STAFF
REPORTS

NO. 1099
APRIL 2024

REVISED
DECEMBER 2024

Personal Bankruptcy Protection and Household Debt

Felipe Severino | Meta Brown | Rajashri Chakrabarti

FEDERAL RESERVE BANK *of* NEW YORK

Personal Bankruptcy Protection and Household Debt

Felipe Severino, Meta Brown, and Rajashri Chakrabarti

Federal Reserve Bank of New York Staff Reports, no. 1099
April 2024; revised December 2024
https://doi.org/10.59576/sr.1099

Abstract

Increasing personal bankruptcy protection raises consumers' desire to borrow and lenders' cost of extending credit; the impact on equilibrium borrowing is ambiguous. Using bankruptcy protection changes between 1999 and 2005 across U.S. states, we find that borrowers respond to greater protection by increasing their unsecured debt. Border county estimates suggest that local economic conditions do not drive these results. Borrowers pay more for protection through higher interest rates, yet delinquency is unaffected. Remarkably, our results indicate that rising borrower demand outstripped decreasing supply. Increased protections did not reduce the aggregate level of household debt but affected the composition of borrowing.

JEL classification: D14, D18, H81, G33
Key words: bankruptcy, debt, credit card, delinquency

Chakrabarti: Federal Reserve Bank of New York (email: rajashri.chakrabarti@ny.frb). Severino: Dartmouth College (email: felipe.severino@tuck.dartmouth.edu). Brown: Ohio State University (email: brown.991@osu.edu). The authors thank Manuel Adelino, Adrien Auclert, Jean-Noel Barrot, Asaf Bernstein, Laurent Calvet, Ing-Haw Chen, Hui Chen, David Colino, Marco Di Maggio, Sebastian Di Tella, Xavier Giroud, Raj Iyer, Benjamin Keys, Henry Korytkowski, Erik Loualiche, Deborah Lucas, Indrajit Mitra, William Mullins, Christopher Palmer, Jun Pan, Jonathan Parker, Juan Passadore, Stephen Ross, Yang Sun, Wilbert van der Klaauw, Adrien Verdelhan, Yu Xu, and especially Daniela Agusti, as well as participants of seminars at AEA Boston, Corporate Finance Conference-Cornell University, Dartmouth College (Tuck), European Conference on Household Finance in Stockholm, Federal Reserve Board of Governors, Imperial College Business School, London School of Economics, MIT (Sloan), NBER Household Finance, Stanford University (GSB), University of Pennsylvania (Wharton), University of Southern California (Marshall), University of Toronto, and Washington University in St Louis (Olin) for their insightful suggestions. Brandi Coates, Kasey Chatterji-Len, and Beck Pierce provided excellent research assistance. Felipe is indebted to Nittai Bergman, Andrey Malenko, and especially Antoinette Schoar for many long, fruitful discussions which greatly improved the paper and for their constant encouragement.

1 Introduction

Consumer credit is increasingly central to households' lives, and, therefore, so is its regulation. Personal bankruptcy laws in the United States protect a fraction of a household's assets against seizure by unsecured creditors, such as credit card providers. Under Chapter 7 of the U.S. Bankruptcy Code, households are protected from creditors up to a monetary limit set by each state, a limit called the "personal bankruptcy exemption." In the case of default, the lender seizes only the portion of the borrower's assets that exceeds the exemption level. If the borrower's assets do not reach the exemption level, the creditor cannot seize any assets. Bankruptcy asset protections that are too narrow impose severe welfare costs on borrowers who realize negative earnings shocks; protections that are too lenient limit the contracting space, to the detriment of both lenders and borrowers. Therefore, regulators must balance these two concerns. This paper explores the credit market consequences of widely varying choices for this bankruptcy protection parameter.

An increase in the exemption level (referred to as protection henceforth) may strengthen the demand for credit and decrease the supply of credit. For example, for a borrower facing an uncertain income stream, an increase in bankruptcy protection reduces the consumption cost of default following a negative income shock. This increases the appeal of borrowing. At the same time, such an increase in protection diminishes the collateral value of the borrower's assets, which increases the interest rate that the lender demands for any given loan amount (Hart and Moore 1994).[1] The net price effect of the increase in the demand for credit and the decline in the supply of credit following an expansion of bankruptcy protection predicted by theory is, unambiguously, an increase in the price of credit. However, the net effect on the quantity borrowed in equilibrium is ambiguous. Borrowing may increase, indicating that the demand response dominates, or decrease, indicating that the supply response dominates.

This paper relies on two large administrative data sources, specifically credit registry data on household debt holding and branch-level interest rate information, in conjunction with the changes in U.S. states' bankruptcy exemptions from 1999 to 2005. Our aim in this study is to update and enrich our understanding of the consequences of personal bankruptcy protection for consumers' credit in equilibrium. The combination of widely varying bankruptcy protections and low costs of filing for bankruptcy, alongside the availability of rich administrative data, make this era an ideal laboratory in which to study protection.

We analyze the impact of the changes in bankruptcy protection levels on household debt by studying 26 states that changed their protection levels 37 times between 1999 and 2005. By using the timing and magnitude of these changes, we are able to isolate the effect of bankruptcy protection on household leverage while controlling for other state-specific factors that may impact household debt. We also use a border county nonparametric approach to further control for unobservable factors (similar to Dube, Lester, and Reich 2010). This approach involves narrowing our sample

[1] See Section 4 for a more detailed consideration of the theoretical literature on personal bankruptcy exemptions and its relationship to our empirical analysis.

to neighboring counties across state borders and includes time-varying fixed effects for each pair of counties; the resulting estimates reinforce our findings.

Three main results are consistent with a demand effect dominating the inward supply response. First, we find that an increase in protection levels causes borrowers' unsecured credit holdings, primarily credit card debt, to rise, while their level of secured debt, including mortgage and auto loans, remains largely unchanged.[2],[3] These differential effects are of interest because, while unsecured debt is subject to bankruptcy protection, secured debt is not directly influenced by it. Second, matching this pattern of results on debt quantity, we find that interest rates rise for unsecured credit. Third, the additional unsecured borrowing is not associated with increases in delinquency rates after the level of protection increased. The estimated positive effect of bankruptcy protection on unsecured credit balances is concentrated among homeowners in low-income areas. Low-income homeowners, who hold housing wealth and face meaningful default risk, may stand to benefit most from states' bankruptcy homestead exemptions.

The equilibrium effect of the demand and supply responses matters for household debt, especially in light of the rapid growth of household debt during the period before the financial crisis in 2008.[4] Gropp, Scholz, and White (1997) were the first to pose the question of how personal bankruptcy protection standards, which vary widely by state, influence consumer lending markets. Gropp et al. (1997) studied the impacts of the 1983 state lending laws using survey data on 3,706 households from the 1983 wave of the Survey of Consumer Finances. Our paper revisits the question two decades later, during a period of rapid policy changes and a historic credit boom.

[INSERT FIGURE 1]

Empirically identifying the true effect of the level of bankruptcy protection on household debt is challenging, as these levels are correlated with unobservable borrower and lender characteristics that might simultaneously shape credit availability and borrower protection. For example, states with higher protection levels may be states in which the pool of borrowers is risky, and, therefore, lenders are less willing to supply credit. This, in turn, will lead to a negative correlation between debt and protection that is not due to the level of exemption but to the riskiness of the borrower pool.

Several aspects of our empirical approach address unobserved borrower and lender characteristics. Each of our empirical specifications holds fixed time-invariant individual and ZIP code characteristics. A subset of our estimates uses a nonparametric border county approach to account for

[2]Credit card balances chiefly compose the unsecured credit reported in the data. Our unsecured credit measure does not include unsecured student debt, which is subject to a distinct legal environment in the event of default.

[3]Vig (2013) also finds a demand response due to an increase in creditor protection, in his case for firms. However, its effect is associated with a rise in the threat of early liquidation, distinct from the insurance channel for the households we document here.

[4]Figure 1 depicts the growth in debt amounts (adjusted for inflation), along with bankruptcy filings. Debt amounts have been converted to constant US$(2,000). *Source*: Federal Reserve Bank of New York Consumer Credit Panel Equifax.

time-varying unobserved behavior of the local economy that characterizes each county pair. Furthermore, where prior research pooled debt across types, we differentiate between secured and unsecured debts. Only unsecured debt is entirely dischargeable under the bankruptcy code.[5]

The possibility remains that unobserved, time-varying debt demand and supply factors that differ within county pairs have some influence on our estimates. Assuming any remaining such factors affect both secured and unsecured debt, while bankruptcy protection affects only unsecured debt, estimates that isolate effects on secured and unsecured debt outcomes will show us the extent of the influence of any remaining time-varying demand and supply factors that persist within county pairs on our estimates, which will be captured in the effects on secured debt. We find a substantial and significant positive association between credit card debt and bankruptcy protection but an insignificant and small relationship between protection and both mortgage and auto debts, suggesting that our estimated credit card debt response does not arise from remaining time-varying, within-county pair factors.

In addition, we analyze the timing of bankruptcy protection changes in order to address the concern that the level of protection may be correlated with preexisting state-specific trends that survive our controls. We perform this analysis to mitigate the concern that our results reflect these differential pre-trends rather than changes in the level of protection. We show that differential pre-trends do not drive our estimates for debt balances and interest rate estimates.

Our analysis includes a series of robustness exercises. We further address endogenous policy concerns by showing that changes in the level of protection are uncorrelated with lagged changes in a set of potential covariates, including state-level house prices, medical expenses, and gross domestic product (GDP). This finding echoes evidence regarding the haphazard legislative process of changing protection levels.[6]

Bankruptcy protections may not be equally relevant throughout the broad population of consumers. Indeed, we find a reasonably precise zero effect of protections on unsecured debt for the broad sample of credit fileholders. Bankruptcy exemptions, many of which apply to the homestead, may be particularly relevant to homeowners who are at meaningful risk of default. Among homeowners in low-income ZIP codes, we estimate an elasticity from 0.043 (all low-income homeowners) to 0.147 (border county low-income homeowners) for the effect of exemption increases on credit card debt; these estimates imply an increase in credit card debt of $156 or $534 in response to a mean increase in exemption of 53%. This magnitude represents the average treatment effect for low-income homeowners.[7] Our estimated credit card debt response to protection arguably represents a modest

[5]Bankruptcy filing generates an automatic stay on mortgage claims, but to discharge mortgage debt, the household must go through foreclosure (Li, White, and Zhu 2011).

[6]Some anecdotes reflect the nature of the legislative process. In describing the homestead exemption's legislative progress, Kopel (2007) writes, it moves "slowly (about as fast as a turtle can climb a mountain) the Colorado homestead exemption increases." Similarly, text from California's 2003 resolution to amend the code of civil procedure section 704.730 reads: ". . . a 90% jump in the homestead allowances overshoots inflation correction and constitutes a higher real homestead allowance, which would be a substantive change in exemption policy . . . ". California did not pass an increase in the homestead exemption in 2003 but finally increased the limit in 2009.

[7]These estimates use the average balances for low-income homeowners reported in Table 2, which are $6,853 for

but economically meaningful increase. In the 2013 Federal Reserve Survey of Household Economics and Decision-Making (SHED), 50% of their representative sample of U.S. adults responded that they could not cover a $400 emergency expense using cash or its equivalent (Chen 2019).

One might expect homeowners who are supporting heavy debt burdens to be more aware of their protections in the event of bankruptcy. We show high-debt, low-utilization borrowers drive significant credit responses, contrasting with the minor responses of the broader homeowner population. We also provide simple survey evidence that helps rationalize the smaller response to increased bankruptcy protection that we estimate for the full sample of low-income homeowners and suggests that the results are driven by a subset of individuals who are both aware of and responsive to changes in bankruptcy protections. For this group, the policy's effect is of economically meaningful magnitude.

Furthermore, consistent with a simultaneous increase in credit demand and contraction in credit supply, we estimate an increase in interest rates for credit cards in response to this mean (53%) rise in protection of 0.45 to 0.47 basis points. This constitutes a 3.5% to 3.7% increase in credit card interest rates, which were, on average, 12.7% during our sample period. Comparing the lender's annual expected loss given default to the expected revenue increase from the interest rate adjustment under reasonable parameters includes the possibility that lenders are fairly compensated for the decrease in recovery rates that results from greater bankruptcy protection by their increased interest income.

The increased borrowing is estimated not to alter overall delinquency rates on credit card debt but seems to spill over to other types of debt, specifically an increase in auto debt delinquency. However, any small increase in early auto delinquencies does not translate to an increase in our more serious household financial distress measures, including new bankruptcy, foreclosures, or credit account collection.

Estimates of the composition of borrowing indicate that new borrowing in response to bankruptcy protection largely operates on the intensive margin, with existing borrowers increasing their credit card utilization and the number of cards. We find no evidence of new borrowers entering the credit market, defined as the time when a member of a household opens their first account or as the time when a credit card balance goes from zero to positive.

Based on the findings, it seems that the increase in unsecured credit driven by bankruptcy protection did not significantly worsen financial distress for affected households. Although we cannot completely rule out overborrowing or risk-shifting behavior, the results described are more consistent with existing risk-averse borrowers increasing their debt as a result of the increase in downside protection, especially in the case of homeowners.

We also find suggestive evidence that changes in the level of protection are correlated with an increase in entrepreneurial activity. Using self-employment information at the county level, we

low-income homeowners and $6,856 for low-income homeowners in the neighboring counties sample, a mean change in protection of $38,841 and an average protection level of $73,627.

show that areas that experienced an increase in the level of credit card debt also experienced an increase in the level of self-employment creation, specifically in industries that use credit cards as startup capital.[8] In conjunction with the delinquency results, this correlation may suggest a role for individual default protection in the creation of viable small businesses.

Finally, we replicate our main findings using a number of alternative specifications. We restrict the sample to eventually treated states, replace the time-varying intensity of treatment with a first-treatment approach and then a treatment indicator approach, restrict the sample to states that were only treated once during our sample period, control for unemployment insurance changes, and replace the treatment measure with only the homestead exemption values. The consistency and significance of the estimates across all of these specifications reinforce our causal interpretation of the baseline results.

The findings in this paper build on previous studies that have examined the relationship between credit availability and bankruptcy protection, including the work of Gropp, Scholz, and White (1997), Berger, Cerqueiro, and Penas (2011), Lin and White (2001), and Hynes, Malani, and Posner (2004). They also relate to empirical work that explores the role of bankruptcy changes in startup creation (Cerqueiro and Penas 2017), innovative activity among small firms (Cerqueiro et al. 2013), and the use of credit cards in entrepreneurial activity (Chatterji and Seamans 2012; Fan and White 2003). Furthermore, the findings are complementary to previous work on credit card borrowing (Agarwal et al. 2015; Gross and Souleles 2002a, 2002b) and personal bankruptcy filings and delinquency rates (Gross, Notowidigdo, and Wang 2014; Agarwal, Liu, and Mielnicki 2003; White 2007; Jagtiani and Li 2015; Indarte 2023).[9] Indarte, in particular, connects both the prevailing bankruptcy protection regime and mortgage payments to bankruptcy filing decisions, and finds that, while both contribute, variation in mortgage payments is the dominant factor in the decision to file for bankruptcy.[10] Finally, these findings inform a literature that aims to understand the general equilibrium effects of the bankruptcy system, including the work of Dick and Lehnert (2010) and Auclert, Dobbie, and Goldsmith-Pinkham (2019).

In addition, our analysis of repayment responses to bankruptcy protection complements previous studies on the impact of bankruptcy verdicts on labor markets and financial health (Dobbie and Song 2015; Dobbie, Goldsmith-Pinkham, and Yang 2017; Dobbie et al. 2020) and contributes to the literature on strategic filing decisions (Indarte 2023; Argyle et al. 2021; Fisher and Lyons 2010). Our analysis of this historical period of rapidly changing bankruptcy regulations is also related to research on the optimal design of bankruptcy laws for both corporate and personal bankruptcies

[8] Examples of low-capital-intensity industries that can be financed with credit card debt include construction and photography. This evidence adds to the description of the interaction between self-employment and consumer credit provided by Cohen-Cole, Herkenhoff, and Phillips (2016) and Parra (2018).

[9] See White (2005) for a detailed review of the prior literature.

[10] Indarte's (2023) variation in bankruptcy forgiveness arises from a kink in the level of forgiveness generated by the state homestead exemption and the homeowner's equity, while variation in mortgage payments is drawn from the timing of ARM resets relative to the Libor-Treasury spread. Though we would prefer to include a similar regression kink approach along with our analyses, our pre-BAPCPA context and New York Fed Consumer Credit Panel / Equifax historical credit data lack equity detail and predate CRISM, the leading source of merged housing and credit data in which home equity, credit, and bankruptcy details coincide.

(Baird and Rasmussen 2002; Bolton and Scharfstein 1996; Davila 2020; Gertner and Scharfstein 1991; Hart 2000).

The rest of the paper proceeds as follows: Section 2 discusses the institutional framework of personal bankruptcy laws. Section 3 describes the various administrative data sources used in the estimation. Section 4 outlines our empirical hypotheses and establishes a short list of predictions based on the existing theoretical literature on bankruptcy protection. Section 5 develops the empirical strategy, and Section 6 reports the results. This is followed by a concluding section.

2 Institutional framework of U.S. personal bankruptcy law

Personal bankruptcy procedures determine both the total amount that borrowers must repay their creditors and how repayment is shared among individual creditors. An increase in the amount repaid may benefit all individuals who borrow because higher repayment levels may cause creditors to lend more at lower interest rates. However, a larger repayment amount implies that borrowers need to use more of their existing assets and/or postbankruptcy earnings to repay prebankruptcy debt. In doing so, they reduce their willingness to borrow and their incentive to work.[11]

U.S. bankruptcy law comprises two separate personal bankruptcy procedures, which are named as they appear in bankruptcy law: Chapter 7 and Chapter 13. Most delinquent consumer debt is discharged in bankruptcy; however, most tax obligations, student loans, allowance and child support obligations, debts acquired by fraud, and some credit card debt used for luxury purchases or cash advances are not.

Mortgages, car loans, and other secured debts are not discharged in bankruptcy, but filing for bankruptcy generally allows debtors to delay creditors from retrieving assets or foreclosure. Prior to the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA), debtors were allowed to freely choose between Chapter 7 and Chapter 13.

This paper focuses on the pre-2005 period, when the cost of filing for bankruptcy was low (about $600 under Chapter 7 or $1,600 under Chapter 13, as of 2001), and, therefore, the demand effect should be stronger.[12] The most commonly used procedure before 2005 was Chapter 7. When filing under Chapter 7, debtors must list all of their assets. Some of these assets are exempt, meaning that they cannot be seized by creditors. Asset exemption amounts are determined by the state in which the debtor lives. Most states provide personal asset protection, which exempts debtors' clothing, furniture, "tools of the trade", and sometimes equity in a vehicle. In addition, nearly all states have some level of homestead protection for equity in owner-occupied homes, with the levels varying from a few thousand dollars to unlimited amounts in five states, including Texas and

[11] See Dobbie and Song (2015) for a more detailed description of this issue.

[12] Table A4 in the Appendix shows that in the post-BACPA period, the demand effect no longer dominates the supply contraction

Florida, plus the federal district Washington DC.[13] From here on, we refer to this exemption level as the level of protection. Under Chapter 7, debtors must use their nonprotected assets to repay creditors, but they are not obliged to use any of their future income to make repayments.

One relevant question for our analysis is the extent to which borrowers are aware of current state bankruptcy exemption levels. This question should be similarly relevant throughout the large literature that studies the effects of protection levels on borrowing, repayment, homeownership, entrepreneurial activity, bankruptcy filing, and postbankruptcy recovery.[14] Moreover, the question of borrowers' awareness of protection levels may be more pertinent to studies of borrowing, business startups, and home purchase behavior than to studies of filing decisions, as the proximity of bankruptcy filing may incentivize policy awareness. In our context, we take protection awareness as an empirical question. Evidence of an increase in borrowing accompanying increased protection acts as a joint test, suggesting that borrowers are both responsive to and aware of protection levels. The empirical methods that follow, among other objectives, seek to identify any existing heterogeneity in responsiveness to bankruptcy protection by income and homeownership. To the extent that low-income homeowners experience higher default risk, they may be more aware of the prevailing local bankruptcy policy and may, therefore, demonstrate greater responsiveness to it.[15]

Under the alternative procedure in Chapter 13, debtors are not obliged to repay from their assets, but they must use part of their postbankruptcy income to make repayments. Before 2005, there was no predetermined income exemption, and borrowers who filed under Chapter 13 proposed their own repayment plans. They often proposed to repay an amount equal to the value of their nonprotected assets under Chapter 7. Also, borrowers were not allowed to repay less than the value of their nonprotected assets, and, since they always had the option to file under Chapter 7, they had no incentive to offer any more. Judges did not need the approval of creditors to approve repayment plans.[16]

The punishment for bankruptcy included making debtors' names public and flagging the bankruptcy filing on their credit records for 10 years for Chapter 7. In contrast, Chapter 13 filers usually had their bankruptcy flag removed after seven years. Also, debtors were not allowed to file again under Chapter 7 for another six years (but they were allowed to file under Chapter 13 as often as every 6 months).[17]

[13] See Table 2 for summary statistics for the level of protection.

[14] This includes, for example, Indarte (2023), Gropp, Scholz, and White (1997), Berger, Cerqueiro, and Penas (2011), Lin and White (2001), Hynes, Malani, and Posner (2004), Cerquiero and Penas (2011, 2017), Fan and White (2003), and Agarwal, Liu, and Mielnicki (2003), among others.

[15] We thank an anonymous reviewer for pointing out the importance of policy awareness in our context.

[16] Even when households file under Chapter 13, the amount that they are willing to repay is affected by Chapter 7 bankruptcy protection. For example, suppose that a household that is considering filing for bankruptcy has $40,000 in assets and is located in a state in which the protection level is $20,000. Since the household would have $20,000 of unprotected assets if filing under Chapter 7, it would be willing to repay no more than $20,000 (in present value) from future income if it were to file under Chapter 13. As a result of this close relationship between Chapter 7 and Chapter 13 bankruptcy filings, we assume that changes in Chapter 7 protection levels will affect household willingness to file for bankruptcy (either under Chapter 7 or Chapter 13).

[17] U.S. bankruptcy law allowed additional debt to be discharged under Chapter 13. Debtors' car loans could be discharged to the extent that the loan principal exceeded the market value of the car (negative equity). Also, debts

Overall, these features made U.S. bankruptcy law pro-debtor. Since debtors could choose between the procedures under Chapters 7 and 13, they could select the procedure that would maximize their gain from filing. Around three-quarters of all those filing for bankruptcy used Chapter 7 (Flynn and Bermant 2002). Most debtors who filed under Chapter 13 did so because their gains were higher using this procedure than under Chapter 7.

3 Data and Summary Statistics

3.1 Data description

To address the impact of changes in bankruptcy protection on household debt, we collect and combine different data sources. The three main data sources include a time series of states' level of protection under bankruptcy, a geographical distribution of household characteristics and debt, and interest rate data representing bank and credit union branches across the United States. In this section, we will describe these data sets in detail.

The level of protection or exemptions represents the dollar amount of equity that the debtor is entitled to protect in the event of bankruptcy. In other words, it represents the amount of home equity and other personal assets that are protected from seizure. The protection levels in our data were manually extracted and compiled from many sources, including, but not limited to, state bankruptcy codes and bankruptcy filing manuals.[18]

We obtained consumers' debt balances from the New York Fed Consumer Credit Panel / Equifax (CCP). This quarterly panel data set is a 1% anonymized random sample of individuals in the United States who have a credit history with Equifax and a social security number associated with their credit file.[19] Reported debt data include mortgage balances, home equity installment loans, and home equity lines of credit; auto loans, including loans from banks, savings and loan associations, credit unions, auto dealers, and auto financing companies; and credit card debt, including revolving accounts from banks, national credit companies, credit unions, and bankcard companies. It also includes detailed information on credit card accounts and individual delinquency status. The individual-level data offer a unique perspective on households'response to bankruptcy protection, as we are able to track the delinquency behavior of consumers from before to after the change in protection.[20]

acquired by fraud and cash advances obtained shortly before filing could be discharged under Chapter 13, but not under Chapter 7. These characteristics were known as the Chapter 13 "super discharge", and some households took advantage of the situation by filing first under Chapter 7, where most of their debts were discharged, and then converting their filings to Chapter 13, where they proposed a plan to repay part of the additional debt covered under Chapter 13. This two-step procedure, known as "Chapter 20", increased borrowers' financial gains from bankruptcy as opposed to filing under either procedure separately.

[18] Elias et al. (2005).

[19] The full CCP is a 5% random sample.

[20] See Lee and van der Klaauw (2010) for details of the sample design.

We obtain interest rates from RateWatch, a U.S. financial data vendor that has been recently integrated into S&P Global Market Intelligence. RateWatch provides historical rate and fee data from banks and credit unions across the country for a wide variety of banking products, such as CDs, checking, savings, money markets, promotional specials, auto loans, unsecured loans, and credit cards. They collect information at the branch level by survey and archive the information on a regular basis. For our purposes, interest rates for unsecured loans, credit cards, and mortgage loans are aggregated at the county level using branch-level rates for the last quarter of each year, matching the timing of our aggregate debt balances measure. We then use this measure of local interest rates from 2001 to 2005 to analyze the supply response to changes in personal bankruptcy protection.[21] Along with the CCP and RateWatch data, we rely on several standard sources of data on the local economic conditions prevailing in U.S. counties from 1999 to 2005. We draw on county and ZIP code-level income information from the Internal Revenue Service (IRS), measured as county per capita wages and salary; these data are available from 1999 to 2005. The house prices that we use in the estimation are Federal Housing Finance Agency (FHFA) House Price index (HPI) data at the state level. The FHFA House Price index is a weighted, repeat-sales index that measures average price changes in repeat sales or refinancing of the same properties. This information is obtained by reviewing repeat mortgage transactions on single-family properties whose mortgages have been purchased or securitized by Fannie Mae or Freddie Mac since January 1975. We use a similar index constructed at the ZIP code level by Zillow using public records for all available ZIP codes in the U.S. We use the FHFA state-level and Zillow ZIP code-level house price indices between 1999 and 2005.

County-based unemployment levels and unemployment rates were obtained using the Bureau of Labor Statistics Local Area estimates. Local Area Unemployment Statistics (LAUS) are available between 1976 and 2012 for approximately 7,300 areas that range from census regions and divisions to counties and county equivalents. We match the county equivalent data to the CCP data using Federal Information Processing Standard (FIPS) county unique identifiers.

In addition, we consider a variety of economic and social factors that could influence the evolution of bankruptcy legislation. Here, we turn to four additional data sources. First, we calculate state-level changes in total medical expenses using the National Health Expenditure Accounts provided by the Centers for Medicare and Medicaid Services. Second, we include state-level changes in GDP and personal income from the U.S. Bureau of Economic Analysis (BEA). Third, we draw on bankruptcy filing statistics at the state level from the Statistics Division of the Administrative Office of the U.S. Courts.[22] Finally, we measure the local political climate using the share of votes for the Democratic Party in the last House of Representatives election, which we obtain from the Clerk of the House of Representatives (CHR).

Turning to our analysis of self-employment and bankruptcy protection, we rely on Census statistics for evidence on the net creation of sole proprietorships. The measure that we use in our estimation

[21] The interest rate data provide good coverage from 2001 onward, that is, the period that defines our sample along this dimension.

[22] See http://www.uscourts.gov/Statistics/BankruptcyStatistics.aspx.

is the net number of new establishments at the two-digit NAICS level in the county for each year from 1999 to 2009. Next, to construct a measure of industries that use credit cards as a source of capital, we look to the Survey of Business Owners (SBO) Public Use Micro Data Sample (PUMS). The SBO PUMS was created using responses from the 2007 SBO and provides more detail than previously published SBO waves. The SBO PUMS is designed to study entrepreneurial activity by surveying a random sample of businesses selected from a list of all firms operating during 2007 with receipts of $1,000 or more provided by the IRS. The survey covers business characteristics, such as firm size, employer-paid benefits, minority and women ownership, access to capital, and firm age. For the purposes of this paper, we focus on one- to four-employee firms established in 2007, and we group the firms at the two-digit NAICS industry level, which is the finest level available in the SBO. The SBO fields a question to businesses on the "use of credit cards as startup capital." We classify each two-digit NAICS industry set of firms in our data set based on the average of its firms'responses about the extent of use of cards as startup capital.

3.2 Summary statistics

Table 1, panel A, reports descriptive statistics for our main estimation samples; the samples span from 1999 to 2005. The estimation samples are a 1% representative sample of the U.S. population of 22,366,347 observations and a sample that focuses on low-income ZIP codes, defined as ZIP codes with below median income, and homeowners, defined as individuals with a mortgage, with 1,217,096 observations. The county border sample restricts the previous samples by only considering counties that are on the states' borders and have neighboring counties with similar levels of income.

[INSERT TABLE 1]

The average credit card debt in these samples ranges between $5,656 and $6,853. Mortgage debt ranges between $56,129 and $102,710, and auto loans between $4,911 and $7,820, depending on the sample. The samples that focus on low-income homeowners show a higher amount of debt overall, reflecting the homeownership sample criterion and, in combination with lower income, possibly indicative of higher financial constraints. Credit card delinquencies are, on average, 10.8%, an order of magnitude larger than mortgage and auto delinquencies during this period. Households in our samples hold an average of 3.1 to 3.4 credit cards and have a credit card utilization rate between 50% and 60%. The share of each sample who have a new bankruptcy flag ranges from 0.28% to 0.39%, and foreclosures range from 0.08% to 0.33%; these relatively low distress rates reflect the fact that our experiment examines the period before the 2008 financial crisis and the subsequent spike in distress for households.

Table 1, panel B, reports mean interest rates in unsecured lending are close to 12.3%, whereas credit card rates are 12.7%. The average mortgage interest rates observed during our sample period range from 5.7% for 3-year ARM mortgages to 6.6% for 30-year fixed mortgages.

[INSERT TABLE 2]

Table 2 describes the exemption levels and changes from 1999 to 2005. Bankruptcy exemption changes are quite common within our sample period. From 1999 to 2005, 37 changes occurred within 26 states. The average level of protection was around $73,000, and the median was $55,800, with most of the total protection amount due to the homestead exemption (protection of homeowners' equity). The average change in protection brought about by an individual law change was close to $40,000, with a median change of $15,400, which implies a mean change in protection around 53% during our sample period. Some changes were very small and attributable to inflation adjustments, whereas other changes were substantial. Figure 2 maps the geographical dispersion in these changes. We observe states with changed and unchanged bankruptcy protection levels in each of the nine census divisions of the country.

[INSERT FIGURE 2]

4 Empirical Hypotheses and Predictions

Changes in the level of asset protection in bankruptcy affect the credit market equilibrium through demand and supply. To guide our empirical analysis, we review the different dimensions along which increases in asset protection can affect the supply and demand of credit, and we consider the implications that these effects have for our empirical exercise.

Collateral channel. If markets are incomplete, the possibility of pledging collateral enhances agents' debt capacity, as collateral gives the lender the option to repossess assets ex post, reducing the risk of borrowers, and easing borrowers' access to finance ex ante (Hart and Moore 1994). In our case, the increase in protection diminishes the collateral value of assets by decreasing the availability of assets for seizure by lenders. As a result, supplying credit becomes less attractive to lenders and borrowers' access to credit is reduced.

Insurance channel. In the presence of incomplete markets, increased protection also makes borrowing more attractive for risk-averse agents by improving risk sharing.[23] The ability to retain a greater portion of assets in the bad state of the world under higher protection incentivizes risk-averse agents to leverage themselves, thereby increasing the demand for credit.

Moral hazard channel. An increase in the level of protection might also incentivize borrowers to undertake riskier projects or overborrow, thereby increasing the demand for credit. Moreover, the ability of lenders to distinguish among borrower types defines the supply response. Following Stiglitz and Weiss (1981), we posit that lenders' profit functions could set an upper limit on the increase in interest rates, leading to a decrease in the quantity of lending due to the increase in

[23] Incomplete markets in our context imply that state-contingent contracts are not available.

borrower risk. Hence, moral hazard increases the demand for credit and, in most cases, will reduce the supply of credit.

Adverse selection channel. If the level of protection increases, more strategic defaulters with private information about their future income or propensity to default could participate in the markets. Strategic defaulters could aim to profit from the new borrowing conditions and thereby increase both the demand for credit and the riskiness of the pool of borrowers. On the lender side, to the extent that interest rate increases stand to drive away less risky borrowers, lenders may react not by raising rates but by tightening underwriting standards. Again, the equilibrium response will be shaped by lenders' ability to screen new borrowers.

Therefore, theoretical predictions about the effect of a protection increase on the equilibrium quantity of lending are ambiguous; the net effect will depend on the relative magnitudes of the supply and demand responses.[24] Interest rates must rise (weakly) in equilibrium, independent of the prevailing force. If the supply effect dominates, quantities will fall, but if the demand effect dominates, quantities will rise. We attempt to distinguish between these channels empirically.

[INSERT FIGURE 3]

Asymmetric information has implications for both demand- and supply-driven equilibria. It affects borrowers' demand and also increases their riskiness, impacting the supply response. Lenders may ration credit due to asymmetric information, reducing total borrowing, or overestimate borrower quality, increasing available credit. Consequently, the equilibrium in the presence of asymmetric information is determined by the combined effects of asymmetric information on credit supply and demand.

Additionally, while asymmetric information frictions are significant, the insurance channel alone can generate a demand-driven equilibrium without such frictions. In Appendix A, we present a model without asymmetric information that demonstrates a demand-driven equilibrium, highlighting that moral hazard and adverse selection are not necessary for it. The model features a risk-averse, financially constrained borrower, a risk-neutral lender, stochastic income, and exogenous home equity. Only debt contracts are available, and in case of default, the lender can seize assets up to the exemption level. Borrowing is essential for consumption in period 1, and the interest rate is set for the bank to break even. Increased bankruptcy protection makes defaulting more attractive to borrowers, leading lenders to charge higher interest rates to break even. The results of the model demonstrate that the insurance channel could lead the demand side to dominate the overall credit market response to increased bankruptcy protection and hence to an increase in borrowing in equilibrium.[25]

[24] Figure 3 illustrates the possible outcomes in a simple demand and supply graph.

[25] However, as mentioned earlier, any insurance channel effect may possibly be masked by an information asymmetry impact on the supply or demand of credit.

4.1 Empirical predictions

First, *if the demand effect dominates*, we should see quantities and prices increase. Furthermore, we hypothesize that the increase in prices should be stronger for low-income borrowers, as the increase in risk sharing (insurance channel) will be more important for borrowers who face a greater risk of default.

The estimated effect of bankruptcy protection on borrowing should be stronger for homeowners, as the changes in asset protection implemented by many states largely pertain to home equity (see Table 2). In addition, we should see a stronger effect on unsecured debt and a weaker or no effect on secured debt, as the bankruptcy code only discharges unsecured debt.

Looking to repayment, if agency problems are an important driver of the increase in demand, we would expect to see a significant effect on ex-post default, arguably driven by individuals who overborrowed ex-ante or invested in riskier projects.

Second, *if the supply effect dominates*, we should see an increase in interest rates and a decrease in the quantity borrowed. The rise in prices should be higher in places where the riskiness of the pool of borrowers or the ex ante probability of defaults increases more. The price and quantity effects should also be stronger where the fundamental value of the ability to pledge assets is higher. Further, the quantity effect should be stronger when lenders have less information about their borrowers, as credit markets are more affected by adverse selection.

5 Empirical Strategy and Main Results

Empirically identifying the actual effect of bankruptcy protection levels on household leverage is challenging, as these levels are correlated with observable and unobservable borrower and lender characteristics, which might simultaneously affect credit availability and the level of protection. For example, states with higher protection levels may be states in which households are less financially savvy and, as a result, are more willing to take on debt; this would lead to a positive correlation between debt and protection. Alternatively, if the level of protection is correlated with a broadly consumer- and worker-friendly state policy environment, then consumers may enjoy greater income and potentially take on less debt, a situation that would lead to a negative correlation between debt and protection levels.

In this paper, we exploit plausibly exogenous variation in state-level bankruptcy protection dollar amounts to identify the effect of this protection on household debt. We use different timing in the changes in exemption levels by state to identify the effect of exemptions on household leverage. Our identification benefits from frequent and irregular law changes: a total of 37 changes in exemptions affected 26 states between 1999 and 2005.

We propose the following baseline specification:

$$Debt_{izt} = \alpha_i + \alpha_t + \alpha_z + \beta_P \; Protection_{st} + \Gamma \; X_{zt} + \varepsilon_{izt} \quad (1)$$

where $Debt_{it}$ is the logarithm of credit card debt, mortgage debt, or auto loan debt in individual i in ZIP code z and year-quarter t. $Protection_{st}$ represents the logarithm of the level of Chapter 7 protection (homestead plus personal) in state s and year-quarter t. α_i is an individual fixed effect, α_t a year-quarter fixed effect, and α_z is the ZIP code fixed effect. X_{zt} represents a vector of ZIP code- and county-level controls, including the county's unemployment rate, average log house price, and average log income in a ZIP code in year-quarter t.

Changes in protection vary at the state level, but debt balances and interest rates are observed at the individual level. Hence, the error term in Equation (1) has a potentially time-varying state component. Following Bertrand, Duflo, and Mullainathan (2004), the residuals are clustered by state. This allows for complete flexibility in the variance-covariance matrix of residuals for each state. It is also more general than state-year clustering, leaving the possibility of serial correlation in the error term intact.

The coefficient β_P represents the percentage change in debt as the level of protection increases by 1%. Additionally, the use of the continuous amount of protection, that is, the intensity of the treatment, ensures that the main estimate is more responsive to larger changes in the level of protection.

The two identifying assumptions that allow for a casual interpretation of the coefficient are: (1) After controlling for observed time-varying characteristics and time-invariant ZIP code and individual characteristics, changes in a state's level of protection will only affect the household debt in the state that adopted the change. Thus, the only determinant of the (conditional) difference in household debt across states is the quasi-exogenous difference in the level of protection. (2) The timing of changes in the level of protection is uncorrelated with unaccounted determinants of household leverage.

We assess the first identifying assumption directly controlling for local economic conditions (local house prices, income, and unemployment) that could produce spurious effects due to geographical heterogeneity correlated with changes in the level of protection. As an additional analysis, we use border county comparisons in an effort to account for the possibility of residual, time-varying, unobserved local factors that correlate with protection and debt; this comes at the cost of a reduced sample. We compare neighboring county pairs across state borders using the following empirical specification:[26]

$$Debt_{izpt} = \alpha_i + \alpha_{pt} + \alpha_z + \beta_P \; Protection_{st} + \Gamma \; X_{zt} + \varepsilon_{izpt} \quad (2)$$

[26] This methodology is similar to that of Heider and Ljungqvist (2015) and Dube, Lester, and Reich (2010).

where $Debt_{ipt}$ is the logarithm of credit card, mortgage, or auto loan debt in individual i, the border county pair p, and year-quarter t. $Protection_{st}$ represents the logarithm of the level of Chapter 7 protection (homestead plus personal) in state s in year-quarter t. α_i is an individual fixed effect, α_z is a ZIP code fixed effect, and, more importantly, α_{pt} is a dummy for each neighboring county pair for each year-quarter. Note that the variables for individual i may be repeated for all pairs of which they are part. In this setup, our β_P estimate is identified using only debt variation within each neighboring county pair across state borders. Our modified identifying assumption for this case implies that changes in protection are uncorrelated with residual ε_{ipt} after controlling for observable characteristics, individual and ZIP code fixed effects, and county pair by year-quarter fixed effects.

Guided by our empirical predictions, we also focus on the effect of protection on debt by income level and homeownership status. The idea is that by focusing on low-income areas and homeowners, we are isolating a sample of households that are more likely to be affected by the increase in protection.

To further examine the validity of our identifying assumptions, we estimate specifications (1) and (2) with secured and unsecured debt outcomes. An alternative hypothesis that could explain our results is the existence of state-specific credit market trends correlated with the protection changes. For example, areas in which the level of protection increased are possibly areas experiencing a general expansion of consumer credit, resulting from any number of conditions that encourage either lending or consumer spending. To meaningfully differentiate the causal impact of protection, we rely on personal bankruptcy laws allowing households to default on unsecured debt only, which implies that changes in personal bankruptcy laws will directly affect only unsecured debt.

[INSERT TABLE 3]

In Table 3, panel A, we report estimates based on specification (1) in columns 1 and 2 and specification (2) in columns 3 and 4. As above, specification (1) represents estimates in the pooled sample of counties, and specification (2) narrows the estimation sample to neighboring counties across state borders. We estimate the model first in the full sample and then separately among only homeowners within low-income ZIP codes.We define low-income areas as ZIP codes whose mean incomes are below the median of ZIP code mean incomes countrywide. Consistent with our first empirical prediction for the case in which the demand effect of bankruptcy protection dominates, we find a statistically significant and economically large effect of an increase in bankruptcy protection levels on household credit card balances among homeowners located in low-income ZIP codes between 1999 and 2005 (Table 3, leftmost panel), and yet a precisely estimated near-zero effect for the broader sample of consumers. This is true in the full set of counties and also when we restrict to county pairs across state borders.

Our point estimate for the full set of counties indicates an insignificant relationship between protection changes and credit card balance. However, when looking at the subsample of homeowners in low-income areas, we find that a 1% increase in protection is associated with a 0.043% increase in credit card debt. This estimate is significant at the 5% level. We repeat this series of estimates in

our sample of neighboring counties across state borders (Table 3, panel A, columns 3 and 4). Here, we find that a 1% increase in bankruptcy protection is associated with a 0.147% increase in credit card debt among homeowners in low-income areas.[27] To the extent that the identifying assumptions applying to our pooled county sample and our neighboring county sample are satisfied, we interpret the coefficients in columns 1–2 and 3–4 as causal.[28]

Importantly, Table 3, panel A, shows the protection effect on debt appears only for homeowners in low-income counties. It is expected that lower-income areas may be more affected by increases in bankruptcy protection, as the impact of the improvement in risk sharing may be more substantial for lower-income borrowers, to the extent that they face a greater risk of bankruptcy. Furthermore, low-income homeowner households should be more affected by the changes in protection levels than nonhomeowners, as a sizable proportion of states' bankruptcy protection levels and changes come from their homestead exemptions. Therefore, while we do not estimate a meaningful effect of bankruptcy protection on debt for the representative sample of consumers, we do observe one for the subset of consumers that we predicted to be most likely to be affected by the protection reforms. We believe that the nature of the effect interacted with the sample where it occurs reinforces our causal interpretation of the results.

Table 3, panels B and C, reports the same series of specifications for mortgage and auto debt. These secured debts are not directly affected by the change in bankruptcy protection, though they may be subject to protection effects through several indirect channels. We find in Table 3, panel B, that the increase in protection has no significant effect on mortgage debt in either the full sample or the low-income homeowner sample. The point estimates arising from the low-income homeowner sample estimation are -0.009 (insignificant) for the low-income homeowner and -0.021 (insignificant) for low-income homeowner in the county border sample. The magnitudes of the coefficients for protection growth arising from the estimation are substantially smaller, and we can rule out that the estimates for credit cards are statistically the same as those for mortgage debt in our focal sample of low-income homeowners in the county border sample.

Moreover, columns 2 and 4 of Table 3, panel C, show that, for homeowners in low-income areas, the increase in protection has no significant effect on the amount of auto debt that individuals hold in equilibrium. The point estimates are –0.002 (insignificant) for the whole set of counties in low-income areas and 0.011 (insignificant) when restricted to the county border sample. An exception is the coefficient in panel C, column 1, which shows a modest 0.021 but significant and positive relationship between the level of protection and auto debt for the full sample. Controlling for time-varying local economic conditions using time-varying county border pair effects removes the

[27] These coefficients are significant at the 1% level. Note that the magnitude of the estimated protection effect increases substantially with the move to the border county sample.

[28] Our focus on the 1999–2005 period allows us to understand how changes in protection affect household debt when the cost of filing for bankruptcy is low. Following the 2005 BAPCPA reform, filing costs increased substantially. If the cost of filing for bankruptcy increases enough, as shown in the model, effective protection is limited, decreasing the ex-ante value of borrowing today. Considering the evidence that household bankruptcy filings are highly sensitive to liquidity constraints (Gross, Notowidigdo, and Wang 2014), we should expect the debt response to protection to be weaker or nonexistent in the high-cost filing regime. Table A4 provides evidence consistent with this interpretation.

significant association between protection and auto debt. The coefficient on protection in column 3, reflecting the border county estimates for the full set of consumers, is small in magnitude and insignificant.

Overall, our Table 3 estimates indicate that the effect of protection on credit card debt is significant and sizable for homeowners in low-income areas. Further, the effect of protection on mortgage and auto (secured) debt is insignificant, and smaller in magnitude, than the effect of protection on card debt. By and large, these findings are inconsistent with the alternative explanation that our protection coefficients are driven by variations in state-specific debt market trends, or spending trends, that are correlated with the changes in protection and that confound our identified effect.[29]

Returning to our Section 4 empirical hypotheses, theory predicts, for the reasons enumerated in Section 4, that an increase in bankruptcy protection for borrowers will simultaneously lead to an expansion in the demand for credit and reduction in the supply of credit at any given interest rate. In equilibrium, this amounts to an ambiguous prediction from the theory regarding the level of unsecured borrowing. Our above results indicate a net zero effect of protection in the broader population of consumers, but that the demand effect dominates for the subpopulation of homeowners in low-income areas, who should indeed benefit most from increased (homestead) bankruptcy protections.

The unambiguous empirical prediction established in Section 4 is that equilibrium interest rates will rise in response to increased bankruptcy protection. Traditional credit registry data, like those used for most of the analysis in this paper, lack interest rate information. To overcome this data limitation, we employ a novel bank-branch-level dataset on the interest rates charged by lenders for different categories of credit. We use this dataset to test the unambiguous prediction from the theory that protection increases cause equilibrium interest rates on unsecured debt (and not secured debts) to rise.

Moreover, ruling out the possibility of an interest rate decrease associated with rising protection has the added value of ruling out a possible threat to the identification of our central unsecured borrowing result. A competing explanation for the estimated increase in unsecured borrowing with increased protection is that some unobserved third factor leads states' borrower protection to vary inversely with lending standards. If interest rates are positively affected by the level of protection, our estimated increase in unsecured borrowing is less likely to be driven by other unobserved factors that correlate with bankruptcy protection changes, such as a relaxation of lending standards in credit markets.

We return to specifications (1) and (2) to estimate the effect of changes in protection on interest rates. To do so, we replace the log debt with interest rates, not logged, for mortgages, personal unsecured loans, and credit cards. Our interest rate measures come from RateWatch. The interest

[29]The total population in the "all counties" sample is 203,899,056, while the corresponding figure for the "border counties" sample is 148,802,400. This yields a ratio of approximately 73%, closely mirroring the reduction in observations across categories in our sample.

rates for unsecured loans, credit cards, and mortgage loans are aggregated at the county level using branch-level rates for each year. Table 4 reports the results. The estimates indicate that a one-percentage-point increase in bankruptcy protection leads to a 0.853 (0.893) basis point increase in the interest rate for credit cards based on the full sample (neighboring counties sample). These point estimates are significant at the 1% and 5% level, respectively.

[INSERT TABLE 4]

Further, the estimates show a 0.731 (0.922) basis point increase in personal unsecured loan interest rates, significant at the 1% (5%) level. At the same time, bankruptcy protection is estimated to have a precise zero or very small negative effect on mortgage interest rates in the full and border county samples. (Table 4 Panel B)[30] The coefficients for bankruptcy protection in our mortgage interest rate specifications for 3- and 5-year ARMs and 15- and 30-year fixed-rate mortgages are close to zero, fairly precisely estimated, and, in most cases, insignificant. Point estimates range from a 0.037 basis point increase to a 0.135-basis-point decrease in mortgage sub-market rates. Only two cases generate significant mortgage interest rate responses to protection: the 3-year ARM rate is estimated to decrease by 0.135 basis points in the full sample, and the 15-year fixed rate is estimated to decrease by 0.084 basis points in the border-county sample. These small negative point estimates are each only marginally significant.

In sum, we find a significant positive response of both credit card and unsecured personal loan interest rates, in both the full and the border-county sample, to increased bankruptcy protection, and yet no evidence of a meaningful positive response of mortgage interest rates to increased bankruptcy protection. There is limited evidence of a relaxation of credit to a subset of mortgage markets in response to bankruptcy protection, suggesting the possibility of some negative correlation between the supply of credit to unsecured consumer lending and mortgage markets. Taken together, our results suggest a demand-driven unsecured credit market equilibrium response to increased bankruptcy protection, as we observe increases in both the quantity and the price of unsecured borrowing.

Our empirical strategy can only identify the causal effect of changes in protection on the market equilibrium. However, the distinct effects of changes in protection on quantities and prices allow us to assess the relative impact that the demand and supply reactions to bankruptcy protection changes have on equilibrium borrowing. We show in this paper that estimates of the effect of changes in the level of bankruptcy protection on credit between 1999 and 2005 are consistent with a credit market equilibrium in which the demand increase dominates any changes in supply. These findings stand in contrast with the findings of previous research, which studied earlier reforms using the more limited data sources available at the time and inferred a dominant supply response.

[30] There is no reliable coverage for auto loan rates during our sample period, so the analysis focuses on credit cards, personal unsecured loans, and different types of mortgages.

5.1 Robustness Analysis

To assess the second identifying assumption, we start by checking for any evidence of pre-trends. Changes in the level of protection could be correlated with state-specific preexisting trends that survive our controls, in which case our results would reflect differential trends between states that raise protection and others rather than the causal effect of changes in the level of protection on borrowing. For example, if those states that increased their protection level shared some common trends in state economic conditions in the years prior to the increase, then this factor would raise concerns about the exogeneity of the law change.

To study prior trends, as well as the progress of any effect of bankruptcy protection changes over the years following the change, we implement an event study design. We structure our estimation of the dynamic effect of bankruptcy protection following a modification of specifications (1) and (2)[31]. Specifically, we estimate the following baseline specification:

$$Debt_{izt} = \alpha_i + \alpha_t + \alpha_z + \sum_{\tau=-8}^{8} \beta_{P,\tau} \times Protection_s \times D_{s,t,\tau} + \Gamma\ X_{zt} + \varepsilon_{izt} \quad (3)$$

where $Debt_{it}$ is the logarithm of credit card debt, mortgage debt, or auto loan debt held by individual i in ZIP code z and year-quarter t. In this case, $Protection_s$ represents the log of the level of Chapter 7 protection (homestead plus personal) in state s in the first year-quarter that it increased or zero if the state s never increased the protection during our sample period. $D_{s,t,\tau}$ is an indicator equal to one when year quarter t is τ quarters away from an increase in the level of protection for state s. α_i is an individual fixed effect, α_t a year-quarter fixed effect and α_z a ZIP code fixed effect. X_{zt} represents a vector of ZIP code- and county-level controls, including the county's unemployment rate, average log house price, and average log income in year-quarter t. Therefore, the coefficient $\beta_{P,\tau}$ represents the percentage change in debt as the level of protection increases by 1% in event time τ, capturing the dynamic effect of the changes in the level of protection. Furthermore, we estimate specification (3) for the county border sample but replace the α_t in specification (3) with α_{pt}, a separate county neighbor pair effect for each year-quarter of our estimation window, to account for time-varying economic conditions.

[INSERT FIGURE 4]

The results are described in Figure 4, which looks at the dynamic effect of changes in protection accounting for the time until or since the protection reform for our focal sample of homeowners in low-income areas. Panel A of Figure 4 reports the event study results for credit card debt. The

[31] See Atanasov and Black (2016) on shock-based causal inference and the importance of visual portrayal of the estimated dynamic effects.

figure on the left represents the estimates for homeowners in low-income areas using all county samples. For homeowners in low-income areas, there is no evidence of a differential pre-trend between individuals in areas where the level of protection will change in the future and places where it will not change.[32] From time $t = 0$ forward, however, residents of areas in which the level of protection increases carry a significantly larger amount of credit card debt.[33] The credit card debt event study estimates for the analogous homeowners in low-income areas border county sample, depicted in the figure on the right, are similar but with larger point estimates of the credit card debt increase, which are significant in all treated periods.

The event study mortgage estimates, reported in panel B of Figure 4, are near zero and largely insignificant. Our dynamic estimation for homeowners in low-income areas in the all counties sample shows neither a pre-trend nor a clear pattern of increase (or decrease) in mortgage debt in response to the $t = 0$ increase in protection. Turning to the figure on the right in panel B, we find that the border county estimates of the mortgage debt response are similar, with the single exception being period $t = 8$, which shows a precisely estimated small increase in mortgage debt.

Next, we turn to the auto debt event study estimates, reported in panel C of Figure 4. We estimate both a significant negative pre-trend in auto debt and an ongoing significant decline in auto debt following the $t = 0$ change in bankruptcy protection. This pattern in the auto debt event study may raise concerns about a relationship between local economic conditions or borrower trends and the emergence of bankruptcy protection reforms. The border county approach is intended to account for confounding time-varying local factors, and indeed, the border county estimates, depicted on the right side of panel C, show no pre-trend and no significant or substantial decrease (or increase) in auto debt following the bankruptcy protection reform.[34]

Overall, we find little sign of a pre-trend in credit card debt and yet a gradual and significant increase in credit card debt following the protection reform among the affected group. We find no clear sign of a differential pre-trend in mortgage debt for those who will see protection increases and no clear sign of an increase (or decrease) in mortgage debt in response to a rise in bankruptcy protection. Finally, while estimates of the effect of rising protection on auto debt in the counties sample suggest that residents of protection reform states are on a distinct downward trajectory in auto debt throughout the estimation window, this downward trajectory is removed entirely when we bring in border county comparisons to account for time-varying local conditions. With border counties, we estimate no response of either mortgage or auto debt to the period $t = 0$ bankruptcy protection reform. Where unsecured credit card debt is estimated to increase in response to a bankruptcy protection reform, the secured debts, which we do not expect to respond to protection since they cannot be expunged in bankruptcy, show no response to protection once we have accounted fully for time-varying local factors.

[32] The single exception is the estimate for period $t = -3$, which is significant, modest, and negative, hence the only suggestion of a pre-trend that appears in these results works against our baseline and event study treatment estimates.

[33] In $t = 7$ and 8 in the all counties sample, the increase is only marginally significant.

[34] The single exception to this claim is a small negative estimate for period $t = -5$ that approaches significance at the 5% level.

We replicate the dynamic estimation for interest rates for all available counties following the methodology described in (3) but estimated at the year frequency due to data limitations. The left-hand columns in Figure 5, panel A, B, and C, show the dynamic effects of changes in the level of protection on credit cards, personal unsecured loans, and various types of mortgage interest rates. The estimated dynamic effects show that an increase in the level of protection leads to a differential increase in the level of interest rates in reform and postreform periods $t = 0$ and $t = 1$. As in Table 4, this effect is economically meaningful only for credit card and unsecured personal loan rates. The four mortgage loan categories show small and insignificant estimated movements both before and after the protection increase.[35] Right-hand columns in Figure 5, panels A, B, and C, replicate the previous estimates using the sample of neighboring counties across state borders. Although noisier than the previous estimates, the conclusion is similar: there is no evidence that the increase in the level of debt is correlated with a contemporaneous decrease in interest rates. On the contrary, the point estimates in the border county sample reflect a moderate increase in interest rates for credit cards and unsecured personal loans following the protection increase. The border county estimates are imprecise, however, and we are unable to claim a significant increase in interest rates on the unsecured debts based on this sample.

[INSERT FIGURE 5]

The increase in equilibrium credit card borrowing alongside increased interest rates that we estimate requires consumers to respond to bankruptcy protection in a manner that outpaces their response to lenders' pricing.[36] This may arise through a combination of (a) the salience of the bankruptcy protection regime, particularly in communities experiencing greater prevalence of repayment struggles and bankruptcy, and (b) lower income borrowers' more limited responsiveness to credit card interest rates. Regarding (a), the salience of the bankruptcy protection regime is a question common to a decades-long bankruptcy reform literature, including Gropp, Scholz, and White (1997), Berger, Cerqueiro, and Penas (2011), Lin and White (2001), and Hynes, Malani, and Posner (2004). Indarte (2023) estimates a precise response of bankruptcy filing around the homestead protection cap, using a regression discontinuity kink method. This suggests some awareness of the homestead exemption cap among homeowners at risk of bankruptcy, which is a group that is relevant to our sample. Ultimately we take the borrowers' awareness of bankruptcy protections to be an empirical question: if borrowers are unaware, then we (and the above researchers) will estimate a zero response of borrowing and repayment behavior to bankruptcy protection.

Regarding (b), various estimates of the interest rate elasticity of the demand for credit card borrowing are available to us from this period and preceding years. Hall (1988) describes an earlier consensus that consumers' interest rate elasticity of demand for credit was near zero. Gross and Souleles (2002a) demonstrate a meaningful elasticity of credit card borrowing to interest rates of

[35] An exception is the post-period behavior of ARM interest rates in border county estimates, which might reflect some substitution in demand away from ARM mortgage debt to credit card and other unsecured debt, as they become more attractive with bankruptcy protection increase.

[36] We thank an anonymous reviewer for this insight.

–1.3, but they estimate the response of borrowing from a single lender to that lender's price, and much of their estimated elasticity arises from substitution across lenders in the credit card market. Perhaps most importantly for us, Grodzicki et al. (2023) demonstrate lower interest rate responsiveness among subprime borrowers, and Gross and Souleles find that consumers near their credit limits are less sensitive to interest rates, and consumers are less sensitive to interest rate increases than to interest rate decreases. Both of these elements go in the direction of decreasing interest rate responsiveness in our particular application. Somewhat more recently, Briglevics and Schuh (2014) find that demand for borrowing among credit card borrowers who revolve balances (rather than pay them off with each billing cycle) is inelastic to interest rates. We infer from the pool of prior research that limited sensitivity to credit card interest rates is plausible for our low-income homeowner population.

Having examined states' pre-reform trends, we turn next to the observable determinants of states' changes in bankruptcy protection. Various observable and unobservable factors could drive joint increases in debt and protection. However, to be problematic for our causal interpretation of the above estimates of the protection-debt relationship, such factors would need to affect only unsecured debt and leave secured debt unchanged. To address this concern, we analyze the relationship between the level of protection and lagged levels of possible determinants of protection using a simple linear regression framework and clustering errors at the state level. Table 5, panel A, shows that the level of protection is meaningfully correlated with housing prices, state GDP, political climate, and bankruptcy filing rates. This is consistent with other evidence that cross-sectional variation in the level of protection is a state-specific characteristic and reflects persistent characteristics of the state's economic and social climate.

[INSERT TABLE 5]

Columns 3 and 4 of Table 5, panel A, look at how changes in the level of exemptions correlate with changes in the above determinants, again using an ordinary least squares (OLS) framework and clustering standard errors at the state level. Columns 5 and 6 report estimates from a linear probability model of the likelihood of a protection change. In both cases, in contrast to the estimates for the protection level, lagged changes in the candidate determinants have substantially smaller and largely insignificant associations with changes in the level of protection. Medical expense growth is the single determinant with notable relationships to the protection growth amounts. These relationships are accounted for in our baseline empirical specifications, expressions (1) and (2) above, through time-varying controls at the ZIP code level, as well as through time-varying local economic conditions fixed effects in the specification (2). Other potential determinants, including changes in states' house price growth, unemployment, real GDP, bankruptcy filings, political climate, and personal income, display little or no relationship to protection growth or the protection change indicator. Furthermore, the F-test of joint significance for most specifications (columns 1,3, 4, and 6) cannot reject that the coefficients are jointly statistically different from zero. It is important to note that given our main log-log specifications, which include ZIP code and individual fixed effect,

to capture the effect of the percentage change in protection, the most relevant columns in Table 5 are columns 3-4, as they more closely resemble the variation used in our estimates. Reassuringly, our F-test associated with columns 3-4 shows no evidence that the timing of the changes can be predicted by observable state variables.

Furthermore, we investigate the possibility of a contemporaneous correlation between protection changes and changes in potential drivers of bankruptcy reform at the state level. Table 5, panel B, reports estimates from a linear regression of bankruptcy protection changes on contemporaneous changes in several potentially relevant factors. The estimates show no significant or substantial correlation between bankruptcy protection changes and contemporaneous changes in the number of bankruptcy filings, political climate, house price indices, or other potential determinants of changes in exemptions.

Finally, we replicate our main findings using a set of alternative specifications. Table A1 in the Appendix replicates specifications (1) and (2) for credit cards, mortgages, and auto loans using several alternative specifications. Columns 1 and 7 restrict the sample to eventually treated states. Columns 2 and 8 replace the time-varying intensity of treatment with a first-treatment measure that is equal to zero if the state did not change its level of exemption and otherwise is equal to the amount of the exemption the first time that it increases. Columns 3 and 9 replace the continuous protection treatment with an indicator for protection change. Columns 4 and 10 restrict the sample to states that were treated only once during our sample period. Columns 5 and 11 control for unemployment insurance changes. Columns 6 and 12 replace the full protection level treatment measure with only the homestead exemption value. Our main findings are not sensitive to these specifications and measurement modifications. The estimates for credit card debt are always significant, and their magnitude is consistent with the main estimates reported in Table 3. Furthermore, all estimates but one for mortgage and auto debt are statistically insignificant and small in magnitude. The consistency and significance of all estimates across all these specifications reinforce a causal interpretation of our central estimates in Table 3.

Table A2 in the appendix reports the results of 12 analogous re-specifications of expressions (1) and (2) for the case of interest rates. Interest rate responses to protection estimated using these various modified approaches also remain similar to our baseline estimates (this time in Table 4). Panel A documents a positive effect of protection increases on unsecured credit interest rates across same six varied specifications and measurement changes, and panels B and C show largely negligible results for mortgage rates. These estimates demonstrate the robustness of our central interest rate results to a long list of sensitivity investigations.

5.2 Magnitudes of the effects and related heterogeneity analysis

A remaining question is whether the net response of unsecured credit to the state-by-state bankruptcy protection reform of the 2000s is of economically meaningful magnitude. In this subsection, we infer the magnitude of the response of credit card debt and credit card interest rates to the realized

bankruptcy protection changes that took place over our 1999 to 2005 sample period. We calculate a conservative mean increase in the level of protection during our sample period of approximately 53% for both the full sample of low-income counties and the low-income border counties. Recall that the low-income areas homeowners' estimated elasticities for these two samples are 0.043 (Table 3, column 2) and 0.147 (Table 3, column 4), respectively. For our average homeowners in low-income areas, the mean increase in exemption leads to an increase in credit card debt of $156 (all counties) or $534 (border counties) in response to a realized increase in exemption protection of 53%. This magnitude represents the average treatment effect for low-income homeowners.[37]

To put these magnitudes in context, in the 2013 wave of the Federal Reserve Survey of Household Economics and Decision-making, 50% of U.S. household respondents reported that they could not cover a $400 emergency expense using cash or its equivalent.[38] Therefore, our main credit card debt response is of a magnitude that is similar to an amount of cash that can meaningfully impact the balance sheets of half of U.S. households. We interpret the estimates to be positive, precise, and modest, yet economically significant. Furthermore, they may be particularly meaningful for our population of low-income homeowners.

5.2.1 Heterogeneity analysis by debt-to-income ratio and credit card utilization, and survey evidence

It is possible that only a minority of households are actively aware of bankruptcy protection levels, and therefore that the modest estimated response of credit card borrowing to bankruptcy protection arises from a combination of non-response among the majority of low-income homeowners and pronounced responses from the minority of low-income homeowners who have reason to track bankruptcy protection levels. We investigate this possibility using heterogeneity analysis of our existing estimates and the results of a new simple survey.

One might expect homeowners who are supporting heavy debt burdens to be more aware of their protections in the event of bankruptcy. To examine the role of unsustainable debt, we split the sample into those with above-median debt-to-income (DTI) ratios and below-median DTI ratios.[39] Estimates are reported in Table 6. We find that the estimated increase in card debt in response to protection is indeed driven by the high-DTI homeowners, with an estimated elasticity of positive 0.054 (0.201 for the border counties sample), significant at the one percent level. In contrast, the estimated elasticity for low-DTI homeowners is negative and insignificant (negative and significant at the ten percent level for border counties).

[37] These estimates use the average balances for low-income homeowners reported in Table 2, which are $6,853 for low-income homeowners and $6,856 for low-income homeowners in the neighboring counties sample.

[38] See Chen (2019), among others.

[39] Note that we use median DTI and median utilization measures drawn from the full CCP 1% sample to create subgroups of our low-income homeowners in the analysis in this subsection. Our intention is to define high and low debt burden and more and less available pre-existing credit lines from a population perspective. We chose this as a conservative approach, lest the reader be misled by the particularly high median DTI level among low-income homeowners.

[INSERT TABLE 6]

In addition, we suspect that borrowers with room on existing credit lines would have more scope for responding to an increase in protection by borrowing more. To examine this second hypothesis, we further break the high-DTI homeowner subsample into those with higher and lower credit card utilization.[40] Also in Table 6, we find that homeowners with both high DTI and low credit card utilization are indeed most responsive to bankruptcy protection changes. Their estimated elasticity of credit card borrowing with respect to bankruptcy protection is 0.114, significant at the one percent level (0.291 in the border counties sample).

This implies an increase in credit card debt of 7.7% in the all counties sample, or 15% in the border counties sample, in response to the observed 53% increase in bankruptcy protection over our estimation period. In dollar terms, the high DTI, low utilization subgroup of our low-income homeowners are estimated to have increased their credit card debt by between $414 (all counties) and $1057 (border counties) in response to the 53% increase in bankruptcy protection from 1999-2005. As we move from all low-income homeowners to those with burdensome debt and available credit, we see the response of credit card borrowing to bankruptcy protection move from modest but precise estimates to more economically meaningful responses, in line with the noted possibility that our modest full-sample responses reflect the choices of a disinterested majority and an interested minority.[41]

This perspective is supported by the findings of a simple survey on consumer awareness of bankruptcy provisions that we fielded in 2024. Survey details appear in Appendix B. In an online survey of 2,187 consumers, characterized by widely varying income levels and with ample representation of both homeowners and non-homeowners, we show in Table A5 that one-third of respondents claim familiarity with consumer bankruptcy regulations, and 11.7% have filed for bankruptcy. Moreover, we document in Table A5 Panel B that familiarity and past experience with bankruptcy are closely associated with the ability to answer simple questions of fact regarding the state bankruptcy protections covering the respondent. Extrapolation from the 2024 online survey to our 1999-2005 policy reform window must be done with caution. However, to the extent that one-third or less of our CCP estimation sample members are aware of (changing) bankruptcy law, we may expect, as inferred based on the above heterogeneity analysis, that our modest estimated full-sample responses to increasing bankruptcy protection represent non-response from the majority and more economically meaningful responses among the aware minority of fileholders.

5.2.2 Magnitudes of the interest rate estimates

Consistent with an increase in demand greater than the contraction in credit supply, our credit card interest rate estimates imply an increase in rates in the range of 0.45 to 0.47 basis points in

[40] Again, we rely on the full CCP sample median utilization to split the sample. In addition, we place the small minority of homeowners without any credit card account in the high utilization subgroup.

[41] We thank the reviewer and editor for this insight.

response to the mean increase in bankruptcy protection levels over our sample period. As a basis of comparison, the average credit card interest rate in our data is 12.7%.

We used the model in Appendix A, along with sample descriptive statistics and estimates drawn from Tables 1, 4, 7, and 8 to compare the lender's expected increase in losses from greater bankruptcy protection with the rise in equilibrium interest rates, aiming to understand the overall impact of the changes.

Consider a borrower with an average credit card debt of $6,586, benefiting from $73,625 in protection. Assume that, in the event of bankruptcy, the borrower's assets are less than their total obligation plus protection (a common bankruptcy scenario). In this case, they will be required to repay only $H - P$. Now imagine that the level of bankruptcy protection increases by one percent, to $74,361. The lender's expected cost increase depends on the incremental loss given default, the default probability, and the distribution of home equity. The specific functional forms and parameterization of the quantification exercise are explained in Appendix C. The calibration exercises show that a one percent rise in bankruptcy protection costs the lender between $0.54 and $0.68 annually. This protection increase raises the credit card interest rate by 0.853 basis points, leading to a $0.56 rise in annual interest payments on the average credit card debt.

By comparing the lender's expected loss of $0.54 to $0.68 to the revenue from interest rate adjustments, we see that our estimates admit the possibility that lenders are fairly compensated through increased interest for the reduced recovery rates that follow from greater bankruptcy protection. The higher end of the expected loss range suggests a potential profit decrease for lenders alongside a net benefit for consumers. Although theory indicates that the danger of consumer protection laws is that they could reduce lending and thereby damage consumer welfare, our analysis suggests that lenders were able to manage risks effectively, sustaining lending as reflected in this paper's findings on post-reform balances.

Overall, the calibration exercise described in Appendix C demonstrates that the estimated magnitude of interest rate increases may be reasonably interpreted as an appropriate response among lenders to their potential increase in risk.

5.3 Mechanisms, delinquency, and self-employment

Important questions remain to be addressed, including which households are expanding the amount of credit they hold, how they are doing so, and what their ex-post default probability may be. Using individual-level data to investigate the ex-ante and ex-post behavior of households, we replicate specifications (1) and (2). As mentioned above, we focus on homeowners in low-income areas, for whom we documented a significant increase in the level of debt in response to protection in Table 3.

[INSERT TABLE 7]

The movements in the quantity of unsecured borrowing and interest rates are consistent with a demand-driven response to increased bankruptcy protection. Therefore, we want to understand how this credit expansion occurs and its consequences. Focusing on the low-income homeowner sample, we explore delinquency behavior up to 8 quarters after the increase in credit card usage induced by the change in protection. Two years is a long timeframe relative to the typical credit card monthly billing cycle, providing ample opportunity for any consequent repayment difficulties to emerge. Table 7, panel A, shows no measurable increase in the rate of credit card delinquency 1 or 2 years after a protection increase, in either the sample of all homeowners in low-income counties or in the border counties sample. Overall, delinquency rates do not increase over the medium term.

Increases in credit card debt could lead delinquency to spill over onto other types of debt as well, even without an increase in credit card delinquency. To check for delinquency spillovers, we replicate the specification in Table 7, panel A, focusing first on mortgages (panel B) and then on auto loans (panel C). In the case of mortgages, as in the case of credit cards, we estimate a precise zero response of delinquency to protection over the 1-year and 2-year terms. However, the estimates do indicate a mild, precisely estimated increase in delinquencies on auto loans after one year, consistent with a slight increase in the debt burden of households that reacted to the increase in protection by expanding unsecured borrowing. The precision of the results disappears when estimated in the group of individuals in counties that share state borders.

The welfare implications of state bankruptcy reform and resulting borrowing changes differ depending on whether reforms increase the unsecured credit use of existing borrowers or bring new borrowers into unsecured debt markets. Our extensive, individual-level administrative data allow us to distinguish the intensive from the extensive margin response of equilibrium unsecured credit to bankruptcy protection changes between 1999 and 2005. Using detailed account information, Table 8, panel A, shows that changes in protection causally increase low-income homeowners' credit card utilization.[42] A one-percentage-point increase in bankruptcy protection leads to a 0.008 increase in credit card utilization. The effect is stronger among households in counties across state borders, with their credit utilization increasing by 0.016.[43]. Furthermore, we find that increases in the level of protection lead to a positive response in the number of credit cards; however, this is only significant in the county border sample.

[INSERT TABLE 8]

Finally, Table 8, panel A, columns 5 and 6 show how changes in protection relate to entry into the credit card market. Entry is defined as the time when a member of a household opens their first account or as the time when their credit card balance goes from zero to positive. We find insignificant, small, and precisely estimated coefficients for the growth in bankruptcy protection in

[42]Following industry practices, we define credit card utilization as the ratio of current outstanding credit card debt to total available credit in existing credit card accounts.

[43]Both of these point estimates are significant at the 5% level.

determining whether a borrower enters into the credit card market.[44] Together these results provide evidence that, in this sample, the effect of bankruptcy protection on consumer debt primarily arises from existing debtors expanding their current balance or their number of accounts rather than from new households entering the credit card market.

Financial distress can be captured through more than just delinquent credit balances. Table 8, panel B, reports the estimated impact of increased protection on new bankruptcy cases, new foreclosures, and accounts in collection. Point estimates are near zero and, in most cases, very precisely estimated. The results reinforce our finding that, despite an increase in credit balances, low-income homeowners do not consistently experience higher levels of financial distress and do not file more bankruptcy claims following a protection increase.

Recalling the Table 3 estimates, these findings suggest that homeowners expanded their existing debt balances *and* did so without a meaningful increase in financial distress ex-post. If households that are increasing their level of debt are overborrowing or taking on more risky projects, we would expect delinquency rates to increase. Although we cannot completely rule out overborrowing behavior, the results obtained for homeowners are more consistent with risk-averse borrowers increasing their debt holdings in response to the greater insurance provided by the increase in protection.

The individual results suggest that the demand effect is consistent with an impact from the insurance channel on existing borrowers, as we do not observe increases in either the entry rates of new borrowers or ex-post delinquencies. Banks may be reluctant to issue credit to new borrowers, but they appear to be providing credit to existing debtors, who, in equilibrium, react to the changes in protection. Although this discussion of the insurance effect of bankruptcy protection involves some speculation based on the estimates, it highlights the important potential benefits of increasing the level of bankruptcy protection, especially for borrowers on the lower end of the income distribution, for whom the insurance effect of bankruptcy protection can be substantial.

So far, this paper has described a range of financial behaviors in response to a gradual process of change in the financial regulations that the consumer lending market was exposed to. We remain interested in the extent to which these financial regulations and behaviors may have had real effects on the economy. With this objective in mind, we turn to the relationship of consumer bankruptcy protection to the rate at which consumers enter self-employment, with the caveat that our need to rely on county aggregates rather than individual-level data limits us to making suggestive correlational, rather than casual, claims.

[INSERT TABLE 9]

[44] We show in Table A7 that including fileholders with no initial credit card debt through the use of an inverse hyperbolic transformation or a log(y+1) transformation of the credit card debt outcome generates qualitatively similar results to those reported in Table 3. The transformed estimates show the combined effect of the expansion of protection for existing credit card borrowers and new entrants; they are of greater magnitude but somewhat reduced statistical significance.

The estimates reported in Table 9 reflect a return to our baseline debt specification, that is, specification (1). However, we now aggregate our data to the county level, and we replace the debt outcome with the change in the logarithm of the county's self-employment rate. Table 9 estimates indicate that low-income areas that experienced growth in bankruptcy protection also experienced an increase in self-employment creation. The increase in self-employment is only positively correlated with the changes in the level of protection in low-income regions; higher-income regions show a zero or slight negative relationship between protection growth and the growth in self-employment. Moreover, columns 3 and 4 show that the positive relationship between protection growth and the growth in self-employment is stronger when we focus on industries for which credit card debt is an important source of financing (e.g., construction or photography). These county-level estimates of the influence of bankruptcy protection on self-employment creation are suggestive of an effect of consumer bankruptcy regulation on productive activities in the real economy.

It is important, however, to point out that these findings constitute suggestive evidence only, and they demonstrate the need for further analysis of the 1999–2005 bankruptcy policy evolution at the level of the individual worker. Furthermore, we must consider caveats provided by the existing literature regarding the relationship between self-employment and business formation. For example, Bellon, Cookson, Heimer and Gilje (2021) demonstrate that the effects of wealth (and liquidity constraints) on self-employment and business formation are distinct, and that self-employment is less entrepreneurial. Additional evidence on the distinct work content and implications for job creation and growth of self-employment and business formation appears in Levine and Rubinstein (2017) and in Pugsley and Hurst (2011). Taking all this evidence together, the rise in credit card debt induced by the increase in the level of protection appears to have been associated with an increase in small business creation, at little or no cost in terms of the delinquency rate of unsecured borrowers.

6 Conclusion

This paper uses contemporary administrative data and panel methods, along with bankruptcy law movements across U.S. states between 1999 and 2005, to revisit the question of how consumer bankruptcy protection has influenced consumer lending markets and household behavior. We use Equifax credit report data on hundreds of thousands of U.S. consumers, drawn from the New York Fed's Consumer Credit Panel, to study the effect of protection changes on equilibrium borrowing. We find that the response of credit card borrowing to changes in protection is a moderate and significant increase in borrowing. Using similar methods, we find little or no response of mortgage and auto loan borrowing to protection changes. The estimated responsiveness of credit card debt to protection is concentrated among homeowners in ZIP codes characterized by lower incomes and is most pronounced for borrowers with high ex ante debt-to-income ratios and low ex ante credit card utilization.

Turning to the response of the price of credit, we aggregate branch-level information on interest rates

from RateWatch to the county level and estimate the influence of bankruptcy protection changes on interest rates for a variety of consumer loans. While interest rates on ARM and fixed-rate mortgages are largely unresponsive to changes in bankruptcy protection, we estimate positive, significant, and substantial responses of credit card and personal consumer loan interest rates to changes in bankruptcy protection. This evidence shows us that the response of borrowing to the protection treatment is concentrated in the loan types most directly affected by the relevant bankruptcy exemptions. The combination of positive price and quantity responses to protection increases in consumer lending markets suggests an equilibrium in which borrowers responded to the increased insurance created by increased protection by borrowing more, whereas lenders responded by reducing their willingness to lend at any given rate. Further, borrowers' response dominated in equilibrium.

Next, we track the repayment quality of their new borrowing in order to understand how reliant these borrowers were likely to be on their increased bankruptcy protection. We find significant and substantial increases in credit card utilization, defined as the balance amount over the credit limit in that account and the number of credit cards the consumers held. However, we observe no meaningful increase in the likelihood of a consumer entering the credit card market.

Credit card delinquency rates did not increase after the changes in bankruptcy protection. Nevertheless, we find a modest uptick in delinquency in auto loans among low-income homeowners following an increase in protection, suggesting that this group, which may be subject to higher default risk, experienced very modest spillover to auto loan delinquencies with an increase in unsecured borrowing. However, this small increase in auto loan delinquency among low-income homeowners did not manifest in subsequent new bankruptcies, foreclosures, or more accounts in collection. Therefore, the behavior of low-income homeowners in our estimation sample is consistent with a borrowing response to the insurance provided by increased bankruptcy protection among consumers who, by and large, continued to repay as they had before the law change.

Finally, we study the movement in self-employment creation along with changes in bankruptcy protection, and we find a positive and significant association between bankruptcy protection growth and the growth in self-employment that is localized to lower-income counties and industries that are more reliant on credit card debt for startup capital.

Several aspects of our approach address potential sources of endogeneity of protection laws to debt and related outcomes, as well as possible confounding movements in local economic conditions and other relevant factors. We estimate a version of our baseline model of the dependence of borrowing on protection, comparing debt outcomes across neighboring counties that share a state border in order to account for time-varying elements of the local economic and social environments. We estimate the effect of protection on classes of consumer debt that are and are not expunged in bankruptcy.

Overall, the evidence we present in this paper identifies the causal effect of the increase in the level of protection under personal bankruptcy on the household leverage equilibrium. We show that increases in the level of bankruptcy protection within our sample period lead to an expansion in

the level of credit card debt held by homeowners in low-income counties. We then provide evidence consistent with the expansion being concentrated among existing borrowers. This expansion is also correlated with an increase in small business creation and has no effect on overall delinquency rates.

These findings highlight the important role that personal bankruptcy laws play as an insurance mechanism in providing downside protection, especially for low-income regions and homeowners. Therefore, the documented credit increase has important implications for our understanding of personal bankruptcy protection as a risk-sharing improving policy.

Bibliography

Agarwal, Sumit, et al. "Regulating consumer financial products: Evidence from credit cards." The Quarterly Journal of Economics 130.1 (2015): 111-164.

Agarwal, Sumit, Cunlin Liu, and Lawrence Mielnicki. Exemption laws and consumer delinquency and bankruptcy behavior: an empirical analysis of credit card data. The Quarterly Review of Economics and Finance 43 (2003) 273-289

Argyle, B., Iverson, B., Nadauld, T. D., & Palmer, C. (2021). Personal Bankruptcy and the Accumulation of Shadow Debt (No. w28901). National Bureau of Economic Research.

Atanasov, Vladimir A., and Bernard S. Black. Shock-based causal inference in corporate finance and accounting research. Critical Finance Review 5 (2016): 207-304.

Auclert, Adrien, Will S. Dobbie, and Paul Goldsmith-Pinkham. Macroeconomic effects of debt relief: Consumer bankruptcy protections in the great recession. No. w25685. National Bureau of Economic Research, 2019.

Baird, Douglas, and Robert Rasmussen. The End of Bankruptcy. Stanford Law Review 55 (2002).

Bellon, Aymeric, et al. Personal wealth, self-employment, and business ownership. The Review of Financial Studies 34.8 (2021): 3935-3975.

Berger, Allen N., Geraldo Cerqueiro, and Maria F. Penas. Does debtor protection really protect debtors? Evidence from the small business credit market. Journal of Banking & Finance 35.7 (2011): 1843-1857.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. How much should we trust differences-in-differences estimates? The Quarterly Journal of Economics 119.1 (2004): 249-275.

Bolton, Patrick, and David S. Scharfstein. Optimal debt structure and the number of creditors. Journal of Political Economy (1996): 1-25.

Bricker, Jesse, Lisa J. Dettling, Alice Henriques, Joanne W. Hsu, Lindsay Jacobs, Kevin B. Moore, Sarah Pack, John Sabelhaus, Jeffrey Thompson, and Richard A. Windle. "Changes in US family finances from 2013 to 2016: Evidence from the Survey of Consumer Finances." Fed. Res. Bull. 103 (2017): 1.

Briglevics, Tamas and Schuh, Scott. U.S. Consumer Demand for Cash in the Era of Low Interest Rates and Electronic Payments. ECB Working Paper No. 1660 (2014).

Cerqueiro, Geraldo, and Maria Penas. How does personal bankruptcy law affect start-ups? The Review of Financial Studies (2017).

Cerqueiro, Geraldo, Deepak Hegde, Maria Penas, and Robert Seamans. Personal Bankruptcy Law and Innovation. Working Paper (2013).

Chang, Andrew C., Aditya Aladangady, Jesse Bricker, Sarena Goodman, Jacob Krimmel, Kevin B. Moore, Sarah Reber, Alice Henriques Volz, and Richard Windle. "Changes in US Family Finances from 2019 to 2022." (2023).

Chatterji, Aaron K., and Robert C. Seamans. Entrepreneurial finance, credit cards, and race. Journal of Financial Economics 106.1 (2012):182-195.

Chen, Anqi. 2019. Why are so many households unable to cover a $400 unexpected expense. *Center for Retirement Research at Boston College* vol. 19, no. 11:1-10.

Cohen-Cole, Ethan, Kyle Herkenhoff, and Gordon Phillips. The Impact of Consumer Credit Access on Employment, Earnings adn Entrepreneurship. Working paper (2016)

Dávila, Eduardo. "Using elasticities to derive optimal bankruptcy exemptions." The Review of Economic Studies 87.2 (2020): 870-913.

Dick, Astrid A. and Andreas Lehnert, "Personal Bankruptcy and Credit Market Competition," The Journal of Finance, 2010, 65 (2), 655–686.

Dobbie, Will, and Jae Song. Debt Relief and Debtor Outcomes: Measuring the Effects of Consumer Bankruptcy Protection. American Economic Review 105.3 (2015): , 105, 3, 1272-1311.

Dobbie, Will, Paul Goldsmith-Pinkham, and Crystal S. Yang. "Consumer bankruptcy and financial health." Review of Economics and Statistics 99.5 (2017): 853-869.

Dobbie, Will, Neale Mahoney, and Jae Song, "Bad Credit, No Problem? Credit and Labor Market Consequences of Bad Credit Reports," Journal of Finance, 2020.

Dube, Arindrajit, T. William Lester, and Michael Reich. Minimum wage effects across state borders: Estimates using contiguous counties. The Review of Economics and Statistics 92.4 (2010): 945-964.

Elias, Stephen., Leon D Bayer, and Cara (Lawyer) O'Neill. The New Bankruptcy: Will It Work for You? Nolo, 2005.

Fan, Wei, and Michelle J. White. Personal Bankruptcy and the Level of Entrepreneurial Activity Journal of Law and Economics 46.2 (2003): 543-567.

Fisher, Jonathan and Angela Lyons, "Information and credit access: Using bankruptcy as asignal," Applied Economics, 2010, 42 (25), 3175–3193.

Flynn, Ed, Gordon Bermant, and Karen Bakewell. A closer look at elderly chapter 7 debtors. American Bankruptcy Institute Journal. 21 (2002): 22-49.

Gertner, Robert, and David Scharfstein. A Theory of Workouts and the Effects of Reorganization Law. The Journal of Finance 46.4 (1991): 1189-1222.

Grodzicki, D., Alexandrov, A., Bedre-Defolie, Ö., & Koulayev, S. (2023). Consumer Demand for Credit Card Services. Journal of Financial Services Research, 63(3), 273-311.

Gropp, Reint, John Karl Scholz, and Michelle J. White. Personal bankruptcy and credit supply and demand. The Quarterly Journal of Economics 112.1 (1997): 217-251.

Gross, David B., and Nicholas S. Souleles. Do liquidity constraints and interest rates matter for consumer behavior? Evidence from credit card data. The Quarterly Journal of Economics 117.1 (2002a): 149-185.

Gross, David B., and Nicholas S. Souleles. An Empirical Analysis of Personal Bankruptcy and Delinquency. Review of Financial Studies, 15.1 (2002b) 319–347.

Gross, Tal, Matthew J. Notowidigdo, and Jialan Wang. Liquidity constraints and consumer bankruptcy: Evidence from tax rebates. Review of Economics and Statistics (2012).

Hall, Robert E. "Intertemporal substitution in consumption." Journal of political economy 96.2 (1988): 339-357.

Hart, Oliver D. "Different approaches to bankruptcy." (2000).

Hart, Oliver and John Moore. A Theory of Debt Based on the Inalienability of Human Capital, The Quarterly Journal of Economics, 109.4 (1994) 841-79.

Heider, Florian, and Alexander Ljungqvist. "As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes." Journal of financial economics 118.3 (2015): 684-712.

Hynes, Richard M., Anup Malani, and Eric A. Posner. The Political Economy of Property Exemption Laws. Journal of Law and Economics 47.1 (2004): 19-43.

Indarte, Sasha. "Moral hazard versus liquidity in household bankruptcy." The Journal of Finance 78, no. 5 (2023): 2421-2464.

Jagtiani, Julapa, and Wenli Li. "Credit access after consumer bankruptcy filing: new evidence." Am. Bankr. LJ 89 (2015): 327.

Kopel, Jerry: Homestead Law Changes, (2007) http://www.jerrykopel.com/2007/homestead-exemption-history.htm

Lee, Donghoon and Wilbert van der Klaauw. An Introduction to the FRBNY Consumer Credit Panel. Federal Reserve Bank of New York Staff Report no. 479. (2010)

Levine, Ross, and Yona Rubinstein. Smart and illicit: who becomes an entrepreneur and do they earn more? The Quarterly Journal of Economics 132.2 (2017): 963-1018.

Li, Wenli, Michelle J. White, and Ning Zhu. Did Bankruptcy Reform Cause Mortgage Default to Rise?. American Economic Journal: Economic Policy 3(4): 123-147.(2011)

Lin, Emily Y., and Michelle J. White. Bankruptcy and the market for mortgage and home improvement loans. Journal of Urban Economics 50.1 (2001): 138-162.

Parra, Carlos. "How Does Consumer Bankruptcy Protection Impact Household Outcomes?." Available at SSRN 2808851 (2018).

Pugsley, Benjamin Wild, and Eric Hurst. What do small businesses do? Brookings Papers on Economic Activity 43.2 (2011): 73-142.

Stiglitz, Joseph E., and Andrew Weiss. Credit rationing in markets with imperfect information. The American Economic Review 71.3 (1981): 393-410.

Vig, Vikrant. Access to collateral and corporate debt structure: Evidence from a natural experiment. The Journal of Finance 68.3 (2013): 881-928.

White, Michelle J. "Personal bankruptcy: insurance, work effort, opportunism and the efficiency of the 'fresh start'." Work. Pap. Univ. Calif. San Diego (2005).

White, Michelle J. "Bankruptcy reform and credit cards." Journal of Economic Perspectives 21.4 (2007): 175-199.

Table 1. Summary statistics data

A. Credit registry data

	All sample				County border sample			
	All		Low-inc.homeowner		All		Low-inc.homeowner	
	N=22,366,347		N=1,217,096		N=11,233,311		N=766,941	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Credit card balance (USD)	5,656	11,967	6,853	11,036	5,652	11,676	6,856	10,449
Mortgage balance (USD)	56,129	113,984	102,710	92,425	57,893	117,137	93,484	78,738
Auto loan balance (USD)	5,057	13,339	7,592	13,558	4,911	14,144	7,820	13,889
Credit card delinquency (%)	10.8	31.0	8.2	27.4	10.8	31.0	9.2	28.8
Mortgage delinquency (%)	0.3	5.7	1.4	11.9	0.4	5.9	1.6	12.6
Auto delinquency (%)	0.8	9.0	0.8	8.7	0.8	8.8	0.9	9.2
No. of credit cards	3.1	2.3	3.4	2.4	3.1	2.3	3.4	2.4
Credit card utilization	0.6	23.1	0.5	3.4	0.6	24.4	0.5	0.4
No. of accounts in collection	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3
New bankruptcy (%)	0.28	5.27	0.32	5.69	0.28	5.24	0.39	6.22
New foreclosure (%)	0.08	2.88	0.30	5.44	0.09	2.95	0.33	5.76
Unemployment rate (%)	4.9	2.0	5.9	2.2	4.9	2.1	5.9	2.2
House price (USD)	171,064	136,498	108,535	60,565	175,579	148,556	97,184	49,179
Income IRS (USD)	18,948	13,050	11,302	2,896	20,059	15,626	11,207	3,126
Population (ZIP code) 2000 census	17,522	15,349	15,212	17,435	17,049	15,584	13,751	16,983

B. Interest rates

	All sample N=4,113		County border sample N=854	
	Mean	SD	Mean	SD
Personal unsecured int. rate (%)	12.3	2.1	12.2	1.9
Credit card int. rate (%)	12.7	1.9	12.7	1.6
3-yr ARM mortgage int. rate (%)	5.7	1.2	5.7	1.1
5-yr ARM mortgage int. rate (%)	6.1	1.0	6.0	1.0
15-yr fixed mortgage int. rate (%)	6.1	0.8	6.1	0.9
30-yr fixed mortgage int. rate (%)	6.6	0.7	6.6	0.7

"All sample" refers to all households in the 1% sample from 1999 to 2005. "Low-income homeowners" refers to individuals in low-income ZIP codes (below median) that are homeowners. Panel A reports credit card, mortgage, and auto loans; delinquency rates for mortgage, credit card, and auto loans; the number of credit card whole per individual, credit card utilization, and the number of accounts in collection; and new bankruptcy and foreclosure flags. Panel B reports personal unsecured, credit card, and mortgage rates constructed from branch-setter-level rates from RateWatch, which are then aggregated at the county level. The sample period is from 1999 to 2005. *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table 2. Summary statistics protection level

All sample	**Mean**	**SD**	**p5**	**p25**	**p50**	**p75**	**p95**
Protection level	73,627	75,125	13,000	23,200	55,800	166,200	unlimited
Homestead	63,932	73,356	7,500	20,000	40,000	150,000	unlimited
Personal assets	9,695	5,965	2,900	5,000	8,400	11,000	25,000
Unlimited states	7						
No. of States	50						
Eventually treated	**Mean**	**SD**	**p5**	**p25**	**p50**	**p75**	**p95**
Protection level	85,655	86,100	11,000	32,300	51,000	110,300	390,000
Homestead	75,243	84,838	0,000	25,000	40,000	100,000	350,000
Personal assets	10,411	6,061	3,000	7,200	9,100	11,000	25,000
No. of states	26						
Protection changes	38,841	52,992	2,000	3,250	15,400	50,000	200,000
No. of changes	37						
Never treated	**Mean**	**SD**	**p5**	**p25**	**p50**	**p75**	**p95**
Protection level	56,922	52,366	14,400	20,700	57,700	586,000	unlimited
Homestead	48,222	49,678	10,000	13,750	45,000	575,000	unlimited
Personal assets	8,700	5,705	2,900	4,800	6,300	12,300	42,000
No. of states	24						

"All sample" refers to all counties in the sample period. "Eventually treated" refers to counties treated during the sample period, that is, states that changed their level of protection during the sample period. "Never treated" refers to counties not treated during the sample period. Protection level is the nominal value of household protection under Chapter 7. Homestead is the amount of home-equity protected under Chapter 7. Personal Assets is the amount of assets protected under Chapter 7, such as, books, furniture, jewelry, etc. The exact description depends on the state. Unlimited states is the number of states with unlimited home-equity protection during our sample period. Protection changes is constructed based on the yearly changes in the level of protection. Levels of protection and homestead are different at the 10% level between "Eventually treated" and "Never treated." The sample period is from 1999 to 2005.

Table 3. Effect of bankruptcy protection on debt

A. Credit cards

	Credit cards			
	(1)	**(2)**	**(3)**	**(4)**
Protection	0.006	0.043**	-0.007	0.147***
Level s,t	(0.011)	(0.018)	(0.009)	(0.048)
No. of obs.	22,366,347	1,217,096	14,902,605	766,941
No. of clusters	50	41	45	39
R-squared	.64	.65	0.65	.66
Controls	Y	Y	Y	Y
Individual FE, ZIP code FE	Y	Y	Y	Y
Year-quarter FE	Y	Y		
Neighbor county Pairs x Year-quarter FE			Y	Y
Sample	All	Low-inc homeowner	All	Low-inc homeowner

B. Mortgage

	Mortgage			
	(1)	**(2)**	**(3)**	**(4)**
Protection	-0.008	-0.009	-0.006	-0.021
Level s,t	(0.015)	(0.019)	(0.007)	(0.016)
No. of obs.	10,673,301	1,615,380	7,160,384	1,014,481
No. of clusters	49	41	42	39
R-squared	.85	.87	.86	.87
Controls	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y		
Year-quarter FE Neighbor county Pairs x Year-quarter FE			Y	Y
Sample	All	Low-inc homeowner	All	Low-inc homeowner

C. Auto

	Auto			
	(1)	**(2)**	**(3)**	**(4)**
Protection	0.021***	-0.002	0.008	0.011
Level s,t	(0.008)	(0.018)	(0.008)	(0.071)
No. of obs.	9,437,033	667,780	6,330,775	429,615
No. of clusters	48	40	41	39
R-squared	.51	.58	0.54	.61
Controls	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y		
Year-quarter FE				
Neighbor county			Y	Y
Pairs x Year-quarter FE				
Sample	All	Low-inc homeowner	All	Low-inc homeowner

Table 3, panel A, shows the estimated coefficient following specification (1) of the log credit card debt on the log bankruptcy protection, and column 1 uses a random 1% representative sample from the New York Fed Consumer Credit Panel / Equifax. Protection level is the log bankruptcy protection in state s at time t. Controls include Unemployment rate measured in county i at time t from the U.S. Bureau of Labor and Statistics (BLS). House price is the logarithm of ZIP-code-level house prices from Zillow, and Income is the logarithm of IRS income level at the individual level. Columns 1 and 2 look at the whole sample of counties available in the New York Fed Consumer Credit Panel / Equifax. Columns 3 and 4 restrict the sample to neighboring counties. Columns 2 and 4 restrict the sample to below-median ZIP code income areas and homeowners, individuals who had a mortgage during our sample period. The sample period is from 1999 to 2005. Panels B and C replicate panel A but use mortgage and auto balances as the dependent variables. $^{*}p<.1$; $^{**}p<.05$; $^{***}p<.01$ (clustered at the state level for columns 1 to 2 and state and neighboring pair levels for columns 3 to 4).

Table 4. Effect of bankruptcy protection on interest rates

A. Credit card

	Credit card		**Personal unsecured**	
	(1)	**(2)**	**(3)**	**(4)**
Protection	0.853***	0.893**	0.731***	0.922**
Level s,t	(0.324)	(0.420)	(0.266)	(0.370)
No. of obs.	4,113	854	3,286	904
No. of clusters	46	36	46	36
R-squared	.72	.91	.87	.95
Controls	Y	Y	Y	Y
County FE and Year FE	Y	Y	Y	Y
Neighbor county pairs - year FE		Y		Y

B. Mortgage

	3-yr ARM		**5-yr ARM**		**15-yr fixed**		**30-yr fixed**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Protection	-0.135*	-0.061	-0.002	-0.105	0.008	-0.084*	0.004	0.037
Level s,t	(0.081)	(0.070)	(0.111)	(0.076)	(0.067)	(0.051)	(0.052)	(0.033)
No. of obs.	6,138	2,138	5,629	1,880	8,264	2,936	7,921	2,820
No. of clusters	49	41	48	42	50	48	50	48
R-squared	.93	.97	.92	.98	.94	.97	.94	.98
Controls	Y	Y	Y	Y	Y	Y	Y	Y
County FE and Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Neighbor county pairs - year FE		Y		Y		Y		Y

Panel A shows the estimated coefficient following specifications (1) and (2) where the dependent variables (interest rates) are not logged. We regress interest rate (credit card and personal unsecured rate) on log bankruptcy protection at the county level. Interest rate data come from RateWatch. Protection level is the log bankruptcy protection in state s at time t. Unemployment rate is measured as the unemployment rate in county i at time t from the BLS. House price is the log FHFA state-level index for state s at time t, and Income is the log income in county i at time t from the IRS. Columns 1 and 3 show the estimates for the full sample using a county fixed effect. Columns 3 and 4 show the results, including neighboring-county- pairs fixed effects. Panel B shows estimates similar to those in panel A, but for the mortgage loans (3- and 5-year ARM and 15- and 30-year fixed rates). The sample period is from 1999 to 2005. *p <0.1; **p <0.05; ***p <0.01 (clustered at the state level for specification (1) and state and neighboring pair levels for specification (2)).

Table 5. Bankruptcy protection changes

Panel A. Determinants of bankruptcy protection levels and changes

	Protection Level s,t		**Protection growth s,t**		**Protection dummy s,t**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
House price/growth s,t-1	-0.800	-0.769	-0.090	0.313	0.866	0.724
	(4.850)	(0.756)	(0.906)	(1.125)	(1.329)	(1.513)
House price/growth s,t-2	2.044	2.356**	1.478	1.183	1.526	1.212
	(4.885)	(0.926)	(0.935)	(1.080)	(1.585)	(1.958)
Medical exp./growth s,t-1	-4.340	0.073	-0.396	-1.160	-0.967	-1.469
	(4.926)	(0.866)	(0.866)	(0.865)	(1.319)	(1.261)
Medical exp./growth s,t-2	5.694	1.325	2.427**	1.968*	1.989*	1.592
	(4.782)	(0.829)	(1.184)	(1.191)	(1.116)	(1.279)
Unemp. rate/change s,t-1	0.092	-0.054	-0.035	-0.033	-0.074	-0.073
	(0.177)	(0.035)	(0.026)	(0.025)	(0.059)	(0.059)
Unemp. rate/change s,t-2	-0.048	-0.027	-0.039	-0.032	0.005	-0.004
	(0.163)	(0.034)	(0.025)	(0.024)	(0.051)	(0.056)
State real GDP/growth s,t-1	3.473	-0.984**	-0.050	0.664	-1.075	0.231
	(4.629)	(0.491)	(0.342)	(0.674)	(0.761)	(0.756)
State real GDP/growth s,t-2	-6.649	-0.193	1.042	1.664	0.383	1.444
	(3.941)	(0.569)	(1.172)	(1.675)	(1.060)	(1.273)
No. filings/growth s,t-1	-0.355*	0.189	0.036	0.002	0.013	-0.020
	(0.285)	(0.069)	(0.037)	(0.038)	(0.054)	(0.062)
No. filings/growth s,t-2	-0.374	0.163***	0.016	-0.008	0.052	0.030
	(0.267)	(0.041)	(0.019)	(0.020)	(0.066)	(0.069)
Political climate s,t-1	-0.275	-0.137***	-0.063	0.340	0.100	0.625
	(1.503)	(0.179)	(0.158)	(0.155)	(0.148)	(0.409)
Personal income/growth s,t-1	12.341	1.230	0.158	-0.546	0.014	-0.617
	(8.213)	(1.298)	(1.225)	(1.721)	(1.890)	(2.157)
Personal income/growth s,t-2	-9.896*	-0.771	-3.305	-4.266	-2.268	-3.562
	(9.091)	(1.297)	(2.040)	(2.599)	(1.906)	(1.907)
No. of obs.	350	350	300	300	300	300
State FE		Y		Y		Y
Year FE	Y	Y	Y	Y	Y	Y
R-squared	.12	.98	.11	.24	.13	.25
F, p-value	1.44, .18	5.03, .00	1.22, .29	1.29, .25	3.63, .00	1.21, .30

Panel A shows the estimated coefficient for the regression of bankruptcy protection on lag t-1 and t-2 values of variables that could determine changes in protection levels. House price s,t is the level or growth of house prices in state s at time t from the FHFA. Medical expenses is the level of growth in the state's annual total medical expenses from the National Health Statistic. No. of filings is the number or change in the number of filings for nonbusiness bankruptcies in a state. Political climate s,t is defined as the share of democratic votes in the closest House of Representative election. State GDP and Personal income come from the BEA, and Unemployment rate comes from the BLS. Columns 1 and 2 report the coefficient for regressions of the log of the protection level on the log of the explanatory variables using only year, and year and state fixed effects. Columns 3 and 4 show the coefficient for regressions of log changes in protection on log changes of the explanatory variables using only year, and year and state fixed effects. Columns 5 and 6 show the coefficient for regressions of a dummy equal to one, if the growth in protection is greater than zero, on the log changes of explanatory variables using only year, and year and state fixed effects. F-test and p-values are shown in the last row. The sample period is from 1999 to 2005. *p <.1; **p <.05; ***p <.01 (clustered at the state level).

Panel B. Bankruptcy protection changes and state-level outcomes

	House price index	**Medical expenses**	**Unemp rate**	**State real GDP**	**Number of filings**	**Political climate**	**Personal income**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Protection	0.000	-0.004	-0.039	0.006	-0.048	0.002	0.004
Growth s,t	(0.009)	(0.003)	(0.103)	(0.004)	(0.045)	(0.009)	(0.006)
No. of obs.	300	300	300	300	250	300	300
No. of clusters	50	50	50	50	50	50	50
State and year FEs	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y
R-squared	.74	.50	.70	.50	.33	.90	.78

Panel B shows the estimated coefficient for the regression of bankruptcy protection changes on dependent variables. House price s,t is the level or growth of house prices in state s at time t from the FHFA. Medical expenses is the level of growth in the state's annual total medical expenses from the National Health Statistic. Unemployment rate comes from the BLS. No. of filings is the number or change in the number of filings for nonbusiness bankruptcies in a state. Political climate s,t is defined as the share of democratic votes in the closest House of Representative election. State GDP and Personal income are from the BEA. The sample period is from 1999 to 2005. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$ (clustered at the state level).

Table 6. Heterogeneous effects of bankruptcy protection on household debt

A. All Counties Sample

	Credit Card				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Protection	0.044**	0.054***	-0.033	0.043*	0.114***
Level s,t	(0.018)	(0.020)	(0.033)	(0.024)	(0.036)
No. of Obs.	1,181,152	1,025,986	151,865	767,285	258,694
No. of Clusters	41	40	41	40	40
R-Squared	0.65	0.65	0.67	0.61	0.59
Controls	Y	Y	Y	Y	Y
Individuals FE, Zipcode FE	Y	Y	Y	Y	Y
Year-quarter FE					
Neighbor County Pairs x Year-quarter FE					
Sample	Low Inc Homeowner	High DTI	Low DTI	High DTI High CCU	High DTI Low CCU

B. Neighboring Counties Sample

	Credit Card				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Protection	0.166***	0.201***	-0.165*	0.130*	0.291**
Level s,t	(0.050)	(0.065)	(0.090)	(0.073)	(0.117)
No. of Obs.	694,012	608,710	82,244	468,874	137,919
No. of Clusters	39	39	38	39	39
R-Squared	0.66	0.65	0.71	0.62	0.61
Controls	Y	Y	Y	Y	Y
Individuals FE, Zipcode FE	Y	Y	Y	Y	Y
Year-quarter FE					
Neighbor County Pairs x Year-quarter FE	Y	Y	Y	Y	Y
Sample	Low Inc Homeowner	High DTI	Low DTI	High DTI High CCU	High DTI Low CCU

This table shows the estimated coefficient following specification (1) of the log credit card debt on the log bankruptcy protection. The estimation sample includes low-income homeowners, defined as below-median ZIP code income area residents who had a mortgage during our sample period, from the random 1% representative sample of Equifax fileholders in the New York Fed Consumer Credit Panel / Equifax (CCP). Panel A reports estimates for low-income homeowners from all sample counties, and Panel B reports estimates for the sample of border count pairs only. Protection level is the log bankruptcy protection in state s at time t. Controls include Unemployment rate measured in county i at time t from the U.S. Bureau of Labor and Statistics (BLS). House price is the logarithm of ZIP-code-level house prices from Zillow, and Income is the logarithm of IRS income level at the individual level. Column 1 includes all sample members with a non-missing credit card utilization measure. Columns 2 and 3 split the sample into above and below median ex ante debt to income ratio (DTI) using the full CCP DTI median. Columns 4 and 5 further subdivide the high DTI subsample into those with above and below (ex ante, full CCP) median credit card utilization rates. The sample period is from 1999 to 2005. *p <.1; **p <.05; ***p <.01 (clustered at the state level for panel A and state and neighboring pair levels for panel B).

Table 7. Effect of bankruptcy protection on credit card delinquency

A. Credit card

	Current (1)	**.+ 1 year. (2)**	**.+ 2 year. (3)**	**Current (4)**	**.+ 1 year. (5)**	**.+ 2 year. (6)**
Protection	0.005	-0.001	0.000	0.013	0.012	0.005
Level s,t	(0.005)	(0.004)	(0.004)	(0.010)	(0.011)	(0.008)
No. of obs.	1,217,096	1,210,648	1,207,643	766,941	721,485	694,218
No. of clusters	41	41	41	39	39	39
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y			
Neighbor county						
Pairs x Year-quarter FE				Y	Y	Y
R-squared	.61	.59	.60	.63	.60	.61

B. Mortgages

	Current (1)	**.+ 1 year. (2)**	**.+ 2 year. (3)**	**Current (4)**	**.+ 1 year. (5)**	**.+ 2 year. (6)**
Protection	0.000	0.001	0.000	-0.003	-0.001	0.002
Level s,t	(0.002)	(0.001)	(0.002)	(0.005)	(0.005)	(0.003)
No. of obs.	1,615,380	1,597,444	1,589,482	1,014,481	950,606	913,783
No. of clusters	41	41	41	39	39	39
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y			
Neighbor county						
pairs x Year-quarter FE				Y	Y	Y
R-squared	.50	.37	.34	.53	.37	.34

C. Auto loans

	Current (1)	**.+ 1 year. (2)**	**.+ 2 year. (3)**	**Current (4)**	**.+ 1 year. (5)**	**.+ 2 year. (6)**
Protection	0.002	0.004***	-0.001	0.006	0.002	0.000
Level s,t	(0.002)	(0.001)	(0.002)	(0.010)	(0.004)	(0.010)
No. of obs.	667,780	663,443	661,549	429,615	403,115	387,556
No. of clusters	40	40	40	39	39	39
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y			
Neighbor county						
Pairs x Year-quarter FE				Y	Y	Y
R-squared	.58	.54	.56	.60	.56	.57

This table shows the estimated coefficient following a variation of specification (1) and (2), where we replace the dependent variable for a dummy indicator that is equal to one if the person is delinquent at the specified time. We regress this delinquency definition on the log of bankruptcy protections. All regressions include controls similar to those used in Table 3. The sample period is from 1999 to 2005. *p <0.1; **p <.05; ***p <.01 (clustered at the state level for specification (1) and state and neighboring pair levels for specification (2)). *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table 8. Effect of bankruptcy protection on credit card use and distress

A. Credit card use

	CC utilization		No. of credit cards		Entry into CC	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Protection	0.008**	0.016**	0.003	0.027**	-0.001	-0.006
Level s,t	(0.004)	(0.008)	(0.008)	(0.013)	(0.006)	(0.020)
No. of obs.	1,217,096	766,941	1,217,096	766,941	1,615,380	1,014,481
No. of clusters	41	39	41	39	41	39
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y		Y		Y	
Neighbor county pairs x Year-quarter FE		Y		Y		Y
R-squared	.75	.76	.79	.79	.49	.46

B. Distress

	New bankruptcy		New foreclosures		Account on collection	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Protection	0.001	0.002	0.000	0.001	0.004	0.007
Level s,t	(0.001)	(0.001)	(0.000)	(0.001)	(0.004)	(0.005)
No. of obs.	1,217,096	766,941	1,217,096	766,941	1,217,096	766,941
No. of clusters	41	39	41	39	41	39
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y		Y		Y	
Neighbor county Pairs x Year-quarter FE		Y		Y		Y
R-squared	.14	.18	.17	.21	.44	.44

Panel A shows the results of a regression similar to specifications (1) and (2) but uses credit card utilization, the number of cards, or entry into the credit card market as the dependent variable. The specification follows Table 3. Panel B shows the results looking at different measures of distress, new bankruptcy, new foreclosures, and accounts in collection. We regress all dependent variables on the log of bankruptcy protection. The sample period is from 1999 to 2005. $*p < .1$; $**p < .05$; $***p < .01$ (clustered at the state level for specification (1) and state and neighboring pair levels for specification (2)). *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table 9. Effect of bankruptcy protection on self-employment

	Self-employment		Credit Card Startup > p50		Credit Card Startup < p50	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Protection growth s,t	0.000	-0.002	-0.003	-0.008	-0.004**	-0.003
	(0.002)	(0.002)	(0.007)	(0.008)	(0.002)	(0.002)
Protection growth s,t x Low-income		0.006**		0.015*		-0.002
		(0.003)		(0.009)		(0.003)
Number of observations	12,738	12,738	73,081	73,081	120,930	120,930
Number of clusters	50	50	50	50	50	50
State FE	Y	Y				
State x 2-digit industry			Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
R-squared	.21	.23	.02	.02	.02	.02

This table shows the estimated coefficient following a variation of specification (1) of log changes in self-employment measures on log changes in the levels of protection. Column 1 shows the estimates for county self-employment aggregates. Column 2 shows the results for the effect interacted with income heterogeneity for aggregate self-employment. Column 3 to 6 shows the estimates using self-employment changes by industry and county for the total sample of observations is 194,011. Column 3 and 4 show the estimates for industries that used the level of credit card debt as a startup capital, and column 5 and 6 show estimates for industries that do not. The sample period is from 1999 to 2005. .1; **p <.05; ***p <.01 (clustered at the state level).

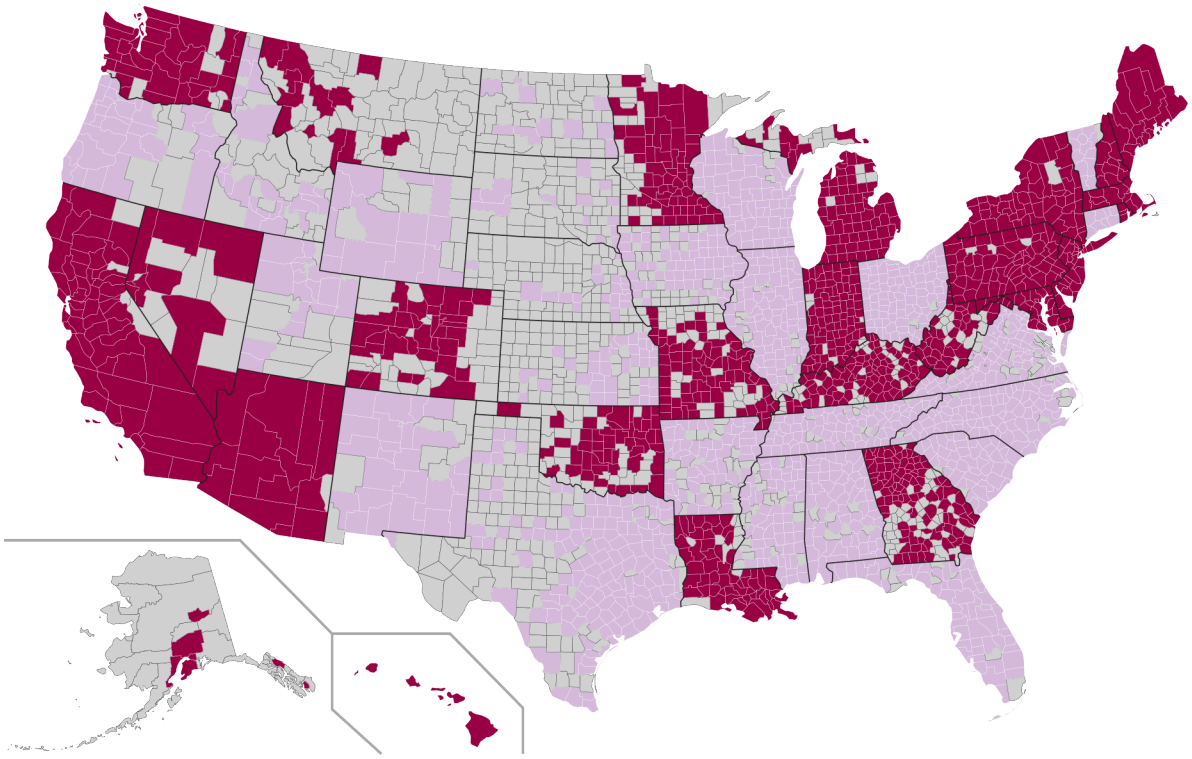
Figure 1. Debt growth and bankruptcy filings

This figure plots the yearly number of nonbusiness filings in the United States from 1994 until 2012. This value was extracted from the Statistics Division of the Administrative Office of the U.S. Courts, and the adjusted total revolving debt in the United States was extracted from the Federal Reserve Board of Governors Consumer Credit Report.

Alt text: Bar chart depicting nonbusiness bankruptcy filings. Filings increased steadily from 1994 through 2004, declined sharply in 2006, and then resumed increasing. A line graph depicting US consumers' total revolving debt is overlaid. It increases from 1994 through 2004, accelerates to a peak in 2008, and then declines.

Figure 2. States that changed their level of bankruptcy protection

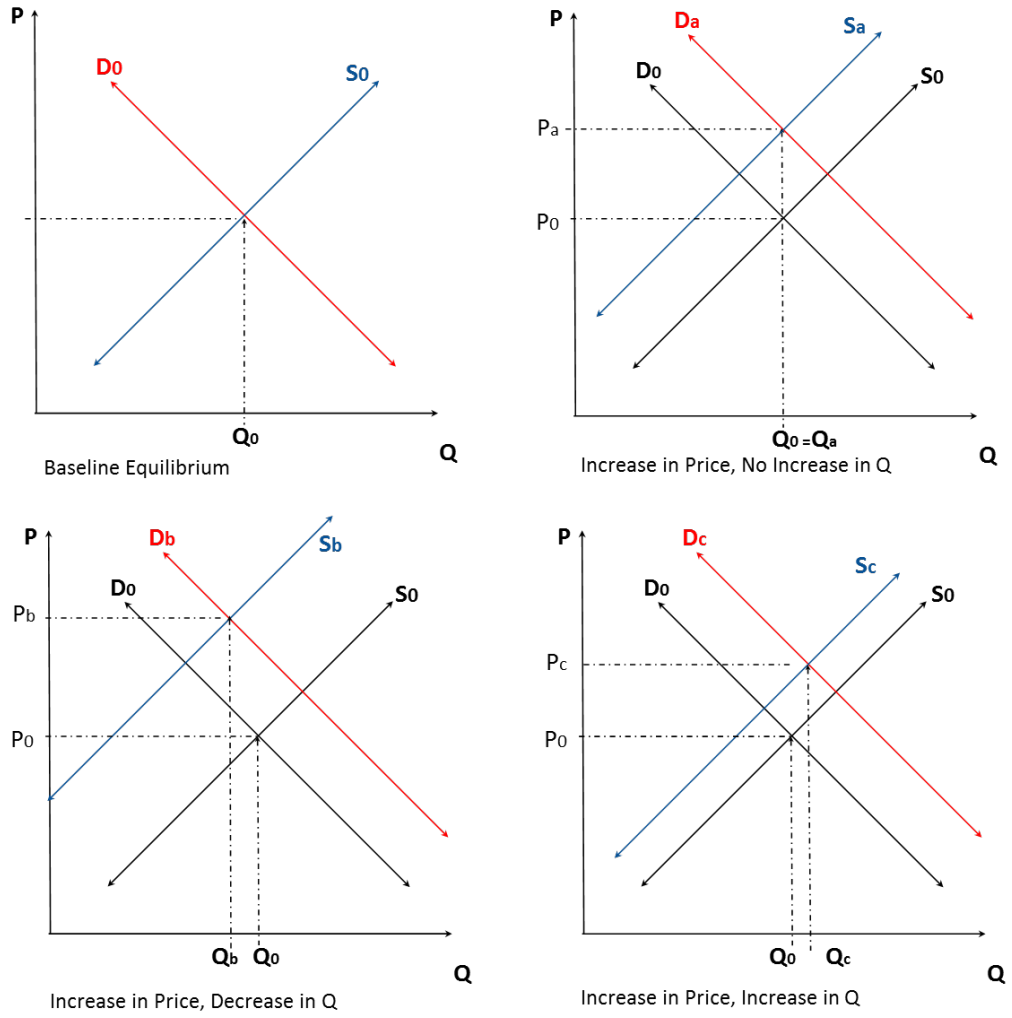
Counties that were at some point treated between 1999 and 2005 are represented in dark color. They represent "eventually" treated counties, or in other words, the level of bankruptcy protection changed at some point during that period. Lightly colored counties never changed; they represent the "never" treated counties. Counties in gray represent counties for which information is not provided because their population was below 10,000 households during our sample period. *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.



Alt text: A map of the United States in which counties are shaded in dark red, lavender, or gray. Counties within a given state's borders are either all dark red or all lavender or one of the two colors mixed with gray. Dark red treated states and lavender untreated states are interspersed across the map.

Figure 3. Illustration of different demand and supply responses

Supply and demand curves illustrate possible net effects. Baseline Equilibrium is the initial equilibrium before the change. Increase in Price, No Increase in Q, show the effect when the supply response totally and perfectly upsets the demand increase. Increase in Price, Decrease in Q, show the effect when the supply response is stronger than the demand increase. Increase in Price, Increase in Q, show the effect when the demand effect dominates.

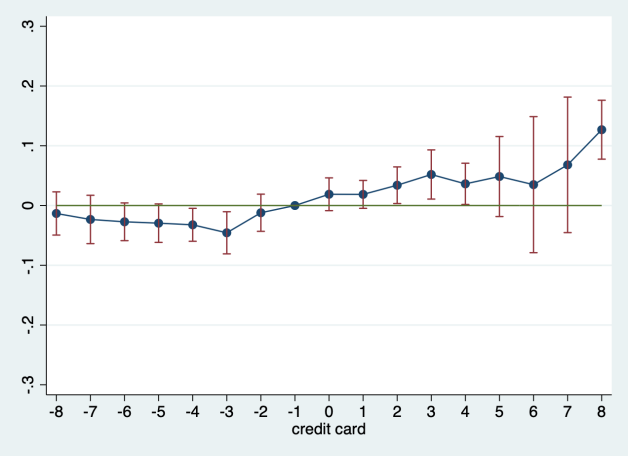


Alt text: Four simple supply and demand graphs. The top left graph shows an upward-sloping supply curve crossing a downward-sloping demand curve. The top right graph is the same, except that the supply curve has shifted in, and the demand curve has shifted out. The shifts leave the quantity at which the new curves intersect unchanged from the old quantity. The price at the new intersection is higher. The bottom left graph shows a larger supply shift in, so that quantity decreases. The bottom right graph shows a larger demand shift out, so that quantity increases.

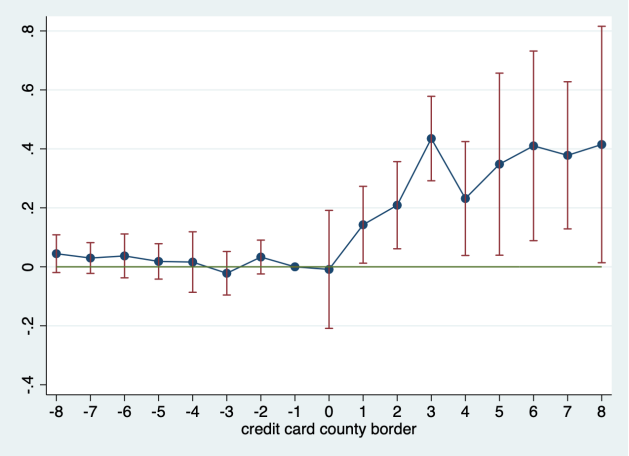
Figure 4. Dynamics effects on debt balances

This figure shows event study estimates that follow specification (3) for debt balances of credit card, mortgages, and auto loans at individual levels, the left-hand column shows the estimates for all homeowners in low-income areas, and the right-hand column shows similar estimates but is restricted to the county pairs sample. *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

(A) Credit card

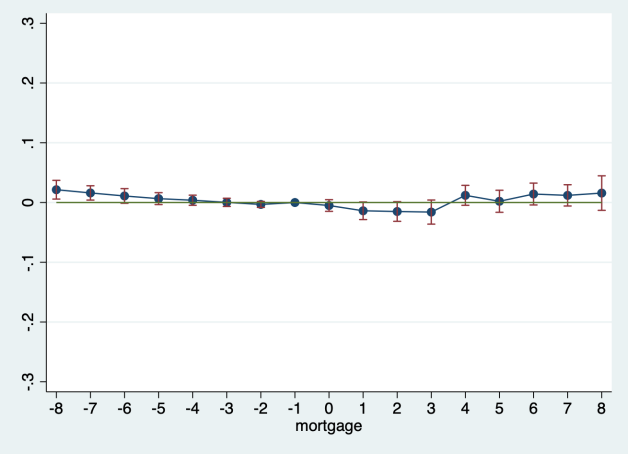


All counties

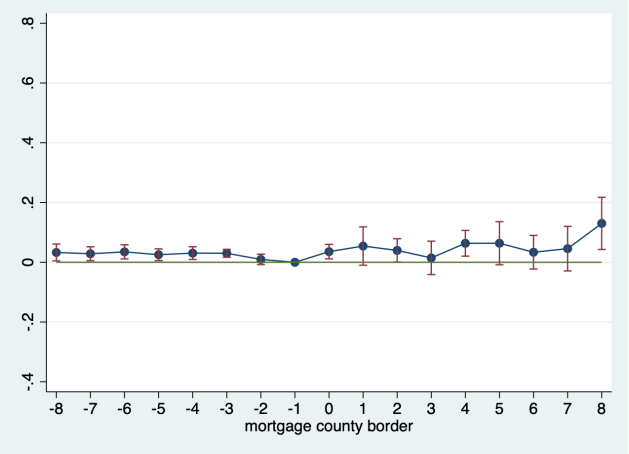


border counties

(B) Mortgage

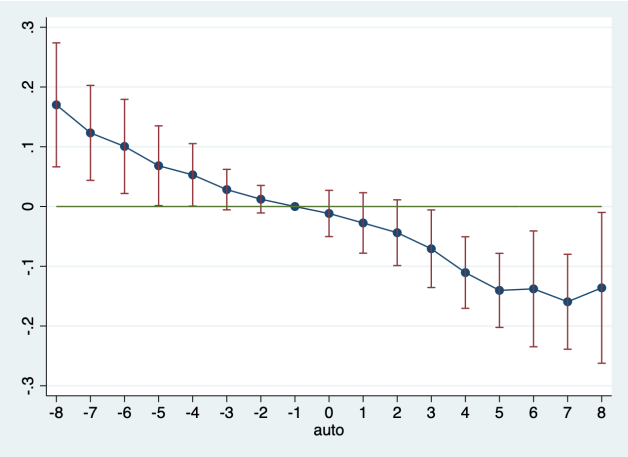


All counties

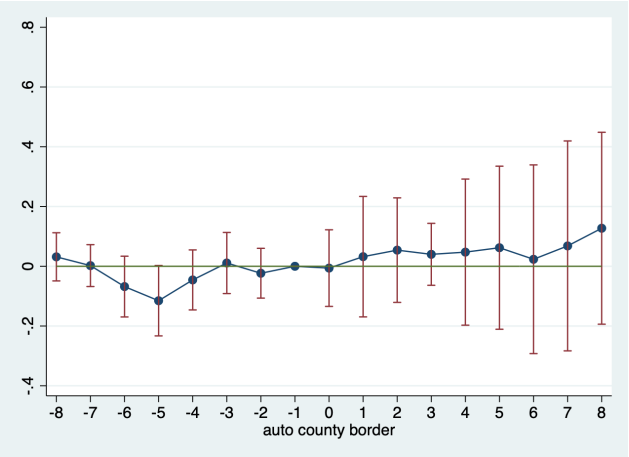


border counties

(C) Auto



All counties



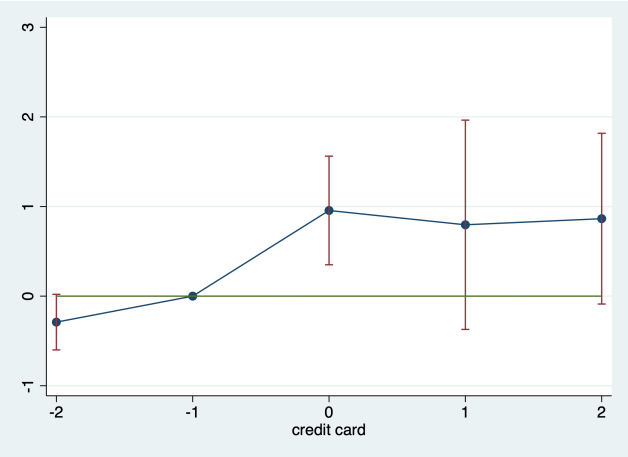
border counties

Alt text: A series of six graphs. Panel A is labeled "credit card" and shows two graphs in which a line is approximately flat near the zero dollar level from negative time periods up to time zero, and then is positive and increasing for positive time periods. Panel B is labeled "mortgage" and shows two graphs in which a line is approximately flat throughout. Panel C is labeled "auto". The line in its left panel declines throughout. The line in its right panel is approximately flat throughout.

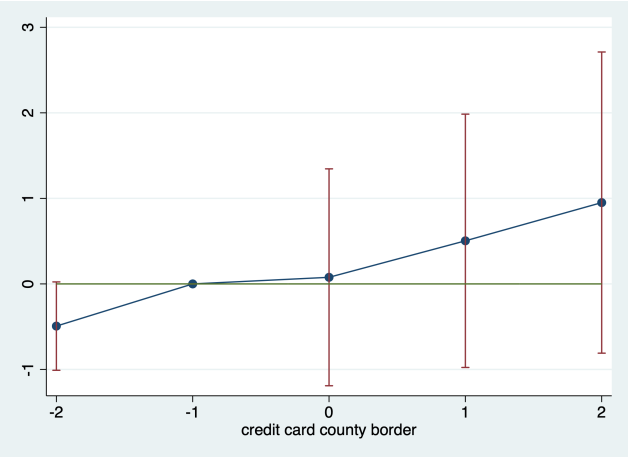
Figure 5. Dynamics effects on interest rates

This figure shows event study that follows specification (3) for interest rates on credit cards, personal unsecured loans, and mortgages rates at 30- and 15-year fixed rates and 3- and 5-year variable rates. The left-hand column shows the estimates for all counties in the sample, and the right-hand column shows the county-pairs sample. *Sources*: RateWatch and author's calculations.

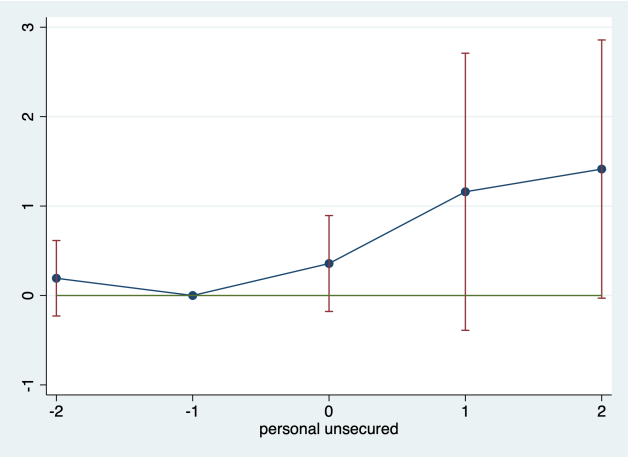
(A) Unsecured credit rates



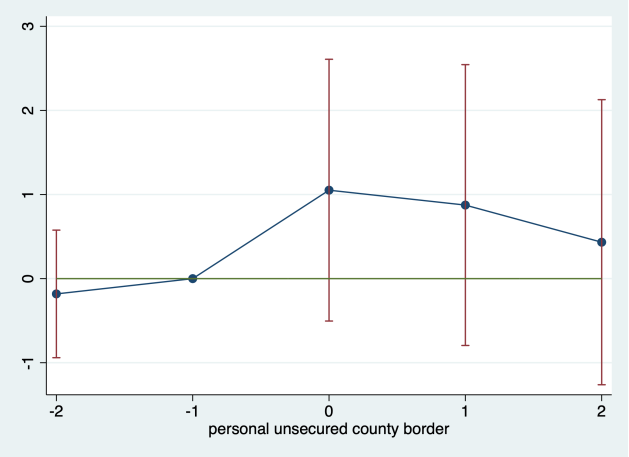
Credit card all counties



credit card border counties

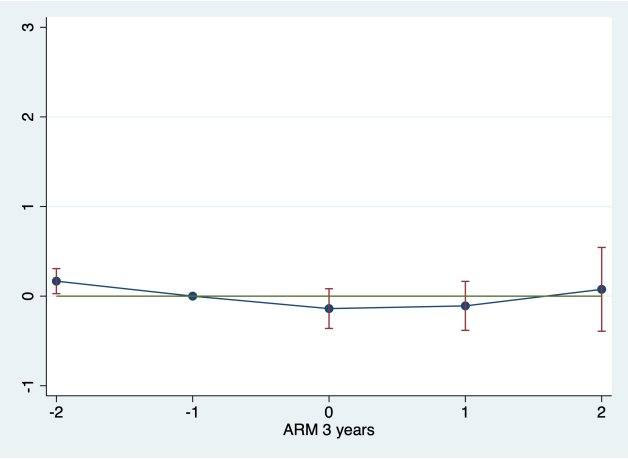


Personal unsecured all counties

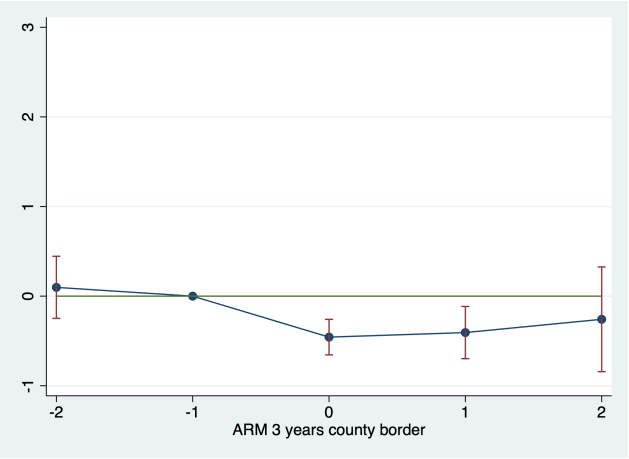


personal unsecured border counties

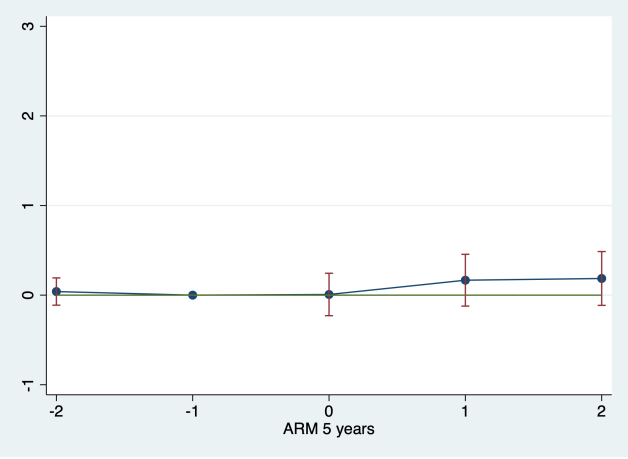
(B) Variable-rate mortgages



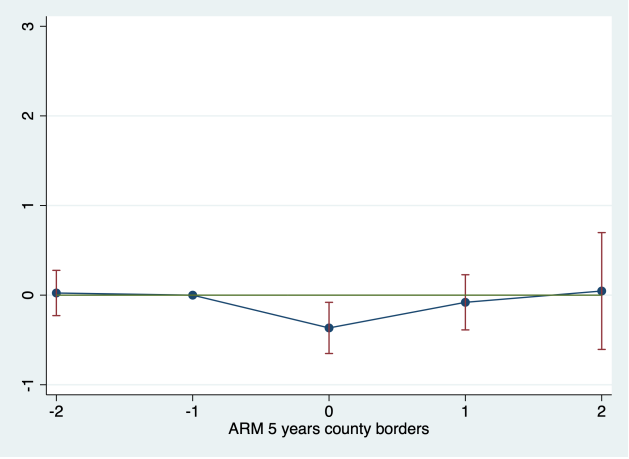
ARM 3 all counties



ARM 3 border counties

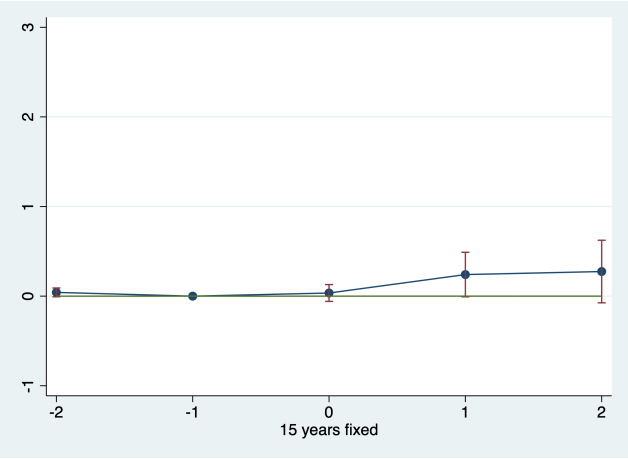


ARM 5 all counties

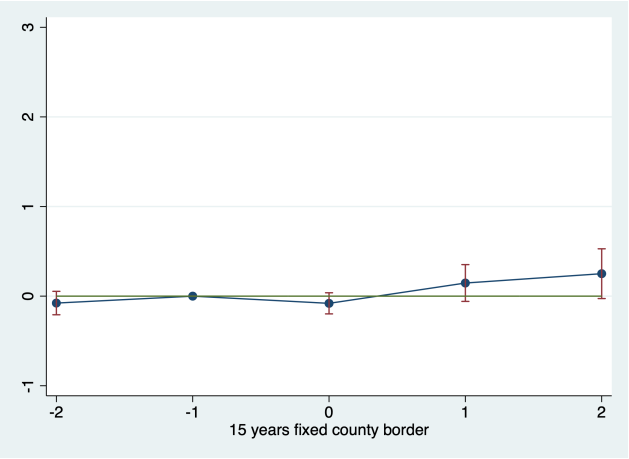


ARM 5 border counties

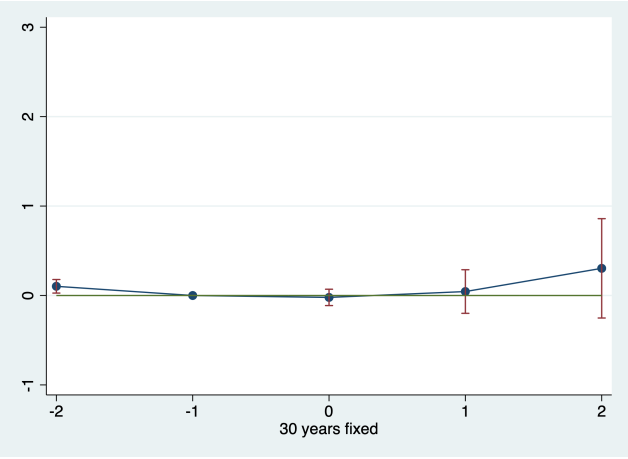
(C). Fixed-rate mortgages



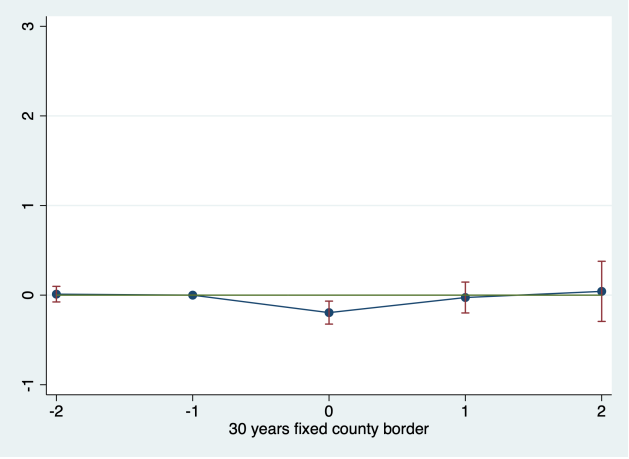
15 fixed all counties



15 Fixed border counties



30 fixed all counties



30 Fixed border counties

Alt text: A series of three panels, each containing four smaller graphs. Panel A is labeled "unsecured credit rates". Its four panels depict zero values before time zero and then positive values for credit card and personal loan interest rates. Panel B is labeled "variable-rate mortgages". Its four panels depict largely flat interest rate trends. Panel C is labeled "fixed-rate mortgages". Its four panels depict largely flat interest rate trends.

Appendix

A Model of Effect of Bankruptcy Protection on Household Borrowing

To explore the previous explanation, to gain further insights into the effects of changes in the bankruptcy reforms on the supply of credit, and to guide the empirical analysis, we provide a simple model of the credit market where we abstract from moral hazard and the adverse selection behavior of borrowers. In our model, we highlight the effect of the increase of partial insurance provided by bankruptcy protection in the credit market equilibrium outcome, and how even in the absence of asymmetric information, we could observe a demand effect.

We use a two-period model, where the agent needs to borrow in order to consume at period 1. Formally, the agent will consume c_o at t=0 and $c_1(s)$ at t=1, where $s \in \{B, G\}$ (good and bad states in t=1), with the corresponding probability $\{p, 1-p\}$.

The agent is endowed with wealth only at t=1. His wealth is a combination of home equity H (exogenous) and income y. For simplicity, assume that income follows a binomial distribution given by $y(G) = W > 0$ and $y(B) = 0$. There exists a level of protection P (exogenously determined).

The agent's consumption will be given by

$$c_0 = b$$

$$c_1 = y + H - Min\{(1+R)b, y + Max(H - P, 0)\}$$

where R is endogenously determined.

Agent's Maximization Problem

Given this setup, the agent will solve the following problem:

$$V(b) \quad = \quad Max \;\; u(c_0) + \beta E[u(c_1)],$$

subject to the consumption above. Therefore, the agent's consumption in period 2 will be given by:

- No default, total repayment: $c_1 = y + H - (1+R)b$
- Default and home-equity is not fully protected $(H - P) > 0$: $c_1 = P$
- Default and home-equity is fully protected $(H - P) < 0$: $c_1 = H$

Bank's break-even condition

It is given by

$$(1+r)b = E[Min\{(1+R)b, y + Max(H-P,0)\}],$$

where r is the risk-free rate (exogenous). The payoff for the bank is given by:

- No default, total repayment: $b(1+R)$
- Default and home-equity is not fully protected: $y + H - P$
- Default and home-equity is fully protected: y

Consider a risk-averse agent, $u(x) = ln(x)$, the solution of the problem above defines three regions as a function of the level of protection. Figure 4 illustrates the shape of the numerical solution using the following set of parameters $r = 0.05$, $\beta = 0.925$, $p = 0.5$, $W = 5k$.

Fixed borrowing (between $0, \underline{P}$): There is no default; banks lend at a risk-free rate, and the borrower demands a fixed quantity not related to the level of protection.

Increase in borrowing (between $\underline{P}, P^*$): There is a probability of default greater than zero, interest rates go up, but quantities go up too. The agent's marginal utility of consumption at t = 0 is greater than the marginal cost in the good state, conditional on the level of protection on the bad state, that ensures a given level of consumption.

Decrease in borrowing (between $P^*, \overline{P}$): The probability of default increases, and interest rates go up even more. Agents will decrease the equilibrium amount of debt with respect to the previous region, and the marginal cost in the good state overcomes the benefit of consumption today, given the level of protection in the bad state.

The main focus of the paper is on the estimation of the increase in borrowing, as reflected in Table 3. However, the Appendix provides support for the model's theoretical solution. By exploring the fact that during the 1999–2005 period, Washington DC changed its protection to unlimited protection, the solution to the model will predict that the supply effect dominates, leading to a decrease in unsecured debt for that state. Table A3 confirms this finding by documenting a negative and significant effect for Washington DC.

B Survey evidence on consumer awareness of the relevant consumer bankruptcy regulations

We have been unable to find direct measures of consumers' awareness of bankruptcy protection terms in the prior literature on consumer bankruptcy. Therefore, we investigated consumer awareness by implementing a simple survey. We must acknowledge the primary limitation of our simple survey from the start: this survey was, of necessity, fielded in 2024, two decades after our estimation window (in which the more informative protection policy evolution took place). The bankruptcy knowledge of contemporary consumers does not necessarily represent that of consumers in the early 2000s.

To explore contemporary awareness of US states' consumer bankruptcy policies, we conducted a survey with 2,187 individuals via Amazon Mechanical Turk. The survey aimed to assess households' awareness of and familiarity with personal bankruptcy protection laws, and their understanding of the bankruptcy process. Table A5 Panel A provides summary statistics: the sample has a 61.4% homeownership rate and an 11.7% cumulative incidence of bankruptcy filings, consistent with U.S. aggregates.[45] Notably, 34% of respondents reported some familiarity with personal bankruptcy.

[45] For example, households' self-reported five-year incidence of bankruptcy ranges from 4.4% in the 2004 Survey of Consumer Finances (SCF) to 1.3% in the (post-pandemic) 2022 SCF (Bricker et al. 2017, Chang et al. 2023).

Table A6 represents our survey questionnaire. We ask respondents about their income (bracketed), whether they are familiar with the US personal bankruptcy code, whether they have filed for consumer bankruptcy, whether they are homeowners, their home equity (bracketed), and their state of residence.

Following this, we ask two questions intended to reveal the respondent's knowledge of bankruptcy law. First, we ask them to imagine that they are a homeowner filing for bankruptcy. Will they lose their home (Q4b)? With this answer in hand, we ask them why or why not. Options are listed in Table A6. We evaluate the consistency of their answers to whether they would lose their home with their answers to why or why not (Q4). For example, "Yes, I would lose my home" and "The equity value of my home is above the state exemption level" is marked as correct; "No" and "...below..." is also marked as correct. In addition, "No" and "One does not lose his/her home under bankruptcy" is marked as correct only for residents of states with unlimited homestead exemptions. We find that 24.6% of survey respondents provide "correct" answers regarding whether they would lose their (hypothetical) home in bankruptcy (reported in Table A5. Panel A); we define this indicator as "lose the home."

Second, we ask homeowner respondents to estimate their home equity holdings (Q4a) and indicate whether their state protects this equity under bankruptcy (Q6). A response is marked as correct if their estimated home equity falls within the protection limits of their state's exemption level. We find that 16.3% of homeowner respondents correctly report their home-equity protection status (Table A5, Panel A); we define this indicator as "protected home-equity."

Finally, evidence regarding survey respondents' ability to report bankruptcy protections correctly may be more or less convincing depending on whether those survey respondents with more self-reported experience or familiarity with bankruptcy law are the ones who report correctly. Table A5 Panel B reports linear probability model estimates of the association between familiarity and experience with personal bankruptcy and correct knowledge of the personal bankruptcy protection process. Our estimates indicate that self-reported familiarity with bankruptcy laws and bankruptcy experience are positively correlated. Further, across Table A5 Panel B, those with familiarity and experience are estimated to be between 14.0 and 18.3 percentage points more likely to answer the "lose home" and the "protected home-equity" questions correctly.[46]

In sum, we find evidence of meaningful heterogeneity in consumer bankruptcy awareness. Our survey results indicate that a third of the respondents to our online survey (who include homeowners and non-homeowners and who report widely varying income) claim to have some familiarity with consumer bankruptcy law, and 11.7% report a past bankruptcy. Familiarity and past experience with bankruptcy are estimated to be closely associated with the ability to respond accurately to questions of fact regarding the consumer bankruptcy regulations to which the respondent is subject.

[46] Each of the relevant point estimates is significant at the one percent level.

C Calibration of interest rate response

In order to understand the economic content of our estimated interest rate response more fully, we rely on the simple model of bankruptcy in Appendix A to compare the lender's expected increase in losses that result from increased bankruptcy protection to the increase in the equilibrium interest rate. Our calculations draw estimates from Tables 1, 4, 7, and 8.

Consider a borrower who carries the average credit card debt of $6,586, and benefits from the average protection of $73,625. Assume that, in the event of bankruptcy, the borrower's assets will be less than the total obligation plus the prevailing bankruptcy protection level (the typical case in bankruptcy). In terms of the model,

$$H - P < (1 + R) \cdot b$$

This borrower will be required to pay only $H - P$, where H is the borrower's home equity, P is the level of bankruptcy protection, b is the amount borrowed in period 1, and R is the equilibrium interest rate.[47]

Therefore, the expected cost for the lender will be determined by the incremental loss given default, the default probability, and the distribution of borrowers' home equity. Suppose that the initial protection level is P_0 and the reformed protection level P_1, such that $P_1 > P_0$. Define the change in the loss given default with the increase in protection from P_0 to P_1 as $c(H)$, a piecewise function:

$$c(H) = \begin{cases} 0 & \text{if } H < P_0 \\ H - P_0 & \text{if } P_0 \leq H \leq P_1 \\ P_1 - P_0 & \text{if } H > P_1 \end{cases}$$

Define $\Delta P = (P_1 - P_0)$. Given that ΔP is typically small relative to both the size of the obligation and the initial protection level, we can closely approximate cost increase $c(H)$ as

$$c(H) = \begin{cases} 0 & \text{if } H \leq P_0 \\ \Delta P & \text{if } H > P_0 \end{cases}$$

Following the empirical distribution described by Indarte (2023), we define the annual probability of default, $f(H)$, as constant in the amount borrowed up to the protection limit, and then following an exponential decay after the limit:[48]

$$f(H) = \begin{cases} 0.01 & \text{if } H \leq P_1 \\ 0.01 \cdot a^{\frac{H - P_1}{k}} & \text{if } H > P_1 \end{cases}$$

To show the similarity to Indarte (2023) of our probability of default as a function of the borrower's asset level, Figure A2 Panel A shows the empirical distribution in Indarte (2023) and Figure A2 Panel B depicts $f(H)$ for different values of a, and assuming that $k = 40,000$ and $P_1 = 73,627 \times 1.01 = 74,363.27$.

Finally, we assume a density function for the home-equity distribution such that $d(H)$ is a normal density centered at the new exemption limit P_1:

$$d(H) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(H-\mu)^2}{2\sigma^2}}$$

where $\mu = P_1$ and $\sigma = 50,000$. The resulting distribution is reasonably similar to that of Indarte (2023), replicated here in Figure A3 Panel A, and to our own inferred home equity distribution, assuming 2000 house price levels, depicted in Figure A3 Panel B.

[47] For more details, see Appendix A model.

[48] Note that the small size of ΔP relative to both a and P_0 further suggests that the choice between defining $f(H)$ using P_0 and P_1 is relatively inconsequential for our comparison.

The expected cost for the lender, L, is given by the following expression:

$$L = \int_0^\infty f(H) \cdot c(H) \cdot d(H)\, dH$$

We evaluate the values of the integral L using the following parameters: $k = 40,000$, $P_0 = 73,627$, $P_1 = 74,363.27$, and for different values of a. We find that for $a = 0.1$, $L \approx 0.54$, and for $a = 0.3$, $L \approx 0.68$.

Thus, depending on the specific parameterization of the default function around the increase in exemption, the annual cost for the lender of a one percent increase in bankruptcy protection is between \$0.54 and \$0.68.

At the same time, a one percent increase in protection is estimated in Table 4 to raise the equilibrium (annual) credit card interest rate by 0.853 basis points. Given an average credit card debt of \$6,586, the annual increase in interest payments on the average credit card balance becomes \$0.56.

Comparing the lender's annual expected loss given default, which ranges from \$0.54 to \$0.68, to the expected revenue increase from the interest rate adjustment of \$0.56 over one year, our descriptive values and interest rate estimates include the possibility that lenders are fairly compensated for the decrease in recovery rates that results from greater bankruptcy protection by their increased interest income.

Moreover, the upper end of the estimates implies a potential decrease in expected profits for the lender, alongside a net benefit for the consumer. While theory tells us that consumer protection laws might lead in some cases to reduced equilibrium lending, higher credit prices, and a net reduction in consumer welfare, the balance that we calibrate between the increased interest price of credit and the decreased repayment in the event of default based on our estimates (weakly) suggests a net benefit to consumers from the 1999-2005 bankruptcy protection reforms. This finding is consistent with our estimated increase in consumer credit card balances, and the increase in consumer demand for credit card borrowing that it implies.

Additional Tables and Figures

Table A1. Effect of bankruptcy protection on debt balances: Robustness specifications

	All counties						County borders					
	Eventually (1)	**First treatment (2)**	**Dummy (3)**	**Changes once (4)**	**UI changes control (5)**	**Homestead only (6)**	**Eventually (7)**	**First treatment (8)**	**Dummy (9)**	**Changes once (10)**	**UI changes control (11)**	**Homestead only (12)**
Credit card												
Protection	0.037*	0.041***	0.043***	0.042***	0.036*	0.047***	0.128**	0.200**	0.200**	0.162**	0.055***	0.137***
Level s,t	(0.019)	(0.012)	(0.012)	(0.012)	(0.019)	(0.018)	(0.053)	(0.082)	(0.082)	(0.067)	(0.010)	(0.053)
No. of obs.	901,885	1,217,096	1,217,096	1,042,403	1,217,096	1,200,663	573,460	766,941	766,941	610,611	766,941	743,573
No. of clusters	33	41	41	32	41	40	31	39	39	32	39	38
Mortgage												
Protection	-0.023	-0.018	0.006	-0.018	-0.008	-0.010	-0.032**	0.021	0.028	0.041	-0.012	-0.022
Level s,t	(0.016)	(0.019)	(0.015)	(0.019)	(0.018)	(0.018)	(0.013)	(0.027)	(0.023)	(0.025)	(0.018)	(0.018)
No. of obs.	1,210,265	1,615,380	1,615,380	1,386,094	1,615,380	1,594,127	760,726	1,014,481	1,014,481	809,650	1,014,481	983,969
No. of clusters	33	41	41	32	41	40	31	39	39	32	39	38
Auto												
Protection	-0.005	-0.011	-0.007	-0.008	-0.001	0.001	-0.032	0.145	0.219	0.057	0.022	0.021
Level s,t	(0.021)	(0.021)	(0.017)	(0.021)	(0.019)	(0.015)	(0.065)	(0.095)	(0.500)	(0.090)	(0.067)	(0.078)
No. of obs.	482,847	667,780	667,780	573,733	667,780	658,341	316,167	429,615	429,615	345,760	429,615	416,011
No. of clusters	32	40	40	32	40	39	31	39	39	32	39	38
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y	Y	Y	Y						
Neighbor county Pairs x Year-quarter FE							Y	Y	Y	Y	Y	Y

This table shows the estimated coefficient following a variation of specification (1) for all counties and (2) county borders sample. Columns 1 and 7 replicate the results for the subsample of eventually treated states. Columns 2 and 8 use a definition of the treatment that is equal to the level of exemption the first time a state is treated (intensity of treatment) and stays at that value. Columns 3 and 9 show the results using the same first-time treatment assignment but with a dummy indicator instead of the level of exemptions. Columns 4 and 10 restrict the sample to states that only changed the limit once during our sample period. Columns 5 and 11 control for changes in unemployment insurance, and columns 6 and 12 show the result if changes in the level of protection are measured only as home-equity protection. The sample period is from 1999 to 2005. .1; **p <.05; ***p <.01 (clustered at the state level, for all counties and state and county border pairs in the county borders specification). *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table A2. Effect of bankruptcy protection on interest rates: Robustness specifications

A. Unsecured rates

	All counties						County borders					
	Eventually	**First treatment**	**Dummy**	**Changes once**	**UI changes control**	**Homestead only**	**Eventually**	**First treatment**	**Dummy**	**Changes once**	**UI changes control**	**Homestead only**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Credit card												
Protection	0.821**	1.082***	0.945**	0.897***	0.901***	0.838***	1.185**	0.953**	0.931*	0.730	1.006**	1.255***
Level s,t	(0.416)	(0.280)	(0.392)	(0.304)	(0.346)	(0.258)	(0.525)	(0.423)	(0.562)	(0.535)	(0.445)	(0.462)
No. of Obs.	1,994	4,113	4,113	3,513	4,113	4,030	238	854	854	600	854	756
No. of clusters	25	46	46	35	46	44	13	36	36	28	36	34
Personal unsecured												
Protection	0.851***	0.498**	0.292**	0.881***	0.843***	0.373**	0.614	1.085***	0.770***	1.185***	0.901**	0.432*
Level s,t	(0.299)	(0.241)	(0.204)	(0.303)	(0.280)	(0.183)	(0.668)	(0.290)	(0.203)	(0.340)	(0.391)	(0.236)
No. of Obs.	1,729	3,286	3,286	2,653	3,286	3,211	422	904	904	458	904	770
No. of clusters	25	46	46	34	46	45	12	36	36	27	36	35
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y	Y	Y	Y						
Neighbor county Pairs x Year-quarter FE							Y	Y	Y	Y	Y	Y

B. Mortgage variable rates

	All counties						County borders					
	Eventually	**First treatment**	**Dummy**	**Changes once**	**UI changes control**	**Homestead only**	**Eventually**	**First treatment**	**Dummy**	**Changes once**	**UI changes control**	**Homestead only**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
3-yr ARM												
Protection	-0.201*	-0.111	-0.080	-0.150*	-0.129	-0.128**	0.007	-0.032	-0.052	-0.210**	-0.039	-0.056
Level s,t	(0.108)	(0.083)	(0.077)	(0.085)	(0.086)	(0.063)	(0.062)	(0.071)	(0.066)	(0.103)	(0.080)	(0.077)
No. of obs.	3,072	6,138	6,138	5,039	6,138	6,005	892	2,138	2,138	1,142	2,138	1,878
No. of clusters	28	49	49	35	49	47	18	41	41	28	41	40
5-yr ARM 5												
Protection	-0.107	0.062	0.002	0.049	-0.002	-0.011	-0.010	-0.070	-0.108	-0.256**	-0.100	-0.081
Level s,t	(0.129)	(0.106)	(0.083)	(0.108)	(0.111)	(0.097)	(0.059)	(0.081)	(0.068)	(0.104)	(0.075)	(0.071)
No. of obs.	2,998	5,629	5,629	4,594	5,629	5,500	848	1,880	1,880	1,000	1,880	1,630
No. of clusters	27	48	48	34	48	47	19	42	42	26	42	41
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y	Y	Y	Y						
Neighbor county Pairs x Year-quarter FE							Y	Y	Y	Y	Y	Y

C. Mortgage fixed rates

	All counties						All counties					
	Eventually (1)	**First treatment (2)**	**Dummy (3)**	**Changes once (4)**	**UI changes control (5)**	**Homestead only (6)**	**Eventually (1)**	**First treatment (2)**	**Dummy (3)**	**Changes once (4)**	**UI changes control (5)**	**Homestead only (6)**
15-yr fixed												
Protection	0.034	0.055	0.072	0.002	0.006	-0.009	-0.128*	-0.035	0.003	-0.057	-0.103*	-0.070
Level s,t	(0.065)	(0.079)	(0.064)	(0.078)	(0.066)	(0.045)	(0.073)	(0.061)	(0.049)	(0.055)	(0.054)	(0.053)
No. of obs.	4,153	8,264	8,264	6,753	8,264	8,125	1,126	2,936	2,936	1,602	2,936	2,652
No. of clusters	28	50	50	36	50	48	20	48	48	34	48	47
30-yr fixed												
Protection	0.066	0.017	0.016	0.014	0.007	-0.006	0.040	0.040	0.038	-0.034	0.017	0.071***
Level s,t	(0.054)	(0.057)	(0.051)	(0.063)	(0.052)	(0.037)	(0.035)	(0.038)	(0.034)	(0.077)	(0.034)	(0.022)
No. of obs.	4,056	7,921	7,921	6,401	7,921	7,778	1,126	2,820	2,820	1,444	2,820	2,522
No. of clusters	28	50	50	36	50	48	20	48	48	36	48	47
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y	Y	Y	Y						
Neighbor county Pairs x Year-quarter FE							Y	Y	Y	Y	Y	Y

This table shows the estimated coefficient following a variation of the specification (1) for all counties and (2) county borders sample for interest rates. Panel A shows the estimates for credit card and personal unsecured loans. Panel B shows the estimates for variable mortgage rates, and panel C shows the estimates for fixed mortgage rates. Columns 1 and 7 replicate the result for the subsample of eventually treated states. Columns 2 and 8 use a definition of treatment that is equal to the level of exemption the first time a state is treated (intensity of treatment) and stays at that value. Columns 3 and 9 show the results using the same first-time treatment assignment but with a dummy indicator instead of the level of exemptions. Columns 4 and 10 restricted the sample to states that only changed the limit once during our sample period. Columns 5 and 11 control for changes in unemployment insurance, and columns 6 and 12 show the result if changes in the level of protection are measured only as home-equity protection. The sample period is from 1999 to 2005. .1; $^{**}p$ <.05; $^{***}p$ <.01 (clustered at the state level for all counties and state and county border pairs in the county borders specification). *Sources*: RateWatch and authors' calculation.

Table A3. Effect of bankruptcy protection on credit card debt, including Washington DC

	Credit card		Mortgage		Auto	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Protection	0.044**	0.154***	-0.009	-0.011	-0.001	0.016
Level s,t	(0.018)	(0.049)	(0.019)	(0.020)	(0.018)	(0.068)
Protection	-0.085***	-0.155***	-0.011	-0.009	-0.175***	-0.223***
Level s,t x Unlimited	(0.022)	(0.044)	(0.019)	(0.018)	(0.019)	(0.061)
No. of obs.	1,220,431	780,444	1,619,508	1,031,196	669,306	435,839
No. of clusters	42	40	42	40	41	40
R-squared	.65	.66	.87	.87	.58	.61
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y		Y		Y	
Neighbor county Pairs x Year-quarter FE		Y		Y		Y

This table shows the estimated coefficient following a variation of the specification (1) and (2) when the unlimited change for Washington DC is included as a dummy. The sample period is from 1999 to 2005. .1; **p <.05; ***p <.01 (clustered at the state level for columns 1, 3, and 5 and state and county border pairs for columns 2, 4, and 6, respectively). *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table A4. Effects of bankruptcy protection post-BACPA estimates

	Credit card				Mortgage				Auto			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Protection	-0.010	-0.031	-0.007	0.040	-0.007	-0.006	-0.001	-0.004	0.011	-0.012	0.012	-0.050
Level s,t	(0.011)	(0.026)	(0.009)	(0.043)	(0.013)	(0.015)	(0.003)	(0.019)	(0.012)	(0.012)	(0.009)	(0.043)
N of Obs	14,036,897	897,680	9,434,270	564,911	7,420,273	1,203,835	5,029,731	755,622	6,863,703	562,091	4,618,178	360,853
No. of clusters	44	42	41	40	43	42	40	40	43	42	40	40
R-squared	.73	.72	.73	.72	.93	.93	.93	.94	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individuals FE, ZIP code FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Year-quarter FE	Y	Y			Y	Y					Y	Y
Neighbor county Pairs x Year-quarter FE			Y	Y			Y	Y		Y		Y
Sample	All	Low-inc Homeowner	All	Low-inc Homeowner	All	Low-inc Homeowner	All	Low-inc Homeowner	All	Low-inc Homeowner	All	Low-inc Homeowner

This table replicates the individual results in Table 3 for the sample period postbankruptcy reform (from 2006 to 2009). *, **, and *** denote significance at the 10%, 5%, and 1% cluster at the state level for regression using the whole sample of households and state levels and county border pairs for the county border sample. Source: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Table A5. Survey on Bankruptcy Protection Familiarity Statistics

A. Summary Statistics

Variable	Obs	Mean	Std. dev.
Lose the Home	2,187	0.246	0.43
Protected Home-Equity	1,342	0.163	0.37
Homeowner	2,187	0.614	0.49
Personal Bankruptcy Familiarity	2,187	0.340	0.47
Filed for Bankruptcy	2,187	0.117	0.32

B. Lose the Home & Protected Home-Equity

	Lose the Home			**Protected Home-Equity**		
	(1)	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Constant	0.246***	0.188***	0.226***	0.163***	0.092***	0.147***
	(0.049)	(0.044)	(0.049)	(0.019)	(0.013)	(0.017)
Familiar with Personal Bankruptcy		0.170***			0.183***	
		(0.026)			(0.030)	
Filed for Bankruptcy			0.164***			0.140***
			(0.034)			(0.038)
No. of Obs.	2,187	2,187	2,187	1,631	1,631	1,631
No. of Clusters	50	50	50	50	50	50
R-Squared	0.00	0.04	0.02	0.00	0.01	0.00

This table reflects the results of our simple survey. Panel A reports summary statistics for our survey sample. "Lose the Home" is an indicator equal to 1 if the respondent's answers to questions (4) and (4b) on whether they would lose their home under bankruptcy are consistent. For example, "Yes, I would lose my home" and "The equity value of my home is above the state exemption level" is marked as correct; "No" and "...below..." is also marked as correct. In addition, "No" and "One does not lose his/her home under bankruptcy" is marked as correct only for residents of states with unlimited homestead exemptions. "Protected Home-Equity" is an indicator equal to 1 if the respondent's reported home equity (Q4a) is below their state's current exemption level and they respond that their home equity is protected (Q6), or if their home equity (Q4a) is above their state's current exemption level and they respond that their home equity is not protected. Panel B displays estimates from linear probability models of the dependence of the "Lose the Home" and "Protected Home-Equity" indicators on the respondent's familiarity and experience with personal bankruptcy. .1; $^{**}p<.05$; $^{***}p<.01$ (clustered at the state level). *Sources*: authors' calculations based on Amazon Turk Survey

Table A6. Survey on Bankruptcy Protection Familiarity

Survey Questions

A. Identified people who have experience with bankruptcy

Q1. Please choose the range that best represents your family income.

$< 50K, 50-100K, 100-150K, 150-200K, > 200K$

Q2. Are you familiar with the US personal bankruptcy code?

Yes No

Q3. Have you ever filed for consumer bankruptcy? (This is different from business or corporate bankruptcy.)

Yes No

Q4. Are you currently a homeowner? Yes/No

Q4a[Q4=Yes]. What range below best represents your home equity? (Your home equity is the difference between what your home is worth and your mortgage debt balance.)

$< 50K, 50-100K, 100-250K, 250-500K, > 500K$

B. Hypothetical bankruptcy

Q4b. Imagine that you are a homeowner considering filing for bankruptcy.

Will you lose your home if you file for bankruptcy? Yes No

Q4. Why did you reply [YES or NO]?

- The equity value of my home is below the state exemption level.
- The equity value of my home is above the state exemption level.
- The equity value of my home is equal to the state exemption level.
- One does not lose her/his home under bankruptcy.
- I don't know.
- Other

Q5. What is your current state of residence? [Drop menu]

Q6. Does your state [Q5] protect your home equity under bankruptcy?

Yes, No, I don't know.

[If yes] What is the amount protected?

$< 25k, 25-50K, 50-100K, 100-250K, 250-500K, > 500K$

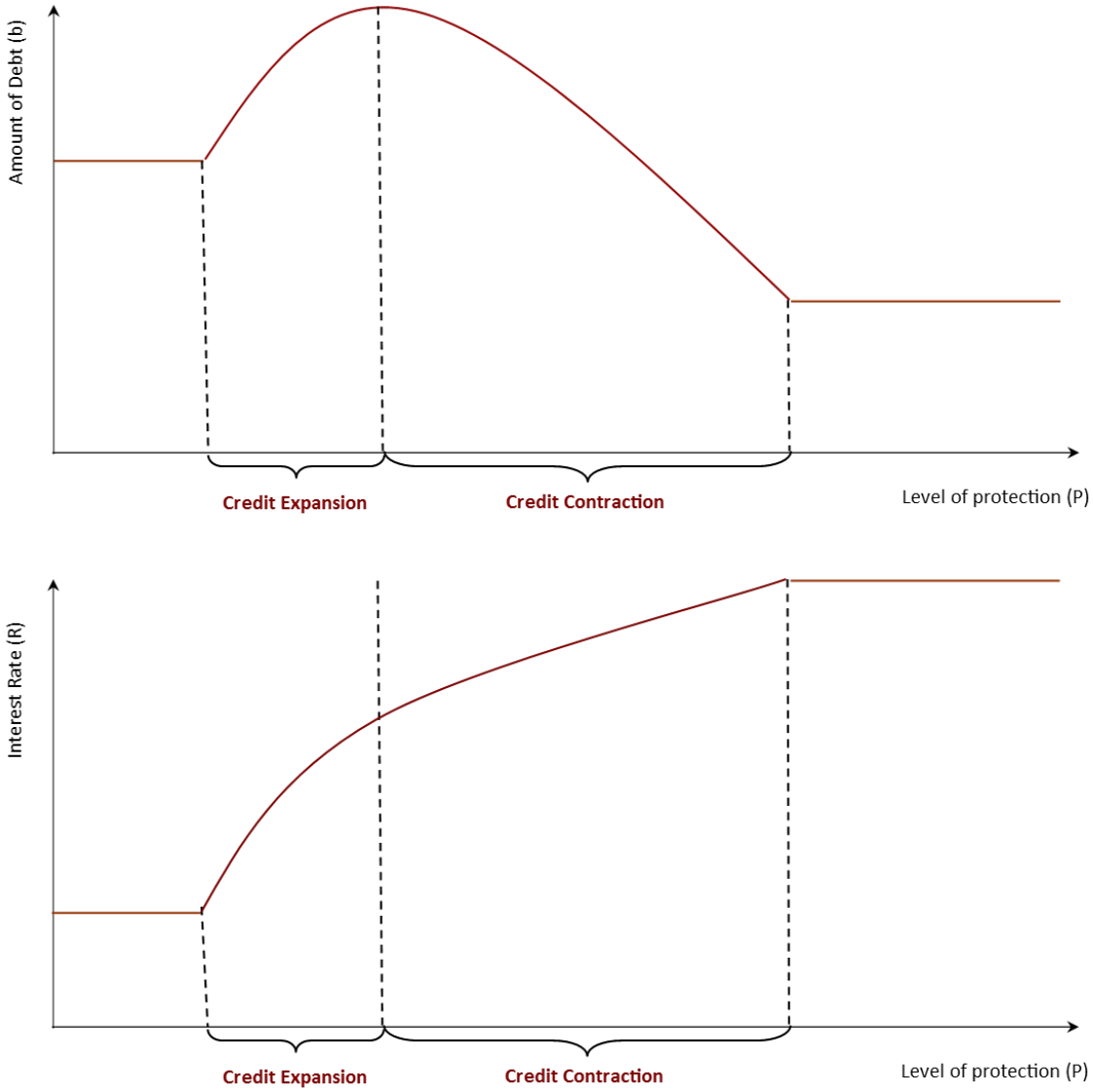
Table A7. Effect of bankruptcy protection on Credit Card Debt: Robutness

	ln(y)	ln(y+1)	asinh(y)	ln(y)	ln(y+1)	asinh(y)
	(1)	(2)	(3)	(4)	(5)	(6)
Protection	0.043**	0.064*	0.069*	0.147***	0.239*	0.254*
Level s,t	(0.018)	(0.034)	(0.036)	(0.048)	(0.135)	(0.143)
No. of Obs.	1,217,096	1,615,380	1,615,380	766,941	1,014,481	1,014,481
No. of Clusters	41	41	41	39	39	39
R-Squared	0.65	0.71	0.71	0.66	0.71	0.71
Controls	Y	Y	Y	Y	Y	Y
Individuals FE, Zipcode FE	Y	Y	Y	Y	Y	Y
Year-quarter FE	Y	Y	Y			
Neighbor County						
Pairs x Year-quarter FE				Y	Y	Y

This table shows the results for different transformations of the credit card balances. Columns 1 to 3 estimate specification (1), and columns 4 to 6 estimate specification (2). The sample period is from 1999 to 2005. .1; **p <.05; ***p <.01 (clustered at the state level). *Sources*: New York Fed Consumer Credit Panel / Equifax and authors' calculations.

Figure A1. Illustration of a solution of the model

This figure shows a stylized, schematic solution of the path obtained by numerically solving the model in Appendix A. The top figure shows the relationship between the debt amount and protection levels. The bottom figure shows the relationship between price and protection levels.

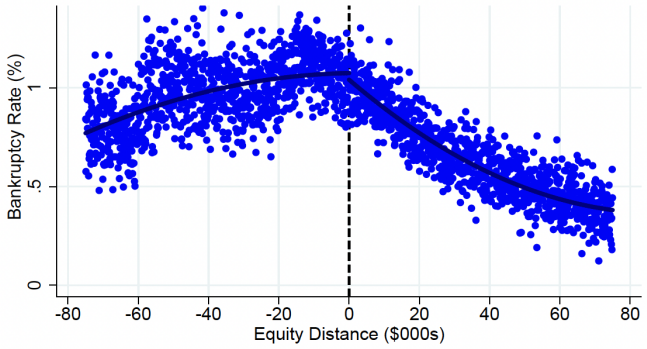


Alt text: The top graph shows a line graph illustrating the relationship between the amount of debt (b) and the level of protection (P). The x-axis represents the level of protection (P), and the y-axis represents the amount of debt (b). The graph shows two distinct phases: a credit expansion phase, where the debt increases sharply, followed by a credit contraction phase, where the debt decreases and eventually flattens out. The transitions between these phases are marked by dashed vertical lines. The bottom graph shows a line graph showing the relationship between the interest rate (R) and the level of protection (P). The x-axis represents the level of protection (P), and the y-axis represents the interest rate (R). The graph illustrates two phases: a credit expansion phase with a gradual increase in the interest rate, followed by a credit contraction phase where the interest rate continues to rise and eventually flattens. Dashed vertical lines mark the transitions between phases.

Figure A2. Model Assumptions: Bankruptcy Rate function

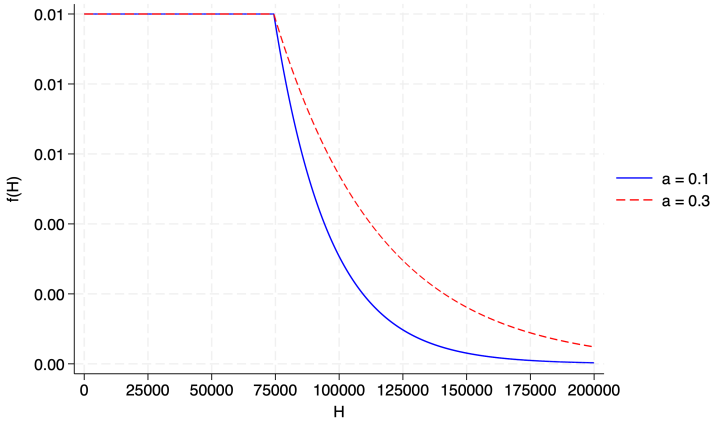
A.Bankruptcy Probability. Indarte(2023)

Figure A.3: Bankruptcy Rates versus Seizable Home Equity (Additional Bins)



Note. The points denote average (annualized) filing rates within equity distance bins. The lines are generated by fitting a quadratic polynomial to the individual observations on each side of the kink.

B.Bankruptcy Probability functional form

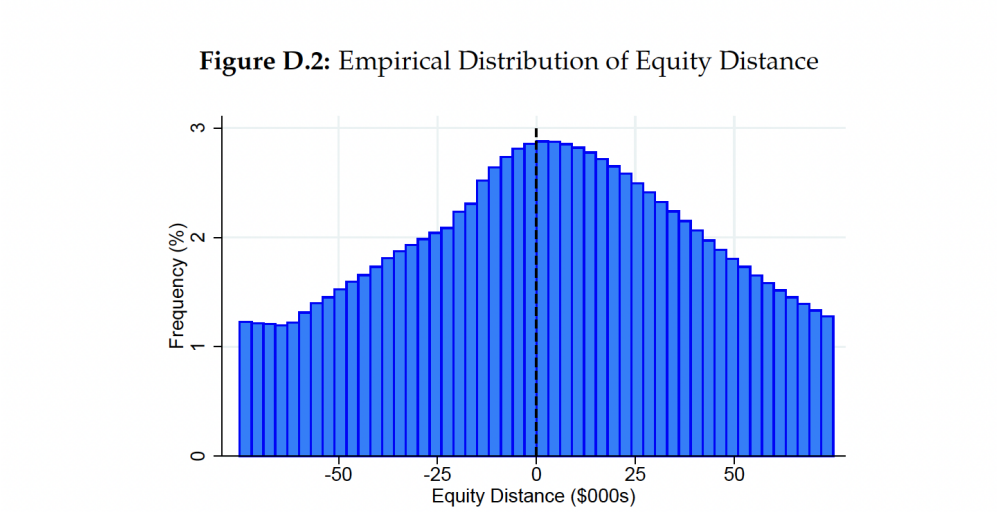


Panel A reproduces Figure A3 from Indarte(2023) that describes the bankruptcy rate by distance from the level of home-equity protection. Panel B shows the parametric bankruptcy functional form using the interest rates response calibration

Alt text: Panel A is a scatterplot showing bankruptcy rates versus equity distance (in $1,000s) with additional bins. The x-axis represents equity distance, ranging from -80 to 80, and the y-axis represents the bankruptcy rate (in percentage terms). The points indicate annualized filing rates within equity distance bins, with a quadratic polynomial fit line showing a decreasing trend as equity distance increases beyond 0.Panel B is a line graph showing the functional form of bankruptcy probability as a function of home equity (H). The x-axis represents home equity (H), ranging from 0 to 200,000, and the y-axis represents the bankruptcy probability (P(H)). Two curves are shown: one for a=0.1 (blue) and another for a=0.3 (red dashed), both displaying a steep decline as home equity increases, flattening toward higher values.

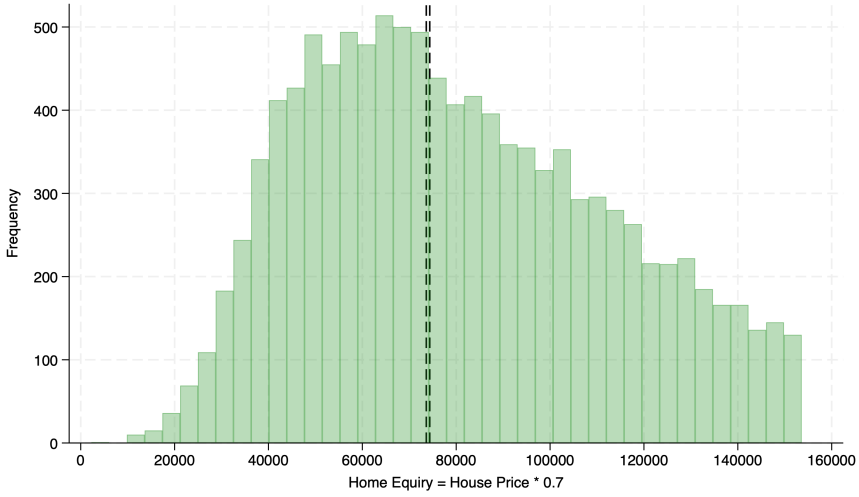
Figure A3. Model Assumptions: Home Equity Distribution function

A. Home Equity Distribution. Indarte (2023)



Note. This graph plots a histogram of equity distance for the main sample, within $75k of the cutoff.

B. Home Equity Distribution Empirically based on 2000 House Prices



Panel A reproduces Figure D2 from Indarte(2023) that describes the frequency histogram of home-equity distance for the main sample. Panel B shows a frequency histogram of the home-equity distribution of zipcode-level house prices in 2000; it assumes that the average equity is 30% of the value of the houses.

Alt text: Panel A is a histogram showing the empirical distribution of equity distance for a main sample within $75,000 of the cutoff. The x-axis represents equity distance in thousands of dollars (ranging from -50 to 50), and the y-axis represents frequency in percentage terms. The histogram peaks at 0, with a roughly symmetric distribution. Panel B is a histogram showing the empirical distribution of home equity based on 2000 house prices. The x-axis represents home equity (calculated as house price times 0.7) in dollars, ranging from 0 to 160,000, and the y-axis represents frequency. The distribution peaks around 80,000, with a slightly skewed distribution tapering toward higher values.