Do Payday Loans Cause Bankruptcy?*

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Abstract

Some recent papers using geographical sources of variation find that payday loans, despite their annualized interest rates of at least several hundred percent, may provide benefits to borrowers and their communities. This paper uses individual-level identification from a discontinuity in the evaluation of loan applications and finds the opposite result, at least for the subsample identifying the local average treatment effect. Specifically, we show that for first-time applicants near the 20th percentile of the credit-score distribution, access to payday loans causes Chapter 13 bankruptcy filings over the next two years to double. In part, this large effect is caused by small ($300) loans because consumers are already financially stressed when they begin borrowing on payday loans. In addition, many payday borrowers take out multiple loans, so that the cumulative interest burden from payday loans amounts to roughly 11% of the total liquid debt interest burden at the time of bankruptcy filing. We find no evidence of strategic payday borrowing in anticipation of debt erasure in bankruptcy.

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1 Introduction

An estimated ten million American households borrow on payday loans each year and payday lenders now have more storefronts in the United States than McDonald's and Starbucks combined.[1] According to the Survey of Consumer Finance, 2.38 percent of households in 2007 (weighted to represent a nationally representative sample) used payday loans within the past year. Payday loans offer borrowers a few hundred dollars cash until their next paydays. Borrowers provide proof of employment and a post-dated check for the principal and interest which is deposited by the lender typically two weeks later. Short payday loans generate high interest payments. Finance charges are typically 18 percent for the duration of the loan, and most payday borrowers are paid biweekly. This implies an APR of at least 18% x 26 = 468%, since people paid biweekly receive 26 paychecks in a year.[2]

Standard economic theory suggests that consumer credit—even high-interest credit—can facilitate consumption-smoothing, and the payday loan industry asserts that the loans help customers cope with short-term shocks that arise between paychecks.

Many policymakers and consumer advocates have a different view, deeming the loans predatory and usurious. In a typical example, State Senator Jim Ferlo of Pennsylvania argued that payday lenders "encourage you not to pay them back and they reel you in. They start the process of getting you hooked financially. You accumulate interest and it becomes a vicious cycle" (Mauriello 2005). The polarized debate on the consequences of this increasingly popular form of credit has led 11 states to pass legislation restricting or prohibiting payday lending, and in November 2005 the FDIC capped the number of payday loans a borrower could take out each year (FDIC 2005).[3]

In this paper, we provide borrower-level estimates of the effects of access to payday loans. A regression discontinuity provides identification at the individual level, in the unique context of a proprietary dataset from a large payday lender. We match individuals from the proprietary dataset with public records on bankruptcy petitions and then exploit the regression discontinuity

[1] Stephens, Inc., an investment bank that monitors the industry, has compiled a national database of payday lending outlets using information from state regulatory agencies and telephone listings. Most recently, they counted 22,300 payday loan outlets in the US in 2008. They also reported that the annual dollar volume of loans grew fourfold in four years to $40 billion dollars in 2003 (Robinson and Wheeler 2003, PricewaterhouseCoopers 2001).

[2] Payday lenders typically do not allow interest to compound, but an alternative APR measure that better captures the cost of liquidity is $100 * \left(1.18^{26} - 1\right) = 7295\%$. Skiba and Tobacman (2008a, 2008b) assess, respectively from the demand side and the supply side, how these interest rates can persist in equilibrium.

[3] The cap depends on the loan durations. Any effect of the rule would have appeared after our period of observation.

to estimate the effect of access to payday loans on chapter 7 and chapter 13 bankruptcies.[4] To interpret the mechanisms driving the bankruptcy results, we also measure the effect of payday loan access on subsequent payday borrowing.

Institutional features of the loan application process at the lender that has provided our data make the regression-discontinuity approach possible.[5] Payday loan applications are approved if and only if the applicant's credit score exceeds a fixed threshold, with few exceptions. Our identifying assumption is that, controlling for flexible smooth functions of the credit score, unobservable characteristics of first-time applicants in the immediate neighborhood of the threshold are similar. If this is true, differences in bankruptcy rates between barely approved and barely rejected applicants can be attributed to payday loan access.[6]

Depending on the specification, our regression-discontinuity estimates imply a doubling of chapter 13 bankruptcy petitions within two years of a first-time applicant's successful payday loan application. Nonparametric estimates support the conclusion that payday loan access increases the probability of filing for bankruptcy, though those estimates introduce other puzzles. An innovation of this paper is that we are able to decouple these results to reveal that the average pattern conceals substantial heterogeneity. Our findings are consistent with the interpretation that payday loans—and interest payments on them—might be sufficient to tip the balance into bankruptcy for a population that is already severely financially stressed: The personal bankruptcy rate among all applicants in our dataset, 2.3% per year, is greater than the rate in the general population by a factor of 6.05. Note again that payday loan interest rates exceed rates on most other forms of credit, and that most payday loan applicants have exhausted other liquidity sources (Elliehausen and Lawrence 2001).

These findings are surprising because payday loans are small (mean≈median≈$300), and bankruptcy is a cumulative financial outcome. We interpret the bankruptcy results by first examining

[4] We study bankruptcy petitions, regardless of whether the petition was dismissed. The majority of Chapter 13 petitions are dismissed in our data. We view petitions themselves as an outcome of interest, representing a form of financial distress. Because bankruptcy law precludes creditors from contacting debtors once a petition is filed, regardless of the outcome of the process, debtors may file to protect themselves from creditors even if their debts are unlikely to be discharged. Hereafter we use "petition" and "filing" interchangeably.

[5] Regression-discontinuity analyses are now commonplace. For the econometric foundations, see Thistlethwaite and Campbell (1960), Hahn, Todd and der Klaauw (2001), Porter (2003) and McCrary (2008). Many modern applications stemmed from the work of Angrist and Lavy (1999); see also, especially, David Lee's many recent contributions (Lee 2008, Lee and Card 2008, Lee and McCrary 2005, DiNardo and Lee 2004, Lee, Moretti and Butler 2004). Imbens and Lemieux (2007) provide a useful practical guide.

[6] Throughout the paper, for convenience we refer to the effect of first-application approval, conditional on applying, as the effect of "payday loan access."

the consequences of first-time payday loan approval for subsequent high-interest-rate borrowing. We demonstrate that approval for one payday loan results in a pattern of future payday loan applications: first-time applicants in our dataset who are approved apply, on average, for 5.2 more loans than rejected first-time applicants over the next 12 months. In dollar terms, this results in $1600 in loans and $300 in interest payments. This suggests payday loan applicants have a persistent demand for credit, so, having discovered a place where credit is available, they return frequently.

We also examine detailed information on creditors, assets, and liabilities from the subsample of individual bankruptcy petitions that statistically identify our empirical estimates. The absence of *short-run* effects of payday loan approval on bankruptcy petitions casts doubt on the theory that payday borrowers are strategically accumulating debt in anticipation of bankruptcy. Our results are more consistent with a medium-run effect compromising of borrowers' overall financial stability due to repeated finance charges made to the payday lender.

Beyond these specific findings, the paper extends the literature on the effects of credit access and on payday loans specifically by revealing substantial heterogeneity in effects that previous work without individual-level data conceals. The payday loan industry, and the subprime-lending market more broadly,[7] have grown dramatically in the last decade. Data on high-interest lending are proprietary, confidential, and politically sensitive. This paper relies on an administrative dataset from a major payday lender, comprising detailed demographic and borrowing information for the full population of loan applications over a four-year period. Individual identifiers in the application records—such as name, date of birth, and Social Security number—allow us to match each applicant to public records on bankruptcy petitions. This unique, large-scale, matched database and our individual-level identification strategy allow us to explore the microeconomic channels through which credit affects consumers, complementing the rich literature which identifies market-level impacts of credit.[8]

The analysis in this paper has several limitations. First, while our research design provides

[7] Payday loans are one form of "fringe banking" Caskey (1994). Like check cashing services and pawnshops, payday lenders provide alternatives to traditional banks. Caskey (1991, 1994, 2001, 2005) has studied fringe banking in great detail; Flannery and Samolyk (2005) have analyzed the profitability of the payday lending industry; Elliehausen and Lawrence (2001) conducted surveys of payday borrowers; and Stegman and Faris (2003) review the payday loan industry's business practices, but the literature on fringe banking remains sparse. Washington (2006) and Adams, Einav and Levin (2006) have studied fringe banking and subprime lending more recently.

[8] Among the vast literature in economics on borrowing and credit, there is very little empirical research on the causal impact of *individual*-level random variation in the ability to borrow money. Excellent exceptions are the work of Gross and Souleles (2002) and Ausubel (1999) on credit cards, and Karlan and Zinman (2005), Karlan and Zinman (forthcomingb) and Karlan and Zinman (forthcominga) studies of South African consumer credit.

clean identification, it has limited ability to address welfare issues. The social costs of chapter 13 bankruptcy are difficult to measure.[9] The second limitation is that our data derive from a single lender that operates hundreds of payday loan outlets but is not a monopolist. Thus, our main estimates represent an upper bound on any effects access to payday loans has on subsequent payday borrowing behavior and a lower bound on the effects on bankruptcy. We explore how competition in payday lending affects the results below by estimating the effects separately for zip codes where this firm operates 100% of the shops and zip codes where this firm has medium and high levels of competition.

Third, it is unclear how readily any results will generalize beyond the ten million working households borrowing on payday loans each year to other borrowers. Finally, a limitation common to all research employing the regression-discontinuity approach[10] is that estimates are identified off of a small range around the discontinuity. Payday loan access may affect consumers with very high or very low credit scores differently than the marginal applicants that drive this paper's estimates. We believe Karlan and Zinman (forthcominga) argue rightly, however, that it is particularly valuable to study the effects of credit access on marginal borrowers since they are likely to be the first affected by changes in policy or lenders' choices.

Our paper adds to the growing literature on the effect of high-interest credit by using individual-level variation rather than aggregate-level changes in access to payday loans such as changes in state regulatory environments or zip-code or county-level shocks. Consensus regarding whether access to payday loans increases or decreases financial strain is illusive. While our work adds to the research finding that payday loans increase financial strain, we additionally focus more directly on heterogeneity in estimates of the effect of payday lending masked by recent work. By uncovering payday lending's heterogeneous effects on different types of consumers, we may yet be able to reconcile what at first appeared to be various research designs contradicting one another.

Using data on check bouncing from Federal credit processing centers, complaints to the FTC about lenders and debt collectors, and state consumer bankruptcy filings from 1997 to 2007, these

[9] A companion paper (Skiba and Tobacman 2008a) develops a structural dynamic-programming model of consumption, saving, payday loan borrowing and default behavior. That paper's model includes standard features like liquidity constraints and uncertainty, and also incorporates institutionally realistic payday loans and generalizations of the discount function. Method of simulated moments estimates of the model's key parameters support the hypothesis of partially naive quasi-hyperbolic agents, and the estimated structural model permits evaluation of the welfare implications of policy alternatives.

[10] More generally, discrete instrumental variables identify only local average treatment effects (Imbens and Angrist 1994).

variables change in Georgia and North Carolina after payday loans were prohibited in 2004 and 2005, respectively. The authors do difference in difference estimations along with DD regressions that control for unemployment and find that in Georgia, relative to other states with no law change, check bouncing, complaints, and chapter 7 bankruptcies all increased significantly. Chapter 13 bankruptcies, however, fell. Coefficients are similar for North Carolina (which results they consider preliminary because of the timing and sample size) but returned checks are no longer significant. Finally, they use Hawaii, where the legal limit for pay day loans doubled in 2003 and thus they have a longer sample, and find similar results. Their results indicate that reduced access to payday loans has a negative impact on consumer welfare.

Similarly, Oregon put a cap on the maximum interest rate a lender could charge along with a minimum loan term of 31 days in 2007 which effectively reduced the number of payday lenders in the state. Zinman (forthcoming) applies a difference in difference approach to compare payday borrower's use of credit and financial situation in Washington (where there was no change in law) and Oregon before the change to after the change. His findings show that payday borrowers in Oregon substituted to bouncing checks and paying late bills after the law and they had a significantly greater likelihood of experiencing an adverse event such as job loss or a decrease in financial situation.

Work by Morse (2009) and Melzer (2009) provides estimates of payday lending's effects using geographic variation in the placement of stores for identification. Morse studies the effects that financial distress has on the foreclosures and crimes in areas where there is access to pay day loans relative to areas that do not have access. Using zip code level data on natural disasters, foreclosures, and crimes for the state of California between 1996 and 2002, she employs a difference in difference in difference (DDD) approach to find that while areas experiencing the exogenous shock of a financial disaster have an increase in foreclosures and small crimes, the presence of a payday lender in the zip code mitigates these effects. She concludes that these results are evidence that payday loans help alleviate problems for people in financial distress caused by a natural disaster; she is, however, clear that these results do not automatically apply to all payday debtors, especially those who are using the loans on a habitual basis.

In order to study the impact of access to payday loan on financial and medical hardship without having results biased by endogenous store location and state-level policy decisions, Melzer measures access to payday loans as the distance from a county in a state where payday loans are prohibited

to the closest state where there are payday loans. He uses household data from Urban Institute's National Survey of America's Families, which asks questions on financial hardship (difficulty paying bills, Cutting Meals, Moving out because of financial problems, and not using a phone for a month to save money) along with questions on health related issues (Postponing medical care, dental care, and drug purchases). Melzer runs a probit estimation and checks with a difference in difference regression (using the fact that some of the border states changed their laws) to find that access to loans had a positive impact on financial hardships, especially difficulty paying bills. The results are not as conclusive in the DD test for health related variables, but the probit estimation does reveal evidence that access to payday loans increases the likelihood of postponing any medical care. Overall, Melzer finds that payday loan access has a negative impact on the financial well-being of individuals.

Zinman and Carrell (2008) look at the impact of the presence of payday loans on Air Force personnel's performance, a concern expressed by the Pentagon. Using the assignment of airmen to bases by occupational needs and not choice, along with the variation in laws on the prohibition of payday loans between states and over time, they can determine the effect on reenlistment eligibility, presence of an Unfavorable Information File, and forced enrollment in a Weight Management Program over there periods 1996 to 2004 and 1996 to 2007. They find the presence of payday loans in states where an airmen is assigned increases the likelihood of Reenlistment Ineligibility and an Unfavorable Information file, especially for the young and financially unsophisticated (proxied for by job assignment), which provides support for the Pentagon's concern that payday loans cause financial distress for military personnel.

Additionally, Karlan and Zinman (forthcominga) implement an experiment in South Africa to study the price elasticity of demand for high-interest credit. Dennis Campbell and Tufano (2008) use county-level data to show that access to payday loans is associated with an increase in bank account closures. Lefgren and McIntyre (2008) show that bankruptcy rates are not influenced by the legalization of payday lending.

The remainder of the paper proceeds as follows. In Section 2, we provide additional background on payday loans. Section 3 outlines our estimation strategy, focusing on the credit-score discontinuity. We present our main empirical results, on the effect of payday loans on bankruptcy filings, in Section 4. Section 6 examines the mechanisms driving these results, and Section 7 concludes.

2 Payday Loans: Data and Institutional Features

The payday loan data we use are administrative records from a provider of financial services. To apply for payday loans at this company, individuals fill out loan applications and present their most recent pay stubs, checking-account statements, and utility or phone bills, along with state-issued photo IDs. The lender uses applicants' pay stubs to infer the dates of their next paydays and assign loan due dates. The duration of payday loans is extremely short, ranging from one week to one month depending on how frequently the borrower is paid. Payday loans are collateralized with personal checks dated on borrowers' upcoming paydays.[11]

We study individuals whose first loan application at this company occurred at an outlet in Texas. This universe of data includes over 1 million loan applications by about 145,000 individuals. Table I presents demographic and background characteristics of this population and summary information about their applications and loans. All data are deflated with the CPI-U to January 2002 dollars. We censor and replace with missing the top 0.1% of the distributions of bank balance and take-home pay. We also replace age with missing if age is less than 18.

Consistent with survey evidence on payday borrowers, women are slightly more common than men in our population, and a large share of the applicants are Black or Hispanic.(Elliehausen and Lawrence 2001) Median annualized individual income is about $20,000, and the median balance in applicants' checking accounts is $66.[12]

3 Identification

3.1 The Credit-Score Regression Discontinuity

Access to payday loans depends on a credit score calculated at the time of the loan application by a third party called Teletrack.[13] Scores above a fixed threshold result in loan approval, while

[11] The longstanding practice of some employers who provide advances against upcoming paychecks is distinct from the topic studied here: payday lenders do not directly garnish paychecks to obtain loan repayment.

[12] Having a checking account is a precondition for receiving a payday loan: each applicant must have an account against which to write her postdated personal check. As a result, payday loans are not used by the unbanked (Washington 2006), though that population is targeted by services like check cashing that some payday lenders also offer.

[13] The credit-scoring formula is proprietary, but we understand these scores to differ from FICO scores in depending on a shorter history of behavior and focusing on borrowing histories in the subprime market. Though Teletrack serves all major payday lenders, the lenders establish their own criteria for approving loan applications. Skiba and Tobacman (2008b) discuss more details of the credit-scoring process in the context of the profitibility of payday lenders.

applications with scores below that threshold are rejected. Among the 17.4% of first-time applicants with scores below the threshold, 99.6% are rejected, while 96.9% of first-time applicants scoring above the threshold are approved. The credit-scoring formula and the threshold for approval were adjusted at all shops once during our period of observation, in August 2002. We perform the analysis three ways. First, we focus on a single variable called *CreditScore*, which is equal to the raw Teletrack score minus the approval threshold that was in force at the time of the application, normalized by the corresponding pre- or post-August 2002 standard deviation of raw scores. However, standard tests indicate the pre- and post-August 2002 distributions of $CreditScore$ differ. Thus we explore the effects pre and post the credit score change in Section 5.2. The main specifications assume the functional form of the effects of $CreditScore$ did not change. Figure 1 plots a histogram of *CreditScore* for first-time payday loan applicants.[14]

Consistent with the company's stated policy, the credit score has a discontinuous effect on the probability a payday loan application is approved. Figure 2 displays the probability of approval among first-time applicants, *Approved*, as a function of *CreditScore*. Two quartic polynomials, fit independently to the data on either side of the credit-score threshold, are superimposed on the figure.

We quantify the discontinuity by examining the coefficient on an indicator for being above the threshold, *AboveThr*, in regressions of *Approved* on *AboveThr*, functions of *CreditScore*, and control variables presented in Table II. Most generally, for first-time applicants we estimate:

$$Approved_i = \beta_0 + \beta_1 AboveThr_i + f\left(CreditScore_i\right) + \gamma X_i' + \delta M_i'^t + \varepsilon_i, \tag{1}$$

where $f(\cdot)$ is a function of the credit score; X_i is a vector of demographics and background characteristics including gender, race dummies, age, monthly income, job tenure, pay frequency dummies, checking account balance, the number of "not sufficient funds" events on the most recent bank statement, months in current residence, dummies for homeownership, direct deposit, and garnishment of paycheck, and dummies for missing for each of these variables; and M^t is a full set of dummies for month of first payday loan application, so $M_i^t = 1$ if i's first application was in month t and $M_i^{t'} = 0$ for $t' \neq t$. In our benchmark specifications, $f(\cdot)$ is a quartic in $CreditScore_i$ interacted with $AboveThr_i$.[15]

[14] We focus on credit scores at the time of first payday loan applications for reasons discussed below.

[15] Equivalently, since $AboveThr_i = I\left(CreditScore_i \geq 0\right)$, $f(\cdot)$ equals independent quartics on either side of the

Columns 1-5 of Table II report OLS (linear probability model) regressions based on this specification. In every specification, the coefficient on *AboveThr* is highly significant and equal to slightly less than 1. The *R*-squared in Column 1 equals 0.84 when only *AboveThr* is included on the right-hand-side (RHS). As the subsequent columns add in a quartic in *CreditScore* fully interacted with *AboveThr*, the demographics listed above, and the dummies for month of first payday loan application, the coefficient on *AboveThr* hardly changes and the *R*-squared increases by only 1%. Probits in Columns 6-8 (showing marginal effects) reveal the same pattern.

Other institutional features permit us to exploit the exogeneity of *AboveThr* conditional on $f\left(CreditScore_i\right)$ for first-time applicants. During the application process, the payday loan company's employee submits information about the applicant electronically to the company's central servers, which in turn send a query to Teletrack. Within minutes, a yes-or-no notification of whether the application was approved or declined is returned. Neither applicants themselves nor the employees in the store are informed of the applicants' scores or the passing credit-score threshold. Moreover, Teletrack uses additional information from other lenders, which is not available to this lender's employees, to compute the score: an OLS regression of the Teletrack scores of first-time payday loan applicants on the demographic and background variables listed in Table I, including a full set of month dummies, yields an R-squared of 0.365. Thus *AboveThr* likely impacts an individual's future choices only insofar as *AboveThr* affects application approval. The regressions reported above therefore constitute the first stage of an IV strategy, with a plausible exclusion restriction, that we use throughout the rest of the paper. See also the Identification Appendix for further discussion.

3.2 Empirical Specifications

Using the credit-score discontinuity described in the previous section, we estimate the effect of payday loan approval on each outcome of interest at horizons from $\tau = 1d$ to $\tau = 3y$ after the first payday loan application. We denote the outcome by individual i between the date of first payday loan application and horizon τ by $Outcome_i^\tau$. We consider several specifications. First, we estimate this equation using OLS:

$$Bankruptcy_i^\tau = \beta_0 + \beta_1 Approved_i + f\left(CreditScore_i\right) + \gamma X_i' + \delta M_i'^t + \varepsilon_i. \tag{2}$$

threshold.

Our main specification is a reduced form:

$$Bankruptcy_i^{\tau} = \beta_0 + \beta_1 AboveThr_i + f\left(CreditScore_i\right) + \gamma X_i' + \delta M_i'^t + \varepsilon_i. \tag{3}$$

Third, we run IV regressions, instrumenting for *Approved* with *AboveThr*. Additionally we restrict the OLS, IV and Reduced Form specifications to subsets of the data, narrowing in to +/-0.5 and +/-0.1 standard deviations around the credit-score threshold. Our preferred specification estimates equation 3 for the sample +/-0.5 standard deviations near the threshold. The Imbens-Lemieux suggestion for bandwidth-choice criterion is inapplicable here because of our binary outcome variables. (Imbens and Lemieux 2007)

4 Bankruptcy

The literature on personal bankruptcy raises two questions of significant interest. First, do filers act strategically when they file, i.e., do they accumulate debt which will be discharged in the event of bankruptcy, hold assets up to and not above the state's exemption limit, and choose the optimal chapter for their case? Second, to what extent does bankruptcy serve as a form of social insurance? Papers in the former literature are divided. White (1998), for example, concludes that at least 10% of households would gain financially from bankruptcy filing. By contrast, using state-level variation, Lehnert and Maki (2002) find that filers optimally "negative estate plan," by converting liquid assets into dischargeable debts before filing. Literature examining the social insurance aspect of bankruptcy is limited. Himmelstein, Warren, Thorne and Woolhandler (2005) survey bankruptcy filers and find that half cite medical debt as a factor in their filings. Domowitz and Sartain (1999) find that employment and medical shocks account for some bankruptcies, supporting the "bankruptcy as insurance" point of view. White and Zhu (2009) provide strong evidence that chapter 13 is largely used by debtors solely to avoid home foreclosure.

Using the procedures described above, we measure the effect of payday loan access on chapter 7 and chapter 13 personal bankruptcy filings. Payday loan approval could affect the probability of bankruptcy in several ways. First, people with little outstanding credit are unlikely to file for court protection from creditors, implying that *any* loan approval, by providing a creditor, could increase the probability of bankruptcy. Second, loan approval could temporarily alleviate financial pressure—for instance until labor supply can be increased. In this case we might expect *rejection*

of a payday loan to increase bankruptcy petitions. Third, payday loans could also have a medium-term effect on the personal finances of borrowers as interest payments (at very high rates) add up. Because payday loans mature each pay period (typically two weeks), whereas payments on other loans are generally due each month, payday interest payments may take priority and borrowers may fall further behind on other accounts. We next evaluate these hypotheses.

Our approach complements existing empirical work on the determinants of bankruptcy, for example by distinguishing between chapter 7 and 13 bankruptcy petitions. Chapters 7 and 13 result in different private and social benefits and costs. Chapter 7 bankruptcy relieves a debtor of all dischargeable debts.[16] Non-exempt assets must be turned over to the filer's trustees at the time of filing. A trustee sells these assets and repays creditors. Texas has an unlimited homestead allowing debtors to keep their home. Debtors can file for chapter 7 bankruptcy no more than once every 6 years. Chapter 13 bankruptcy, by contrast, does not result in the erasure of dischargeable debt. Instead, each filer proposes a several-year repayment plan to the court, and the judge determines whether the repayment plan is reasonable based on income, assets, etc. After successful completion of the repayment plan, the remainder of debts are discharged. Judges determine whether debtors can afford repayment under a chapter 13 reorganization; and, if so, judges do not permit filing under chapter 7. Debtors can file for chapter 13 bankruptcy as often as they wish, i.e., they can revise their repayment plan and submit changes to the judge repeatedly. Debtors can file chapter 7 bankruptcy following a chapter 13 filing and often do so if they find they cannot afford their original repayment plan. Bankruptcy filings appear on debtors' credit reports for 10 years.

The Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005 made it harder to file for bankruptcy and particularly for chapter 7, for example, by requiring the filer to attend credit counseling and introducing income-based means tests.[17] While enactment of BAPCPA occurred after our sample period, there could have been anticipatory effects of the reform, as the bill was signed in April 2005, which does allow us to examine the effect of anticipation of reform within one year of a consumer's first payday loan application. Below we analyze the impact of BAPCPA anticipation on the treatment in Section 5.1.

[16] Back taxes, most student loans, and child-support and alimony obligations are non-dischargeable. For more details on the bankruptcy process, see White (2009), Lefgren and McIntyre (2008) and White and Zhu (2009).

[17] White (2007) provides a thorough discussion of the institutional features of BAPCPA, the political economy surrounding the acts signing and enactment as well as discussion of consumers' reacttion to this reform.

4.1 Data

Personal bankruptcy petitions are public record and are available online through Public Access to Court Electronic Records (PACER). We study the universe of 641,521 chapter 7 and chapter 13 personal bankruptcy filings in the four United States Bankruptcy Courts in Texas from January 2001 through June 2005. The data include the date of filing, the chapter of filing (7 or 13), the disposition of the bankruptcy case (generally, dismissal or discharge of debts), and individual identifiers that permit linkage to the payday loan data. We supplement these data with a small sample of the detailed bankruptcy petitions debtors submit during the filing process. The sample consists of the 211 applicants closest to the credit-score threshold, with approximately half on either side. These data include the names of the creditors (loan collection agencies in some cases), and the amount and description of the type of debt for each creditor.

Table III provides an overview of the data we use. Panel A shows an individual bankruptcy rate (as a fraction of population) for Texas as a whole of 0.38% per year (about $\frac{3}{4}$ of the national bankruptcy rate). Panel A also reports the fraction of chapter 7 versus chapter 13 fillings. (According to informal communications with the PACER Service Center, debtors file under chapter 13 in order to protect their homes from foreclosure.)

We identify debtors in the PACER bankruptcy dataset with payday loan applicants if the following variables in the two datasets match exactly: first name, last name, zip code of home residence, and last four digits of Social Security number. By these criteria, as reported in Panel A of Table III, 8,331 of the 145,519 payday loan applicants filed for personal bankruptcy during the bankruptcy sample period.[18] Given that the average amount of time from first payday loan application to the end of the bankruptcy data period is 2.48 years, we compute an average rate of $\frac{8831}{145519*2.48} = 0.023$ bankruptcy petitions per payday applicant per year. Comparing to Panel A of Table III, we see that payday loan applicants have a bankruptcy base rate that is $0.023/0.0038 \approx 6.05$ times the average rate in the population.

Panel B of Table III provides basic summary statistics on the fraction of those above and below the credit threshold who filed for bankruptcy. These averages begin to tell the story that people above the threshold are more likely to file. Of course these are simple means, which do not control

[18] Of the 3,768 people who match in the Northern District for example, included are 244 couples in which both spouses applied for payday loans. Our analysis below ignores the intra-household correlation structure of bankruptcy filing.

for any demographics. Our next step is to the regression specifications which can test the effect of payday loan access on bankruptcy.

4.2 Main Estimation Results

Using the credit-score regression discontinuity, we estimate the effect of payday loan approval on chapter 7, chapter 13, and total personal bankruptcy filings at one- and two-year horizons using the basic specification, Equation 3. Ch could be 7, 13, or All, and the dependent variables are as above. The RHS variables are as described in Section 3 above.[19]

Table IV reports estimates of Equation 3 for $Ch \in \{7, 13, All\}$ and $\tau \in \{1y, 2y\}$. We multiply the outcome variables by 100, so coefficients in the table can be interpreted as the increase in bankruptcies in percentage points associated with unit increases in the independent variables.

Column 1 presents the OLS results for the full sample, which shows little association between loan approval and chapter 7 bankruptcy, and a strong and significant association between loan approval and chapter 13 bankruptcy. Specifically, approval is associated with an increase of 0.328 (0.319) percentage points in chapter 13 bankruptcies over one year (two years). Relative to the baseline bankruptcy rate among payday loan applicants of 2.3%, this is an increase of $\frac{0.33}{2.3} = 14.3\%$; relative to the much lower baseline rate in the general population, it is an increase of $\frac{0.33}{0.382} = 88\%$.

However, the OLS results could well be biased. For example omitted characteristics that affect bankruptcy declarations, like household assets, could be correlated with *Approved* even beyond their correlation with $f(CreditScore)$ and X. As a result, we focus more closely on individuals with credit scores close to the threshold for loan approval. For them, there is more reason to believe that approval may be randomly assigned conditional on the other independent variables. Specifically, Columns 2 and 3 restrict to the subsample with credit scores no more than 0.5 and 0.1 standard deviations, respectively, from the credit-score threshold for loan approval. For both chapter 7 and chapter 13 bankruptcy, the standard errors on *Approved* rise in these columns as the number of observations falls.

Section 3 demonstrated that a large share of the variation in *Approved* can be explained by $AboveThr$, an indicator for whether the credit score is above a lender-defined threshold. To the extent individual characteristics cause slippage between $AboveThr$ and loan approval, correlation

[19] As the time horizon increases our number of observations falls: we compute $Bkcy(Ch)_i^\tau$ for individual i only if i's first PDL application is at least τ before the end of the bankruptcy sample period. This induces cohort effects which we control for by including dummies for month of first PDL application in our regressions.

between those characteristics and propensity or ability to declare bankruptcy (e.g., if loan approval is correlated with resourcefulness at paperwork, which is also necessary for completing a bankruptcy filing) could bias even the restricted-range OLS estimates. However, controlling for $f(CreditScore)$ and X, which do change discontinuously at the credit-score threshold, we can estimate the causal impact of *AboveThr* on bankruptcy propensities. In Column 4 of Table IV we show that this reduced-form effect of *AboveThr* on chapter 7 bankruptcies within 2 years is smaller than the full-sample OLS coefficient on *Approved* and statistically insignificant. Column 4 also shows the reduced-form effect for chapter 13 which is nearly the same as the OLS coefficient; *AboveThr* increases chapter 13 bankruptcies by 0.341 percentage points over two years, or $\frac{0.341}{2.3} = 15\%$ above their baseline rate. Again, the increase relative to the baseline rate in the general population is roughly 90%. The standard errors of these reduced-form OLS regressions fall by an order of magnitude if we use Poisson or negative binomial regression instead. Columns 5 and 6 show the narrowed ranges (0.5 and 0.1 standard deviations in credit score) of the reduced-form estimate.

Finally, to obtain another measure of the impact of *Approved* we instrument for it with *AboveThr*. The IV regressions with the full sample, in Column 7 of this table, use all of the available data but identify the parameter of interest only off of the variation in *Approved* induced at the credit-score threshold by *AboveThr*. As we would predict given the first stage regressions (reported in Section 3), these regressions yield results almost identical to the reduced-form in magnitude and significance. Columns 8 and 9 again narrow the range of observations to 0.5 and 0.1 standard deviations around the credit-score threshold. The coefficients rise in both cases and become significant when restricting to data within a 0.5 sd range, not surprising given the strong relationship between *AboveThr* and *Approved*. The IV estimates are nearly identical to the reduced form.

There are no statistically significant overall effects of access to payday loans on chapter 7 bankruptcy fillings. (Results are in the first Panel of Table IV.) The positive effect access to payday loans has on chapter 13 bankruptcies is revealed by the pattern of significant coefficients in the 0.5 standard-deviation range for both the one- and two-year horizons.

These regression findings are also reflected in Figures 3a, 3b, 4a and 4b which plot one- and two-year chapter 7 and chapter 13 filing rates versus credit-score centiles. Points shown are at the medians of their quantiles on the x-axis and at the means of their quantiles on the y-axis. In addition, the figures plot a predicted bankruptcy rate generated from the reduced form regression.

We view the figures as reinforcing the conclusions of the regression analysis and identifying their limitations: a large effect of payday loan approval on bankruptcy appears to be present, but the effect may be sensitive to the range around the threshold that is examined and to the functional form of the credit-score controls.

Additionally, Figures 5a and 5b plot the reduced-form coefficient estimates from the main regressions as a function of the window around the threshold in standard deviations. We plot the point estimates for each regression varying the bandwidth around the credit-score threshold up to 2 standard deviations, with +/- two-standard errors of the estimates.

One interesting feature of these figures is that among this entire population, the probability of filing for bankruptcy *increases* in the first application credit score. We conjecture this overall positive correlation is present because the sample of payday loan applicants is selected to have had difficulties in regular (prime) credit markets; individuals with higher subprime credit scores are more likely to have prime debt they would like to erase; and individuals with higher subprime credit scores are more likely to have the financial savvy to figure out how to file for bankruptcy.

Our results are significant for chapter 13 but not chapter 7. Our effects on chapter 13 are driven by the fact that 78% of our sample filer chapter 13, despite the fact that about three quarters of filers in the US file chapter 7. This makes sense in light of the main considerations in chapter choice among debtors. To file chapter 13, debtors must have regular income from which to make their 3-5 year plan payments. As payday borrowers must have regular income to obtain a payday loan, it is logical that 78% of payday applicants who file for bankruptcy file chapter 13, as shown in Table III. 2) A major factor in bankruptcy filers' chapter choice is attorneys' fees. Chapter 7 bankruptcy requires that debtors pay their attorneys fees up front, typically about $1500. Chapter 13 requires debtors to pay only modest amount up front, around $200. Mann and Porter (forthcoming 2009) document the fact that low-income bankruptcy filers, like those in our sample, do not have the liquidity to file chapter 7 and thus enter chapter 13.

5 Robustness

We have examined this dependence on functional form further. In the context of the reduced-form regressions with dependent variable $Bkcy13^{2y}$, we experiment with constraining $f\left(CreditScore\right)$ to be identical on either side of the threshold; removing $f\left(CreditScore\right)$ entirely; removing the dummies for month of first payday loan application; and removing the financial and demographic control

variables. We also use probits; linear probability models; and non-parametric locally weighted polynomial (lowess) regressions. Most of the coefficients in these specifications go in the same direction and are significant, including the lowess regressions. Section 5.2 discusses these results in detail.

Specifically, the locally-weighted polynomial regressions of bankruptcy filing rates on the credit score, computed using Stata's lowess command with a bandwidth of 0.8, are run separately above and below the credit-score threshold. The fitted values of these regressions close to the threshold represent the best available numeric approximations of the limits, from above and below the threshold, of the bankruptcy filing rates. The difference between the two limits is the estimator; and its standard error is estimated by bootstrapping. Specifically, we take 50 bootstrap samples of the population within 0.2 standard deviations of the threshold, keeping fixed proportions on each side. For each sample we compute the difference between the estimated filing rate immediately to the right of the threshold and immediately to the left. The reported standard error is the standard deviation of the estimates from each of the 50 bootstrap samples.

Because of the computational intensity of this analysis, we only report estimates for our benchmark case of chapter 13 bankruptcies within two years of the first payday loan application. The nonparametrics confirm the linear analysis reported above: the lowess point estimate of the effect on chapter 13 filings within two years is 2.39 percentage points with a standard error of 1.01.

All of the analysis so far has focused on the cumulative effect until $\tau = 1y$ or $\tau = 2y$ after the first payday application. Effects on chapter 7, chapter 13 and all bankruptcies at horizons from $\tau = 1d$ to $\tau = 3y$ are presented in Figures 8a-8c, which plot the estimated coefficients on *Approved* in reduced-form full-range regressions.[20]

5.1 Bankruptcy Reform

The largest change in bankruptcy law in the US to date was the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA). It was signed into law in April 2005 and went into effect in October 2005. BAPCPA was meant to reduce the number of "abusive filings." BAPCPA made it more difficult for debtors to file either chapter.

The centerpiece of BAPCPA was the income-base means test. The means test was designed to

[20] The number of observations shrinks as τ grows since we drop individuals for whom our sample period ends before the full τ duration after their applications. This induces cohort effects, which we control for by including dummies for month of first payday loan application in our regressions.

channel consumers into chapter 7 over chapter 13, thus making a full discharge of all debts more difficult. Debtors wishing to file chapter 7 must have an average income in the last six months below the median income in their state for a similar household size. Debtors who do not pass the means test can attempt to file chapter 13.

The signing and enactment of BAPCPA had a dramatic on the number of filings. A large increase in filings occurred between April and October 2005 in anticipation of harsher filing standards. A drop in filings followed the enactment in October 2005.

To test whether BAPCPA had an impact on the effect access to payday loans had on bankruptcy filings, we use a subsample of the data which was exposed to BAPCPA. Because our sample only goes to August 2004, we can only look at the impact of anticipation of BAPCPA because enactment occurred in October 2005, too late for us to observe sufficient sample sizes. Table VIII shows results separated by people who applied for payday loans before, and after, the credit-score change in August 2002. We show the impact of payday loan access on bankruptcy filings in the quarters leading up to the enactment of BAPCPA. These results are strongest for people in the lower part of the credit score distribution (those who first application was after the credit-score change). These results are consistent with our general findings that the impact of payday loans is larger for people in more severe financial distress.

5.2 Heterogeneity

We uncover substantial heterogeneity in the effect of payday loan access on personal bankruptcy filing rates. First, we consider alternative functional forms for $f(\cdot)$ and the error. Instead of the benchmark quartic in $CreditScore_i$ interacted with $AboveThr_i$, we try quadratics and cubics interacted with $AboveThr_i$ and quadratics, cubics, and quartics *not* interacted with $AboveThr_i$. Second, instead of the linear probability models that we run in the benchmark OLS, reduced-form, and IV regressions, we implement probits for binary outcomes and probits for $I(Outcome_i^\tau > 0)$ for non-binary outcomes. Third, for discrete, non-binary outcomes (e.g., the number of chapter 13 bankruptcy filings), we run count regressions (Poisson and negative binomial). Fourth, as suggested above, we fully interact a Post-August-2002 dummy with $f(CreditScore_i)$ and $AboveThr_i$. Next, we run locally weighted polynomial regressions to nonparametrically estimate the treatment effect (Fan and Gijbels 1996, Hahn et al. 2001, Porter 2003, Imbens and Lemieux 2007). Sixth, we run regressions for time τ *before* each outcome, checking for the *absence* of effects on these "placebo

outcomes."

Finally, it should be noted that throughout the paper we focus on identification from $first$ loan applications. In principle, more power would be available if our first stage included *all* applications. However, there is more slippage between $AboveThr$ and application approval after the first loan application: the lender is more likely to have a history on a repeat applicant that informs its approval choice. In addition, the regression results reported above indicate we already have considerable power in the first stage, and using all applications would require correcting for intra-applicant correlation structure in the effect of $AboveThr$ on application approval and the effect of approval on the outcome variables of interest. We do replicate all the analysis using a new endogenous variable, an indicator for whether an individual *ever* has an application approved.

In cases where any of these modifications to the benchmark specification matter materially we discuss them below. A full set of the results is available upon request. We further investigate these effects by looking at heterogeneity in Table V. Again we rely on the 0.5 standard-deviation reduced-form estimates. (IV estimates are nearly identical.) Regressions are estimated for gender, race and homeownership status. Sample sizes shrink so standard errors are large. Nonetheless, chapter 13 results remain statistically significant for females and blacks. Chapter 7 results are negative in most cases. Texas has a generous homestead exemption so we may expect differential results for homeowners and renters, and indeed the effects are larger for homeowners for chapter 13 filings.

One potential concern with our results is that our data come from a single lender. Rejected applicants may be able to obtain payday loans elsewhere. However, this observation *strengthens* our qualitative findings about the effect of payday loan access on bankruptcy: if rejected applicants may borrow anyway, our estimates represent a lower bound on the true effect of payday loan access. We explore this issue further by estimating effects by various levels of competition this lender faces by zip code. Table VIII shows the results. As expected, estimates are larger and strongly significant for monoline shops versus multiline shops.[21]

The rest of this subsection discusses sources of evidence about the quantitative size of the

[21] Pawn loans are collateralized with personal items like jewelry, electronics, tools or guns. The loan principal typically equals half of the item's (secondhand) retail value. At the time the loan is made, the lender receives and stores the collateral. Items are stored at the pawnshop as long as the borrower continues to service the loan, and in this way loans can be renewed indefinitely. The borrower receives the item back ("redeems" the item) upon repaying the loan. When a loans becomes 30 days past due, the collateral is removed from storage and put on sale at the pawnshop.

underestimate.

First, all major payday lenders use the same subprime credit-rating agency, Teletrack Inc., to provide information on loan applicants. Each lender may, however, choose its own threshold for approving loan applications (and may use a smoother decision rule), and we lack information about those practices.[22] If all lenders do choose exactly the same threshold, our estimated coefficients will not reflect bias due to substitution opportunities. To the extent the firms have comparable costs (Flannery and Samolyk 2005) and the industry is competitive (Skiba and Tobacman 2008b), they would adopt identical thresholds in equilibrium.

Second, we suspect the underestimate of the effect of payday loan approval on bankruptcy to be small is that this company's loans remain attractive to rejected applicants. Of the 20% of applicants who were first declined, 48% re-apply. Only 9% of re-applicants were ever approved, but those who were approved borrowed on average $2485 and paid $415 in interest, comparing near par with initially approved applicants, who cumulatively borrowed $2793 and paid $477 in interest.

In addition to the qualitative discussion on the underestimate of the effects, we can quantitatively test how the effect differs by market share. We run regressions by the level of market share for this lender by zip code. Using Reference USA database, we determine the number of competitors this lender had during the sample period. Results for various specifications by market share and store tenure are shown in Table VIII. We also explore the effect of payday loans broken down by whether an applicant applied before or after the credit-score formula changed in August 2002 in Table VIII and Appendix Table 2. Figures 6 and 7 show the results of access to payday loans on chapter 7 and chapter 13 bankruptcies in high market share locations. The effect of payday loans on bankruptcy is highest in zip codes where this lender has 100% market share.

6 Mechanisms and Interpretation

As discussed above the typical payday loan is quite small: in our dataset the mean and median principal are approximately $300. This section investigates how such small loans might impact cumulative financial outcomes like bankruptcy. First, we show that approval of a single loan application initiates a pattern of subsequent borrowing from this lender. Second, we provide suggestive evidence that borrowers only partially substitute toward other sources of credit, perhaps because of

[22] Endogeneity of the approval decision rules does not matter for our estimates. The distribution of credit scores is smooth near the credit score approval threshold.

costs of search. Third, we compare the interest costs from payday loans and applicants' total debt interest burden at the time of bankruptcy filing, and find that payday loan interest constitutes a nontrivial share. Together, these findings suggest that payday loan approval could suffice to tip applicants, who are already financially stressed, into bankruptcy.

6.1 Subsequent Payday Loan Applications

The identification strategy used to measure the effect of payday loan access on bankruptcy can also be used to measure effects on subsequent borrowing from this lender. We observe more subsequent loans than bankruptcies, so results are more precisely identified and less sensitive to the choice of specification. Analogously to bankruptcy analysis above, our main regression specification is:

$$(nbr\ pdl\ applications)_i^{\tau} = \beta_0 + \beta_1 Approved_i + f\left(CreditScore_i\right) + \gamma X_i' + \delta M_i'^{t} + \varepsilon_i,$$

where the RHS variables are as described above.

The sharp discontinuity we obtain from estimating this equation for subsequent payday applications and subsequent amount borrowed make the results easy to see graphically. Full results are shown in Table VI. Estimation results are presented for $\tau = 2y$ in Figures 9a and 9b. When comparing first-time payday loan applicants who are approved and rejected, $\hat{\beta}_1$ equals the number of additional applications, within two years, caused by first-application approval. The OLS specification using the full range of credit scores implies that $\hat{\beta}_1 = 4.606$ and is highly significant. Rejected first-time applicants apply again at very low rates, so the coefficient mostly reflects the subsequent applications made by those who are approved. The reduced-form and IV estimates confirm these findings. In addition, they have nearly identical coefficients and standard errors, as expected given the strength and precision of the first stage. We also restrict the sample to +/-0.5 and +/-0.1 standard deviations in the credit score using the OLS specification, as in the bankruptcy specifications. Similarly we restrict the sample for the IV estimates. In each case, standard errors rise as sample sizes fall, though all coefficients remain positive and significant. Summary statistics on these outcomes are found in Table VI. Panel B summarizes, by various credit-score ranges, the subsequent payday applications and amounts borrowed for one year and two years after the first payday loan application.

Because *AboveThr* is correlated with subsequent loan approval probabilities, the effect of

Approved on the total dollar value of subsequent payday loans is strictly not identified. In addition, in some sense the *demand* for credit reflected in the number of subsequent applications is the quantity of primary interest. However, we may still estimate the subsequent dollar amounts of borrowing predicted by *Approved*. Access to payday loan credit, conditional on application, predicts roughly $2200 of additional payday borrowing at this company within two years.

Figures 9a and 9b plot these results. Each point represents a centile in the credit score, and the points shown are at the medians of their quantiles on the x-axis and at the means of their quantiles on the y-axis. Overlaid are the best-fitting quartic polynomials on either side of the credit-score threshold.

We repeat this analysis for time horizons from $\tau = 1d$ to $\tau = 3y$. To summarize the estimated coefficients over this full range of time horizons, Figures 10a, 10b and 10c plot the reduced-form full range $\hat{\beta}_1$'s. The line is above zero, implying payday loan applicants who were approved for their first loan applied more subsequently than those whose first application was denied. Two-standard-error bands are also shown on the graph. The reduced-form regression with range restricted to +/-0.5 standard deviations, implies that approval of first-time payday loan applications causes 6.11 more payday loan applications within the next two years, significant at the 1-percent level.[23]

6.2 Assets and Liabilities of Payday Borrowers

Together, these findings paint a picture of substantial high interest rate borrowing following payday loan approval, and a substantial differential in high interest rate borrowing between initially approved and initially rejected applicants. Detailed data on creditors, debts, and assets for a sample of the 211 bankruptcy filers closest to the credit-score threshold provide additional information, shown in Table VII.[24] Twenty-three percent of these individuals had payday loan debt at the time they filed for bankruptcy, and 12 percent had outstanding payday loan debt at the company that supplied our data. Average outstanding payday loan balances at all payday lenders and at our data provider conditional on borrowing were respectively $1,323 and $567.

[23] We have also estimate the effect of payday loan approval on pawn borrowing from the same company. In the short-run, rejection of a first-time payday loan application increases the probability of taking out a pawn loan from this company by a factor of two, implying payday loan applicants substitute between forms of credit. However, this effect dissipates quickly, and in dollar amounts it is small compared to the observed increase in subsequent payday borrowing.

[24] The sample consists 211 people who applied for a payday loan and subsequently filed for bankruptcy. The data are from bankruptcy petitions of the 104 people closest to the threshold (from below) and 107 people closest to the threshold (from above). The samples are not exactly balanced due to ties in the credit score.

Payday loan debt outstanding is therefore a small fraction of the $34,000 of unsecured debt that these bankruptcy filers had on average.[25] However, cumulative *interest payments* on payday and pawn loans, because of their very high interest rates and very short durations, were significant. If we assume the filers' unsecured debt carried 15% APRs, the payday loan interest burden would have been approximately $\frac{\$567}{0.15*\$34,000} \approx 11\%$ of these individuals' total annual interest burden. We consider it plausible that this could suffice to tip financially stressed payday loan applicants into bankruptcy.

7 Conclusion

We find that payday loan applicants approved for their first loans file for chapter 13 bankruptcy significantly more often than rejected first-time applicants. The magnitude of the effect is very large, representing an increase of between 0.3 and 3.3 percentage points in bankruptcy filing rates. In our preferred specification the estimated effect size is 2.48 percentage points. Opportunities for rejected applicants to substitute toward credit elsewhere imply that our quantitative estimates are lower bounds on the true effects.

These results are consistent with the interpretation that payday loan applicants are financially stressed; first-time loan approval precedes significant additional high interest rate borrowing; and the consequent interest burden tips households into bankruptcy. Though some strategic bankruptcy filings may occur, our findings suggest that households generally do not borrow on payday loans to take advantage of an upcoming bankruptcy filing. This paper's results inform the contentious policy debate which has led to 11 states banning payday lending on the presumption that they lead to bankruptcy and lower consumers' welfare. We have uncovered substantial heterogeneity in the effect of access to credit—evidence hidden in aggregate-level analyses.

[25] Strategic gaming of the bankruptcy system implies debtors would accumulate as much debt as possible before filing. This hypothesis receives no more than tentative support from our results.

A Identification Appendix

We first report further tests of the exogeneity of *AboveThr* and demographic characteristics of payday loan applicants. A potential source of bias in this research design is selection close to either side of the threshold. If payday loan applicants knew both their credit score and the passing threshold used to approve loans, we could expect applicants who knew they would be declined not to apply, and additional mass in the distribution in credit scores just above the threshold. The histogram of the credit score, Figure 1, showed that while there are some credit scores that are common because of the discrete nature of the scoring process, there is not bunching near the threshold which would suggest selection bias.

Table A1 reports the values of the control variables on either side of the credit-score threshold. Each pair of columns reports average values of the control variables below and above the credit-score threshold, for shrinking credit score ranges around the threshold. Differences between the columns generally shrink and become less significant going from left to right across the table. It is not surprising that some significant differences remain, since the credit score is correlated with many of the control variables.

We also performed two sets of first stage placebo regressions. In both types, we regressed *Approved* on the usual pair of quartics in *CreditScore*, the usual X's, and the usual month dummies. In the first set of placebo regressions, we included modified versions of *AboveThr*, one by one, for every value of the credit score. The coefficient on the pseudo-*AboveThr*, and its statistical significance, was maximized when it was equivalent to the true *AboveThr*. The true version of *AboveThr* was included in every element of the the second set of placebo regressions, but in that set we again included, one by one, pseudo-*AboveThr*'s defined for every possible value of the credit score. In this case, the coefficient on the true *AboveThr* was always larger and more highly significant than the coefficient on the pseudo-*AboveThr*.

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Figure 1: Distribution of Credit Scores

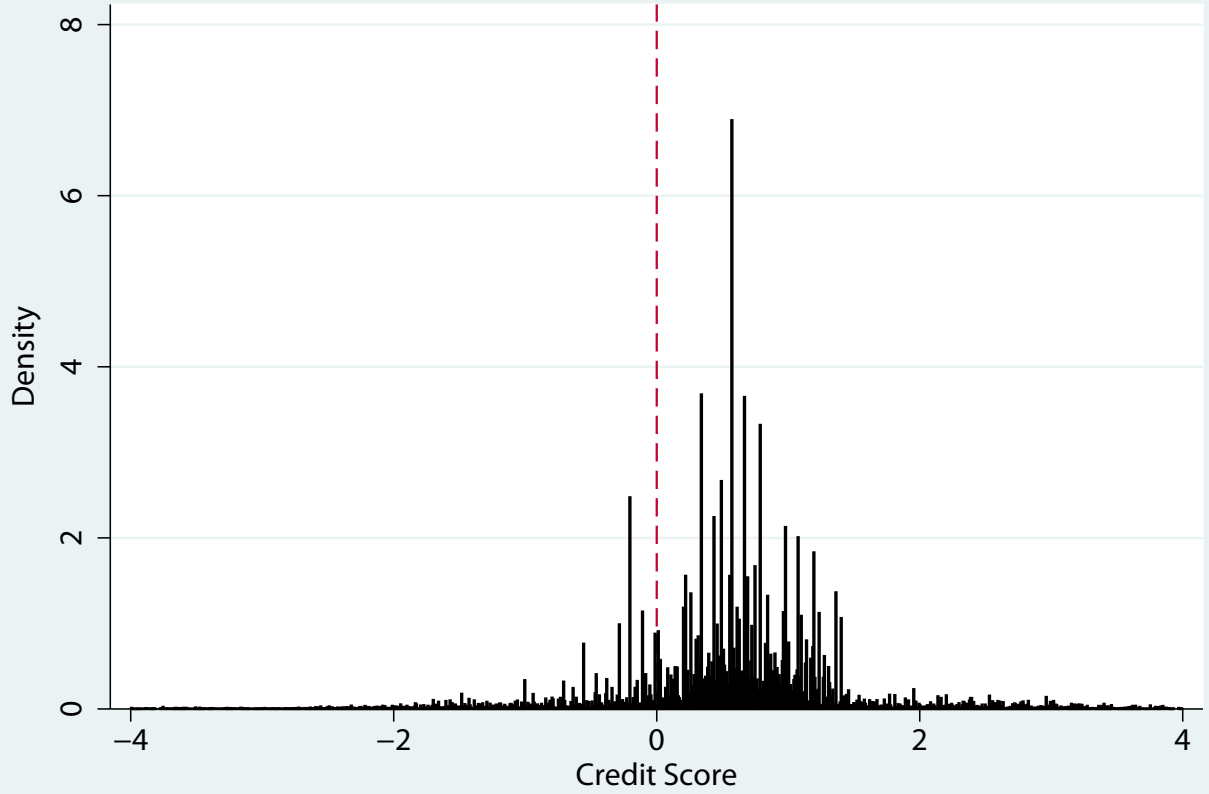
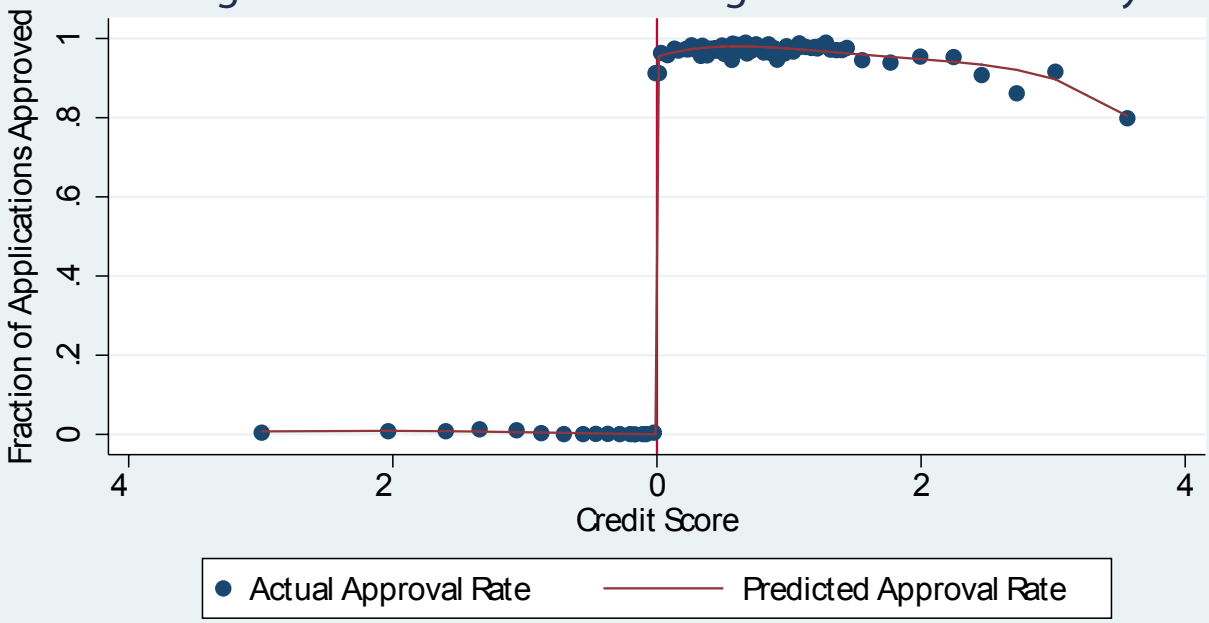
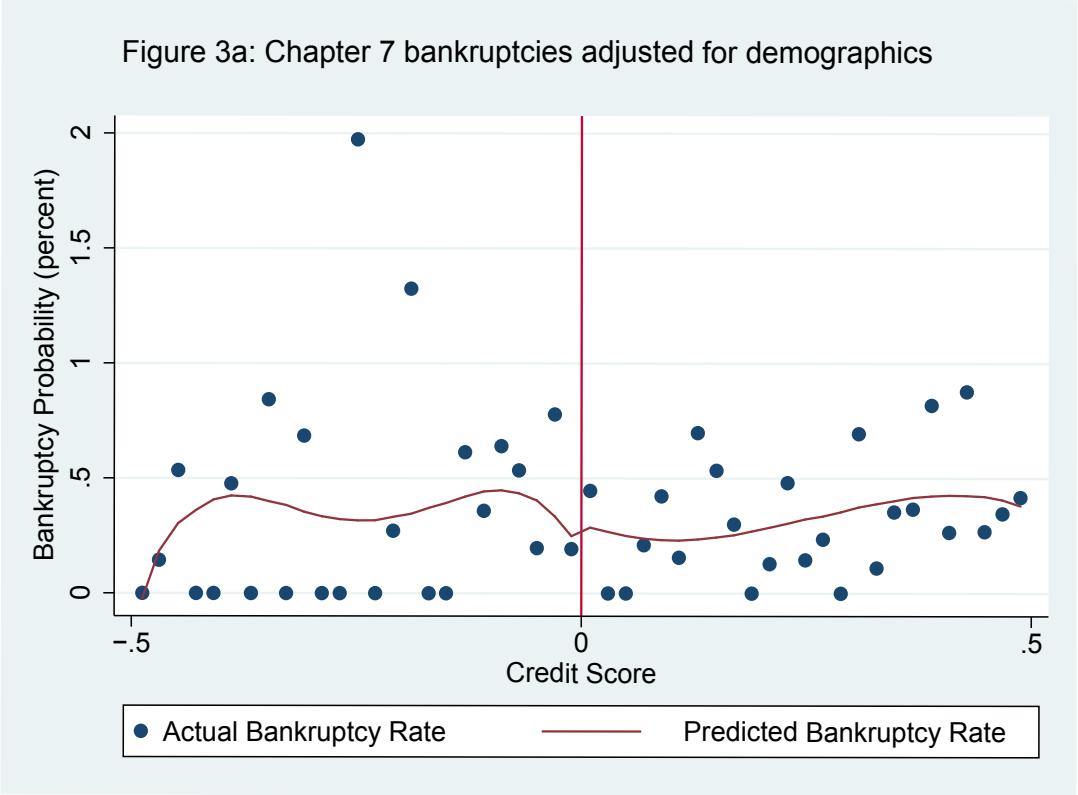


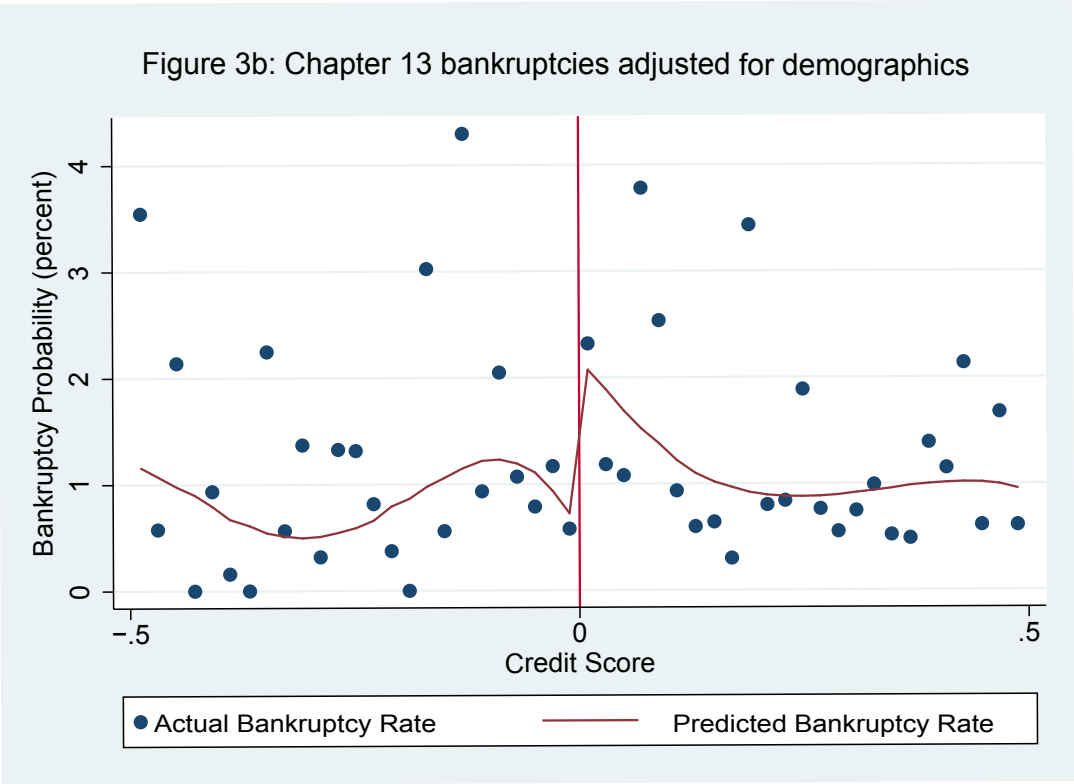
Figure 2: The Credit-Score Regression Discontinuity



Source and notes: Authors' calculations based on data from a national payday lending company. Figure 1 plots the distribution of *CreditScore* or first-time payday loan applicants. *CreditScore* is equal to the raw credit score provided by Teletrack minus the threshold for loan approval chosen by the lender, divided by the standard deviation of scores among this lender's first-time applicants. We normalize by different standard deviations for applications before and after an August 2002 change in the scoring formula. The dashed line marks the threshold for loan approval; about 80% of first-time applications are approved. Figure 2 plots the probability of approval for first-time payday loan applicants as a function of *CreditScore*. Each point represents one of 100 quantiles in the credit score. Points shown are at the medians of their quantiles on the x-axis and at the means of their quantiles on the y-axis. The predicted approval-rate function plots the best-fitting quartic polynomials on both sides of the credit score threshold.

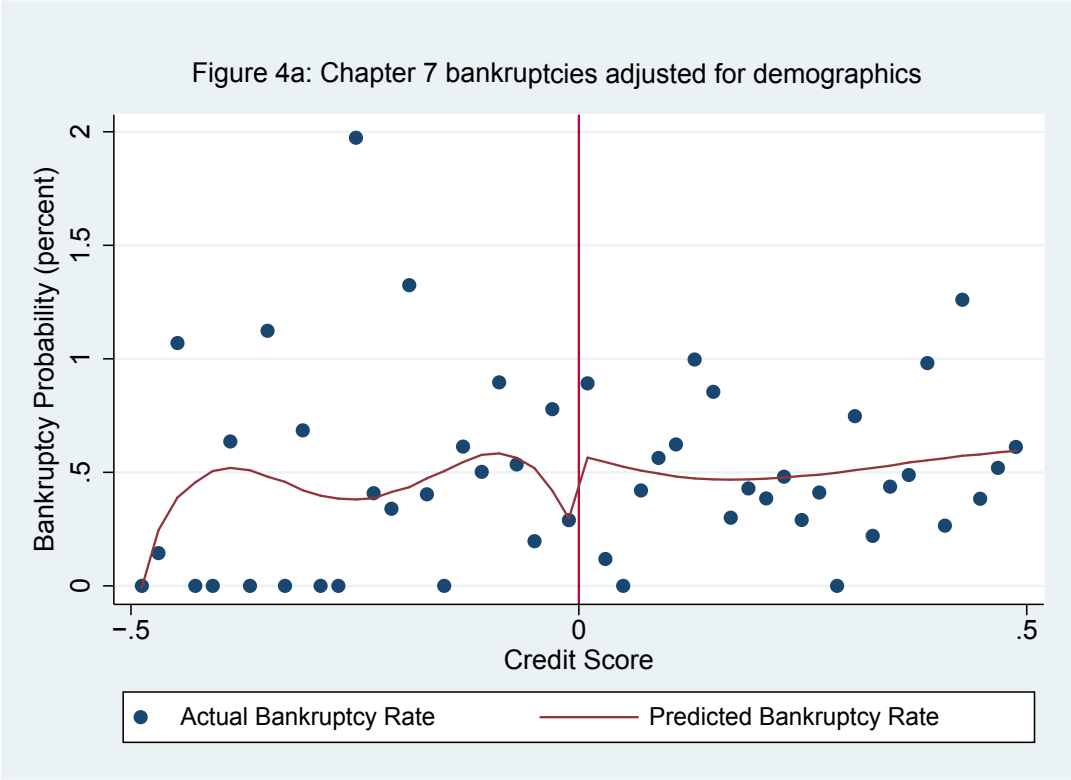
Figure 3: One Year Bankruptcy Probabilities

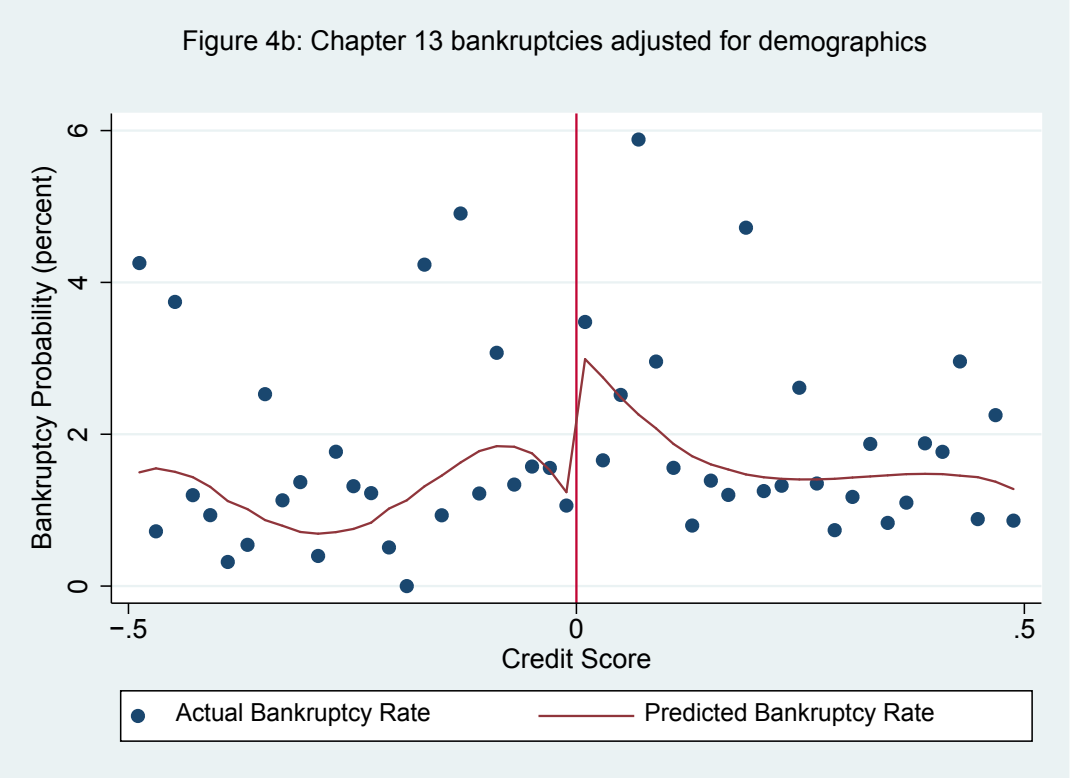




Figures 3a and 3b plot the effect of payday loan access on Chapter 7 and Chapter 13 bankruptcy petitions within the 12 months after applicants' payday loan application. Each point represents one of 100 bins. Points shown are at the medians of their bins on the x-axis and at the means of their bins on the y-axis. The predicted bankruptcy-rate function plots the best-fitting quartic polynomials on both sides of the credit-score threshold adjusted for demographics, which include dummies for pay frequency, direct deposit, homeownership, race, paycheck garnishment, and dummies for missing values of these; log monthly pay, log checking account balance, job tenure, age, sex, months at current residence, and number of non-sufficient funds on checking statement. The polynomials are restricted to 0.5 standard deviations above and below the passing credit score. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 4: Two-Year Bankruptcy Probabilities





Figures 4a and 4b plot the effect of payday loan access on Chapter 7 and Chapter 13 bankruptcy petitions within the 24 months after applicants ' payday loan application. Each point represents one of 100 bins. Points shown are at the medians of their bins on the x-axis and at the means of their bins on the y-axis. The predicted bankruptcy-rate function plots the best-fitting quartic polynomials on both sides of the credit-score threshold adjusted for demographics. The polynomials are restricted to 0.5 standard deviations above and below the passing credit score. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 5: Effect of Payday Loans on Bankruptcy as a Function of Bandwidth

Figure 5a: Chapter 7 Bankruptcy within 2 years

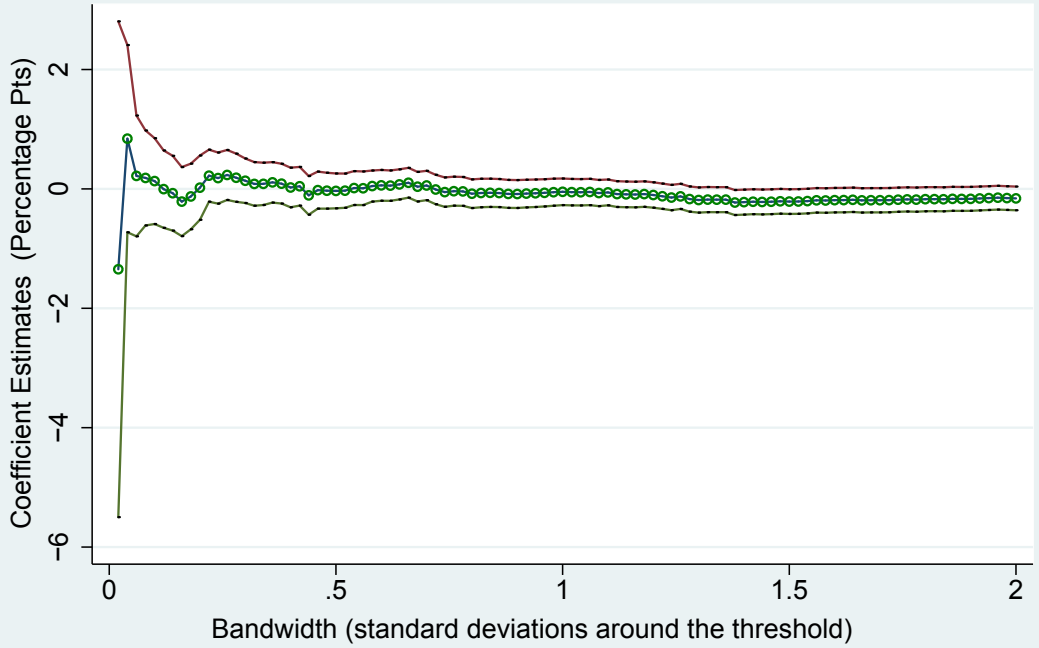
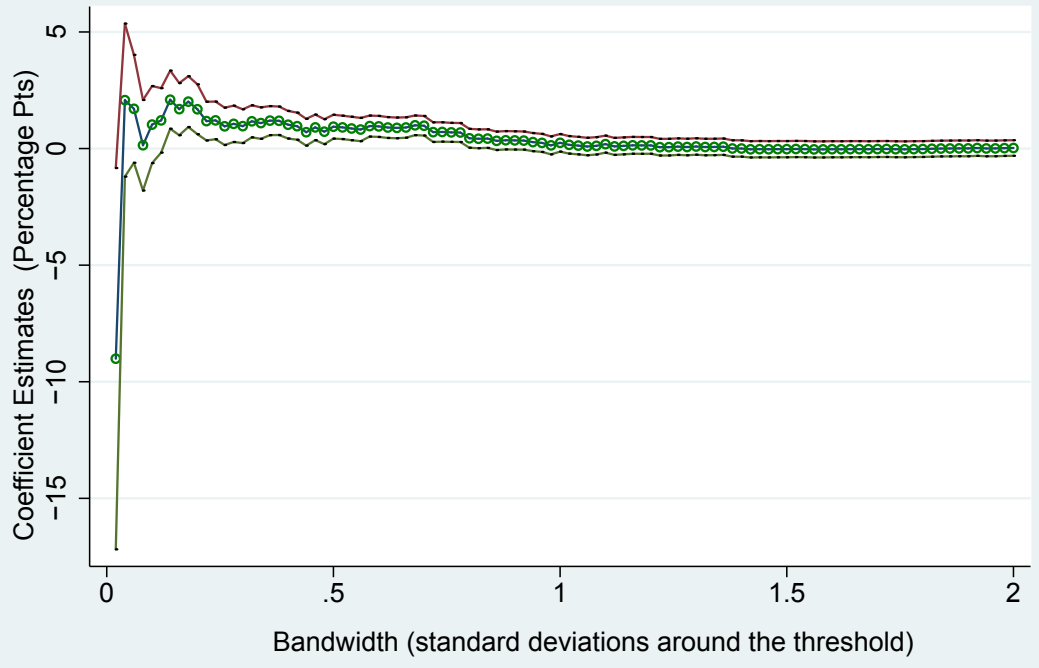
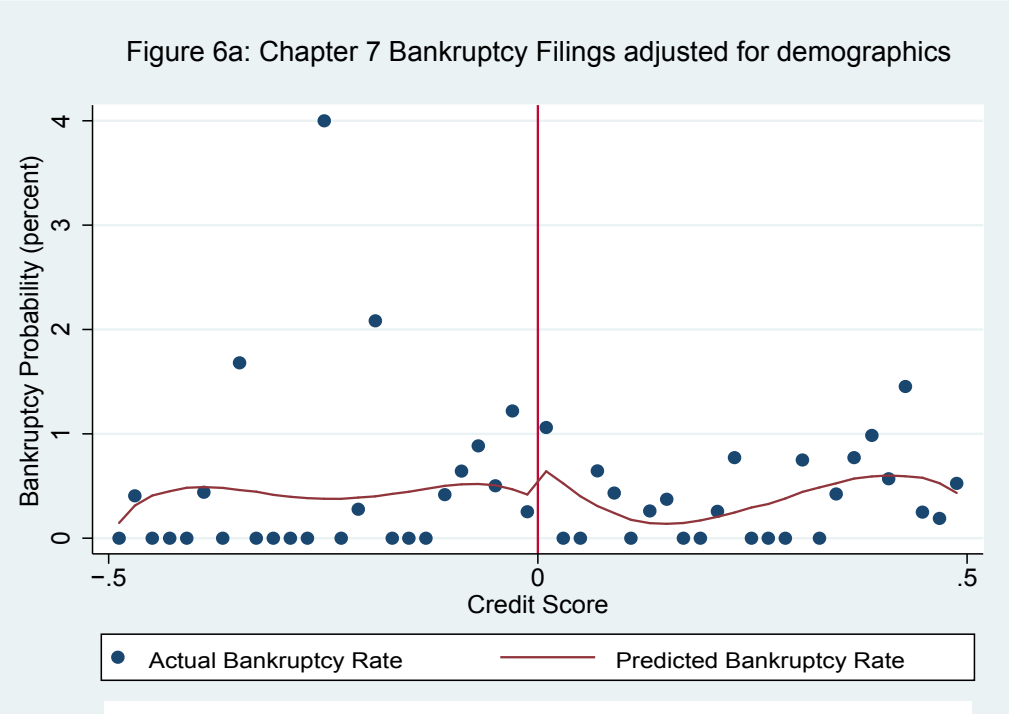


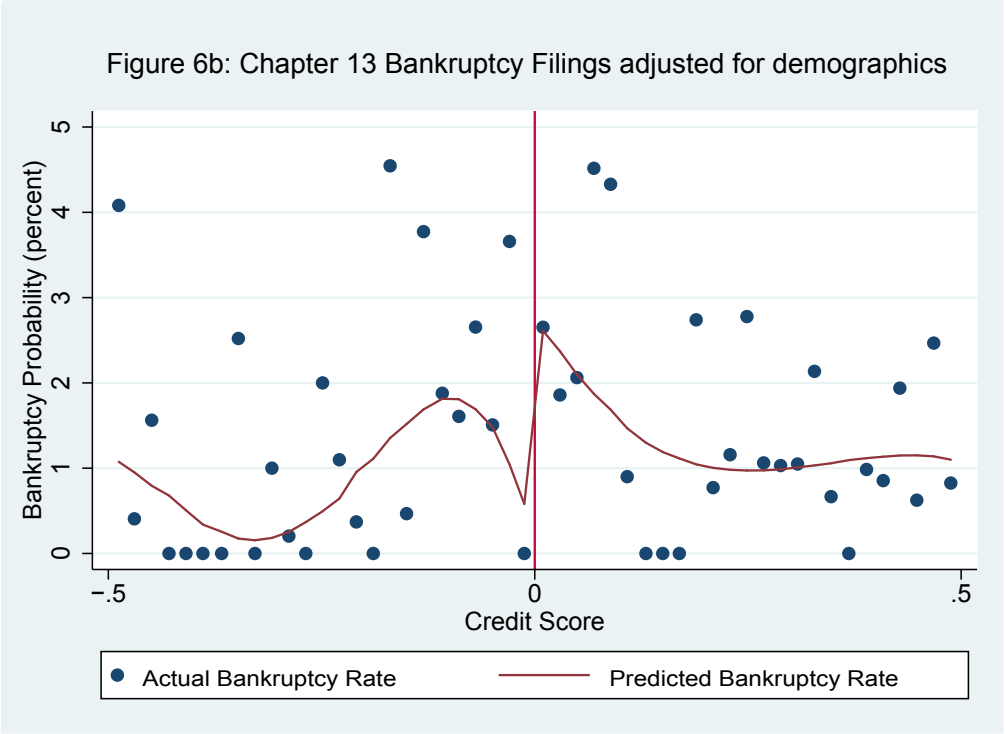
Figure 5b: Chapter 13 Bankruptcy within 2 years



Figures 5a and 5b plot the reduced-form coefficient estimates from the main regressions as a function of the window around the threshold in standard deviations. The line with open circles plots the point estimates for each regression varying the bandwidth around the credit-score threshold up to 2 standard deviations. The solid lines represent +/- two-standard errors of the estimates.

Figure 6: Bankruptcy Probability as a Function of the Credit Score within One Year
High-Market Share Locations

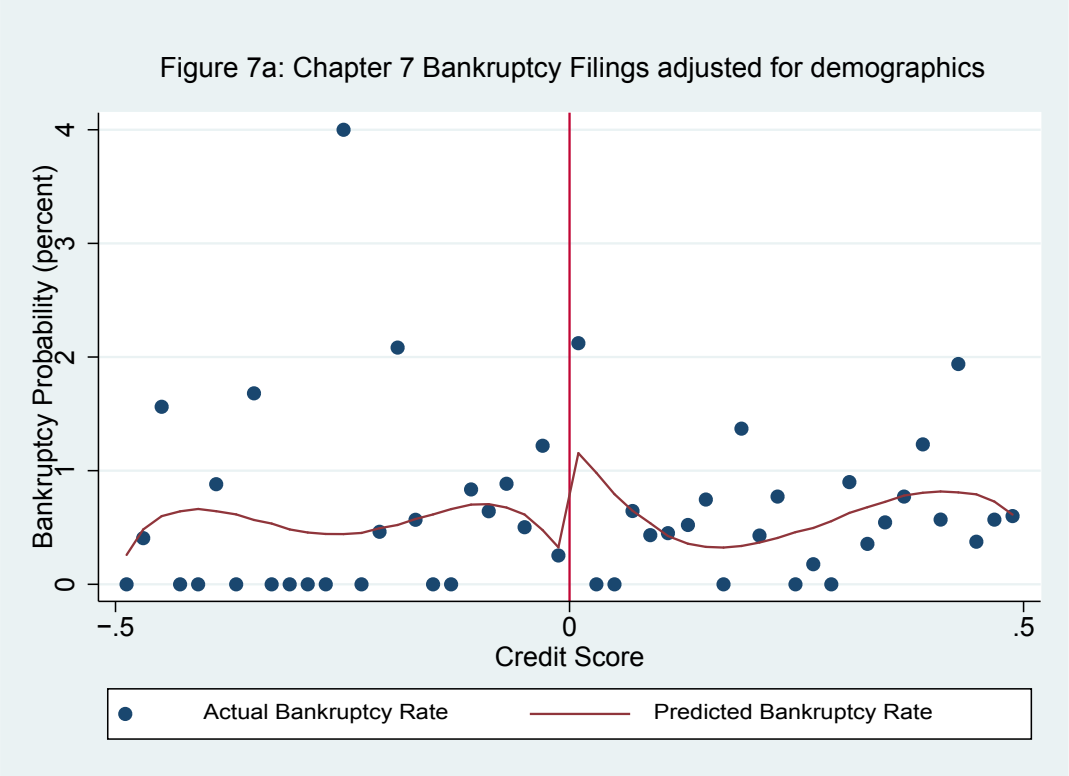


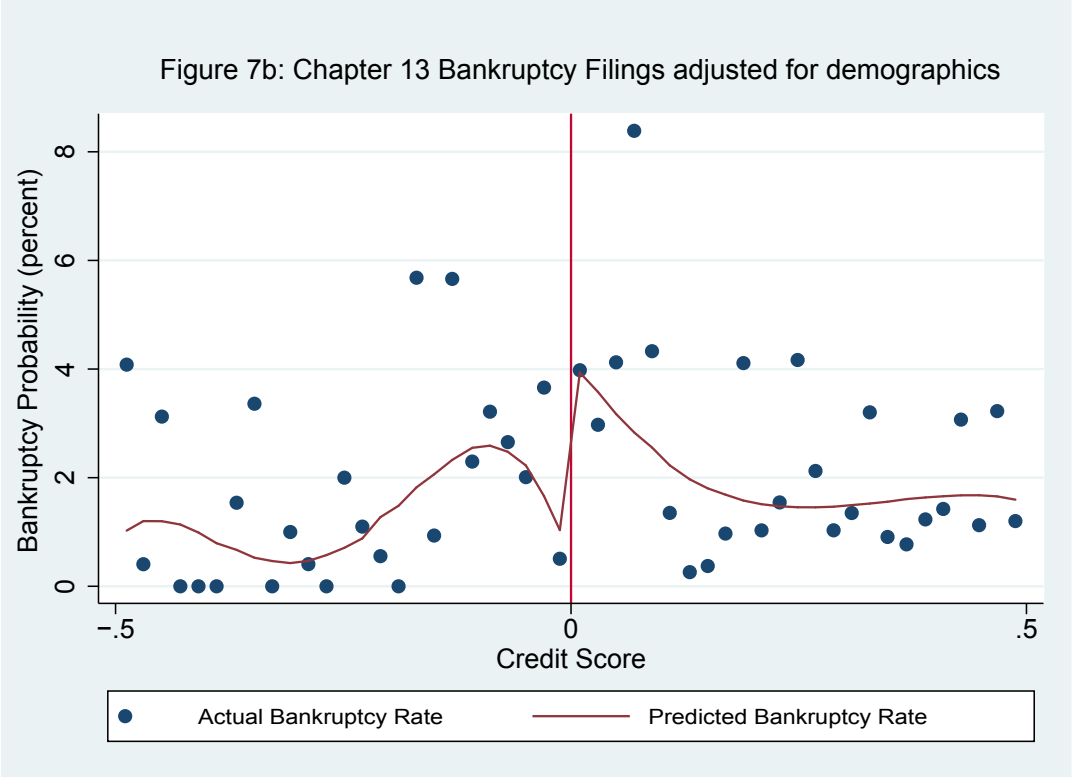


Figures 6a and 6b plot the effect of payday loan access on Chapter 7 and 13 bankruptcy petitions within the 12 months after applicants' first payday loan application. The sample is restricted to payday loan outlets with 100% market share in their zip code. Each point represents one of 100 bins. Points shown are at the median of their bins on the x-axis and at the means of their bins on the y-axis. The predicted bankruptcy-rate function plots the best-fitting quartic polynomials on both sides of the credit-score threshold adjusted for demographics. The polynomials are 0.5 standard deviations above and below the passing credit score. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 7: Bankruptcy Probability as a Function of the Credit Score within Two Years

High-Market Share Locations





Figures 7a and 7b plot the effect of payday loan access on Chapter 13 bankruptcy petitions within the 24 months after applicants' first payday loan application. The sample is restricted to payday loan outlets with 100% market share in their zip code. Each point represents one of 100 bins. Points shown are at the median of their bins on the x-axis and at the means of their bins on the y-axis. The predicted bankruptcy-rate function plots the best-fitting quartic polynomials on both sides of the credit-score threshold adjusted for demographics. The polynomials are 0.5 standard deviations above and below the passing credit score. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Fig 8a: Effect of Payday Loan Access Over Time: All Bankruptcies

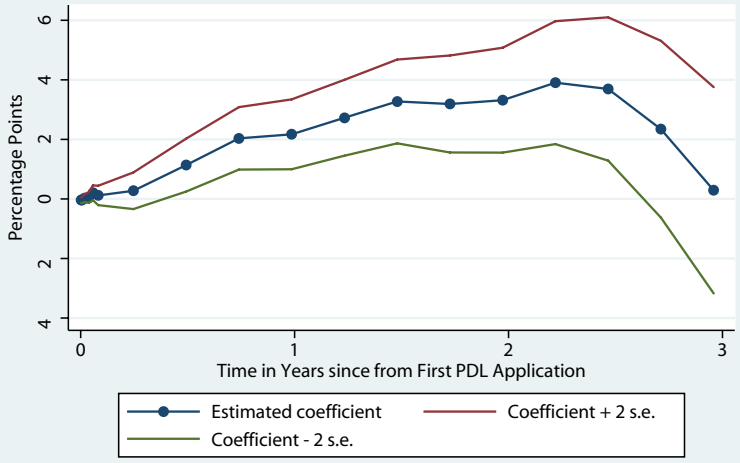


Fig 8b: Effect of Payday Loan Access Over Time: Ch7 Bankruptcies

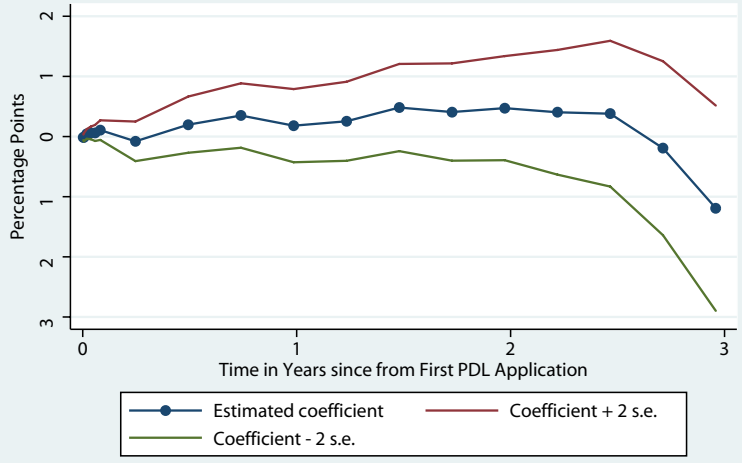
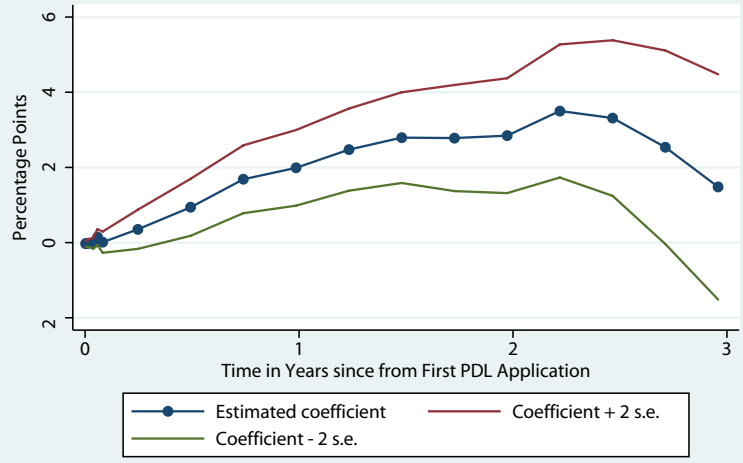
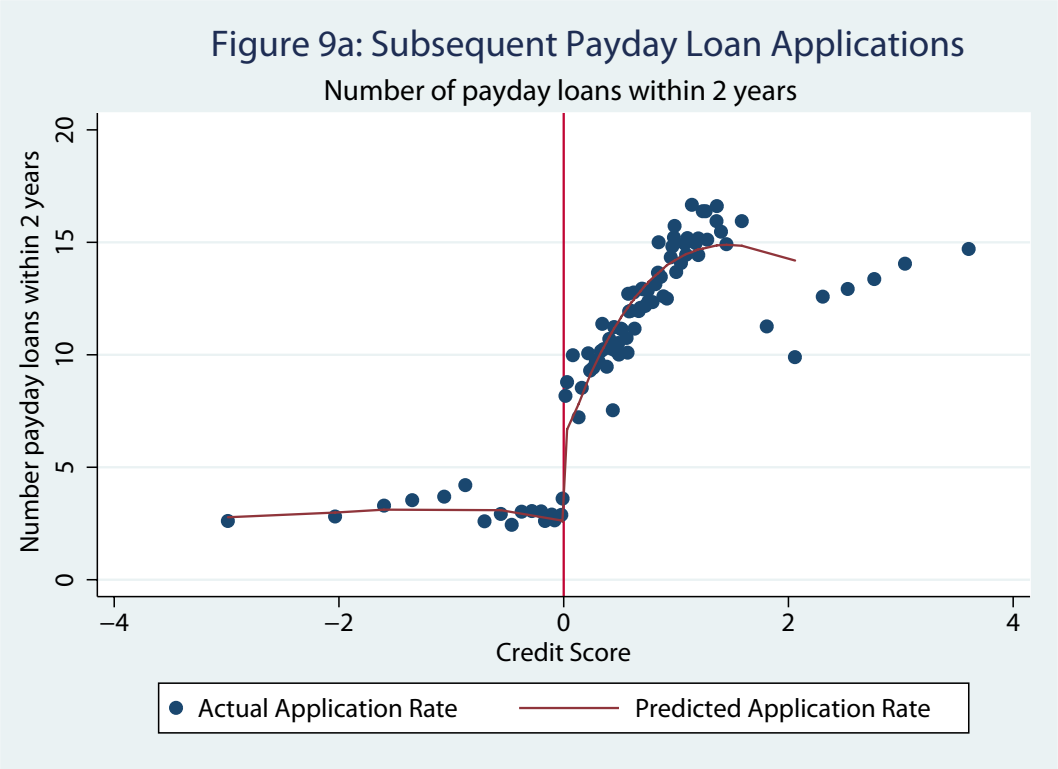
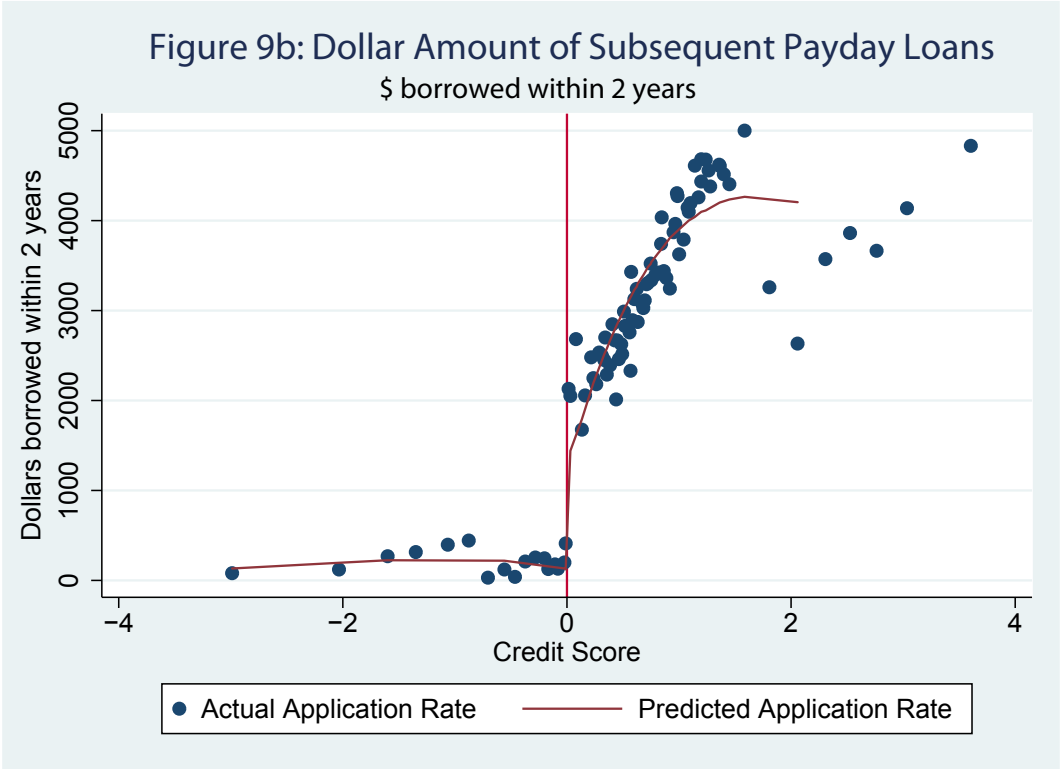


Fig 8c: Effect of Payday Loan Access Over Time: Ch13 Bankruptcies

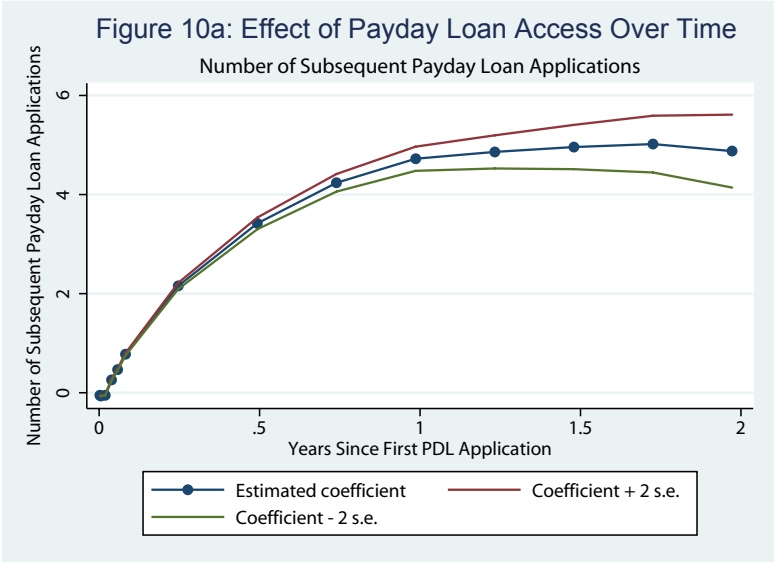


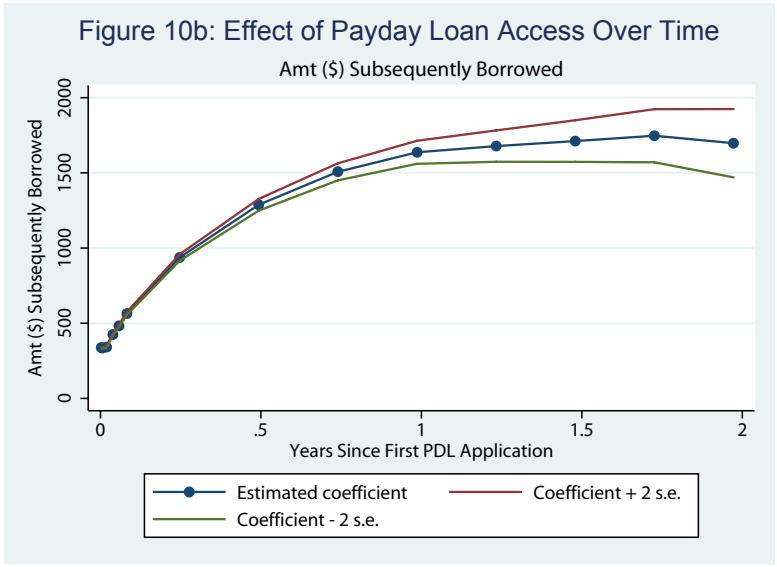
Figures 8a, 8b, 8c. Source: Authors' calculations based on data from a national payday lending company and the electronic records from Texas Bankruptcy Courts via PACER. The middle line represents the reduced-form estimated effect of First Application Approved. The other lines are two-standard-error bands. Regressions producing these estimates include quartic polynomials on both sides of the credit-score threshold, demographic controls, and dummies for month of first application. Figures 8a, 8b, and 8c plot bankruptcy petitions for all Chapters, Chapter 7 and Chapter 13, respectively.

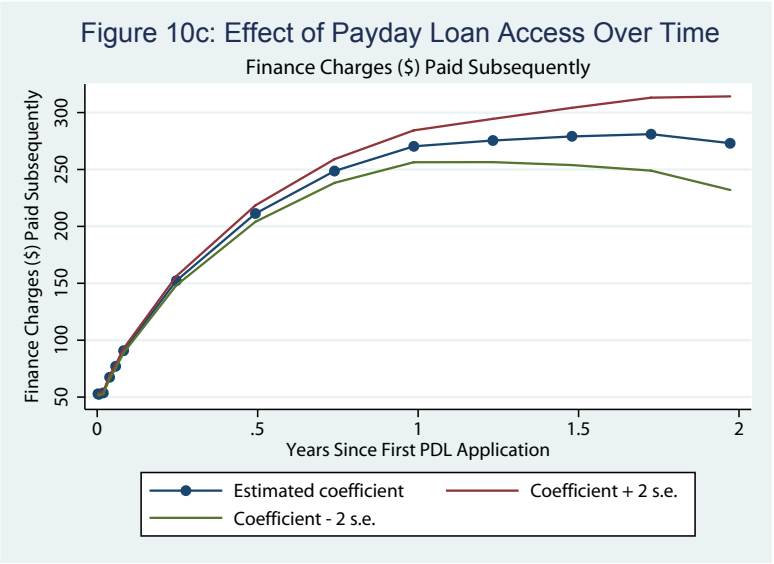




Figures 9a and 9b. Source: Authors' calculations based on data from a national payday lending company. Each point represents one of 100 quantiles. Points shown are the medians of their quantiles on the x axis and at the mean of their quantiles on the y-axis. The predicted line plots the best-fitting quartic polynomials on both sides of the credit-score threshold. All data are from Texas, 9/2000-8/2004. Figure 8a plots the effect of payday loan access on the number of subsequent payday loan applications made. Figure 8b plots the dollar amount subsequently borrowed.







Figures 10a, 10b, 10c. The middle line represents the reduced-form estimated effect of First Application Approved on subsequent behavior in the payday loan market. The other lines are two-standard-error bands. Regressions producing these estimates include quartic polynomials on both sides of the credit-score threshold, demographic controls, and dummies for month of first application. Figures 11a, 11b and 11c plot the number of subsequent application made at this company, the dollar amount borrowed, and the finance charges paid to this company, respectively.

TABLE I

PAYDAY LOANS

Variable	Mean	Median	SD	N
Demographic Characteristics:				
Age	36.46	35	11.25	145,154
Black (%)	48.70		0.49	27,923
Hispanic (%)	29.41		0.48	27,923
Female (%)	61.84		0.49	27,922
Monthly Pay ($)	1699	1545	1047	93,997
Years at Current Job	4.28	2	7.23	94,384
Paid Weekly (%)	13.45		34.10	94,384
Paid Biweekly (%)	50.81		49.99	94,384
Paid Semimonthly (%)	19.08		39.29	94,384
Paid Monthly (%)	16.67		37.27	94,384
Wages Garnished (%)	2.88		16.73	67908
Direct Deposit (%)	72.67		46.17	94,384
Checking Account Balance ($)	235	66	552	142,407
NSF's on Bank Statement	1.09		3.00	145,159
Owns Home (%)	33.84		47.30	67,908
Months at Current Residence	67	36	91	145,157
Month of Application	12/2002	1/2003	One year	145,159
Loan and Application Characteristics:				
Approved (First Application)	0.80			145,159
Approved (All Applications)	0.89			1,097,330
Loan Size ($)	301	289	140	1,097,330
$ Loans Per Person	2279	978	3494	145,159

Authors' calculations based on data from a payday lending company. Included are all available demographics for the universe of payday-loan applicants in Texas between 9/2000 and 8/2004. Quantities are calculated from each individual's first application. These variables, with the exception of Month of First Application, represent the full set of "demographic controls" included in most regression specifications reported in this paper. Whenever we include these controls, we also include dummies for missing values of each of them. Dummies for each value of Month of First Application are often included as well, and indicated separately. "NSF's" are "Not Sufficient Funds" events like bounced checks.

TABLE II

THE CREDIT-SCORE REGRESSION DISCONTINUITY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Columns: Dependent Variable = First Application Approved							
	OLS						Probit	
Above Threshold Indicator	0.966	0.968	0.953	0.954	0.944	0.966	0.972	0.979
	(0.001)**	(0.002)**	(0.003)**	(0.003)**	(0.003)**	(0.001)**	(0.002)**	(0.001)**
Quartic in Credit Score		x	x	x	x		x	x
(Quartic in Credit Score) x AboveThr			x	x	x		x	x
Demographic Controls				x	x			x
Month Dummies					x			x
Observations	145,159	145,159	145,159	145,159	145,159	145,159	145,159	145,157
R-squared	0.84	0.85	0.85	0.85	0.85			

* Significant at the 5 percent level

** Significant at the 1 percent level

Authors' calculations based on data from a payday lending company. This table documents the discontinuous effect of the credit score on approval of candidate payday borrowers' first applications. The key independent variable is the Above Threshold Indicator, a dummy for whether Credit Score >=0. Columns 1-5 perform OLS regressions; Columns 6-8 report marginal effects from probit regressions. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included. "Month Dummies" refer to dummies for the month of first payday loan application.

TABLE III

BANKRUPTCY SUMMARY STATISTICS

Panel A: Texas Bankruptcy Data

	Number of Bankruptcies	Annual Personal Bankruptcy Rate, TX (Individuals)	Bankruptcy filers who ever apply or applied for PDL	Bankruptcy petitions per payday applicant per year
Chapter 7	382,654	0.23%	2,705	0.007
Chapter 13	258,867	0.15%	5,626	0.016
All	641,521	0.38%	8,331	0.023

Panel B: Outcome Data Around the Credit Score Approval Threshold

	All Credit Scores		Within 1 s.d. of Approval Threshold		Within 0.1 s.d. of Approval Threshold	
	Below Threshold	Above Threshold	Below Threshold	Above Threshold	Below Threshold	Above Threshold
Number of Payday Applicants	25,305	119,854	18,060	84,490	2,957	3,430
Payday Applicants' Bankruptcy Filing Rates (%)						
Within 1 Year after First Application (%)						
Ch 7 (%)	0.30	0.49	0.35	0.42	0.41	0.26
Ch 13 (%)	1.02	1.32	0.97	1.13	1.12	2.19
All Bankruptcies (%)	1.32	1.81	1.32	1.55	1.52	2.45
Within 2 Years after First Application (%)						
Ch 7 (%)	0.40	0.79	0.47	0.66	0.51	0.50
Ch 13 (%)	1.48	2.09	1.45	1.77	1.76	3.18
All Bankruptcies (%)	1.88	2.88	1.91	2.42	2.27	3.67

Panel A uses bankruptcy data from Public Access to Court Electronic Records (PACER) and American Bankruptcy Institute (http://www.abiworld.org/), Texas population data are from the US Census Bureau, (http://www.census.gov/popest/states/tables/NST-EST2005-01.xls), and the matched sample consists of bankruptcy filers that have the same first name, last name, zip code and final four SSN digits as individuals who applied for loans from a national payday lender. According to the data from the US Census Bureau, the population of Texas in 2002 was 21,722,394. Panel B uses bankruptcy data from PACER.

TABLE IV

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILINGS

	(1) OLS full range	(2) OLS range = 0.5sd	(3) OLS range = 0.1sd	(4) Reduced Form full range	(5) Reduced Form range = 0.5sd	(6) Reduced Form range = 0.1sd	(7) IV full range	(8) IV range = 0.5sd	(9) IV range = 0.1sd
Chapter 7, One Year	-0.041	-0.003	0.053	-0.054	0.169	0.523	-0.056	0.175	0.547
	(0.085)	(0.170)	(0.519)	(0.120)	(0.294)	(1.821)	(0.124)	(0.304)	(1.905)
Chapter 7, Two Years	0.021	0.134	-0.214	-0.098	0.445	2.507	-0.101	0.460	2.622
	(0.106)	(0.204)	(0.641)	(0.150)	(0.351)	(2.245)	(0.155)	(0.363)	(2.353)
Chapter 13, One Year	0.328*	0.785 **	0.751	0.213	1.797**	1.994	0.220	1.860**	2.086
	(0.142)	(0.288)	(1.173)	(0.200)	(0.495)	(4.111)	(0.208)	(0.513)	(4.301)
Chapter 13, Two Years	0.319*	0.931**	-0.376	0.341	2.377**	2.884	0.353	2.460**	3.017
	(0.179)	(0.356)	(1.472)	(0.254)	(0.614)	(5.160)	(0.263)	(0.635)	(5.400)
All Bankruptcies, One Year	0.287*	0.782*	0.804	0.159	1.966**	2.517	0.164	2.035**	2.633
	(0.164)	(0.334)	(1.278)	(0.233)	(0.574)	(4.480)	(0.241)	(0.595)	(4.688)
All Bankruptcies, Two Years	0.340	1.065**	-0.590	0.244	2.822**	5.391	0.252	2.920**	5.639
	(0.208)	(0.411)	(1.606)	(0.294)	(0.708)	(5.628)	(0.304)	(0.732)	(5.895)
Number of observations	145,159	47,434	6,387	145,159	47,434	6,387	145,159	47,434	6,387

* Significant at the 5 percent level

** Significant at the 1 percent level

Regression coefficients are the estimated treatment effects, in percentage points, of first payday loan approval ("*CreditScore* ") on bankruptcy filings, and their standard errors. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the abovethr dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included. "Range" refers to the number of standard deviations around the credit-score threshold to which the sample is restricted. Reduced form regressions report the coefficient on the "above threshold" indicator. The IV regressions instrument for CreditScore with an indicator for whether the credit score exceeds the approval threshold ("AboveThr").

TABLE IX

BANKRUPTCY FILINGS BEFORE AND AFTER CREDIT-SCORE CHANGE

	3rd quarters pre	2nd quarters pre	1 quarter pre	1 quarter post	2nd quarter post	3rd quarter post
ALL TIME PERIODS						
Ch 7						
	-0.014	-0.033	0.191*	0.000	0.132	0.000
	(0.096)	(0.094)	(0.111)	0.000	(0.167)	0.000
N	47,434	47,434	47,434	47,434	47,434	47,434
Ch 13						
	0.558**	0.277*	-0.062	0.073	0.204	0.011
	(0.165)	(0.147)	(0.124)	(0.064)	(0.181)	(0.039)
N	47,434	47,434	47,434	47,434	47,434	47,434
All						
	0.543**	0.244	0.129	0.073	0.077	0.011
	(0.191)	(0.174)	(0.167)	(0.064)	(0.060)	(0.039)
N	47,434	47,434	47,434	47,434	47,434	47,434
PRE						
Ch 7						
	-0.050	-0.005	0.020	0.000	0.254	0.000
	(0.211)	(0.182)	(0.105)	0.000	(0.365)	0.000
N	13855	13855	13855	13855	13855	13855
Ch 13						
	0.265	0.000	-0.464	-0.002	0.560	0.000
	(0.315)	(0.182)	(0.298)	(0.149)	(0.407)	0.000
N	13,855	13,855	13,855	13,855	13,855	13,855
ALL						
	0.215	-0.005	-0.444	-0.002	0.015	0.000
	(0.379)	(0.258)	(0.316)	(0.149)	(0.105)	0.000
N	13,855	13,855	13,855	13,855	13,855	13,855
POST						
Ch 7						
	-0.013	-0.023	0.222	0.000	0.095	0.000
	(0.112)	(0.112)	(0.143)	0.000	(0.194)	0.000
N	33,579	33,579	33,579	33,579	33,579	33,579
Ch 13						
	0.653**	0.282	0.032	0.094	0.096	0.013
	(0.198)	(0.187)	(0.140)	(0.073)	(0.209)	(0.052)
N	33,579	33,579	33,579	33,579	33,579	33,579
ALL						
	0.639**	0.259	0.253	0.094	0.094	0.013
	(0.227)	(0.218)	(0.200)	(0.073)	(0.073)	(0.052)
N	33,579	33,579	33,579	33,579	33,579	33,579

* Significant at the 5 percent level

** Significant at the 1 percent level

The credit-scoring formula and the threshold for approval were adjusted at all shops once during our period of observation, in August 2002. This table shows reduced-form estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold for borrowers who applied for their first payday loan at this company during the months before the credit-score change. Regressions include a quartic in the credit score, a quartic in the credit score interacted with the *AboveThr* dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.

TABLE V

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILINGS BY SUBCATEGORIES

	(1) All	(2) Male	(3) Female	(4) Black	(5) White	(6) Hispanic	(7) Homeowners	(8) Renters
Chapter 7, One Year	0.169	-0.257	0.331	0.187	0.286	-0.351	-1.741	-0.402
	(0.294)	(0.822)	(0.696)	(0.454)	(2.068)	(1.208)	(1.799)	(0.631)
Chapter 7, Two Years	0.445	-0.185	-0.145	-0.681	0.739	0.120	-1.644	-1.023
	(0.351)	(1.122)	(0.982)	(0.787)	(2.307)	(1.772)	(2.155)	(0.750)
Chapter 13, One Year	1.797**	1.265	0.133	1.580	-1.040	-1.702	0.460	0.080
	(0.495)	(2.174)	(1.252)	(1.503)	(3.318)	(1.917)	(3.881)	(0.821)
Chapter 13, Two Years	2.377**	-0.174	1.011	2.260	-6.579	-0.317	4.162	0.029
	(0.614)	(2.809)	(1.561)	(1.903)	(4.154)	(2.505)	(4.976)	(1.055)
All Bankruptcies, One Year	1.966**	1.008	0.464	1.768	-0.754	-2.053	-1.282	-0.322
	(0.574)	(2.318)	(1.429)	(1.567)	(3.898)	(2.261)	(4.250)	(1.044)
All Bankruptcies, Two Years	2.822**	-0.358	0.866	1.579	-5.840	-0.197	2.518	-0.994
	(0.708)	(3.014)	(1.859)	(2.074)	(4.736)	(3.048)	(5.373)	(1.316)
Number of observations	47,434	3,347	5,458	4,629	1,663	2,442	2,960	13,823

* Significant at the 5 percent level

** Significant at the 1 percent level

Estimates shown are reduced-form estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold. Cells report regression coefficients that are the estimated treatment effects, in percentage points, of first payday loan approval on bankruptcy filings, and their standard errors. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the *AboveThr* dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included. Column (1) repeats the benchmark results from Table 4. Monoline shops offer payday loans only. The number of observations by subpopulation may not add up due to missing observations in demographic characteristics.

TABLE VI

SUBSEQUENT PAYDAY LOANS

Panel A: Payday Applicants' Subsequent Payday Loans According to Credit Score

	All Credit Scores		Within 1 s.d. of Approval Threshold		Within 0.1 s.d. of Approval Threshold	
	Below Threshold	Above Threshold	Below Threshold	Above Threshold	Below Threshold	Above Threshold
Within 1 Year after First Application						
Average Subsequent Applications	2.09	8.85	1.80	8.42	1.89	7.48
Average Borrowed ($)	68.32	2,376.21	40.57	2,192.58	49.29	1,953.19
Within 2 Years after First Application						
Average Subsequent Applications	3.03	12.50	2.91	11.63	2.80	9.48
Average Borrowed ($)	202.03	3,346.15	167.70	3,000.31	154.81	2,446.46

Panel B: Subsequent Payday Loans for All Approved Applicants	Number of Applications	Amount Borrowed ($)	Number of Observations
All Shops			
Within 1 Year of First PDL Application	5.125**	1820.75**	30,243
	(0.42)	(127.35)	
Within 2 Years of First PDL Application	6.107**	2169.842**	11,148
	(1.48)	(423.69)	

* Significant at the 5 percent level

** Significant at the 1 percent level

Cells report reduced-form regression coefficients that are the estimated treatment effects, in percentage points, of first payday loan approval ("CreditScore") on subsequent payday loan applications and their standard errors. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the abovethr dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included. Estimates shown are IV estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold.

TABLE VII

PAYDAY APPLICANTS' ASSETS AND LIABILITIES

Panel A: General Assets and Liabilities

		Below	Above			Below	Above
Total Liabilities ($)	Mean	145,317	137,954	**Total Assets ($)**	Mean	156,908	83,321
	SD	106,043	122,601		SD	514,178	63,634
Total Secured Debt	Mean	113,096	103,783	Personal Property	Mean	22,834	19,872
	SD	80,054	79,531		SD	21,386	18,868
Total Unsecured Debt	Mean	32,221	34,171	Real Property	Mean	134,074	63,449
	SD	37,060	55,202		SD	513,319	57,848

Panel B: Liabilities by Subcategory

		Below	Above
Student Loans	Mean	24,696	11,727
	SD	25,205	12,321
Car Lease	Mean	16,194	13,674
	SD	10,729	9,924
Mortgage	Mean	101,264	102,728
	SD	42,635	63,075

This table shows bankruptcy petition filings for 211 payday loan applicants (104 below and 107 above the passing credit-score threshold) who filed for bankruptcy after their first payday loan application. Samples are not exactly balanced due to ties in the credit score. Data are from PACER matched to records from a payday loan company. The two rows under each type of asset or liability are the mean and the standard deviation of dollar amounts of outstanding debts.

TABLE VIII

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILINGS BY MARKET SHARE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Low Market-Share Shops	Medium Market-Share Shops	High-Market Share Shops	Multiline Shops	Monoline Shops	Multiline-pre credit score change	Monoline-pre credit score change	Multiline-post credit score change	Monoline-post credit score change	Low market share, pre-credit-score change	Low market share, post-credit-score change	High market share, pre-credit-score change	High market share, post-credit-score change	Old shops	New Shops
Chapter 7, One Year	0.003	0.404	0.419	0.034	0.33	-1.313	0.992	0.3	0.21	0.444	-0.11	-2.085	0.733	-0.03	1.239
	(0.371)	(0.479)	(0.539)	(0.349)	(0.49)	(0.716)	(1.523)	(0.414)	(0.517)	(0.861)	(0.422)	(1.461)	(0.59)	(0.312)	(0.864)
Chapter 7, Two Years	-0.041	1.125*	1.214*	0.123	0.846	-1.501	0.829	0.405	0.790	0.306	-0.175	-2.631	1.716*	0.171	1.819*
	(0.441)	(0.575)	(0.643)	(0.43)	(0.572)	(0.899)	(1.781)	(0.506)	(0.603)	(1.06)	(0.495)	(1.698)	(0.709)	(0.375)	(1.007)
Chapter 13, One Year	1.225*	2.658**	2.871**	1.389*	2.237**	-0.193	-0.142	1.648*	2.444**	1.000	1.256*	-0.239	3.082**	2.056**	-0.056
	(0.616)	(0.825)	(0.87)	(0.668)	(0.74)	(1.305)	(1.869)	(0.806)	(0.829)	(1.309)	(0.723)	(2.018)	(0.991)	(0.545)	(1.236)
Chapter 13, Two Years	1.461*	3.766**	4.087**	1.391*	3.426**	0.204	-1.426	1.559	3.979**	-0.192	1.855*	2.185	4.002**	2.386**	1.623
	(0.765)	(1.02)	(1.086)	(0.843)	(0.897)	(1.712)	(2.412)	(1.003)	(0.99)	(1.699)	(0.884)	(2.715)	(1.216)	(0.6795)	(1.4721)
All Bankruptcies, One Year	1.228*	3.062**	3.29**	1.422*	2.567**	-1.506	0.850	1.948*	2.653**	1.445	1.146	-2.324	3.814**	2.027**	1.183
	(0.719)	(0.95)	(1.018)	(0.751)	(0.886)	(1.484)	(2.436)	(0.903)	(0.972)	(1.58)	(0.834)	(2.481)	(1.147)	(0.627)	(1.5)
All Bankruptcies, Two Years	1.420	4.89**	5.301**	1.514	4.272**	-1.297	-0.598	1.965*	4.769**	0.114	1.68*	-0.446	5.718**	2.556**	3.442*
	(0.883)	(1.171)	(1.26)	(0.95)	(1.061)	(1.953)	(3.006)	(1.126)	(1.155)	(2.02)	(1.011)	(3.182)	(1.407)	(0.778)	(1.769)
Number of observations	28,514	18,920	16,366	26,010	21,424	8,836	5,019	17,174	16,405	8,918	19,596	4,104	12,262	40,941	6,493

* Significant at the 5 percent level

** Significant at the 1 percent level

Estimates shown are reduced-form estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold. Column 1 shows results from zip codes where this payday lender has market share of less than 50%. Market-share percentages were calculated using payday store locations from ReferenceUSA. The modal zip code of customers' patronizing a shop was used as the shop zip code. Columns 2 and 3 show results for zip codes that have market share above 50% and 75%, respectively. Cells report regression coefficients that are the estimated treatment effects, in percentage points, of first payday loan approval on bankruptcy filings, and their standard errors. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the *AboveThr* dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included. Eight percent of the shops are monoline shops, .i.e., they offer payday loans only. The other 92% of the shops offer both payday loans and pawnshop loans. Old shops are shops that were open before tha change in credit score. New shops were opened after the credit score change.

Table IX: The Effect of Bankrtupcy Reform

Applicants applying in all time periods			Applicants applying before the credit-score change			Applicants applying after the credit-score change		
(1)	(2)	(3)	(4)	(5)	(6)	(9)	(10)	(11)
	All Chapters			**All Chapters**			**All Chapters**	
3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre
.543**	0.244	0.129	0.215	-0.005	-0.444	0.639**	0.259	0.253
0.191	0.174	0.167	0.379	0.258	0.316	0.227	0.218	0.200
	N = 47,434			N = 13,855			N = 33,579	
	Chapter 13			**Chapter 13**			**Chapter 13**	
3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre
0.558**	0.277*	-0.062	0.265	0.000	-0.464	0.653**	0.282	0.032
0.165	0.147	0.124	0.315	0.182	0.298	0.198	0.187	0.140
	N = 47,434			N = 13,855			N = 33,579	
	Chapter 7			**Chapter 7**			**Chapter 7**	
3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre	3rd quarters pre	2nd quarters pre	1 quarter pre
-0.014	-0.033	0.191	-0.050	-0.005	0.020	-0.013	-0.023	0.222
0.096	0.094	0.111	0.211	0.182	0.105	0.112	0.112	0.143
	N = 47,434			N = 13,855			N = 33,579	

The credit-scoring formula and the threshold for approval were adjusted at all shops once during our period of observation, in August 2002. This table shows reduced-form estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold for borrowers who applied for their first payday loan at this company during the months before the credit-score change. Regressions include a quartic in the credit score, a quartic in the credit score interacted with the AboveThr dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.Columns (1)-(3) show results for applicants who applied during the entire sample period. Columns (4)-(6) show results for applicants who applied for their first payday loan before the lender instituted a change in the credit-score threshold. Columns (9)-(11) show results for applicants who applied *after* the change. The results show the effects of payday loan access on subsequent bankruptcy filing rates for quarters leading up to the implimentation of the Bankrtupcy Abuse Prevention and Consumer Protection Act of 2005. * Significant at the 5 percent level. ** Significant at the 1 percent level.

APPENDIX TABLE I

DEMOGRAPHIC CHARACTERISTICS AND THE THRESHOLD

	All			Within 0.5 sd			Within 0.05 sd		
	Below	Above		Below	Above		Below	Above	
Age	34.032	36.976	**	33.714	34.443	**	33.984	36.022	**
	(10.376)	(11.358)		(10.487)	(10.800)		(10.188)	(11.605)	
Black	0.189	0.193		0.177	0.197	**	0.178	0.211	*
	(0.392)	(0.395)		(0.381)	(0.398)		(0.383)	(0.408)	
Hispanic	0.113	0.165	**	0.112	0.147	**	0.086	0.168	**
	(0.317)	(0.371)		(0.315)	(0.354)		(0.280)	(0.374)	
Female	0.228	0.292	**	0.217	0.274	**	0.208	0.276	**
	(0.419)	(0.454)		(0.412)	(0.446)		(0.406)	(0.447)	
Monthly Pay ($)	878.615	1147.138	**	725.063	944.194	**	789.272	838.439	
	(1039.932)	(1190.408)		(982.089)	(1034.300)		(950.915)	(1056.526)	
Months at Current Job	1.216	3.115	**	0.855	1.366	**	1.145	1.098	
	(3.761)	(6.528)		(2.739)	(3.911)		(3.233)	(3.317)	
Paid Weekly	0.082	0.089	**	0.069	0.089	**	0.068	0.085	
	(0.275)	(0.284)		(0.253)	(0.285)		(0.252)	(0.278)	
Paid Biweekly	0.291	0.339	**	0.248	0.315	**	0.262	0.274	
	(0.454)	(0.473)		(0.432)	(0.464)		(0.440)	(0.446)	
Paid Semimonthly	0.107	0.128	**	0.090	0.116	**	0.099	0.097	
	(0.309)	(0.334)		(0.287)	(0.320)		(0.299)	(0.296)	
Paid Monthly	0.073	0.116	**	0.059	0.090	**	0.065	0.090	**
	(0.261)	(0.320)		(0.236)	(0.286)		(0.247)	(0.287)	
Wages Garnished	0.378	0.503	**	0.245	0.414	**	0.276	0.321	**
	(0.519)	(0.525)		(0.459)	(0.517)		(0.464)	(0.489)	
Direct Deposit	1.481	1.807	**	1.246	1.616	**	1.344	1.427	
	(1.375)	(1.321)		(1.372)	(1.346)		(1.396)	(1.350)	
Checking Account Balance ($)	41.680	270.378	**	-10.507	132.231	**	53.627	77.242	
	(370.903)	(570.110)		(302.296)	(438.501)		(328.233)	(460.626)	
NSF's on Bank Statement	2.055	0.889	**	2.273	1.269	**	1.803	1.862	
	(4.423)	(2.557)		(4.737)	(3.251)		(4.165)	(3.939)	
Owns Home	0.074	0.176	**	0.036	0.073	**	0.060	0.080	*
	(0.261)	(0.381)		(0.187)	(0.260)		(0.238)	(0.272)	
Months at Current Residence	48.847	70.646	**	42.250	48.223	**	46.805	82.858	**
	(59.045)	(96.444)		(51.259)	(76.797)		(60.179)	(104.245)	

* Significant at the 5 percent level

** Significant at the 1 percent level

Data provided by a company that makes payday loans. Included are all available demographics for the universe of payday-loan applicants in Texas between 9/2000 and 8/2004. Quantities are calculated from each individual's first application. These variables, with the exception of Month of First Application, represent the full set of "demographic controls" included in most regression specifications reported in this paper. Whenever we include these controls, we also include dummies for missing values of each of them. Dummies for each value of Month of First Application are often included as well, and indicated separately. "NSF's" are "Not Sufficient Funds" events like bounced checks.

APPENDIX TABLE II

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILINGS BEGORE AND AFTER CREDIT SCORE CHANGE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Reduced Form	Reduced Form, pre-August 2002	Reduced Form, post-August 2002	Reduced form, RHS variable interaction of *AboveThr* and post-August 2002 dummy	Same as col (4) except allowing functional form of credit score to vary before and after credit score change of August 2002.	Same as Col (5) but without a post-August 2002 dummy.	Reduced form, RHS variable interaction of *AboveThr* and post-August 2002 dummy. Sample includes only post-August 2002 observations.
Chapter 7, One Year	0.169	-0.459	0.233	-0.147	0.134	-0.004	0.101
	(0.294)	(0.712)	(0.330)	(0.144)	(0.346)	(0.318)	(0.353)
Chapter 7, Two Years	0.445	-0.634	0.559	-0.081	0.477	0.226	0.424
	(0.351)	(0.859)	(0.392)	(0.172)	(0.413)	(0.379)	(0.420)
Chapter 13, One Year	1.797**	-0.033	2.041**	0.512*	1.218*	1.064*	1.122*
	(0.495)	(1.070)	(0.577)	(0.242)	(0.584)	(0.536)	(0.618)
Chapter 13, Two Years	2.377**	-0.079	2.751**	0.681*	1.783*	1.476*	1.717*
	(0.614)	(1.395)	(0.705)	(0.301)	(0.724)	(0.665)	(0.755)
All Bankruptcies, One Year	1.966**	-0.492	2.273**	0.365	1.352*	1.060*	1.223*
	(0.574)	(1.289)	(0.662)	(0.281)	(0.677)	(0.622)	(0.709)
All Bankruptcies, Two Years	2.822**	-0.713	3.310**	0.599*	2.259**	1.702*	2.142*
	(0.708)	(1.649)	(0.805)	(0.346)	(0.834)	(0.766)	(0.862)
Number of observations	47,434	13,855	33,579	47,434	47,434	47,434	33,579

* Significant at the 5 percent level

** Significant at the 1 percent level

Estimates shown are reduced-form estimates from the sample restricted to 0.5 standard deviations around the credit-score threshold. Cells report regression coefficients that are the estimated treatment effects, in percentage points, of first payday loan approval on bankruptcy filings, and their standard errors. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the *AboveThr* dummy, demographic controls and a full set of dummies for month of loan application. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.