Do Payday Loans Cause Bankruptcy?[1]

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Abstract

Payday loans are used by millions of Americans every year despite carrying interest rates of several hundred percent. We provide new evidence on the consequences of payday borrowing and the determinants of personal bankruptcy. Using an administrative panel dataset of loan records and a regression discontinuity design, we estimate that payday loans substantially increase personal bankruptcy rates. We assess possible mechanisms and find the most support for a novel one: payday loan access appears to induce bankruptcy filings by worsening the cash flow position of the household.

Keywords: Payday loans, bankruptcy, household cash flow, regression discontinuity

JEL Codes: D14 (Personal Finance), K35 (Personal Bankruptcy Law)

I. Introduction

Usury laws are often adopted to restrict high interest lending such as payday loans. With annual percentage rates (APRs) of 400-600%, payday loans carry some of the highest interest rates available on formal credit products. Despite this, about ten million American households borrow on payday loans each year, and payday lenders have more storefronts in the United States than McDonald's and Starbucks combined (Pew 2013; Lusardi and de Bassa Scheresberg 2013).

This paper contributes new evidence on both the impact of payday loan access and the causes of personal bankruptcy. We use an administrative panel dataset from a lender and a discontinuity in the lender's underwriting rule to study the impact of payday loans on bankruptcy filings. The administrative panel includes information on the timing, size, and locations of applications, as well as demographics for 145,000 applicants. Individual identifiers in the administrative data permit matching to bankruptcy petitions that are publicly available from Public Access to Court Electronic Records (PACER).

An institutional feature of the lender's underwriting process then allows statistical identification of the impact of payday loans on bankruptcy from a regression discontinuity. Payday loan applications are approved if the applicant's credit score exceeds a fixed threshold. Regression discontinuity analyses rely on unobservable characteristics not changing discontinuously at the threshold.[2] With this standard identifying assumption, differences in bankruptcy rates between barely approved and barely rejected applicants can be attributed to the causal impact of payday loan access.[3]

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[2] For econometric foundations of the regression discontinuity approach, see Thistlethwaite and Campbell (1960), Hahn, Todd and Van der Klaauw (2001), Porter (2003), and McCrary (2008). Many modern applications stemmed from the work of Angrist and Lavy (1999). Imbens and Lemieux (2008) provide a practical guide.

[3] For convenience, we will refer to approval of one's first payday loan application, conditional on applying, as the effect of payday loan access.

Our estimates answer the paper's title question affirmatively: payday loan access causes a significant increase in personal bankruptcy rates. The benchmark point estimate corresponds to a near-doubling of the annual bankruptcy rate, with other specifications ranging between increases of 21-185 percent. Regression discontinuity results can sometimes be fragile, so we show exactly how our findings depend on dozens of implementation choices, demonstrating robustness and allowing readers to focus on their preferred specifications for quantitative takeaways.

Even at the low end of the estimate range, the magnitudes we find are striking: payday loans average about $300, but access has an economically significant effect on bankruptcy, a cumulative financial outcome. We therefore view the remainder of the paper, which complements the main bankruptcy impact analysis by extensively evaluating a series of possible mechanisms, as a second important contribution. This investigation of mechanisms also helps contextualize the paper in the literature on the determinants of bankruptcy.

A variety of forces have previously been implicated as drivers of bankruptcy filing rates, including the pecuniary benefits of debt discharge (Fay, Hurst, and White, 2002), stigma (Gross and Souleles, 2002a), the expansion of credit card indebtedness (Domowitz and Sartain 1999; White, 2007), adverse health and medical expense shocks (Himmelstein et al., 2009; Morrison et al., 2013), and the ability to pay filing costs (Mann and Porter, 2010; Gross, Notowidigdo, and Wang, 2014). We find evidence for a complementary force, which to our knowledge is novel in this literature: payday loans increase bankruptcy rates by worsening borrowers' cash flow positions.

Using individual-level variation (rather than changes in state regulatory environments or zip-code- and county-level shocks), we are able to

contribute new evidence on the effects of high-interest credit.[4] Other analyses of the effects of payday loan access include those by Lefgren and McIntyre (2009), Zinman (2010), Melzer (2011), Morse (2011), Morgan, Strain and Seblani (2012), Carrell and Zinman (2013), Bhutta (2014), Bhutta, Skiba and Tobacman (2014), and Carter and Skimmyhorn (2014). Caskey (2012) reviews the mixed collection of findings in this literature, and we contextualize our contribution in Section VI.D. 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 that identifies market-level impacts of credit.[5]

It is sometimes suggested that the central policy question is whether payday loans suck borrowers into a downward spiral of financial distress. The answer we come to in this paper is nuanced and involves a reframing of the question. We find the empirical evidence compelling that payday loan access causes personal bankruptcy to increase. The mechanism supported most strongly is that the bankruptcies could arise because of the cash flow burden of payday finance charges. Additional theoretical work, beyond the scope of this paper, should investigate whether this mechanism is or is not consistent with a downward spiral view. Beyond these considerations, it could be the case that the bankruptcy filings *benefit* the filers, alleviating their longstanding financial distress. Bankruptcy filings also cause other debt to go bad, distorting equilibrium interest rates for non-payday borrowers. Instead

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[4] Payday loans are often described as a form of "fringe banking" (Caskey 1994). Like check cashing services and pawnshops, payday lenders provide alternatives to traditional banks. Caskey (1991, 1994, 2001, 2005, 2012) has studied fringe banking in great detail; Flannery and Samolyk (2005) have analyzed the profitability of the payday lending industry; Elliehausen and Lawrence (2001) have conducted surveys of payday borrowers; and Stegman and Faris (2003) have reviewed the payday loan industry's business practices.

[5] Among the vast literature in economics on borrowing and credit, there is relatively little empirical research on the causal impact of *individual*-level random variation in the ability to borrow money as in this paper. Excellent exceptions are the work of Ausubel (1999) and Gross and Souleles (2002a) on credit cards and Karlan and Zinman (2008, 2009, 2010) on South African consumer credit.

of further discussing a possible "downward spiral," we therefore attempt in Section VI.B to seriously analyze the private and social costs and benefits of bankruptcy filings.

The remainder of the paper is organized as follows. In Section II we provide additional background on payday loans and introduce the administrative data. Section III describes our estimation strategy, focusing on the credit-score discontinuity. We present our main empirical results and robustness checks in Section IV and discuss heterogeneity in Section V. Section VI examines the mechanisms driving these results and the implications, and Section VII concludes.

II. Context and Data

Administrative data were supplied for this project by a provider of financial services that offers payday loans. To apply for a payday loan at this company, individuals fill out paper applications and present their most recent pay stubs, checking account statements, utility or phone bills, and state-issued photo IDs. The lender uses applicants' pay stubs to infer the dates of their next paydays and assign loan due dates. Loans are collateralized only with personal checks dated on borrowers' upcoming paydays.[6] Finance charges equal 18 percent of the loan principal. The two-week loan term that is most common implies an APR of 18% x 26 = 468%, since people paid biweekly receive 26 paychecks per year.[7]

We study the universe of individuals whose first loan application at this company occurred at an outlet in Texas between September, 2000 (when the firm entered this market), and August, 2004. This includes about one million loan applications by 145,159 individuals. Table 1 presents

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

[7] Payday lenders typically do not allow interest to compound, but an alternative measure of the annualized cost of liquidity from biweekly payday loans is $100 * (1.18^{26} - 1) = 7,295\%$.

demographic and background characteristics of this population and summary information about their applications and loans.[8] There is variation in the availability of the background characteristics, mostly due to changes over time in the data collection and retention practices by the lender.[9]

Overall, the available observables align with the broader population of payday borrowers (e.g., Elliehausen and Lawrence, 2001). Table 1 also reports summary statistics for a subgroup of 31,892 applicants we focus on for some of the empirical analysis, whose credit score is within 0.5 standard deviations of the passing threshold.

Summary statistics for the bankruptcy data are presented in Table 2. Personal bankruptcy petitions are public record and were downloaded from Public Access to Court Electronic Records (PACER). We obtained the universe of 556,767 personal bankruptcy filings in the four United States Bankruptcy Courts in Texas from 2000 through 2006.[10] These bankruptcy data include the date of filing, the chapter (7 or 13),[11] the disposition of the

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[8] All dollar values are deflated with the CPI-U to January 2002 dollars. We replace with missing the top and bottom 0.1 percent of the distributions of checking account balance and take-home pay. We also replace age with missing if it is less than 18.

[9] For the data extract we use, the company stopped collecting some work-related variables in August, 2003, i.e., job tenure, pay frequency, and income. They had previously, in December, 2002, stopped collecting information on wage garnishment and homeownership. This means that only a few observations (<2%) are missing these control variables for reasons that are uncorrelated with the time effects that we control for in all the paper's specifications. Race and sex were collected by the company as a legal requirement for making pawn loans. Those variables are therefore available only in this paper's data for people who had pawned an item at this company prior to their first payday loan application. Thus missing values of race and sex are perfectly correlated with a dummy for not having previously taken a pawn loan at this company. We do include that dummy variable in all specifications below.

[10] The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 (BAPCPA) modified United States bankruptcy law substantially. It was enacted on April 20, 2005 and became effective six months later. We lack statistical power to draw clear conclusions about the interaction of BAPCPA and payday loan access. Most payday applicants studied in this paper have low enough income that they would meet the new means-test criterion for a post-BAPCPA Chapter 7 filing.

[11] Filing under chapter 7 generally results in a full discharge of debt obligations. Filing under chapter 13 entails a reorganization of debts. We discuss in more detail later the important differences in the chapters.

bankruptcy case (generally, dismissal or discharge of debts),[12] and individual identifiers that permit linkage to the payday loan data.

Panel A of Table 2 shows an individual bankruptcy rate (as a fraction of population) for Texas as a whole of 0.366 percent per year. We identify debtors in the PACER bankruptcy dataset as 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 2, 13,540 of the 145,519 payday loan applicants filed for personal bankruptcy during the bankruptcy sample period. Thus the annual bankruptcy rate among payday applicants is $13,540/(145,519*7) = 1.33\%$ per year, more than 3.5 times the overall annual rate in Texas from 2000 to 2006. This average difference is also displayed year-by-year in Appendix Figure 1.

Panel B of Table 2 provides summary information about the fraction of applicants above and below the credit threshold who subsequently filed for bankruptcy. These averages imply that people above the credit-score threshold are more likely to file. This is true for the full sample and for samples of 0.5 and 0.05 standard deviations around the threshold. These differences are suggestive of a relationship between payday lending and bankruptcy. For more thorough analysis, next we turn to regressions that exploit the discontinuous access to payday loans near the credit score threshold.

III. Identification and Empirical Strategy
III.A. The Credit Score Regression Discontinuity

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[12] We focus on bankruptcy petitions, regardless of whether debt was eventually discharged: filing is an indicator of financial distress (Fay, Hurst, and White, 2002). Bankruptcy law precludes creditors from contacting debtors once a petition is filed, so debtors may file to protect themselves from creditors even if their debts are unlikely to be discharged. Hereafter we use "petition" and "filing" interchangeably.

Access to payday loans depends on a credit score calculated at the time of the loan application by a third-party credit bureau called Teletrack.[13] During our observation period, the lender maintained a fairly strict threshold rule for loan approvals. Among first-time applicants with scores below the threshold 99.6 percent were rejected, while 96.9 percent of first-time applicants scoring above the threshold were approved. Below, we exploit changes in the threshold rule to analyze effects of payday loan access across the credit score distribution. In most of the empirical analysis, we pool the data and use a variable called $CreditScore$, which equals the raw Teletrack score minus the approval threshold that was in force at the time of the application, normalized by the standard deviation of raw scores during the corresponding period. Figure 1A displays a histogram of $CreditScore$, indicating that there is discreteness in the distribution but no unusual bunching in close proximity the threshold.

Consistent with the company's stated policy, the credit score has a discontinuous effect on the probability that a payday loan application is approved. Figure 1B shows the probability of approval among first-time applicants (denoted $Approved$) 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 this visually striking discontinuity by regressing $Approved$ on an indicator for being above the threshold ($AboveThr$), controlling for a polynomial in $CreditScore$ and background characteristics:

$$Approved_i = \beta_0 + \beta_1 AboveThr_i + f(CreditScore_i) + \gamma X_i' + \delta M_i'^t + \epsilon_i \quad (1)$$

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[13] The credit scoring formula is proprietary, but in personal communications with Teletrack personnel we have been told these scores differ from FICO scores in that they depend on a shorter history of behavior and focus on borrowing histories in the subprime market. Though Teletrack serves major payday lenders, the lenders establish their own criteria for approving loan applications. Skiba and Tobacman (2008) and Agarwal, Skiba and Tobacman (2009) discuss more details of the credit-scoring process in the context of the profitability of payday lenders.

In this equation, X_i is a vector for borrower i of all the demographic and background characteristics provided by the company and reported in Table 1. $M_i'^t$ is a full set of dummies for the month-year of the first payday loan application, so $M_i'^t = 1$ if individual i's first application was in month t and 0 otherwise. A variety of choices can be made for the functional form of $f(CreditScore_i)$, and we adopt an agnostic approach. Our benchmark specifications allow $f(\cdot)$ to be a quartic in $CreditScore_i$ interacted with $AboveThr_i$.[14]

Informal default is common on payday loans: at this firm, over 30 percent of borrowers had a loan written off by the lender within a year of taking their first loans. In choosing the threshold for loan approval, the company therefore had incentives disconnected from bankruptcy filing probabilities. To the extent the company adjusted their threshold in order to decrease loan losses due to borrowers' bankruptcy filings, the bankruptcy rate should fall when crossing the threshold, biasing our findings downward.

III.B. Identification

The identifying assumption for the regression discontinuity design is that unobservables must not change discontinuously at the threshold. This assumption is not directly testable, but two main avenues are available for gaining insight about it. The first avenue relates to observable characteristics. If observables do not change discontinuously at the threshold, that is neither necessary nor sufficient to guarantee that unobservables also do not, but it somewhat increases our confidence. Appendix Figure 2 plots the 16 control variables from Table 1 versus $CreditScore$ and indicates reasonable

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[14] Appendix Table 1 reports linear probability and probit estimates of (1) based on this specification. In every regression, the coefficient on *AboveThr* is highly significant and close to 1. The R-squared in Column 1 equals 0.90 when only *AboveThr* is included on the right-hand side. 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 percent. Probits in Columns 5–8 (showing marginal effects) reveal the same pattern.

but imperfect balance. Appendix Table 2 provides further information about balance across the threshold. It shows that the balance of the raw variables improves as the range around the threshold shrinks; and it shows estimates of the discontinuities in each of the Appendix Figure 2 figures, using exactly the same approach as we use to estimate the bankruptcy effects of interest below.

Imbalances are most pronounced for age, checking account balance, and months in current residence, all of which are modestly higher above the credit score threshold. Manipulation of these types of covariates in order to get over the threshold would be problematic: applicants successful at this kind of manipulation could also be successful at navigating the bankruptcy filing process, for example.

We view this type of manipulation as unlikely for the checking balances, which are measured with bank statements, but possible with the (unverified) variable measuring months at current residence. Were borrowers to know the impact that this has on borrowing access, one may wait until a sufficient amount of time has elapsed to apply for a loan.

Encouragingly, there is no difference in the discontinuity based on whether or not people have multiple applications on the same day as their first applications (some people do reapply after being rejected). It does not appear that applicants and the lender are trying to tune underwriting variables in real time in order to gain approval.

Reassuringly for our strategy, the particular *directions* of imbalances we observe across the threshold in Appendix Table 2 and Appendix Figure 2 usually would induce omitted variables bias that would go against our bankruptcy findings below. For example, above-threshold applicants have slightly higher checking account balances and residential stability.

Moreover, institutional features of the underwriting process increase our confidence in the exogeneity of $AboveThr_i$ conditional on $f(CreditScore_i)$ for first-time applicants. First, 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 to the employee. Neither applicants themselves nor the employees in the store are informed of the applicants' scores or the passing credit score threshold. Second, 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 1, including a full set of month-year dummies, yields an R-squared of just 0.304. This process limits the capacity of applicants and clerks to decisively manipulate applications, so increasing our confidence that *AboveThr* affects an individual's future choices only insofar as *AboveThr* affects application approval. In light of these considerations, and following best practices for regression discontinuity implementations, we control for all of the available covariates and proceed.

III.C. Regression Discontinuity Specifications

Using the credit-score discontinuity described in the previous subsection, we estimate the effect of payday loan approval on bankruptcy at various horizons (from one day to 27 months) after the first payday loan application.[15] Our main outcome of interest, denoted $Bankruptcy_i$, is an indicator for whether payday loan applicant i filed for bankruptcy within one or two years of their first payday loan application. We consider several specifications. We refer to the first as the "OLS" specification:

$$Bankruptcy_i = \beta_0 + \beta_1 Approved_i + f(CreditScore_i) + \gamma X'_i + \delta M'_{ti} + \varepsilon_i \quad (2)$$

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[15] The last payday loan applications in the administrative dataset occur in August 2004 and we study bankruptcies through the end of 2006, so at least 27 months of outcome data are available for all applicants.

Second, our main specification is the "reduced-form (RF)":

$$Bankruptcy_i = \beta_0 + \beta_1 AboveThr_i + f(CreditScore_i) + \gamma X'_i + \delta M'_{ti} + \varepsilon_i \quad (3)$$

Third, we report IV regressions, instrumenting for *Approved* in Equation (2) with *AboveThr*.[16]

Analyses identified off of discontinuities generally involve a tradeoff as more and more data are included around the discontinuity (i.e., as the "bandwidth" increases). The additional data reduce sampling noise, but potentially introduce bias as weight is placed on observations where unobservables may be correlated with the outcome.[17]

We take an agnostic perspective in this paper about how to proceed in light of this tradeoff, demonstrating robustness to a variety of choices. First, we restrict to subsets of the data, narrowing in to +/-0.5 and +/-0.05 standard deviations around the credit-score threshold. These bandwidth restrictions result in samples with 31,892 and 3,328 applicants, respectively. Second, we implement optimal bandwidth estimates following Calonico, Cattaneo, and Titiunik (2014) and Imbens and Kalyanaraman (2011). Third, we show how

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[16] Throughout the paper we focus on identification from first 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 that 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. In principle it would be possible to replicate the IV regressions using a new endogenous variable, an indicator for whether an individual has *ever* had an application approved.

[17] The starkness of the tradeoff is highlighted in Appendix Table 3. Suppose that rather than studying the effect of payday loans on bankruptcy using the discontinuity available in this field environment, we could run an experiment that randomly assigned payday loan access. This table reports the numbers of observations necessary in order to have the specified probability of detecting various effect sizes at a 95% confidence level. For example, if the expected effect is an increase in the bankruptcy rate from 1.5% to 2%, then for 90% power almost exactly the number of observations that we actually have with a 0.5sd bandwidth would be required.

the direction and statistical significance of our findings vary for *any* bandwidth in a huge range.

IV. Results

IV.A. Descriptive Findings

Figure 2 displays how the two-year bankruptcy rate varies with *CreditScore*, in six ways which all suggest that payday loan access increases personal bankruptcy rates. Figure 2A reports the raw bankruptcy rates, where each dot corresponds to one of forty bins. The averages to the left and right of the threshold, respectively, are 2.84% and 3.38%, as in Table 2. Smoothed polynomial fits are also plotted, with 95% confidence intervals. Figure 2B replicates Figure 2A, except that we use the residuals from a regression of the *Bankruptcy* indicator on the control variables and the month dummies.

Since bankruptcy is so rare an outcome, averaging only 31,892 * 3% / 40 = 25 events per bin, some volatility is evident in Figures 2A and 2B. Figures 2C and 2D, before plotting, take the cumulative sum of bankruptcy events (2C) and residuals (2D) from left to right, and plot that cumulative sum against *CreditScore*. For a binary outcome variable like a bankruptcy indicator, a regression discontinuity in levels corresponds to a regression kink in the cumulative sum, so an effect of payday loan access on bankruptcy is present if the slope differs across the threshold in Figures 2C and 2D.

Figures 2E and 2F again show cumulative sums of bankruptcy events and residuals, but now the horizontal axis is the applicant's *CreditScore* rank. These Figures show all of the observations below the threshold, and an equal number of observations above the threshold. Again, an effect of payday loan access on bankruptcy rates would appear as a change in slope at the threshold.

IV.B. Conventional Regression Discontinuity Results

Table 2 and Figure 2A-F suggest that payday loan access increases bankruptcy rates. We formalize and quantify first by estimating Equations (2) and (3) in Table 3a. Regressions report point estimates and standard errors of β_1 for bankruptcies at one- and two-year time horizons since the first loan application. Each point estimate in the table comes from a different regression. The outcome variables have been multiplied 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 (Equation 2) results for the full sample. Column 2 restricts to a range of +/-0.5 standard deviations around the threshold, and Column 3 restricts to +/-0.05 standard deviations.

Section III demonstrated that a large share of the variation in *Approved* can be explained by *AboveThr*, an indicator for whether the credit score is above the lender-defined threshold. To the extent individual characteristics cause slippage between *AboveThr* and loan approval, correlation 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. We can more cleanly estimate the causal impact of payday loan access on bankruptcy by putting *AboveThr* on the RHS, as in Equation (3). Controlling for $f(CreditScore)$, X_i, and the month of application as well, we obtain the results in Columns 4–6 of Table 3a. [18]

Column 4 shows that the reduced-form effect of *AboveThr* on bankruptcies is significant at the 5% level for the 0.5 standard deviations sample: Having a credit score above the passing threshold increases bankruptcies by 2.289 percentage points over one year, more than a doubling of the baseline rate of 1.864 percent. Standard errors grow large when we

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[18] The full regression results for these three specifications may be found in Appendix Table 4.

restrict to just 0.05 standard deviations on either side of the threshold in Column 6.

In Columns 7–9 we instrument for *Approved* with *AboveThr* and again report coefficients for the full sample and samples restricted to +/-0.5 and +/-0.05 standard deviations around the threshold. As we would expect given the tight relationship between *Approved* and *AboveThr* reported above, these regressions are nearly identical to the reduced form in magnitude and significance. Effects for bankruptcies two years after the first payday loan are also shown in Table 3a. The two-year effects are generally larger than the one-year effects, statistically and economically.

IV.C. Alternative Specifications

Sometimes robustness analysis is almost an afterthought. Not so here. We test the directional conclusions from these regressions and figures, and we refine the quantitative conclusions, in six important ways. First, in Table 3b we employ the optimal bandwidth approaches of Calonico, Cattaneo, and Titiunik (2014) and Imbens and Kalyanaraman (2011), which formally balance the increased precision from additional data with the possible introduction of correlation in unobservables. Optimal bandwidths implied by these procedures tend to be larger than the +/-0.5 standard deviation windows adopted above, implying numbers of observations greater than 31,892. Coefficients from these optimal bandwidth specifications tend to be smaller in magnitude but more highly statistically significant than the conventional regressions in the previous subsection. Robust estimated effects on the two-year bankruptcy rate range from 0.690-1.858 percentage points and are generally significant at the 1 percent level.

Second, we consider alternative functional forms for $f(\cdot)$ and the error structure. Instead of a quartic in $CreditScore_i$ interacted with $AboveThr_i$, we try cubics, quadratics, and linear functions interacted with $AboveThr_i$ and quartics, cubics, quadratics and linear functions not interacted with

AboveThr$_i$. Relatedly, instead of linear probability models, we implement probits. Most of the coefficients in these specifications, reported in Appendix Tables 5 and 6, go in the same direction and are similarly significant.

Third, we examine robustness with respect to the bandwidth and the functional form of $f(CreditScore_i)$ by plotting point estimates and confidence intervals as a *function* of the bandwidth in Figures 3a and 3b. The horizontal axis in these figures is the bandwidth in standard deviations around the credit-score approval threshold: smaller bandwidths restrict attention to smaller intervals around the threshold, so data points to the left are noiser than those to the right which include more data. Both of these Figures show statistically significant effects for almost any interval around the threshold from +/-0.4 standard deviations to +/- 1 standard deviation. To our knowledge, it is an innovation in the literature to demonstrate robustness of regression discontinuity estimates in this fashion.

Fourth, in Figure 4 and the associated Appendix Table 7, we run Cox proportional hazard regressions. These specifications incorporate information not only about whether a payday applicant files for bankruptcy, but how quickly he or she does so after the payday loan application. Again, we find statistically and economically significant evidence that payday loan access increases bankruptcy filing rates.

Fifth, to the extent possible, we examine heterogeneity across the credit-score distribution. The credit scoring formula and the threshold for approval were adjusted at the lender's storefronts only once each during our period of observation. On 11/12/2002, the lender began receiving credit scores from Teletrack based on a new formula with a lower mean and variance. Exactly three months earlier, the company had reduced the approval threshold by two-thirds of a standard deviation. The resulting approval rates for applications prior to 8/12/2002, between 8/12-11/11/2002, and from 11/12/2002 onward, respectively, were 85.2%, 94.6%, and 79.1%. For applicants within 0.5 standard deviations of the threshold, the approval rates

during the three periods, respectively, were 82.7%, 79.0%, and 52.1%. About three-fifths of the available observations come from the post-11/12/2002 period, because the lender's business was growing rapidly, so power is limited when estimating treatment effects without that period. Appendix Table 8 shows that the results are less precise but statistically indistinguishable in each period, when identified separately off these several points in the *CreditScore* distribution.[19]

Sixth, the results reported above rely on data from a single payday lender, though applicants rejected by this firm might be able to obtain payday loans elsewhere. This means the estimates represent a lower bound on the true effect of payday loan access on bankruptcy. Qualitatively, we expect the size of the underestimate to be moderate for two reasons. First, during our sample period most major payday lenders used the same subprime credit bureau, Teletrack, to provide information on loan applicants. Each lender, however, chooses its own rule for approving loan applications (and may use a smoother decision rule), and we lack information about those practices.[20] 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 2008), they would adopt identical thresholds in equilibrium. We also suspect the underestimation of the effect of payday loan approval on bankruptcy to be small because this company's loans remain attractive to rejected applicants. Of the 20 percent of applicants who were first rejected, 48 percent reapply. Only 9 percent of reapplicants were ever approved, but those who were approved borrowed on average

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[19] Regardless of this demonstration of robustness, we agree with Karlan and Zinman (2010) that it is particularly valuable to study the effects of credit access on marginally approved borrowers since they are likely to be the first borrowers affected by changes in policy or lenders' choices.

[20] 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, as shown in Figure 1A.

$2,485 and paid $415 in interest, similar to initially approved applicants who cumulatively borrowed $2,793 and paid $477 in interest.

More importantly, we quantify the possible bias due to outside borrowing opportunities in Table 4, by examining the effect of this lender's zip-code-level market share on the estimated treatment effects. Local market share is proxied as follows. For each new applicant, we count the number of the company's stores visited by applicants residing in the new applicant's ZIP code. We divide this number by the ZIP Business Patterns' year-specific count of establishments with NAICS codes 522291 and 522390 (Bhutta, 2014). Column 1 of Table 4 shows that, as expected, the results attenuate when this lender has a low (below-median) market share. In the high-market-share ZIP codes, we estimate effects of payday loan access that are large and significant at both one- and two-year horizons. Column 3 reports regressions where the *AboveThr* dummy is interacted with the market share proxy. We find a large and significant effect of access, and insignificant positive coefficients on the interaction terms.

Considering this collection of six tests together, the positive effect of payday loan access on bankruptcy appears robust to optimal bandwidth algorithms, the functional form of the relationship with the credit score, many reasonable bandwidth choices, analysis using hazard models, the location of the threshold in the credit score distribution, and the degree of competition in the local payday lending market. Next we investigate the mechanisms that could give rise to this economically and statistically large effect.

V. Mechanisms

The typical payday loan is quite small: in our dataset the mean and median principal are approximately $300. This section investigates the interesting question of how access to these loans can impact a cumulative financial outcome like bankruptcy.

V.A. Assets and Liabilities of Bankruptcy Filers

Debtors filing for bankruptcy protection must provide the court with detailed information about their assets and liabilities. This information is publicly available in pdfs downloadable from PACER. We hand-coded the data for a "threshold sample" of the 100 post-payday-application bankruptcy filers closest to the credit-score threshold on each side, plus those with equal scores at the endpoints.[21] Table 5 reports summary information about these filers' balance sheets.

Substantial empirical support has previously been found for strategic default to escape outstanding obligations, at least in the sense that debtors' pecuniary incentives to file correlate strongly with bankruptcy propensities. Fay, Hurst, and White (2002) found that each $1000 increase in the financial benefit of a bankruptcy filing increased the predicted probability of such a filing by 0.021 percentage points. Domowitz and Sartain (1999) and Gross and Souleles (2002a) provide evidence specifically that higher credit card debt predicts higher bankruptcy probabilities, and White (2007) elaborates further on this and related, supportive evidence.

The balance sheet data in our Table 5 show substantial unsecured liabilities, with a mean of $27,880, indicating considerable possible financial benefit from a bankruptcy filing. However, by the time of the observed filings, the median approved borrower had no payday loan debt outstanding from the company that supplied our data. Thus strategic default to escape outstanding payday loan *balances* does not appear to be directly implicated as the mechanism driving our results.

V.B. Short-Run Responses

The empirical analysis above has focused on the cumulative effect of payday loan access until one or two years after the first payday application.

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[21] This resulted in review of 211 filings, 104 below the threshold and 107 above.

Some evidence on the determinants of bankruptcy points to motives that would induce short-run effects of credit access. First, applicants might (erroneously) believe that imminent debt erasure means it would be to their advantage to borrow as much as possible prior to a filing. Bankruptcy courts generally do not tolerate such short-run exploitation of bankruptcy protection; regardless, the evidence from filers' balance sheets suggests that many payday loans have been repaid or written off by the time of filing. Figure 5 also reports point estimates of the effect of payday loan access on bankruptcy filing on time horizons from several days to six years. It confirms that the directional effects are robust to the time horizon we examine; and it also displays no disproportionate short-run response. Estimated coefficients come from the reduced-form specification, Equation (3), with +/- 0.5 standard deviation windows around the threshold.

A second possible reason payday loan access could have a short-run effect on bankruptcy concerns filing fees. Mann and Porter (2010) argue that that filing fees affect the chapter of a bankruptcy filing. Gross, Notowidigdo, and Wang (2014) used a natural experiment to estimate the impact of positive liquidity shocks on filing rates. They found large very-short-run effects, supporting the view that sometimes liquidity infusions can be used to pay filing fees. Together, the balance sheet information and the estimates at various time horizons reported in Table 4 and Figure 5 suggest a different mechanism is more likely to be giving rise to the effect of payday loan access on bankruptcy.

V.C. Subsequent Payday Borrowing and the Cash Flow Hypothesis

This subsection investigates the possibility that payday loan access increases the personal bankruptcy rate via household cash flow. Table 6 reports the effect of payday loan access on applications, borrowing, and finance charges at this lender. Approval for one payday loan evidently results in substantial follow-on activity. The reduced-form regression with range

restricted to +/-0.5 standard deviations implies that the approval of a first-time payday loan application causes an average of 5.1 more payday loan applications at this company within the next year. Borrowing is increased by $1,837 over a one-year horizon, while finance charges paid to this company increase by $298 over the same period. All of these results are significant at the 1-percent level.

The effect on finance charges speaks most clearly to the mechanism behind the bankruptcy effect. Suppose bankruptcy filers' unsecured debt carries a 15 percent APR.[22] Then, drawing again on data from Table 5, over the first year after a payday loan application the interest burden from payday loans would have averaged $\frac{\$298}{\$27880*15\%} = 7$ percent of these individuals' annual liquid debt interest burden.[23] Moreover, credit card debt service might be easier to postpone, for example by remitting only a minimum payment. This 7 percent increase in the debt-related household cash flow burden could suffice to tip financially stressed payday applicants into bankruptcy.[24]

VI. Discussion

VI.A. Interpretation and Related Literature

Our findings complement and extend rich but unsettled literatures on the effects of payday loan access and the causes of bankruptcy filings, which we discuss in turn. Research on the impact of payday loans has come to

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[22] The Federal Reserve's G19 data series on consumer credit implies a debt-weighted average nominal interest rate on credit card debt of about 15 percent. This could imply an underestimate of the liquid debt service burden for payday loan applicants if they have higher-rate cards or disproportionately pay penalty interest rates, or it could be an overestimate if payday borrowers disproportionately let interest accrue while making small payments and then eventually default at high rates on their credit cards.

[23] Almost identically, Bhutta, Skiba, and Tobacman (2014) report median scheduled minimum debt payments (including principal and interest) for the population of payday applicants of $4000 per year.

[24] One complementary possibility is that payday loan access results in increased collections activity, and the collections activity motivates dunned borrowers to seek protection from bankruptcy's automatic stay. Over half of the borrowers in our data have a payday loan that results in a bounced check within one year of their first loan, and over 30% have a loan that is written off and sold to a collection agency.

disparate conclusions (Caskey 2012). Zinman (2010), Morse (2011), and Carter and Skimmyhorn (2014) generally find beneficial consequences of payday loan access. Carrell and Zinman (2008), Melzer (2011), and Campbell, Martinez-Jerez and Tufano (2012) generally find the opposite. Lefgren and McIntyre (2009), Morgan, Strain, and Seblani (2012), Bhutta (2014) and Bhutta, Skiba, and Tobacman (2014) obtain null or mixed effects.

Many forces could give rise to this diversity of findings, from variation in the source of identification to differences in the affected populations. Three papers are particularly close to ours. Bhutta, Skiba, and Tobacman (2014) use the same identification strategy and examine effects on variables reported to a prime credit bureau. They find economically small effects on credit scores, balances, and delinquencies, but their standard errors are large enough to be compatible with the effects on bankruptcy that we document here.[25] In addition, Bhutta, Skiba, and Tobacman (2014) show that this sample of payday applicants has been experiencing longstanding financial distress at the time of their first payday applications, with low availability on credit cards, high rates of recent delinquencies, and credit scores that have on average fallen in the bottom quartile of the national distribution for at least five years.

Lefgren and McIntyre (2009) investigate the relationship between cross-sectional geographic characteristics and bankruptcy rates, using state-level and zip code-level variation. Their striking primary results concern wage garnishment rules, household characteristics, and legal culture, with effects of wage garnishment restrictions amounting to 42% of baseline bankruptcy rates. In addition, they report a statistically insignificant but positive relationship between legal payday lending in a state and bankruptcy rates. Payday loan access raises the state rate by 0.12 bankruptcies per

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[25] They do not examine bankruptcy as an outcome, because of data limitations: bankruptcy flags appear with irregular timing in their matched credit bureau data, and their strategy to match multiple datasets results in a sample with too few bankruptcy filings.

thousand residents off a baseline rate of 4.46. Morgan, Strain, and Seblani (2012), working with state-year variation in payday loan bans and difference-in-difference regressions, estimate that bans reduce Chapter 13 filing rates by between 1/6 and 1/3.

If payday bans only affect bankruptcy propensities for payday borrowers, and the payday borrowing rate in states without bans is 10%, then the quantitative findings in Lefgren and McIntyre (2009) and Morgan, Strain, and Seblani (2012) should be scaled up by an order of magnitude to compare with our findings in this paper, since we estimate effects only on payday applicants. This rescaling would imply effect sizes of 1.2 bankruptcies (Lefgren and McIntyre, 2009) and 0.48-0.93 Chapter 13 bankruptcies (Morgan, Strain, and Seblani 2012) per thousand payday applicants, smaller than our findings here but of the same order of magnitude.

VI.B. Welfare Implications

The welfare effects of the indebtedness and bankruptcies resulting from access to payday loans are difficult to measure and could in principle be positive or negative. More specifically, Since bankruptcy is a form of social insurance, the net private costs may lie in transactions costs and externalities elsewhere in the credit markets. Specifically, access to payday loans may cause other unsecured debt to go bad, driving up equilibrium interest rates on other forms of credit.

One window into the private costs and benefits of bankruptcy filing is provided by the chapter of filing and the disposition of the case. Specifically, many of the benefits of a Chapter 13 filing accrue only if and when the associated payment plan is completed and remaining debts are discharged.[26] Chapter 13 filers often instead have their cases dismissed prior to discharge, for fraud (e.g., not reporting assets), failure to pay court fees or complete

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[26] We are very grateful to an anonymous referee for highlighting this point and suggesting the following analysis.

appropriate paperwork, or failure to make the regular payments toward one's Chapter 13 plan. Dobbie and Song (2015) find that completing a chapter 13 relative to filing for Chapter 13 and having the case dismissed improves subsequent earnings and lowers mortality rates.

We test for differential effects by Chapter (7, 13, or 13/dismissed) in Table 7. The first four columns report estimated treatment effects analogous to those in Table 3a Columns 1 and 2 show a significant impact of payday loan access on Chapter 13 but not on Chapter 7 filings. Columns 3 and 4 show that the effect on Chapter 13 filings is primarily attributable to cases that were dismissed.

Similar results appear in the multinomial logit specifications reported in Columns 5-12, which respect more of the structure of the debtor's choice environment. For various sets of controls, the estimates are most reliably statistically significant for Chapter 13 filings that are eventually dismissed. However, all of the point estimates for effects on Chapter 7 bankruptcy are also positive, and the standard errors are always large enough that we cannot statistically reject the hypothesis that the 7, 13, and 13/dismissed estimates are the same.[27]

One other possible window into welfare implications is provided by analysis of heterogeneous treatment effects. Appendix Table 10 reports estimates by gender, race, and homeownership status from the reduced-form specification with a +/-0.5 standard deviation credit-score range. Column 1 repeats the benchmark numbers from Table 3a regressions for comparison. In the other columns, sample sizes shrink so standard errors are large and no effects are statistically significant. The final column examines effects on servicemembers, because of concerns by regulators, elected representatives, and the Department of Defense that payday loans disproportionately affect

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[27] Appendix Table 9abc reports optimal bandwidth version of the Table 7 regressions, analogous to Table 3b, for Chapter 7 filings, Chapter 13 filings, and Chapter 13 filings that were eventually dismissed. Appendix Figures 3-8 similarly replicate the main figures.

military personnel.[28] We estimate an economically large positive effect of payday loans on servicemembers' bankruptcies, which (not surprisingly given the small sample) is statistically insignificant.

More broadly, Han and Li (2011) show that the available terms of borrowing are worse (e.g., credit card interest rates higher by 116 basis points) for households who have filed for bankruptcy than households who haven't. Similiarly, Han, Keys, and Li (2011) find that direct mail credit card offers generally worsen for recent bankruptcy filers. These empirical results combine the effect of whatever led to the bankruptcy filing with the effect of the bankruptcy filing itself. Dobbie and Song (2015) and Dobbie, Goldsmith-Pinkham, and Yang (2015) focus on the quasi-experimental effect of a Chapter 13 filing alone, and find it to be highly beneficial, reducing foreclosure rates, mortality, civil judgments, and repossessions, and increasing earnings, homeownership, and credit scores.

Taken together, the related literature and our estimates carry the following interpretation. The bankruptcy filings induced by payday loan access cause other debt to go bad for these borrowers, which may cause interest rates to rise for other ex ante indistinguishable borrowers, so the externalities are unlikely to be positive. The net private costs are difficult to ascertain, but it appears that the payday applicants induced to file for bankruptcy receive benefits from its social insurance aspects that are toward the low end. Overall, our view is that a bankruptcy filing is a rare but interesting and high-consequence indicator of financial distress.

VII. Conclusion

We find that payday loan applicants barely approved for their first loans file for bankruptcy protection significantly more often than barely

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[28] We code an applicant as a member of the military if (ignoring capitalization) their employer name contains "Marines," "Marine Corps," "Air Force," "USAF," "Army" but not "Salv," or "Navy" but not "Old Navy." This yields 2332 servicemember observations in the entire dataset and 638 observations out of the 31,892 within 0.5 standard deviations of the threshold.

rejected first-time applicants. The magnitude of the effect is economically nontrivial, representing an increase of about one percentage point in the bankruptcy filing rate. Opportunities for rejected applicants to substitute with credit elsewhere imply that our quantitative findings are lower bounds on the true effects, but by estimating the effects as a function of this firm's zip-code-level market share we document that the bias is likely to be small.

Equally importantly, we evaluate three major candidate mechanisms for the increase in bankruptcy rates. We find the most support for a mechanism that to our knowledge is novel in the literature, i.e., reductions in household cash flow due to the debt service burden. Taken together, our results are consistent with the view that payday loans exacerbate financial distress, and that household cash flow should be more intensively explored as a driver of bankruptcy filing decisions. First-time payday loan approval causes significant additional high-interest-rate borrowing, and the consequent interest burden may worsen household cash flow sufficiently to induce bankruptcy. The bankruptcies that result are often Chapter 13 filings which result in dismissal, providing less benefit to the debtors. The welfare implications of our empirical findings depend on difficult-to-estimate parameters like the private and social net costs of bankruptcy filings. We nonetheless hope that these findings, and the questions they raise, advance ongoing discussion about payday lending and the determinants of bankruptcy.

VIII. References

Adams, William, Liran Einav, and Jonathan Levin. 2009. Liquidity Constraints and Imperfect Information in Subprime Lending. *American Economic Review* 99:49.84.

Agarwal, Sumit, Paige Marta Skiba, and Jeremy Tobacman. 2009. Payday Loans and Credit Cards: New Liquidity and Credit Scoring Puzzles? *American Economic Review Papers and Proceedings* 99:412-417.

Angrist, Joshua and Victor Lavy. 1999. Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement. *Quarterly Journal of Economics* 114:533-575.

Ausubel, Lawrence. 1999. Adverse Selection in the Credit Card Market. University of Maryland, Unpublished Manuscript.

Bos, Marieke, Susan Payne Carter and Paige Marta Skiba. 2012. The Pawn Industry and Its Customers: The United States and Europe. *Vanderbilt Law and Economics Research Paper*, No. 12-26.

Bhutta, Neil. 2014. Payday Credit Access and Household Financial Health: Evidence from Consumer Credit Records.

Bhutta, Neil, Paige Marta Skiba, and Jeremy Tobacman. 2014. Payday Loan Choices and Consequences. *Vanderbilt Law and Economics Research Paper* No 12-30.

Calonico, Sebastian, Matias Cattaneo, and Rocio Titiunik. 2014a. Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs.

Calonico, Sebastian, Matias Cattaneo, and Rocio Titiunik. 2014b. Robust Data-Driven Inference in the Regression-Discontinuity Design.

Campbell, Dennis, Asis Martinez-Jerez, and Peter Tufano. 2012. Bouncing Out of the Banking System: An Empirical Analysis of Involuntary Bank Account Closures. *Journal of Banking and Finance* 36:1224-1235.

Carrell, Scott and Jonathan Zinman. 2013. In Harm's Way? Payday Loan Access and Military Personnel Performance. Unpublished Manuscript.

Carter, Susan Payne and Bill Skimmyhorn. 2014. "Estimating the Effects of Payday Lending Access and the Military Lending Act." Unpublished Manuscript.

Carter, Susan Payne, Paige Marta Skiba, and Justin Sydnor. 2012. Impatience vs. Inattention: Explaining Payday Loan Borrowing Behavior. Unpublished Manuscript.

Caskey, John. 1991. Pawnbroking in America: The Economics of a Forgotten Credit Market. *Journal of Money, Credit, and Banking* 23:85-99.

Caskey, John. 1994. *Fringe Banking: Check-Cashing Outlets, Pawnshops, and the Poor*. New York: Russell Sage Foundation.

Caskey, John. 2001. Payday Lending. *Association for Financial Counseling and Planning Education* 12:1-14.

Caskey, John. 2005. Fringe Banking and the Rise of Payday Lending. In *Credit Markets for the Poor* edited by Patrick Bolton and Howard Rosenthal. Russell Sage Foundation.

Caskey, John. 2012. "Payday Lending: New Research and the Big Question." In *The Oxford Handbook of the Economics of Poverty* edited by Phillip N. Jefferson. Oxford University Press.

Department of Defense. 2006. Report on Predatory Lending Practices Directed at Members of the Armed Forces and Their Dependents.

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

Dobbie, Will, Paul Goldsmith-Pinkham, and Crystal Yang. 2015. Consumer Bankruptcy and Financial Health. Unpublished working paper. http://scholar.princeton.edu/sites/default/files/wdobbie/files/dgy_bankruptcy.pdf

Domowitz, Ian and Robert L. Sartain. 1999. Determinants of the Consumer Bankruptcy Decision. *The Journal of Finance* 54:403-420.

Elliehausen, Gregory and Edward C. Lawrence. 2001. Payday Advance Credit in America: An Analysis of Customer Demand. *Credit Research Center, McDonough School of Business, Monograph #35*, Georgetown University.

Fan, Jianqing and Irene Gijbels. 1996. *Local Polynomial Modeling and Its Applications*. London: Chapman and Hall/CRC Monographs on Statistics and Applied Probability.

Fay, Scott, Erik Hurst, and Michelle J. White. "The Household Bankruptcy Decision." *American Economic Review* (2002): 706-718.

FDIC. 2005. Payday Lending Programs: Revised Examination Guidance. *Financial Institution Letter*: FIL-14-2005.

Flannery, Mark and Katherine Samolyk. 2005. Payday Lending: Do the Costs Justify the Price? *FDIC Center for Financial Research Working Paper* No. 2005-09.

Gross, David, and Nicholas Souleles. 2002a. An Empirical Analysis of personal Bankruptcy and Delinquency. *Review of Financial Studies* 15.1: 319-347.

Gross, David and Nicholas Souleles. 2002b. Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data. *Quarterly Journal of Economics* 117:149-185.

Gross, Tal and Matthew J. Notowidigdo. 2011. Health Insurance and the Consumer Bankruptcy Decision: Evidence from Expansions of Medicaid. *Journal of Public Economics* 95: 767–778.

Gross, Tal, Matt Notowidigdo, and Jialan Wang. 2001. Liquidity Constraints and Consumer Bankruptcy: Evidence from Tax Rebates. *Review of Economics and Statistics* 96(3): 431-443.

Gupta, Arpit, Edward Morrison, Catherine Fedorenko, and Scott Ramsey. 2014. Health and Financial Fragility: Evidence from Cancer and Consumer Bankruptcy.

Hahn, Jinyong, Petra Todd, and Wilbert Van der Klaauw. 2001. Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design. *Econometrica* 69:201-209.

Han, Song, and Geng Li. 2011. Household Borrowing After Personal Bankruptcy. *Journal of Money, Credit, and Banking* 43:491-517.

Han, Song, Benjamin Keys, and Geng Li. 2011. Credit Supply to Bankrupt Consumers. Unpublished working paper available at: http://works.bepress.com/geng_li/26.

Himmelstein, David, Elizabeth Warren, Debbie Thorne, and Steffie Woolhandler. 2009. Medical Bankruptcy in the United States, 2007: Results of a National Study. *The American Journal of Medicine* 122:741–746.

Imbens, Guido and Joshua Angrist. 1994. Identification of Local Average Treatment Effects. *Econometrica*, 62:467-475.

Imbens, Guido, and Karthik Kalyanaraman. 2011. Optimal Bandwidth Choice for the Regression Discontinuity Estimator. *Review of Economic Studies*, rdr043.

Imbens, Guido and Thomas Lemieux. 2008. Regression Discontinuity Designs: A Guide to Practice. *Journal of Econometrics* 142:615-635.

Karlan, Dean and Jonathan Zinman. 2008. Credit Elasticities in Less Developed Economies: Implications for Microfinance. *American Economic Review* 98:1040-1068.

Karlan, Dean and Jonathan Zinman. 2009. Observing Unobservables: Identifying Information Asymmetries with a Consumer Credit Field Experiment. *Econometrica* 77:1993-2008.

Karlan, Dean and Jonathan Zinman. 2010. Expanding Credit Access: Using Randomized Supply Decisions to Estimate the Impacts. *Review of Financial Studies* 23:433-464.

Lefgren, Lars and Frank McIntyre. 2009. Explaining the Puzzles of Cross-State Differences in Bankruptcy Rates. *Journal of Law and Economics* 52:367-393.

Lehnert, Andreas and Dean Maki. 2007. Consumption, Debt and Portfolio Choice: Testing the Effect of Bankruptcy Law. In *Household Credit Usage: Personal Debt and Mortgages* edited by Sumit Agarwal and Brent Ambrose. New York: Palgrave MacMillan.

Lusardi, Annamaria, and Carlo de Bassa Scheresberg. 2013. Financial Literacy and High-Cost Borrowing in the United States. NBER Working Paper No. 18969.

Mann, Ronald and Katherine Porter. 2010. Saving Up for Bankruptcy. *Georgetown Law Journal* 98:289-339.

McCrary, Justin. 2008. Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test. *Journal of Econometrics* 142:698-714.

Melzer, Brian. 2011. The Real Costs of Credit Access: Evidence from the Payday Lending Market. *Quarterly Journal of Economics* 126:517-555.

Morgan, Donald, Michael Strain and Ihab Seblani. 2012. How Payday Credit Access Affects Overdrafts and Other Outcomes. *Journal of Money, Credit and Banking*, 44(2-3), 519-531.

Morrison, Edward, Arpit Gupta, Lenora Olson, Lawrence Cook, and Heather Keenan. 2013. Health and Financial Fragility: Evidence from Car Crashes and Consumer Bankruptcy. http://ssrn.com/abstract=2353328.

Morse, Adair. 2011. Payday Lenders: Heroes or Villains? *Journal of Financial Economics* 102:28-44.

Norton Quick-Reference Bankruptcy Code and Rules, 2013-2014.

Pew Charitable Trusts. 2012. Who Borrows, Where They Borrow, and Why: Payday Lending in America.

Porter, Jack. 2003. Estimation in the Regression Discontinuity Model.

PricewaterhouseCoopers LLC. 2001. The Payday Advance Industry: 1999 Company Survey Findings. Prepared for Community Financial Services Association of America and Financial Service Centers of America, Inc.

Robinson, Jerry and John Wheeler. 2003. Update on the Payday Loan Industry: Observations on Recent Industry Develpments. *Technical Report*, Stephens, Inc.

Skiba, Paige Marta and Jeremy Tobacman. 2008. The Profitability of Payday Lending.

Stegman, Michael and Robert Faris. 2003. Payday Lending: A Business Model That Encourages Chronic Borrowing. *Economic Development Quarterly* 17:8-32.

Thistlethwaite, Donald and Donald Campbell. 1960. Regression-Discontinuity Analysis: An Alternative to the Ex Post Facto Experiment. *Journal of Educational Psychology* 51:309-317.

Washington, Ebonya. 2006. The Impact of Banking and Fringe Banking Regulation on the Number of Unbanked Americans. *Journal of Human Resources* 41:106-137.

White, Michelle. 1998. Why Don't More Households File for Bankruptcy? *Journal of Law, Economics, and Organization* 14:205-231.

White, Michelle. 2007. Bankruptcy Reform and Credit Cards. *Journal of Economic Perspectives* 21(4):175-200.

White, Michelle. 2009. Bankruptcy: Past Puzzles, Recent Reforms, and the Mortgage Crisis. *American Law and Economics Review* 11:1-23.

White, Michelle and Ning Zhu. 2010. Saving your Home in Chapter 13 Bankruptcy. *Journal of Legal Studies* 39:33-61.

Zinman, Jonathan. 2010. Restricting Consumer Credit Access: Household Survey Evidence on Effects Around the Oregon Rate Cap. *Journal of Banking and Finance* 34:546-556.

Table 1
PAYDAY LOAN SUMMARY STATISTICS

	All Data				Within 0.5sd of Threshold			
	Mean	Median	SD	N	Mean	Median	SD	N
Demographic Characteristics:								
Month of Application	Jan-2003	Jan-2003	One year	145,159	Jan-2003	Apr-2003	One year	31,892
NSF's on Bank Statement	1.09	0.00	3.00	145,159	1.76	0.00	4.08	31,892
Months at Current Residence	66.85	36.00	91.41	145,157	46.64	24.00	69.39	31,891
Age	36.46	35.00	11.25	145,154	34.12	32.00	10.64	31,892
Checking Account Balance ($)	234.96	65.54	551.93	142,407	75.90	5.65	407.46	31,368
Years at Current Job	4.28	2.00	7.23	94,384	2.07	1.00	4.43	19,902
Paid Weekly (%)	0.13		0.34	94,384	0.15		0.35	19,902
Paid Biweekly (%)	0.51		0.50	94,384	0.52		0.50	19,902
Paid Semimonthly (%)	0.19		0.39	94,384	0.19		0.39	19,902
Paid Monthly (%)	0.17		0.37	94,384	0.14		0.35	19,902
Direct Deposit (%)	0.69		0.46	94,384	0.66		0.47	19,902
Monthly Pay ($)	1699.23	1545.14	1047.08	93,997	1556.91	1433.76	880.52	19,796
Owns Home (%)	0.34		0.47	67,908	0.17		0.38	14,099
Wages Garnished (%)	0.03		0.17	67,908	0.04		0.19	14,099
Black (%)	0.49		0.50	27,923	0.54		0.50	6,026
Hispanic (%)	0.29		0.46	27,923	0.27		0.44	6,026
Female (%)	0.38		0.49	27,922	0.38		0.49	6,025
Loan and Application Characteristics:								
Above Threshold (First Application)	0.83		0.38	145,159	0.65		0.48	31,892
Approved (First Application)	0.80		0.40	145,159	0.62		0.48	31,892
Loan Size ($, First Application if Approved)	279	265	141	116,261	264	246	135	19,837

Notes: Authors' calculations based on data from a provider of financial services that offers payday loans. Included are all available demographics for the universe of payday loan applicants at the Texas locations of this company between 9/2000 and 8/2004. Quantities are calculated from documentation submitted during each individual's first application. These variables represent the full set of "demographic controls" included (unless otherwise specified) in this paper's regressions. Whenever we include these controls in regressions, we also include dummies for missing values of each of them. "NSF's" are "Not Sufficient Funds" events like bounced checks.

Table 2

BANKRUPTCY SUMMARY STATISTICS

Panel A: Texas Bankruptcy Totals, 2000-2006				
	Number of Bankruptcies	Annual Personal Bankruptcy Rate, TX (Individuals)	Bankruptcy filers who ever applied for PDL	Bankruptcy petitions per payday applicant per year
Chapter 7	311,864	0.205%	3,903	0.384%
Chapter 13	244,903	0.161%	9,637	0.948%
All	556,767	0.366%	13,540	1.333%

Panel B: Payday Applicants' Bankruptcy Rates Above and Below the Credit Score Approval Threshold						
	All Credit Scores		Within 0.5 s.d. of Approval Threshold		Within 0.05 s.d. of Approval Threshold	
	Below Threshold	Above Threshold	Below Threshold	Above Threshold	Below Threshold	Above Threshold
Within 1 Year after First Application						
Ch 7 (%)	0.41	0.69	0.37	0.51	0.36	0.41
Ch 13 (%)	1.62	1.94	1.49	1.55	1.46	2.91
Ch 13 & Dismssed (%)	1.03	1.07	0.91	0.98	0.95	1.74
All Bankruptcies (%)	2.03	2.63	1.86	2.06	1.82	3.32
Within 2 Years after First Application (Not Annualized)						
Ch 7 (%)	0.60	1.17	0.55	0.83	0.44	0.82
Ch 13 (%)	2.53	3.31	2.30	2.55	2.63	4.14
Ch 13 & Dismssed (%)	1.51	1.71	1.31	1.56	1.46	2.20
All Bankruptcies (%)	3.13	4.48	2.84	3.38	3.07	4.95
Number of Payday Applicants	25,305	119,854	11,320	20,572	1,370	1,958
	Total: 145,159 observations		Total: 31,892 observations		Total: 3,328 observations	

Notes: Bankruptcy data are drawn from the Public Access to Court Electronic Records (PACER) database. In Panel A, the Texas-wide personal bankruptcy rate is calculated using PACER bankruptcy data and population data from the US Census Bureau (http://www.census.gov/popest/states/tables/NST-EST2005-01.xls). Bankruptcy rates among payday applicants are calculated by matching administrative data from a payday lender to individual bankruptcy filings in PACER, using first names, last names, zip codes, and the final four SSN digits.

Table 3a

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILING RATES: CONVENTIONAL REGRESSION ESTIMATES

	(1) OLS	(2) OLS	(3) OLS	(4) Reduced Form	(5) Reduced Form	(6) Reduced Form	(7) IV	(8) IV	(9) IV
	full range	range = 0.5sd	range = 0.05sd	full range	range = 0.5sd	range = 0.05sd	full range	range = 0.5sd	range = 0.05sd
All Bankruptcies, One Year	0.326	0.946*	-1.087	0.552*	2.289**	-2.158	0.567*	2.352**	-2.209
	(0.228)	(0.498)	(2.233)	(0.334)	(0.985)	(16.762)	(0.343)	(1.012)	(17.160)
All Bankruptcies, Two Years	0.495	1.312*	-0.942	1.123**	3.025**	8.616	1.155**	3.108**	8.820
	(0.309)	(0.675)	(2.953)	(0.453)	(1.336)	(22.158)	(0.466)	(1.372)	(22.722)
N	145,159	31,892	3,328	145,159	31,892	3,328	145,159	31,892	3,328

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Standard errors are in parentheses. Each coefficient in this table comes from a separate regression. OLS regressions in Columns (1)-(3) report the coefficient on an indicator for whether the first payday loan application was approved. Reduced form regressions in Columns (4)-(6) report the coefficient on an indicator for whether the credit score exceeds the approval threshold. The IV regressions instrument for loan approval with the above threshold indicator. All effects are computed from regressions that include a quartic in the credit score interacted with the above threshold indicator, demographic controls, and a full set of dummies for the (month X year) 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.

Table 3b

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILING RATES: OPTIMAL BANDWIDTH ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Bankruptcies, One Year								
Conventional	0.718**	0.562*	0.851**	0.289	-0.231	0.074	-0.063	0.013
	(0.334)	(0.293)	(0.341)	(0.285)	(0.191)	(0.159)	(0.213)	(0.161)
Bias-Corrected	0.903***	0.716**	1.054***	0.405	0.563***	0.435***	0.499**	0.410**
	(0.334)	(0.293)	(0.341)	(0.285)	(0.191)	(0.159)	(0.213)	(0.161)
Robust	0.903**	0.716**	1.054***	0.405	0.563*	0.435*	0.499*	0.410*
	(0.378)	(0.340)	(0.385)	(0.335)	(0.300)	(0.245)	(0.300)	(0.247)
Observations	49974	64758	38216	52858	127944	143787	96493	139907
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes
All Bankruptcies, Two Years								
Conventional	1.196***	1.125***	0.911*	1.584***	0.102	0.174	-0.036	0.123
	(0.456)	(0.427)	(0.486)	(0.463)	(0.300)	(0.216)	(0.297)	(0.229)
Bias-Corrected	1.461***	1.366***	1.174**	1.858***	1.196***	0.990***	1.394***	0.690***
	(0.456)	(0.427)	(0.486)	(0.463)	(0.300)	(0.216)	(0.297)	(0.229)
Robust	1.461***	1.366***	1.174**	1.858***	1.196***	0.990***	1.394***	0.690*
	(0.528)	(0.487)	(0.534)	(0.504)	(0.421)	(0.378)	(0.432)	(0.362)
Observations	50477	57780	31540	38444	108122	143524	91771	130842
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Standard errors are in parentheses. Each coefficient in this table represents the effect of payday loan access on personal bankruptcies from a separate optimal bandwidth regression discontinuity estimation. Columns (1)-(4) and (5)-(8) use the optimal bandwidths suggested by Calonico, Cattaneo, and Titiunik (2014) [CCT] and Imbens and Kalyanaraman (2011) [IK], respectively, all as implemented by the rdrobust Stata package. Even-numbered columns residualize the bankruptcy outcome variable, by regressing on demographic controls and a full set of dummies for the (month X year) of loan application, prior to running rdrobust. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.

Table 4

EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY FILINGS BY MARKET SHARE

	(1)	(2)	(3)
	Company stores / ZBP		
	Low (Below Median)	High (At Least Median)	Interacted
All Bankruptcies, One Year			
AboveThreshold	0.302	2.592**	2.102**
	(1.941)	(1.129)	(1.000)
AboveThreshold X (Company stores/ZBP Total)			0.029
			(0.038)
All Bankruptcies, Two Years			
AboveThreshold	0.896	3.287**	2.635*
	(2.546)	(1.536)	(1.355)
AboveThreshold X (Company stores/ZBP Total)			0.065
			(0.052)
Number of individual observations	5,785	25,972	31,757
Company	< 1	>= 1	

* Significant at the 10 percent level

** Significant at the 5 percent level

*** Significant at the 1 percent level

Notes: The cells report estimated reduced form effects on bankruptcy filings, in percentage points, and their standard errors. Estimates shown are from reduced-form regressions using the sample restricted to a +/- 0.5 standard deviation range around the credit-score threshold. Columns (1) and (2) split the sample based on the ratio of company stores in the borrower's home ZIP code to the number of establishments in that ZIP code, reported in the same year by the Census Bureau's ZIP Business Patterns, with NAICS codes of 522291 and 522390. Column (3) shows results when the interaction between the market share proxy and the above threshold indicator is included. All effects are computed from regressions that include a quartic in the credit score interacted with the above threshold dummy, demographic controls, and a full set of dummies for month of loan

Table 5

PAYDAY APPLICANTS' ASSETS AND LIABILITIES IN BANKRUPTCY

		Below	Above				Below	Above
Total Assets ($)	Mean	105,905	131,149	Total Liabilities ($)		Mean	110,581	116,513
	Med	105,784	125,788			Med	87,560	99,094
	SD	83,156	80,009			SD	85,524	75,514
Personal Property	Mean	67,249	85,408	Total Secured Debt		Mean	82,543	88,786
	Med	60,300	82,620			Med	72,994	77,310
	SD	67,463	59,081			SD	78,995	63,228
Real Property	Mean	20,802	20,772	Total Unsecured Debt		Mean	28,037	27,726
	Med	17,432	15,046			Med	16,868	17,480
	SD	17,252	18,243			SD	29,988	30,208
				Company Payday Debt		Mean	11	159
						Med	0	0
						SD	66	335
				Other Payday Debt				
						Mean	41	88
						Med	0	0
						SD	179	285

Notes: 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. We sought 100 filers above and below the threshold, and samples are not exactly balanced due to ties in scores. 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, median, and the standard deviation of dollar amounts of outstanding debts.

Table 6
EFFECTS OF PAYDAY LOAN APPROVAL ON THE STREAM OF PAYDAY BORROWING

	(1) OLS full range	(2) OLS range = 0.5sd	(3) OLS range = 0.05sd	(4) Reduced Form full range	(5) Reduced Form range = 0.5sd	(6) Reduced Form range = 0.05sd	(7) IV full range	(8) IV range = 0.5sd	(9) IV range = 0.05sd
Total PDL Applications									
One Year	4.570***	4.727***	5.044***	4.626***	5.136***	7.043***	4.747***	5.301***	7.530***
	(0.111)	(0.225)	(0.598)	(0.172)	(0.513)	(2.392)	(0.176)	(0.525)	(2.537)
	97,252	20,553	2,851	97,252	20,553	2,851	97,252	20,553	2,851
Two Years	4.876***	5.124***	5.426***	5.146***	6.801***	8.751*	5.419***	7.425***	8.805*
	(0.279)	(0.552)	(1.260)	(0.465)	(1.304)	(4.558)	(0.488)	(1.421)	(4.574)
	51,895	12,224	1,470	51,895	12,224	1,470	51,895	12,224	1,470
Total Payday Loans ($$)									
One Year	1634.40***	1664.83***	1771.73***	1708.76***	1837.11***	2745.38***	1753.47***	1896.21***	2935.25***
	(34.1)	(66.8)	(183.0)	(53.0)	(152.6)	(734.7)	(54.0)	(155.8)	(780.2)
	97,252	20,553	2,851	97,252	20,553	2,851	97,252	20,553	2,851
Two Years	1758.51***	1666.65***	1866.17***	2090.36***	2243.55***	3106.49**	2193.38***	2449.32***	3125.96**
	(85.8)	(158.6)	(372.9)	(143.3)	(375.2)	(1351.1)	(150.2)	(408.8)	(1355.7)
	51,895	12,224	1,470	51,895	12,224	1,470	51,895	12,224	1,470
Total Finance Charges ($$)									
One Year	266.00***	273.31***	291.26***	271.34***	298.21***	466.31***	278.44***	307.80***	498.56***
	(6.2)	(12.3)	(33.7)	(9.7)	(28.1)	(134.9)	(9.9)	(28.7)	(143.6)
	97,252	20,553	2,851	97,252	20,553	2,851	97,252	20,553	2,851
Two Years	284.76***	272.14***	300.95***	330.54***	358.42***	529.25**	346.83***	391.29***	532.57**
	(15.5)	(28.9)	(68.0)	(25.9)	(68.3)	(246.1)	(27.2)	(74.5)	(247.4)
	51,895	12,224	1,470	51,895	12,224	1,470	51,895	12,224	1,470

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: This table reports effects of payday loan access on subsequent payday borrowing behavior. Each coefficient, standard error, and N comes from a separate regression. Compared to the bankruptcy regressions, N is lower here because the payday loan data end sooner than the bankruptcy data. All of these regressions include a quartic in the credit score interacted with the "above threshold" 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 7
MULTINOMIAL ANALYSIS OF PAYDAY LOAN IMPACTS OVER TWO YEARS

	(1) Reduced Form	(2) Reduced Form	(3) Reduced Form	(4) Reduced Form	(5) Multinomial Logit	(6) Multinomial Logit	(7) Multinomial Logit	(8) Multinomial Logit	(9) Multinomial Logit	(10) Multinomial Logit	(11) Multinomial Logit	(12) Multinomial Logit
Chapter 7 AboveThreshold	0.524				0.284***	0.684	0.408	0.407	0.284***	0.683	0.407	0.406
	(0.575)				(0.094)	(0.533)	(0.768)	(0.648)	(0.094)	(0.533)	(1.244)	(1.052)
Chapter 13 AboveThreshold		2.460**			0.203	2.069***	0.956*	0.858				
		(0.960)			(0.164)	(0.703)	(0.559)	(0.555)				
Chapter 13, Not Dismissed AboveThreshold			0.129						0.022	0.655	0.116	0.097
			(0.147)						(0.108)	(0.435)	(0.331)	(0.328)
Chapter 13, Dismissed AboveThreshold				1.785**					0.181	1.462**	0.806*	0.723*
				(0.742)					(0.124)	(0.562)	(0.459)	(0.436)
Quartic in Credit Score	X	X	X	X		X	X	X		X	X	X
(Quartic in Credit Score) x Abov	X	X	X	X		X	X	X		X	X	X
Demographic Controls	X	X	X	X			X	X			X	X
Month Quartic								X				X
Month Dummies	X	X	X	X								
Number of observations	31,892	31,892	31,892	31,892	31,892	31,892	31,892	31,892	31,892	31,892	31,892	31,892

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level
Notes: This table reports the reduced form effects, in percentage points, of the above threshold indicator on bankruptcy filings, with standard errors in parentheses. Regressions include the controls indicated above. "Range" refers to the number of standard deviations around the credit-score threshold to which the sample is restricted. The multinomial logits report marginal effects of the above threshold indicator on the various bankruptcy outcomes.

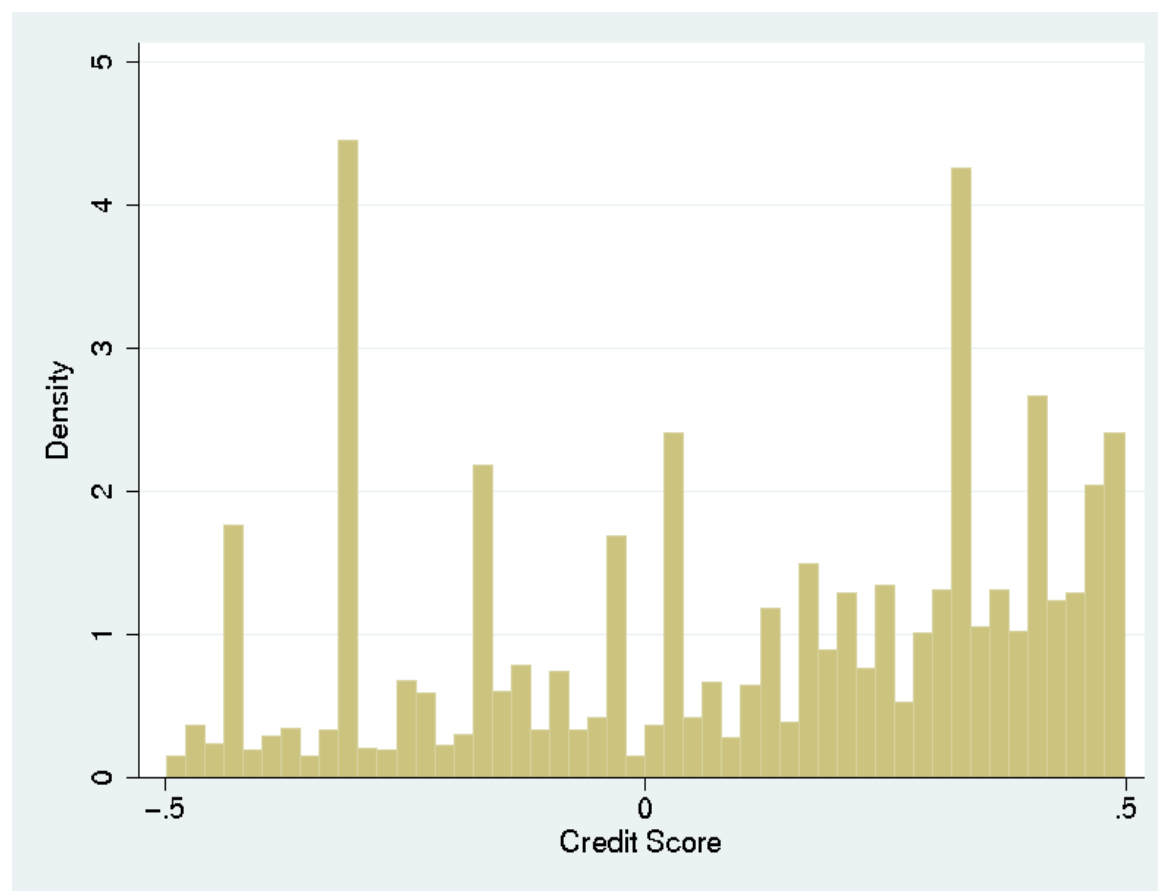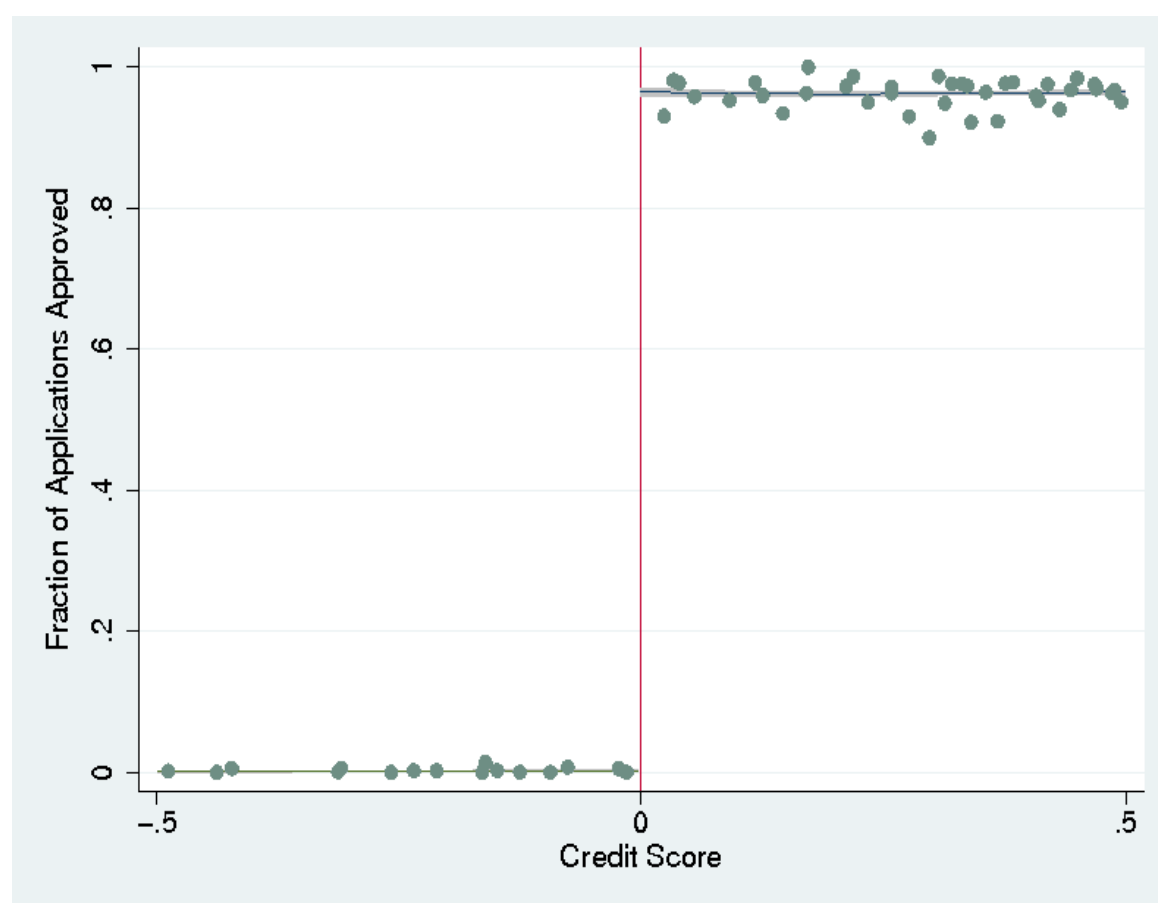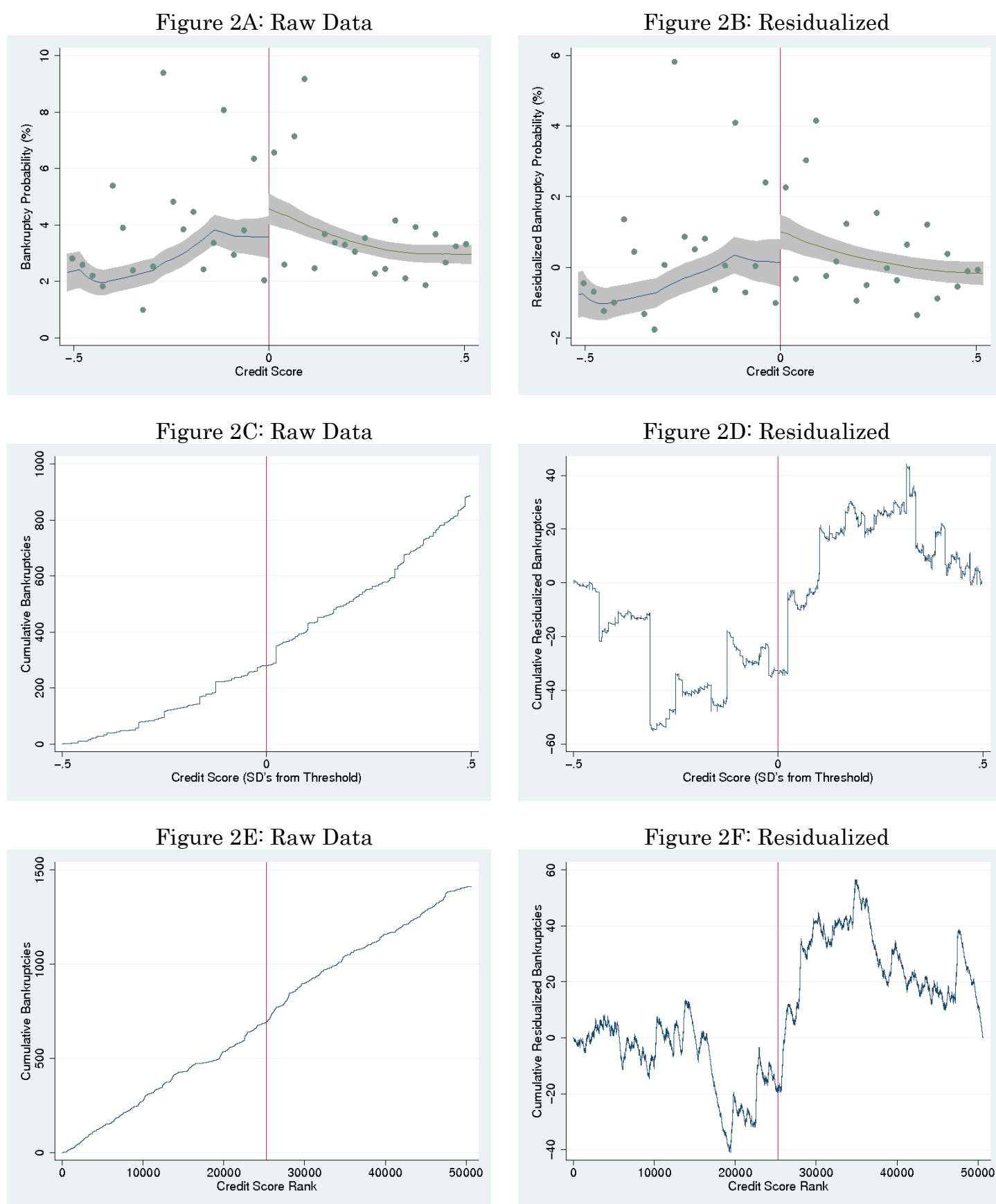Figure 1A: The Distribution of Teletrack Scores

Figure 1B: The Credit Score Regression Discontinuity

Notes: Figure 1A plots the distribution of the normalized credit score for first-time payday loan applicants. The scores equal the raw credit score minus the threshold for loan approval chosen by the lender, divided by the time-period-specific standard deviation of scores among this lender's first-time applicants. A score of 0 is the threshold for loan approval. Figure 1B plots the probability of approval for first-time payday loan applicants as a function of the credit score. Each point represents one of 100 quantiles 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. The predicted approval-rate function plots the best-fittng quartic polynomials, and associated confidence intervals, on both sides of the credit score threshold. Source: Authors' calculations based on administrative data from a national financial services provider that offers payday loans.

Figure 2: The Effect of Payday Loans on Bankruptcies Within Two Years

Figure 2A: Raw Data

Figure 2B: Residualized

Figure 2C: Raw Data

Figure 2D: Residualized

Figure 2E: Raw Data

Figure 2F: Residualized

Notes: Figures A-D plot the normalized credit score within 0.5 standard deviations around the passing threshold on the x axis. Figure A plots the raw bankruptcy probability with 95% confidence intervals from lpoly fits. Figure B plots residualized bankruptcy rates. Figures C and D plot the cumulative bankruptcy rate (raw and residualized) against the credit score, in which the test is for a change in slope across the threshold. Figures E and F plot on the x-axis the rank of the credit score, rather than the actual value. The universe of observations below the threshold is plotted and an equal number is shown above the threshold. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 3: Effect of Payday Loans on Bankruptcy as a Function of Bandwidth

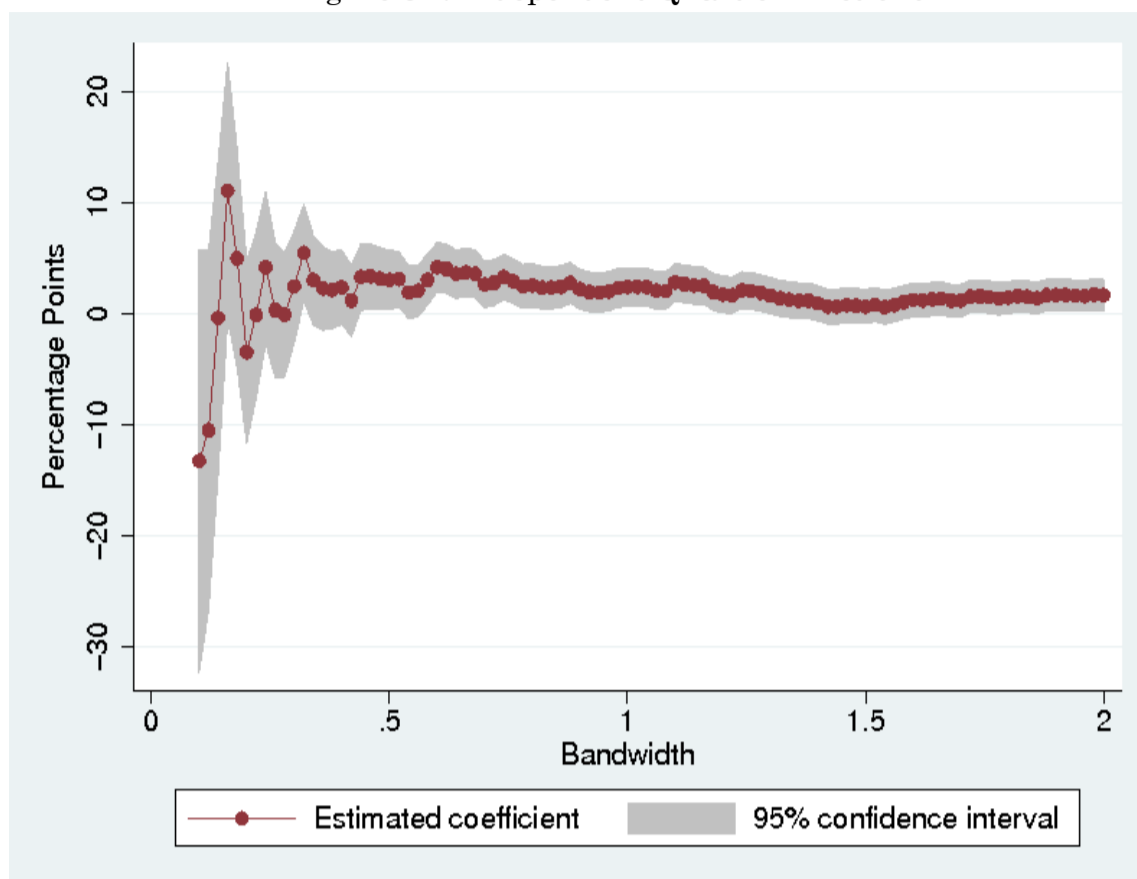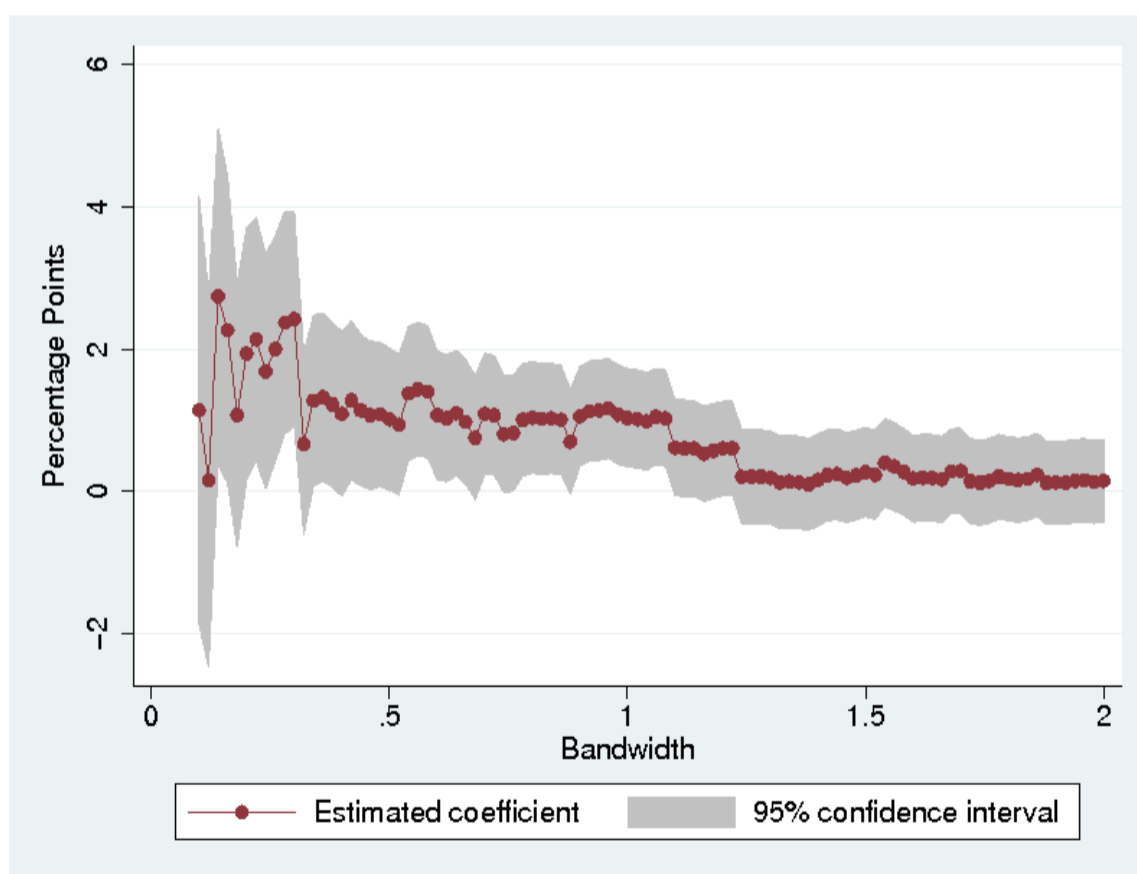### Figure 3A. Independent Quartic Functions

### Figure 3B. Independent Linear Functions

Notes: Each datapoint in these figures comes from a separate regression of a bankruptcy on the AboveThreshold indicator and controls. Both figures demonstrate the robustness of estimates to the choice of RD bandwidth. Figure 3A shows estimates using independent quartic functions on either side of the threshold, corresponding exactly to Table 3a. Figure 3B shows the analogous estimates using independent linear functions on either side of the threshold. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 4: Effect of Payday Loan Access on Bankruptcy Hazards
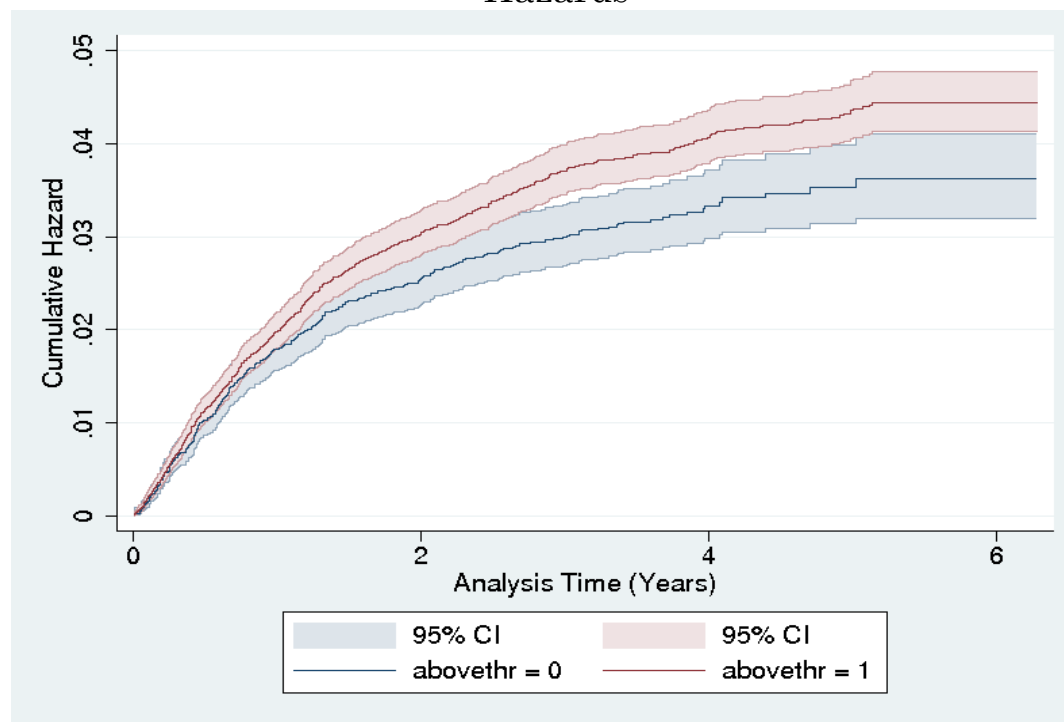
Notes: This figure reports the Nelson-Aalen cumulative hazard of filing for bankruptcy, unconditional on covariates, for barely-approved and barely-rejected payday applicants (ie, the 31,892 applicants within 0.5 standard deviations of the credit score threshold). Bankruptcy cumulative hazards increase over time and eventually begin to plataeu. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Figure 5: Long Run Effects of Payday Loans on Bankruptcy
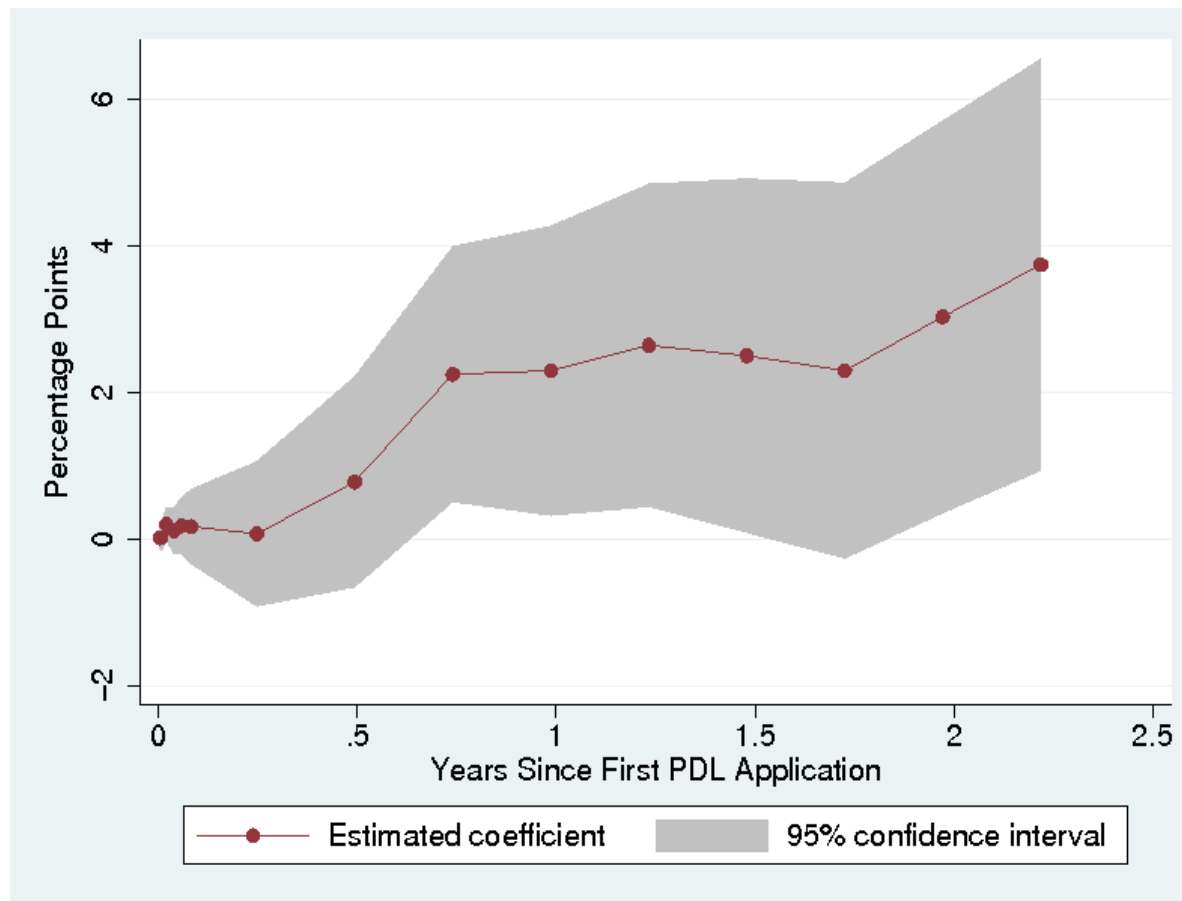
Notes: Figure 5 plots the effect of payday loan access on bankruptcy petitions over time. The dotted line represents the reduced-form effect of the Above Threshold indicator with a 0.5 standard deviation bandwidth around the threshold and two-standard-error bands shown in gray. The reduced-form regressions producing these estimates include quartic polynomials on both sides of the credit-score threshold, demographic controls, and dummies for month of first application. As years since first payday loan application increase, the percentage of bankruptcy petitions grows. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Do Payday Loans Cause Bankruptcy?
Appendix Tables and Figures
Not for print publication

Appendix Table 1

THE CREDIT-SCORE REGRESSION DISCONTINUITY

	(1)	(3)	(3)	(4)	(5)	(6)	(7)	(8)
				All Columns: Dependent Variable = First Application Approved				
			OLS				Probit	
Panel A: Full Range								
Above Threshold Indicator	0.966***	0.977***	0.976***	0.972***	0.966***	0.975***	0.977***	0.980***
	(0.001)	(0.003)	(0.003)	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)
Quartics in Credit Score Above and Below		x	x	x		x	x	x
Demographic Controls				x	x			x	x
Month Dummies					x				x
Observations	145,159	145,159	145,159	145,159	145,159	145,159	145,157	145,157
R-squared	0.842	0.869	0.874	0.875	0.765	0.803	0.816	0.827
Panel B: Range = 0.5sd								
Above Threshold Indicator	0.962***	0.961***	0.966***	0.973***	0.962***	0.951***	0.962***	0.975***
	(0.002)	(0.010)	(0.010)	(0.010)	(0.001)	(0.012)	(0.010)	(0.007)
Quartics in Credit Score Above and Below		x	x	x		x	x	x
Demographic Controls			x	x			x	x
Month Dummies				x				x
Observations	31,892	31,892	31,892	31,892	31,892	31,892	31,891	31,361
R-squared	0.900	0.900	0.905	0.913	0.840	0.840	0.855	0.879

* Significant at the 10 percent level

** Significant at the 5 percent level

*** Significant at the 1 percent level

Notes: Authors' calculations based on data from a company that provides payday loans. This table documents the discontinuous effect of the credit score on approval of payday borrowers' first applications. Panel A covers the full range of applicants, while Panel B covers applicants within 0.5 standard deviations of the credit score threshold. The key independent variable is the Above Threshold Indicator, a dummy for whether (normalized) Credit Score is greater than or equal to 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.

Appendix Table 2

DEMOGRAPHIC CHARACTERISTICS AND THE THRESHOLD

	All		Within 0.5 sd		Within 0.2 sd		Within 0.05 sd		PLACEBO REGRESSION DISCONTINUITY ANALYSIS	
	Below	Above	Below	Above	Below	Above	Below	Above	Demographics	Dummies for Missing
NSF's on Bank Statement	2.055	0.889	2.125	1.562	1.903	1.980	1.682	1.657	-1.038	
	(4.423)	(2.557)	(4.698)	(3.682)	(4.256)	(4.291)	(4.026)	(3.594)	(0.264)	
Months at Current Residence	48.847	70.647	42.026	49.179	46.209	66.458	43.181	85.934	67.624	0.000
	(59.045)	(96.445)	(50.743)	(77.644)	(58.091)	(93.058)	(52.607)	(105.945)	(4.310)	(0.000)
Age	34.032	36.977	33.544	34.437	34.482	35.549	33.622	36.152	2.327	
	(10.376)	(11.356)	(10.484)	(10.709)	(10.876)	(11.103)	(10.047)	(11.736)	(0.670)	
Checking Account Balance ($)	42	276	-12	125	13	82	29	65	1.571	0.055
	(373)	(575)	(298)	(450)	(294)	(438)	(244)	(465)	(0.107)	(0.008)
Years at Current Job	2.197	4.646	1.848	2.159	2.133	2.432	2.155	1.984	0.570	0.055
	(4.838)	(7.512)	(3.862)	(4.628)	(4.321)	(5.141)	(4.147)	(4.304)	(0.021)	(0.008)
Paid Weekly (%)	0.149	0.132	0.147	0.147	0.140	0.156	0.141	0.155	-1.008	0.000
	(0.356)	(0.339)	(0.355)	(0.354)	(0.347)	(0.362)	(0.349)	(0.362)	(0.223)	(0.004)
Paid Biweekly (%)	0.526	0.505	0.532	0.514	0.531	0.511	0.524	0.501	0.007	0.000
	(0.499)	(0.500)	(0.499)	(0.500)	(0.499)	(0.500)	(0.500)	(0.500)	(0.014)	(0.004)
Paid Semimonthly (%)	0.193	0.190	0.194	0.192	0.195	0.178	0.203	0.174	0.000	0.000
	(0.395)	(0.393)	(0.395)	(0.394)	(0.396)	(0.382)	(0.403)	(0.379)	(0.017)	(0.004)
Paid Monthly (%)	0.133	0.173	0.127	0.147	0.134	0.155	0.131	0.170	-0.002	0.000
	(0.339)	(0.378)	(0.332)	(0.355)	(0.340)	(0.362)	(0.338)	(0.376)	(0.015)	(0.004)
Direct Deposit (%)	0.676	0.695	0.674	0.654	0.681	0.636	0.711	0.607	-0.071	0.000
	(0.468)	(0.461)	(0.469)	(0.476)	(0.466)	(0.481)	(0.453)	(0.489)	(0.024)	(0.004)
Monthly Pay ($)	1596	1717	1560	1556	1573	1538	1601	1520	-0.070	-0.007
	(905)	(1069)	(886)	(879)	(909)	(846)	(731)	(938)	(0.025)	(0.003)
Owns Home (%)	0.204	0.359	0.159	0.175	0.199	0.203	0.239	0.263	-0.008	0.012
	(0.403)	(0.480)	(0.365)	(0.380)	(0.399)	(0.402)	(0.427)	(0.441)	(0.016)	(0.006)
Wages Garnished (%)	0.047	0.026	0.044	0.034	0.049	0.036	0.029	0.028	0.008	0.012
	(0.212)	(0.159)	(0.205)	(0.181)	(0.215)	(0.186)	(0.169)	(0.166)	(0.008)	(0.006)
Black (%)	0.560	0.473	0.562	0.534	0.576	0.528	0.611	0.536	-0.005	-0.013
	(0.496)	(0.499)	(0.496)	(0.499)	(0.494)	(0.499)	(0.489)	(0.499)	(0.011)	(0.012)
Hispanic (%)	0.256	0.301	0.258	0.273	0.258	0.291	0.212	0.281	0.006	-0.013
	(0.436)	(0.459)	(0.437)	(0.445)	(0.438)	(0.454)	(0.410)	(0.450)	(0.010)	(0.012)
Female (%)	0.396	0.379	0.391	0.372	0.384	0.376	0.345	0.382	0.020	-0.013
	(0.489)	(0.485)	(0.488)	(0.484)	(0.487)	(0.485)	(0.476)	(0.487)	(0.014)	(0.012)
Number of Observations	25,305	119,854	11,320	20,572	4,819	5,586	1,370	1,958	31,892	31,892

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Authors' calculations based on data from a payday lending company. Included are all available demographics for the universe of payday-loan applicants at the Texas locations of that lender between 9/2000 and 8/2004. Quantities are calculated from documentation submitted during each individual's first application. This table compares demographic variables for all applicants above and below the approval threshold; for applicants above and below the threshold but within +/- 0.5 standard deviations; for applicants above and below the threshold but within +/- 0.2 standard deviations; and for applicants above and below the threshold but within +/-0.05 standard deviations.

Appendix Table 3
POWER CALCULATIONS: REQUIRED N'S+A11

		Effect Size, Percentage Points			
		0.25	0.5	0.75	1
Baseline Bankruptcy Rate = 1%					
Power	80%	57,464	16,290	8,092	5,030
	90%	76,390	21,542	10,656	6,600
Baseline Bankruptcy Rate = 1.5%					
Power	80%	81,892	22,384	10,794	6,546
	90%	109,092	29,698	14,272	8,630

Notes: This table reports the number of observations that would be theoretically required in order to detect the indicated effect sizes, at 95% confidence levels, with the indicated power in a randomized experiment. For example, to have an 80% chance of detecting an increase in the bankruptcy rate from 1.5% to 2%, 22,384 observations would be required, 11,192 on each side of the threshold.

COMPLETE REGRESSION RESULTS FOR BENCHMARK SPECIFICATION

	All Bankruptcies, One Year				All Bankruptcies, Two Years			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Above Threshold Indicator	0.192	3.098***	2.417**	2.289**	0.539**	4.368***	3.215**	3.025**
	(0.172)	(0.971)	(0.983)	(0.985)	(0.233)	(1.320)	(1.334)	(1.336)
amtabove		-13.563	-6.53	-3.734		-11.792	1.751	6.029
		(17.685)	(17.754)	(17.795)		(24.044)	(24.078)	(24.130)
amtabove_2		29.338	-1.526	-20.202		-17.474	-80.079	-110.587
		(139.610)	(139.726)	(139.972)		(189.813)	(189.492)	(189.800)
amtabove_3		-41.531	26.048	72.577		104.725	247.438	328.474
		(404.720)	(404.618)	(405.220)		(550.254)	(548.731)	(549.470)
amtabove_4		45.077	-17.271	-55.987		-87.722	-221.17	-292.553
		(388.462)	(388.200)	(388.718)		(528.150)	(526.465)	(527.093)
amtbelow		-36.933	-27.163	-26.516		-62.506**	-48.605	-46.663
		(23.238)	(23.276)	(23.287)		(31.594)	(31.566)	(31.577)
amtbelow_2		-206.223	-132.068	-127.076		-429.255	-321.563	-305.132
		(202.588)	(202.362)	(202.460)		(275.437)	(274.437)	(274.532)
amtbelow_3		-342.388	-152.5	-136.769		-977.501	-708.908	-656.84
		(642.827)	(641.426)	(641.743)		(873.983)	(869.883)	(870.191)
amtbelow_4		-131.54	27.834	44.086		-720.748	-504.771	-451.385
		(667.038)	(665.259)	(665.594)		(906.901)	(902.205)	(902.532)
Paid Semimonthly			-0.168	-0.239			0.361	0.228
			(0.376)	(0.377)			(0.510)	(0.511)
Paid Biweekly			0.002	-0.031			0.622	0.555
			(0.324)	(0.325)			(0.440)	(0.440)
Paid Weekly			0.026	-0.05			0.369	0.245
			(0.407)	(0.408)			(0.552)	(0.553)
Months in Same Residence			-0.002*	-0.002			-0.001	-0.001
			(0.001)	(0.001)			(0.002)	(0.002)
Direct Deposit Dummy			0.156	0.155			0.288	0.276
			(0.227)	(0.227)			(0.307)	(0.308)
Log(Monthly Pay)			1.244***	1.280***			1.652***	1.685***
			(0.220)	(0.220)			(0.298)	(0.298)
Homeowner Indicator			4.026***	4.165***			6.754***	7.015***
			(0.334)	(0.341)			(0.453)	(0.462)
Job Tenure (Years)			0.057**	0.058**			0.118***	0.119***
			(0.025)	(0.025)			(0.034)	(0.034)
Age			0.078***	0.078***			0.121***	0.122***
			(0.008)	(0.008)			(0.011)	(0.011)
Black			-0.063	-0.046			0.259	0.294
			(0.504)	(0.505)			(0.684)	(0.684)
Hispanic			-1.121**	-1.122**			-1.422*	-1.414*
			(0.566)	(0.566)			(0.767)	(0.767)
Paycheck Garnishment Indicator			0.66	0.632			0.458	0.429
			(0.661)	(0.662)			(0.897)	(0.897)
Log(Checking Acct Balance + 1)			0.124**	0.122**			0.197***	0.192***
			(0.052)	(0.052)			(0.070)	(0.070)
(Checking Acct Balance < 0)			0.563**	0.530**			0.684*	0.636*
			(0.264)	(0.264)			(0.358)	(0.359)
Number of NSF's			0.064***	0.064***			0.084***	0.086***
			(0.021)	(0.021)			(0.028)	(0.028)
Male			0.29	0.277			0.890*	0.875*
			(0.392)	(0.392)			(0.531)	(0.531)
DM - Months in Same Residence			-0.871	2.065			-1.45	3.391
			(14.571)	(14.594)			(19.761)	(19.789)
DM - Log(Monthly Pay)			8.368***	8.646***			12.250***	12.530***
			(2.123)	(2.125)			(2.879)	(2.881)
DM - Homeownership/Paycheck Garnishment			1.070***	0.623			1.896***	1.452
			(0.244)	(1.010)			(0.331)	(1.370)
DM - Job Tenure (Years)			0.878	0.562			0.553	0.747
			(1.464)	(1.715)			(1.986)	(2.325)
DM - Black			0.027	0.038			0.529	0.122
			(8.425)	(8.426)			(11.426)	(11.425)
DM - Checking Acct Balance			-0.214	0.047			-0.428	-0.244
			(0.679)	(0.768)			(0.920)	(1.042)
DM - Race/Sex			-0.042	-0.051			-0.378	0.042
			(8.415)	(8.415)			(11.412)	(11.411)
Month*Year Dummies				X				X
Constant	1.864***	0.782	-12.282***	-15.310**	2.845***	1.472	-17.829***	-22.456***
	(0.138)	(0.751)	(1.786)	(6.200)	(0.187)	(1.021)	(2.422)	(8.407)
N	31892	31892	31892	31892	31892	31892	31892	31892
r2	0	0.002	0.014	0.016	0	0.002	0.019	0.022

Notes: This table reports complete regression results with all estimated coefficients for the most important specifications in the paper. Columns 4 and 8 correspond to Column 5 of Table 3, which reports only what is shown in the first row here. The demographics correspond to those controls listed in Table 1.

Appendix Table 5a

FUNCTIONAL FORM ROBUSTNESS: *f(tkscore)*, Interacted with AboveThreshold

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Quartic	Quartic	Cubic	Cubic	Quadratic	Quadratic	Linear	Linear
	Reduced Form	Reduced Form	Reduced Form	Reduced Form	Reduced Form	Reduced Form	Reduced Form	Reduced Form
	range = 0.5sd	range = 0.05sd	range = 0.5sd	range = 0.05sd	range = 0.5sd	range = 0.05sd	range = 0.5sd	range = 0.05sd
Chapter 7, One Year	0.163	1.597	-0.092	-1.639	0.340	-1.472	-0.012	0.124
	(0.458)	(6.310)	(0.340)	(3.395)	(0.254)	(1.990)	(0.172)	(0.771)
Chapter 7, Two Years	0.524	4.320	0.199	-5.380	0.656**	-3.726	0.170	0.688
	(0.575)	(8.173)	(0.427)	(4.405)	(0.319)	(2.582)	(0.216)	(1.001)
Chapter 13, One Year	2.126**	-3.755	2.476***	-16.898**	1.097**	-4.462	0.584*	4.652**
	(0.873)	(15.632)	(0.649)	(8.409)	(0.484)	(4.932)	(0.328)	(1.915)
Chapter 13, Two Years	2.501**	4.296	2.798***	-29.587**	1.208*	-8.032	0.840*	5.617**
	(1.198)	(20.490)	(0.891)	(11.028)	(0.665)	(6.470)	(0.450)	(2.513)
Chapter 13 and Dismissed, One Year	1.319*	7.700	1.400**	-4.788	0.546	-0.765	0.117	2.396
	(0.697)	(12.370)	(0.518)	(6.654)	(0.387)	(3.901)	(0.262)	(1.513)
Chapter 13 and Dismissed, Two Years	2.031**	16.631	1.412**	-10.481	0.50754332	-0.924	0.210	2.647
	(0.939)	(15.258)	(0.698)	(8.212)	(0.521)	(4.815)	(0.353)	(1.868)
All Bankruptcies, One Year	2.289**	-2.158	2.383***	-18.536**	1.438**	-5.934	0.572	4.776**
	(0.985)	(16.762)	(0.732)	(9.019)	(0.546)	(5.289)	(0.370)	(2.053)
All Bankruptcies, Two Years	3.025**	8.616	2.997***	-34.967***	1.864**	-11.758*	1.010**	6.305**
	(1.336)	(22.158)	(0.993)	(11.935)	(0.741)	(7.002)	(0.502)	(2.720)
Number of observations	31,892	3,328	31,892	3,328	31,892	3,328	31,892	3,328

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Regression coefficients are the estimated treatment effects, in percentage points, of first payday loan approval ("*CreditScore* ") on bankruptcy filings, and their standard errors. Columns 1 through 4 are reduced form regressions reporting the coefficient on the "above threshold" indicator. These effects are computed from regressions that include a cubic (quadratic) in the credit score for columns 1 and 2 (3 and 4) ,a cubic (quadratic) in the credit score interacted with the "above threshold" 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. Columns 5 and 6 report marginal effects on the "above threshold" indicator. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the "above threshold" dummy, demographic controls and a full set of dummies for month of loan application.

Appendix Table 5b

FUNCTIONAL FORM ROBUSTNESS: *f(tkscore),* NOT Interacted with AboveThreshold

	(1) Quartic Reduced Form range = 0.5sd	(2) Quartic Reduced Form range = 0.05sd	(3) Cubic Reduced Form range = 0.5sd	(4) Cubic Reduced Form range = 0.05sd	(5) Quadratic Reduced Form range = 0.5sd	(6) Quadratic Reduced Form range = 0.05sd	(7) Linear Reduced Form range = 0.5sd	(8) Linear Reduced Form range = 0.05sd
Chapter 7, One Year	0.270	-1.141	0.307	-0.673	-0.005	0.069	-0.039	-0.051
	(0.227)	(1.525)	(0.222)	(1.388)	(0.173)	(0.762)	(0.168)	(0.754)
Chapter 7, Two Years	0.534*	-2.147	0.617**	-0.933	0.178	0.704	0.179	0.668
	(0.285)	(1.979)	(0.279)	(1.802)	(0.217)	(0.989)	(0.211)	(0.979)
Chapter 13, One Year	0.820*	-2.807	0.982**	-4.013	0.583*	4.478**	0.932***	4.543**
	(0.433)	(3.780)	(0.423)	(3.441)	(0.330)	(1.891)	(0.320)	(1.871)
Chapter 13, Two Years	0.952	-5.570	1.164**	-7.721*	0.833*	5.297**	1.335***	5.319**
	(0.594)	(4.959)	(0.580)	(4.516)	(0.452)	(2.482)	(0.440)	(2.457)
Chapter 13 and Dismissed, One Year	0.371	-0.718	0.502	-1.269	0.135	2.347	0.322	2.483*
	(0.346)	(2.990)	(0.338)	(2.722)	(0.263)	(1.494)	(0.256)	(1.479)
Chapter 13 and Dismissed, Two Years	0.346	-0.512	0.509	-2.360	0.222	2.484	0.470	2.481
	(0.465)	(3.690)	(0.455)	(3.360)	(0.355)	(1.845)	(0.344)	(1.825)
All Bankruptcies, One Year	1.091**	-3.948	1.289***	-4.686	0.578	4.547**	0.898**	4.492**
	(0.488)	(4.054)	(0.477)	(3.691)	(0.372)	(2.028)	(0.361)	(2.007)
All Bankruptcies, Two Years	1.486**	-7.717	1.775***	-8.654*	1.011**	6.001**	1.515***	5.988**
	(0.662)	(5.367)	(0.647)	(4.886)	(0.504)	(2.687)	(0.490)	(2.659)
Number of observations	31,892	3,328	31,892	3,328	31,892	3,328	31,892	3,328

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: This table is identical to Appendix Table 5a, except the regressions do not include interactions with AboveThreshold. Regression coefficients are the estimated treatment effects, in percentage points, of first payday loan approval ("*CreditScore* ") on bankruptcy filings, and their standard errors. Columns 1 through 4 are reduced form regressions reporting the coefficient on the "above threshold" indicator. These effects are computed from regressions that include a cubic (quadratic) in the credit score for columns 1 and 2 (3 and 4) ,a cubic (quadratic) in the credit score interacted with the "above threshold" 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. Columns 5 and 6 report marginal effects on the "above threshold" indicator. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the "above threshold" dummy, demographic controls and a full set of dummies for month of loan application.

Appendix Table 6a

FUNCTIONAL FORM ROBUSTNESS: *f(tkscore),* Interacted with AboveThreshold, Probits

	(1) Quartic Probits range = 0.5sd	(2) Quartic Probits range = 0.05sd	(3) Cubic Probits range = 0.5sd	(4) Cubic Probits range = 0.05sd	(5) Quadratic Probits range = 0.5sd	(6) Quadratic Probits range = 0.05sd	(7) Linear Probits range = 0.5sd	(8) Linear Probits range = 0.05sd
Chapter 7, One Year	0.110	Insuff. Obs.	-0.025	Insuff. Obs.	0.242	-1.769	-0.015	-0.210
	(0.338)		(0.270)		(0.167)	(716.021)	(0.130)	(117.017)
Chapter 7, Two Years	0.378	Insuff. Obs.	0.195	-41.650	0.429**	-8.199	0.092	0.297
	(0.409)		(0.318)	(1879.001)	(0.214)	(710.314)	(0.160)	(36.892)
Chapter 13, One Year	0.954**	10.262	1.142***	-8.512	0.494*	-10.075	0.237	3.736**
	(0.463)	(41.470)	(0.345)	(20.482)	(0.268)	(12.015)	(0.192)	(1.665)
Chapter 13, Two Years	1.046*	17.132	1.349***	-43.220	0.537	-17.394	0.348	4.290**
	(0.607)	(48.158)	(0.440)	(36.216)	(0.352)	(14.824)	(0.248)	(1.720)
Chapter 13 and Dismissed, One Year	0.478	99.412***	0.510	2.237	0.182	-1.464	-0.029	0.880
	(0.347)	(7.631)	(0.258)	(14.544)	(0.208)	(8.621)	(0.156)	(4.763)
Chapter 13 and Dismissed, Two Years	0.849	99.678***	0.645	0.406	0.196	-0.531	-0.013	0.882
	(0.447)	(8.395)	(0.336)	(9.139)	(0.272)	(10.408)	(0.197)	(17.603)
All Bankruptcies, One Year	1.296**	7.448	1.325***	-24.260	0.818**	-10.423	0.217	3.513**
	(0.595)	(29.361)	(0.443)	(33.841)	(0.337)	(11.493)	(0.250)	(1.685)
All Bankruptcies, Two Years	1.519**	20.582	1.699***	-60.558**	1.046**	-22.536	0.439	4.460**
	(0.767)	(46.480)	(0.563)	(30.444)	(0.434)	(14.847)	(0.313)	(1.857)
Number of observations	31,227	2,945	31,227	2,945	31,227	2,945	31,227	2,945

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes:This table corresponds to Appendix Table 5a but uses the probit model instead of OLS. Regression coefficients are the estimated treatment effects, in percentage points, of first payday loan approval ("*CreditScore* ") on bankruptcy filings, and their standard errors. Columns 1 through 4 are reduced form regressions reporting the coefficient on the "above threshold" indicator. These effects are computed from regressions that include a cubic (quadratic) in the credit score for columns 1 and 2 (3 and 4) ,a cubic (quadratic) in the credit score interacted with the "above threshold" 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. Columns 5 and 6 report marginal effects on the "above threshold" indicator. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the "above threshold" dummy, demographic controls and a full set of dummies for month of loan application.

Appendix Table 6b

FUNCTIONAL FORM ROBUSTNESS: *f(tkscore)*, NOT Interacted with AboveThreshold, Probits

	(1) Quartic Probits range = 0.5sd	(2) Quartic Probits range = 0.05sd	(3) Cubic Probits range = 0.5sd	(4) Cubic Probits range = 0.05sd	(5) Quadratic Probits range = 0.5sd	(6) Quadratic Probits range = 0.05sd	(7) Linear Probits range = 0.5sd	(8) Linear Probits range = 0.05sd
Chapter 7, One Year	0.173	-0.826	0.195	-0.672	-0.008	-0.217	-0.027	-0.224
	(0.146)	(363.673)	(0.139)	(297.580)	(0.131)	(122.796)	(0.125)	(135.931)
Chapter 7, Two Years	0.304	-2.961	0.371**	-0.980	0.102	0.282	0.124	0.183
	(0.188)	(313.729)	(0.176)	(114.231)	(0.162)	(35.138)	(0.151)	(22.937)
Chapter 13, One Year	0.361	-6.956	0.450*	-7.160	0.256	3.366**	0.532***	3.286**
	(0.242)	(7.161)	(0.231)	(6.819)	(0.194)	(1.543)	(0.187)	(1.470)
Chapter 13, Two Years	0.409	-10.099	0.565*	-10.346	0.372	3.977**	0.773***	3.999**
	(0.318)	(8.282)	(0.302)	(7.948)	(0.251)	(1.631)	(0.240)	(1.590)
Chapter 13 and Dismissed, One Year	0.119	-2.514	0.191	-2.802	-0.009	0.732	0.146	0.993
	(0.191)	(12.822)	(0.181)	(14.004)	(0.160)	(4.010)	(0.153)	(5.317)
Chapter 13 and Dismissed, Two Years	0.112	-1.538	0.193	-2.321	0.000	0.726	0.216	0.797
	(0.248)	(27.233)	(0.235)	(39.498)	(0.201)	(14.560)	(0.190)	(16.324)
All Bankruptcies, One Year	0.589*	-7.043	0.739**	-6.586	0.243	3.211**	0.525**	3.094**
	(0.304)	(6.873)	(0.290)	(6.214)	(0.253)	(1.597)	(0.241)	(1.540)
All Bankruptcies, Two Years	0.786**	-12.449	1.025***	-10.480	0.472	4.162**	0.913***	4.077**
	(0.391)	(8.495)	(0.371)	(7.404)	(0.317)	(1.782)	(0.300)	(1.732)
Number of observations	31,227	2,945	31,227	2,945	31,227	2,945	31,227	2,945

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: This table corresponds to Appendix Table 5b but uses the probit model instead of OLS. Regression coefficients are the estimated treatment effects, in percentage points, of first payday loan approval ("*CreditScore* ") on bankruptcy filings, and their standard errors. Columns 1 through 4 are reduced form regressions reporting the coefficient on the "above threshold" indicator. These effects are computed from regressions that include a cubic (quadratic) in the credit score for columns 1 and 2 (3 and 4) ,a cubic (quadratic) in the credit score interacted with the "above threshold" 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. Columns 5 and 6 report marginal effects on the "above threshold" indicator. These effects are computed from regressions that include a quartic in the credit score, a quartic in the credit score interacted with the "above threshold" dummy, demographic controls and a full set of dummies for month of loan application.

Appendix Table 7
Cox Hazard Regression Estimates

	(1) Estimates and Standard Errors	(2) Implied Hazard Ratios
Chapter 7	0.840	2.316
	(0.901)	
Chapter 13	0.802**	2.229
	(0.385)	
Chapter 13 and Dismissed	0.507	1.660
	(0.498)	
All Bankruptcies	0.828**	2.288
	(0.353)	
Number of observations	31,892	

* Significant at the 10 percent level

** Significant at the 5 percent level

*** Significant at the 1 percent level

Notes: This table reports estimates of Cox Proportional Hazard Models using the sample restricted to +/-0.5 standard deviations around the credit-score threshold. Cells report hazard regression coefficients that are the estimated treatment effects 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 (2) exponentiates the estimated coefficients in Column (1) to find the implied hazard ratio. For example, for All Bankruptcies, AboveThreshold increases the hazard rate to 2.288 times the BelowThreshold rate.

Appendix Table 8

TIMING ROBUSTNESS

	(1) Reduced Form, Combined	(2) Reduced Form, Pre-August 2002	(3) Reduced Form, August-November 2002	(4) Reduced Form, Post-November 2002	(5) Reduced Form, Interacted
All Bankruptcies, One Year					
AboveThreshold	2.289**	0.148	6.701	1.951	2.516**
	(0.985)	(1.816)	(8.467)	(1.278)	(1.045)
AboveThreshold X I(Aug-Nov 2002)					0.512
					(1.189)
AboveThreshold X I(post-Nov 2002)					-0.321
					(0.433)
All Bankruptcies, Two Years					
AboveThreshold	3.025**	-0.840	-1.039	3.143*	3.177**
	(1.336)	(2.442)	(11.413)	(1.740)	(1.417)
AboveThreshold X I(Aug-Nov 2002)					-0.333
					(1.612)
AboveThreshold X I(post-Nov 2002)					-0.275
					(0.588)
Number of observations	31,892	12,015	1,011	18,866	31,892

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: This table reports a robustness check on timing before, during, and after August to November 2002. 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.

Appendix Table 9a

EFFECTS OF PAYDAY LOAN APPROVAL ON CHAPTER 7 BANKRUPTCY FILING RATES: OPTIMAL BANDWIDTH ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Chapter 7 Bankruptcies, One Year								
Conventional	0.089	0.107	0.057	0.079	-0.014	-0.014	-0.042	-0.025
	(0.113)	(0.107)	(0.129)	(0.113)	(0.071)	(0.068)	(0.075)	(0.068)
Bias-Corrected	0.111	0.139	0.089	0.118	0.107	0.090	0.109	0.013
	(0.113)	(0.107)	(0.129)	(0.113)	(0.071)	(0.068)	(0.075)	(0.068)
Robust	0.111	0.139	0.089	0.118	0.107	0.090	0.109	0.013
	(0.134)	(0.122)	(0.147)	(0.124)	(0.104)	(0.100)	(0.111)	(0.095)
Observations	76949	86329	47089	61683	143275	144595	136786	143784
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes
Chapter 7 Bankruptcies, Two Years								
Conventional	0.294*	0.275*	0.317*	0.350**	-0.012	0.054	-0.061	0.017
	(0.166)	(0.157)	(0.181)	(0.163)	(0.093)	(0.089)	(0.095)	(0.090)
Bias-Corrected	0.361**	0.325**	0.404**	0.398**	0.245***	0.084	0.192**	0.001
	(0.166)	(0.157)	(0.181)	(0.163)	(0.093)	(0.089)	(0.095)	(0.090)
Robust	0.361*	0.325*	0.404**	0.398**	0.245*	0.084	0.192	0.001
	(0.188)	(0.179)	(0.199)	(0.186)	(0.142)	(0.114)	(0.144)	(0.118)
Observations	53330	61174	38110	49694	141013	143249	132903	140984
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Standard errors are in parentheses. Each coefficient in this table represents the effect of payday loan access on personal bankruptcies from a separate optimal bandwidth regression discontinuity estimation. Columns (1)-(4) and (5)-(8) use the optimal bandwidths suggested by Calonico, Cattaneo, and Titiunik (2014) [CCT] and Imbens and Kalyanaraman (2012) [IK], respectively, all as implemented by the rdrobust Stata package. Even-numbered columns residualize the bankruptcy outcome variable, by regressing on demographic controls and a full set of dummies for the (month X year) of loan application, prior to running rdrobust. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.

Appendix Table 9b

EFFECTS OF PAYDAY LOAN APPROVAL ON CHAPTER 13 BANKRUPTCY FILING RATES: OPTIMAL BANDWIDTH ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Chapter 13 Bankruptcies, One Year								
Conventional	0.641**	0.458*	0.487*	0.391	-0.334**	0.081	-0.134	0.069
	(0.308)	(0.257)	(0.291)	(0.272)	(0.157)	(0.142)	(0.194)	(0.145)
Bias-Corrected	0.819***	0.619**	0.628**	0.547**	0.514***	0.307**	0.404**	0.240*
	(0.308)	(0.257)	(0.291)	(0.272)	(0.157)	(0.142)	(0.194)	(0.145)
Robust	0.819**	0.619**	0.628*	0.547*	0.514*	0.307	0.404	0.240
	(0.346)	(0.303)	(0.336)	(0.308)	(0.283)	(0.213)	(0.270)	(0.221)
Observations	49973	74968	42605	50171	139627	143833	96119	139907
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes
Chapter 13 Bankruptcies, Two Years								
Conventional	0.853**	0.788**	1.183***	0.762**	-0.121	0.128	0.351	0.105
	(0.414)	(0.362)	(0.426)	(0.387)	(0.266)	(0.198)	(0.282)	(0.205)
Bias-Corrected	1.112***	1.010***	1.449***	0.971**	0.747***	0.659***	0.761***	0.396*
	(0.414)	(0.362)	(0.426)	(0.387)	(0.266)	(0.198)	(0.282)	(0.205)
Robust	1.112**	1.010**	1.449***	0.971**	0.747**	0.659**	0.761**	0.396
	(0.477)	(0.424)	(0.478)	(0.435)	(0.377)	(0.325)	(0.382)	(0.330)
Observations	52318	72946	38453	45164	111346	143215	86681	132401
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Standard errors are in parentheses. Each coefficient in this table represents the effect of payday loan access on personal bankruptcies from a separate optimal bandwidth regression discontinuity estimation. Columns (1)-(4) and (5)-(8) use the optimal bandwidths suggested by Calonico, Cattaneo, and Titiunik (2014) [CCT] and Imbens and Kalyanaraman (2012) [IK], respectively, all as implemented by the rdrobust Stata package. Even-numbered columns residualize the bankruptcy outcome variable, by regressing on demographic controls and a full set of dummies for the (month X year) of loan application, prior to running rdrobust. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.

Appendix Table 9c

EFFECTS OF PAYDAY LOAN APPROVAL ON FILING RATES OF DISMISSED CHAPTER 13 PETITIONS: OPTIMAL BANDWIDTH ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dismissed Chapter 13 Bankruptcies, One Year								
Conventional	0.110	0.144	0.018	0.114	-0.074	0.112	-0.050	0.146
	(0.197)	(0.181)	(0.205)	(0.193)	(0.119)	(0.112)	(0.119)	(0.113)
Bias-Corrected	0.227	0.184	0.102	0.132	-0.015	0.146	-0.068	0.032
	(0.197)	(0.181)	(0.205)	(0.193)	(0.119)	(0.112)	(0.119)	(0.113)
Robust	0.227	0.184	0.102	0.132	-0.015	0.146	-0.068	0.032
	(0.236)	(0.223)	(0.243)	(0.231)	(0.169)	(0.161)	(0.176)	(0.171)
Observations	79154	91038	52943	59113	142148	143873	134828	141895
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes
Dismissed Chapter 13 Bankruptcies, Two Years								
Conventional	0.265	0.297	0.254	0.306	-0.012	0.162	-0.081	0.189
	(0.260)	(0.245)	(0.285)	(0.262)	(0.165)	(0.151)	(0.174)	(0.152)
Bias-Corrected	0.409	0.359	0.400	0.327	0.052	0.283*	-0.234	0.314**
	(0.260)	(0.245)	(0.285)	(0.262)	(0.165)	(0.151)	(0.174)	(0.152)
Robust	0.409	0.359	0.400	0.327	0.052	0.283	-0.234	0.314
	(0.312)	(0.299)	(0.331)	(0.313)	(0.237)	(0.218)	(0.244)	(0.222)
Observations	80621	90238	50926	59113	139969	143601	117251	140629
Kernel Type	Triangular	Triangular	Uniform	Uniform	Triangular	Triangular	Uniform	Uniform
Bandwidth Type	CCT	CCT	CCT	CCT	IK	IK	IK	IK
Residualized	No	Yes	No	Yes	No	Yes	No	Yes

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Standard errors are in parentheses. Each coefficient in this table represents the effect of payday loan access on personal bankruptcies from a separate optimal bandwidth regression discontinuity estimation. Columns (1)-(4) and (5)-(8) use the optimal bandwidths suggested by Calonico, Cattaneo, and Titiunik (2014) [CCT] and Imbens and Kalyanaraman (2012) [IK], respectively, all as implemented by the rdrobust Stata package. Even-numbered columns residualize the bankruptcy outcome variable, by regressing on demographic controls and a full set of dummies for the (month X year) of loan application, prior to running rdrobust. Demographic control variables are listed in Table 1, and dummies for missing values of each of these variables are included.

GROUP-LEVEL HETEROGENEITY IN EFFECTS OF PAYDAY LOAN APPROVAL ON BANKRUPTCY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				Sex				Race/ Ethnicity			Ownership Status	
	All	Male	Female	Unknown	Black	White	Hispanic	Unknown	Homeowners	Renters	Unknown	Military
Chapter 7, One Year	0.163	0.033	-0.453	0.177	0.106	3.365	-0.459	0.177	0.397	-0.437	0.553	1.145
	(0.458)	(1.573)	(1.071)	(0.526)	(0.958)	(3.780)	(1.335)	(0.526)	(2.504)	(0.857)	(0.582)	(2.503)
Chapter 7, Two Years	0.524	0.051	-1.787	0.849	-0.978	1.729	-1.673	0.849	1.721	-1.873*	1.352*	1.145
	(0.575)	(2.046)	(1.610)	(0.647)	(1.536)	(4.433)	(2.187)	(0.647)	(3.097)	(1.019)	(0.752)	(2.503)
Chapter 13, One Year	2.126**	1.450	2.050	2.246**	-0.328	2.132	3.678	2.246**	0.573	-0.098	2.143*	6.163
	(0.873)	(3.459)	(2.432)	(0.975)	(2.933)	(4.959)	(3.004)	(0.975)	(5.930)	(1.188)	(1.158)	(4.687)
Chapter 13, Two Years	2.501**	-4.342	6.092*	2.634**	1.164	0.223	1.860	2.634**	5.120	-1.509	2.452	7.095
	(1.198)	(5.361)	(3.276)	(1.324)	(4.240)	(7.192)	(4.143)	(1.324)	(8.426)	(1.591)	(1.578)	(5.949)
Chapter 13 and Dismissed, One Year	1.319*	1.126	1.313	1.397*	1.191	-0.090	0.172	1.397*	5.220	-0.055	1.201	6.277
	0.697	(2.931)	(2.074)	(0.767)	(2.528)	(4.505)	(2.204)	(0.767)	(5.327)	(1.063)	(0.850)	(3.958)
Chapter 13 and Dismissed, Two Years	2.031**	0.104	4.247	2.020**	3.454	3.332	-1.984	2.020**	8.972	0.099	1.646	7.209
	(0.939)	(4.650)	(2.710)	(1.015)	(3.617)	(6.157)	(3.362)	(1.015)	(7.659)	(1.352)	(1.123)	(5.395)
All Bankruptcies, One Year	2.289**	1.483	1.598	2.423**	-0.223	5.497	3.220	2.423**	0.970	-0.535	2.696**	7.307
	(0.985)	(3.774)	(2.650)	(1.108)	(3.076)	(6.174)	(3.277)	(1.108)	(6.369)	(1.474)	(1.297)	(5.266)
All Bankrupcies, Two Years	3.025**	-4.291	4.305	3.483**	0.185	1.952	0.187	3.483**	6.841	-3.382*	3.804**	8.239
	(1.336)	(5.793)	(3.656)	(1.481)	(4.533)	(8.541)	(4.635)	(1.481)	(8.945)	(1.901)	(1.760)	(6.408)
Number of observations	31,892	2,280	3,745	25,867	3,275	1,096	1,613	25,866	2,421	11,678	17,793	638

* Significant at the 10 percent level
** Significant at the 5 percent level
*** Significant at the 1 percent level

Notes: Estimates shown are reduced-form estimates from the sample restricted to a +/- 0.5 standard deviation range 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 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. The number of observations by subpopulation adds up to 31,892 in each case except for the omission of 42 people who identified with a race or ethnicity that was not Black, White, or Hispanic.

Appendix Figure 1: Bankrtupcy Rates of Full Texas versus Payday Loan Samples

Appendix Figure 1A: All Bankruptcies
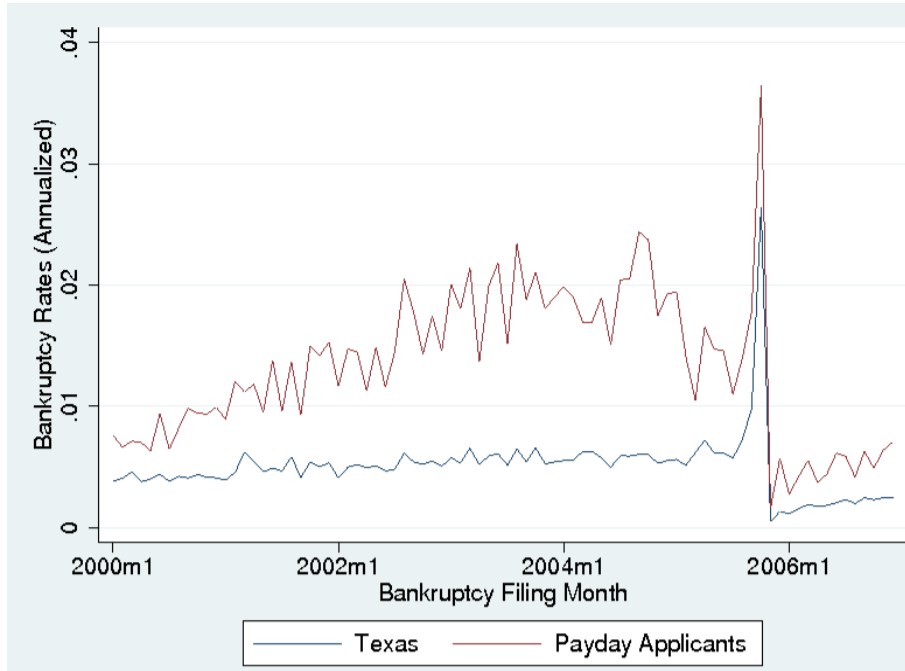
Appendix Figure 1B: Chapter 7
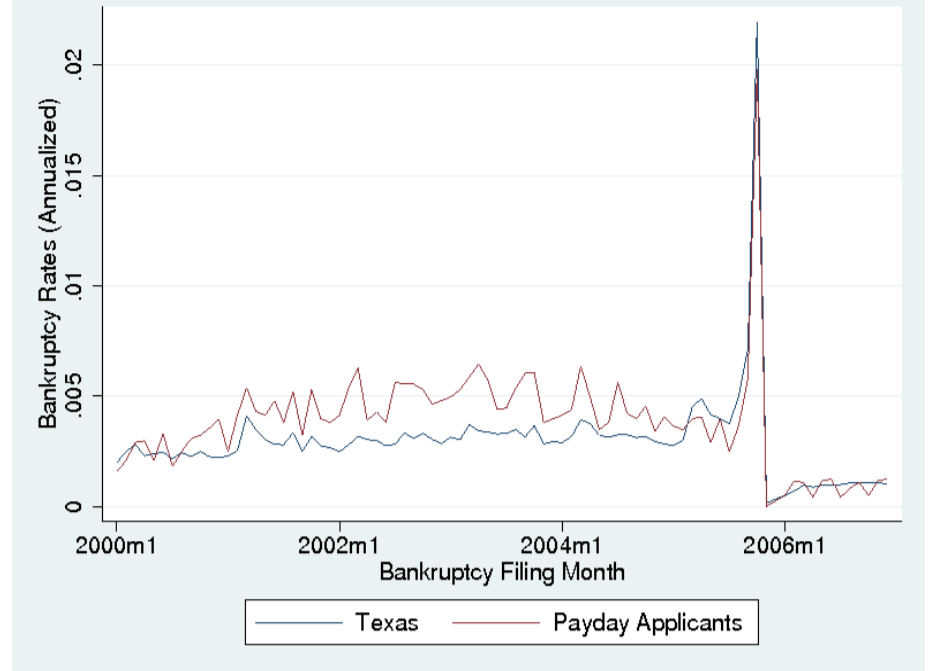
Appendix Figure 1C: Chapter 13
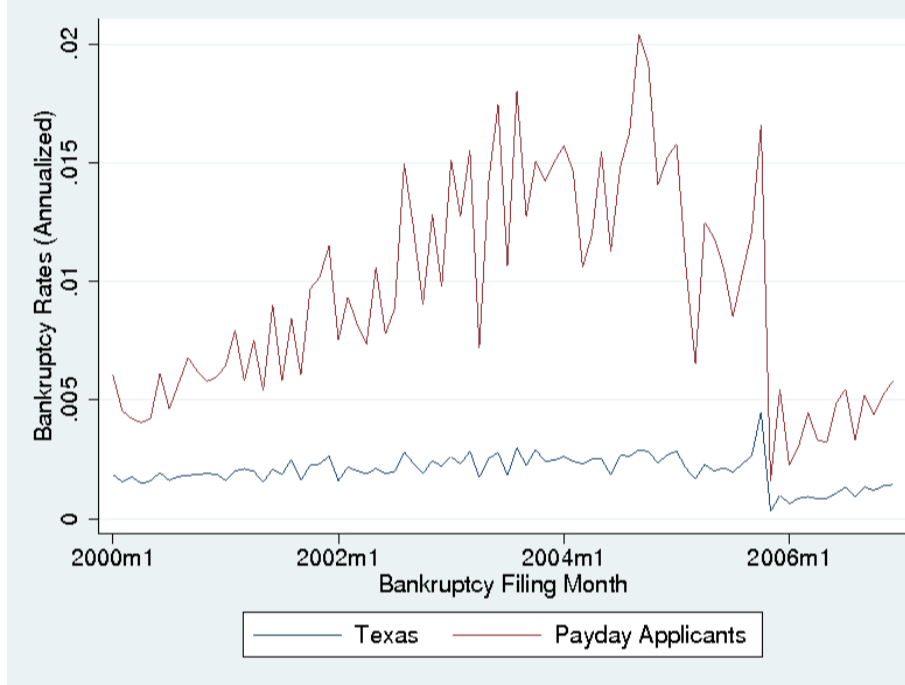
Appendix Figure 1D: Chapter 13 Discharged
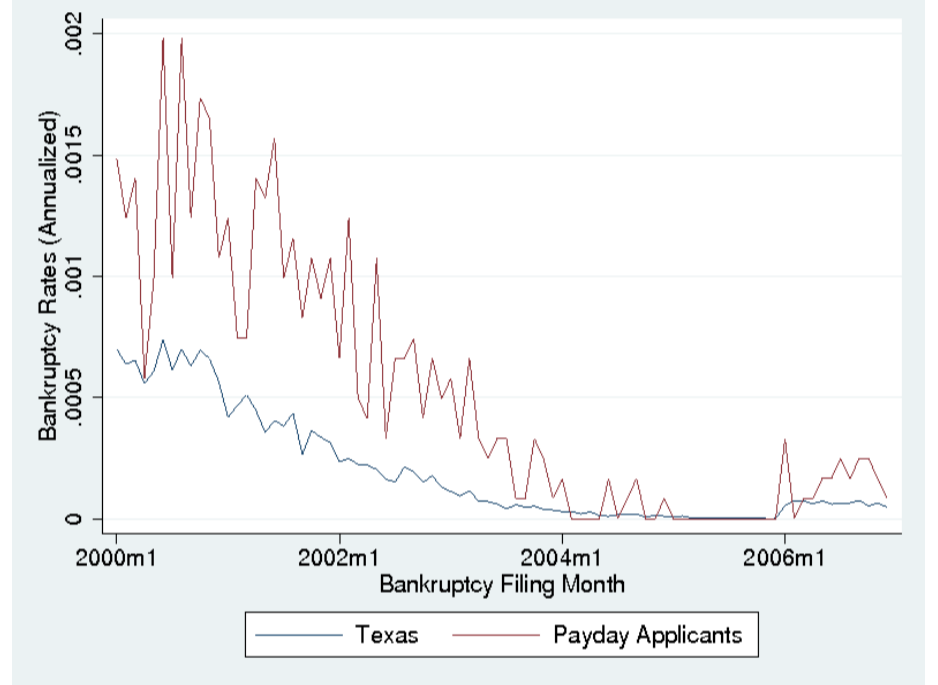
Appendix Figure 1E: Chapter 13 Dismissed
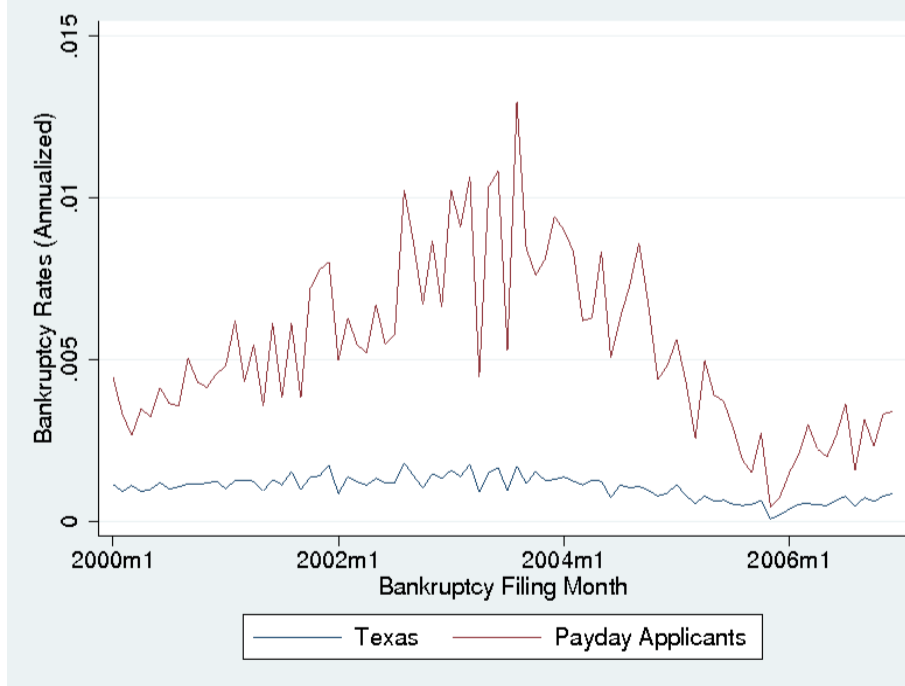
Notes: Appendix Figures 1A-E compares the overall, individual-level bankruptcy rates for all of Texas and for the pdl applicant population over the observation period. Results are shown for five outcomes: all bankruptcy filings; all chapter 7 filings; all chapter 13 filings; chapter 13 filings that resulted it debt discharge; and chapter 13 petitions that were dismissed and therefore did not result in a discharge of debts. Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Appendix Figure 2: Control Variables Around the Threshold
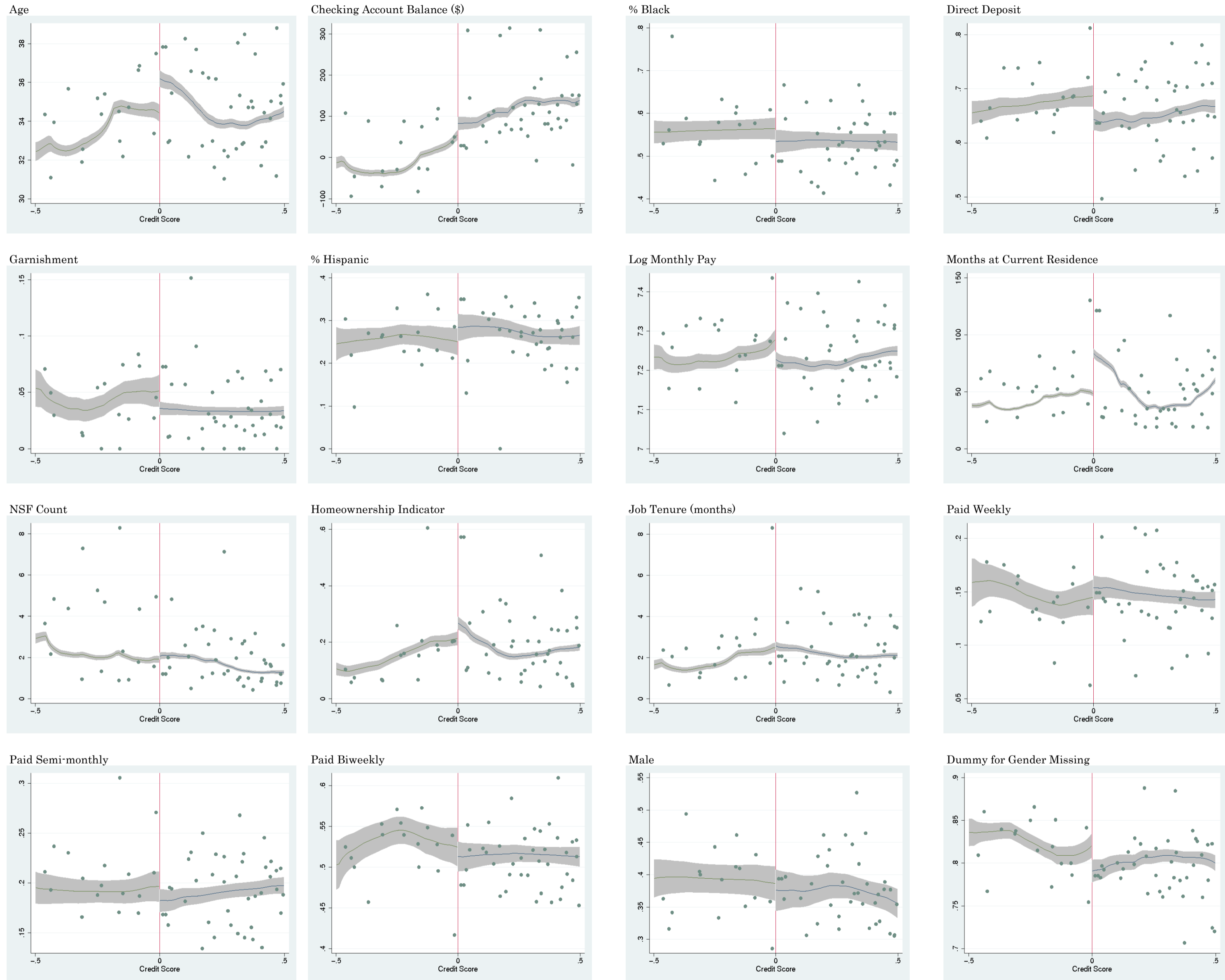
Notes: Appendix Figure 2 plots control variables around the threshold, with two-standard-error bands shown in gray. The rescaled credit score used to evaluate loans is on the x-axis. Our controls variables are: age, checking account balance, black, direct deposit dummy, garnishment dummy, Hispanic, log of monthly pay, months at current address, number of non-sufficient funds events on most recent checking account statement, homeownership dummy, job tenure, dumies for being paid weekly, semimonthly, and biweekly, gender, and a dummy for gender information missing.

Appendix Figure 3: The Effect of Payday Loans on Chapter 7 Bankruptcy Within Two Years

Appendix Figure 3A: Raw Data
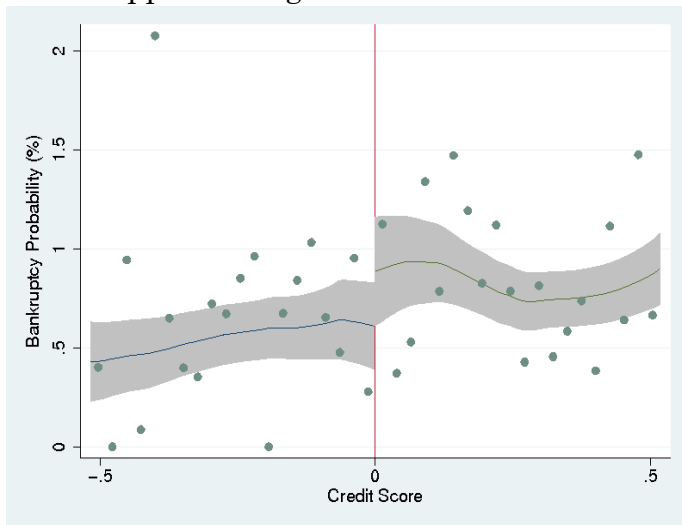
Appendix Figure 3B: Residualized
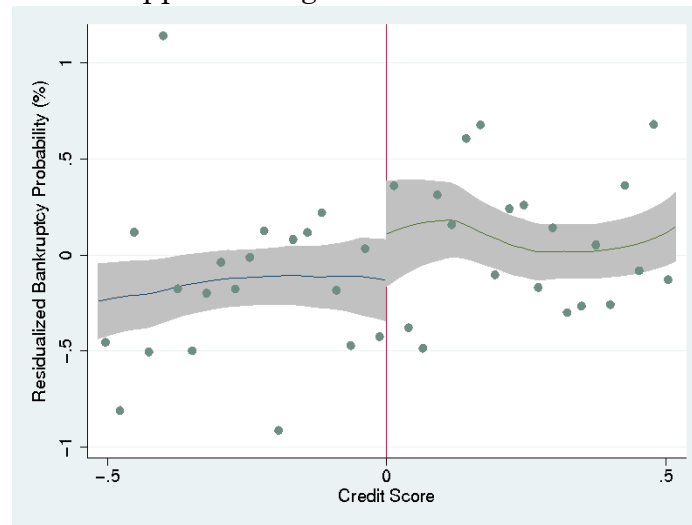
Appendix Figure 3C: Raw Data
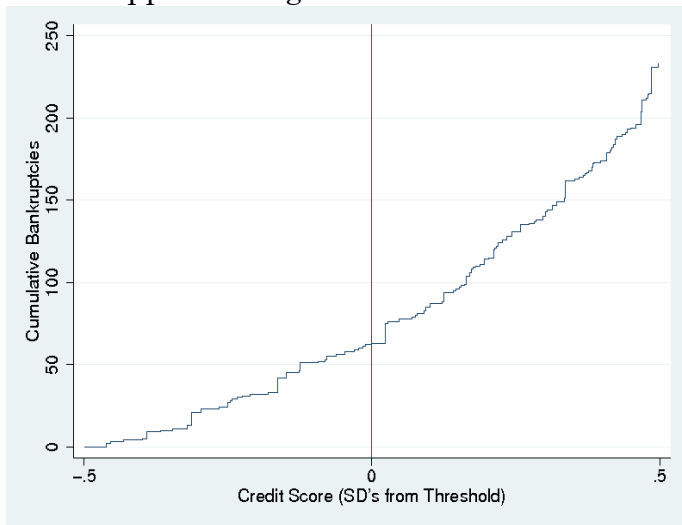
Appendix Figure 3D: Residualized
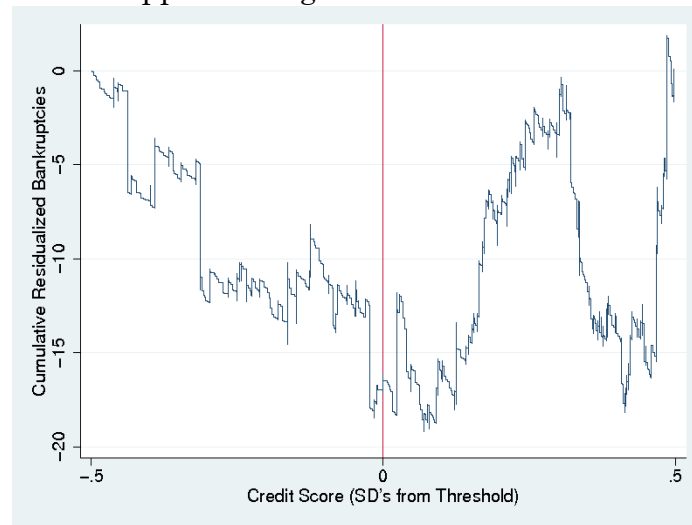
Appendix Figure 3E: Raw Data
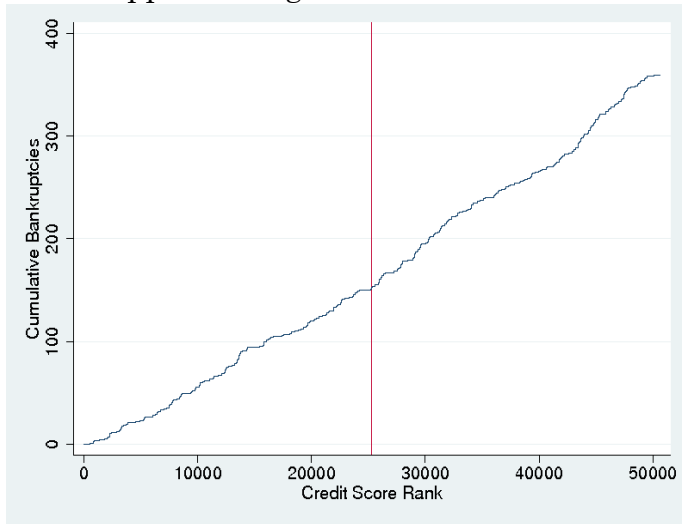
Appendix Figure 3F: Residualized
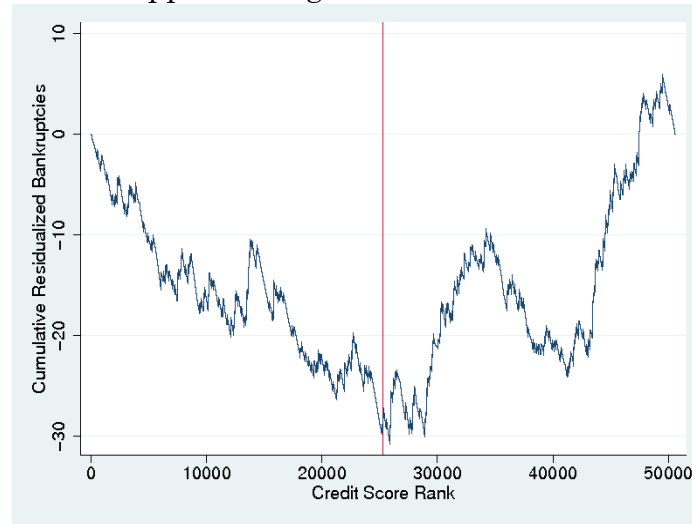
Notes: Appendix Figure 3 is the same as Figure 2 but for Chapter 7 bankrtupcies only. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

# Appendix Figure 4: The Effect of Payday Loans on Chapter 13 Bankruptcy Within Two Years

Appendix Figure 4A: Raw Data
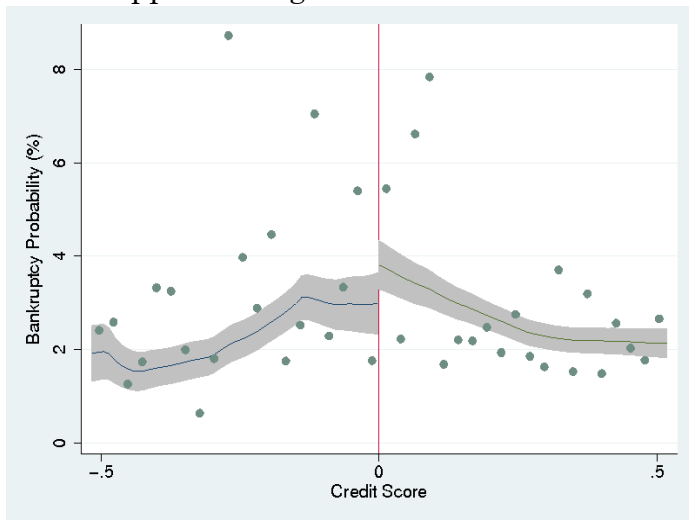
Appendix Figure 4B: Residualized
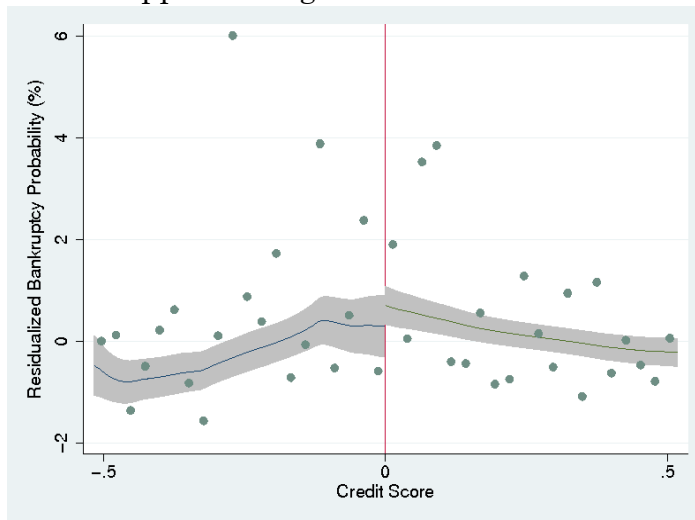
Appendix Figure 4C: Raw Data
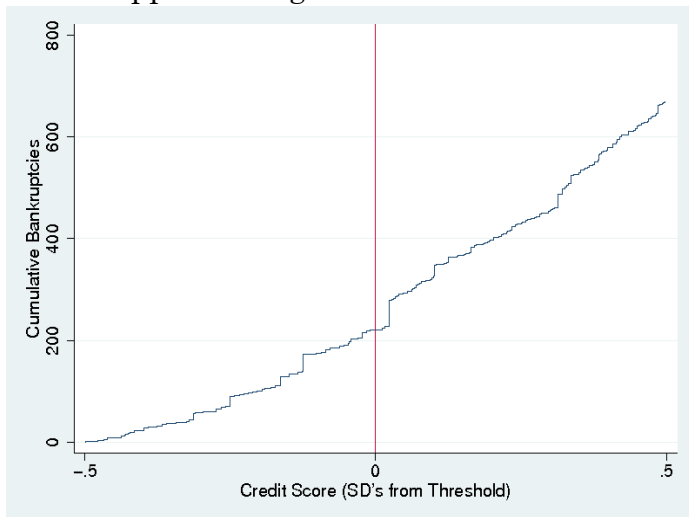
Appendix Figure 4D: Residualized
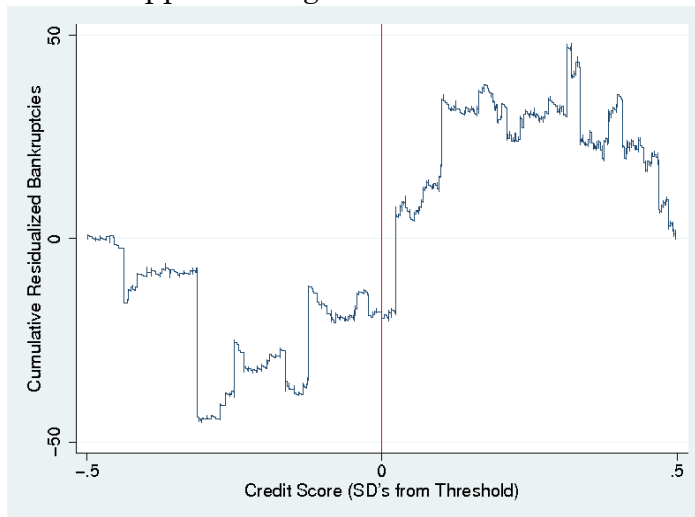
Appendix Figure 4E: Raw Data
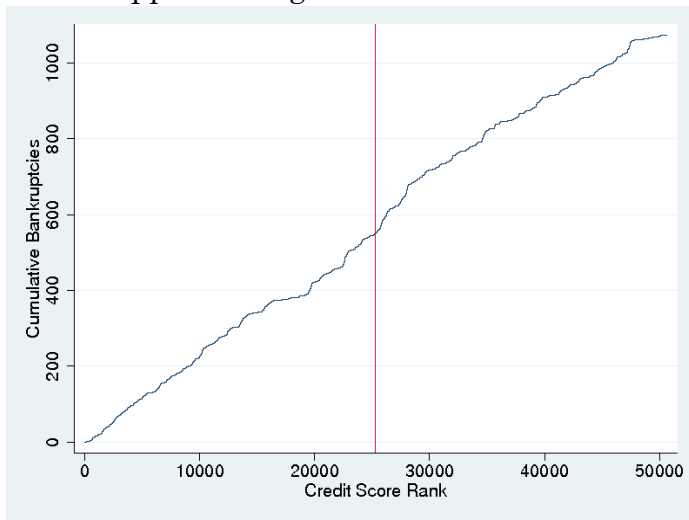
Appendix Figure 4F: Residualized
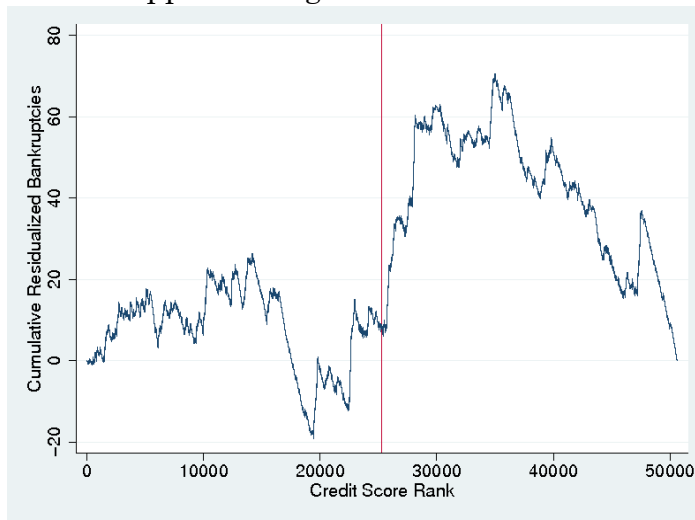
Notes: Appendix Figure 4 is the same as Figure 2 but for Chapter 13 bankruptcies only. Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Appendix Figure 5: The Effect of Payday Loans on Chapter 13 Bankruptcy Filings Within Two Years Which are Eventually Dismissed

Appendix Figure 5A: Raw Data
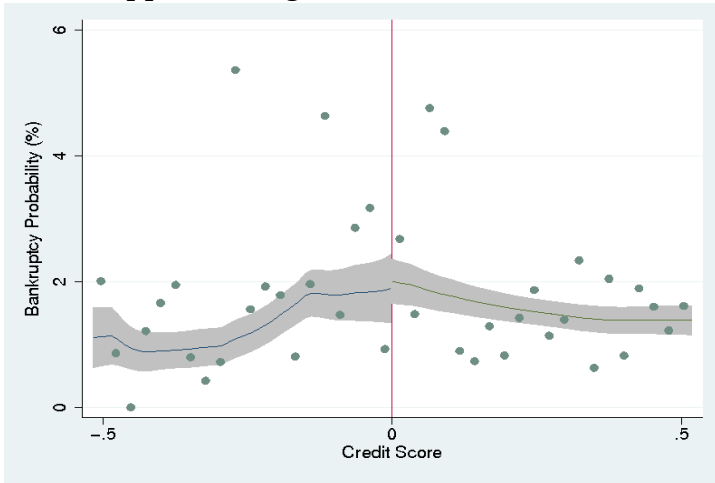
Appendix Figure 5B: Residualized
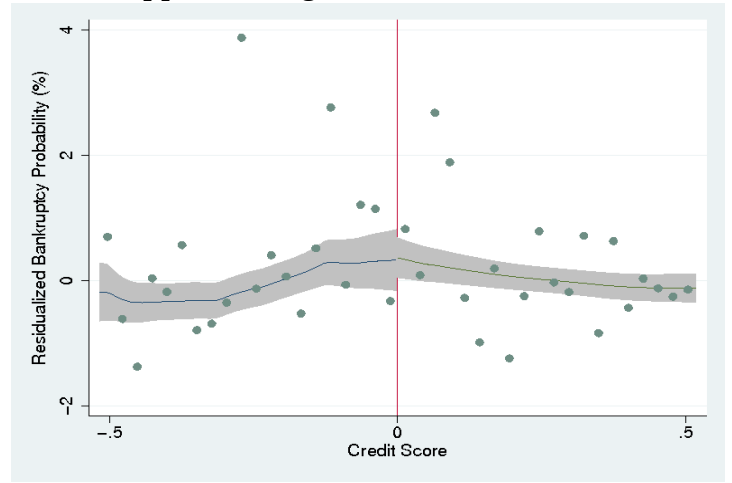
Appendix Figure 5C: Raw Data
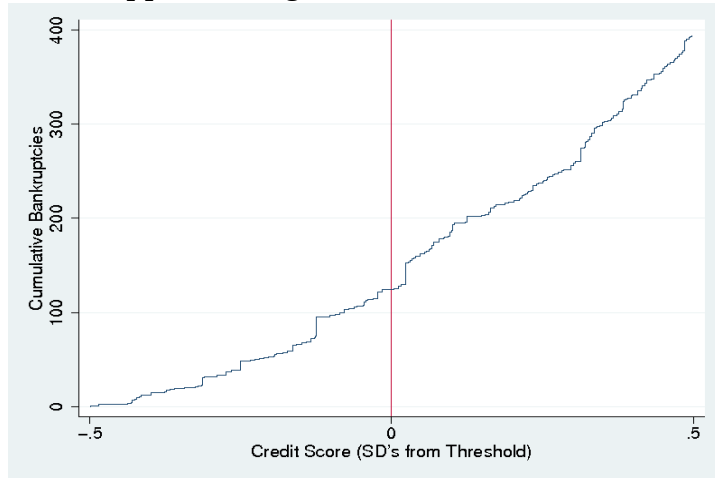
Appendix Figure 5D: Residualized
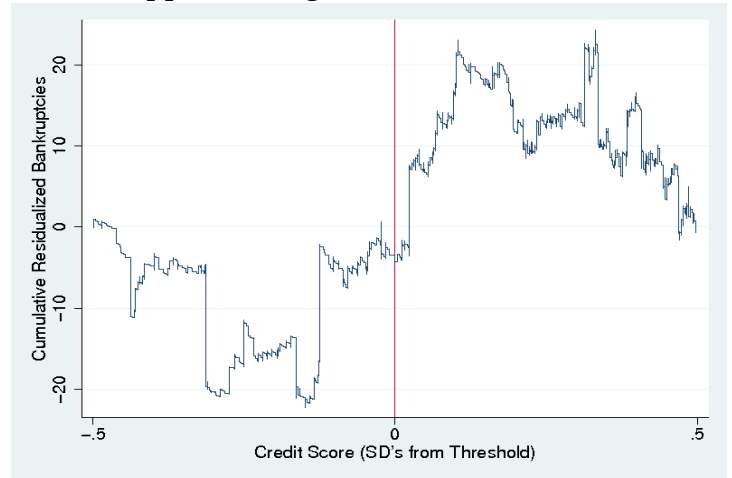
Appendix Figure 5E: Raw Data
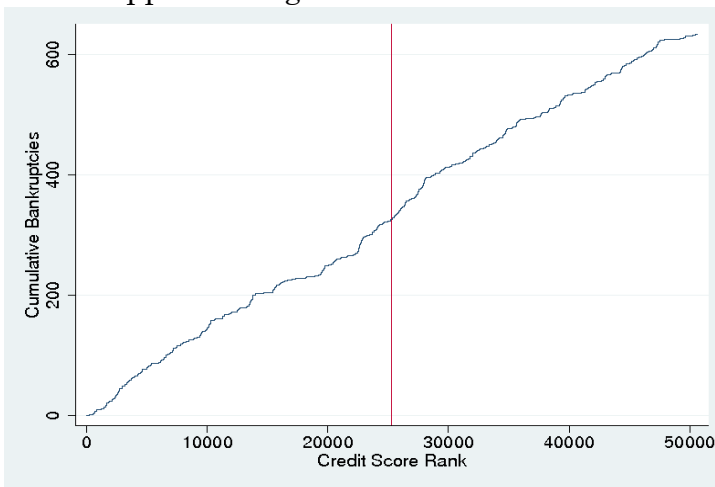
Appendix Figure 5F: Residualized
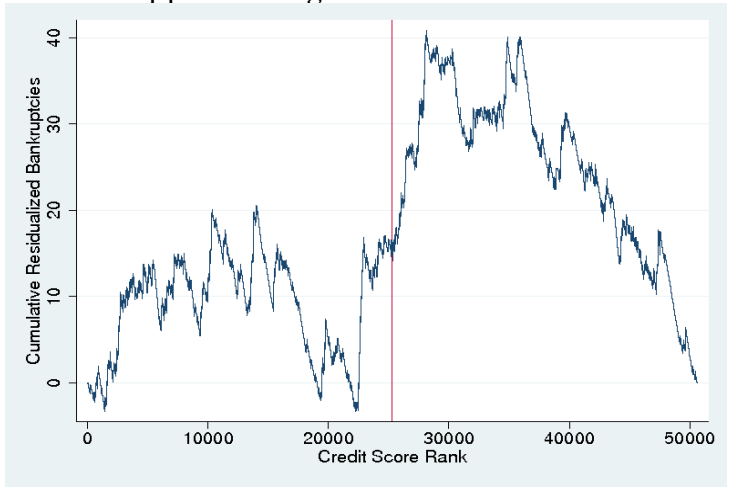
Notes: Appendix Figure 5 is the same as Figure 2 but for only for Chapter 13 bankruptcy cases that were eventually dismissed (without discharge).Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Appendix Figure 6: Effect of Payday Loans on Bankruptcy as a Function of Bandwidth

Chapter 7. Independent Quartic Functions
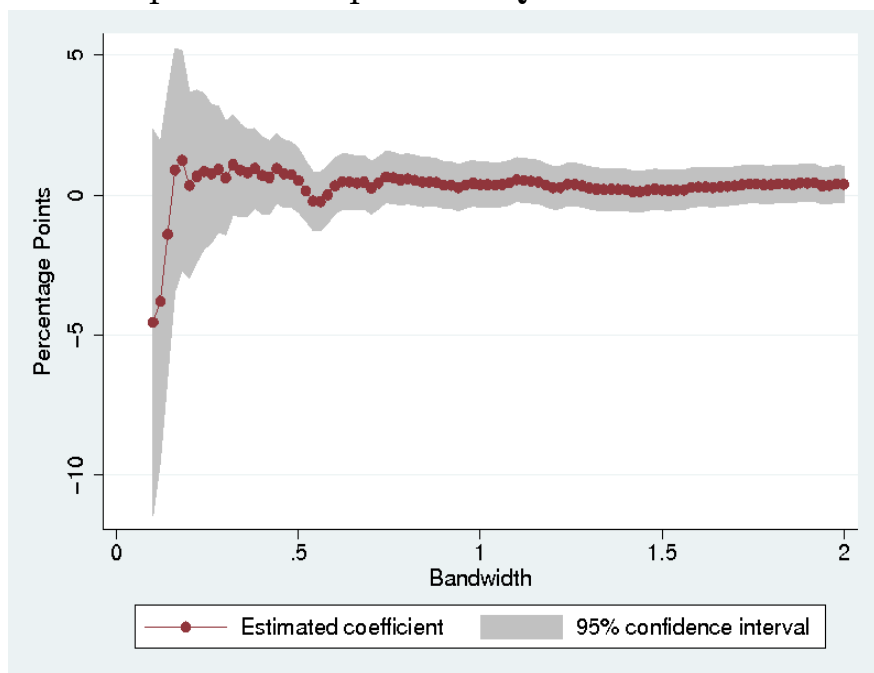
Chapter 7. Independent Linear Functions
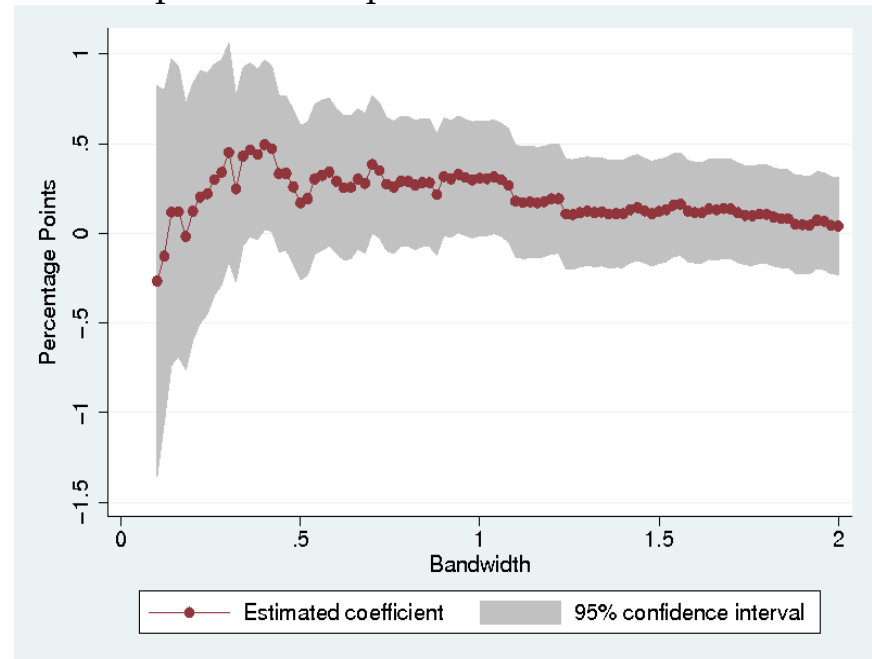
Chapter 13. Independent Quartic Functions
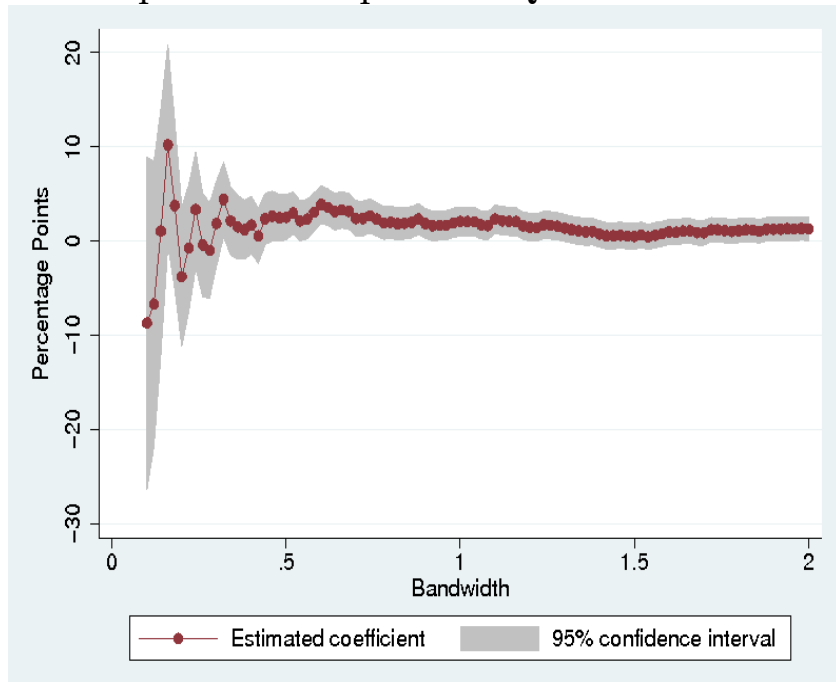
Chapter 13. Independent Linear Functions
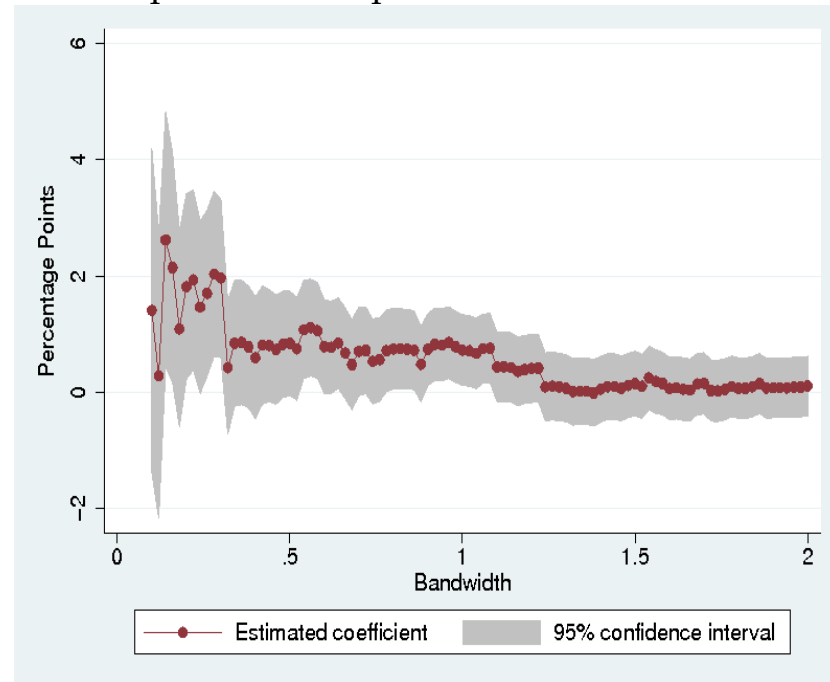
Chapter 13 and Dismissed. Independent Quartic Functions
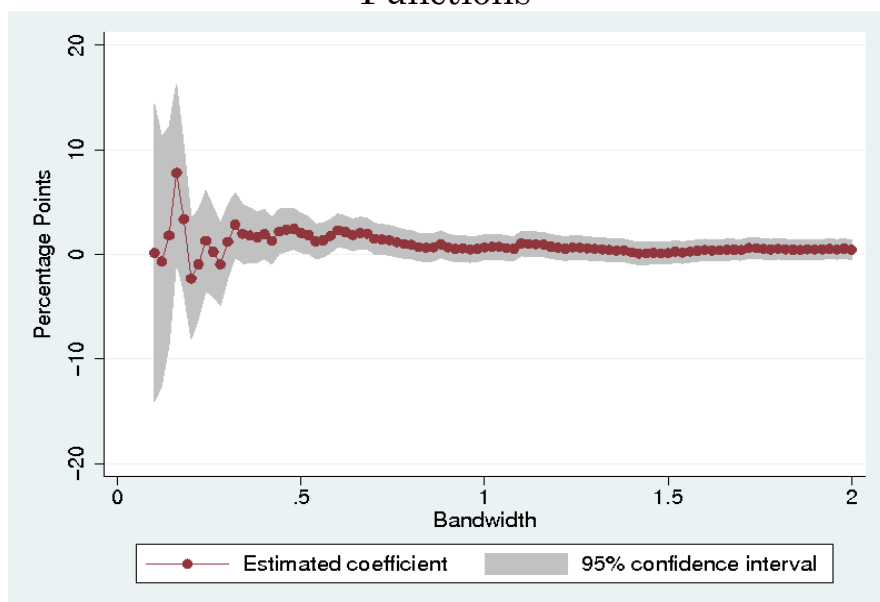
## Chapter 13 and Dismissed. Independent Linear Functions
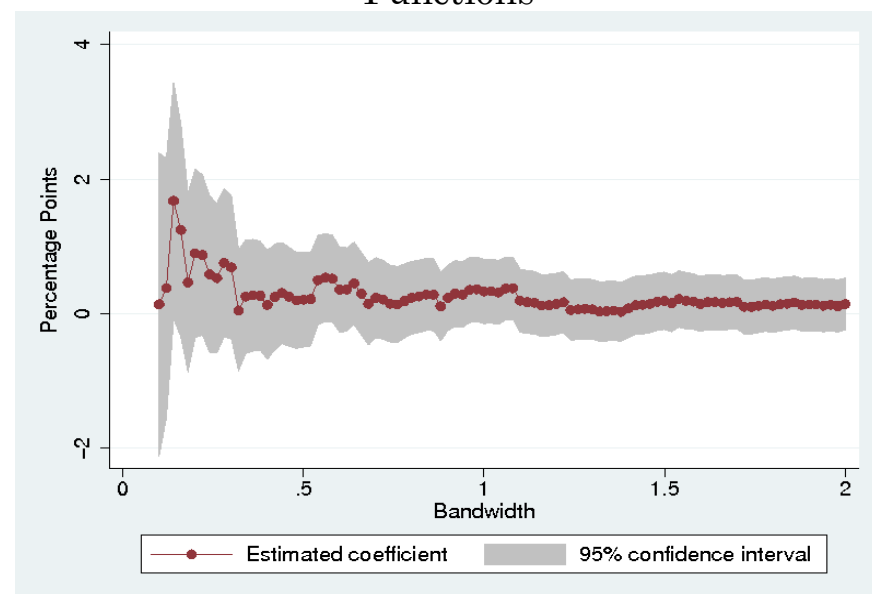
Notes: Appendix Figure 6 is the same as Figure 3, separating out chapter 7 and chapter 13 bankrtuptcies. Results are shown for independent quartic- and linear functions on either side of the threshold (corresponding to Table 3 Panel A and Panel B, respectively).Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.
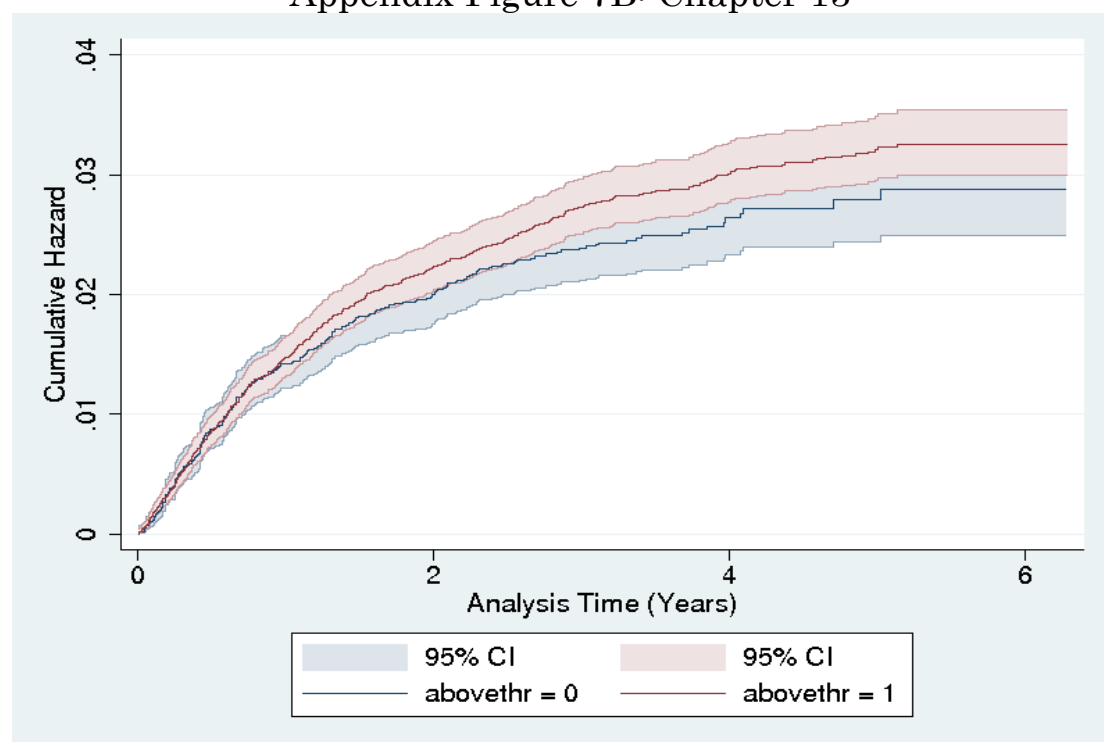
Appendix Figure 7: Effect of Payday Loan Access on Bankruptcy Hazards
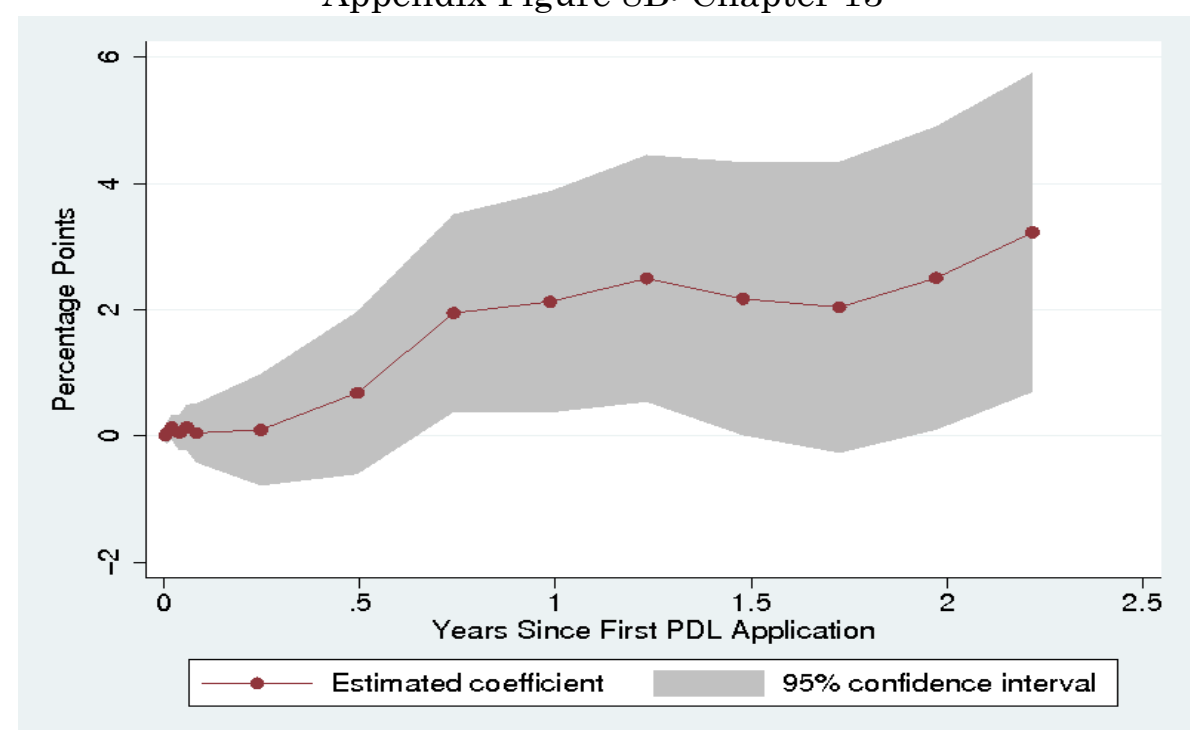Appendix Figure 7A: Chapter 7
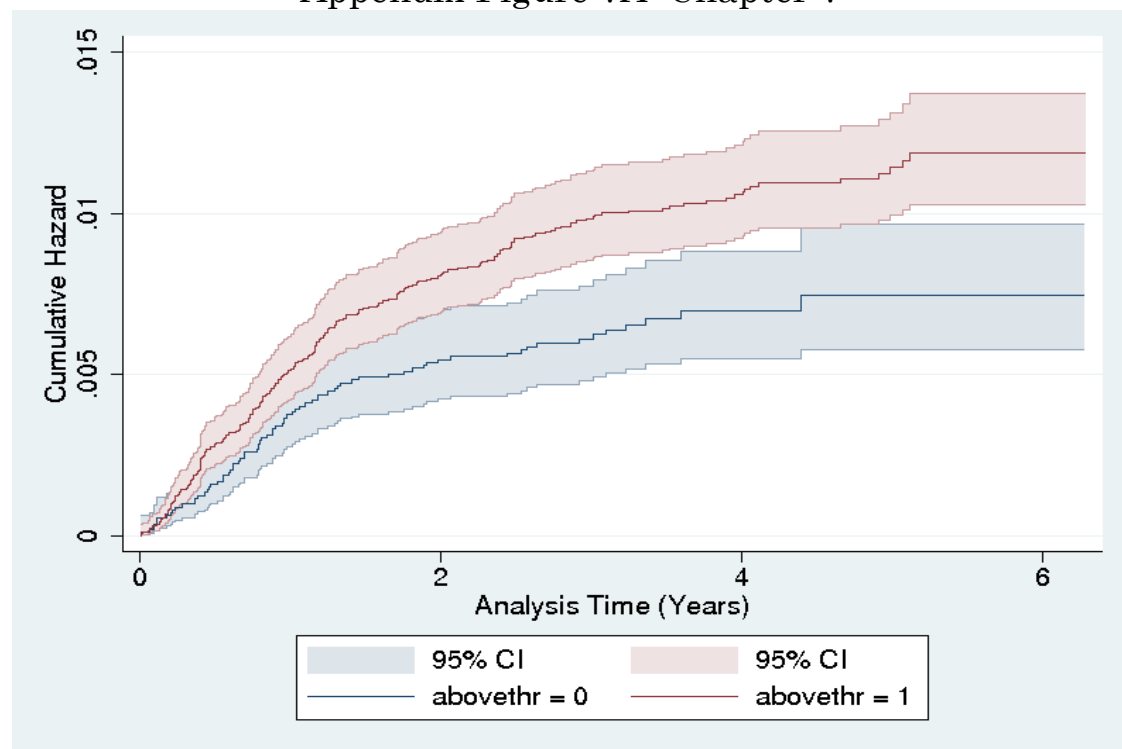
Appendix Figure 8: Long Run Effects of Payday Loans on Bankruptcy Rates
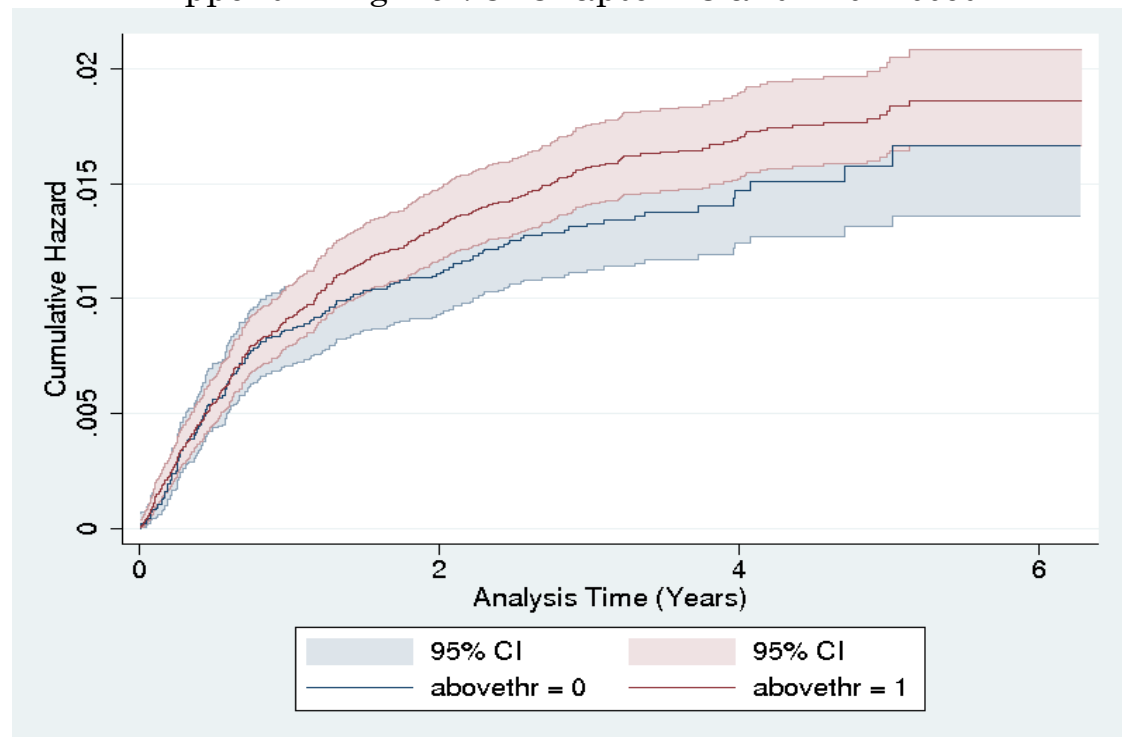Appendix Figure 8A: Chapter 7
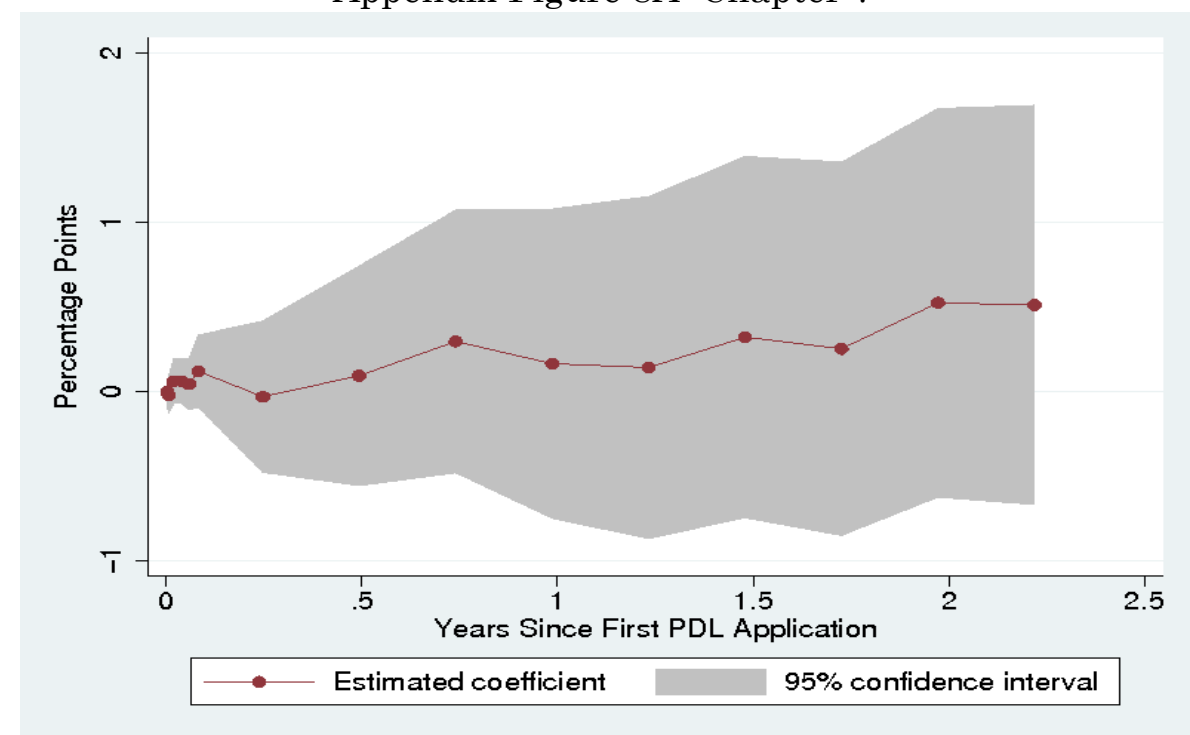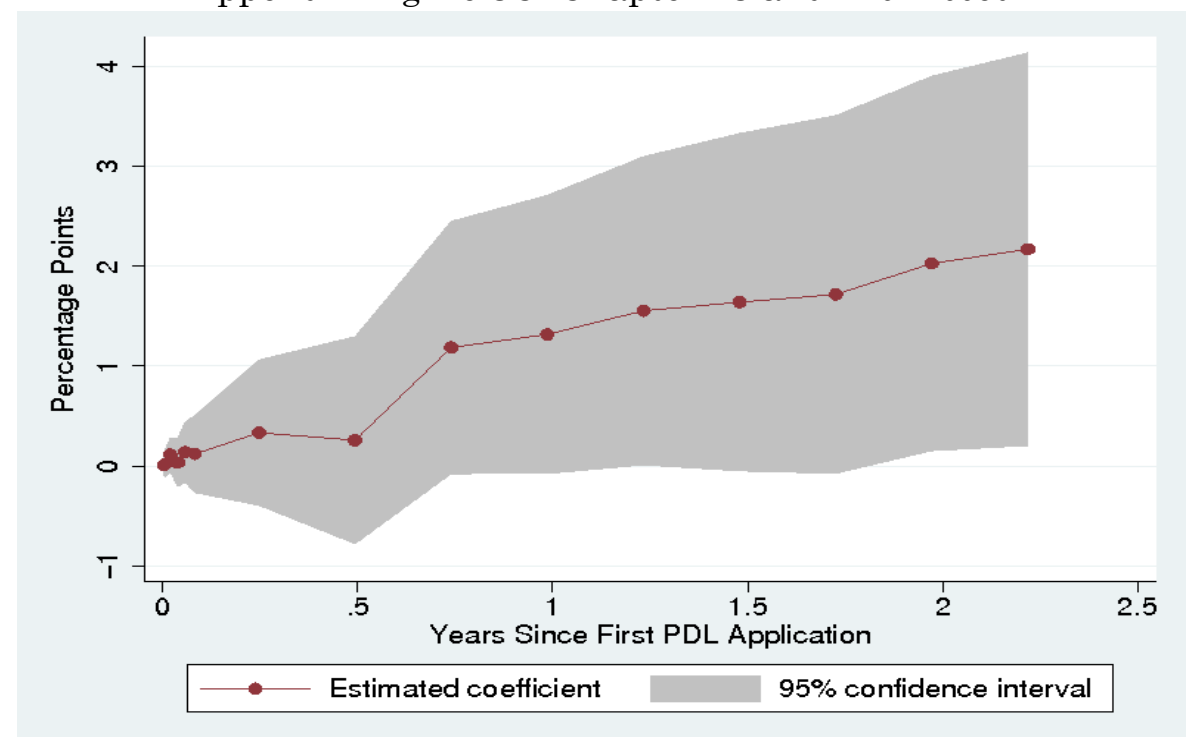

Appendix Figure 7B: Chapter 13

Appendix Figure 8B: Chapter 13

Appendix Figure 7C: Chapter 13 and Dismissed

Appendix Figure 8C: Chapter 13 and Dismissed

Notes: Appendix Figures 7A-C display the Nelson-Aalen cumulative hazards of filing for bankruptcy, respectively under Chapter 7, Chapter 13, and Chapter 13 with eventual dismissal of the case. Estimates are unconditional on covariates, for barely-approved and barely-rejected payday applicants (ie, the 3,1892 applicants within 0.5 standard deviations of the credit score threshold). Source: Authors' calculations based on data from a national payday lending company and the Texas Bankruptcy Courts' PACER Database.

Notes: Appendix Figures 8A-C plot the effect of payday loan access on bankruptcy petitions over time for Chapter 7, Chapter 13, and Chapter 13 and Dismissed, respectively. The middle line represents the reduced-form effect of First Application on Approved with a 0.5 standard deviation bandwidth around the threshold and two-standard-error bands shown in gray. The reduced-form regressions producing these estimates include quartic polynomials on both sides of the credit-score threshold, demographic controls, and dummies for month of first application. Source: Authors' calculations based on data from a national payday lending company and the electronic records from Texas Bankruptcy Courts via PACER.