The Economic Consequences of Bankruptcy Reform*

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Abstract

A generous consumer bankruptcy system provides partial insurance against financial risks faced by households, but it may also raise the cost of credit to consumers. We study this trade-off using a large reform to the U.S. bankruptcy code which raised the cost of filing for bankruptcy and reduced the benefits of filing for many consumers. We find that the reform significantly reduced aggregate bankruptcy filings, and using a combination of administrative records, proprietary market-research data, and credit reports, we estimate pass-through to borrowing costs and the consequences for the insurance value of bankruptcy. We estimate a one-percentage-point reduction in filing risk within a credit score segment translates to a 70–100 basis-point decline in the offered interest rate for unsecured credit. After the reform, a large negative financial shock—in particular, an uninsured hospitalization—is less than half as likely to be discharged through bankruptcy. Overall, we find that reducing the generosity of the bankruptcy code lowered interest rates at the cost of reducing the insurance value of the bankruptcy system, with identical shocks less likely to be insured by bankruptcy after the reform.

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1 Introduction

In a world without complete insurance contracts, the bankruptcy system provides insurance to consumers who cannot repay their debts. The insurance provided by bankruptcy comes at a cost. While the option of discharging debts through bankruptcy lowers the risk of borrowing for consumers, it may also increase the cost of borrowing by reducing their ability to credibly commit to repayment. Policymakers determining the structure of the bankruptcy system must balance its insurance value against its costs.

Facilitated by the United States' unusually generous bankruptcy system and fueled by an expansion in the unsecured credit market, the rate of consumer bankruptcy filings in the United States climbed from 0.3 percent of households annually in the early 1980s to 1.5 percent in the early 2000s (Board of Governors, 2006). This increase in bankruptcies was cited by lawmakers as reason to pass the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA). The bill implemented a number of provisions that collectively made filing for bankruptcy more onerous, more expensive, and less financially beneficial. One central provision was a "means test" which restricted the options available to high-income filers and intended to "ensure that debtors repay creditors the maximum they can afford" (House Report, 2005).

There was considerable debate over how bankruptcy reform would affect credit markets. Proponents of the bill argued that creditors would pass through higher debt-recovery rates in the form of lower interest rates.[1] Critics of the reform argued that reduced filings would not be passed-through to borrowers and would instead be captured by lenders.[2] Further, they contended that claims of abuse were overstated, and that the bill would worsen the insurance value of bankruptcy by harming filers struggling with medical expenses and job loss. Limited evidence exists, however, to adjudicate the incidence of the reform.

This paper uses changes ushered in by the reform to document the first evidence, to our knowl-

[1] Posner (March 2005) argued that "the new Act... should reduce interest rates and thus make borrowers better off." In Senate testimony, Prof. Todd Zywicki argued "We all pay for bankruptcy abuse in higher down payments, higher interest rates, and higher costs for goods and services" (House Report, 2005).

[2] In one policy forum, Crockett (2005) wrote "Warren and Tyagi present a compelling case that recent bankruptcy legislation is likely to bludgeon many middle-class families into financial submission while lining the pockets of the major lending companies."

edge, that bankruptcy reform was passed-through to interest rates. We begin by estimating the effect bankruptcy reform on aggregate bankruptcy filings, documenting a significant decline. Second, we estimate how reductions in bankruptcy filing risk affected the interest rates offered by lenders. Third, we show the means test did change the composition of filers, but that bankruptcy provided less insurance for large expense shocks (namely, an uninsured hospitalization) after the reform.

We document a large effect of the reform on the frequency of bankruptcy filings. In the short run, we estimate a net increase in filings of more than 750,000, as consumers rushed to discharge their debts before the new bankruptcy code was implemented. We estimate that, net of the excess filings ahead of implementation, there were more than one million fewer bankruptcy filings in the two years after BAPCPA was signed into law than would have occurred without the reform. In the medium run, the reform led to an approximate halving of the 12-month bankruptcy filing risk for individuals with the same credit scores.

Second, we study the relationship between bankruptcy filing risk and the cost of borrowing. We develop a simple model to predict how changes in the generosity of the bankruptcy regime (increasing the cost of filing or decreasing asset exemptions) should affect filing rates and borrowing costs. We show that changing the cost of filing or asset exemptions affects the consumer bankruptcy decision, and pass-through to interest rates depends on the amount recovered from those marginally deterred from filing.

Empirically, we document that bankruptcy reform lowered interest rates, as measured in proprietary data on credit card offers. Using event study and difference-in-differences designs, our identification strategy exploits the timing of the passage of the reform and differential exposure to the reform across the credit score distribution to estimate the effect of a decrease in filing risk on the cost of borrowing. For each one percentage point decline in the risk of filing for bankruptcy within a credit score segment, interest rate spreads fell by 70–100 basis points. Effects fall by around a third when accounting for "teaser" interest rates, but remain statistically and economically significant.

We show bankruptcy reform lowered interest rates, but the effect does not appear to be driven

by a decline in high-income filers as lawmakers intended. The means test was designed to shift filers with higher incomes from Chapter 7 to Chapter 13 by eliminating the option to file Chapter 7.[3] We document a small increase in the share of filings which are Chapter 13, though filings of both chapters decline after the reform. Counter to the intent of the law, however, we document no decline in the distribution of median ZIP Code incomes of filers. These findings suggest that increasing the cost of filing for bankruptcy—which increased from $868 to $1,309 for Chapter 7 and from $2,260 to $2,861 for Chapter 13 (Lupica, 2012)—deterred filings at least as much as the means test. The literature on targeting (e.g., Nichols and Zeckhauser, 1982; Besley and Coate, 1992; Alatas et al., 2012; Deshpande and Li, 2017) recommends higher costs for those you wish to deter from benefits. Further, lawmakers' explicitly intended to implement an "income/expense screening mechanism" (House Report, 2005). By these metrics, we find no evidence the reform succeeded in its goal of changing the self-targeting of bankruptcy filers.

The insurance value of bankruptcy depends on which shocks it is insuring; all sides agree profligate borrowing should be treated differently than "bad luck" like job loss or severe illness. Life-cycle models have demonstrated that the insurance value of bankruptcy is higher for "expense shocks," and a more generous bankruptcy code can be justified on the basis of insuring these events (Livshits et al., 2007). In order to understand how changes to the bankruptcy code affect the insurance value of bankruptcy, we need to know whether individuals experiencing the same shock, before and after the reform, access bankruptcy to discharge their debt.

We show that individuals who experience one frequently referenced shock—a medical event—are much less likely to access the insurance value of the bankruptcy option after reform. We isolate unexpected "health shocks" in a large sample of hospitalizations linked to credit reports. Using an event-study design similar to Dobkin et al. (2018a), we find uninsured hospitalizations increased the likelihood of filing for bankruptcy by 1.5 percentage points before the reform, but by just 0.4 percentage points after implementation. By contrast, the increase in the likelihood of filing is smaller for insured hospitalizations (who experience much smaller expense shocks) and

[3]Chapter 7 bankruptcy offers filers a "fresh start." All qualifying debts are discharged in exchange for their non-exempt assets. Chapter 13 bankruptcy offers filers a "reorganization." Chapter 13 filers lose no assets, but must commit to a repayment plan out of their future income.

does not change significantly after the reform. While they provide just one example and the share of overall bankruptcies caused by health shocks is small (Dobkin et al., 2018b), declining use of bankruptcy to insure otherwise uninsured health and medical expense shocks is evidence that the reform meaningfully reduced the insurance value of bankruptcy. To the degree that this generalizes to other "expense shocks," these estimates provide evidence that bankruptcies deterred by the reform were not limited to abusive filings, and increasing the costs of accessing the bankruptcy option meaningfully reduced its insurance value.

1.1 Connections to Existing Literature

This paper contributes to empirical literatures estimating the effect of the bankruptcy code on interest rates and pass-through in credit markets. This paper provides the first evidence that bankruptcy reform was passed-through to unsecured credit markets, which should be most affected by changes in the law governing when and how debt can be discharged. The increase in credit supply was predicted in an early discussion of BAPCPA by Ashcraft et al. (2007), but was not found in earlier evaluations of the reform which focused on aggregate interest rate spreads (Simkovic, 2009) or student loans (Alexandrov and Jiménez, 2017). In related work in the pre-reform environment, Gropp et al. (1997), Berkowitz and White (2004), and Severino et al. (2014) use cross-state variation to show that more-generous exemptions are associated with less readily available credit. Existing research on pass-through in credit markets emphasizes "sticky" interest rates, but typically estimates pass-through of the cost of funds (rather than changes in bankruptcy filing or default risk) (e.g., Ausubel, 1991; Calem and Mester, 1995; Stavins, 1996; Stango, 2000; Calem et al., 2006; Agarwal et al., 2017). We contribute new evidence to this literature by estimating how within-credit score changes in bankruptcy filing risk are passed-through to interest rates.

This paper contributes empirical tests of the assumptions underlying a literature that evaluates the structure of the bankruptcy system, which tends to rely on calibrated structural models. These models emphasize the trade-off between using bankruptcy to smooth consumption across *states* at the expense of higher cost of smoothing consumption over *time* (Zame, 1993; Dubey et al., 2005;

Livshits et al., 2007). Chatterjee et al. (2007) and Mitman (2016) builds on this literature (e.g., Livshits et al., 2007; Athreya, 2002, 2006) and find modest welfare benefits of bankruptcy reform. Models in this literature make two consequential assumptions which we test empirically. First, they assume perfectly competitive credit markets and full pass-through of the costs of lending to consumers (e.g., Athreya, 2002; Livshits et al., 2007; Chatterjee et al., 2007). Second, the causes of bankruptcy filing decisions are typically calibrated (e.g., Livshits et al., 2007) or abstracted away from (e.g., Mitman, 2016). We test for pass-through empirically, and directly estimate the effect of the reform on the likelihood that one shock emphasized by Livshits et al. (2007), medical events, leads to a bankruptcy filing.

This paper also contributes to a literature on the insurance role of bankruptcy. Li et al. (2011), Morgan et al. (2012), and Mitman (2016) argue that by reducing the substitutability between bankruptcy and foreclosure, the reform increased foreclosures and exacerbated the mortgage crisis. Han and Li (2011) and Albanesi and Nosal (2018) show that bankruptcy filers have better access to credit than the insolvent. Dobbie and Song (2015) and Dobbie et al. (2017) demonstrate the insurance value of bankruptcy by showing those marginally granted bankruptcy protection have improved access to credit, lower mortality, and higher earnings than those who remain insolvent. Mahoney (2015) illustrates the ways bankruptcy provides implicit high-deductible health insurance, while Dobkin et al. (2018a) demonstrate an increase in the likelihood of filing for bankruptcy following a hospitalization. We show that the reform's changes to the costs and benefits of filing for bankruptcy altered the probability individuals claim the insurance provided by the bankruptcy option.

The paper proceeds as follows. The subsequent section provides background information on bankruptcy before and after BAPCPA. Section 3 develops a simple model to guide an assessment of the costs and benefits of bankruptcy reform. Section 4 describes our data sources and sample construction. Section 5 evaluates how BAPCPA affected the number of filings, Section 6 then estimates the pass-through of this decline in bankruptcy to borrowing costs. Section 7 evaluates how the reform changed who accessed bankruptcy. Section 8 concludes.

2 Institutional Background and Conceptual Framework

In contrast to other developed countries, American consumers have historically enjoyed an exceptionally debtor-friendly bankruptcy system.[4] In particular, American consumers filing for bankruptcy have had the option to freely choose between a "fresh start" (liquidating outstanding debts through Chapter 7) and a "reorganization" of debts (repaying debts on an installment plan over several years through Chapter 13). Chapter 7 filers must forfeit all non-exempt assets in exchange for discharge of their debt, while Chapter 13 filers are allowed to keep all of their assets but must repay their debt out of future income.

Despite the potential financial benefits, consumer bankruptcy has historically been a relatively rare phenomenon in the United States. In the late 1970s, just 0.3 percent of households filed for bankruptcy in a given year. A 1978 Supreme Court decision[5] which allowed banks to export their home interest rates and evade state usury laws catalyzed the growth of unsecured borrowing in the ensuing decades (White, 2007). By 1999, the bankruptcy rate had increased to 1.5 percent, prompting creditors to lobby for a more stringent bankruptcy code.

To make their case, credit-industry lobbyists pointed to a handful of high-profile cases of "exemption shopping," where debtors moved across state lines to select the most-beneficial bankruptcy regime, as emblematic of the abuse in the bankruptcy system. The law was first drafted in 1998 and passed by Congress in 2000, but pocket-vetoed by President Clinton. The bill was reintroduced each Congress until it finally passed with broad bipartisan support in 2005. The Senate passed the bill on March 10, 2005, the House on April 14, 2005, and it was signed by President Bush on April 20, 2005. The new bankruptcy code went into effect for all bankruptcies filed on or after Monday, October 17, 2005.

BAPCPA made filing for bankruptcy less attractive in three primary ways. First, the law sought to prohibit higher-income households from filing Chapter 7. To do so, lawmakers introduced a means

[4] Italy, for instance, had no form of consumer bankruptcy until 2015, and Germany only began allowing consumer bankruptcy in 1999. Before then, consumers in those countries had few options to discharge their debts (Tabb, 2005).

[5] In *Marquette National Bank of Minneapolis v. First of Omaha Service Corporation* (439 U.S. 299 (1978)), the U.S. Supreme Court ruled that state anti-usury laws regulating interest rates are not enforceable against nationally chartered banks based in other states. The United States also adopted a new bankruptcy code in 1978, though changes were relatively minor.

test which they referred to as "the heart of the bill" (House Report, 2005). The means test added a "presumption of abuse" for filers whose income is above certain thresholds. Debtors are subject to the means test if their income from the previous six full months before filing, adjusted for family size, is more than the state median income.[6] Debtors subject to the means test are functionally prohibited from filing Chapter 7, and can only file Chapter 13 (which was also required higher repayment after BAPCPA). This created an incentive for borrowers to suppress their labor supply and earnings below the state median in order to skirt the means test and file Chapter 7 or reduce their repayment obligation under Chapter 13.[7]

Second, BAPCPA limited the benefits of filing for bankruptcy along a number of dimensions. Prior to BAPCPA, Chapter 13 filers could propose their own repayment plan and faced no incentive to offer a repayment plan more generous than the relief they would receive under Chapter 7. After BAPCPA, Chapter 13 filers are required to forfeit 100 percent of their disposable income for five years to pay down their debts.[8] The reform also limited the ability of filers to discharge some purchases and "exemption shop" for the most favorable state bankruptcy regime. Debtors who move must now wait two years before they are allowed to file under their new state's exemptions. Bankruptcy filers must wait a set number of years before they are allowed to file again. BAPCPA increased the waiting period from six years to eight years for Chapter 7 and from six months to two years for Chapter 13.

Finally, BAPCPA made the process of filing for bankruptcy much more burdensome and expensive. Bankruptcy court fees themselves increased. Bankruptcy filers are now required to take two educational courses: a credit-counseling course before filing and a financial-management course

[6] Virtually all income is included in this calculation with the notable exception of Social Security income. Those with debts that are not "primarily consumer debts" (e.g. business investments) are also exempt from the means test. Debtors can also "pass" the means test if they can demonstrate that their "disposable income" (income after allowed deductions) is less than $182.50 or $109.59, if that is enough to pay unsecured creditors more than 25 percent of the debt owed over five years.

[7] The incentive to suppress income prior to filing is relevant even if households cannot suppress it enough to get under the state median. Chapter 13 repayment plans, which are paid over the subsequent five years, are based on documented disposable income *over the prior six months*. As White (2007) points out, a reduction in monthly earnings of $1 for the six months prior to filing costs filers $6 in the short-run but reduces their repayment requirement by $60 ($1 each month over the next 60 months).

[8] Allowances for living expenses vary by metropolitan area and are largely based on the Internal Revenue Service policies for the treatment of delinquent taxpayers.

before their debt is discharged. Filing requirements increased and bankruptcy attorneys were made liable for any inaccuracies in the filing, which increased attorney costs by as much as $500 and subsequently increased the fees they charged their clients (which are not dischargeable in bankruptcy) House Report (2005). Altogether, these changes increased the mean financial cost of filing from $868 to $1,309 for Chapter 7 and from $2,260 to $2,861 for Chapter 13 (Lupica, 2012).

3 Economic Framework

We develop a simple economic framework to describe the effects of an increase in the cost of filing and decrease in exempted assets on filing rates and borrowing costs; we will analyze these effects using data from bankruptcy filings, credit reports, and the interest rates of credit card offers.

3.1 Model Set-up

There is a unit mass of ex-ante identical individuals, and the model consists of two periods. In the first period, each individual borrows b at interest rate r, so that if the debt is repaid in full in the second period, the individual repays $(1 + r) \cdot b$.[9] In the second period, each individual receives income y, drawn from distribution $f(y)$, with associated cumulative distribution function $F(y)$.

After realizing their income y, individuals can either repay their outstanding debt, or they can file for bankruptcy and keep assets up to an exemption level, e. When individuals file they must also pay cost c, which captures all relevant costs of filing (such as filing fees, legal costs, hassle costs, and stigma). To reflect the reality that the costs of filing are not dischargeable, c must be paid out of exempted assets. If realized income is low, then the individual can file for bankruptcy, which allows individuals to keep their second-period income up to e, with the remainder recovered by the creditor (partially repaying outstanding debt).

This leads to a simple decision rule: the individual will file for bankruptcy if income (net of full repayment of debt) is less than the exemption amount minus the cost of filing $(e - c)$; that is, if

[9] We treat b as exogenous throughout this simple framework. In reality, changes in the bankruptcy code should also affect the amount borrowed. We make this simplification in order to focus on the response of creditors to the change in bankruptcy filings induced by the types of reforms implemented by BAPCPA. Given the relatively short-run nature of our empirical analysis, we view this as the first-order impact of the changes to the bankruptcy code for our purposes.

$y-(1+r)b < e-c$. If the individual files for bankruptcy, then the creditor recovers $\max(0, y-e)$. We work through the case where individuals with income below c are insolvent and unable to file for bankruptcy in Appendix Section A.2. In the interest of parsimony, for the main exercise we assume $f(y)$ has no support below c.

3.2 Impact of Changes in Cost of Filing or Exemption Rule

Across the population of borrowers, the probability of filing for bankruptcy can be defined as $p = F(e+(1+r)b-c) = F(y^*)$, where y^* represents the second-period income at which a borrower is indifferent between filing and not filing. Based on this decision rule, we can calculate how the exemption level (e) and filing costs (c) affect filing and repayment behavior. We start by emphasizing how changes in the exemption level and cost of filing determine the share of individuals who choose to file.

Proposition 1. *The direct effects of changes in the exemption level or the cost of filing on the share of the population filing for bankruptcy are given by the following expressions:*

$$\begin{aligned} \partial p/\partial e &= f(y^*) > 0 \\ \partial p/\partial c &= -f(y^*) < 0 \end{aligned}$$

We are interested in the relationship between the bankruptcy code (i.e., e and c) and the cost of borrowing (r). If we are willing to assume the credit market is perfectly competitive, then we can define the equilibrium interest rate r implicitly by setting the amount recovered by lenders equal to the amount of borrowing (i.e., $R(r) = b$). To calculate the effect of changes in e and c on interest rates, we can define $R(r)$:

$$\begin{aligned} R(r) &= \int_0^{e+(1+r)b-c} (\max(0, y-e)) f(y)dy + \int_{e+(1+r)b-c}^{\infty} ((1+r)b) f(y)dy, \\ &= \underbrace{\int_e^{e+(1+r)b-c} (y-e) f(y)dy}_{\text{Recovered from bankruptcy filers}} + \underbrace{\int_{e+(1+r)b-c}^{\infty} b(1+r) f(y)dy}_{\text{Recovered from non-filers}} \end{aligned}$$

Using this expression, we can then solve for the effect of a reform that changes either the exemption level or the cost of filing on the interest rate by implicitly differentiating the equation $R(r) = b$. This produces the following proposition.

Proposition 2. *Under perfect competition, the effect of a change in the exemption level or a change in filing costs on interest rates is given by:*

$$\begin{aligned} dr/de &= \frac{cf(y^*) + (F(y^*) - F(e))}{-bcf(y^*) + b(1-p)}, \\ dr/dc &= \frac{-cf(y^*)}{-bcf(y^*) + b(1-p)}. \end{aligned}$$

See Appendix Section A.1 for a derivation.

Focusing first on dr/de, the numerator in this expression has two parts. The first is the additional amount of debt discharged rather than repaid by marginal filers (who are induced to file due to an increase in the exemption level). Without filings costs (i.e., $c = 0$), this term goes to zero as the only barrier to filing for bankruptcy is the income forfeited above the exemption level. In this case, the marginal filers were already repaying virtually all of their debts because the exemption level was binding, making them close to indifferent to filing. The second term represents the additional amount discharged rather than paid back to creditors due to changes in repayment behavior for *infra-marginal* filers. If this group is small (for example, because not many filers lie in the mass between e and y^*), then the second term becomes less important. The expression for dr/dc also features $cf(y^*)$ in the numerator but with the opposite sign. Naturally, increases in filing costs and exemptions have opposite effects on the decision to file. Changes in the cost of filing have no effect on the amount recovered by creditors for infra-marginal filers.

Both expressions have the same denominator, which has an ambiguous sign due to the negative $-bcf(y^*)$ term. This is surprising given one would expect a less generous bankruptcy code to unambiguously lead to fewer filings and, in turn, lower interest rates. However, there is an additional indirect effect which arises from the equilibrium condition because an increase in c and e changes the decision rule (with fewer individuals filing for bankruptcy); r increases until the share of individuals

filing p increases to restore $R(r) = b$. The sign is determined by the share of non-filers $(1-p)$ who repay in full against the additional repayment c from marginal filers. This ambiguity goes to zero in the absence of filing costs.

We can develop the model further to guide the empirical exercises which follow. In particular, we are interested in estimating the reform-induced change in the probability of filing (dp/de and dp/dc, collectively), and the pass-through of this change in the probability of filing to interest rates, $\frac{dr/de}{dp/de}$ and $\frac{dr/dc}{dp/dc}$. Plugging in total derivatives for dp/de and dp/dc (see Appendix Section A.1 for derivations) and from Proposition 2, we can express pass-through using the following expression:

$$\frac{dr/dc}{dp/dc} = \frac{c/b}{1-p}.$$

The pass-through effect of changes to asset exemptions, $\frac{dr/de}{dp/de}$, simplifies to the same expression if we are willing to assume $F(e) \approx F(y^*)$.[10]

In words, this expression states that a bankruptcy reform that decreases bankruptcies (either by reducing exemptions or raising costs) will decrease the interest rate and the magnitude of the decrease in the interest rates will be increasing in the change in the probability of filing. The ratio is scaled by c/b, which is the share of the outstanding debt that is paid when the marginal filer is deterred from filing. This suggests that for bankruptcy reform to have a meaningful effect on interest rates, it must be the case that c/b is not small. This requires that marginal filers repay a meaningful share of their debts when they are deterred from filing. Intuitively, this expression shows that the pass-through of bankruptcy reform to interest rates requires that marginal filers must face substantial (financial, hassle, or stigma) costs of filing.[11]

We can consider an extended version of the model with two types of borrowers that are differentially affected by the reform. If lending markets are segmented and one group is more affected by the change in e or c, then as long as the other terms on the right-hand side of expression are

[10] The full expression is $\frac{dr/de}{dp/de} = \frac{cf(y^*)+F(y^*)-F(e)}{bf(y^*)(1-F(e))}$. Assuming $F(e) \approx F(y^*)$ is an innocuous assumption when the amount to be repaid $(1+r)\cdot b \approx c$, that is, the amount to be repaid is close to the cost of filing.

[11] There is suggestive evidence that the collective cost of filing for bankruptcy is high. White (1998), for instance, estimated that 15 percent of households could benefit from filing for bankruptcy at a time when just over one percent did. Indarte (2018) finds evidence in support of a weak strategic motive and large costs of filing for bankruptcy.

similar across the two groups, the model predicts this group will experience a larger change in interest rates. We use this intuition to motivate our empirical strategy to estimate pass-through in Section 6 and, specifically, the regression in Equation 3, which uses variation in dp/dc in a given credit score segment to estimate $\frac{dr/dc}{dp/dc}$. The model predicts that the credit score segments for which the probability of filing changes the most will be the groups with the greatest expected change in interest rates.

This model makes a number of simplifying assumptions, including perfect competition. With imperfect pass-through, the same effect of reform on filings will lead to smaller change in interest rates, since some of the incidence of the reform will reduce firm profits. We also assume individuals make rational bankruptcy filing decisions with full information. In addition to appearing through the cost of filing c, a relaxation of this assumption could allow borrowers to under-estimate the financial benefit of filing. This would result in broadly similar expressions in the ultimate effect on borrowing costs (see, e.g., Finkelstein and Notowidigdo (2018) for a framework which incorporates this type of misperception).

4 Data

Our analysis relies on three main data sets: legal dockets for all consumer bankruptcies in 78 (of 94) United States bankruptcy courts; Mintel Comperemedia data on credit card offers made to more than 2,000 consumers each month; and hospital-discharge records for over half a million individuals merged with a ten-year panel of their credit reports.

Data on consumer bankruptcy filings come from the Public Access to Court Electronic Records (PACER) system. The data include more than three-million filings from 78 bankruptcy courts during our sample period of 2004 through 2007, roughly 86 percent of the total filings during that period. We limit the post-period to before 2008 throughout our analysis in order to avoid the effect of the Great Recession on filings and the credit market. We validate the data for each district by comparing the filings in the PACER records with the official totals published by the Administrative

Office of the United States Courts (AOUSC).[12] Appendix Table A1 details the sample coverage by chapter and quarter-year and Appendix Section B.1 provides more details on the sample.

To study pass-through to credit-market pricing, we use Mintel Comperemedia (Mintel) data on credit card offers.[13] Mintel collects credit card offers from a representative sample of households in the United States, who are paid to send all direct-mail credit card offers they receive to Mintel.[14] The data includes demographic information on the households (age of head of households, household composition), details on the credit card offers (type of credit, interest rates, fees), and some limited credit measures (importantly, these include the same credit score observed in the CCP). Data is collected monthly and includes approximately 350,000 credit card offers (7,000 per month) and 100,000 individual-month observations (2,200 per month). Appendix Table A3 provides summary statistics on offers and Appendix Section B.2 provides more details on the sample.

To study the insurance value of the bankruptcy option, we analyze administrative hospital-discharge records from the California Office of Statewide Health Planning and Development for the universe of uninsured hospitalizations (and approximately 20 percent of individuals hospitalized with insurance) between 2003 and 2007. Our sample links hospitalized individuals to their panel of credit reports spanning the years 2002 to 2011. To emphasize unexpected hospitalizations, we restrict the sample to individuals ages 25 to 64 who are hospitalized for non-pregnancy-related reasons and have not previously been to the hospital in the last three years. Appendix Table A7 provides pre-hospitalization summary statistics and Appendix Section B.3 provides more details on the sample.

[12] The sample does not include the universe of bankruptcies because 13 districts did not grant fee waivers, and we drop 3 districts from the sample because the bankruptcies in the data do not match the AOUSC statistics.

[13] We do not observe bankruptcy filings in the Mintel data, so we additionally use the Consumer Financial Protection Bureau Consumer Credit Panel (CCP) to estimate the bankruptcy filing risk for each credit score segment, combining public-record snapshots with credit score archives to estimate prospective filing probabilities.

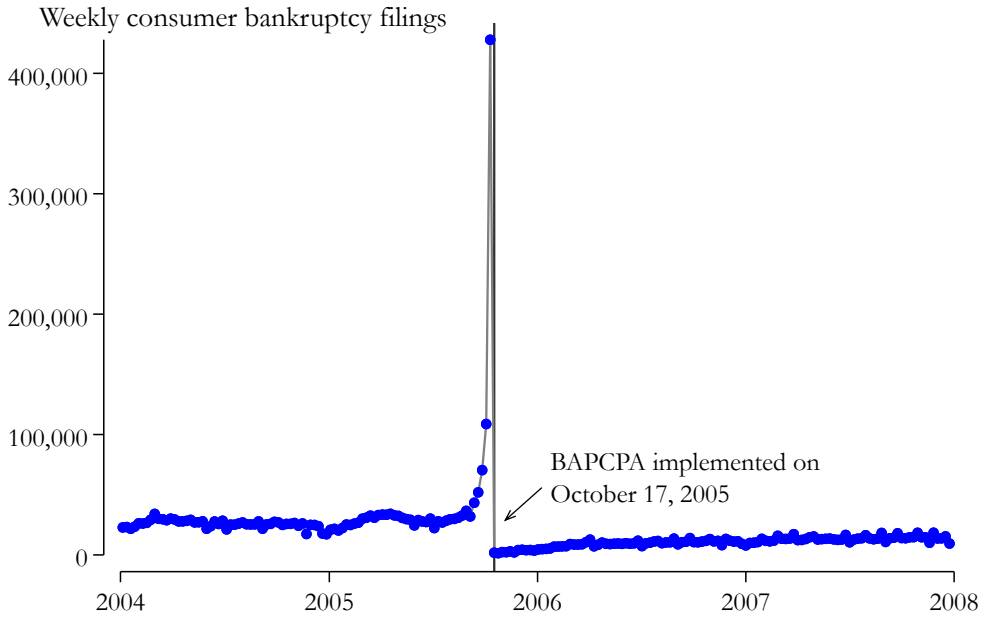
[14] The sample is representative of United States credit card holders. Roughly 75 percent of American households hold at least one credit card according to Fulford and Schuh (2015).

5 Effect of BAPCPA on Filings in the Short and Medium Run

5.1 Effect on Total Filings

Figure 1 plots the total number of consumer bankruptcy filings in the PACER sample by week from January 2004 through December 2007. The most striking feature of Figure 1 is the dramatic rush to file after BAPCPA was signed but before the bankruptcy code was changed. In the five weeks before the law was implemented, from September 12th through October 16th, the filing rate increased dramatically. In the final week before the implementation of the law, more than 400,000 households declared bankruptcy, roughly 13 times the typical weekly caseload.

Figure 1: Time-Series of Bankruptcy Filings



Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007. Each dot in the figure represents the total count of filings for that week.

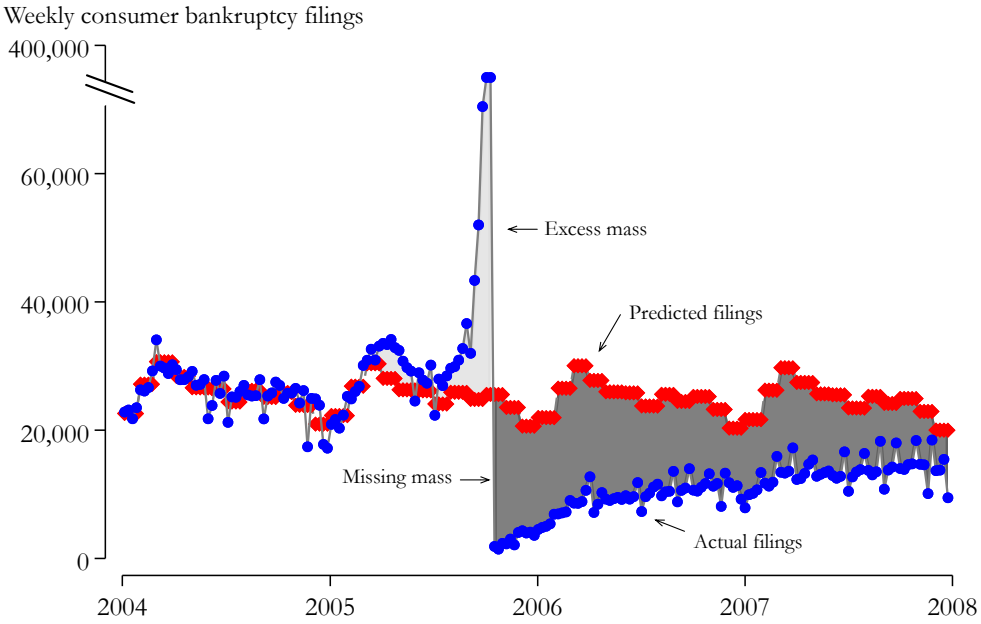
To quantify the number of excess filings before implementation and to test whether, on net, the law led to a reduction in bankruptcies, we adapt "excess mass" methods from the tax-notch literature (e.g., Chetty et al., 2011; Kleven, 2016) to generate a counterfactual time-series in the absence of the changes to the bankruptcy code. We fit the following regression to the weekly filing

count in the period before BAPCPA was passed by the Senate (March 10, 2005).

$$Filings_t = \gamma t + \tau_m + \varepsilon_t, \tag{1}$$

where $Filings_t$ are nationwide filings in week t, t is a linear time trend, and τ_m are calendar-month fixed effects. In Appendix Table A2, we additionally control for the national unemployment rate and show robustness to alternatively fitting the counterfactual time-series through the passage of the bill in the House (April 14, 2005) and its signing into law (April 20, 2005). The results are qualitatively similar across the specifications.

Figure 2: Excess and Missing Mass of Bankruptcy Filings



Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007. The total count of filings for each week is plotted against the predicted number of filings for the week. The predicted number of filings are the result of estimating equation 1 on the total count of filings from January 2004 through the day that BAPCPA was passed by the Senate (March 10, 2005). The two data points before implementation of BAPCPA are censored in this figure: there were 108,745 filings during the week that began on October 3, 2005 and 427,947 filings during the week that began on October 10, 2005.

We use Equation 1 to predict the counterfactual number of filings each week for the full sample period and calculate the sum of the difference between the predicted and actual filings for each week. Figure 2 presents this exercise by plotting the time-series of bankruptcy filings against the estimated counterfactual. As expected, the predicted filings closely match actual filings before the

passage of the law. Actual filings diverge from the predicted time-series in September of 2005 in advance of the pre-BAPCPA filing deadline in mid-October. An excess of more than 750,000 households filed for bankruptcy between March 10, 2005 and October 17, 2005 relative to the counterfactual time-series. To calculate the net effect of BAPCPA on filings, we account for the filings which were intertemporally substituted before the implementation of the law.

Table 1: Difference between Realized and Predicted Filings

		(1)	(2)	(3)
Weeks relative to implementation	Index Date	Predicted Filings	Realized Difference	Cumulative Net Difference
-30	March 21, 2005			
0	October 17, 2005	911,656	762,192	762,192
30	May 15, 2006	879,729	-656,283	105,909
60	December 11, 2006	857,796	-481,442	-375,533
90	July 9, 2007	889,823	-445,607	-821,140
114	December 24, 2007	659,619	-256,539	-1,077,679

Notes: This table presents a running sum of the net change in filings due to BAPCPA: the difference between actual bankruptcies observed each week and the number of bankruptcies that would have been predicted based on the counterfactual by estimating equation 1 from the beginning of the sample until BAPCPA was approved by the Senate in March of 2005. Index date for each row refers to the end of the 30 weeks period presented. The overall numbers are inflated to reflect the nation as a whole, based on our PACER sample coverage (see Appendix Table A1).

Table 1 presents the difference between the predicted and the realized number of filings from the bill's passage in the Senate through the end of 2007. Column 1 presents the predicted number of filings for the 30 week period ending in the index date. Column 2 represents the difference between the realized and predicted filings for the same period. Column 3 presents the cumulative net difference in filings from the counterfactual time-series.

The more than 750,000 excess filings suggest debtors anticipated the changes to the bankruptcy code to be significant. Due to the mandated waiting period before filing (6 years for Chapter 7 before BAPCPA, 8 years after), individuals who file for bankruptcy the benefits from filing today must exceed the loss of the option to file at another point in the future. For debtors who rushed to file before the new bankruptcy code went into effect, we can infer that the benefit from filing for bankruptcy under the previous system exceeded the continuation value of the bankruptcy option under the new system.

On net, the decline in filings after implementation exceeds the pre-implementation increase in filings by July of 2006. The steady decline over the subsequent year and a half suggests intertemporal substitution of filings before the implementation of BAPCPA was quickly overwhelmed by the decline in filings post-implementation. Filings remained persistently lower under the new bankruptcy regime. At the end of 2007, 114 weeks after the implementation of BAPCPA, 1,077,679 filings were deterred.[15]

5.2 Effect on Chapter of Filing

Bankruptcy reform clearly decreased the overall number of filings, but the introduction of the means test also sought to shift more filings from "fresh start" bankruptcies (Chapter 7) to repayment-plan bankruptcies (Chapter 13). Appendix Figure A1 plots the time-series for total filings separately for Chapter 7 and Chapter 13. The time-series patterns are not markedly different across the two chapters, as we might expect if the primary impact of the reform was a means-test-driven shift in the chapter of filings; however, the decline in filings is larger among Chapter 7 filings. The share of filings that were Chapter 13 remained persistently higher after the reform, as is clear from Appendix Figure A2. Appendix Table A2 estimates the net change in overall filings through 2007 by chapter. Through 2007, both Chapter 7 and Chapter 13 filings declined substantially. This result could be consistent with the law's intention to shift high-income filers to Chapter 13, which we will examine directly in Section 7.

6 Effects of Bankruptcy Filing Risk on Interest Rates

In determining interest rates, creditors must predict the expected repayment rates on the credit offered. A key input for determining repayment rates is the probability an individual will discharge their debt through bankruptcy (either reducing repayment to zero through Chapter 7 or repaying

[15] To calculate a confidence interval for the estimated net change in filings, we implement the bootstrapping procedure described by Chetty et al. (2011) to obtain a 95-percent confidence interval with an upper bound of 1,125,242 and a lower bound of 1,034,709. Since we observe the full sample of bankruptcy filings in our time-series, the standard errors reflect error due to misspecification of Equation 1 rather than sampling error. In our setting, it is not literally the exact number but we validate the PACER sample using the administrative totals as described in Appendix Section B.1.

a limited amount through Chapter 13). As we showed in Section 3, by decreasing the probability a borrower files for bankruptcy, reducing the generosity of the bankruptcy option should increase prospective repayment rates, and thus decrease the cost of lending. We expect this decrease in the cost of lending to be passed-through to borrowers in the form of lower interest rates. At the same time, reducing the generosity of the bankruptcy option increases the risk of borrowing for consumers. In order to understand the degree to which this increased risk is offset by lower prices, we estimate the pass-through of the decrease in filings induced by reform to the interest rates of credit card offers.

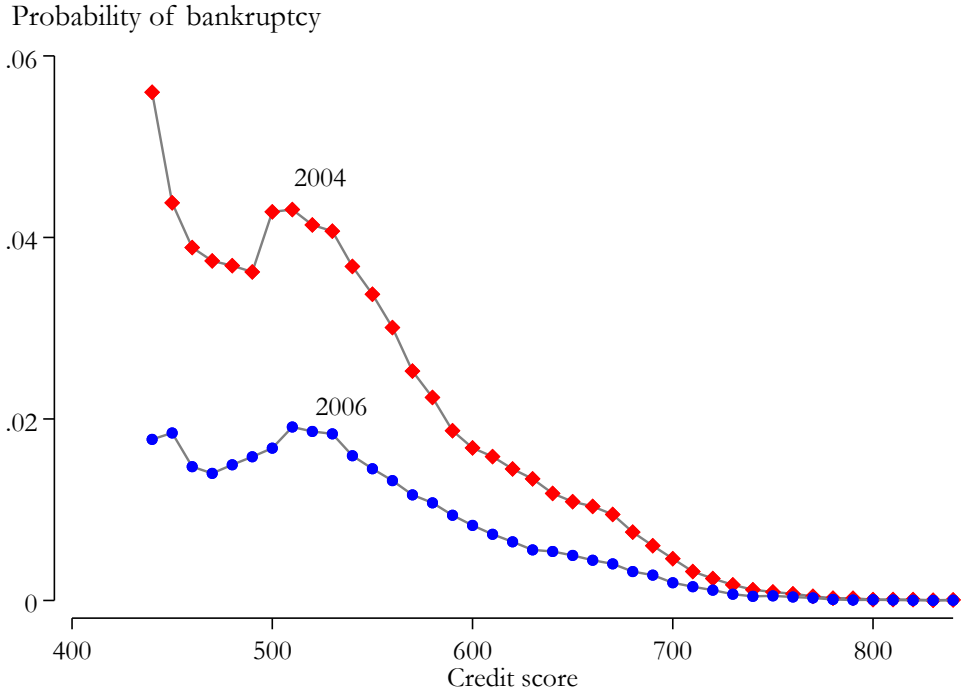
We focus on the unsecured credit market for three reasons. First, unsecured credit (primarily credit cards) is the most common method of borrowing in the United States. Roughly 75 percent of Americans have at least one credit card (65 percent of whom carry a balance) and total revolving debt was over $800 billion for most of our sample period (Fulford and Schuh, 2015). Second, because unsecured debt is not collateralized, it is the most likely to be discharged in bankruptcy and thus the area of credit supply most responsive to changes in the bankruptcy code. Third, it can be difficult to measure the prices at which credit is supplied and the Mintel data allow us to observe offers for a large number of households and the prices they face to borrow.[16]

Our empirical approach to estimate pass-through is motivated by the observation that the bankruptcy risk of a potential borrower varies substantially by credit score. This is evident in Figure 3, which plots the probability a borrower in a credit score segment (defined as an increment of 10 credit score points) files for bankruptcy over the next 12 months. While the within-credit-score-segment risk of filing for bankruptcy jumped down after the new bankruptcy code was implemented, credit scores are calculated using the same set of risk factors throughout the sample period.[17] We are interested in identifying the change in borrowing costs (dr) for a given change in bankruptcy filing risk (dp). In the previous section, we used a counterfactual time-series of bankruptcy filings to estimate the net effect of bankruptcy reform on the number of filings. For this exercise, we

[16] For instance, credit bureau data do not include prices. Other datasets, such as the National Mortgage Database, offer information on prices conditional on loan take-up.

[17] We use the same credit score throughout the period and there were no major changes to the standard commercially available credit scoring formulas over this sample period.

Figure 3: Probability of Bankruptcy



Notes: The sample are individuals in the CFPB CCP. This figure presents the share of individuals observed at two points in time—June 2004 and June 2006—who file for bankruptcy within the next 12 months. Each point represents the filing rate for a 10-point credit score segment.

are interested in how *prospective* bankruptcy filing risk affects the cost of borrowing. For this reason, and because we only observe bankruptcy filings by credit score quarterly in the consumer credit panel (we do not observe credit scores for bankruptcy filers in the PACER data), we use the probability an individual in a given credit score segment files for bankruptcy over the next 12 months as our measure of filing risk.

To parameterize the change in the probability of filing for bankruptcy, we define the difference between the post-BAPCPA filing probability and the pre-BAPCPA filing probability, δ_b, for each credit score segment. Those most at risk of filing for bankruptcy before the reform, mainly subprime borrowers, experienced the largest declines in filing. We define the filing probability as the share of individuals within a credit score segment who file for bankruptcy over the next 12 months. We choose June 2004 through May 2005 for the pre-period and June 2006 to May 2007 for the post-period to avoid the rush to file and missing mass after implementation. Appendix Figure A3

demonstrates the stability of the filing risk by credit score both before and after the reform, with the large jump evident in Figure 3 separating the two. While this is a convenient parameterization of the comparative static of interest (i.e., $\frac{dr/dp}{dp/dc}$), it is not strictly necessary for the exercise. We present additional regressions in Appendix Table A6 using only the pre-BAPCPA risk of filing for bankruptcy in lieu of the difference. As expected, the results are consistent with estimates using the change in filing probability.

This empirical strategy involves a comparison of changes in the interest rates offered to credit score segments that experienced large declines in bankruptcy filing risk to the interest rates offered to segments for which bankruptcy filing risk did not meaningfully change. In equilibrium, we would expect any changes to the bankruptcy code and interest rates to also affect borrowing behavior. Our analysis focuses on short-run interest rate responses to changes in bankruptcy filing risk. We expect offered interest rates to respond immediately to anticipated changes in bankruptcy filing probability, while any feedback effect of endogenous borrowing responses may be slower moving. Therefore, we are particularly interested in whether there exists a break in the evolution of interest rate offers when BAPCPA was signed into law. We focus on the timing of passage (rather than implementation) for this portion of the analysis because the bankruptcy code (both before and after reform) considers debts incurred in the months just before filing as non-dischargeable; therefore, creditors could safely assume new lines of credit opened between passage and implementation would not be discharged before the new bankruptcy code took effect.

The Mintel data is a repeated cross-section and the level of observation is a credit card offer. In our main specifications, we include lender fixed effects to absorb differences across lenders, credit score segment fixed effects to absorb differences across credit score segments unrelated to changes in bankruptcy filing probability, and fixed effects for the characteristics of the offer (card category and application type). Our identification assumption is that, absent BAPCPA and conditional on these controls, the pre-period differences in offered interest rates would have evolved along parallel trends. The assumption would be violated if, for example, credit score segments that experienced larger declines in bankruptcy filing probability also experienced larger changes in interest rate offers

for reasons other than those controlled for in Equation 2. Given the subprime credit expansion in the mortgage market over this time period, one might be reasonably worried about differential time trends. We address this concern by showing that estimates are robust to the inclusion of subprime (credit score 620 or below) and prime-specific time trends.

The estimating equation for the event study is

$$y_{ijt} = \beta_0 \delta_b + \sum_{t=2004m1}^{t=2007m12} \lambda_t (\delta_b * \tau_t) + \nu_j + \chi_i + \phi_b + \varepsilon_{ijt}. \quad (2)$$

The dependent variable y_{ijt} is the interest rate of offer i for credit score segment j in month-year t. δ_b is the "treatment" (difference in propensity to file before and after passage of BAPCPA) and τ_t, ν_j, χ_i, and ϕ_b are fixed effects for each month and year combination, lender, credit score segment, and other offer features (i.e., card category, application type, and state of residence) respectively. We two-way cluster standard errors by credit score segment and lender.

We examine two interest rate outcomes. The first is the regular annual percentage rate (APR). The second is the adjusted APR, which adjusts for whether the credit card offer has an introductory "teaser" rate. To adjust for introductory rates, we follow Gross et al. (2016) and take a weighted average of the introductory interest rate and the regular interest rate.[18] In each case, we use the rate spread to adjust for changes to the underlying prime rate.[19] Appendix Figure A4 shows the time-series of the average interest rate offered, split by prime and subprime and adjustment for the prime rate. We weight all credit card offers using weights intended to represent the overall mail volume of the campaign, which allows us to estimate effects representative of the credit card market as a whole.[20]

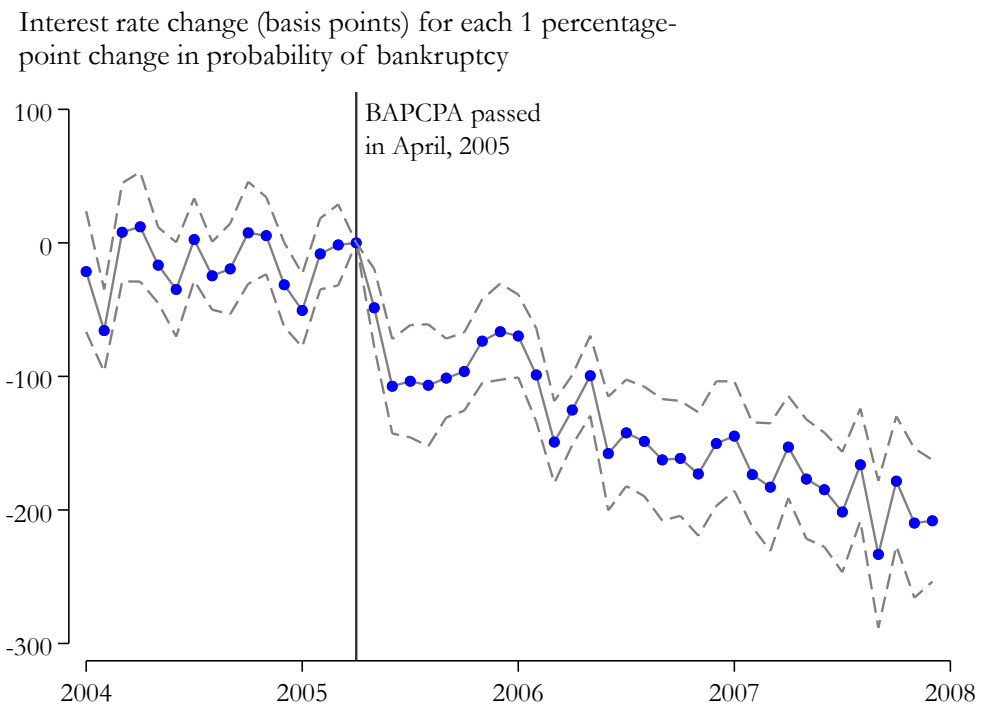
Figure 4 plots the coefficients of interest (λ_t for each month t) for the event-study estimates with the regular APR spread as the dependent variable. By allowing the λ_t's to evolve flexibly over

[18] The weighted average uses the minimum of the number of months of the introductory offer and 12 months over 12 months as the weight on the introductory rate and one minus this weight for the weight on the regular APR.

[19] Results are robust to using the interest rates (both offered and adjusted) instead of the rate spread. See Appendix Table A5 for results unadjusted for the prime rate.

[20] Mail volume represents the effective weight on each mail piece. For instance, if you add up all of the mail volume weights in the full Mintel data for Chase Freedom cards in a given month, they should equal the total credit card mailings for Chase Freedom in that month nationwide. In practice, the weights do not meaningfully affect the coefficients.

Figure 4: Effect of Decline in Filing Probability on Offered Interest Rates



Notes: The sample is credit card offers made between January 2004 and December 2007 included in the Mintel data. The points represent estimates of the λ_t's in equation 2. The dashed lines provide 95% confidence intervals for each point. The dependent variable is the rate spread for regular offered interest rate.

time, the regression in Equation 2 allows us to assess the assumption that interest rate offers were evolving along parallel trends before the passage of BAPCPA. Further, by refraining from imposing any ex-ante restrictions on when interest rates should change, we can use the time pattern gauge whether any changes in interest rates appear related to the passage of bankruptcy reform.

The effect of the anticipated decline in bankruptcy filing risk on interest rates is apparent in Figure 4. While interest rates evolved similarly for the credit score segments affected and unaffected by the reform throughout the pre-period, we can observe a sharp drop in the λ_t's following the passage of BAPCPA in April 2005. The decline in interest rates among the credit score segments who experience a decline in the probability of filing for bankruptcy is stark and persistent—the interest rate spread drops by approximately 100 basis points upon passage of BAPCPA and remains below the pre-period level through the post-period.

Motivated by the pattern in Figure 4, we specify a simple difference-in-difference regression to

quantify $\frac{dr/dp}{dp/dc}$. Specifically, we estimate the change in offered interest rates for a one percentage point decline in the 12-month probability of filing for bankruptcy:

$$y_{ijt} = \beta_0 \delta_b + \beta_1 \delta_b \times \text{post} + \tau_t + \nu_j + \chi_i + \phi_b + \varepsilon_{ijt}, \tag{3}$$

where again δ_b is the difference in the probability of filing before and after the passage of BAPCPA and ν_j, χ_i, and ϕ_b are indicators for lender, offer features, and credit score segment. In lieu of the month-year indicators interacted with δ_b, we simply interact δ_b with a "post" indicator for the offer coming after the Senate passage of BAPCPA. Offers are weighted by mail volume and standard errors are clustered by credit score segment and lender. Table 3 shows the stability of coefficients with the incremental inclusion of each of the above controls.

Table 2: Pass-through of Change in Bankruptcy Filing Probability to Interest Rates

	(1)	(2)	(3)	(4)
Dependent variable:	Regular Interest Rate		Adjusted Interest Rate	
Post-BAPCPA $\times\delta_b$	-107.1	-73.6	-56.7	-42.6
	(11.8)	(15.3)	(12.1)	(16.2)
Time Trends $\times\mathbb{1}\{\text{Subprime}\}$		✓		✓
N	390,501	390,501	390,501	390,501

Notes: The sample is credit card offers made to households from January 2004 through December 2007. All columns report effects based on OLS estimates of equation 3. The outcome variables are the interest rates on credit card offers, adjusted for the prime rate. Standard errors (clustered by the interaction of lender and credit score) are in parentheses. Offers are weighted by the mail volume of the campaign. All coefficients are significant at the 1 percent level.

Table 2 presents the coefficients of interest, β_1, from Equation 3. The offered interest rate spread declines by 107 basis points for each percentage point decline in bankruptcy filing probability without subprime-specific time trends, and 74 basis points with their inclusion. The adjusted interest rate spread falls by 56 and 43 basis points. Borrowers who were in a credit score segment whose bankruptcy risk fell by two percentage points (a relatively common decline observed in Figure 3) received interest rate savings of between 80 and 214 basis points, depending on specification and adjustment for introductory rates. The average regular APR in the pre-period for these groups was

around 15 percent, indicating the approximately 50% decline in bankruptcy filing rate translated to a 6-13 percent decline in the interest rates faced.

Table 3: Pass-through to Interest Rates (Robustness)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:				Regular Interest Rate			
Post-BAPCPA $\times\delta_b$	-93.98	-115.2	-101.7	-96.95	-106.9	-107.1	-73.6
	(12.3)	(13.5)	(12.3)	(12.3)	(11.8)	(11.8)	(15.3)
Dependent variable:				Adjusted Interest Rate			
Post-BAPCPA $\times\delta_b$	-18.4	-77.5	-68.9	-55.8	-56.6	-56.7	-42.6
	(13.6)	(13.6)	(13.2)	(12.2)	(12.1)	(12.1)	(16.2)
Lender FE		✓	✓	✓	✓	✓	✓
Score Bin			✓	✓	✓	✓	✓
Card Category				✓	✓	✓	✓
Application Type					✓	✓	✓
State FE						✓	✓
Time Trends $\times\mathbb{1}\{\text{Subprime}\}$							✓
N	391,279	391,279	391,279	391,279	391,096	390,501	390,501

Notes: The sample is credit card offers made to households from January 2004 through December 2007. All columns report effects based on OLS estimates of equation 3. The outcome variables are the interest rates on credit card offers, adjusted for the prime rate. Standard errors (clustered by the interaction of lender and credit score) are in parentheses. Offers are weighted by the mail volume of the campaign. The coefficients of interest (Post-BAPCPA $\times\delta_b$) are significant at the 1 percent level for all specifications with the lone exception of column 1 for the adjusted interest rate.

The differences between the results for the regular interest rate and the adjusted interest rate are notable. Ru and Schoar (2016) show that financially less sophisticated households are more likely to be offered back-loaded interest rates and introductory teaser rates. *A priori*, one might have been concerned that, to the degree that high bankruptcy risk credit score segments are likely to be less financially savvy, the decline in adjusted interest rates may be driven by an expansion of teaser rate offers. In contrast, it appears that the effect is driven by decreases in the regular interest rate.

While we show that declines in the risk of bankruptcy filing were passed-through to borrowers in the form of lower interest rates, the benefits to consumers will depend on their ability to take advantage of these lower interest rates. There is some reason to be measured in our expectations of the size of this benefit to consumers. Stango and Zinman (2013) and Woodward and Hall (2012) document substantial dispersion in borrowing costs that appear to be driven by under-shopping.

Similarly, Gathergood et al. (2017) document consumers tend to repay their credit card debt across different cards using a "balance-matching" heuristic rather than minimizing borrowing costs. Further, our sample period pre-dates the CARD Act which lowered borrowing costs for consumers by regulating fees and the presentation of offers (Agarwal et al., 2014). Unsecured borrowing far exceeds the amount predicted even by models including hyperbolic discounting (Angeletos et al., 2001), and it remains an open question whether credit is over- or under-supplied (Zinman, 2014). Nevertheless, as long as consumers borrow using unsecured credit, the decrease in interest rates as a result of BAPCPA are likely to have provided considerable savings to borrowers.

7 Effects of BAPCPA on Targeting and the Insurance Value of Bankruptcy

The previous section documents how a decrease in bankruptcy filings passed-through to lower interest rates. This benefit to borrowers came from worsening the value of the bankruptcy option. How we weigh these impacts depends on *which* potential bankruptcy filers were deterred. Bankruptcy reform had the explicit goal of deterring "abusive" filings from higher income filers who could repay. In this section, we evaluate whether the means test was successful at shifting the distribution of filers away from lower insurance value bankruptcy filings, and estimate the effect of the reform on the likelihood that a negative financial shock is insured by bankruptcy.

7.1 Characteristics of Bankruptcy Filers

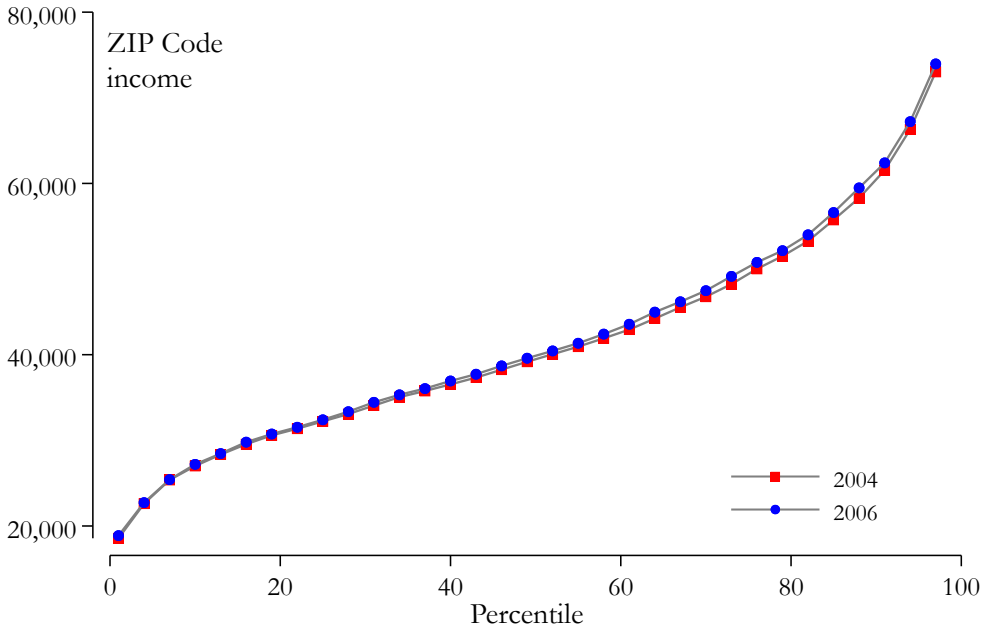
A key goal of bankruptcy reform was to deter high income filers from accessing bankruptcy relief "opportunistically"; lawmakers referenced the income-based means test as the "heart of the bill" House Report (2005). By excluding households with income above the state median from the option to liquidate their debts, the law intended to target the bankruptcy code's most generous provisions to lower-income filers. If the means test was an important force altering the composition of filers, we would expect to see the income of the average filer decrease.

While much attention has been given to the means test, the reform's collective impact on the composition of filers is ambiguous *a priori*. BAPCPA also made a number of additional changes to

the bankruptcy filing process which collectively increased both the hassle costs of filing (through mandated credit counseling and financial management courses) and the liquidity requirements to file (through increased filing and attorney fees). The increased liquidity requirements to file are most likely to deter lower-income filers. The effect of hassle costs on the composition of filers is ambiguous, and depends on both filers' opportunity cost of time and their ability to navigate the requirements or to pay an attorney to help them do so.

The overall impact of the reform on the income of filers will depend on the relative deterrent effects of these provisions across the income distribution. A cursory reading of the decline in filings, and the decline in Chapter 7 filings in particular, suggests the means test may have been effective in achieving its stated goals of deterring higher-income filers. This interpretation is belied by a closer examination of the composition of filers. We examine how the income of filers evolved through the reform by merging the filer's ZIP Code in the PACER sample with the median income for that ZIP Code from the 2000 Decennial Census.

Figure 5: Income Distribution of Filers



Notes: The sample includes all consumer bankruptcy filings included in the PACER sample in 2004 and 2006, matched with the ZIP Code median household income measured in the 2000 decennial census. The two distributions plot the percentiles of ZIP Code median household income among filers in 2004 and 2006.

Figure 5 plots the full distribution of median ZIP Code income among filers in 2004 and 2006. The distributions are strikingly similar—percentiles are virtually on top of each other through the 60^{th} percentile, at which point the post-BAPCPA distribution of filers drifts slightly upward. As is clear from the figure, there is no stark change in the composition of filers. This suggests that the reform did not change the composition of filers by very much in terms of income (at least with respect to their ZIP Code), and, if anything, average income appears to creep upward after the reform. This is consistent with some suggestive evidence presented in Appendix Section C that hassle costs and liquidity constraints were relevant for filers. The surprising impotency of the means test to shift the ZIP Code income of filers should be accounted for by future research aiming to use the reform to vary the bankruptcy decision rule.[21]

It is important to note that income also varies within-ZIP Codes and it is possible that while the ZIP Code incomes of filers did not change, there are large within-ZIP Code changes in the incomes of filers. Nevertheless, we view it as unlikely that the ZIP Code income measure is masking large means-test-driven shifts in the income distribution of filers. This is consistent with anecdotal reports from bankruptcy attorneys (Littwin, 2016) and other evaluations of the reform (Ashcraft et al., 2007; Albanesi and Nosal, 2018).

Inspecting differences in the composition of filers before and after the reform can be informative for how the self-targeting properties of the bankruptcy system changed. However, to assess changes in the insurance value of bankruptcy, we need to test how individuals facing the same negative financial shocks were able to access bankruptcy before and after changes to the bankruptcy code. The next section takes such an approach.

7.2 Effect of BAPCPA on the Insurance Value of Bankruptcy

It is clear that bankruptcy reform deterred filings. To evaluate the cost of these deterred filings, we next ask how expense shocks (specifically, health shocks requiring hospitalization) were insured by bankruptcy before and after the reform. Concerns over how provisions designed to deter abusive

[21] Several papers have naturally used the means test as variation with which to study the effects of BAPCPA and bankruptcy more generally, for example, Chatterjee et al. (2007), Li et al. (2011), Mahoney (2015), Mitman (2016).

filings could negatively impact the insurance value of bankruptcy were raised in the debate over the bill. Warren (2005) argued against the law because the means test would "treat all families alike... A person who had a heart attack is treated the same as someone who had a spending spree at the mall."

The distinction between bankruptcies driven by medical costs and discretionary consumption is present in life-cycle models of the bankruptcy decision.[22] Livshits et al. (2007) demonstrate that the existence of expense shocks such as medical costs can make "fresh start" (Chapter 7) bankruptcy regimes welfare-increasing despite increasing the cost of borrowing. Particularly when markets are incomplete, bankruptcy may be the only mechanism by which an individual can insure some negative events. We thus seek to estimate whether *specific expense shocks* were insured by bankruptcy, before and after the reform. We test the likelihood that individuals experiencing observationally identical hospitalizations, before and after changes to the bankruptcy code, declare bankruptcy to obtain debt relief.

We study the universe of uninsured hospitalizations between 2003 and 2007 in California, where approximately 20 percent of residents lacked insurance during that time (California Healthcare Foundation, 2010). For comparison, we study insured hospitalizations in parallel. The insured include adults ages 25–64 hospitalized with either private or Medicaid coverage. Each hospitalization is linked to the individual's credit reports observed each year in January from 2002 through 2011. We limit the sample to those who were not hospitalized in the three years prior to their hospitalization to isolate "health shocks."

In the ideal experiment, we would randomly assign either different bankruptcy regimes to otherwise identical individuals experiencing a health shock. One might be concerned that the composition of uninsured hospitalizations might be different before and after the reform.[23] By isolating health

[22] Divorce, job loss, and unplanned pregnancies are additional shocks that are discussed as relevant to the welfare implications of the bankruptcy code (Livshits et al., 2007; Fay et al., 2002; Keys, 2018), though medical expenses are often pointed to as the most "blameless."

[23] As observed by Mahoney (2015), changes in the bankruptcy code also changes the incentives for individuals to purchase health insurance. This generates a concern that uninsured health shocks would be differentially selected before and after BAPCPA. Two patterns in the data ameliorate these concerns. First, the means test does not appear to be the primary driver of the change in bankruptcy filings. Second, at least in a coarse examination of the data, the share of Californians without health insurance was broadly unchanged over our sample period (California Healthcare Foundation, 2010). The estimated share of individuals lacking health insurance in California in each year from 2003

shocks for individuals who have not been hospitalized in the previous three years, we come close to approximating this experiment. Hospitalizations are much less likely to be anticipated than other sources of health insurance demand like chronic conditions requiring outpatient care.

To further address this concern, we reweight the two sets of hospitalizations on their observable characteristics, though it has little effect on our estimates. We use propensity score matching to reweight those hospitalized in each period in order to match them on age, sex, race, zip code household income, whether the hospitalization was for a chronic condition, and on the major diagnostic category. Appendix Table A7 presents summary statistics by insurance status and hospitalization period.

Following Dobkin et al. (2018a), we estimate event-study regressions, additionally splitting the sample by whether the hospitalization occurred under the pre- or post-BAPCPA bankruptcy regime. We define the pre-BAPCPA period to be January 2003 through December 2004 and the post-BAPCPA period to be from October 2005 through December 2007.[24]

We define event time m as the number of months relative to the hospitalization (which occurs at $m = 0$). Omitting the month prior to the hospitalization ($m = -1$) and including calendar year fixed effects, we specify a non-parametric event-study regression to estimate the evolution of the outcome variable preceding and following the hospitalization:

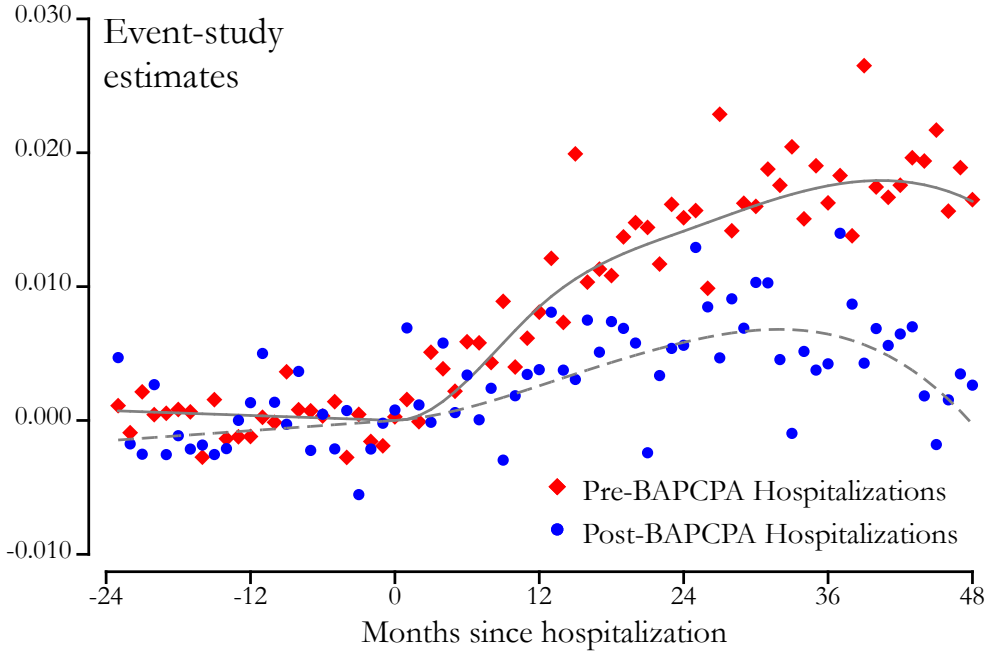
$$y_{it} = \gamma_t + \mathbb{1}\{\text{Pre-BAPCPA}\}\left(\sum_{m=-24}^{-2} \mu_m + \sum_{m=0}^{48} \mu_m\right) + \varepsilon_{it}. \tag{4}$$

In order to estimate how frequently a hospitalization leads to bankruptcy, we also estimate a parametric event-study specification. This allows us to calculate the "implied effect" at each month relative to hospitalization. We allow for a linear pretrend in event time m (months relative to admission) and a flexible cubic spline with breaks at 0, 12, and 24 months in the post-period. These allow us to estimate the effect of the hospitalization at any point, separately by the hospitalization

through 2007 was 19.1%, 19.5%, 19.9%, 19.6%, and 19.4%.

[24] We exclude hospitalizations occurring between January 2005 and September 2005 to avoid those most likely to coincide with the rush-to-file in October 2005.

Figure 6: Effect of Hospitalization on Bankruptcy Filing



Notes: The sample is individuals ages 25-64 who are hospitalized without insurance in California, additionally split by the timing of the hospitalization (January 2003 through December 2004 for the pre-BAPCPA sample, October 2005 through December 2007 for the post-BAPCPA sample). The points represent the estimated effects of event time (i.e., the μ_rs from the non-parametric event study in equation 4) and the lines represent the parametric event study in equation 5 with the pre-trends normalized between the two periods for ease of visual comparison.

period:

$$y_{it} = \gamma_t + \mathbb{1}\{\text{Pre-BAPCPA}\}\left(\beta_{0q} m + \beta_{1q} m^2\{m > 0\} + \sum_{s=0}^{2} \beta_{(s+2)q}(m - 12s)^3\{m > 12s\}\right) + \varepsilon_{it}. \quad (5)$$

It is evident from Figure 6 that the parametric spline fits the non-parametric event-study coefficients well. The identifying assumption requires that, separately for pre-BAPCPA and post-BAPCPA hospitalizations, conditional on having a hospital admission and jointly estimated calendar-year fixed effects, the timing of the admission is uncorrelated with deviations of the outcome from a linear trend in event time.

Figure 6 presents the results of both event studies for the probability an uninsured hospitalization resulted in a bankruptcy filing. The red diamonds trace the path of individuals hospitalized in the pre-BAPCPA environment, while the blue circles trace the path of those hospitalized in the

Table 4: Implied Effects of Hospitalization on Bankruptcy

	(1)	(2)	(3)	(4)
Insurance Coverage:	Uninsured		Insured	
Hospitalization Period:	Pre	Post	Pre	Post
Implied Effect at 12 Months[a]	0.89	0.18	0.19	0.15
	(.12)	(.08)	(.08)	(.05)
Implied Effect at 24 Months[b]	1.49	0.43	0.37	0.25
	(0.23)	(0.15)	(0.15)	(0.10)
Pre-Hospitalization Mean	2.11	4.94	2.07	4.38
P-Value for Null of 12 Month Pre/Post Equality	[<0.001]		[0.84]	
N	53,611	62,912	164,207	145,502

Notes: The sample is individuals ages 25-64 who are hospitalized in California, additionally split by the timing of the hospitalization (January 2003 through December 2004 for the pre-BAPCPA sample, October 2005 through December 2007 for the post-BAPCPA sample) and insurance coverage (uninsured or insured which includes those with private insurance or Medicaid coverage). All columns report effects based on OLS estimates of equation 5. The outcome variable is whether an individual has filed for bankruptcy since the beginning of the sample (January 2002). Standard errors (clustered on the individual) are in parentheses. The universe of qualifying uninsured hospitalizations are included in the sample; estimates for the insured are weighted to adjust for individuals' sampling probabilities.

[a] The implied effect at 12 months is calculated from equation 5 as $144 \times \beta_2 + 1,728 \times \beta_4$

[b] The implied effect at 24 months is calculated from equation 5 as $576 \times \beta_2 + 13,824 \times \beta_4$

post-BAPCPA environment. The pre-BAPCPA hospitalizations result in a pronounced spike in bankruptcy filings following hospitalization, increasing starkly around the time debt is typically sent to collections (around 180 days after the hospitalization). The rate of filings remains persistently higher for the subsequent four years. In comparison, those hospitalized after changes to the bankruptcy code were implemented display a muted filing response to the hospitalization.

Table 4 provides estimates of the "implied effect" of the hospitalization at 12 and 24 months, separately by bankruptcy regime and insurance coverage. The implied effect is the deviation of the parametric coefficients from the linear pretrend, which we interpret as the impact of the hospitalization on the outcome variable, in this case whether or not the individual has filed for bankruptcy.

Uninsured hospitalizations are much less likely to be discharged through bankruptcy after the reform. At 24 months post-hospitalization, the pre-BAPCPA uninsured are 1.49 percentage points

more likely to file for bankruptcy due to the hospitalization. After implementation, the implied effect of the hospitalization on filing for bankruptcy is just 0.43. While the share of individuals eligible to file for bankruptcy is smaller post-BAPCPA, this is a mechanical result of the construction of a stock variable for ever filing for bankruptcy over the sample period. As further reassurance on this point, the insured demonstrate a similar increase in the share of individuals who have filed for bankruptcy in advance of their hospitalization (4.38 percent from 2.07 percent versus 4.94 percent from 2.11 percent for the uninsured), but a substantially smaller decline after the reform. The marked decline in the implied effect of a hospitalization on filing for bankruptcy indicates that bankruptcy reform significantly reduced the share of uninsured individuals who access bankruptcy as implicit health insurance.

This effect does not appear to be driven by differences in medical debt. Uninsured hospitalizations result in a similar amount of debt sent to collections under both bankruptcy regimes, but 70 percent fewer bankruptcy filings after the reform. Appendix Table A8 shows the implied effect on debt sent to collections 24 months after the hospitalization increased from $6,700 to $6,900 after the reform. While hospitalizations in and of themselves may make up a small share of overall bankruptcy filings (Dobkin et al., 2018b), to the degree that uninsured health shocks can be generalized to other types of uninsured shocks, these results suggest that the reform meaningfully reduced the insurance value of the bankruptcy option.

8 Conclusion

On the one hand, the option to file for bankruptcy provides a form of insurance for American households and lowers the risk of borrowing by providing a process for them to discharge their debts. On the other hand, the option of bankruptcy also increases the cost of borrowing, and hence the cost they face to smooth consumption over time, by limiting the ability of borrowers to commit to repayment. The existence and relative magnitudes of these two forces have considerable policy implications and a matter of contentious debate. This paper evaluates changes to the bankruptcy code to address these issues.

Bankruptcy reform induced a net reduction of more than one million bankruptcy filings in the two years after implementation. We demonstrate that this reduction in the risk of bankruptcy filing was passed-through to consumers in the form of lower borrowing costs. The results suggest that a 1-percentage-point reduction in bankruptcy filing risk leads to a 43–107 basis-point decline in offered credit card interest rates.

Policymakers intended the law's means test to deter higher-income filers, but we find that the income distribution of filers remained essentially unchanged in the wake of the reform. In addition, we find that those hospitalized without health insurance were less likely to declare bankruptcy after the reform. This suggests that BAPCPA decreased the insurance value of bankruptcy.

Collectively, the findings emphasize the trade-offs in determining the optimal generosity of the bankruptcy code. More-generous insurance comes at the cost of higher interest rates. This paper's estimates may be informative for future changes to the bankruptcy system, changes to other social-insurance programs, and to the regulation of credit markets. While this paper does not make the assumptions or impose the structural framework required to infer the overall welfare impact of the reform, the results presented identified and quantified a number of the critical inputs for this exercise, which we leave to future research.

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A Model Derivations and Extensions

A.1 Derivations

We want to derive the following proposition.

Proposition 2. *Under perfect competition, the effect of a change in the exemption level or a change in filing costs on interest rates is given by:*

$$\begin{aligned} dr/de &= \frac{cf(y^*) + (F(y^*) - F(e))}{-bcf(y^*) + b(1-p)}, \\ dr/dc &= \frac{-cf(y^*)}{-bcf(y^*) + b(1-p)}. \end{aligned}$$

Recall, with the assumption of perfect competition, we can implicitly define the interest rate r by setting the repayment rate to creditors equal to the amount of borrowing ($R(r) = b$). Observing that $R(r) - b = 0$, we can take partial derivatives in order to apply the implicit function theorem to derive dr/de and dr/dc. The direct effects of e and c are straightforward, but the effect of r on $R(r)$ is ambiguous:

$$\begin{aligned} \frac{\partial R}{\partial c} &= \underbrace{cf(y^*)}_{\text{Reduces filings}} > 0 \\ \frac{\partial R}{\partial e} &= \underbrace{-cf(y^*) - F(y^*) + F(e)}_{\text{Increases filings \& reduces recovery (among filers)}} < 0 \\ \frac{\partial R}{\partial r} &= \underbrace{-bcf(y^*)}_{\text{Increases filings}} + \underbrace{b(1-p)}_{\text{Increases recovery among non-filers}} \lessgtr 0 \end{aligned}$$

Using the partial derivatives above, the proposition follows by the implicit function theorem, and

$$\begin{aligned} \frac{dr}{dc} &= -\frac{\partial R/\partial c}{\partial R/\partial r} = \frac{-cf(y^*)}{b(1-p-cf(y^*))} \\ \frac{dr}{de} &= -\frac{\partial R/\partial e}{\partial R/\partial r} = \frac{cf(y^*) + F(y^*) - F(e)}{b(1-p-cf(y^*))}. \end{aligned}$$

We also want to derive the total derivatives for $\frac{dp}{de}$ and $\frac{dp}{dc}$, which we use to derive the empirical object of interest (i.e., $\frac{dr/dc}{dp/dc}$ and $\frac{dr/de}{dp/de}$). To obtain $\frac{dp}{de}$, we can make the following substitutions:

$$\begin{aligned} dp/de &= \partial p/\partial e + \partial p/\partial r * dr/de \\ &= f(y_h^*) + \frac{dr}{de} bf(y_h^*) \\ &= f(y_h^*) \frac{1 - F(e)}{1 - F(y_h^*) - cf(y_h^*)}. \end{aligned}$$

We can do the same for $\frac{dp}{dc}$:

$$\begin{aligned} dp/dc &= \partial p/\partial c + \partial p/\partial r * dr/dc \\ &= -f(y_h^*) - f(y_l^*) + \frac{dr}{dc} b f(y_h^*) \\ &= -(f(y_h^*) + f(y_l^*)) \frac{1 - F(y_h^*)}{1 - F(y_h^*) - c f(y_h^*)}. \end{aligned}$$

We can use the total derivatives for $\frac{dp}{dc}$, $\frac{dr}{dc}$, $\frac{dp}{de}$, and $\frac{dr}{de}$ to define:

$$\begin{aligned} \frac{dr/dc}{dp/dc} &= \frac{c/b}{1-p} \\ \frac{dr/de}{dp/de} &= \frac{c f(y^*) + F(y^*) - F(e)}{b f(y^*)(1 - F(e))}, \end{aligned}$$

as desired.

A.2 Incorporating Insolvency

We can extend the model in Section 3 to incorporate insolvency; that is, the case where we require income of at least c to file bankruptcy so that individuals with income $y < c$ are insolvent and unable to file for bankruptcy.

The filing rule now becomes

$$c \leq y \leq e - c + (1+r)b.$$

The filing probability is now $p = F(e-c+(1+r)b) - F(c) = F(y_h^*) - F(y_l^*)$, where y_h^*, y_l^* are upper and lower bounds of filers' income. We assume individuals who cannot afford to file for bankruptcy repay the debt. This reflects wage garnishment or aggressive debt collection. We will assume that whenever $y < c$, individuals repay y. As before, individuals with $y > e - c + (1+r)b$ repay $(1+r)b$.

Assuming perfect competition, the equilibrium interest rate is implicitly defined by $R(r) = b$, and the new expression for the expected amount recovered from the population $R(r)$ is

$$R(r) = \underbrace{\int_0^c y f(y) dy}_{\text{Recovered from insolvent}} + \underbrace{\int_e^{e+(1+r)b-c} (y-e) f(y) dy}_{\text{Recovered from bankruptcy filers}} + \underbrace{\int_{e+(1+r)b-c}^{\infty} (1+r) b f(y) dy}_{\text{Recovered from non-filers}}.$$

We can walk through the propositions and empirical object derivations to see how incorporating insolvency changes the expressions. We will find that, while it adds another group of marginal filers, the expressions are qualitatively similar as in the model without insolvency.

Proposition 1 *The direct effect of a change in the exemption level on probability of filing bankruptcy, and the effect of a change in the cost of filing on probability of filing bankruptcy are given by the following*

$$\begin{aligned}
\partial p/\partial e &= f(e+(1+r)b-c) \\
&= f(y_h^*) > 0, \\
\partial p/\partial c &= -f(e+(1+r)b-c) - f(c) \\
&= -f(y_h^*) - f(y_l^*) < 0.
\end{aligned}$$

The signs are the same as those in the model without insolvent individuals, but a change in the cost of filing now affects two marginal groups: those on the margin of insolvency ($y_l^* = c$); and, the margin in the main model at the asset exemption level: ($y_h^* = e + (1-r)b - c$). An increase in the cost of filing shifts both groups from filing to non-filing.

We can also derive the effects of changes to the bankruptcy code (i.e., c, e) on interest rates, by re-deriving Proposition 2.

Proposition 2 *The total effect of a change in exemption level or cost of filing on interest rates are given by the following:*

$$\begin{aligned}
dr/de &= \frac{cf(y_h^*) + F(y_h^*) - F(e)}{b(1 - F(y_h^*) - cf(y_h^*))}, \\
dr/dc &= \frac{-c(f(y_l^*) + f(y_h^*))}{b(1 - F(y_h^*) + cf(y_h^*))}.
\end{aligned}$$

To derive these expressions, first note that $R(r) - b = 0$, then

$$\begin{aligned}
\partial R/\partial r &= b(y-e)f(y)|_{y=e+(1+r)b-c} - b(1+r)bf(y)|_{y=e+(1+r)b-c} + \int_{e+(1+r)b-c}^{\infty} bf(y)dy \\
&= b(1 - F(y_h^*) - cf(y_h^*)), \\
\partial R/\partial c &= yf(y)|_{y=c} - (y-e)f(y)|_{y=e+(1+r)b-c} - (1+r)bf(y)|_{y=e+(1+r)b-c} \\
&= c(f(y_l^*) + f(y_h^*)), \\
\partial R/\partial e &= (y-e)f(y)|_{y=e+(1+r)b-c} - (y-e)f(y)|_{y=e} - (1+r)bf(y)|_{y=e+(1+r)b-c} + \int_{e}^{e+(1+r)b-c} -f(y)dy \\
&= -cf(y_h^*) - F(y_h^*) + F(e).
\end{aligned}$$

We can apply the implicit function theorem to obtain our desired total derivatives:

$$\begin{aligned}
dr/de &= -\frac{\partial R/\partial e}{\partial R/\partial r} \\
&= \frac{cf(y_h^*) + F(y_h^*) - F(e)}{b(1 - F(y_h^*) - cf(y_h^*))}, \\
dr/dc &= -\frac{\partial R/\partial c}{\partial R/\partial r} \\
&= \frac{-c(f(y_l^*) + f(y_h^*))}{b(1 - F(y_h^*) - cf(y_h^*))}.
\end{aligned}$$

The signs and intuition of these total effects are the same as those in the model without insolvent individuals, with additional terms to reflect the filers on the margin of insolvency.

Before we derive the empirical object ($\frac{dr/dc}{dp/dc}$, we again calculate the total derivatives on the

filing probability:

$$\begin{aligned} dp/de &= \partial p/\partial e + \partial p/\partial r * dr/de = f(y_h^*) + \frac{dr}{de} b f(y_h^*) \\ &= f(y_h^*) \frac{1 - F(e)}{1 - F(y_h^*) - c f(y_h^*)} \\ dp/dc &= \partial p/\partial c + \partial p/\partial r * dr/dc = -f(y_h^*) - f(y_l^*) + \frac{dr}{dc} b f(y_h^*) \\ &= -(f(y_h^*) + f(y_l^*)) \frac{1 - F(y_h^*)}{1 - F(y_h^*) - c f(y_h^*)}. \end{aligned}$$

The intuition is similar to cases discussed above. Deriving the empirical objects without approximation,

$$\frac{dr/de}{dp/de} = \frac{c f(y_h^*) + F(y_h^*) - F(e)}{b f(y_h^*)(1 - F(e))}.$$

$$\frac{dr/dc}{dp/dc} = \frac{c/b}{1 - F(y_h^*)}.$$

As before, if we are willing to assume $F(y_h^*) \approx F(e)$, then

$$\frac{dr/de}{dp/de} \approx \frac{c f(y_h^*)}{b f(y_h^*)(1 - F(y_h^*))} = \frac{c/b}{1 - F(y_h^*)}.$$

B Data Appendix

B.1 PACER Bankruptcy Records

Gross et al. (2014) contacted every bankruptcy court in the US and requested a waiver of PACER fees; 81 districts granted the research team a waiver. They downloaded the dockets for each court from the 1990s through 2011.

For the purposes of this paper, we validated that dataset by comparing the annual counts of bankruptcies to administrative records. We discarded three districts if their annual counts scraped from the PACER database diverged from the official administrative record by more than 10% in any year between 2004 and 2007.[25] The final sample consists of 78 districts over that time period. For each district, we observed a record of each bankruptcy filing: the Chapter of filing, the date filed, and the characteristics of the filer in the appendix figures.

Most districts use the PACER system solely to create a record for each bankruptcy case as it is filed, but do not update the docket with the outcomes of the case. As a result, we cannot observe the dismissal rate in most districts—the dismissals are not consistently recorded. Instead, to study dismissals, we focus on districts in which only a small share of the cases in the docket have records in which the outcome is unclear. Specifically, we label a bankruptcy filing as having an unknown dismissal status if there is no discharge date, no dismissal date, and the disposition of the case is not included in the docket. In studying dismissals, we focus on districts in which under 1 percent of bankruptcies have an unknown dismissal status using this definition. That leads to the following nine districts: WAW, ILN, AZ, IAN, NYE, CAC, OKE, WVN, and DC. These are used for Figure A8. Similarly, *pro se* filings are not well recorded in every district, so we limit the sample of Figure

[25] Those three districts were MOE, MTB, and NYN.

A11 to districts that track *pro se* filings reliably (WVNB, TXNB, TXEB, SCB, OKWB, OKEB, OHNB, NCWB, MOEB, MIEB, LAWB, KSB, ILSB, ILNB, IASB, IANB, and ALNB).

BAPCPA increased the years a Chapter 7 filer has to wait before filing Chapter 7 again. Previously, households could legally file for Chapter 7 every 6 years; BAPCPA increased that waiting period to 8 years. In order to examine whether that change was binding, we use the identifiers in the PACER data to link bankruptcies over time. The PACER data include name and the last four digits of each filer's Social Security number. We sort all Chapter 7 bankruptcies in the PACER data by those two identifiers, combined with district, and assume that two filers with those same identifiers are the same person. That procedure is necessarily speculative, since we do not possess full Social Security numbers, but we consider the output a useful proxy for repeat filers.

Figure A12 presents a histogram of the waiting time before likely repeat filings, both before and after BAPCPA. There exists some measurement error, given that the identifiers are not perfect, and that may explain some of the non-compliance that is clear in the figure. Nevertheless, before BAPCPA, the vast majority of waiting times were above 6 years. The pattern suggests "bunching" just after 6 years, which implies that some filers were waiting until they could file again. After BAPCPA, that same pattern shifted to 8 years. Figure A12 thus suggests another dimension on which BAPCPA deterred filing.

B.2 Consumer Financial Production Bureau Consumer Credit Panel (CCP) and Mintel Data

The Consumer Financial Protection Bureau Consumer Credit Panel (CCP) is a 1-in-48 random sample of U.S. consumers with credit records. Our primary use of the CCP is to estimate the bankruptcy filing risk for each credit score segment. To do so, we combine all public record snapshots in the CCP. We eliminate any duplicate public records to obtain a clean index file, which we merge with the full credit score archives for consumers. Consumers without a credit score are dropped. For each consumer, we allot them to a credit score segment (defined as the 10-point credit score bins). The small number of consumers with credit scores below 440 are allocated to that bin. At each point in time, we estimate the share of the consumers in that credit score segment who file for bankruptcy over the subsequent 12 months. Individuals without credit scores are dropped from the sample.

Data on credit card offers are from Mintel Comperemedia, accessed through the Consumer Financial Protection Bureau. Mintel Comperemedia conducts proprietary market research by surveying United States households, who forward all incoming marketing mail. We focus on credit card offers. The data include rich information on each credit card offer, including card categories (Affinity Cards, Co-Branded, Credit Cards, Lifestyle Cards, Retail Cards, Secured Cards), application type (Confirmed, General, Guaranteed Approval, Pre-Approved, Pre-Qualified, Pre-Selected), and the lender. They additionally include information on the offered interest rate, and whether (and for how long) an introductory ("teaser") rate might be applied. Importantly for our purposes, the offers are coupled with information on the consumer who received the offer, including their credit score and state of residence. We drop offers associated with consumers who are missing credit scores and offers for which interest rates are missing. The data is a repeated cross-section, surveying around 2,500 individuals each month and include between 5,900 and 12,079 credit card offers over our sample period (with both the mean and median number of offers around 8,000 per month).

B.3 Hospitalizations Data

We use hospital discharge data from the California Office of Statewide Health Planning and Development (OSHPD). The hospitalizations data are merged with credit reports and vital records using social security numbers as described in the Online Appendix of Dobkin et al. (2018a). All data production and analysis happened on-site at OSHPD's Sacramento office and all output was reviewed by OSHPD staff to confirm privacy was protected.

The hospital discharge data includes a unique identifier, dates of admission and discharge, details about the health event (e.g., diagnosis codes), and demographic information. It also includes an indicator for insurance coverage which includes Medicaid, private insurance, and "self-pay." We use the primary payer of the index admission to define insurance coverage.

We sample non-pregnancy related admissions with a non-missing social security number from 2003 through 2007. We additionally use hospitalizations from 2000 to 2010 to limit the sample to admissions which were the first in three years for the individual, in order to isolate health "shocks." We select the universe of "self-pay" (uninsured) hospitalizations. For those insured with Medicaid or private coverage (insured), we sample a random 20% of individuals whose admission originated through the Emergency Department, and a random 10% of individuals whose admission was not through the Emergency Department. We construct reweights according to the inverse probability an individual was sampled. We restrict to ages 25 to 64. For additional sample selection and summary statistics, see Dobkin et al. (2018a).

We convert the credit report variable for bankruptcy filings from a flow into a stock by defining a cumulative indicator variable based on whether the individual has filed for bankruptcy since entering the sample in 2002. This allows the event study specification to exploit variation in the timing of the hospitalization to identify the effect of the hospitalization on the likelihood of filing for bankruptcy.

Finally, we define whether hospitalizations were exposed to the "pre-BAPCPA" or "post-BAPCPA" bankruptcy regime. We define those hospitalized between January 2003 through December 2004 as facing the pre-BAPCPA bankruptcy code and hospitalizations between October 2005 through December 2007 for the post-BAPCPA sample. Most hospitalization-induced bankruptcies occur in the first 18 months following the hospitalization. In order to limit the impact of intertemporally substituted bankruptcies filed during the rush-to-file period just before BAPCPA went into effect, we limit the pre-BAPCPA sample to those hospitalized by the end of 2004. Any individuals hospitalized in or after October 2005 faced the post-BAPCPA bankruptcy code.

C Evidence on Filing Process

Given the significant decline in the number of filings documented in Section 5, we cannot conclude that the means test was unsuccessful. However, it is clear that the additional hassle costs and liquidity requirements imposed by BAPCPA were at least as important in deterring bankruptcy filings. Examining some aspects of the bankruptcy process provides some circumstantial evidence for the relevance of hassle and liquidity costs. From the PACER dockets, we can measure the share of filings that were dismissed, listed as having assets, that reported the filing fee as "unpaid" or "paid in installments," and in which the filer does not retain a bankruptcy lawyer (i.e., they file on their own behalf, or *pro se*). Appendix Figures A8, A9, A10, and A11 present those analyses. A slight uptick in the share of Chapter 7 cases dismissed in the post-period (up from virtually zero in the pre-period) seems to suggest a small number of filers may be refused the Chapter 7 option. Other outcomes are consistent with liquidity constraints being relevant. The share of Chapter 7 filings with assets is highly seasonal, with the share of filings with assets declining substantially

in the months when households receive their tax returns. This is consistent with the findings of Gross et al. (2014), who find that households use the liquidity provided by their tax return to afford bankruptcy. An increase in the share of filings with an unpaid filing fee may also indicate that the cost of filing is a constraint for some filers.

D Appendix Tables

Table A1: Percentage of Total Filings Covered by PACER Sample

		(1)	(2)	(3)
Year	Quarter	All Bankruptcy Filings	Chapter 7	Chapter 13
2004	1	86.2	89.6	74.1
	2	85.5	89.2	74.2
	3	86.1	90.6	74.5
	4	86.0	90.6	74.1
2005	1	86.1	89.8	74.4
	2	86.2	89.3	74.4
	3	87.2	90.1	75.1
	4	88.1	90.0	75.4
2006	1	82.8	87.6	74.8
	2	83.1	87.5	75.0
	3	83.6	89.0	74.9
	4	84.5	91.0	74.8
2007	1	85.5	91.2	75.3
	2	86.4	92.1	75.7
	3	86.3	92.8	75.4
	4	86.6	93.1	75.5

Notes: The table presents the percent of the total administrative counts of bankruptcies which are included in the PACER sample in each year and quarter of the data. Administrative counts are provided by the Administrative Office of the United States Courts.

Table A2: Net Change in Filings through 2007 (Robustness to Counterfactual Specifications)

	(1)	(2)	(3)	(4)	(5)	(6)
Total	-1,077,679	-1,085,106	-1,549,639	-1,529,728	-1,637,479	-1,618,761
Chapter 7	-946,148	-948,801	-1,444,828	-1,419,240	-1,533,578	-1,509,383
Chapter 13	-160,950	-173,816	-157,714	-158,298	-153,844	-154,385
Date Used	Senate	Senate	House	House	Signed	Signed
Unemployment Rate		✓		✓		✓

Notes: This table presents robustness to results presented in Table 1. In each column, we estimate the total deviation from the predicted number of bankruptcy filings through the end of 2007. We estimate equation 1 from the beginning of the sample until BAPCPA until the date indicated in the "Date Used" row. The Senate passage date is March 10, 2005, the House passage date is April 14, 2005, and the date signed is April 20, 2005. We additionally include the national unemployment rate in estimating equation 1 where indicated. The overall numbers are inflated to reflect the nation as a whole, based on our PACER sample coverage (see Appendix Table A1).

Table A3: Summary Statistics for Credit Card Offers

	(1)	(2)	(3)
	Prime	Subprime	All Borrowers
APR	11.50	14.52	11.88
Weighted APR	6.61	10.67	7.12
Introductory APR	5.46	8.76	5.87
Rate Spread	4.85	7.58	5.19
Weighted Rate Spread	-0.04	3.73	0.43
Pre-Approved	61.6%	74.1%	63.2%
Annual Fee	11.0%	52.5%	16.2%
Rewards	59.5%	16.7%	54.1%
Annual Fee, No Rewards	4.6%	49.8%	10.2%
Introductory Rate	56.3%	43.6%	54.7%
Credit Score	750	566	727
Mean Offers Per Month	3.33	2.77	3.26
N (Individual-Months)	105,941	13,982	119,923
N (Offers)	352,589	38,690	391,279

Notes: The sample is individuals in the Mintel sample at any point between January 2004 and December 2007, collapsed to the individual-month. The table presents mean features of credit card offers, weighted by the mail volume of the campaign.

Table A4: Effect of Change in Bankruptcy Filing Probability on Number of Offers

	(1)	(2)
Dependent variable:	Offers Per Person	
Post-BAPCPA $\times\delta_b$	0.27	0.17
	(0.04)	(0.07)
Time Trends $\times\mathbb{1}\{\text{Subprime}\}$		✓
N (Person-Months)	120,321	120,321

Notes: The sample is individuals in the Mintel sample at any point between January 2004 and December 2007, collapsed to the individual-month. All columns report effects based on OLS estimates of equation 3, excluding lender fixed effects. The outcome variable is the number of offers per person. Standard errors (clustered by the interaction of lender and credit score) are in parentheses. When collapsing to the individual, offers are weighted by the mail volume of the campaign. The coefficients of interest (Post-BAPCPA $\times\delta_b$) are significant at the 1 percent level for both specifications.

Table A5: Pass-through to Interest Rates Unadjusted by the Prime Rate

	(1)	(2)	(3)	(4)
Dependent variable:	Regular Interest Rate		Adjusted Interest Rate	
Post-BAPCPA $\times\delta_b$	-106.4	-72.4	-56.7	-41.4
	(11.8)	(15.6)	(12.1)	(16.2)
Time Trends $\times\mathbb{1}\{\text{Subprime}\}$		✓		✓
N	390,501	390,501	390,501	390,501

Notes: The sample is credit card offers made to households from January 2004 through December 2007. All columns report effects based on OLS estimates of equation 3. The outcome variables are the interest rates of credit card offers, unadjusted for the prime rate. Standard errors (clustered by the interaction of lender and credit score) are in parentheses. Offers are weighted by the mail volume of the campaign. All coefficients are significant at the 1 percent level.

Table A6: Pass-through to Interest Rates (using pre-BAPCPA risk)

	(1)	(2)	(3)	(4)
Dependent variable:	Regular Interest Rate		Adjusted Interest Rate	
Post-BAPCPA $\times\delta_b$	-61.4	-43.3	-33.3	-25.8
	(6.7)	(8.8)	(7.1)	(9.4)
Time Trends $\times\mathbb{1}\{\text{Subprime}\}$		✓		✓
N	390,501	390,501	390,501	390,501

Notes: The sample is credit card offers made to households from January 2004 through December 2007. All columns report effects based on OLS estimates of equation 3, with the treatment δ_b replaced by the June 2004 prospective 12-month filing probability for the credit score bin b. The outcome variables are the interest rates on credit card offers, adjusted for the prime rate. Standard errors (clustered by the interaction of lender and credit score) are in parentheses. Offers are weighted by the mail volume of the campaign. All coefficients are significant at the 1 percent level.

Table A7: Summary Statistics for Hospitalizations

	(1)	(2)	(3)	(4)
Insurance Coverage:	Uninsured		Insured	
Hospitalization Period:	Pre	Post	Pre	Post
Age	44	45	48	49
	(11)	(11)	(10)	(10)
Asian	0.046	0.046	0.066	0.07
	(.21)	(.21)	(.25)	(.25)
Black	0.11	0.11	0.077	0.077
	(.31)	(.31)	(.27)	(.27)
Hispanic	0.24	0.27	.18	.19
	(.43)	(.44)	(.38)	(.39)
White	0.56	0.53	.64	.62
	(.5)	(.5)	(.48)	(.48)
Male	0.62	0.61	.45	.45
	(.49)	(.49)	(.5)	(.5)
Chronic Diagnosis	0.78	0.82	0.84	0.87
	(.41)	(.38)	(.36)	(.34)
Zip Code Median Income	59,146	58,957	66,652	67,307
	(22,013)	(21,866)	(24,307)	(24,505)
Any Collection in Last 12 Months	0.34	0.38	.16	.17
	(.47)	(.49)	(.36)	(.38)
Collection Balance	2,869	3,994	1,068	1,341
	(9,181)	(11,528)	(5,834)	(6,481)
Any Bankruptcy in Last 12 Months	0.014	0.012	.014	.011
	(.12)	(.11)	(.12)	(.1)
Credit Limit	13,366	16,368	30,164	43,741
	(39,116)	(51,555)	(51,750)	(80,580)
Credit Score	655	655	727	734
	(111)	(109)	(119)	(120)
N	53,611	62,912	164,207	145,502

Notes: The sample is individuals ages 25-64 who are hospitalized in California, additionally split by the timing of the hospitalization (January 2003 through December 2004 for the pre-BAPCPA sample, October 2005 through December 2007 for the post-BAPCPA sample) and insurance coverage (uninsured or insured which includes those with private insurance or Medicaid coverage). Age is defined at admission. Insurance status is defined at the index admission and denotes coverage by Medicaid or private insurance. The universe of qualifying uninsured hospitalizations are included in the sample; estimates for the insured are weighted to adjust for individuals' sampling probabilities. Standard deviations are in parentheses.

Table A8: Implied Effects of Hospitalization on Debt in Collections

	(1)	(2)	(3)	(4)
Insurance Coverage:	Uninsured		Insured	
Hospitalization Period:	Pre	Post	Pre	Post
	Panel A. Number of Debts in Collections			
Implied Effect at 12 Months	0.96	1.14	0.11	0.13
	(0.02)	(0.03)	(0.01)	(0.01)
Implied Effect at 24 Months	1.32	1.52	0.16	0.21
	(0.05)	(0.06)	(0.02)	(0.02)
Pre-Hospitalization Mean	1.05	3.06	0.43	1.28
	Panel B. Collection Balance			
Implied Effect at 12 Months	4,559	5,163	103	178
	(104.7)	(135.1)	(28.0)	(28.6)
Implied Effect at 24 Months	6,724	6,944	163	316
	(169.0)	(229.1)	(53.1)	(56.8)
Pre-Hospitalization Mean	2,869	3,994	1,068	1,341
N	53,611	62,912	164,207	145,502

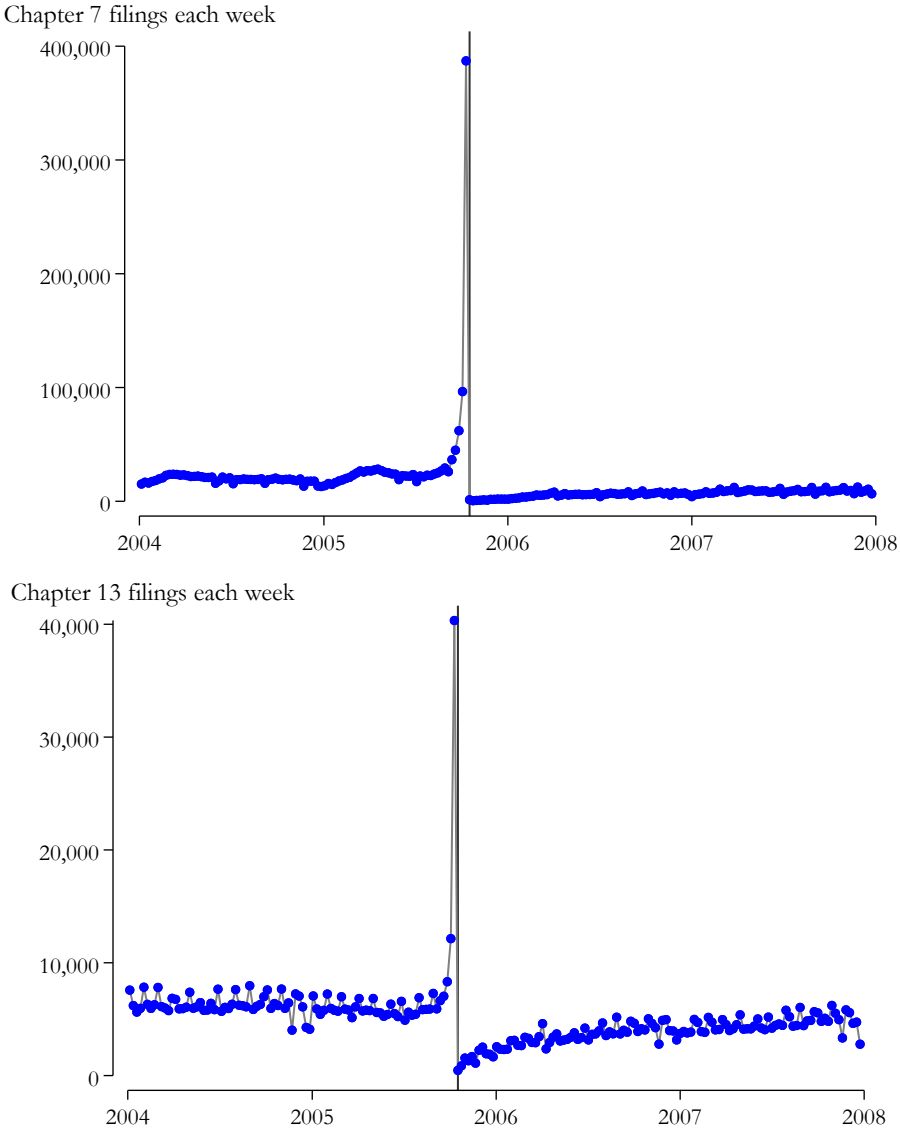
Notes: The sample is individuals ages 25-64 who are hospitalized in California, additionally split by the timing of the hospitalization (January 2003 through December 2004 for the pre-BAPCPA sample, October 2005 through December 2007 for the post-BAPCPA sample) and insurance coverage (uninsured or insured which includes those with private insurance or Medicaid coverage). All columns report effects based on OLS estimates of equation 5. The outcome variable is whether an individual has filed for bankruptcy since the beginning of the sample (January 2002). Standard errors (clustered on the individual) are in parentheses. The universe of qualifying uninsured hospitalizations are included in the sample; estimates for the insured are weighted to adjust for individuals' sampling probabilities.

[a] The implied effect at 12 months is calculated from equation 5 as $144 \times \beta_2 + 1,728 \times \beta_4$

[b] The implied effect at 24 months is calculated from equation 5 as $576 \times \beta_2 + 13,824 \times \beta_4$

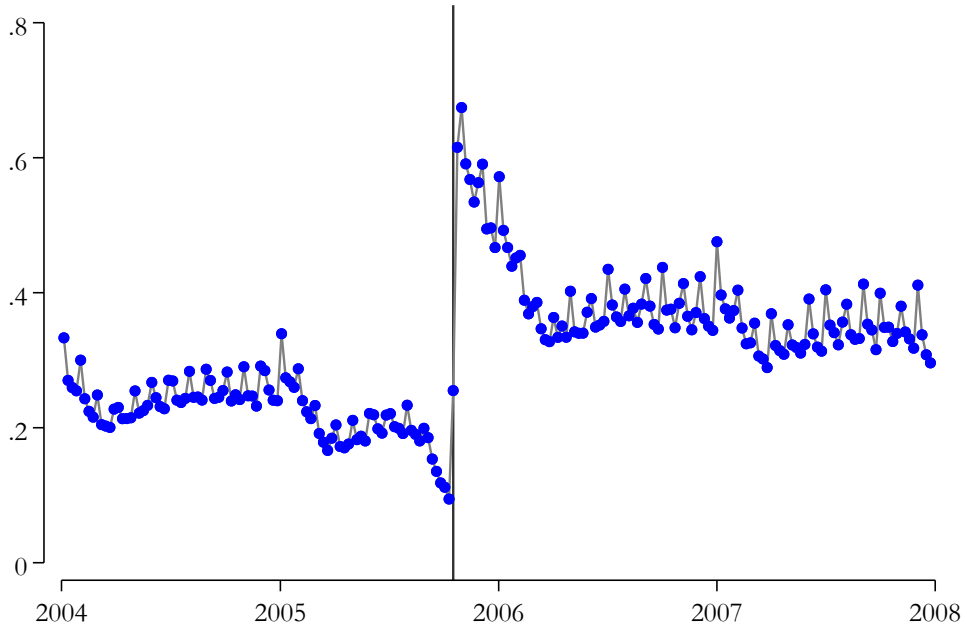
E Appendix Figures

Figure A1: Time Series for Chapter 7 and Chapter 13 Filings



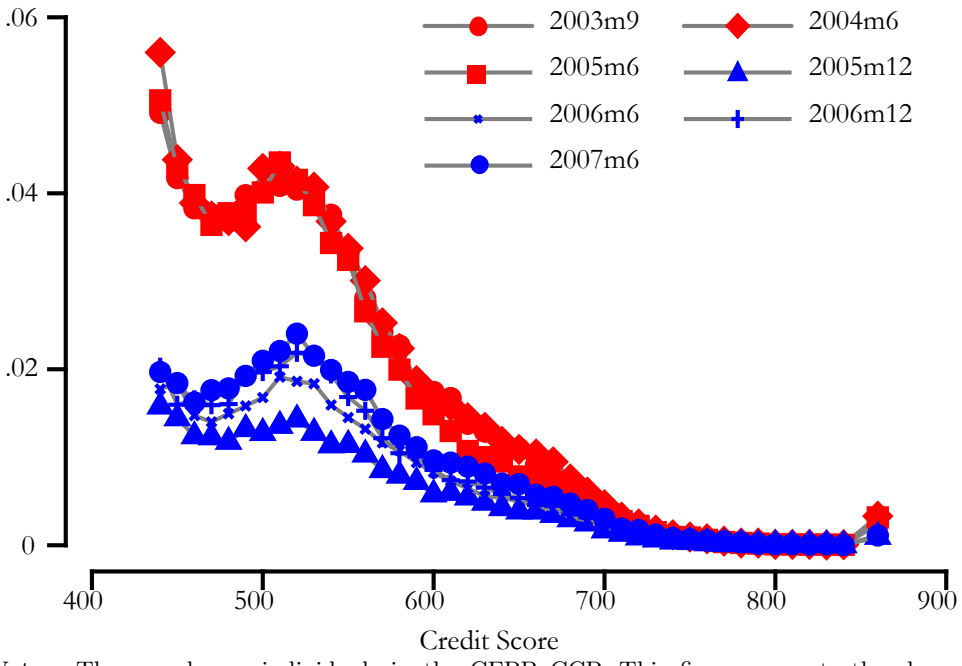
Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007. Each dot in the figure represents the total count of filings for that week, separately for Chapter 7 filings (top figure) and Chapter 13 filings (bottom figure).

Figure A2: Share Chapter 13



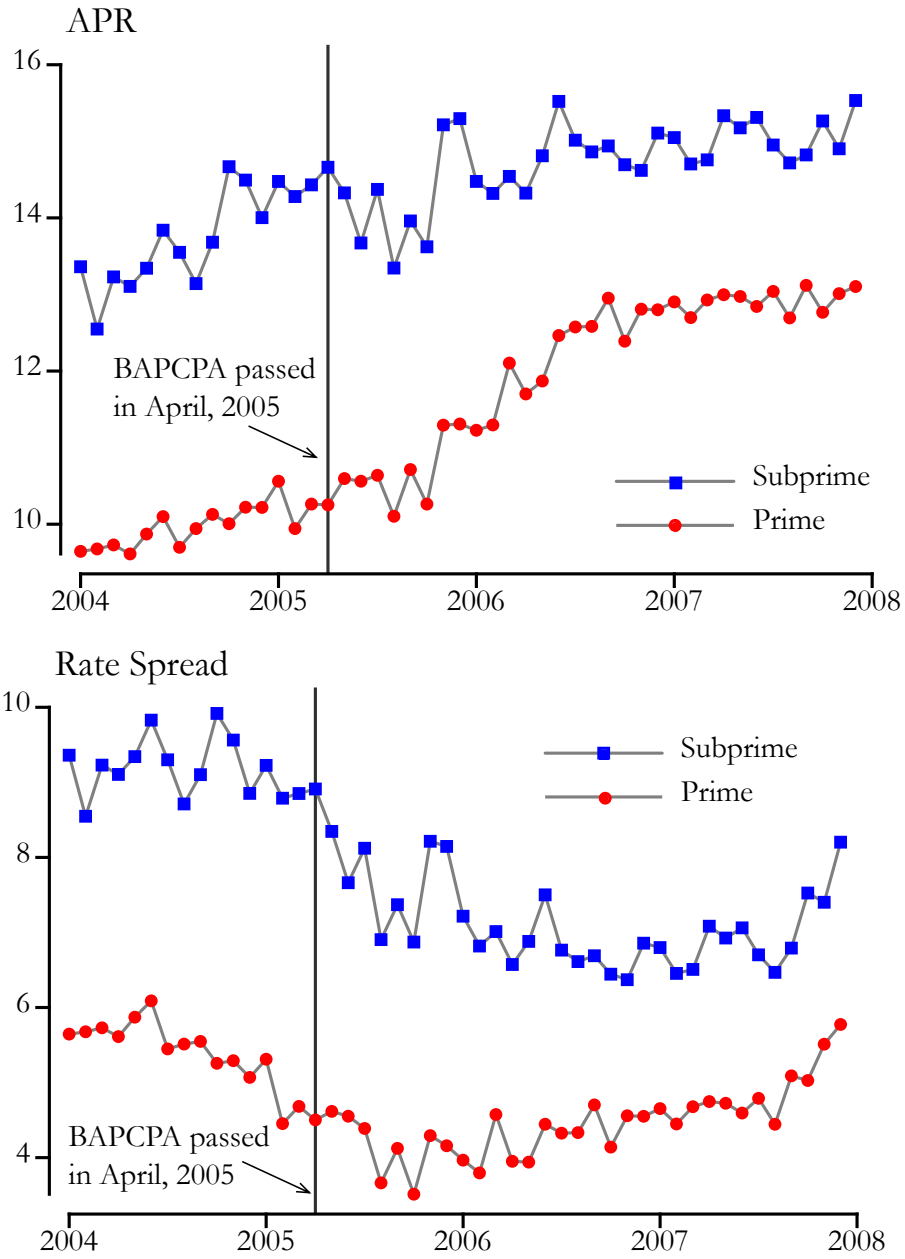
Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007. Each dot in the figure represents the share of filings in that week which were Chapter 13. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A3: Probability of Bankruptcy



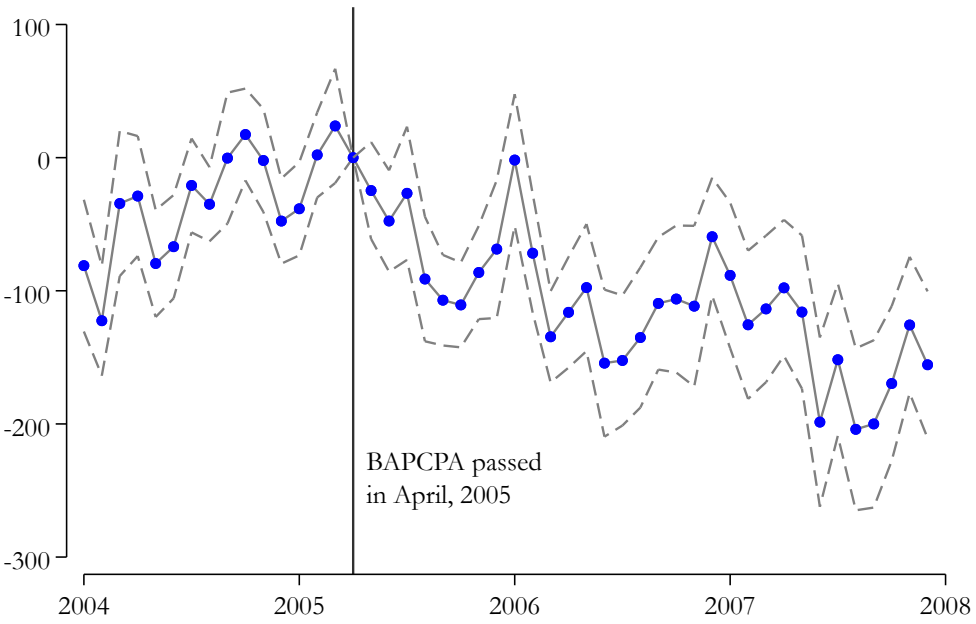
Notes: The sample are individuals in the CFPB CCP. This figure presents the share of individuals who file for bankruptcy within the next 12 months. Each point represents the filing rate for a 10-point credit score segment.

Figure A4: Time Series for APR and Rate Spread



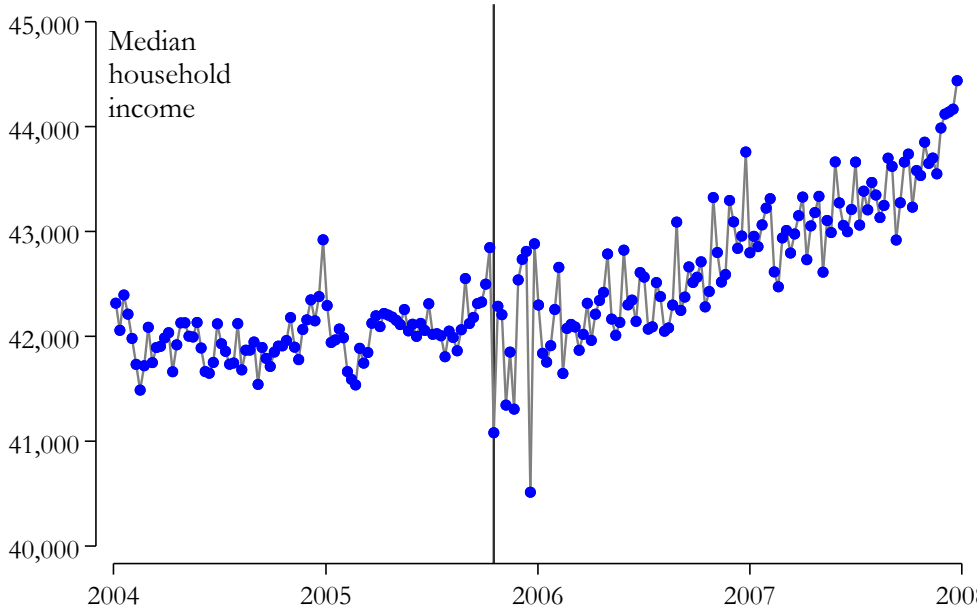
Notes: The sample is credit card offers made between January 2004 and December 2007 included in the Mintel data. Figures plot the average interest rate (either APR or rate spread) offer made to prime and subprime borrowers (defined as a credit score 620 or below).

Figure A5: Effect of Decline in Filing Probability on Offered Interest Rates



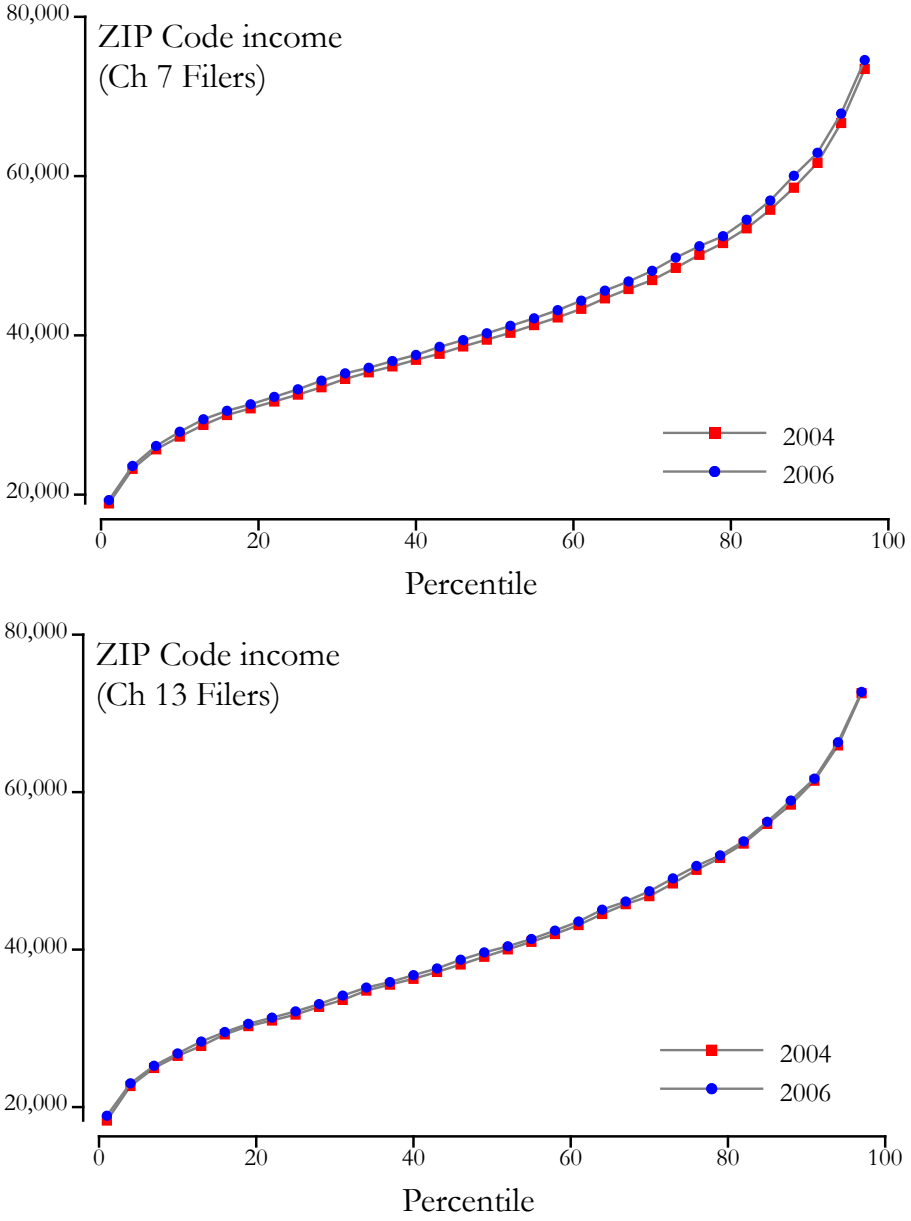
Notes: The sample is credit card offers made between January 2004 and December 2007 included in the Mintel data. The points represent estimates of the λ_t's in equation 2. The dashed lines provide 95% confidence intervals for each point. The dependent variable is the rate spread for offered interest rate adjusted for the teaser rate.

Figure A6: ZIP Code Income



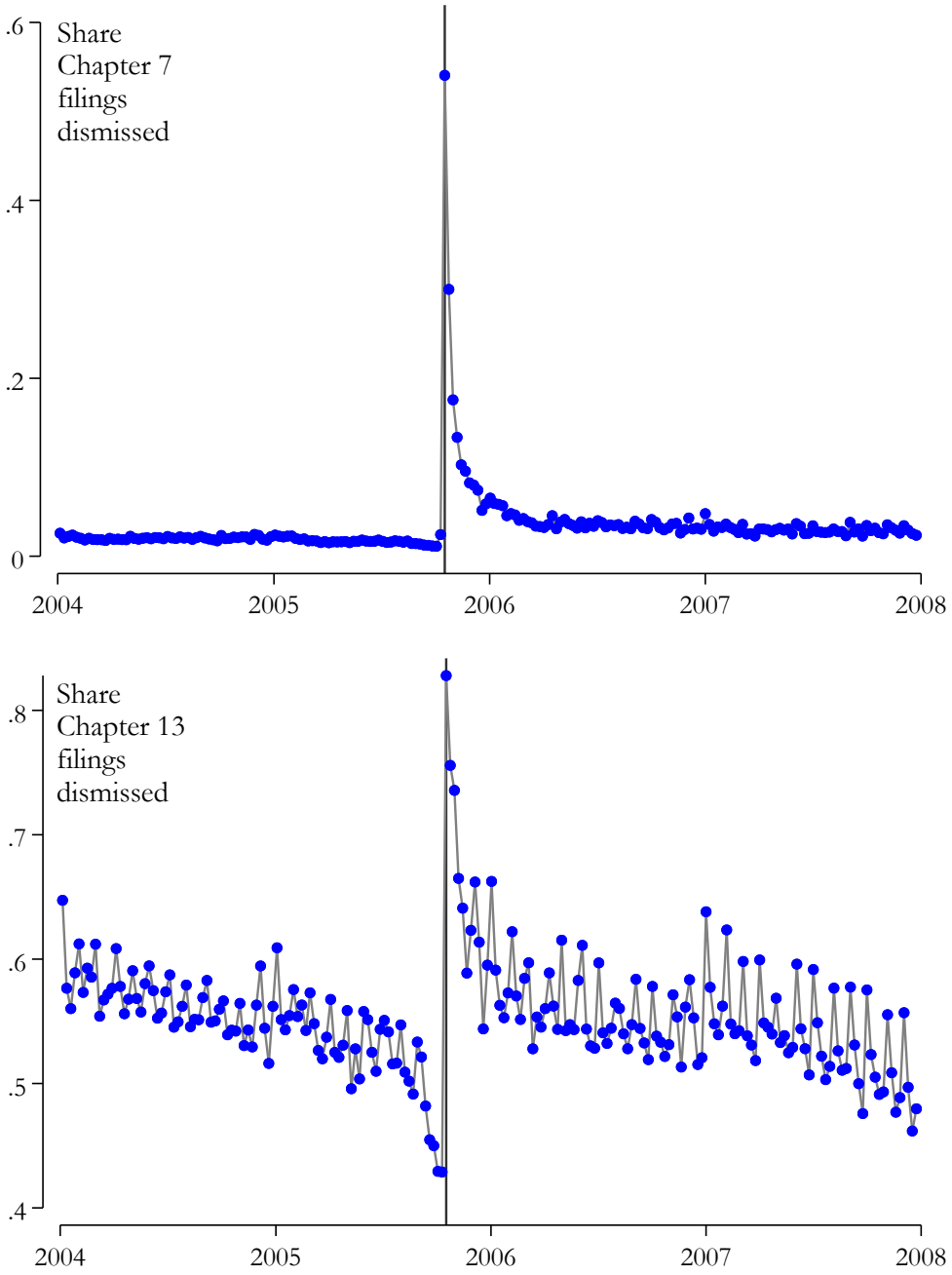
Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007, matched with the ZIP Code median household income measured in the 2000 decennial census. Each dot in the figure represents the average median ZIP Code household income for filers in that week. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A7: Income Distribution Filers by Chapter



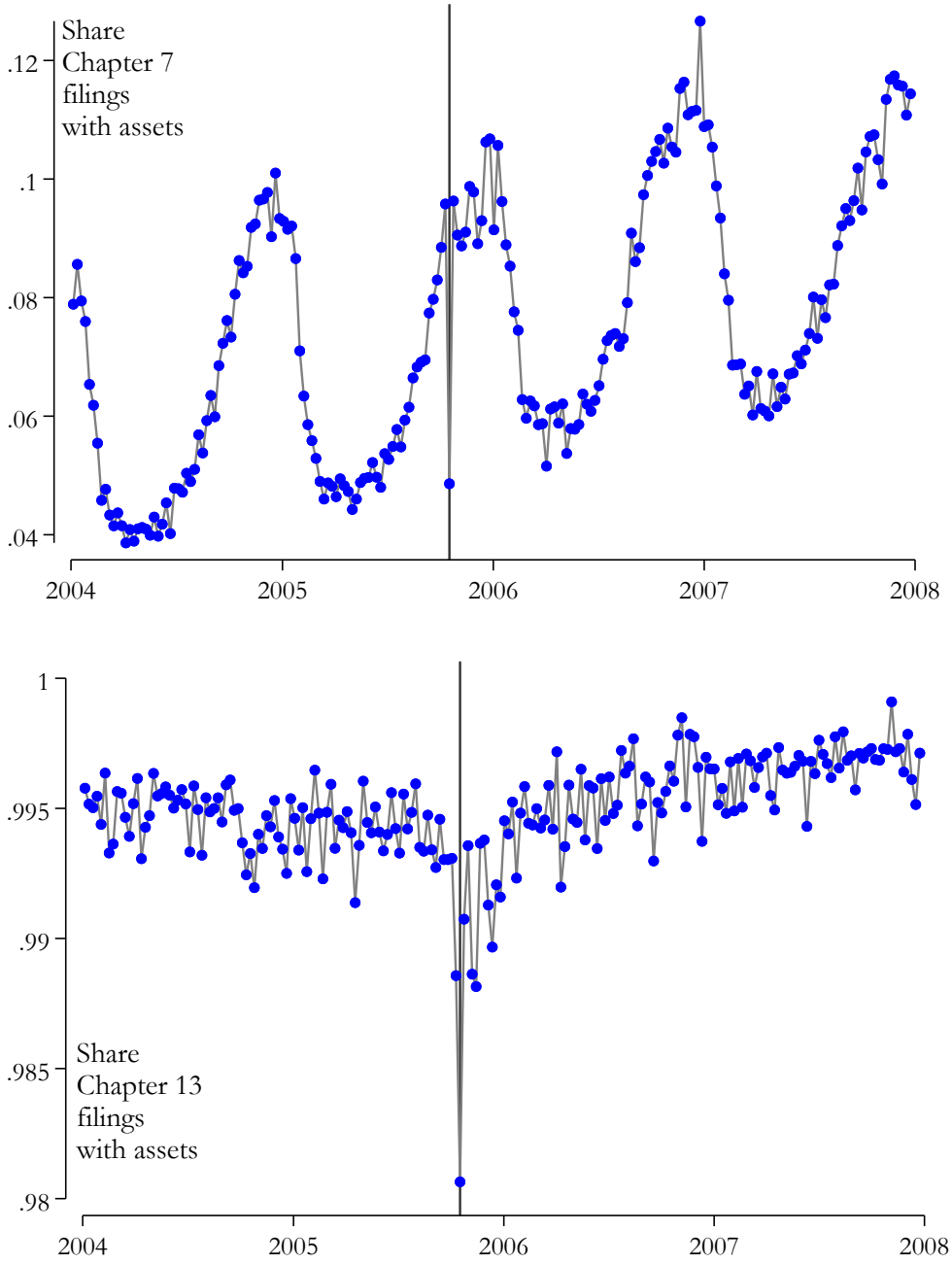
Notes: The sample includes all Chapter 7 and 13 consumer bankruptcy filings included in the PACER sample in 2004 and 2006, matched with the ZIP Code median household income measured in the 2000 decennial census. The two distributions plot the percentiles of ZIP Code median household income among filers in 2004 and 2006.

Figure A8: Share of Bankruptcy Filings Dismissed By Chapter



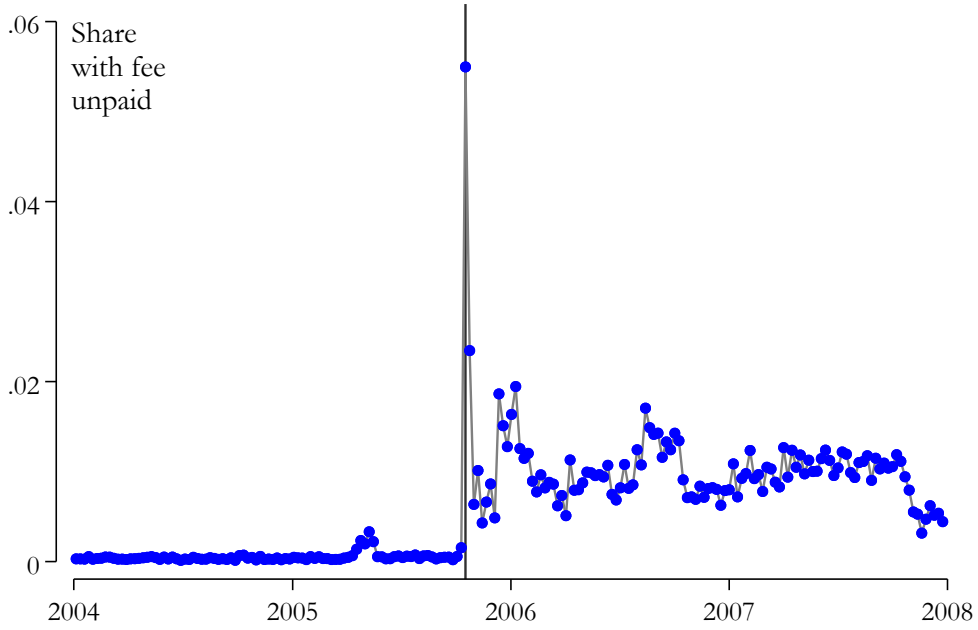
Notes: The sample includes bankruptcy filings in the PACER sample from January 2004 through December 2007 from districts for which we can observe dismissals: WAW, ILN, AZ, IAN, NYE, CAC, OKE, WVN, and DC. Each dot in the figure represents the average dismissal rate in the PACER sample for each chapter conditional on filing in that week. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A9: Share of Bankruptcy Filings With Assets



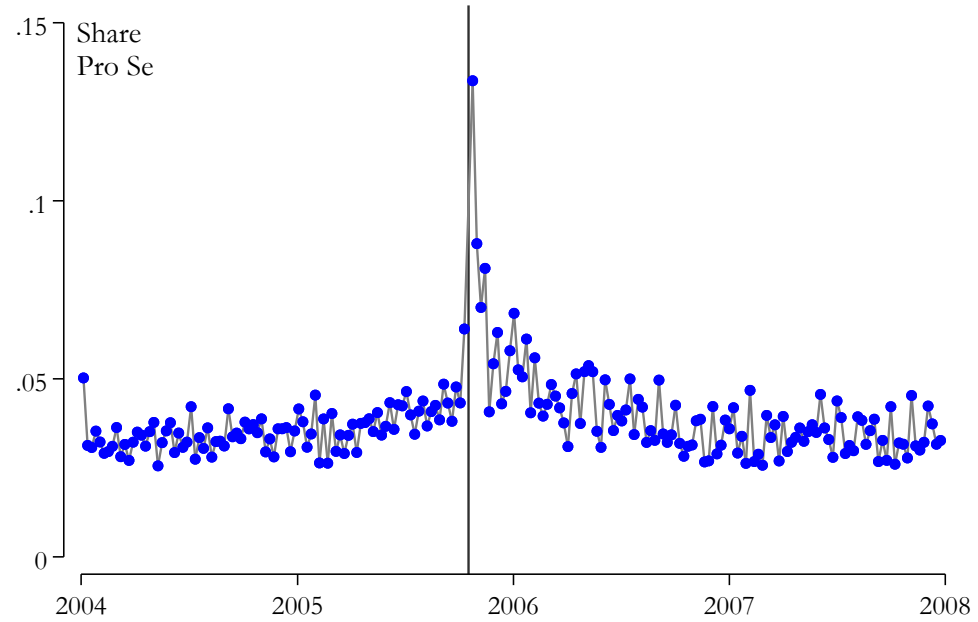
Notes: The sample includes all consumer bankruptcy filings in the PACER sample from January 2004 through December 2007. Each dot in the figure represents the share of filings in that week with exempt assets, separately by chapter. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A10: Effect of BAPCPA on The Share of Filings with an Unpaid Court Fee



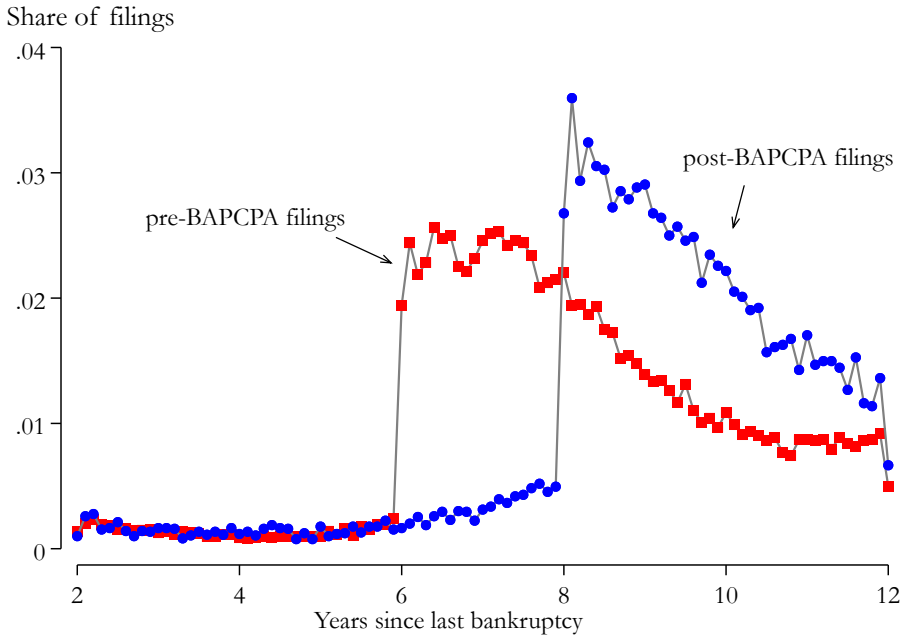
Notes: The sample includes all consumer bankruptcy filings in the PACER sample from January 2004 through December 2007. Each dot in the figure represents the share of filings in that week with the filing fee unpaid. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A11: Effect of BAPCPA on Share of Filers Representing Themselves



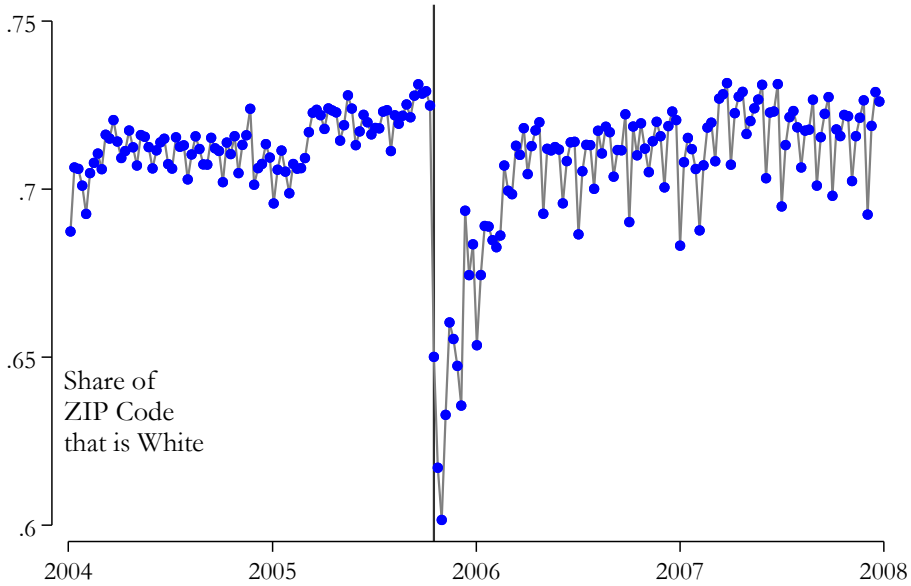
Notes: The sample includes bankruptcy filings in the PACER sample from January 2004 through December 2007 from districts for which we can observe whether the filing was *pro se*: WVNB, TXNB, TXEB, SCB, OKWB, OKEB, OHNB, NCWB, MOEB, MIEB, LAWB, KSB, ILSB, ILNB, IASB, IANB, and ALNB. Each dot in the figure represents the share of filings that are *pro se*. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005. The share *pro se* in the week of BAPCPA implementation is omitted, but was above 37%.

Figure A12: Years Since Last Chapter 7 Filing



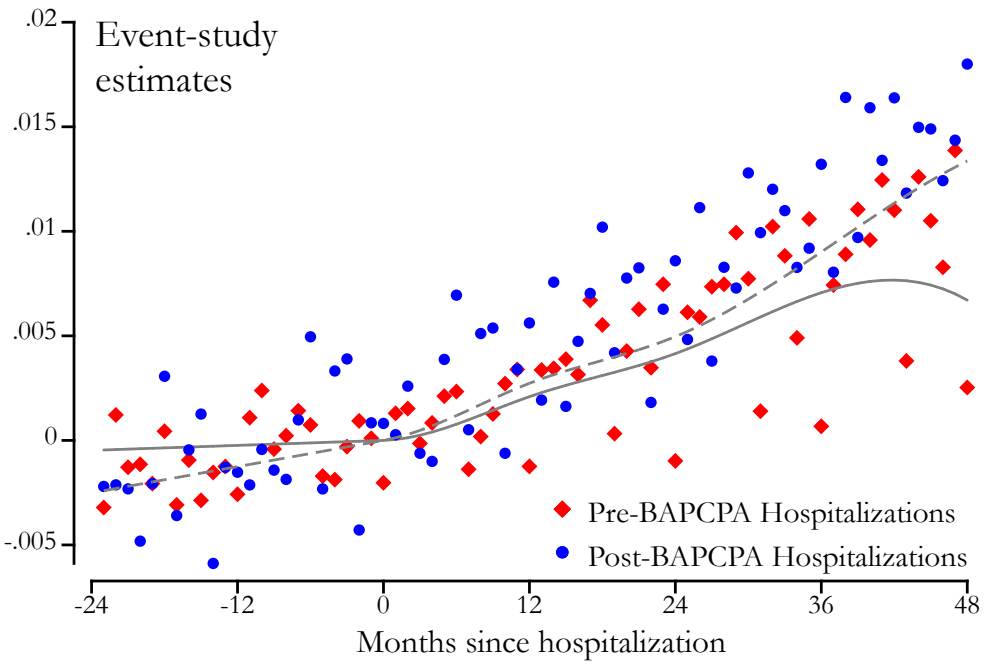
Notes: The sample includes Chapter 7 consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007. We match filings for the same individual over time using name, last four digits of Social Security number, and district. The figure plots the distribution of "years since last Chapter 7 filing" for bankruptcies filed before and after BAPCPA was implemented (October 17, 2005).

Figure A13: Neighborhood Race



Notes: The sample includes all consumer bankruptcy filings included in the PACER sample from January 2004 through December 2007, matched with data on race by ZIP Code come from the 2007–2011 American Community Survey, series B02001. Each dot in the figure represents the average share-white of the ZIP Codes of filers in that week. The vertical line indicates the date when BAPCPA was implemented, October 17, 2005.

Figure A14: Effect of Hospitalization on Bankruptcy Filing



Notes: The sample is individuals ages 25-64 who are hospitalized with insurance in California, additionally split by the timing of the hospitalization (January 2003 through December 2004 for the pre-BAPCPA sample, October 2005 through December 2007 for the post-BAPCPA sample). The points represent the estimated effects of event time (i.e., the μ_rs from the non-parametric event study in equation 4) and the lines represent the parametric event study in equation 5 with the pre-trends normalized between the two periods for ease of visual comparison.