate of the gender difference in the rise in indebtedness may be conservative from the standpoint of structural gender inequality. Household size is one such example. The care obligations faced by female-headed households are part of what may make them vulnerable to predatory, high-cost lending, but it can also be seen as an exogenous source of greater credit demand.

Second, are the effects of gender on the growth of indebtedness mediated by other factors? Section 4.2 above suggests hypotheses for gendered trends in mortgage and educational debt. Relatively low-income women would be more likely to be “cash poor” Wyly and Ponder (2011) and to lack social power (Dymski, Hernandez, and Mohanty 2013). If securitization led to disproportionate growth of (private) student loan debt among female-headed households, this should be primarily notable among non-traditional (older) students who are disproportionately represented at for-profit colleges (Consumer Financial Protection Bureau and U.S. Department of Education 2012; Institute for Women’s Policy Research 2017b).

These two considerations and the nature of the research question lead me to adopt a difference-in-differences (DID) empirical strategy. I estimate the following model:

$$y_i = \mathbf{X}'_i\boldsymbol{\beta} + \gamma Fem_i + \alpha_{exp} Exp_i + \alpha_{post} PostCrisis_i + \delta_{exp} Fem_i Exp_i + \delta_{post} Fem_i PostCrisis_i + \epsilon_i$$

where for individual i , y_i is the debt outcome of interest (total, mortgage, or educational debt; the debt-to-wealth ratio; or the debt-to-income ratio), \mathbf{X}'_i is a vector of credit demand and credit access controls, and Exp_i and $PostCrisis_i$ are dummy variables indicating whether the individual is observed during the 2004/2007 or 2010/2013 surveys, respectively (with the 1995/1998/2001

surveys being the reference group). The interaction terms with coefficients δ_{exp} and α_{post} are the DID estimators. The coefficients α_{exp} and α_{post} are the time trend estimates of the average change in indebtedness relative to the reference period for male-headed households, and $\alpha_{exp} + \delta_{exp}$ and $\alpha_{post} + \delta_{post}$ estimate the changes in indebtedness for female-headed households.

I test the predictions discussed in Section 4.2 by allowing parameters to vary by income and age. For mortgage debt, debt-to-wealth ratios, and debt-to-income ratios, separate regressions are run for observations reporting above median income (calculated by year) and for those reporting below median income. For educational debt, separate regressions are run for the full sample and for a non-traditionally aged sample, 25 to 65.

The DID approach has the advantage of eliminating the time-invariant heterogeneity that was discussed above. However, time-variant heterogeneity by gender could still confound the results. The vector of controls X'_i attempt to account for this concern. Controls and summary statistics are shown in Table 4.3. The controls are drawn from the literature on credit scoring variables and determinants of credit demand (e.g., Crook 2001). Controls not shown in the table are the interaction of race and gender and a quadratic age term. Wealth and income controls are omitted from the debt-to-wealth ratio and debt-to-income ratio regressions, respectively.

Two controls merit additional comment. Risk aversion is included in light of work suggesting that women may be more risk averse in their financial behavior on average (Charness and Gneezy 2012; Jianakoplos and Bernasek 1998). I also control for being “unbanked.” The opportunities for mainstream financial institutions to market new financial products to potential borrowers were likely mediated by the extent to which those borrowers were already incorporated into formal lending markets.⁴²

Note that income and wealth show significant variation, particularly among male-headed households. The standard deviation of wealth in the male subsample is 8.44 times larger than the mean. This may point to the presence of significant outliers in the distribution, although it is also well known that wealth tends to be more unequally distributed than income (e.g., Saez and Zucman

⁴²See Chapter 2 for a review of the literature on financial exclusion.

2014). To reduce this variation, income and wealth are transformed into logs, which also drops observations with zero income or wealth.⁴³

4.4 Results

4.4.1 Mortgage debt

Results from OLS regressions of the covariates on total household debt and mortgage debt specifically are reported in Table 4.4, with separate regressions for single-headed households with above and below median income.⁴⁴ Focusing first on the above-median-income group, there is evidence of a strong time trend. Average mortgage debt increased by about \$15,800 dollars between the credit expansion and reference periods. The coefficient for the post-crisis period is slightly larger at about \$20,600, suggesting that household debt continued to increase slightly between the credit expansion and post-crisis periods. There is no evidence of gender-differentiated trends in this subsample.

By contrast, the below-median-income group shows no sign of an increase in average mortgage debt among male-headed households in either of the periods of interest. To the extent that average household debt did increase among the relatively low-income group, it is driven entirely by changes in indebtedness among low-income, female-headed households. Average mortgage debt increased by about \$7,500 dollars for female-headed households between the reference and the credit expansion periods. The level of average indebtedness did decline for this group in the post-crisis period, but there is no evidence of a “catching up” by male-headed households.

Importantly, growth in mortgage debt during the credit expansion is a significant portion of the growth in total household debt for the below median income sample (72.8%). This finding suggests that growth in other forms of debt (i.e., educational debt, non-revolving consumer debt, automobile debt, credit card debt, etc.) contribute to the growth of indebtedness among these

⁴³Results are qualitatively robust to use of original values in regressions where convergence was not precluded by high variance of income and wealth.

⁴⁴For all debt level and extensive margin regressions, results listing estimates for controls are listed in Appendix E. Analogous results for the leverage and financial fragility regressions are available upon request.

households. In the above-median-income sample, the overall trend in household debt growth is positive but insignificant, suggesting that the increase in mortgage debt was accompanied by a decrease in other forms of debt. Growing reliance on other forms of debt may be a sign of financial distress among these households or of correlations between various types of borrowing.

4.4.2 Educational debt

Results from the educational debt regressions are reported in Table 4.5. Column 1 reports results from a regression of the full sample 18 to 65, and Column 2 reports analogous results for an older sample, 25 to 65. In both regressions, the period dummies reflect the time trends visible in Figure 4.2. There was an increase in educational debt during the credit expansion of almost \$776 on average among male-headed households and an increase of \$3,631 between the credit expansion and post-crisis periods. The magnitudes are similar when the sample is limited to older household heads.

Returning to the younger sample, there is evidence of gendered differences in growth both pre- and post-crisis. During the credit expansion period, educational debt increased by more than twice as much for female-headed than male-headed households. The magnitude of the DID coefficient corresponding to the post-crisis period is in turn \$600 (53%) greater than that of the DID coefficient for the credit expansion period, suggesting that women continued to see a faster rate of increase in dollar terms.

When the sample is narrowed to households 25 to 65, the magnitude of the DID coefficient for the credit expansion period falls by about 35% and is no longer statistically significant. This finding is consistent with the claim that most of the rapid increase in educational debt among female household heads is driven by growing enrollment of female recent high school graduates. The post-crisis DID estimator indicates a slightly greater or approximately equivalent amount of educational debt growth among women in the older sample. Because the coefficient on credit expansion growth is statistically indistinguishable from zero, most of the \$1,958 estimate for post-

crisis growth relative to the reference period may actually represent debt growth relative to the credit expansion period.

Overall, these results and differences by age group do not provide quantitative evidence in support of increased private student borrowing among older female household heads, but they are consistent with the secular increase in female enrollment and a return to college by female household heads of non-traditional college age.

4.4.3 Extensive margin

Implicit in the discussion of Section 4.2 is a distinction between the intensive and extensive margins of indebtedness. At the extensive margin, the outcome of interest is whether households hold a certain type of debt at all (e.g., to rent or to sign a mortgage). At the intensive margin, the relevant outcome is the magnitude of indebtedness conditional on holding debt (e.g., how expensive of a house to finance with how large of a down payment).

Determining whether the previous results are driven by differences on the extensive or intensive margins can shed some light on the mechanisms at play. For instance, if lenders primarily marketed new loans to customers by encouraging home purchases or the refinancing of a previously paid-off home, this should be reflected as an increase in the proportion of households holding debt regardless of magnitude. If the cost of loans increased on average as well, then the average magnitude of debt should increase conditional on holding a loan.

Table 4.6 reports results and selected marginal effects from logit regressions where the dependent binary variable equals one if the household holds the type of debt in question (the extensive margin).⁴⁵ The increase in indebtedness among lower income, female household heads appears to have occurred at the extensive margin. Among above median income borrowers, there is again no indication of gender differentiated trends on the extensive margin.

⁴⁵A regression on changes along the intensive margin is also possible by limiting the for each debt type to the subsample of individuals with non-zero debt of that type. However, comparisons to the previous result are problematic because sample size falls significantly depending on the prevalence of each type of borrowing.

Interestingly, the extensive margin results suggest that the relative increase in indebtedness among lower income female-headed households may be due at least in part to a decrease in the indebtedness of male-headed households. The net change in the probability of being a mortgage debt holder for male-headed households falls over time, while the net change is zero or slightly positive for female-headed households, independent of observable changes in household composition.

The explanation of the decline among male-headed households is unclear. As shown in Table 4.3, homeownership increased for both male- and female-headed households between the pre-expansion and credit expansion periods, and household size remained relatively constant. One possibility is that female-headed households mostly experienced an increase in the magnitude of mortgage debt already held (e.g., by refinancing), suggesting a change along the intensive margin.

Post-crisis, the results suggest that both men's and women's likelihood of holding mortgage debt falls, although men experience a slightly greater decrease. Due to greater mobility and less reliance on social networks (see discussion in Chapter 2), men may have been more readily able to foreclose on or walk away from homes and mortgage debt.

The results for educational debt suggest a general increase in the probability of holding educational debt during both periods, but particularly post-crisis, with no differences in growth trajectories by gender or age. Such a general increase that is not specific to the traditional college age population points to the growing enrollment of non-traditional students. Furthermore, these results suggest that most of the gender difference in educational debt is driven by differences along the intensive margin. Non-traditional students, who are disproportionately female heads of household, may have borrowed more on average than traditional students. Parental borrowing for children attending college could also play a role in the differences: If female heads of household are more likely to have children of college age and take on student loans for their children (e.g., PLUS loans which can be used by parents to fund their child's undergraduate education), these households could have accumulated a greater college debt burden than other households holding their own debt. For instance, the latter group may have already paid off part of their student loans or may be better equipped to pay off that debt quickly.

4.4.4 Household leverage and financial fragility

Table 4.7 presents regression results for leverage and financial fragility ratios by income group and sample. Among the lower income group, female-headed households experienced an average increase in leverage. In the post-crisis period, the average debt-to-wealth ratio in the trimmed sample of female-headed households increased by 130 percentage points relative to the pre-expansion period. Compared to the low-income sample mean of 1.77 (debt equal to 177% of gross wealth), this result is economically significant. Moreover, these female-headed households appear to have experienced increasing financial fragility. In the trimmed sample, the average debt-to-income ratio increased by 39 percentage points for women in the credit expansion period. The gender difference grows in the post-crisis period and is more precisely estimated.

The above-median-income group does not exhibit gender-differentiated trends in either ratio. There is evidence of growing indebtedness among all households relative to incomes during the credit expansion and post-crisis period.

4.5 Conclusions

This analysis used evidence from the Survey of Consumer Finances to test various mechanisms for the growth in indebtedness among female-headed households prior to and following the Financial Crisis. The results point to a growing debt burden among female-headed households that accelerated during the credit expansion and showed greater persistence post crisis. Subsample analyses by income and age provide some evidence that this gendered growth in indebtedness stems from institutional changes in lending markets and less deleveraging of mortgage and other debt post-crisis among female household heads. This growing mortgage indebtedness is combined with investment in education among young women pre-crisis and particularly among non-traditionally aged female household heads post-crisis.

The evidence also suggests that lower income, female-headed households saw an increase in debt-to-wealth ratios post-crisis. Although debt and wealth rose at similar rates during the credit expansion, the collapse of home equity in the post-crisis period left these households more lever-

aged than pre-crisis. Debt-to-income ratios also rose for female-headed households, raising concerns about the financial fragility of these households moving forward.

This difference-in-difference analysis using successive waves of the Surveys of Consumer Finances faces several limitations. First, the observed changes in indebtedness over time may reflect unobserved variation in the composition of the female-headed households and male-headed households sampled (e.g., changes in the number of college students) or other unobserved, time-variant characteristics of these households. Second, the SCF oversamples high-wealth households, who are less likely to be impacted by some of the debt dynamics that are the focus of this paper. The University of Michigan's Panel Survey of Income Dynamics (PSID) offers a promising alternative dataset to address both of these concerns. Since 1968, the PSID has followed a sample of American households and "splitoff" households formed from that original sample in a series of yearly and (since 1997) biennial surveys. The sample includes an oversampling of low-income households and can be made nationally representative through use of sampling weights. Chapter 5 applies an extension of the present analysis to the PSID.

Debt is not necessarily problematic. It can enable households to acquire assets and invest in human capital. However, the debt accumulated in the context of the credit expansion is concerning. Equity funded with mortgage debt disappeared the collapse of the housing bubble. Educational debt is potentially beneficial in the long run, but the promise of increased future income is premised on degree completion and on a reasonable earnings premium. Neither of these is guaranteed, particularly when women are concentrated in lower-paying industries and must juggle education with care responsibilities. Further research should investigate the continued consequences of this growth in debt for the financial stability and economic security of female-headed households.

4.6 Tables and figures

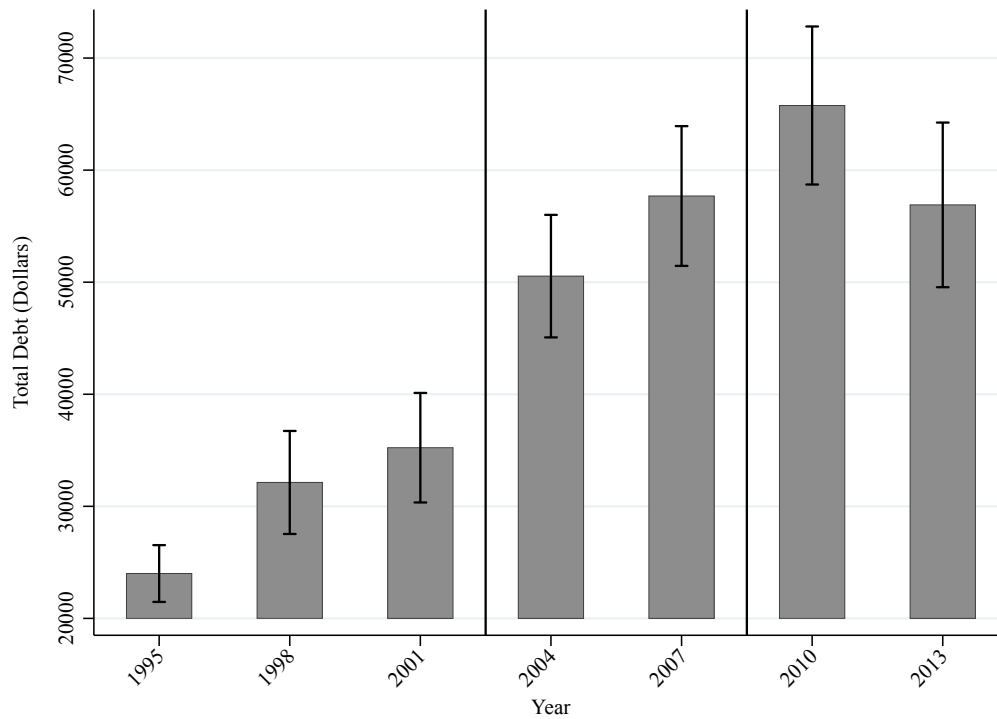


Figure 4.1: Average total household debt, 1995 - 2013

Source: 1995 to 2013 Surveys of Consumer Finances.

Notes: Sample is limited to first implicate set and to single-headed households with household heads aged 18 to 65 and non-zero wealth and income. Bars indicate standard errors. Means and standard errors are calculated using sampling weights. Black lines separate time periods of interest (the pre-expansion or reference period [1995-2001], the credit expansion period [2002-2007], and the post-crisis period [2008-2013]).

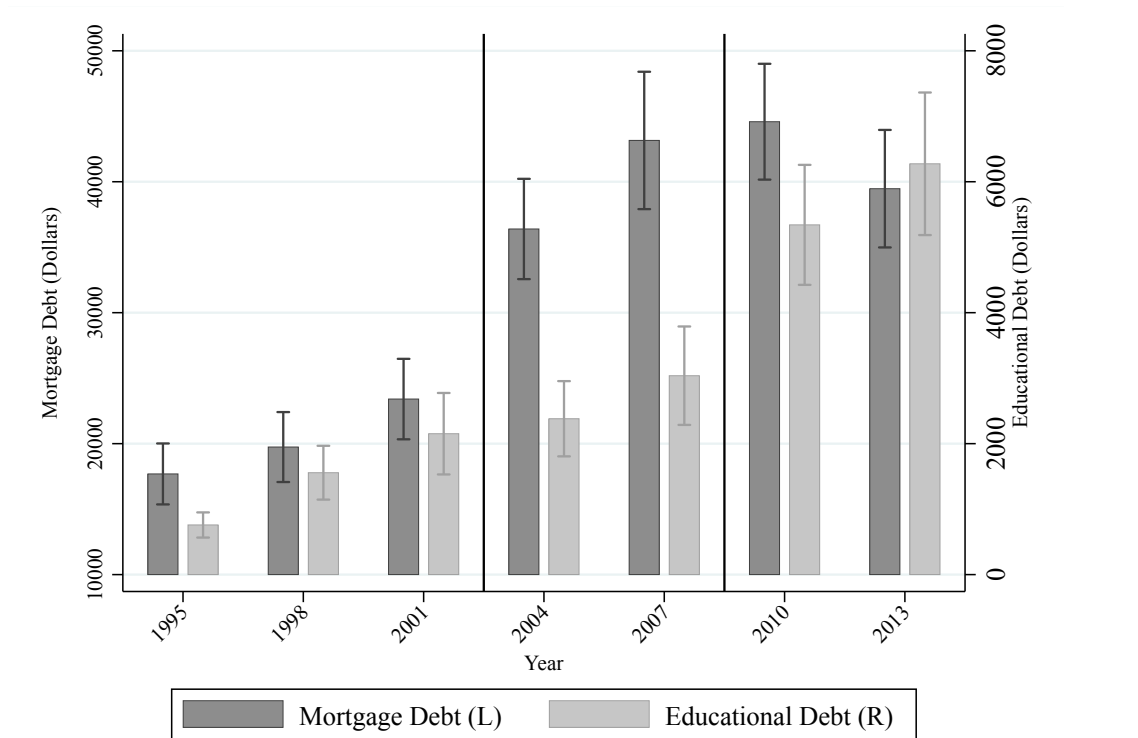


Figure 4.2: Average household mortgage and educational debt, 1995 - 2013

Source: 1995 to 2013 Surveys of Consumer Finances.

Notes: Sample is limited to first implicate set and to single-headed households with household heads aged 18 to 65 and non-zero wealth and income. Bars indicate standard errors. Means and standard errors are calculated using sampling weights. Black lines separate time periods of interest (the pre-expansion or reference period [1995-2001], the credit expansion period [2002-2007], and the post-crisis period [2008-2013]).

Table 4.1: Debt-to-wealth and debt-to-income ratio summary statistics by household type

<i>Full sample</i>	Female-headed households		Male-headed households	
Debt-to-wealth ratio	7.258	(161.744)	3.478	(46.938)
Debt-to-income ratio	1.531	(7.933)	2.573	(76.698)
<i>Observations</i>	4986		3578	

<i>Trimmed sample</i>	Female-headed households		Male-headed households	
Debt-to-wealth ratio	1.521	(7.511)	1.168	(7.473)
Debt-to-income ratio	1.265	(2.073)	1.082	(2.003)
<i>Observations</i>	4936		3544	

Source: 1995 to 2013 Surveys of Consumer Finances.

Notes: Sample is limited to first implicate set and includes all single-headed households with household heads 18 to 65 years of age and with non-zero wealth and income. The trimmed sample drops the top 0.5 percent of the distribution for each variable.

Table 4.2: Average total, mortgage, and educational debt by gender

Female-Headed Households	Period 1: 1995-2001	Period 2: 2004-2007	Percent Change: 1 to 2	Period 3: 2010-2013	Percent Change: 2 to 3
Total Debt	\$27505.94	\$49575.90	80.24%	\$56311.24	13.59%
Mortgage	\$19389.17	\$37342.88	92.60%	\$41857.27	12.09%
Education	\$1578.52	\$3191.73	102.20%	\$6652.62	108.43%
<i>Observations</i>	<i>1752</i>	<i>1264</i>		<i>1970</i>	
Male-Headed Households					
Total Debt	\$35566.37	\$60827.57	71.03%	\$61973.26	1.88%
Mortgage	\$21962.34	\$43189.08	96.65%	\$41064.82	-4.92%
Education	\$1399.63	\$1939.69	38.59%	\$4657.85	140.13%
<i>Observations</i>	<i>1273</i>	<i>878</i>		<i>1427</i>	

Source: 1995 to 2013 Surveys of Consumer Finances.

Notes: Sample is limited to first implicate set and includes all single-headed households with household heads 18 to 65 years of age and with non-zero wealth and income.

Table 4.3: Summary statistics of controls by gender

Control	Female-headed households		Male-headed households	
Wealth (dollars)	136171.60	(874999.90)	215125.40	(1815515.00)
Income (dollars)	33742.95	(64882.78)	48862.67	(235895.30)
Age	43.267	(12.361)	40.925	(13.278)
Non-White	0.366		0.254	
Never married	0.387		0.538	
Separated	0.095		0.077	
Divorced	0.414		0.345	
Widowed	0.103		0.040	
Risk averse*	0.493		0.324	
Unbanked	0.090		0.086	
Household size	1.864	(1.159)	1.241	(0.664)
Major expense in 5 to 10 yrs	0.585		0.567	
Unemployed**	0.159		0.168	
<i>Observations</i>	4986		3578	

Source: 1995 to 2013 Surveys of Consumer Finances.

Notes: Standard deviations in parentheses for continuous variables. Sample is limited to first implicate set and to all single-headed households with household heads 18 to 65 and non-zero wealth and income. Means and standard deviations are calculated using sampling weights. *Defined as being unwilling to take “any financial risks.” **Except for 1995, defined as not working and “looking for work in past 12 months.”

Table 4.4: Mortgage regression results

Dependent (dollars):	Below median income		Above median income	
	Total debt	Mortgage	Total debt	Mortgage
Female	720.8 (1783.7)	-238.6 (1538.6)	3299.8 (4930.2)	4407.2 (2717.6)
Expansion	-187.1 (2026.1)	-701.4 (1762.6)	9077.1 (7303.5)	15762.8*** (4352.2)
Post-Crisis	6269.2** (2514.4)	1868.1 (2014.9)	16965.3** (7134.3)	20606.3*** (4174.5)
Expansion # Female	10267.3*** (2758.9)	7478.5*** (2414.6)	-3832.7 (8263.9)	-2078.3 (5419.6)
Post-Crisis # Female	7259.8** (2969.1)	5530.6** (2440.3)	-5101.3 (9944.4)	394.5 (5547.5)
<i>Observations</i>	<i>3847</i>	<i>3847</i>	<i>4717</i>	<i>4717</i>
<i>R-squared</i>	<i>0.168</i>	<i>0.174</i>	<i>0.094</i>	<i>0.273</i>

Notes: Standard errors in parentheses. Stars indicate significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown. All regressions use sampling weights and first implicate set.

Table 4.5: Educational debt regression results

Dependent (dollars):	18 to 65 years of age		25 to 65 years of age	
	Total debt	Educational	Total debt	Educational
Female	194.3 (2901.9)	941.2*** (314.4)	110.6 (3232.6)	988.6*** (328.4)
Expansion	13049.1*** (4439.3)	775.7** (373.6)	13539.3*** (5047.0)	947.0** (417.4)
Post-Crisis	21412.1*** (5126.8)	3631.2*** (573.6)	23491.7*** (5777.0)	3403.4*** (600.2)
Expansion # Female	-140.9 (5026.8)	1169.6** (523.8)	-889.6 (5639.4)	762.5 (541.1)
Post-Crisis # Female	-4742.3 (6239.8)	1786.1** (767.9)	-6471.8 (7016.3)	1958.4** (796.4)
<i>Observations</i>	8564	8564	7782	7782
<i>R-squared</i>	0.078	0.051	0.079	0.054

Notes: Standard errors in parentheses. Sample is limited to all single-headed households with household heads 18 to 65 and non-zero wealth and income. Stars indicate significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown. All regressions use sampling weights and first impute set.

Table 4.6: Extensive margin regression results

Logit parameter estimates	Mortgage debt		Educational debt	
	Below median income	Above median income	18 to 65	25 to 65
Female	-0.157 (0.256)	0.0115 (0.124)	0.453*** (0.130)	0.565*** (0.148)
Expansion	-0.700** (0.320)	0.292** (0.132)	0.384*** (0.148)	0.408** (0.171)
Post-Crisis	-0.803*** (0.289)	0.201* (0.119)	0.672*** (0.127)	0.699*** (0.146)
Expansion # Female	0.890** (0.362)	0.0608 (0.180)	0.0222 (0.184)	-0.0520 (0.207)
Post-Crisis # Female	0.723** (0.329)	0.0615 (0.160)	0.251 (0.158)	0.149 (0.176)
<i>Observations</i>	<i>3847</i>	<i>4717</i>	<i>8564</i>	<i>7782</i>
Marginal effects				
Expansion # Female	0.0736** (0.0296)	0.0112 (0.0323)	0.0155 (0.0206)	0.00826 (0.0209)
Post-Crisis # Female	0.0553** (0.0270)	0.0113 (0.0287)	0.0643*** (0.0188)	0.0508*** (0.0190)

Notes: Standard errors in parentheses. Sample is limited to all single-headed households with household heads 18 to 65 and non-zero wealth and income. Stars indicate significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown. All regressions use sampling weights and first implicate set.

Table 4.7: Leverage and financial fragility regression results

Dependent:	Less than median income				More than median income			
	Debt-to-wealth ratio		Debt-to-income ratio		Debt-to-wealth ratio		Debt-to-income ratio	
	Full	Trimmed	Full	Trimmed	Full	Trimmed	Full	Trimmed
Female	5.668 (8.838)	-0.0213 (0.381)	-2.609 (2.121)	0.0531 (0.144)	0.514 (0.578)	0.0263 (0.437)	0.0851 (0.0653)	0.0987 (0.0609)
Expansion	2.622 (5.105)	0.577 (0.662)	-1.366 (1.756)	-0.0486 (0.172)	-0.234 (0.540)	-0.179 (0.526)	0.239*** (0.0859)	0.260*** (0.0818)
Post-Crisis	6.663 (5.093)	0.196 (0.339)	7.296 (7.887)	0.120 (0.154)	2.732 (1.951)	0.244 (0.639)	0.272*** (0.0798)	0.288*** (0.0761)
Expansion # Female	-6.800 (12.76)	0.0420 (0.768)	1.900 (1.752)	0.385* (0.211)	1.795 (1.149)	0.513 (0.638)	0.0915 (0.111)	0.0758 (0.109)
Post-Crisis # Female	-8.538 (13.10)	1.308** (0.564)	-6.022 (7.641)	0.489** (0.197)	-1.487 (1.802)	0.203 (0.730)	0.145 (0.103)	0.134 (0.101)
<i>Observations</i>	<i>3847</i>	<i>3776</i>	<i>3847</i>	<i>3776</i>	<i>4717</i>	<i>4704</i>	<i>4717</i>	<i>4704</i>
<i>R-squared</i>	<i>0.007</i>	<i>0.023</i>	<i>0.003</i>	<i>0.125</i>	<i>0.007</i>	<i>0.014</i>	<i>0.181</i>	<i>0.199</i>

Notes: Standard errors in parentheses. Sample is limited to all single-headed households with household heads 18 to 65 and non-zero wealth and income. Stars indicate significance at the * 10%, ** 5%, and *** 1% levels. Controls not shown. All regressions use sampling weights and first implicate set. Trimmed sample drops observations with debt-to-wealth or debt-to-income ratios in the top 0.5% of the distributions.

Chapter 5

Personal Indebtedness, Social Inequality: The Gendered and Racialized Effects of the 2008 Financial Crisis on Household Debt

5.1 Introduction

Since the 2008 Financial Crisis, a substantial literature has emerged examining changes in household net worth in the lead-up to and aftermath of the crisis, with particular attention to inequality in net worth by class, race, and household structure (Baker, West, and Wood 2017; Mckernan, Ratcliffe, Steuerle, and Zhang 2010; Pfeffer, Danziger, and Schoeni 2013; Weller and Hanks 2018; Zhang and Feng 2017). This work has shown that Black and Hispanic and low-income households experienced smaller gains in net worth pre-crisis and greater relative losses in the recession than more advantaged groups. According to one study, households with White household heads lost 32% of their wealth on average, compared to 45.7% for household heads of other racial identities (Pfeffer, Danziger, and Schoeni 2013).

Part of this rising inequality in net worth around the 2008 Financial Crisis has been traced to differences in the types of investments made by each group. More affluent households tend to hold a larger portion of their wealth in liquid assets such as stocks and bonds. The wealth held by less affluent households is generally concentrated in housing, which experienced a slower recovery post-crisis (Zhang and Feng 2017).

Yet changes in asset values only explain a portion of the changes in net worth. Figure 5.1 follows Pfeffer, Danziger, and Schoeni (2013) in tracking relative changes in the distribution of net worth and gross asset values between 1999 and 2015.⁴⁶ The distribution of net worth experi-

⁴⁶Net worth in the PSID is defined as total asset values (home equity, farm/business value, checking/savings account value, non-residential real estate, vehicles, annuities/IRAs, and other assets) net of mortgage debt, consumer debt, and any debt owed on the previously listed assets. The debt corresponding to the last category is not listed separately by asset, so it is not possible to determine a true measure of gross asset values. The measure of “gross assets” in this analysis is therefore gross in terms of “reversing” the netting out of consumer and mortgage debt only.

enced a greater divergence than gross asset values during this time, pointing to the role of debt in contributing to net worth inequality. Without careful attention to both sides of household balance sheets, it is difficult to disentangle the mechanisms driving net worth. How much of economically marginalized households' smaller gains in net worth came from slower growth in asset values, and how much came from greater reliance on debt financing of consumption and investment?

In addition, an analysis of changes in household debt provides a more complete understanding of households' financial health. Two households may have a net worth of \$20,000, but their financial fragility—their probability of becoming insolvent in the case of an income or expenditure shock—may differ depending on the dollar value of their debt. Even with offsetting wealth, a more indebted household may nonetheless be more financially fragile. That household may have illiquid assets, a low level of income, limited access to additional credit, or high financing costs on their debt. In light of the rising household debt burden in the United States, attention to the indebtedness of households is important for understanding the true extent of intergroup inequality.

A small body of literature focused primarily on mortgage lending has started to raise these types of questions about the role of credit markets in shaping U.S. race and gender inequality (Baker 2014, 2018; Dwyer 2018; Dymski, Hernandez, and Mohanty 2013; Fishbein and Woodall 2006; Long 2018; Wyly and Ponder 2011). This work has included valuable assessments of how social power and the tasks of social reproduction have pushed vulnerable households into indebtedness. This paper contributes to this literature by applying wide-scale quantitative evidence to examine gender and race inequality in the growth of both mortgage and consumer debt surrounding the 2008 Financial Crisis.

Using a rich longitudinal dataset—the Panel Study of Income Dynamics—I apply a difference-in-differences empirical strategy to assess whether economically marginalized groups such as female household heads and Black or Hispanic household heads experienced greater increases in indebtedness and financial fragility between 1999 and 2015 than other types of households. I focus attention on changes in mortgage principal, total mortgage expenditures, and non-mortgage, non-vehicle consumer debt at the intensive and extensive margins. I summarize the changes at both

margins with an analysis of how the Financial Crisis affected households' probability of becoming "financially vulnerable" as measured by their debt burden relative to income, with and without income adjustments that account for household size.

The results provide mixed evidence that these groups—particularly households with Black household heads—experienced disproportionate growth in the magnitude of mortgage debt burden relative to income. There is robust evidence that consumer debt grew both in dollar terms and relative to household income among women and Black heads of households during the Great Recession and the recovery. This growing inequality is even more stark when income is scaled to household size as an "ability to repay" adjustment. A decomposition of household debt between 2011 and 2015 suggests that much of the divergence in consumer debt is driven by educational borrowing.

This analysis matters for developing a richer picture of economic inequality in an increasingly financialized U.S. economy. Debt allows households to invest in assets and smooth across income shocks, but if the debt is unsustainable or leads to short-lived wealth creation, then households suffer a net loss. Some have also argued that rising consumer debt is of concern from the perspective of macroeconomic volatility and even long-run growth (Krugman 2014; Mian and Sufi 2012). In the concluding section of the paper, I will address the implications of rising student loan debt specifically.

Section 5.2 introduces the theory and empirical literature from economics, political economy, and sociology relating to changes in debt and net worth before and during the Financial Crisis. Section 5.3 introduces the Panel Study of Income Dynamics, discusses its limitations and advantages, and describes the empirical strategy. Results are presented in Section 5.4, and Section 5.5 concludes.

5.2 Background and literature

5.2.1 Theory

Much has been written on the causes of the 2008 Financial Crisis and on the implications of the housing bubble for rising mortgage and consumer indebtedness (e.g., Bricker et al. 2012).⁴⁷ But why would some groups of households—particularly those headed by women or minorities—be expected to experience faster growth in household debt pre- or post-crisis, *a priori*?

Couching the argument first in the terms of individual choice within a neoclassical framework, relevant factors include increased credit supply and variation in search effort. The early to mid-2000s was characterized by a credit expansion during which high-cost credit was increasingly marketed to borrowers who previously would have been credit constrained (Chomsisengphet and Pennington-Cross 2006; Smith and Hevener 2010). Even in the absence of predatory lending or variation in the demand for credit, this expansion would have disproportionately increased borrowing among the previously credit constrained. Low-to-moderate income households and prospective Black and Hispanic borrowers are more likely than White borrowers to be credit constrained and to lack access to financial services more broadly (Crook 2001; FDIC 2015; Shapiro 2006).

Time poverty and transaction costs may also impact the search efforts of households for low-cost loans. For example, women and female-headed households in particular are more likely than other households to be time poor as a result of their care obligations (Turner and Grieco 1998). This may limit these households' incentive to dedicate extended search efforts towards finding the lowest-cost mortgage or consumer loans. Within communities with lower levels of financial inclusion, knowledge of low-cost lending options may also be less widely available. Cheng, Lin, and Liu (2011) present evidence that women are less likely to search for the lowest mortgage rate than men on average and are more likely to make a decision based on someone's recommendation. Others have argued that financial literacy plays an important role in differences in households' financial outcomes (Lusardi and Scheresberg 2013).

⁴⁷Much of this section draws from the literature review in Long (2018).

Work in political economy and sociology attributes variation in indebtedness to persistent inequality in social power. Dwyer (2018) has suggested that as Western economics financialize, access to credit and the terms under which credit is accessible for different groups play an important role “in shaping social inclusion and exclusion,” determining “life chances,” and reinforcing “oppressive social relations” (237). The power of credit in the U.S. results in part from the late-20th-century movement away from the direct provisioning of public goods and social safety nets. Instead, economic risk has become increasingly “individualized” for households (Dwyer 2018, 255). Households are expected to borrow to cope with unexpected shocks—whether idiosyncratic in nature or market-wide—and to afford those same public goods that were previously publicly provisioned, such as higher education. Empirical work has confirmed that households with low levels of wealth rely on unsecured debt as a safety net during unemployment, while wealthier households do not (Sullivan 2007).

In the context of the 2008 Financial Crisis specifically, subprime lending may have had gendered and racialized dimensions. Dymski, Hernandez, and Mohanty (2013) note that financial actors leveraged the pre-expansion financial exclusion and continued economic vulnerability of Black and Hispanic households as well as female-headed households to extract rents from those same households during the lending expansion. Securitization, the externalization of risk for financial actors that resulted, and deregulation encouraged banks to target these previously excluded communities as potential customers for high-cost mortgage products. Rather than simply representing a neutral expansion of credit access, Dymski, Hernandez, and Mohanty (2013) point to the role of existing racial and gender inequality in enabling predatory lending by financial institutions.

Other work has argued that specific subgroups within these social categories, such as African-American widows, were targeted for similar reasons (Wyly and Ponder 2011). Anecdotal accounts suggest that these “cash-poor and equity-rich” groups had enough assets to generate additional leverage, while their limited income flows left them vulnerable to predatory lending. Outside of the subprime context in particular, there is evidence that Black and Hispanic borrowers and low-

to-moderate income households are more likely to rely on high-cost lending (e.g., from payday lenders) (e.g, Carr and Schuetz 2001).

Social reproduction tasks may also contribute to gender and intersectional inequality. Baker (2014) argues that the dismantling of social safety nets in the 1990s pushed female heads of household in particular towards debt as an alternative risk-coping mechanism. In a subsequent qualitative study, Baker (2018) interviews older women who lost their homes in the aftermath of the Financial Crisis. Many women experienced this loss of wealth in part because their position as homeowners made them central in their social networks. One participant stated, “Everyone’s living with me again. My daughter dropped out of college, my brother’s living upstairs getting himself together and my Mom can’t be alone anymore” (32). Women in the study reported taking second mortgages to put children through college and then serving as the safety net if those children left school or if another friend or family member lost a job.

Previous research has found that care work and financial responsibility for friends and family have economically significant impacts on households’ financial security. Many households used home equity to support their children in college, in turn shifting to student debt when housing prices plummeted post-2008 (Amromin, Eberly, and Mondragon 2016). Chiteji and Hamilton (2002) report that Black households’ greater tendency to provide financial assistance to family members with low incomes explains part of the persistent racial wealth gap. These care responsibilities may therefore contribute to inequalities in mortgage and consumer debt if households with limited wealth must borrow to meet the needs of their friends or family.

Yet the centrality of women in social networks can also lead to forms of indebtedness that less often appear in household surveys. Women—especially women of color—appear more likely than men to rely on borrowing from friends and family in the case of an unexpected emergency expense (Lusardi et al. 2011).⁴⁸ There is important slippage in many cases between “loans,” “financial assistance,” and “gifts” exchanged within friend and kinship networks (Morduch and Schneider 2015), so much of this borrowing may not appear in household surveys that ask about loans specifically.

⁴⁸See Chapter 2 for a review of this literature and an empirical analysis of gender differences in informal borrowing.

5.2.2 Empirical literature on net worth and debt

The studies on Americans' net worth pre- and post-2008 broadly agree that these periods were characterized by rising inequality in net worth. Based on both PSID and SCF data, Pfeffer, Danziger, and Schoeni (2013) show that median wealth increased by about 12% between 2003 and 2007 and fell by 50% between 2007 and 2011, but the authors note that this change in median wealth is misleading. Wealth at the 95th percentile of the distribution increased by more than twofold between 1984 and 2007 and remained 60% higher in 2011 than in 1984. Meanwhile, the 25th percentile of wealth saw virtually no gains during the credit expansion and an almost complete loss of wealth by 2011 (about 16% of 1984 levels).

Focusing on household characteristics specifically, the same study finds that the most “disadvantaged” groups experienced greater relative losses in wealth post-2008 than other groups (albeit smaller absolute losses). These groups included Non-White respondents and households with children. Another SCF study uses a synthetic control approach to determine the extent to which the Financial Crisis eroded household wealth relative to pre-crisis trends (Mckernan, Ratcliffe, Steuerle, and Zhang 2010). They conclude that the average loss in wealth was about 28%, with younger households and those with Black household heads experiencing losses closer to 47% of pre-crisis wealth. A range of other studies using the SCF document similar inequality in wealth losses and recovery, attributing this inequality in part to variation in the type of assets owned by different households (Weller and Hanks 2018; Zhang and Feng 2017).

Compared to this body of work, there is a much smaller empirical literature on debt inequality surrounding the 2008 Financial Crisis. The most attention has been paid to subprime lending. Fishbein and Woodall (2006) analyze patterns in subprime (3 points or more above the Treasury yield threshold) and high-cost subprime lending (5 points or more above) as revealed in HMDA data. Women were disproportionately likely to receive both categories of subprime loans regardless of income. The magnitude of the gender gap grew with income, which the authors attribute to the greater impact of gender differences in self-perceived bargaining power and financial confidence at higher levels of income.

These gaps in borrowing costs varied by race and ethnicity as well. White women were about 1.25 times as likely to receive such loans as White men, and the ratio rose to 4.75 for African American women with incomes more than 200% of median income (Fishbein and Woodall 2006). Wyly and Ponder (2011) find mixed evidence of a “feminization of risky credit,” particularly among older Black women (543). There is also ample evidence of racial inequality in subprime lending as surveyed by Dymski, Hernandez, and Mohanty (2013), with Smith and Hevener (2010) reporting double-digit differences between Black and White borrowers in the probability of receiving subprime loans, even after controlling for observable characteristics. Women were also more likely to receive such loans independent of other factors.

Finally, educational debt has received some attention as well, albeit less frequently in the context of the Financial Crisis specifically. Women are enrolling in college at a greater rate than men, now representing a majority of enrolled students and earning 57% of all bachelor’s degrees as of 2017 (American Association of University Women [AAUW] 2017). These enrollment trends alone suggest that women are more likely to hold student debt. Moreover, female students more frequently borrow for college and hold greater levels of student debt than male students. Borrowing is greatest among Black women in particular, and they repay that debt more slowly than other groups (AAUW 2017). This gap in student debt by race and ethnicity has been attributed partly to Black families’ lower average ability to pay and partly to the less liquid nature of the wealth that Black families hold compared to White families (e.g., home equity vs. savings or stocks) (Addo, Houle, and Simon 2016).

There are several possible linkages between these long-run gendered and racialized trends in student debt and the 2008 Financial Crisis. Amromin, Eberly, and Mondragon (2016) find that about 40% of the rise in student loan debt following the Financial Crisis can be attributed to the loss of home equity, which families had previously leveraged to fund educational expenses. As noted above, if the main source of wealth for Black families was home equity, they may have disproportionately had to shift towards student loans post-crisis compared to other families. In addition, there is some anecdotal and quantitative evidence indicating that women may have been

more likely than men to pursue or resume post-secondary education during the recession, all else equal (Aaronson et al. 2006; Rampell 2011; Van Zandweghe 2012). Finally, during the credit expansion of the early 2000s, private student lending ballooned in volume, driven largely by for-profit colleges (Consumer Financial Protection Bureau and U.S. Department of Education 2012). Women and particularly single mothers are disproportionately likely to attend for-profit colleges and thus may have been more frequent recipients of high-cost student loans (Institute for Women’s Policy Research 2017b).

The present analysis builds on a previous paper exploring these gendered and racialized mechanisms in household debt using the Survey of Consumer Finances (SCF) (Long 2018).⁴⁹ The earlier paper tracks differences in average mortgage and educational debt growth as reported in the triennial SCF surveys administered during the pre-expansion (1995 to 2001), credit expansion (2003 to 2007), and post-crisis (2010 and 2013) periods. The results suggest that lower income women experienced faster growth in mortgage debt and overall financial fragility during the credit expansion than men and male-headed households. Educational debt grew more quickly for women pre- and post-crisis, with the gender differences primarily being driven by young women (18 to 25 years of age) pre-crisis and older women (25 and up) post-crisis. However, as discussed below, the SCF has several limitations compared to the dataset used in this analysis, the Panel Survey of Income Dynamics (PSID).

5.3 Data and empirical strategy

5.3.1 Panel Study of Income Dynamics

The PSID is a longitudinal survey of American households founded on an initial, representative sample of 1968 households. This initial sample included a low-income oversample as part of the Survey of Economic Opportunity, which was then combined with an additional subsample to form a representative sample of the U.S. population. The children of these households and the split-off families that formed as a result were followed as well. The result is a representative “family tree”

⁴⁹See Chap 4 for an extended version of this article.

of American households. Surveys were administered annually every year until 1997, at which point the survey was administered biennially. Adjustments were made to the sample in later years, such as the addition of an immigrant sample in 1997 and 1999 and a reduction in the low-income sample at the same time.

Every household contains at least one “sample member.” A sample member is either a member of the original 1968 sample (or 1997-1999 Immigrant Sample) or a direct descendent of those individuals. Therefore, the sample member of a household is most often 1) a child within a household headed by one or two sample members, 2) the head of a household, or 3) the spouse or partner of a household head. If the non-sample spouse or partner of the sample member were to leave the household, they would not be followed in subsequent surveys.⁵⁰ Children of sample members (“born-in sample members”) are always followed. Like the SCF and most other U.S. household finance surveys, household head status is defined mechanistically on the basis of gender and household structure. All men in households with an opposite-sex couple (married or cohabiting for more than one year) are defined as household head unless incapacitated. Otherwise, women are only defined as household head if they are a sample member and 1) have no partner or spouse or 2) are living with a female partner or spouse.

The PSID includes detailed information on households and specific household members, including their employment status, consumption, health, marital status, and fertility choices. Beginning in 1984, the PSID began collecting data on household assets and debts. In 1999, detailed mortgage information including multiple mortgages and total mortgage expenditures became consistent parts of the wealth supplement. As a result, the time period used in this analysis starts at 1999. I also make two truncations to the analytical sample within this time frame: I drop the top 1% of wealth holders within each time period of interest, and I drop household heads below the age of 18 (less than 0.1% of the sample). Previous work has noted that the PSID does not accurately

⁵⁰In more recent surveys, the children of sample members who have moved into households headed by non-sample members while being under 18 years of age have been followed as part of the survey. Because I drop all respondents 18 years of age and under as discussed in more detail below, this very small group of observations is not included in my analytic subsample.

describe the wealth holdings of the top few percent of the net worth distribution (Hurst, Luoh, Stafford, and Gale 1998).

I pool nine waves of the PSID and categorize them into four different time periods:

- *Pre-expansion period:* 1999, 2001
- *Credit expansion period:* 2003, 2005, 2007
- *Recession:* 2009, 2011, 2013
- *Post-recession:* 2015

The major expansion in the U.S. supply of consumer and mortgage credit can be traced to approximately 2003. The Case-Shiller housing price index had been increasing since the 1990s, but the early 2000s saw an acceleration of that growth (S&P Dow Jones Indices LLC 2019). In addition, the volume of subprime lending increased significantly beginning precisely in 2003 (Smith and Hevener 2010).

In light of these stylized facts, I define the “credit expansion” as the period from 2003 to 2007. There was notable slowing in housing price growth and a dramatic reduction in subprime mortgage originations in 2007, even though the collapse of Lehman Brothers did not occur until September 2008. This was triggered by early signs of destabilization in housing markets, including rising foreclosures rates. However, the relevant PSID surveys were conducted only in 2005, 2007, and 2009. Of these, 2007 is the most reasonable end to the credit expansion, and the negative employment and growth effects of the recession had not yet begun.

I define the recession period as including the three surveys of 2009, 2011, and 2013. Even though the official end of the recession occurred in 2009, recovery was notoriously slow in terms of employment and incomes. Employment growth only turned weakly positive in the second quarter of 2010 and only returned to pre-crisis levels after 2014. Moreover, housing values did not begin

to recover until 2012 and were closer to pre-crisis levels in 2015. As a result, I set the recovery or “post-recession” period to include only the 2015 survey year.⁵¹

5.3.2 Comparison of the PSID and the SCF

As noted in Section 5.2 above, this analysis builds on Long (2018), which used the Survey of Consumer Finances. The SCF shares one key shortcoming with the PSID that has already been commented upon. The SCF, PSID, and all other major U.S. household finance surveys apply a unitary household assumption for wealth- and debt-related questions. Both datasets maintain a roster of household members with individual-level information on educational attainment, income, and employment status. Yet all questions about wealth holdings, debt, and credit (e.g., applications, rejections, and discouragement) are reported at the household level. The implicit assumption is that all adults in the household pool responsibility for debts and share wealth. As a result, it is not possible to distinguish between the indebtedness of individuals within the same household, and gender and household structure become intertwined for both empirical surveys.

Empirical work has cast serious doubt on the applicability of the unitary household assumption for household finances. Pahl (2008) notes a trend towards increasing individualization of household finances in the United Kingdom. Many couples are choosing to only partially pool their financial accounts. Within households, some individuals—especially women with lower earnings and bargaining power—may not even hold savings or checking accounts under their name despite their spouse or partner holding such accounts (Klawitter and Fletschner 2011).

However, the PSID does address two of the major shortcomings of the SCF. First, the SCF oversamples the high end of the wealth distribution. The PSID has the opposite challenge and is known for providing a less than representative picture of the wealth holdings of the top several percent of the wealth distribution (Hurst, Luoh, Stafford, and Gale 1998). Much of the work discussed in Section 5.2 anticipating gender and racial differences in household debt focuses attention on low-

⁵¹Specifications in which the post-recession period is defined to include both 2013 and 2015 have also been estimated. The results are qualitatively consistent with those presented in Section 5.4 and are available upon request.

to-moderate income communities and households with relative low wealth. Therefore, the PSID is expected to provide greater insight on the debt dynamics of these households than the SCF.

Second, the PSID's panel structure allows researchers to address selection issues that may arise when evaluating changes in outcomes within social groups over time. Specifically, the composition of households (including whether they are dual-, female-, or male-headed) may change over time in response to an economic shock. For example, households with high levels of debt post-crisis may have had a higher probability of divorce than other households, leaving the single-headed households that emerge with more debt than otherwise predicted. High levels of debt can also represent a financial burden that discourages individuals from forming households. Addo (2014) argues that student loan debt can encourage women in particular to delay marriage, although cohabitation outside of marriage may in fact be more common among indebted graduates.

However, an empirical approach that fully leverages the PSID's longitudinal nature is not itself unproblematic. First, it would be necessary to specify what represents a consistent "household" over time. Second, household debt and wealth variables are already extremely variable (see Section 5.3.4 below). Changes in those variables are even more widely distributed and make inference difficult. As a result, this analysis is cross-sectional, although a longitudinal analysis is an important direction for future work. To account for some of the effects of household formation and dissolution, all specifications control for whether each household observed in a given year experienced a change in household structure that year (i.e., whether the household head changed or spouse/partner left). As discussed in Section 5.3.3, I also test specifications with controls for observable household characteristics that may vary over time within groups.

5.3.3 Empirical strategy

This analysis seeks to address the research question, "Compared to other households, did female-headed or minority households experience greater growth in household debt surrounding the 2008 Financial Crisis?" Two issues are key to addressing this question: defining the social groups of interest and choosing an empirical approach to identifying changes in growth.

It was previously noted that the PSID combines gender and household structure by imposing a unitary household assumption on the household finance components of the survey. This means that any researcher attempting to understand the role of gender in household debt is limited to considering a minimum of three categories: dual-headed households, women with no spouse or partner, and men with no spouse or partner. However, the literature suggests that it may also be important to distinguish between single women with and without dependents. Those with dependents are the most likely to experience high levels of economic risk (Weller and Tolson 2017) while having low income and low levels of liquid wealth to fall back upon (Pressman 2003; Schmidt and Sevak 2006).

This results in four groups of interest:

1. *Dual-headed households*: households with or without children and headed by a married or cohabiting couple
2. *Single women*: households composed of one female adult
3. *Female-headed households*: households composed of a female head of household with other non-spouse/non-partner members in the household (children, other kin, etc.)⁵²
4. *Single men and male-headed households*: analogous to Groups 2 and 3 above, but with a male adult

To recognize the multiple characteristics linked with each group beyond gender, these groups will be referred to broadly as “household types” in the analysis. The other dimension of household identity that has been linked to debt accumulation in the literature is race and ethnicity. I again distinguish between four groups:

1. White, Non-Hispanic

⁵²Note that this category would not generally include adult female sample members who are living with their parents, because the parents would be sample members themselves and would be considered head of household unless the female sample member were considered to have greater “financial responsibility” than the parents.

2. Black, Non-Hispanic
3. Hispanic
4. Other Race/Ethnicity

The last group results from inconsistencies in the aggregation of certain racial/ethnic groups. Most notably, the race and ethnicity questions in the 1999, 2001, and 2003 surveys allow respondents to select “Asian, Pacific Islander” as one option. Subsequent waves of the survey distinguish between “Asian” and “Native Hawaiian or Pacific Islander.” Individuals who identify as Native American or as Alaska Natives face similarly shifting options between survey years. In addition, sample sizes for these groups are extremely small. As a result, these racial and ethnic identities are aggregated into “Other Race/Ethnicity.” Asian heads of household represent the largest portion of this category in every survey year.

The theory surveyed above speaks to the possibility of gender and racial differences in the growth of household debt, not in the relative levels of household debt. Therefore, a difference-in-differences (DID) approach is necessary. The effect of the “treatment” (household type or race and ethnicity) is determined by comparing outcomes in two time periods (e.g., the pre-expansion and credit expansion periods) with and without the treatment. DID eliminates time-invariant heterogeneity between treated and untreated groups, such as differences in the demand for credit between female- and dual-headed households, all else equal.

The model can be represented as follows for household head i in year t :

$$y_{it} = \beta_1' \mathbf{Group}_{it} + \beta_2' \mathbf{Period}_{it} + \beta_3' \mathbf{Group}_{it} \mathbf{Period}_{it} + \beta_X' \mathbf{X}_{it} + \epsilon_{it}$$

where y_{it} is one of several continuous or binary debt outcomes of interest (discussed in Section 5.3.4), \mathbf{Group}_{it} is a vector of dummy variables indicating the individual’s household type or race and ethnicity, \mathbf{Period}_{it} is a vector of dummy variables indicating the period of which year t is a part (Pre-Expansion, Credit Expansion, Recession, or Post-Recession), and \mathbf{X}_{it} is a vector of control variables. The vector of parameters β_3 represents the DID parameter estimates, where a

positive value for each parameter would indicate a faster rate of growth for the relevant group compared to the reference group. The specific estimation technique used and the assumptions made about the error terms (e.g., the possible correlation of error terms between years for the same household head) will vary by outcome of interest and are discussed in Section 5.3.4.

It should be noted that identification of causal effects is conditional on a “parallel trends assumption.” This assumption is violated if time-variant heterogeneity between groups exists prior to the treatment. In the case of the present analysis, if various household types already showed divergent trends in an outcome of interest (e.g., total mortgage principal) prior to the credit expansion, then the actual “effect” of a particular treatment (e.g., being a female-headed household) will be conflated with other time variant differences between the treated and untreated groups. For example, perhaps female-headed households have been experiencing a long-term increase in the demand for credit that began prior to 1999.

I take two approaches to this identification concern and the set of controls X_{it} . First, I argue that a *ceteris paribus* approach is not appropriate from the perspective of political economy. A “causal” interpretation of gender or race and ethnicity risks shifting the focus of analysis towards discrimination narrowly defined rather than cumulative differences in outcomes. As Wylly and Ponder (2011) note, the socioeconomic characteristics of female heads of household or minority household heads that impact indebtedness may themselves be the result of gender or racial inequality, not differences to be controlled away.

This is not to say that there is no room for attempting to control for unobserved, time-invariant heterogeneity. As noted previously, household formation and dissolution are not the focus of this paper, and all specifications control for a change in household status having occurred. Second, any analysis of household saving or borrowing behavior over time risks conflating time-specific effects with life-cycle effects. This is doubly important when comparing household types, many of which are highly heterogeneous in terms of age composition. For example, the group of single women in the analytical subsample for this study is starkly bimodal, with about 35% of single women being under 30 years of age and another 30% being over 65 (in contrast to dual-headed

households, where almost 70% of [male] household heads are under 30 and only 8% over 65). Finally, geography is particularly relevant to developments in housing markets surrounding the Financial Crisis. Certain states and cities experienced greater growth in housing prices as part of the housing bubble (Garriga, Ricketts, and Schlagenhauf 2017). To the extent that certain racial and ethnic groups are disproportionately represented in these areas, failure to control for state of residence may conflate geographic effects with the effects of interest. As a result of these considerations, all specifications control for age, changes in household composition, and state of residence.⁵³

Despite the previous concerns about controlling away the economic and social context in which household structure, gender, and race/ethnicity operate, it may be valuable to assess whether specific mechanisms can be identified as contributing to a particular group's disproportionate change in indebtedness. For example, it may be the case that lower levels of liquid wealth among female-headed households or households with Black household heads led these households to rely more on borrowing during the recession. By testing specifications that include net worth and comparing the results with those specifications that do not, the role of wealth inequality in leading to debt inequality can be addressed. The controls used are discussed in Section 5.3.4 below and are analogous to those used in Chapter 4. The results of these specifications are not presented in this chapter but are available upon request. The DID estimates are qualitatively robust in every case to the inclusion of these control variables, suggesting that unexplained variation plays a more important role in the gender and racial debt gaps.

5.3.4 Variables of interest and summary statistics

As previously noted, the PSID has included information on household wealth and debt since 1984, but certain categories of debt (especially regarding mortgage principal and expenditures) have only been consistently available since 1999. Of these variables, I consider two measures of the level of outstanding debt:

⁵³The public-use PSID dataset does not include information on city of residence or urban/rural residence.

1. *Mortgage principal remaining (\$)*: the sum of total mortgage principal remaining for the first two mortgages held. It includes both mortgages for home purchases as well as home equity loans, line of credit loans, land contracts, and other types of mortgages.
2. *Consumer debt (\$)*: non-vehicular, non-mortgage debt, or the sum of “credit card charges, student loans, medical or legal bill, or loans from relatives.”⁵⁴

At the same time, it is clear that a certain dollar value of debt does not represent the same debt burden across households or pose the same risk of financial instability. Three additional measures of “financial fragility” are also considered:

1. *Annual mortgage expenditure as a percent of annual income (%)*: Previous work has suggested the use of consumer debt repayment-to-income ratios as a measure of over-indebtedness (D’Alessio and Iezzi 2013; DeVaney 1994; Fondeville, Özdemir, and Ward 2010; Gibbons and Vaid 2016). Unfortunately, PSID data does not provide sufficient information on borrowing costs to generate meaningful estimates of these ratios, especially for the purpose of intergroup comparisons. Mortgage expenditures are the only category for which repayment burden information is available. This variable provides helpful insight into whether variation in borrowing costs (e.g., prime vs. subprime loans) may drive differences in mortgage indebtedness that would not be visible when considering mortgage principal alone.
2. *Consumer debt-to-income (DTI) ratio*: The ratio of outstanding consumer debt to annual income has also been proposed as a measure of over-indebtedness.⁵⁵ Gibbons and Vaid (2016) argue that it captures “*vulnerability* to debt problems in the event of income or expenditure shocks” (26, emphasis original). However, unobserved factors do complicate the relationship between the DTI ratio and the likelihood of experiencing financial difficulties (Fondeville,

⁵⁴The consumer debt question changed from a single question in the 1999 through 2009 waves to a set of questions about each category of consumer debt separately beginning in 2011. This does introduce the risk of variation in the reporting of debt due to imperfect recall. However, as long as this variation is not heterogenous by race/ethnicity or household type, it should not introduce bias into the estimation.

⁵⁵Total income is the sum of the household head’s (and, if present, spouse’s/partner’s and other family members’) taxable income, Social Security income, and transfer income.

Özdemir, and Ward 2010). These factors include the availability of credit to help households service existing debt and the level of other necessary expenses (e.g., housing) relative to income. Despite these limitations to the DTI ratio and its interpretation, I argue that the DTI ratio is the best available measure of relative debt burden in the PSID.

3. *Consumer debt-to-equivalent income ratio:* An income figure alone does not indicate how much of that income can be dedicated to servicing debt. Although it provides far from a full accounting of “ability to pay,” using LIS or OECD equivalency scales to adjust income 1) recognizes that the same level of income represents less purchasing power for a larger household while 2) acknowledging household economies of scale.⁵⁶

Summary statistics for the variables of interest are presented by household type and by race/ethnicity in Tables 5.1 and 5.2, and average consumer and mortgage debt over time is presented in Figure 5.2. Before discussing suggestive differences between groups and across time, several empirical challenges associated with these variables of interest should be noted. Wealth and debt variables are notoriously noisy and widely distributed (Pfeffer and Griffin 2012), raising issues in using both OLS and median regression. The issues can be observed in the summary statistics reported in Tables 5.1 and 5.2: Variables such as total debt and the debt-to-income ratio have standard deviations many times greater than their means, driven in large part by outliers. Therefore, OLS regression can subsequently be extremely imprecise for continuous variables, and there is no clear *a priori* rationale for trimming the high ends of the distribution. On the other hand, many categories of households have median values of debt and financial fragility of zero, and this median persists across time periods. Therefore, median regression will miss all variation among households that do hold debt.

⁵⁶Previous work has used household leverage as a measure of financial fragility (DeVaney 1994). This measure poses several challenges. If defined in an analogous fashion to leverage in corporate finance, leverage would be calculated as the ratio of debts to net worth. However, many households have negative net worth. The direction of the change in leverage in response to an increase in debt can be ambiguous as a result, depending on whether net worth is initially positive or negative. Another possibility that avoids this counterintuitive relationship is defining leverage in terms of debt and gross asset values (e.g., Long 2018). However, the PSID data on most non-mortgage household assets are presented already netted of debt, and the components of consumer debt cannot be matched to those asset categories. Therefore, I do not consider leverage in the present analysis.

To deal with these two issues, I conduct the DID estimation using three strategies:

1. *Estimating effects on the extensive margin using OLS (linear probability model)*: The extensive margin refers to the likelihood of holding any non-zero level of debt. This approach misses variation in the magnitude of debt but captures the substantial variation in each group's probability of holding debt.
2. *Estimating effects on the intensive margin using median (quantile) regression*: The intensive margin refers to the magnitude of debt held, conditional on holding debt. This approach misses variation in the probability of holding debt but captures the variation in the magnitude of debt while avoiding the use of OLS regression that would be strongly influenced by outliers.
3. *Estimating the probability of being “financially vulnerable” using OLS (linear probability model)*: This approach represents a middle ground between the first two strategies. Like the extensive margin, it collapses the sizable variation in debt-to-income ratios into a binary measure. Households with a DTI of $x\%$ or more are characterized as “financially vulnerable” in the Minskian sense of having a higher probability of facing default in the case of an unexpected loss of income or interest rate increase (Minsky 1977). Although the level of the threshold x is clearly debatable, it has the advantage of capturing some of the variation in household indebtedness on both the intensive and extensive margins. I follow Gibbons and Vaid (2016), who apply a 60% threshold as constituting financial vulnerability based on a previous report on over-indebtedness in Britain. Approximately 12% of households in their analysis are financially vulnerable by this measure.

All OLS regressions (Strategies 1 and 3 above) use the STATA *svy* module to account for complex survey design. However, median regression poses greater challenges to implementing weighting and clustering simultaneously. All median regressions were conducted with sample weights. Unweighted results with and without clustering were qualitatively similar, suggesting that the omission of clustered standard errors may not be a significant concern. Alternative clustering

approaches to account for the longitudinal structure of the data—such as clustering by household head ID—also did not meaningfully change the OLS estimates.

As illustrated in Figure 5.2, the lead-up to the Financial Crisis—or the credit expansion period of 2003 to 2007—was associated with growing average household indebtedness, both in absolute terms and relative to income. This growth included both mortgage and consumer debt. Although average mortgage principal remaining fell during the recession and the recovery, consumer debt persisted from 2009 to 2013 and resumed rising in 2015.

Tables 5.1 and 5.2 summarize the variables of interest by household type and by race and ethnicity. Summary statistics for the control variables used in alternative specifications can be found in Appendix F. There are several important take-aways from these tables. White and dual-headed households have the greatest median net worth and are more likely to have positive net worth than other groups. Female-headed households and Black, Non-Hispanic households are the least likely to have positive net worth and have median net worth of less than \$10,000. This difference in net worth may be driven partly by consumer debt. Many of the same groups that have low net worth are more likely to hold consumer debt. Notably, this does not hold for single men and male-headed households, who have relatively low median wealth but are also among the least likely to hold consumer debt. This points to a possible linkage between indebtedness and responsibility for dependents, consistent with previous work (Fondeville, Özdemir, and Ward 2010). Households with two household heads and those with a household head who is White or of another racial/ethnic identity than Black or Hispanic (e.g., Asian households) are most likely to hold mortgage debt.

5.4 Results

5.4.1 Extensive and intensive margins

Figures 5.3 and 5.4 present the predicted probability of holding non-zero mortgage and consumer debt by household type and race/ethnicity (respectively) after controlling for the age of household head, whether a change in household structure (household formation or dissolution)

had occurred since the previous survey, and the household's state of residence.⁵⁷ White and dual-headed households are among the most likely to hold mortgage debt across time periods, and growth in mortgage debt was statistically similar across groups. During the credit expansion, households became about 1.7 percentage points more likely to have outstanding mortgage principal relative to a sample mean of 41.2%. During the recession and recovery, households headed by Black respondents experienced greater decreases in the probability of holding mortgage debt.

The gap at the extensive margin between dual-headed households and other groups is smaller for consumer debt. Single women are as likely to hold consumer debt across time periods as dual-headed households, and men are the least likely to hold consumer debt. By race and ethnicity, households headed by Black respondents are 6.6 percentage points less likely to hold consumer debt than other groups. All groups experienced an increase in the probability of holding consumer debt of about 3 percentage points during the credit expansion (sample mean = 50.4%) and another 3 percentage points during the recession. Interestingly, female-headed households experienced a greater decline in consumer indebtedness at the extensive margin than other groups post-recession. This decline may point to faster deleveraging during the recovery or more persistently binding credit constraints for female-headed households (even as the credit crunch eased for most households).

Figures 5.5 and 5.6 present analogous results on the intensive margins. Note that these specifications are conditional on holding mortgage or consumer debt and therefore only speak to variation in the magnitude of indebtedness. The rise in mortgage debt conditional on holding debt between the late 90s and the credit expansion period was primarily driven by dual-headed households. By race and ethnicity, households headed by someone with one of the "other" racial or ethnic self-identifications (predominantly including Asian household heads) experienced a slightly faster rate of growth than other groups.

⁵⁷Regression tables showing the difference-in-differences estimates and parameter estimates for the controls are available upon request.

The story differs significantly regarding consumer debt. There is evidence of a rapid increase in the magnitude of consumer debt among female-headed households after 2008. The increase is greatest and statistically significant in the post-recession period. Predicted median debt among the indebted for this group rises from about \$5,800 in the credit expansion period to \$9,000 in the recession and \$13,500 in the recovery (55% and 50% increases, respectively). Trends across race and ethnicity are broadly parallel over time, with the exception of Hispanic households, who exhibited a growth in average consumer debt holdings of \$2,600 to about \$8,000 between the pre-expansion and credit expansion periods.

Taken together, these results at the intensive and intensive margins point to several preliminary conclusions. First, in addition to White and dual-headed households, households headed by someone who identifies as Asian or another racial/ethnic identity account for the majority of growth in mortgage principal pre-crisis at the intensive margins. This is consistent with previous work finding that Asian households experienced the greatest rise in homeownership rates between 1994 and 2007 (Garriga, Ricketts, and Schlagenhaut 2017). The same work finds that Asian households had lower interest rates but were more likely to hold “jumbo” mortgage loans, or loans that were larger than the limits imposed by federal lenders Fannie Mae and Freddie Mac. Differences in the geographic distribution of these households may play a role. Garriga, Ricketts, and Schlagenhaut (2017) note that a large share of the Asian households in their sample live in California and specifically in “Sunbelt cities” with particularly “volatile” housing markets (163). Although state-level controls explain away some of this variation, city-level identifiers are not available in the public-use PSID data.

Second, the distribution of consumer debt appears to be particularly wide for female-headed households. At the same time that these households experienced the greatest post-2008 growth in the magnitude of consumer debt, they also experienced the largest decrease in the probability of holding such debt during the recovery. This suggests that the Financial Crisis prompted heterogeneous responses in borrowing between groups of female-headed households. The result is a smaller group of more highly indebted women with dependents.

5.4.2 Financial fragility

Results for mortgage expenditures relative to income and consumer debt-to-income ratios are presented in Figures 5.7 and 5.8. These financial fragility measures are again conditional on indebtedness. Although dual-headed and White, Asian, and other non-Hispanic households hold the greatest levels of mortgage principal across time periods, these groups do not spend the most on mortgage repayment relative to income. Rather, households with female, Black, or Hispanic household heads have the greatest mortgage repayment burdens. As the figure illustrates, there is also suggestive evidence that Black households experienced a faster increase in mortgage expenditures between the pre-expansion and credit expansion periods, although the difference between Black and White households (an increase of about two percentage points during this time compared to one percentage point) falls short of being statistically significant.

The consumer debt-to-income ratio results mirror those of consumer debt in levels, although the trends are even clearer. The median DTI ratios among female-headed households and households with Black household heads approximately doubled between the pre-expansion and post-recession periods, with the majority of the growth occurring after 2008.

The final measure of financial fragility—a binary indicator of financial vulnerability—is not conditional on debt holding. Predicted probabilities of being financially vulnerable (a DTI ratio of 60% or more) are presented in Figures 5.9 and 5.10. Results are shown using standard income (top) and using income adjusted for household size via the LIS Equivalence Scale (bottom). In both cases, largely the same trends over time are evident: Female-headed households and Black heads of household experience greater increases in financial vulnerability, especially post-crisis. Although it appears that single men and male heads of household track similarly until the recovery period, the trends are more distinct when household size is taken into account.⁵⁸

⁵⁸The results are qualitatively robust to using alternative cut-offs for financial vulnerability (70%, 80%, and 90%).

5.4.3 Student debt

To understand the implications of rising financial vulnerability, it is important to identify what type of debt is driving the increase. One likely candidate is student loan debt, which is one of the largest and the fastest growing components of non-mortgage debt (Federal Reserve Bank of New York 2017). Unfortunately, the decomposition of consumer debt into separate categories is only available for the 2011, 2013, and 2015 PSID waves. Since much of the observed divergence in indebtedness outcomes occurs in these survey years, I compare DTI ratios with and without student debt for these periods. The results by household type are presented in Figure 5.11. Student debt explains much of the consumer debt burden, both in levels and in terms of between-group differences. A similar impact of student debt is observed by race and ethnicity (not shown). In fact, when student debt is omitted, the median consumer DTI ratio appears to fall more for Black household heads than for other groups post-recession, while the opposite is true when student debt is included.

5.5 Conclusions

This analysis used longitudinal data from the PSID to identify gendered and racialized trends in the growth of household debt prior to and following the 2008 Financial Crisis. Previous work in sociology and political economy has argued that economically marginalized groups, such as female-headed households and women of color, may have been targeted for high-cost loans. Others have pointed to the role of social reproduction in heightening women's exposure to market risk through their social networks. I have sought to assess whether the large-scale quantitative evidence on household debt available in U.S. household finance surveys is consistent with these arguments.

The results suggest that women with dependents and households with Black household heads did in fact experience a faster increase in their debt burden than other groups. Specifically, these groups experienced a two-fold increase in the probability of holding high levels of consumer debt relative to incomes during the recession and recovery. The significant gap that emerges between households in the probability of being financially vulnerable is widened when household ability to

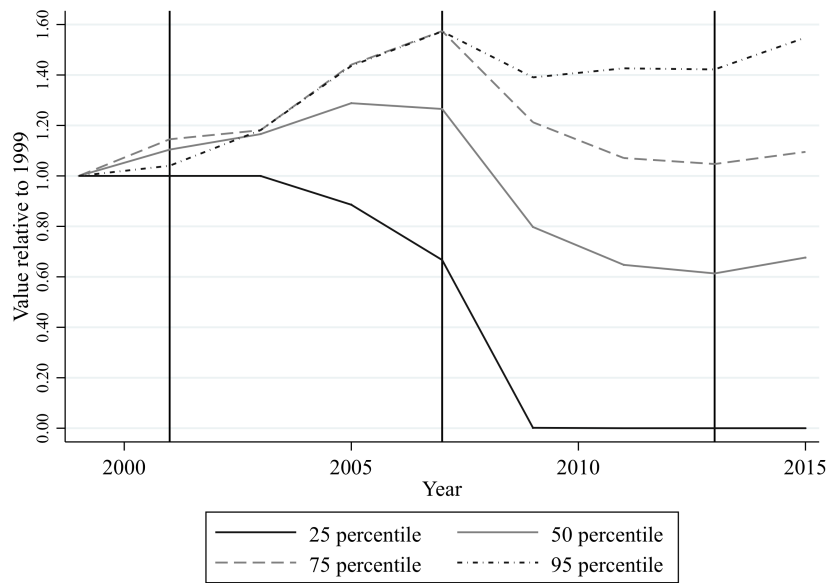
repay is taken into account. It also appears that this increase in consumer debt was driven largely by rising student indebtedness. On the other hand, there is mixed evidence that these same groups—particularly Black households—experienced a faster increase in mortgage expenditures during the credit expansion.

This analysis faces several limitations that are themselves areas for future work. First, the analysis has been largely cross-sectional in nature due to the extreme variation introduced by analyzing changes in household debt. Despite the longitudinal nature of the dataset and attempts to control for household formation and dissolution, I cannot reject the possibility that changes in the types of households that are female-headed, male-headed, etc. are driving the observed changes in household debt. Similarly, any analysis of this nature is subject to the critique that unobservable characteristics are influencing the results. Second, the direct linkage between debt-to-income ratios and financial difficulties has been shown to be weak in previous work (Fondeville, Özdemir, and Ward 2010). Debt repayment-to-income ratios are generally considered a preferable measure of over-indebtedness but are not available in the PSID. Additional mixed-methods survey work that combines a clearer understanding of households' sense of financial distress and their debt burden will be necessary to elucidate this relationship.

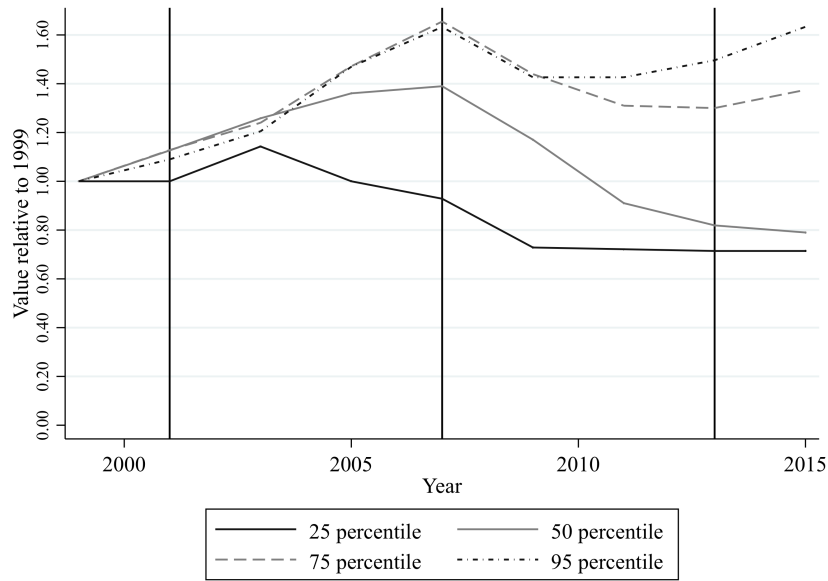
The policy implications of this rising consumer debt burden depend in part on whether student indebtedness is seen as a concerning development for households' financial security. Some economists continue to portray borrowing for college as a worthwhile investment, even if that debt represents a major financial burden relative to income (e.g., Avery and Turner 2012). Indeed, college graduates continue to appear to benefit from a major earnings and employment premium relative to high school graduates. However, evidence suggests that this premium is falling (Vedder, Denhart, and Robe 2013), and previous work has shown that student debt can cause individuals to delay activities that may otherwise serve to enhance their financial security, such as buying a home (Andrew 2010; Baum and O'Malley 2003). Many families also borrow to fund their children's education (Amromin, Eberly, and Mondragon 2016; Baker 2018). In fact, student debt is rising more quickly among older Americans than among any other group (Brown et al. 2014). To the

extent that female-headed or Black households are accumulating debt for children at times in the lifecycle when they would otherwise be saving, this may be a concerning development for financial security. Future work will need to address the specific nature of the rising student debt burden for different groups of families.

5.6 Tables and figures



(a) Net worth percentiles relative to 1999



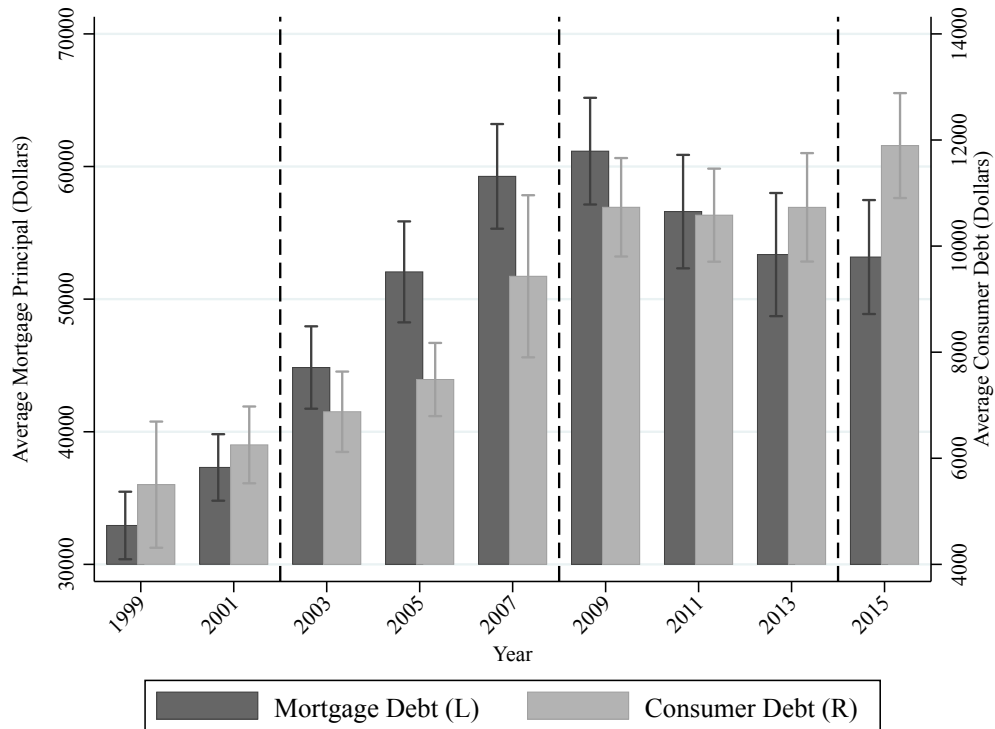
(b) Asset percentiles relative to 1999

Figure 5.1: Distribution of net worth and assets, 1999 - 2015

Source: 1999 - 2015 PSID Surveys. Author's calculations.

Notes: The vertical black lines mark the start of the Credit Expansion period, the approximate start of the 2008 Recession, and the start of the Recovery.

Figure 5.2: Average household mortgage principal and consumer debt, 1999 - 2015



Source: 1999 - 2015 PSID Surveys. Author's calculations. Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights and accounting for clustering and stratification. The vertical black dotted lines mark the start of the Credit Expansion period, the approximate start of the 2008 Recession, and the start of the Recovery.

Table 5.1: Summary statistics of variables of interest by household type

	Dual-headed households			Single women		
	mean	sd	median	mean	sd	median
Net Worth	\$301487	(452351)	\$130000	\$172593	(257787)	\$33500
Mortgage Principal	\$79210	(115526)	\$32000	\$23344	(47746)	0
Consumer Debt	\$10359	(40928)	\$674	\$7060	(20989)	0
Mortgage Exp. (%)	.261	(37.043)	0	.0954	(1.542)	0
Debt-to-Assets Ratio	2.16	(56.307)	0	14	(515.934)	0
Consumer DTI Ratio	2.77	(648.136)	0	14.4	(891.137)	0
<i>Household-Year Obs.</i>	36506			8094		
	Female-headed households			Men		
	mean	sd	median	mean	sd	median
Net Worth	\$91388	(289457)	\$9090	\$148959	(312610)	\$15000
Mortgage Principal	\$30901	(88320)	0	\$25397	(56358)	0
Consumer Debt	\$8832	(27642)	\$500	\$8754	(27589)	0
Mortgage Exp. (%)	.0832	(0.899)	0	1.45	(66.656)	0
Debt-to-Assets Ratio	40.4	(1444.852)	0	15.4	(331.902)	0
Consumer DTI Ratio	.367	(5.468)	0	.581	(6.658)	0
<i>Household-Year Obs.</i>	10157			9139		

Source: 1999 - 2015 PSID Surveys.

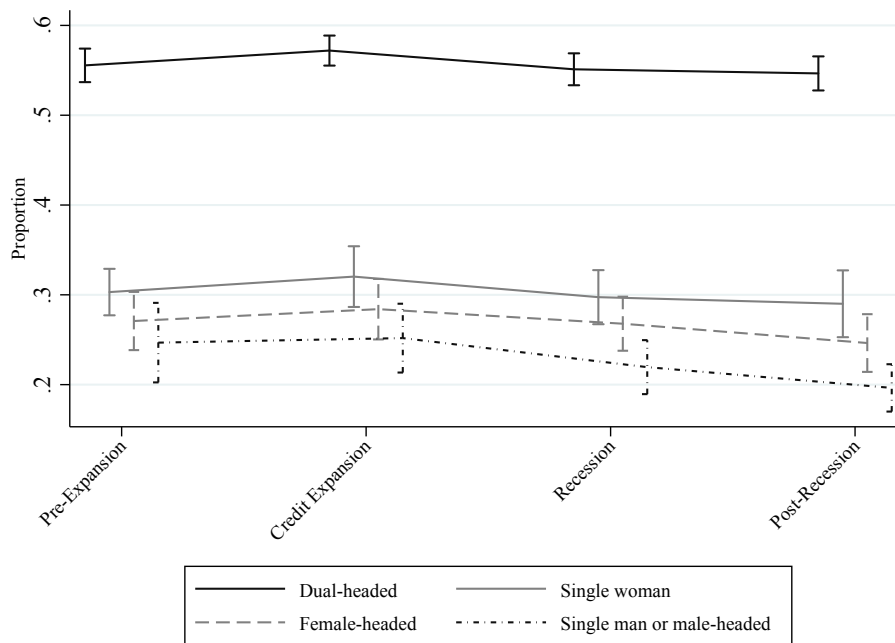
Notes: Means and SDs are estimated using sample weights and accounting for clustering and stratification. Medians use sampling weights.

Table 5.2: Summary statistics of variables of interest by race and ethnicity

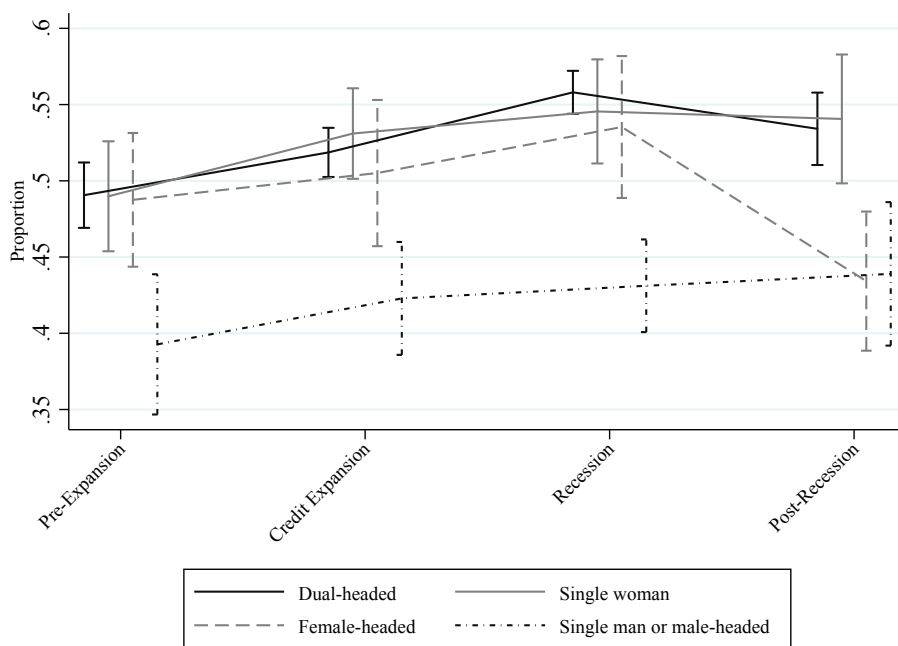
	White (Non-Hispanic)			Black (Non-Hispanic)		
	mean	sd	median	mean	sd	median
Net Worth	\$263287	(360635)	\$95417	\$66186	(300626)	\$7201
Mortgage Principal	\$56246	(83286)	0	\$29624	(107693)	0
Consumer Debt	\$9500	(32184)	\$222	\$9017	(39100)	0
Mortgage Exp. (%)	.202	(25.684)	0	2.13	(145.059)	0
Debt-to-Assets Ratio	9.53	(427.121)	0	23.4	(1103.592)	0
Consumer DTI Ratio	5.7	(670.588)	0	.496	(12.362)	0
<i>Household-Year Obs.</i>	38077			18911		
	Hispanic			Other Race/Ethnicity		
	mean	sd	median	mean	sd	median
Net Worth	\$104375	(234356)	\$18000	\$290333	(443727)	\$79000
Mortgage Principal	\$57538	(100719)	0	\$76560	(122449)	0
Consumer Debt	\$7918	(21476)	0	\$7856	(18201)	0
Mortgage Exp. (%)	.0958	(0.407)	0	.1	(0.852)	0
Debt-to-Assets Ratio	5.85	(105.375)	0	3.5	(69.144)	0
Consumer DTI Ratio	.188	(0.668)	0	.165	(0.526)	0
<i>Household-Year Obs.</i>	4442			1912		

Source: 1999 - 2015 PSID Surveys.

Notes: Means and SDs are estimated using sample weights and accounting for clustering and stratification. Medians use sampling weights.



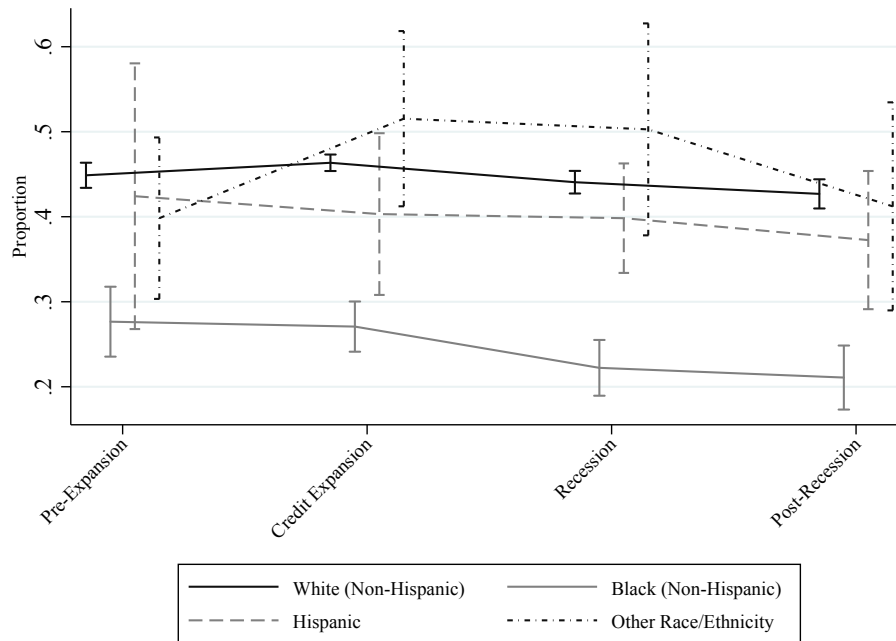
(a) Predicted probability of non-zero mortgage debt



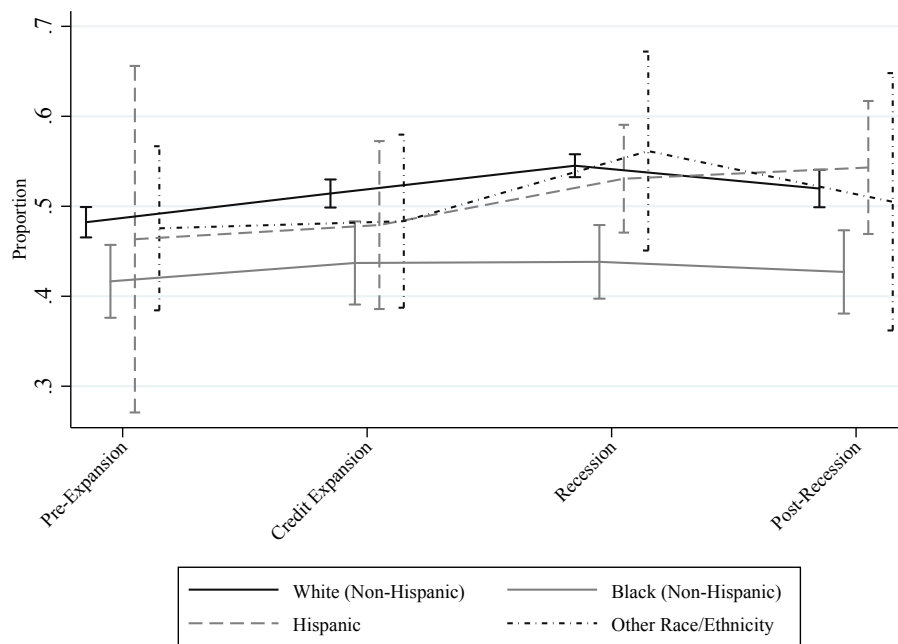
(b) Predicted probability of non-zero consumer debt

Figure 5.3: Extensive margins by household type

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights and accounting for clustering and stratification. Controls for age, age squared, change in household head status, and state of residence included.



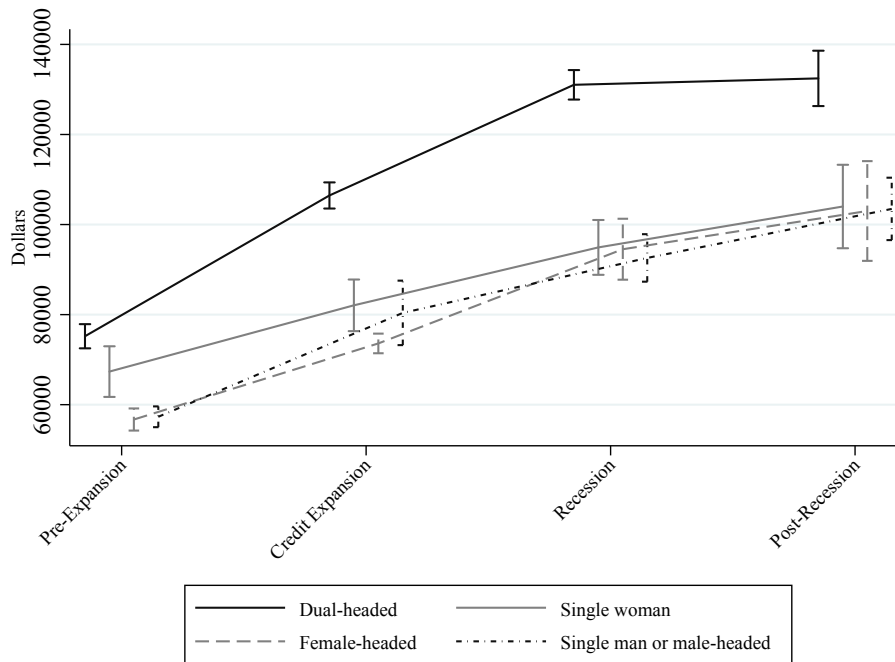
(a) Predicted probability of non-zero mortgage debt



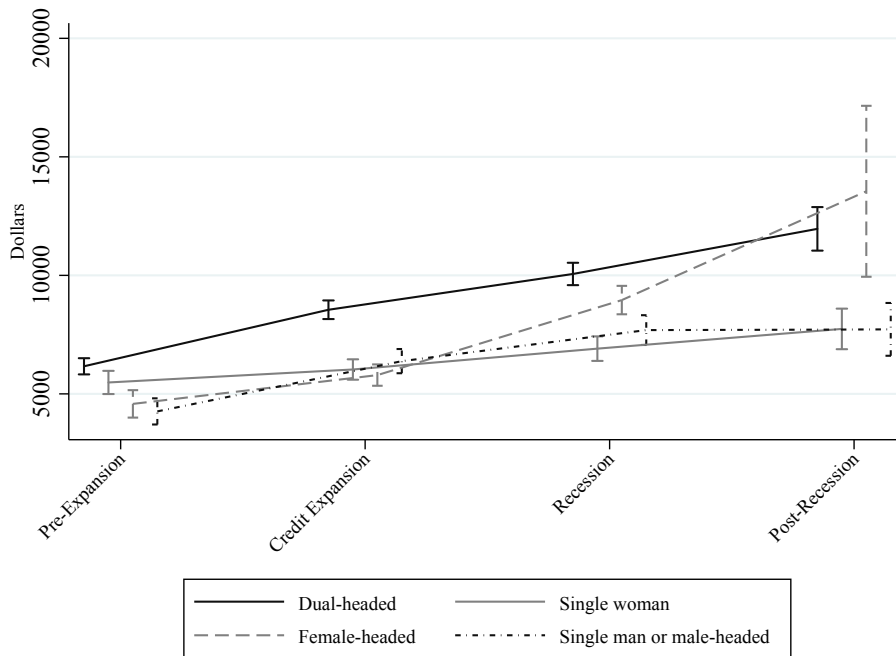
(b) Predicted probability of non-zero consumer debt

Figure 5.4: Extensive margins by race and ethnicity

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights and accounting for clustering and stratification. Controls for age, age squared, change in household head status, and state of residence included.



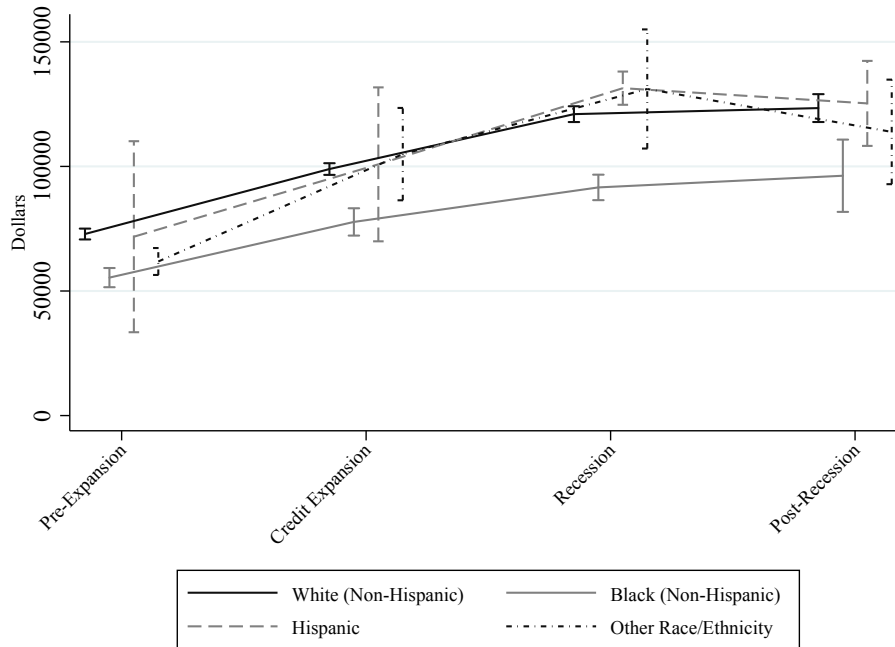
(a) Predicted median mortgage principal conditional on holding mortgage



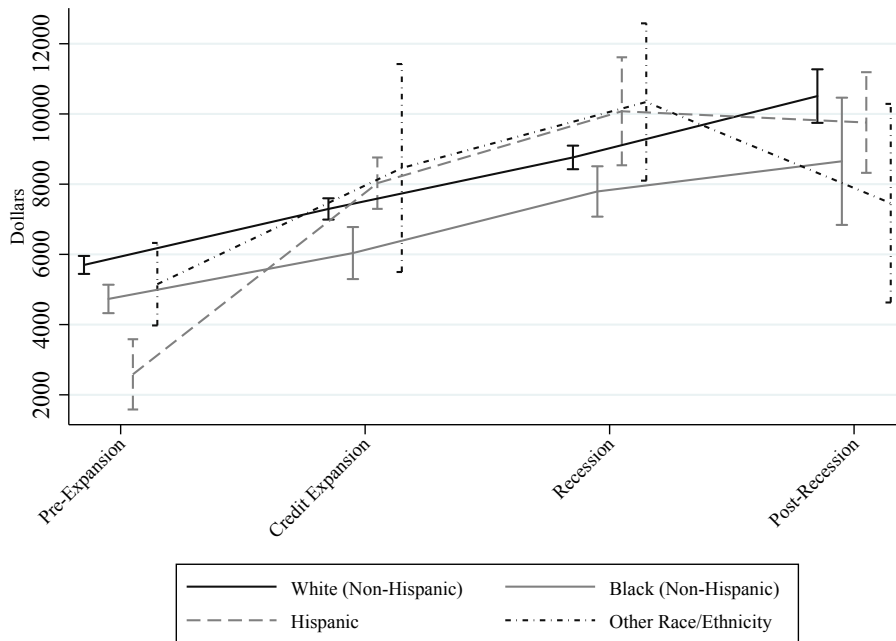
(b) Predicted median consumer debt conditional on holding consumer debt

Figure 5.5: Intensive margins by household type

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights. Controls for age, age squared, change in household head status, and state of residence included.



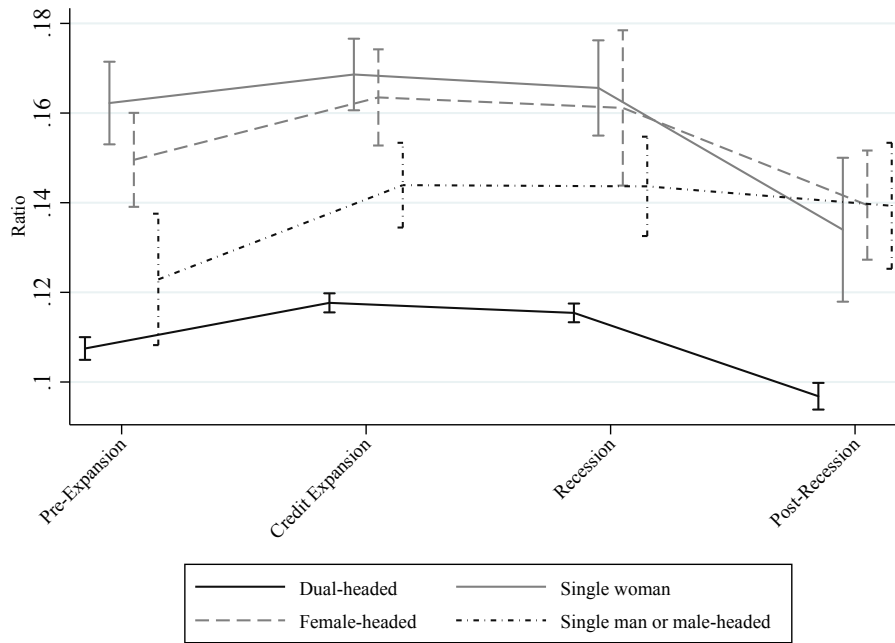
(a) Predicted median mortgage principal conditional on holding mortgage



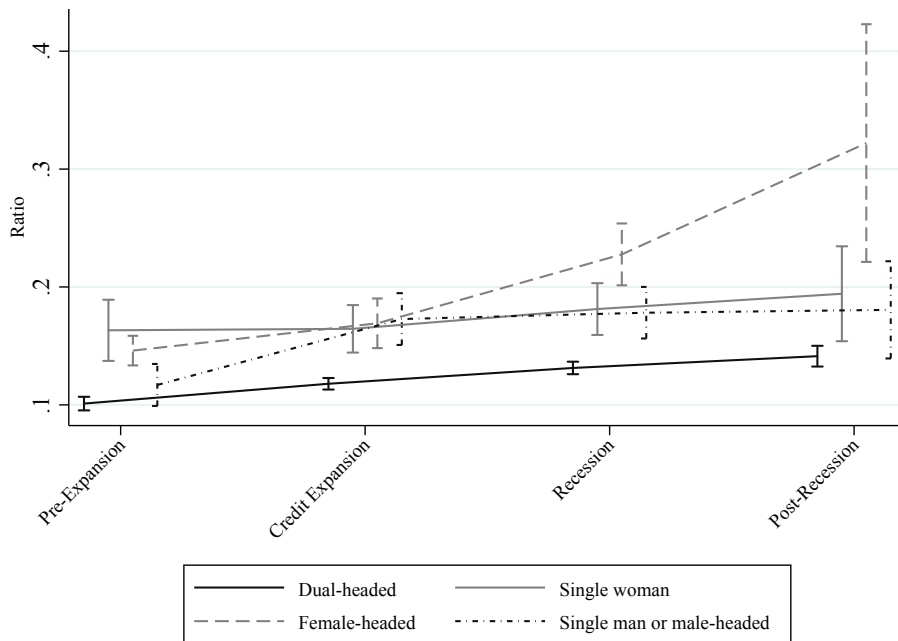
(b) Predicted median consumer debt conditional on holding consumer debt

Figure 5.6: Intensive margins by race and ethnicity

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights. Controls for age, age squared, change in household head status, and state of residence included.



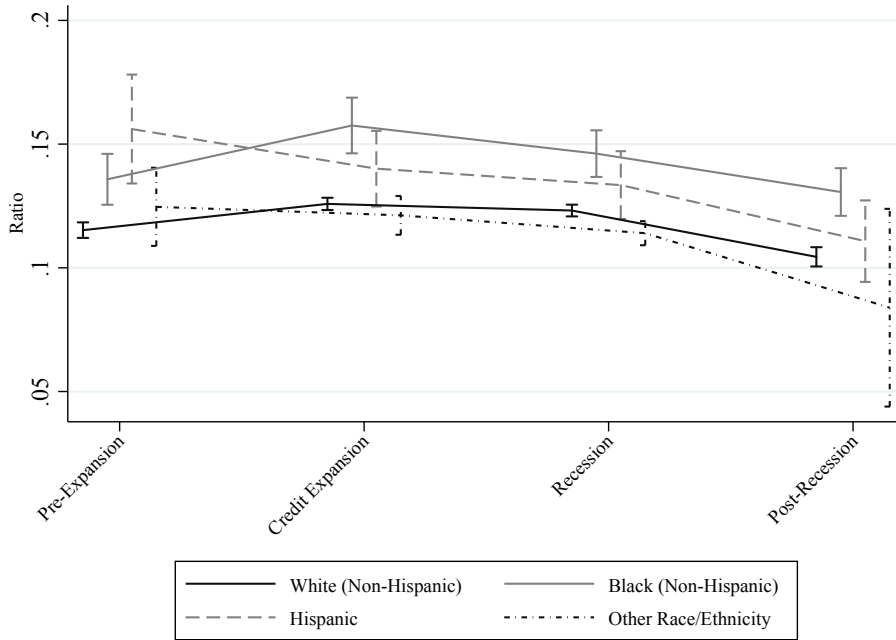
(a) Predicted median mortgage expenditures relative to income conditional on holding mortgage



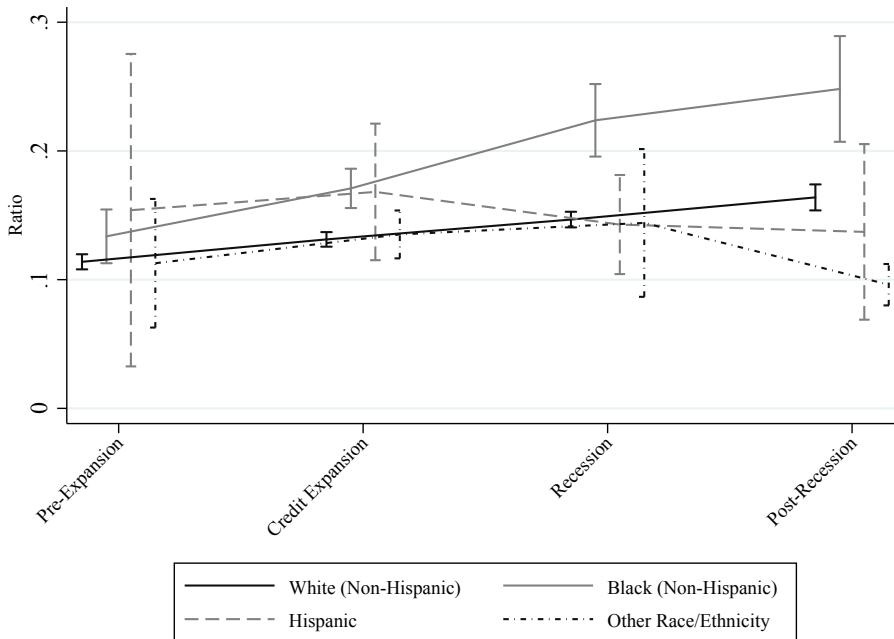
(b) Predicted median consumer debt-to-income ratio conditional on holding consumer debt

Figure 5.7: Conditional measures of financial fragility by household type

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights. Controls for age, age squared, change in household head status, and state of residence included.



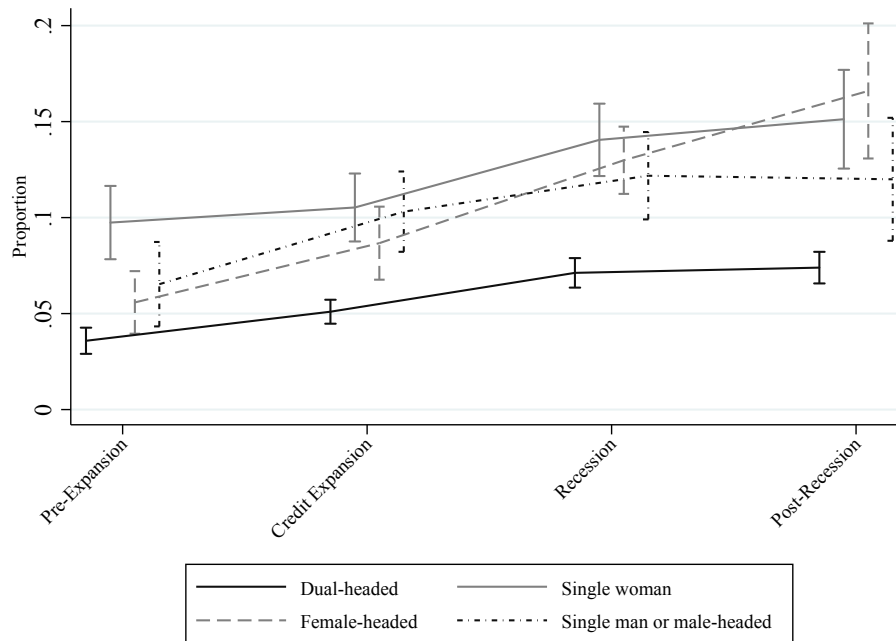
(a) Predicted median mortgage expenditures relative to income conditional on holding mortgage



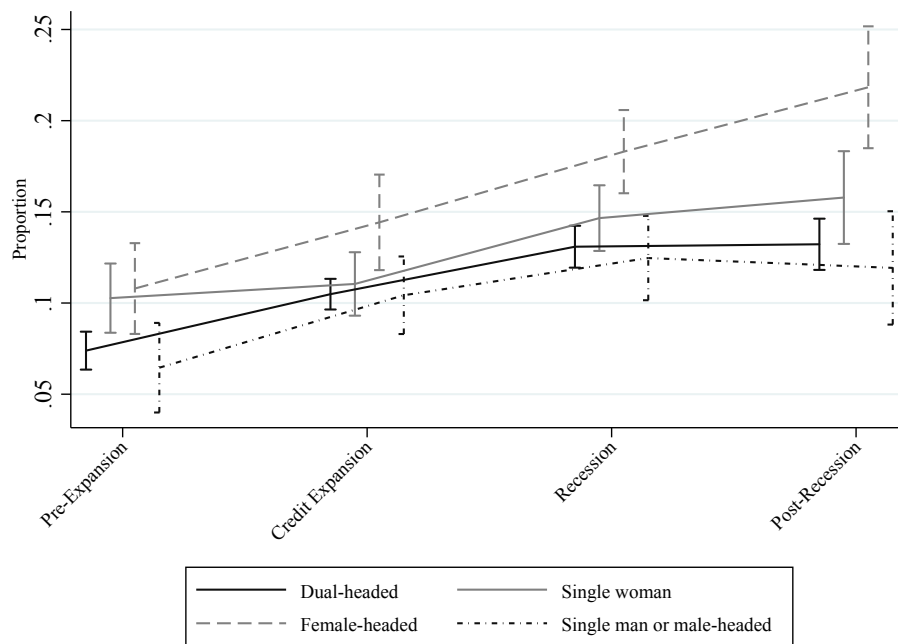
(b) Predicted median consumer debt-to-income ratio conditional on holding consumer debt

Figure 5.8: Conditional measures of financial fragility by race and ethnicity

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights. Controls for age, age squared, change in household head status, and state of residence included.



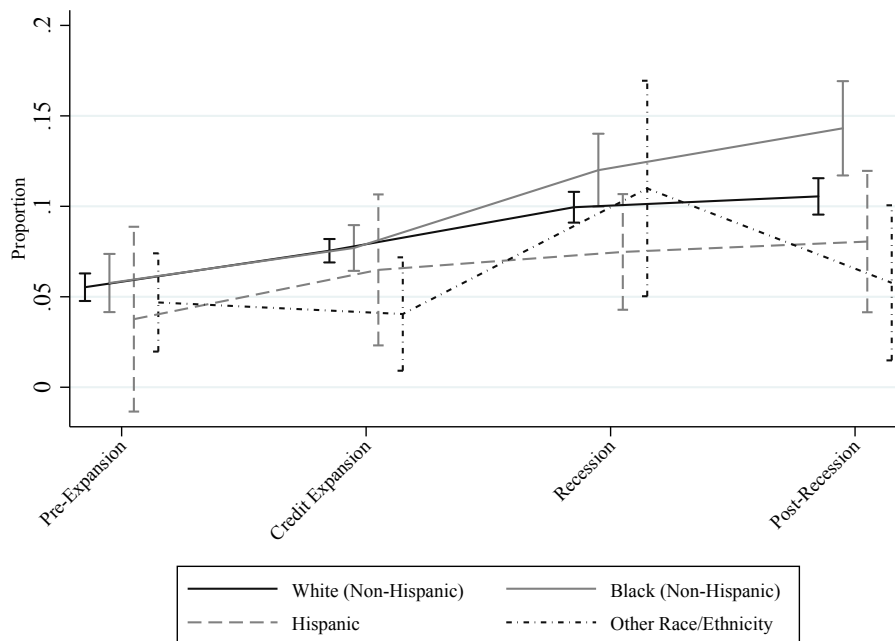
(a) Predicted probability of financial vulnerability (60% DTI or more), standard income



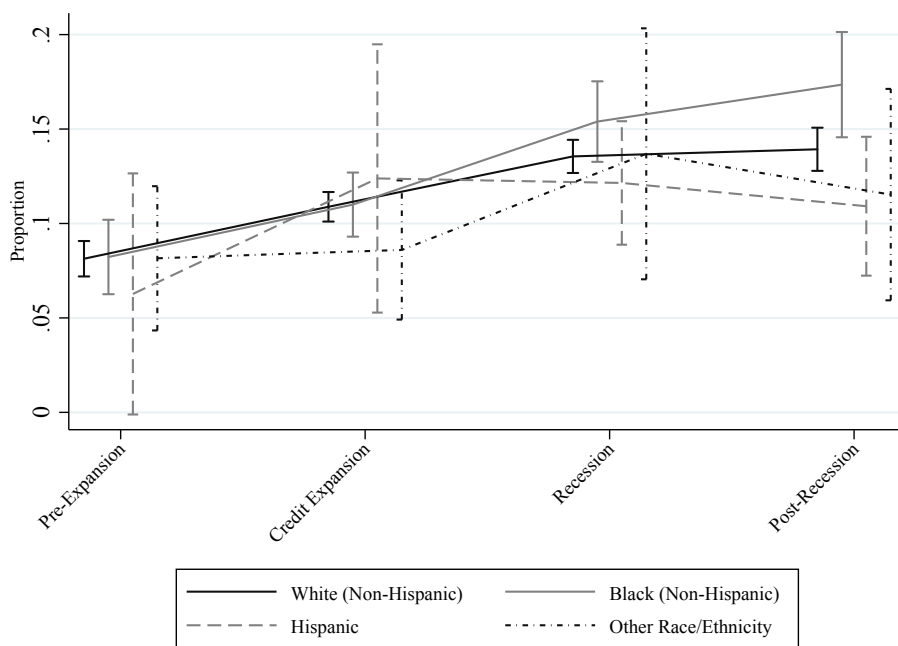
(b) Predicted probability of financial vulnerability (60% DTI or more), LIS Equivalency Scale

Figure 5.9: Unconditional, binary measure of financial fragility by household type

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights and accounting for clustering and stratification. Controls for age, age squared, change in household head status, and state of residence included.



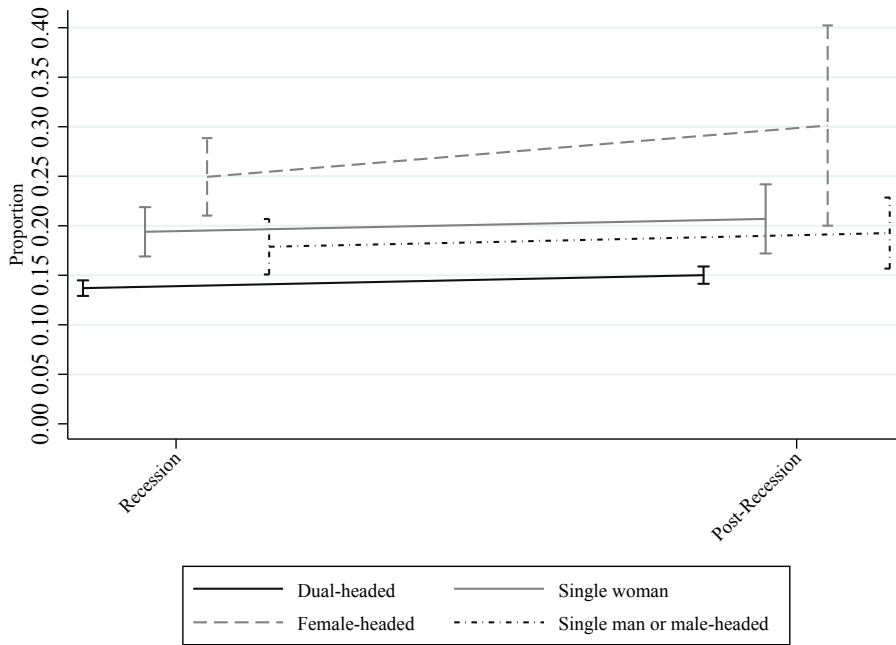
(a) Predicted probability of financial vulnerability (60% DTI or more), standard income



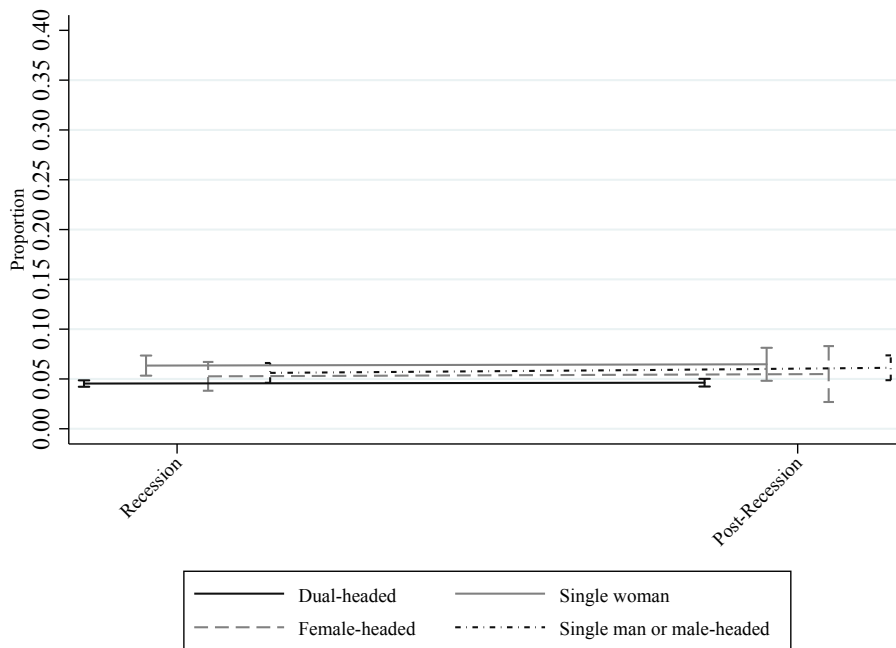
(b) Predicted probability of financial vulnerability (60% DTI or more), LIS Equivalency Scale

Figure 5.10: Unconditional, binary measure of financial fragility by race and ethnicity

Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights and accounting for clustering and stratification. Controls for age, age squared, change in household head status, and state of residence included.



(a) Predicted consumer debt-to-income ratio conditional on holding debt, 2011 - 2015



(b) Predicted consumer debt-to-income ratio excluding student debt, conditional on holding debt, 2011 - 2015

Figure 5.11: Consumer debt-to-income ratios with and without student debt by household type
 Notes: Brackets indicate 95% confidence intervals. Results estimated using sample weights. Controls for age, age squared, change in household head status, and state of residence included.

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Appendix A

Modeling Educational Financing Choices

A.1 Constant educational costs

Assume that a student has a non-linear utility function $u(\cdot)$ such that $u''(\cdot) < 0$. If the maximization problem for educational funding is as given above,

$$\max_{s,d} u(y_1 - s) + p\beta u[y_2 + \alpha - d(1 + \theta_d)] + (1 - p)\beta u[y_2 - d(1 + \theta_d)] - \beta v(d|\eta)$$

$$s.t. \quad TC = s + d + s_p + d_p$$

the corresponding first order conditions are

$$s : \quad -u'(y_1 - s) + \mu = 0$$

$$d : \quad -p\beta(1 + \theta_d)u'[y_2 + \alpha - d(1 + \theta_d)] - (1 - p)\beta(1 + \theta_d)u'[y_2 - d(1 + \theta_d)] -$$

$$\beta v'(d|\eta) + \mu = 0$$

where μ is the Lagrange multiplier for the total cost condition.

The Euler equation from these conditions is

$$\frac{u'(y_1 - s)}{Eu'(y_2 + \alpha(i) - d(1 + \theta_d))} = \frac{MU(c_1)}{EMU(c_2)} = \frac{1}{b} \left[(1 + \theta_d) + \frac{v'(d)}{EMU(c_2)} \right]$$

$$\Rightarrow \frac{MU(c_1) - \beta v'(d)}{EMU(c_2)} = \frac{1 + \theta_d}{b}$$

$$\alpha(i) = \begin{cases} \alpha > 0 \text{ with probability } p \\ 0 \text{ with probability } 1 - p \end{cases}$$

where b is the discount rate, $MU(\cdot)$ is marginal utility, and $EMU(\cdot)$ is expected marginal utility.

If there are no psychological costs of borrowing, the re-arranged Euler equation simplifies to

$$\frac{u'(y_1 - s)}{Eu'(y_2 + \alpha(i) - d(1 + \theta_d))} = \frac{MU(c_1)}{EMU(c_2)} = \beta(1 + \theta_d) = \frac{1 + \theta_d}{b}$$

The Euler equation for the case without psychological costs illustrates that in a context where the education funding problem incorporates only pecuniary costs, the decision to take on debt versus pay out of pocket involves balancing the cost of borrowing $1 + \theta_d$ with the discount rate. For example, suppose that a student's discount rate falls, so she considers the future to be relatively more important. Then the right hand side of the Euler equation will increase. Given the assumption of diminishing marginal utility ($u''(\cdot) < 0$), the student will shift consumption from c_1 to c_2 (by reducing borrowing d and increasing out of pocket expenses s) to meet the optimality condition. If the cost of borrowing increases, the right hand side will also increase, and the student will again reduce borrowing d .

Comparing the solution to this problem with the problem including psychological costs illustrates the effect of psychological debt burden. Suppose a student chooses s^* and d^* with corresponding consumption choices c_1^* and c_2^* such that

$$\frac{MU(c_1^*)}{EMU(c_2^*)} = \frac{1 + \theta_d}{b}$$

for some values of θ_d and b . Let c_1^{**} , c_2^{**} , s^{**} , and d^{**} be the analogous optimal values for the Euler equation with non-pecuniary costs. That is,

$$\frac{MU(c_1^{**}) - \beta v'(d^{**})}{EMU(c_2^{**})} = \frac{1 + \theta_d}{b}$$

Then given the same values of θ_d and b , diminishing marginal utility, and $v''(d) > 0$, it can be shown that $c_1^{**} < c_1^*$, $s^{**} > s^*$, $c_2^{**} > c_2^*$, and $d^{**} < d^*$ if the Euler equation for the non-pecuniary case is to be satisfied:

$$\frac{MU(c_1^{**}) - \beta v'(d^{**})}{EMU(c_2^{**})} = \frac{MU(c_1^*)}{EMU(c_2^*)} = \frac{1 + \theta_d}{b}$$

Therefore, all else equal, greater psychological debt burden discourages students from funding educational costs with debt, leading to a shift from current consumption to future consumption.

A.2 Variable educational costs

Consider a simple case in which p is a function of TC such that $p'(TC) > 0$. I assume that there are institutional limits to how far total cost of attendance can be reduced (e.g., attending a two-year community college with multiple cost-saving measures such as living at home may be close to the lower bound). Suppose that TC is constrained by the condition $TC \geq s_p + d_p + \tau, \tau > 0$. This constraint may or may not be binding depending on the function $p(TC)$. For this simple case, I assume that the constraint is not binding. Then the Lagrangian for the financing decision becomes

$$L = u(y_1 - s) + p(TC)\beta u[y_2 + \alpha - d(1 + \theta_d)] + [1 - p(TC)]\beta u[y_2 - d(1 + \theta_d)] - \beta v(d|\eta) +$$

$$\mu(s + d + s_p + d_p - TC)$$

$$\mu \geq 0$$

with first order conditions

$$s : \quad -u'(y_1 - s) + \mu = 0$$

$$d : \quad -p(TC)\beta(1 + \theta_d)u'[y_2 + \alpha - d(1 + \theta_d)] - [1 - p(TC)]\beta(1 + \theta_d)u'[y_2 - d(1 + \theta_d)]$$

$$-\beta v'(d|\eta) + \mu = 0$$

$$TC : \quad \beta p'(TC)u[y_2 + \alpha - d(1 + \theta_d)] - \beta p'(TC)u[y_2 - d(1 + \theta_d)] - \mu = 0$$

These yield one intratemporal optimality condition between increasing total educational spending and financing that spending through debt and one intertemporal optimality condition between increasing total educational spending and financing that spending out of first-period income:

$$\frac{p'(TC) \{u[y_2 + \alpha - d(1 + \theta_d)] - u[y_2 - d(1 + \theta_d)]\} - v'(d)}{Eu'[y_2 + \alpha(i) - d(1 + \theta_d)]} = \frac{MU(TC) - v'(d)}{EMU(c_2)} = 1 + \theta_d$$

$$\frac{u'(y_1 - s)}{p'(TC) \{u[y_2 + \alpha - d(1 + \theta_d)] - u[y_2 - d(1 + \theta_d)]\}} = \frac{MU(c_1)}{MU(TC)} = \frac{1}{b}$$

These optimality conditions illustrate the trade-offs between increasing the probability of success via higher total costs and reducing current and future consumption.

Appendix B

Chapter 3 Weighted WTB Histograms

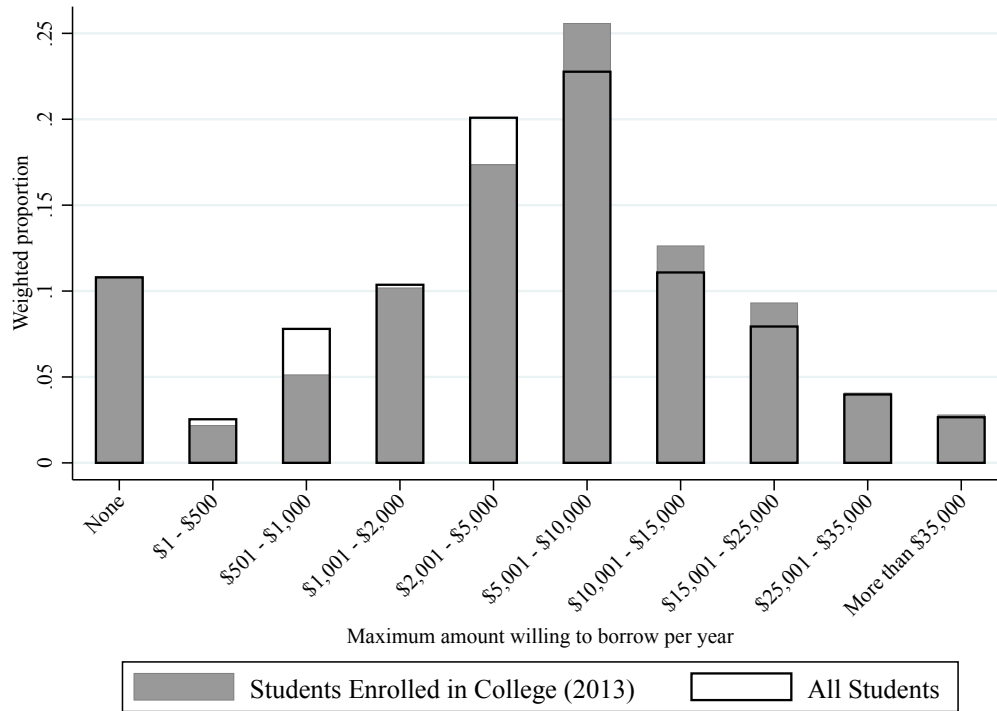


Figure B.1: Weighted histogram of willingness to borrow responses by sample

Notes: Proportions are weighted, account for complex survey design, and are conditional on student knowing their WTB. Sample sizes are 7,599 for the full sample and 3,564 for the enrolled sample.

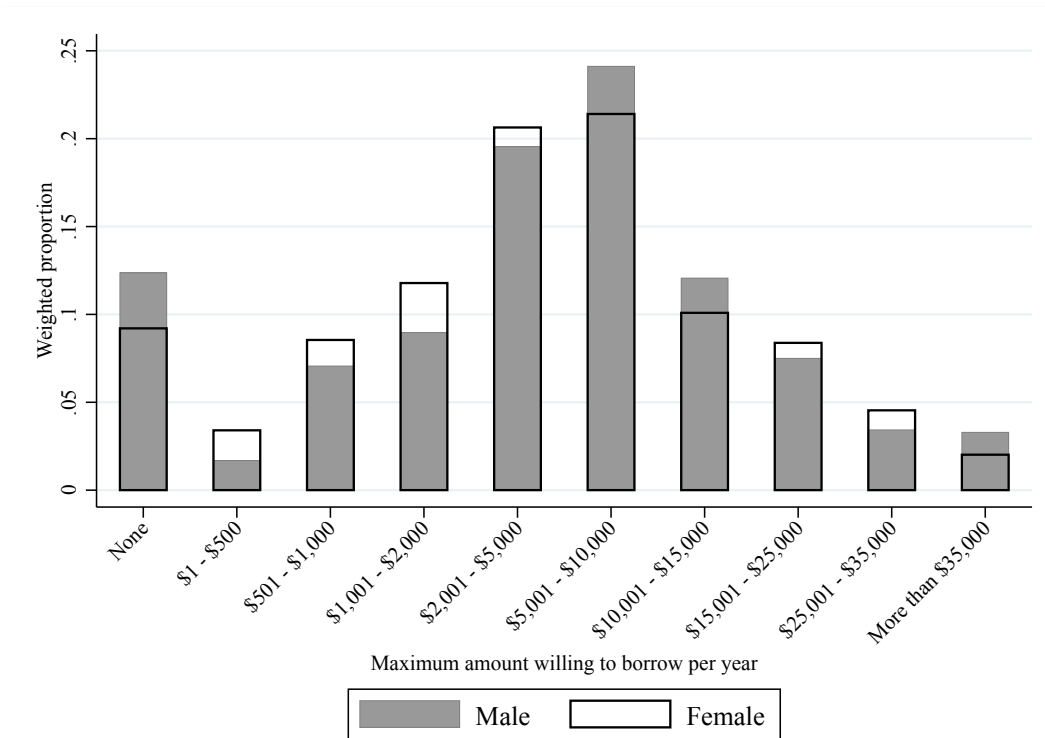


Figure B.2: Weighted histogram of stated willingness to borrow by gender

Notes: Proportions are weighted, account for complex survey design, and are conditional on student knowing their WTB. Sample sizes are 3,744 for women and 3,855 for men.

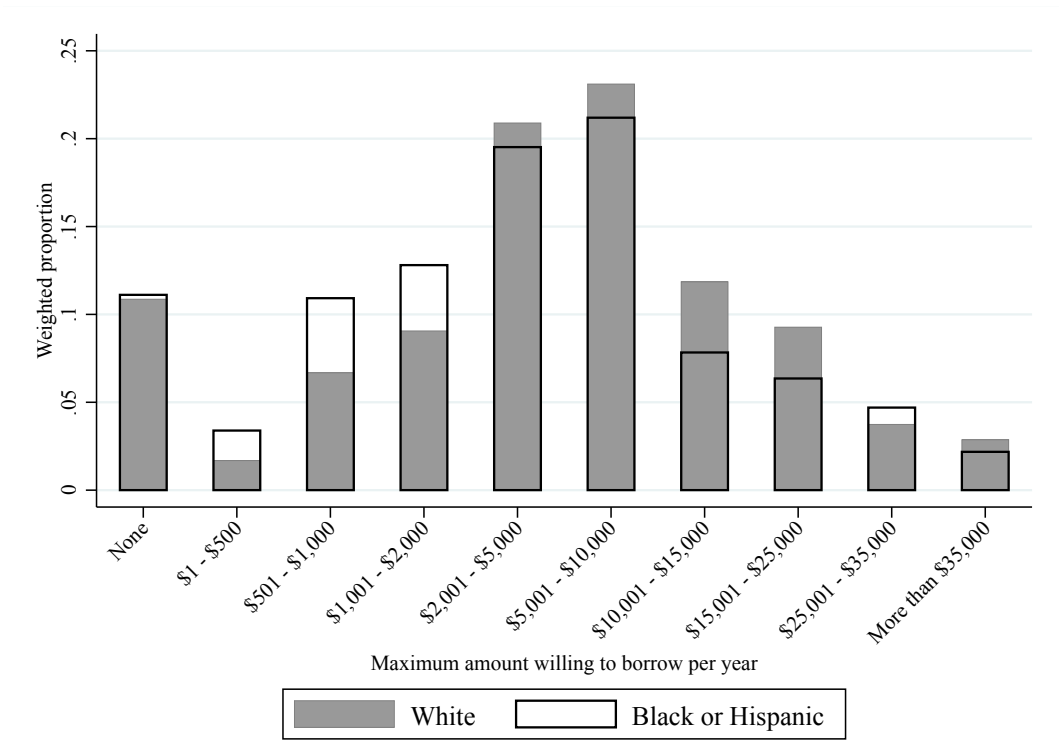


Figure B.3: Weighted histogram of stated willingness to borrow by race/ethnicity
 Notes: Proportions are weighted, account for complex survey design, and are conditional on student knowing their WTB. Sample sizes are 1,641 for Black or Hispanic students and 4,650 for White students.

Appendix C

Chapter 3 Weighted Propensity Score Matching Logit Regression Results

Table C.1: Propensity score matching logit regression results with weights: average marginal effects

Dependent = Pr(treatment)	Zero		\$1 to \$2,000		More than \$15,000		Don't Know	
	Full Sample	Enrolled	Full Sample	Enrolled	Full Sample	Enrolled	Full Sample	Enrolled
Female	-0.0176 (0.0235)	-0.0154 (0.0303)	0.0747*** (0.0252)	0.0767** (0.0324)	0.00585 (0.0231)	0.00272 (0.0365)	0.0298 (0.0237)	0.0267 (0.0329)
<i>Race/ethnicity (Reference group: White)</i>								
African-American	0.0372 (0.0560)	-0.0255 (0.0819)	0.110** (0.0515)	0.165* (0.0934)	0.0450 (0.0619)	0.0257 (0.0892)	0.0323 (0.0378)	-0.113 (0.0724)
Hispanic	0.0445 (0.0422)	0.0353 (0.0708)	0.0373 (0.0479)	0.0838 (0.0770)	0.00628 (0.0377)	-0.0169 (0.0619)	-0.0334 (0.0362)	-0.107* (0.0637)
Asian	-0.0741* (0.0397)	-0.0661 (0.0558)	0.00713 (0.0640)	0.0871 (0.0982)	-0.0244 (0.0538)	-0.0320 (0.0862)	-0.0419 (0.0555)	-0.0572 (0.0703)
Other race/ethnicity	0.0216 (0.0430)	0.0410 (0.0558)	-0.00186 (0.0455)	0.0582 (0.0838)	-0.0518 (0.0403)	-0.0929 (0.0596)	0.0148 (0.0422)	-0.110* (0.0602)
<i>Highest parental education (Reference group: high school or less)</i>								
Bachelor's degree		0.0233 (0.0359)		0.00306 (0.0371)		0.0345 (0.0356)		0.0700** (0.0346)
Graduate degree	0.0178 (0.0393)		0.0337 (0.0374)		0.0600* (0.0361)		0.103*** (0.0325)	
Bachelor's degree	-0.0278 (0.0306)		-0.0436 (0.0271)		0.0195 (0.0268)		0.0383 (0.0290)	
Associate's degree	-0.0181 (0.0322)		0.0501 (0.0423)		0.0591 (0.0414)		0.0917** (0.0364)	

Occupational training	-0.0993**		0.000790		0.0202		0.00262	
	(0.0500)		(0.0837)		(0.0616)		(0.0690)	
Parents U.S. born	0.00702	-0.00874	0.0223	0.0782	0.0165	0.0215	0.00245	0.0188
	(0.0352)	(0.0432)	(0.0436)	(0.0483)	(0.0352)	(0.0515)	(0.0320)	(0.0481)
<i>Family income in 2012 (Reference group: less than \$15000)</i>								
\$15000 to \$55000	0.0321	-0.0610	-0.00727	0.0342	0.0121	-0.0282	0.0296	0.0681
	(0.0379)	(0.0873)	(0.0468)	(0.0838)	(0.0431)	(0.0924)	(0.0445)	(0.0890)
\$55001 to \$115000	0.0908*	-0.0109	-0.0630	-0.0134	0.0167	-0.0928	0.0213	0.0582
	(0.0501)	(0.0895)	(0.0426)	(0.0802)	(0.0424)	(0.0871)	(0.0424)	(0.0775)
\$115001 to \$175000	0.0951*	-0.0106	-0.0399	0.0114	0.0347	-0.0425	0.0415	0.0639
	(0.0484)	(0.0930)	(0.0487)	(0.0879)	(0.0452)	(0.0884)	(0.0476)	(0.0882)
\$175000 to \$235000	0.111	0.0268	-0.0183	-0.00895	0.0210	-0.115	-0.00837	0.0605
	(0.0680)	(0.111)	(0.0872)	(0.120)	(0.0587)	(0.101)	(0.0645)	(0.0988)
Greater than \$235000	0.239***	0.144	-0.0461	0.0633	-0.0257	-0.116	0.0873	0.160*
	(0.0726)	(0.109)	(0.0730)	(0.113)	(0.0624)	(0.110)	(0.0568)	(0.0966)
<i>Household members in 2012 (Reference group: Two)</i>								
Three	0.00930	0.0276	-0.00827	-0.00141	0.0804*	0.0374	-0.00505	0.0143
	(0.0432)	(0.0522)	(0.0435)	(0.0753)	(0.0414)	(0.0672)	(0.0429)	(0.0611)
Four	0.0275	0.0783	0.0310	-0.00599	0.0173	-0.00839	0.00373	-0.0175
	(0.0415)	(0.0522)	(0.0442)	(0.0806)	(0.0408)	(0.0697)	(0.0392)	(0.0584)
Five	-0.00884	-0.00616	-0.00179	-0.0105	0.00582	-0.00191	-0.00156	-0.0123
	(0.0394)	(0.0457)	(0.0449)	(0.0820)	(0.0448)	(0.0754)	(0.0470)	(0.0634)
Six or more	0.0239	0.0229	0.0117	-0.0400	0.0101	-0.0120	-0.0276	-0.00635
	(0.0513)	(0.0560)	(0.0456)	(0.0836)	(0.0407)	(0.0819)	(0.0430)	(0.0685)
<i>Region of high school residence (Reference group: Northeast)</i>								
Midwest	-0.0129	-0.00520	0.0786**	0.00220	-0.0761**	-0.0184	-0.0365	-0.0147
	(0.0486)	(0.0505)	(0.0354)	(0.0499)	(0.0313)	(0.0514)	(0.0324)	(0.0409)

South	-0.000196 (0.0501)	-0.0123 (0.0508)	0.110*** (0.0328)	0.0752 (0.0552)	-0.141*** (0.0312)	-0.0869 (0.0539)	-0.0510* (0.0300)	-0.0141 (0.0449)
West	-0.000149 (0.0583)	-0.00882 (0.0629)	0.128*** (0.0471)	0.0812 (0.0741)	-0.0764** (0.0334)	-0.0245 (0.0636)	-0.0153 (0.0357)	-0.00332 (0.0558)
<i>Locale of high school residence (Reference group: City)</i>								
Suburb	-0.0456 (0.0314)	-0.0272 (0.0398)	0.00936 (0.0337)	0.0480 (0.0424)	0.00714 (0.0291)	0.00285 (0.0496)	-0.0186 (0.0265)	-0.00928 (0.0416)
Town	-0.0331 (0.0413)	-0.0515 (0.0520)	0.0166 (0.0412)	0.126 (0.0796)	0.00105 (0.0355)	0.0334 (0.0576)	0.00943 (0.0323)	0.00130 (0.0484)
Rural	-0.0177 (0.0332)	-0.0118 (0.0414)	-0.00293 (0.0364)	0.0521 (0.0469)	-0.0142 (0.0290)	-0.0279 (0.0444)	-0.0332 (0.0265)	-0.0552 (0.0422)
Searched for college info.	-0.131*** (0.0410)	-0.0199 (0.0636)	-0.0404 (0.0535)	0.00836 (0.0768)	0.0968*** (0.0349)	0.0897 (0.0635)	-0.115*** (0.0370)	0.0112 (0.0720)
High school GPA	0.00159 (0.0148)	-0.0198 (0.0281)	-0.0203 (0.0146)	-0.00800 (0.0279)	-0.00916 (0.0170)	-0.0565* (0.0308)	0.0140 (0.0159)	-0.00613 (0.0249)
Expected earnings premium (\$1000s)†	-0.000225 (0.000440)	0.000195 (0.000621)	-0.00110** (0.000469)	-0.000391 (0.000752)	0.000150 (0.000395)	0.000818 (0.000683)	-0.000330 (0.000410)	-0.000594 (0.000658)
Grants and scholarships (\$1000s)		0.00374 (0.00241)		-0.00182 (0.00196)		-0.000197 (0.00172)		0.000327 (0.00171)
Parent responded to questionnaire		0.0127 (0.0258)		-0.0274 (0.0337)		0.00946 (0.0325)		0.0233 (0.0291)
<i>N</i>	<i>3181</i>	<i>1540</i>	<i>3573</i>	<i>1662</i>	<i>3370</i>	<i>1665</i>	<i>5470</i>	<i>2588</i>

Notes: Stars indicate significance at the 10%, 5%, and 1% levels. Estimates are weighted and account for complex survey design. “Enrolled” sample refers to observations with non-missing responses for net cost of attendance. Regressions also include interaction of GPA and expected earnings premium (not shown). †Based on expected earnings for four-year degree in full sample and expected earnings for expected degree in enrolled sample.

Appendix D

Chapter 3 Balance Statistics by Gender and by Race/Ethnicity

Table D.1: Selected balance statistics by gender for college enrollment outcome

	(1) Covariates with statistically significant difference at 5% level (#)		(2) Covariates with standardized difference > 5% (#)		(3) Mean standardized difference (%)		(4) Continuous covariates with variance ratio ≠ 1 (#)	
	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
	<i>Women</i>							
Zero	5	0	16	5	7.70	2.72	1	0
\$1 to \$2,000	9	0	15	1	7.73	1.48	0	0
More than \$15,000	1	0	10	0	5.06	2.00	0	0
Don't know	4	0	11	0	4.27	1.01	0	1
<i>Men</i>								
Zero	8	0	21	1	9.94	1.78	1	0
\$1 to \$2,000	3	0	19	3	9.01	2.64	0	0
More than \$15,000	3	0	13	3	5.68	2.31	0	0
Don't know	4	0	6	0	3.62	0.95	0	0
<i>Total covariates</i>	27	27	27	27	27	27	3	3

Notes: Results are for full sample only. Balance statistics for the enrolled sample corresponding to analyses of other college outcomes are available upon request.

Table D.2: Selected balance statistics by race and ethnicity for college enrollment outcome

	(1) Covariates with statistically significant difference at 5% level (#)		(2) Covariates with standardized difference > 5% (#)		(3) Mean standardized difference (%)		(4) Continuous covariates with variance ratio ≠ 1 (#)	
	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched
	<i>Black or Hispanic</i>							
Zero	6	0	20	10	11.12	4.86	0	0
\$1 to \$2,000	5	0	10	2	8.90	2.48	0	0
More than \$15,000	4	0	15	2	9.05	2.76	0	0
Don't know	3	0	12	2	6.33	2.20	0	0
<i>White</i>								
Zero	6	0	17	0	9.73	1.88	3	0
\$1 to \$2,000	6	0	13	1	7.14	1.34	0	1
More than \$15,000	1	0	8	0	3.74	1.78	0	0
Don't know	6	0	9	1	4.48	1.32	0	0
<i>Total covariates*</i>	<i>23/24</i>	<i>23/24</i>	<i>23/24</i>	<i>23/24</i>	<i>23/24</i>	<i>23/24</i>	<i>3</i>	<i>3</i>

Notes: Results are for full sample only. Balance statistics for the enrolled sample corresponding to analyses of other college outcomes are available upon request. Total covariates are 23 for the White subsample and 24 for the Black or Hispanic subsample.

Appendix E

Chapter 4 Estimation Results with Controls

Table E.1: Mortgage regression results with controls

Dependent (dollars):	Below median income		Above median income	
	Total debt	Mortgage	Total debt	Mortgage
Log(Wealth)	6791.5*** (395.3)	5702.6*** (353.6)	26331.3*** (1597.4)	22416.9*** (1029.1)
Log(Income)	-59.89 (1038.9)	638.1 (721.4)	83315.5*** (13959.4)	30653.2*** (5499.6)
Age	1311.2*** (298.5)	1044.5*** (264.4)	493.1 (966.1)	1755.4** (732.3)
Age Squared	-17.42*** (3.628)	-12.36*** (3.220)	-22.62* (11.65)	-30.92*** (8.703)
Separated	2383.7 (2274.1)	2112.8 (1895.2)	25848.5*** (7828.8)	15085.1*** (5396.2)
Divorced	1526.4 (1550.7)	524.7 (1363.6)	15126.1*** (4307.3)	12606.5*** (2627.8)
Widowed	1050.2 (2670.6)	1306.4 (2532.3)	-5592.9 (6358.9)	-2554.6 (4940.6)
Non-White	-2198.9 (1910.6)	-1230.5 (1502.8)	-2051.5 (5450.5)	3804.7 (3972.8)
Female	720.8 (1783.7)	-238.6 (1538.6)	3299.8 (4930.2)	4407.2 (2717.6)
Female*Non-White	-729.0 (2453.0)	-33.87 (2019.9)	11225.4 (6851.7)	3618.1 (5077.2)
More Risk Averse	-2665.2** (1326.3)	-1230.1 (1111.9)	6799.2** (3092.8)	2591.5 (2285.7)
Unbanked	-8338.4*** (1075.1)	-5850.1*** (920.9)	987.7 (6111.3)	-5732.4 (3861.6)
Unemployed	793.7 (1521.9)	330.7 (1255.5)	3609.0 (4471.2)	-16.78 (3744.7)
Household Size	1253.4 (788.8)	2106.8*** (698.7)	6210.7*** (1477.7)	4593.7*** (1172.3)
Expects Major Expense	-895.2 (1262.9)	-3208.6*** (1097.3)	-7595.5** (3483.2)	-9807.9*** (2470.6)

Expansion	-187.1 (2026.1)	-701.4 (1762.6)	9077.1 (7303.5)	15762.8*** (4352.2)
Post-Crisis	6269.2** (2514.4)	1868.1 (2014.9)	16965.3** (7134.3)	20606.3*** (4174.5)
Expansion # Female	10267.3*** (2758.9)	7478.5*** (2414.6)	-3832.7 (8263.9)	-2078.3 (5419.6)
Post-Crisis # Female	7259.8** (2969.1)	5530.6** (2440.3)	-5101.3 (9944.4)	394.5 (5547.5)
<i>Observations</i>	3847	3847	4717	4717
<i>R-squared</i>	0.168	0.174	0.094	0.273

Notes: Standard errors in parentheses. Stars indicate significance at 10%, 5%, and 1% levels. All regressions use sampling weights and first implicate set.

Table E.2: Education regression results with controls

Dependent (dollars):	18 to 65 years of age		25 to 65 years of age	
	Total debt	Educational	Total debt	Educational
Log(Wealth)	15545.3*** (680.1)	37.17 (85.66)	16700.0*** (758.0)	65.65 (91.88)
Log(Income)	25735.7*** (3100.8)	-72.30 (353.9)	28243.8*** (3532.5)	-19.22 (411.0)
Age	84.31 (501.6)	-52.34 (70.81)	1238.2* (665.1)	-529.6*** (116.2)
Age Squared	-7.222 (6.072)	-1.208 (0.795)	-19.76** (7.735)	3.791*** (1.170)
Separated	13270.3*** (3937.9)	-919.7** (385.1)	14471.1*** (4098.3)	-871.0** (402.9)
Divorced	7327.6*** (2640.7)	-40.43 (360.4)	7087.5*** (2694.2)	141.3 (367.5)
Widowed	-3732.0 (3540.1)	409.9 (428.6)	-3292.1 (3636.0)	392.5 (434.4)
Non-White	-7113.0** (3395.1)	348.4 (477.5)	-6862.1* (3804.9)	533.0 (511.4)
Female	194.3 (2901.9)	941.2*** (314.4)	110.6 (3232.6)	988.6*** (328.4)
Female*Non-White	12086.2*** (4200.1)	-272.1 (636.7)	12767.1*** (4680.2)	-258.8 (677.4)
More Risk Averse	-2222.2 (1671.1)	-800.7** (332.1)	-313.2 (1881.6)	-683.2* (352.5)
Unbanked	-326.5 (2567.4)	-1831.4*** (297.0)	2586.8 (3021.4)	-1723.8*** (329.5)
Unemployed	4516.9** (2085.1)	505.5 (489.1)	3694.3 (2357.7)	451.5 (527.4)
Household Size	3418.0*** (852.1)	-404.0*** (127.8)	3628.8*** (899.9)	-334.2** (134.1)
Expects Major Expense	-5299.5*** (1999.5)	1445.2*** (287.3)	-5346.9** (2166.6)	1358.5*** (305.0)

Expansion	13049.1*** (4439.3)	775.7** (373.6)	13539.3*** (5047.0)	947.0** (417.4)
Post-Crisis	21412.1*** (5126.8)	3631.2*** (573.6)	23491.7*** (5777.0)	3403.4*** (600.2)
Expansion # Female	-140.9 (5026.8)	1169.6** (523.8)	-889.6 (5639.4)	762.5 (541.1)
Post-Crisis # Female	-4742.3 (6239.8)	1786.1** (767.9)	-6471.8 (7016.3)	1958.4** (796.4)
<i>Observations</i>	8564	8564	7782	7782
<i>R-squared</i>	0.078	0.051	0.079	0.054

Notes: Standard errors in parentheses. Stars indicate significance at 10%, 5%, and 1% levels. All regressions use sampling weights and first implicate set.

Table E.3: Extensive margin regression results with controls: mortgage debt

Dependent variable:	Below median income		Above median income	
	Estimates	AME	Estimates	AME
Pr(non-zero debt)				
Log(Wealth)	1.267*** (0.0569)	0.112*** (0.00413)	0.887*** (0.0370)	0.159*** (0.00472)
Log(Income)	0.279** (0.116)	0.0246** (0.0102)	-1.092*** (0.0635)	-0.196*** (0.00985)
Age	0.140*** (0.0403)	-0.00164*** (0.000570)	0.205*** (0.0250)	-0.00412*** (0.000713)
Age Squared	-0.00176*** (0.000471)		-0.00250*** (0.000285)	
Separated	0.530** (0.225)	0.0492** (0.0218)	0.0348 (0.141)	0.00625 (0.0252)
Divorced	0.578*** (0.163)	0.0523*** (0.0150)	0.537*** (0.0844)	0.0979*** (0.0154)
Widowed	0.301 (0.263)	0.0274 (0.0246)	0.0496 (0.162)	0.00891 (0.0291)
Minority	-0.432 (0.292)	0.0196 (0.0122)	-0.0298 (0.123)	0.00977 (0.0143)
Female	-0.157 (0.256)	0.0526*** (0.0126)	0.0115 (0.124)	0.0159 (0.0133)
Female # Minority	0.892*** (0.325)		0.161 (0.159)	
More Risk Averse	0.240* (0.135)	0.0210* (0.0117)	0.00492 (0.0806)	0.000883 (0.0145)
Unbanked	0.0242 (0.202)	0.00214 (0.0179)	-0.486** (0.242)	-0.0863** (0.0421)
Unemployed	-0.362** (0.158)	-0.0311** (0.0131)	-0.412*** (0.123)	-0.0736*** (0.0218)
Household Size	0.237*** (0.0574)	0.0209*** (0.00504)	0.181*** (0.0369)	0.0325*** (0.00659)
Expects Major Expense	-0.478*** (0.127)	-0.0426*** (0.0113)	-0.527*** (0.0720)	-0.0958*** (0.0130)

Expansion	-0.700** (0.320)	-0.00515 (0.0143)	0.292** (0.132)	0.0582*** (0.0163)
Post-Crisis	-0.803*** (0.289)	-0.0248* (0.0135)	0.201* (0.119)	0.0418*** (0.0148)
Expansion # Female	0.890** (0.362)		0.0608 (0.180)	
Post-Crisis # Female	0.723** (0.329)		0.0615 (0.160)	
<i>Observations</i>	<i>3847</i>		<i>4717</i>	

Notes: AME coefficients indicate average marginal effects. Standard errors in parentheses. Stars indicate significance at 10%, 5%, and 1% levels. All regressions use sampling weights and first implicate set.

Table E.4: Extensive margin regression results with controls: educational debt

Dependent variable:	18 to 65		25 to 65	
	Estimates	AME	Estimates	AME
Pr(non-zero debt)				
Log(Wealth)	-0.0450*** (0.0173)	-0.00578*** (0.00221)	-0.0378* (0.0195)	-0.00451* (0.00232)
Log(Income)	-0.0109 (0.0507)	-0.00140 (0.00650)	-0.00198 (0.0585)	-0.000236 (0.00698)
Age	0.0217 (0.0213)	-0.00640*** (0.000456)	-0.0786*** (0.0278)	-0.00800*** (0.000508)
Age Squared	-0.000976*** (0.000268)		0.000146 (0.000327)	
Separated	-0.271** (0.133)	-0.0328** (0.0151)	-0.283** (0.138)	-0.0317** (0.0144)
Divorced	0.0255 (0.0825)	0.00327 (0.0106)	0.0667 (0.0852)	0.00798 (0.0102)
Widowed	0.283 (0.173)	0.0386 (0.0249)	0.245 (0.175)	0.0310 (0.0233)
Minority	0.0128 (0.124)	0.00850 (0.00964)	0.0904 (0.139)	0.0157 (0.00981)
Female	0.453*** (0.130)	0.0724*** (0.00896)	0.565*** (0.148)	0.0717*** (0.00909)
Female # Minority	0.0807 (0.151)		0.0578 (0.166)	
More Risk Averse	-0.350*** (0.0729)	-0.0442*** (0.00904)	-0.372*** (0.0796)	-0.0438*** (0.00919)
Unbanked	-0.370*** (0.130)	-0.0438*** (0.0140)	-0.379*** (0.145)	-0.0414*** (0.0144)
Unemployed	0.258*** (0.0841)	0.0345*** (0.0118)	0.299*** (0.0940)	0.0378*** (0.0125)
Household Size	-0.00391 (0.0348)	-0.000501 (0.00447)	0.0209 (0.0359)	0.00250 (0.00429)
Expects Major Expense	0.509*** (0.0727)	0.0634*** (0.00869)	0.487*** (0.0783)	0.0566*** (0.00879)

Expansion	0.384*** (0.148)	0.0465*** (0.0106)	0.408** (0.171)	0.0402*** (0.0108)
Post-Crisis	0.672*** (0.127)	0.110*** (0.0100)	0.699*** (0.146)	0.0978*** (0.0102)
Expansion # Female	0.0222 (0.184)		-0.0520 (0.207)	
Post-Crisis # Female	0.251 (0.158)		0.149 (0.176)	
<i>Observations</i>	8564		7782	

Notes: AME coefficients indicate average marginal effects. Standard errors in parentheses. Stars indicate significance at 10%, 5%, and 1% levels. All regressions use sampling weights and first implicate set.

Appendix F

Chapter 5 Summary Statistics for Controls by Household Type and by Race and Ethnicity

Table F.1: Summary statistics of controls by household type

	Dual-headed households			Single women		
	mean	sd	median	mean	sd	median
Age of HH Head	50.4	(15.938)	49	58.4	(15.777)	60
Number of Children in HH	.829	(1.164)	0	0	(0.000)	0
Income	90158	(82322)	71000	35643	(29550)	25000
Income (LIS)	53859	(49190)	42240	35643	(29550)	25000
Income (OECD)	47547	(44430)	36700	35643	(29550)	25000
Unemployed (Last Year)	.054	(0.232)	0	.0557	(0.179)	0
Banked	.875	(0.339)	1	.86	(0.270)	1
Married	.93	(0.262)	1	.00673	(0.064)	0
Never Married	.0428	(0.207)	0	.324	(0.365)	0
Widowed	.00242	(0.050)	0	.347	(0.371)	0
Divorced or Annulled	.0225	(0.152)	0	.294	(0.355)	0
Separated	.0024	(0.050)	0	.0284	(0.130)	0
<i>Household-Year Obs.</i>	36506			8094		

Source: 1999 - 2015 PSID Surveys. Notes: Means and SDs are estimated using sample weights and account for clustering and stratification. Medians use sampling weights.

Summary statistics of controls by household type (continued)

	Female-headed households			Men		
	mean	sd	median	mean	sd	median
Age of HH Head	45.4	(19.699)	43	45.5	(15.725)	43
Number of Children in HH	1.08	(1.406)	1	.0973	(0.377)	0
Income	42156	(46129)	30432	47139	(44743)	32000
Income (LIS)	26295	(28969)	18660	44026	(41114)	29870
Income (OECD)	23816	(26527)	16730	43556	(40790)	29400
Unemployed (Last Year)	.109	(0.386)	0	.1	(0.264)	0
Banked	.719	(0.557)	1	.811	(0.344)	1
Married	.0271	(0.201)	0	.0103	(0.089)	0
Never Married	.316	(0.576)	0	.498	(0.439)	1
Widowed	.145	(0.437)	0	.101	(0.265)	0
Divorced or Annulled	.408	(0.609)	0	.334	(0.414)	0
Separated	.104	(0.378)	0	.0567	(0.203)	0
<i>Household-Year Obs.</i>	<i>10157</i>			<i>9139</i>		

Source: 1999 - 2015 PSID Surveys. Notes: Means and SDs are estimated using sample weights and account for clustering and stratification. Medians use sampling weights.

Table F.2: Summary statistics of controls by race and ethnicity

	White (Non-Hispanic)			Black (Non-Hispanic)		
	mean	sd	median	mean	sd	median
Age of HH Head	51.8	(15.377)	51	47.3	(24.794)	45
Number of Children in HH	.482	(0.793)	0	.657	(1.709)	0
Income	71375	(63820)	51236	44530	(60100)	29400
Income (LIS)	49080	(40774)	37008	31521	(41606)	21360
Income (OECD)	45285	(37815)	34000	29254	(39731)	19280
Unemployed (Last Year)	.0586	(0.201)	0	.102	(0.475)	0
Banked	.896	(0.262)	1	.644	(0.753)	1
Married	.518	(0.428)	1	.266	(0.695)	0
Never Married	.182	(0.331)	0	.375	(0.762)	0
Widowed	.111	(0.269)	0	.0942	(0.460)	0
Divorced or Annulled	.17	(0.322)	0	.202	(0.631)	0
Separated	.0195	(0.118)	0	.0628	(0.382)	0
<i>Household-Year Obs.</i>	<i>38077</i>			<i>18911</i>		

Source: 1999 - 2015 PSID Surveys. Notes: Means and SDs are estimated using sample weights and account for clustering and stratification. Medians use sampling weights.

Summary statistics of controls by race and ethnicity (continued)

	Hispanic			Other Race/Ethnicity		
	mean	sd	median	mean	sd	median
Age of HH Head	45.1	(14.415)	44	49.6	(15.329)	48
Number of Children in HH	1.13	(1.251)	1	.678	(0.975)	0
Income	53742	(48378)	37984	76665	(62968)	56360
Income (LIS)	32640	(31042)	22700	51282	(44955)	38006
Income (OECD)	28730	(28819)	19533	46767	(43056)	33267
Unemployed (Last Year)	.106	(0.288)	0	.0707	(0.236)	0
Banked	.644	(0.449)	1	.862	(0.318)	1
Married	.573	(0.464)	1	.565	(0.457)	1
Never Married	.186	(0.365)	0	.214	(0.379)	0
Widowed	.0469	(0.198)	0	.0701	(0.236)	0
Divorced or Annulled	.14	(0.325)	0	.131	(0.311)	0
Separated	.0533	(0.211)	0	.0195	(0.128)	0
<i>Household-Year Obs.</i>	<i>4442</i>			<i>1912</i>		

Source: 1999 - 2015 PSID Surveys. Notes: Means and SDs are estimated using sample weights and account for clustering and stratification. Medians use sampling weights.