Personal Bankruptcy and Credit Market Competition

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Abstract

We document a link between U.S. credit supply and rising personal bankruptcy rates. We exploit the exogenous variation in market contestability brought on by banking deregulation — the relaxation of entry restrictions in the 1980s and 1990s — at the state level. We find deregulation explains at least 10% of the rise in bankruptcy rates. We also find that deregulation leads to increased lending, lower loss rates on loans, and higher lending productivity. Our findings indicate that increased competition prompted banks to adopt sophisticated credit rating technology, allowing for new credit extension to existing and previously excluded households.

The last quarter century saw a dramatic increase in the share of U.S. consumers filing for personal bankruptcy, thereby seeking a discharge of their unsecured debt. In 2005, this increase led to the most comprehensive change to U.S. bankruptcy law since 1978. While several causes for the rise in bankruptcies have been advanced, and it is the subject of ongoing research, two potentially significant changes occurred during this period: banking deregulation — the relaxation of bank entry restrictions in the 1980s and 1990s — and technological change in consumer lending. Banking deregulation, by removing barriers to entry, increases credit market competition and therefore affects the supply of credit; new screening technologies change the way loans are made, allowing for interest rates to better reflect underlying risk and, thus, facilitating lending to riskier borrowers. In this paper we examine whether banking deregulation and technological change played a role in the increase in consumer bankruptcy.

The empirical literature has mostly focused on cross sectional differences in personal bankruptcy. In particular, it has revolved around legal institutions as a way to answer whether consumers file due to adverse events, as part of a rational financial calculation, or as a consequence of unfair or deceptive lending practices. Usually, researchers have exploited the different asset exemptions across U.S. states (that is, the amount of personal assets protected from creditors when a person files) to determine how important financial incentives are in a person's decision to file. In the time series, however, the real increases in bankruptcy exemptions are too small to explain the dramatic rise in filings.

This paper examines whether credit supply factors can explain the rise in bankruptcy rates. The only other paper that we know to ask a similar question is Gross and Souleles (2002). Using a panel of credit card accounts over 1995-1997, they study how much of the

increase in bankruptcy rates can be explained by changes in the risk composition of borrowers as opposed to changes in unobserved factors, taken to be borrowers' willingness to default. They find that only the increase in the latter has explanatory power.

We exploit the dramatic changes in the U.S. banking industry throughout the 1980s and early 1990s. Over the period, U.S. states gradually lifted restrictions on branching within the state as well as entry barriers to interstate banking. While determining the degree of market power is usually difficult, we use the state-level variation in deregulation dates as a way to measure the impact of changing credit conditions on consumer bankruptcy.

We find that bank deregulation increased competition among banks for borrowers, leading them to adopt more sophisticated technology for estimating borrower credit risk. In turn, this allowed previously excluded households to enter the credit market. In particular, we document four findings. First, we find that the removal of entry restrictions by out-of-state banks into state markets was associated with a 10 to 16% rise in the rate of personal bankruptcy. This is an economically significant magnitude, in contrast with the results of Gross and Souleles (2002), who find that changes in the risk composition of borrowers explain none of the increase in bankruptcy rates and that the increase in borrowers' willingness to default could explain less than 1% of the increase in the bankruptcy rate over a two-year period. Second, using bank financial data we find that deregulation was associated with increases in the growth rate of credit card loans. Third, we explore the mechanism behind these results. We use credit card loan productivity, defined as the average loan per bank employee, as a proxy for the use of information technology such as credit risk scoring software (Petersen and Rajan, 2002). We find that credit card loan productivity increases following interstate deregulation, suggesting that technology played a role in the expansion of credit

and the resulting increase in bankruptcies. Fourth, we find that credit risk, measured as the loss rate on loans, decreases following deregulation. Thus, while banks made more bad loans, which explains the increase in bankruptcies, the default risk among all borrowers fell. This reduction in average credit risk along with the increase in the bankruptcy rate suggests that banks increased credit to both existing low risk customers as well as new, riskier ones, because of banks' enhanced ability to discriminate risk.

We conduct a number of robustness tests. One important issue is how exogenous banking deregulation is to credit market changes. Our results are robust to controlling for the state of development of banking markets. Importantly, because we might expect more competitive banks to offer less resistance to deregulation, we find there is no relationship between the deregulation date and the the level of credit card lending productivity at the beginning of the sample. Finally, we control for important factors that lead households to find bankruptcy attractive, i.e. bankruptcy "demand" factors, including unemployment rates, income growth and homestead exemptions. Our results are robust to all of these controls.

The current financial crisis appears to contradict our findings: lending expanded rapidly in the 2000s, accompanied by novel financial products, yet default rates among even prime borrowers have increased sharply and several large banks have failed or been acquired at low prices. We discuss how our results relate to the financial crisis in greater detail in Section VI. Mortgages are fundamentally different from the unsecured loans that we study because their credit risk is tied directly to the value of the underlying collateral and not especially dependent on the risks and decisions of families. Gerardi et al (forthcoming) present evidence that lenders expected house prices to continue to appreciate, allowing them to make loans to virtually any borrower. Given the popularity of the so-called "low doc" mortgage it

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appears that lenders did not invest heavily in screening and monitoring technologies during the recent credit boom. Thus, the credit expansion of the 2000s appears to have been due to a miscalculation by lenders. We also discuss whether there was an analagous exogenous increase in credit availability over the period.

Our paper is part of the growing literature on household finance with a focus on how credit market competition affects consumer access to credit and default (Campbell 2006, provides a review of this literature). Our findings stand in apparent contrast to the banking literature crediting banking deregulation for a host of positive outcomes, including greater bank efficiency, lower prices and higher loan quality, as well as to higher rates of new business formation and faster economic growth [Jarayatne and Strahan, 1996, 1998; Black and Strahan, 2002]. Although consumer bankruptcy filings may be seen as a negative outcome per se, our results indicate that some of the rise is due to lending to previously excluded households, and which probably also yielded benefits. One must exercise caution here, however, as these borrowers are likely to be poorer and less educated, and thus more likely to make borrowing mistakes (Campbell, 2006). One concern is predatory lending. While the effects of competition on such practices are not fully understood, Bond, Yilmaz and Musto (forthcoming) argue that competition among lenders reduces or eliminates the welfare loss suffered by borrowers due to predatory lending. Along these lines, Gabaix and Laibson (2006) provide a model where firms exploit unsophisticated consumers by offering confusing financial products which generate a cross-subsidy from naïve to sophisticated consumers. Our results thus suggest that, while the legal environment in which lenders and borrowers operate is obviously important, further research into the consumer lending industry is required to fully assess the welfare implications of greater access to credit and consumer bankruptcy.

In addition, our results are consistent with Livshits, MacGee, and Tertilt (2007), who calibrate an equilibrium model of personal bankruptcy in a heterogeneous agent life cycle model with incomplete markets. They find (as have others) that increased income and expense uncertainty cannot quantitatively explain the rise in bankruptcies since the 1970s. However, they do find a role for credit market factors: decreased transactions costs of lending. In their paper, it is this technological improvement that leads to increased filings. Our paper provides the first empirical confirmation of such a link.

The paper is organized as follows. Section I provides some background on personal bankruptcy law in the U.S., and on recent trends. Section II reviews the literature on personal bankruptcy and on the theories relating credit market competition with borrower default. Section III introduces the data and the empirical model and strategy. Sections IV and V present and discuss results on the relationship between credit supply and personal bankruptcy, and the mechanism by which deregulation affects credit risk, respectively. We discuss our results in light of the current mortgage crisis in Section VI. Section VII concludes.

I. Background on personal bankruptcy in the U.S.

The incidence of personal bankruptcy among consumers has increased significantly since 1980. Generally speaking, consumers can file under either Chapter 7 or Chapter 13 of the bankruptcy code. A Chapter 7 filing requires the consumer to liquidate all non-exempt assets in exchange for the elimination of most unsecured debts. A Chapter 13 filing allows the consumer to avoid liquidating assets, but requires them to make payments on outstanding unsecured debts for up to five years. Here, we focus on Chapter 7 bankruptcy, where the

debtor is given a "fresh start." Chapter 7 filings account for more than 70% of total filings every year. Figure 1 shows the trend of Chapter 7 filings as a share of U.S. population since 1980. As shown, the rate of Chapter 7 filings has increased significantly over the past two decades: the rate in 2004 is more than triple that of 1980, and the total number of filings increased to over one million a year near the end of the series.[1] The average rate in the period is 0.22%, or about 600,000 filers on average per year. Federal law governing consumer bankruptcy changed relatively little throughout this period. The Bankruptcy Reform Act of 1978, considered debtor-friendly as it increased the amount of assets protected from creditors when filing for bankruptcy, was the first overhaul of the law since 1898. Prior to the comprehensive Bankruptcy Abuse Prevention and Consumer Protection Act of 2005, there were only minor revisions to federal bankruptcy law, which introduced slight changes to curtail fraud and adjusted federal asset exemptions for inflation.[2]

Interestingly, household debt showed a similar trend throughout the period. As Figure 1 shows, the ratio of revolving consumer credit to disposable income increased along with the bankruptcy rate. Indeed, this ratio more than tripled during the period, while revolving consumer credit per person (not shown) more than quadrupled.

A similar picture arises at the state level. Figures 2 and 3 show U.S. states grouped by Chapter 7 personal bankruptcy filings per 1,000 persons in both 1980 and 1994 (our sample

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[1] Bankruptcy rates were essentially flat from 1960 to 1980.

[2] These include the 1984 Bankruptcy Amendments and Federal Judgeship Act and the 1994 Bankruptcy Reform Act, respectively. From a consumer's point of view, the most important feature of bankruptcy law during the 1978–2005 period was the asset exemption level, which determined the value of assets that the consumer could keep following a Chapter 7 filing. The 1978 Act set uniform national standards for exemptions, but allowed states to opt out and set their own exemptions. Many states quickly passed laws opting out of the federal statute. Throughout our sample period, most states did not change their exemptions, thereby leading to little variation in the law at the state level as well. We will return to this issue later in our estimation.

period). As can be seen from the darkening of colors from 1980 to 1994, most states shifted to a higher bankruptcy rate category, and indeed, all states experienced an increase in the bankruptcy rate over the period.

The large increase in personal bankruptcy has been interpreted in various ways. On the one hand, some have argued that the increase is the result of consumer abuse of an overly lenient bankruptcy code. On the other hand, some have seen the increase as evidence of growing household distress, driven by increasing housing and medical costs, and, to a certain degree, unfair and abusive practices by lenders. Other factors put forth as possible causes include a decrease in the social stigma associated with bankruptcy, a decrease in legal filing costs, an increase in the availability of information about the process of filing, and increased lending to riskier borrowers. The increase in bankruptcies led to a major policy debate, spurring a series of attempts to modify the law. With the April 2005 passage of a comprehensive national reform (effective October 2005), bankruptcy filers must complete a means test in order to determine their eligibility for Chapter 7 bankruptcy. The law included other features that made bankruptcy less attractive. While the welfare effects from reform are hard to determine, the potential gain in consumer access to credit and lower costs (assuming enough competition in credit card market) must be weighed against the reduction of the crude insurance that the bankruptcy option provides against unexpected adverse events [Ashcraft, Dick and Morgan, 2006].

II. Personal bankruptcy and the credit market

Economists have adduced two main drivers of the consumer bankruptcy decision: the

strategic motive sees bankruptcy as driven by the financial benefit from filing, while the *adverse events* theory sees bankruptcy as caused by shocks to income (e.g. unemployment) or expenditures (e.g. medical expenses). Fay, Hurst, and White (2002) find that the financial benefit from filing – defined as the debt discharged minus the amount of nonexempt assets that must be liquidated– is the primary driver of bankruptcy, with most of the variation in the financial benefit across individuals being due to the debt level of individuals. However, they also find that couples undergoing a divorce are likelier to file and that, all else equal, consumers in states with high filing rates are likelier to file, suggesting a role for spillovers (whether from peer effects, advertising, or decreased stigma). Survey evidence suggests that one main cause of bankruptcy is medical problems, followed by divorce and unemployment (see Himmelstein et al. 2005; Sullivan et al. 2000; Warren and Tyagi 2003). Domovitz and Sartain (1999) also find that medical debt due to health problems is the most important bankruptcy factor, though the largest contributor at the margin is credit card debt. Research has also found that consumers are more likely to be turned down for credit and pay higher interest rates in states with higher exemptions [Gropp, Scholtz and White, 1997], as banks adjust ex ante for the level of consumer protection ex post. Given that state exemptions increased little (in real terms) over the last twenty five years (half of the states never changed them and most that did change them only once), changes in exemptions may be an important explanatory factor for cross-sectional differences but not so for the secular increase in bankruptcies over the last two decades.

Whatever the reasons for filings, the degree of competition in credit markets affects the supply and price of credit, and as a result the level of consumer default and personal bankruptcy filings. The theory, however, offers conflicting views about this link. On the one

hand, some theories predict a positive link between competition and bankruptcies. First, competition shifts out the supply of credit as existing rents are eaten away by entry. This shift in itself should lead to a rise in consumer default as banks lend more to existing consumers – i.e. on the intensive margin– and consumers have greater debt burdens. Second, Keeley (1990) argues that by decreasing banks' charter values, competition worsens the risk-taking incentives stemming from deposit insurance, and this leads banks to take on greater portfolio risk. He uses state banking deregulation from 1970 to 1986 to show how increases in competition led to a decrease in bank franchise value (Tobin's q, measured as market-to-book asset values) and excessive risk taking on a sample of 150 publicly traded banking holding companies. On the other hand, some theories predict competition to reduce the supply of credit to opaque borrowers and therefore decrease default rates. In Petersen and Rajan (1995), banks in less competitive markets are more willing to invest in building the relationship needed for lending to lower quality firms. Instead, competition reduces the value (rents) banks anticipate deriving from these relationships, leading them to curtail lending to lower quality borrowers. Boyd and De Nicoló (2005) revisit the literature on the relationship between competition and bank risk taking and find that greater competition leads to higher deposit rates and lower loan rates, which by diminishing the adverse selection problem leads to an increase in the loan supply and a decrease in bank risk. Moreover, the effects of competition on lending standards are theoretically ambiguous. On the one hand, we might expect banks to loosen standards due to more competitive pressure (it is harder to make a loan, so you demand less for your money); on the other hand, banks may not afford the luxury of relaxing lending standards due to more competitive pressure, and in fact, might have to strengthen them: while a monopolist can enjoy the quiet life and lend carelessly, a

competitive bank might risk bankruptcy in doing so.

Ours is one of only two papers that examines credit supply factors to the increasing bankruptcy rates in the U.S. during the last 25 years. Gross and Souleles (2002) estimate a duration model for bankruptcy using a panel of credit card accounts from a single credit card issuer for 1995-1997. They put forth two leading explanations for the increasing trend in bankruptcy throughout the period: a deterioration in the risk composition of borrowers (supply or risk effect) versus an increase in borrowers willingness to default due to declines in default costs (demand effect). The latter could be related to decreased social stigma, information and/or legal costs. They disentangle the two by controlling for changes in the risk effect using all the variables observed by the lender. The demand effect is thus the residual increase in defaults not explained by changes in observed risk factors. They find that the risk effect, which should also capture changes in credit supply such as increases in the credit limit, cannot explain any of the increase in bankruptcy, while the demand effect can explain a 0.7% point increase in the bankruptcy rate, ceteris paribus. Thus, a credit card holder in 1997 is 0.7 percentage points more likely to declare bankruptcy than a cardholder with identical risk characteristics in 1995.

III. Data and specification

For our bankruptcy data, we use the annual compilation of petitions from the Administrative Office of the U.S. Courts (AOUSC), which is the primary public source for consumer bankruptcy data. Our data covers the period 1980–1994. We focus on this period for several reasons. First, a major modification to bankruptcy law was introduced by the 1978

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Bankruptcy Reform Act, which made it easier for consumers to file for bankruptcy by increasing the exemption levels they could claim when filing. This reform was followed by the surge in bankruptcies that ensued over the following two decades. As a result, most data become available starting in 1980, which determines our sample's start date. Second, given that our source of exogenous variation in credit market conditions derives from banking deregulation, our sample ends in 1994, the year in which a federal law was passed to establish nationwide branching.

In terms of our credit market data, we use data from the Reports of Condition and Income from the Federal Reserve Board to analyze loan growth and loan quality, as well as to construct our measures of bank productivity. We complement these data with those of the Federal Deposit Insurance Corporation Summary of Deposits, in order to build bank market shares at the state level and other measures of market structure and market entry. Our demographic data come from the Bureau of Economic Analysis and other sources (National Center for Health Statistics, Dunn and Bradstreet).

A. Banking deregulation

Banking is a highly regulated industry, yet over the last three decades restrictions on a bank's ability to do business in different geographic areas have almost vanished. Over the 1980s and early 1990s, in particular, U.S. states gradually removed barriers to banking and branching within and across state lines. The fact that states chose to remove these barriers at different times provides us with variation in the competitive environment faced by consumer lenders that is potentially exogenous with respect to consumer bankruptcy decisions.

The deregulation of branching and banking across state lines represents a shift in the level of contestability of the market; even if nothing changes, deregulation automatically increases the threat of potential entry and decreases the market power of incumbents. States usually deregulated *intra*-state banking and then moved to deregulate *inter*-state banking. We analyze both levels of deregulation. In particular, we use the removal of branch restrictions *within* states (by merger and acquisition) and the removal of restrictions to banking *across* state lines (via bank holding companies). Banking deregulation has been extensively studied in the literature. For instance, Black and Strahan (2002) follow a similar approach in their study of the effects of banking deregulation on entrepreneurship.

Table I shows states grouped by year of intrastate and interstate deregulation. By 1980, about a third of states had removed restrictions to branching within the state, but only one state had lifted restrictions to interstate banking. The extensive literature on the effects of banking deregulation finds that deregulation was generally a positive development, leading to greater bank efficiency and competition, lower prices and higher quality, new business formation, and higher economic growth [Jarayatne and Strahan, 1996, 1998; Black and Strahan, 2002]. In terms of market structure, deregulation allowed for considerable consolidation in the industry, mostly through a series of mergers and acquisitions. Moreover, the number of banking institutions and the share of deposits in the hands of small banks decreased substantially.

A.1. Endogeneity of deregulation

One important issue is how exogenous banking deregulation is to consumer credit conditions. For example, states dominated by technologically sophisticated banks might relax

restrictions on interstate banking sooner, because the banks would have little fear from out-of-state competitors.

To address this potential issue, we construct a measure of a bank's credit card lending productivity, which we define as the average credit card loan generated per bank employee. We define the measure for 1980, the beginning of our sample, since we are interested in the state of bank development before interstate deregulation takes place. Petersen and Rajan (2002) use such a measure as a proxy for banks' use of information technology. Figure 4 shows the relationship between early average credit card loan productivity and the year in which the state deregulates. As can be seen, states with relatively productive banks do not appear to be deregulating earlier (correlation of -0.03). We get a similar picture if we use credit card productivity over 1980-1983.

In our analysis, we explore the issue further by introducing a measure for any gradual steps that the state might take toward deregulation, as well as controlling for regional clustering and banking market structure.

B. Empirical specification

Table II shows summary statistics over the period 1980–1994. Following the literature of U.S. banking deregulation in this period, we remove South Dakota and Delaware from the analysis because they are states that provide special tax incentives for credit card banks. Given the remaining 48 states and 15 years of data, we have a total of 720 observations. The state personal bankruptcy rate throughout the period is an average of 1.7 filings per 1,000 persons. All of the states that allowed interstate banking during our sample period have

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a higher average personal bankruptcy rate after deregulation relative to the average before deregulation. However, this could be related to the secular rise in bankruptcy rates over the sample period; in our empirical work we control for common variation across years with time dummies.

To explore how competition in banking markets affects the rate of personal bankruptcy, we study the relationship between personal bankruptcy and the two banking deregulation events at the state level. Because measuring market power is not straightforward, the exogenous increase in contestability from deregulation allows us to explore the question of how competition and bankruptcy are related. In particular, we specify the following unobserved effects model:

$$PersonalBankruptcy_{j,t} = \beta_1 InterstateBanking_{j,t} + \beta_2 IntrastateBranching_{j,t}$$

$$+ \gamma X_{j,t} + \alpha_j + \tau_t + \epsilon_{j,t} \quad (1)$$

Here $PersonalBankruptcy_{j,t}$ represents the number of personal bankruptcy petitions per 1,000 persons in state j and year t. $InterstateBanking_{j,t}$ and $IntrastateBranching_{j,t}$ are indicator variables equal to one for states that allow interstate banking and intrastate branching, respectively (and zero otherwise). These indicators should capture changes in the credit supply. $X_{j,t}$ is a $1 \times K$ vector of time-varying demand-side controls, including current and lagged (by one year) state personal income growth and the lagged unemployment rate. The specification includes a series of fixed effects: α_j is a state fixed-effect while τ_t is a year fixed-effect. The latter captures nationwide changes in bankruptcy rates, most obviously the secular rise in bankruptcies. The ability to use state fixed effects is a strength of our empirical approach

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because these can potentially control for a range of omitted variables. In particular, the state fixed effects capture differences in the bankruptcy rates across states due to time-invariant factors such as state demographic makeup and the state legal framework and culture. Formal statutes and the informal cultural differences in attitudes of bankruptcy court trustees vary considerably across states and obviously influence the household bankruptcy decision. For example, Florida, Texas and a few other states have *unlimited* homestead exemptions; creditors in these states have effectively no claim on a debtor's home equity, regardless of the value of the home.

Given the time-series persistence of our data, within-group errors could be correlated; that is, $E(\epsilon_{j,t}\epsilon_{j,t+1}) \neq 0$. Standard OLS would produce inappropriate standard errors on our coefficient estimates. Thus, we allow for arbitrary correlation within-group by constructing a variance-covariance matrix that is valid in the presence of any heteroskedasticity or serial correlation in the idiosyncratic error $\epsilon_{jt} : t = 1, \ldots, T$, where $j = 1, \ldots, N$ is any cross section observation (i.e. state), provided that T is small relative to N (in our setup, the appropriate asymptotics is $N \to \infty$, for fixed T).[3] We use the fully robust variance matrix estimator suggested by Arellano (1987) for fixed effects models in the context of panel data, also proposed in Wooldridge (2003). Recently, Kezdi (2004) and Bertrand, Duflo and Mullainathan (2002) analyze the finite-sample properties of robust variance matrix estimators in fixed effects with panel data, and conclude that it works reasonably well. This approach is equivalent to a seemingly unrelated regression equations (SUR) structure on the errors, as well as fully controlling for unobserved heterogeneity across groups.

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[3]Note also that N asymptotics are appropriate even if in the case of U.S. states they practically remain fixed while T can grow (Wooldridge, 2002, p. 250).

IV. The effect of deregulation on personal bankruptcy and credit supply

A. Main result

The first column in Table III shows results from our basic specification where we estimate the state personal bankruptcy rate as a function of the two deregulation events, as well as key demand factors (personal income growth plus a lag and the unemployment rate), state and year fixed effects. Recall that our standard errors are adjusted to allow for heteroskedasticity and serial correlation of the within-state shocks. This base specification explains a substantial 83% of the variation in the dependent variable. As shown in column (i), interstate banking deregulation has a positive and statistically significant effect on the rate of personal bankruptcy. The effect of branching deregulation is not statistically different from zero. While both types of deregulation should have increased competitive pressures on banks by allowing various forms of entry, it is interstate banking deregulation that appears to have been most significant in affecting consumer credit market conditions. This is not surprising given that interstate deregulation allowed competition by banks from all over the country, whereas intrastate deregulation only allowed for competition by banks already in the state. With interstate deregulation, banks faced the threat of entry into their state markets, with out-of-state banks usually taking control over state banks. Out-of-state banks tended to be larger and had therefore greater access to funds and better technologies, which could have allowed them to make loans that incumbent banks eschewed as too risky, resulting in higher bankruptcies.

The result is economically meaningful as well. In particular, we can trace a 12% increase in the filing rate directly to interstate banking deregulation, based on the sample median

(1.5 filings per 1,000 persons).

As expected, personal income growth has a negative effect on personal bankruptcy: a one standard deviation increase in personal income growth leads to a 5% decrease in the rate of personal bankruptcy. The unemployment rate has a positive effect on bankruptcy, with a one standard deviation increase in the unemployment rate leading to an increase in the personal bankruptcy rate of 17%. The results are consistent with the survey evidence that highlights unemployment as a one of the leading factors driving people to file for bankruptcy.

B. Additional controls: banking market structure

One possibility is that states deregulated once the competitive forces were strong enough to make a move toward liberalization part of a natural market evolution, in which case the deregulation indicators would simply be capturing the degree of competition at the time of deregulation. Thus, it is important to control for the banking market structure in the state to explore whether our earlier finding stemmed from the deregulation *per se* or from gradual changes in the level of competition in the market.

Columns (ii)-(vi) in Table III report results when we include variables directly measuring the banking market structure in the state. In particular, we introduce diverse measures of market concentration, including the number of banks that control over half of state deposits (columns ii and iii), the state Herfindahl-Hirschman index (HHI) for deposit shares (columns iv and v), and the share of state assets in the hands of small banks, defined as those with deposits of less than $100M (column vi). We include the latter following the work of Kroszner and Strahan (1999), who find that states with a large small bank presence were the last ones

to remove bank branching restrictions (our measure of intrastate deregulation), presumably because they had the most to lose from greater competition. Since market structure and the degree of personal bankruptcy in a given year might be jointly determined, we lag our market structure variables by one year to diminish the possibility of endogeneity.

As shown in columns (ii), (iv) and (vi), we find that when we control for these measures of market structure, banking deregulation continues to show a significant and positive effect on personal bankruptcy, with a magnitude of at least 11% (based on the lowest coefficient on interstate deregulation from column (iv)). While we find that a decrease in concentration, via an increase in the number of state banks jointly holding at least half of state deposits, or a decrease in the HHI, is associated with an increase in personal bankruptcy, none of the coefficients are statistically different from zero (similarly for the deposit share of small banks).

Deregulation might have different effects depending on the preexisting competitive environment of state banking markets, so we add an interaction term between the interstate deregulation and our market concentration measures. We find, perhaps not surprisingly, that deregulation matters more (greater positive effect) in states that had highly concentrated banking markets at the time of deregulation, as measured by the HHI in column (v) (note that the effect is not significant when we use, in col. (iii), the number of state banks holding half of deposits as the alternative measure of concentration). This is reasonable since the latter had presumably the most to gain from the removal of barriers to entry. For instance, states with high levels of concentration (an HHI of 2300 or higher, such as Arizona, Nevada and Rhode Island) experience a 23% increase or more in the bankruptcy rate following deregulation. States with low levels of concentration (an HHI equal to 100 or lower,

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such as Arkansas, Florida, and Texas) experienced an increase in the bankruptcy rate of only 1% following deregulation. Similarly, concentration, which still shows a negative effect on bankruptcy, matters less after deregulation.[4]

Finally, we construct a measure for the level of geographic diversification of state banks. Banking deregulation allowed banks to expand geographically, thereby lowering volatility and bank default risk, which in turn might allow banks to take on riskier loans. While it is deregulation that allowed for greater geographic diversification, the latter may have an effect on the loan portfolio distinct from the increased competition following deregulation. To disentangle the two effects, we use the number of states of operation of the average bank in the state (weighted by deposit share) and find that the coefficient on the variable is positive but imprecisely estimated, with no effect on the interstate deregulation coefficient. This is shown on column (vii) of Table III.

In column (viii), where we incorporate all our market structure variables jointly, the impact of the interstate deregulation continues to be highly significant and accounts for a 12% increase in the rate of bankruptcy. These results suggest that the effect from deregulation on the bankruptcy rate is robust to changes over time in the structure of state banking markets.

C. Additional demand factors driving bankruptcy

As already mentioned, the empirical literature has focused on demand-side factors in

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[4]Although it is common to assume an unambiguous correlation between market concentration and competition in the market, this assumption might not hold. Dick (2006) finds that following banking deregulation in the 1990s, concentration showed little variation in local banking markets, even though competition likely increased. Note that here we use within-state variation to identify the coefficient on concentration measures. When we look at this variation within the sample, we find that states experience slight variation in their concentration levels, with most states seeing an increase from 1980 to 1994. We consider the effect of the actual (rather than the threatened) presence of out-of-state banks below.

its search for explanations for what drives personal bankruptcy. In Table IV, we augment our base specification to introduce variables to account for additional demand factors usually associated with consumer bankruptcy in the U.S. Unemployment, unpaid medical bills, and divorce are the most commonly cited life events leading directly to bankruptcy. We already account for unemployment in our base specification: note that unemployment varies significantly over time within states, allowing for identification of its effect when state fixed effects are included. In column (i) of the table, we augment our base specification with state divorce rates. While the coefficient on the divorce rate is positive, as we would expect, it is not statistically significant. This is likely because divorce rates do not vary much over time within a given state. The coefficient on interstate deregulation continues to be highly significant and positive. Unfortunately, data on medical bills and/or insurance take up rates are not available for our sample period.[5] [6]

As we discussed, several papers have found that the financial benefit to filing for bankruptcy plays an important role in the household bankruptcy decision. The potential financial benefit from filing is directly related to state asset exemptions. While state laws vary along many dimensions, the largest and best-measured exemptions are those related to the equity in the primary residence (the so-called "homestead exemption"). In columns (ii) and (iii) of Table

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[5]For instance, the share of the population over 65 years of age without health insurance as a proxy is only available starting 1987. The coefficient is positive but statistically insignificant (results not shown). Note that the information and legal costs of filing might have decreased throughout our sample period as well, through the increase in the number of bankruptcy lawyers and their advertising, as well as through social spillovers as more people file for bankruptcy. While we have no data at the state level to control for this, much of this is likely captured by the year fixed effects.

[6]House prices may have an effect through substitution of mortgage for consumer debt. Canner, Dynan, and Passmore (2002) find that the proceeds of cash-out refinancings are used to pay down existing, higher-cost, debts. Cash-out refinancings are more common during low interest rate periods, and when house prices are appreciating rapidly. To explore this, we introduce in our specification the OFHEO state house price index (lagged one year). We find that higher house prices are associated with a lower rate of consumer bankruptcy (results not shown).

IV we show the results of our baseline specification augmented with state homestead exemptions. We use both the actual dollar amount of the home equity exemption (capped at one million dollars for states with unlimited homestead exemptions), and an indicator variable for whether the state has an unlimited homestead exemption. Only the coefficient on the unlimited homestead indicator is significant, indicating that states where such is available have bankruptcy rates that are on average 7% higher. There is actually little time variation that we have to distinguish the state fixed effect from the homestead exemption effect – for 27 states, these are in fact indistinguishable from each other. In particular, homestead exemptions changed in only 21 states during 1980-1994. All states increased exemptions, except for Minnesota, which capped its unlimited exemption. In order to determine the marginal effect on bankruptcy of state exemptions, we estimate a model with nine region fixed-effects, as opposed to state fixed effects (thereby still controlling for much of the unobserved geographic heterogeneity). This is shown in columns (iv) and (v). As one would expect, we find that a greater (or unlimited) state homestead exemption is associated with a greater degree of consumer bankruptcy, and, in this specification, the effect is statistically different from zero. In particular, an increase in the homestead exemption from the 25th ($10,000) to the 75th ($60,000) percentile of the distribution is associated with a 2% increase in the bankruptcy rate. This is a rather small effect, especially given the important role the homestead exemption has been found to play elsewhere. When we incorporate instead the indicator for unlimited homestead exemption, we find that bankruptcy rates in states with such exemption are on average 28% higher relative to other states. It is worth noting that the effect from interstate deregulation doubles when we use region fixed effects, explaining at least 20% of the increase in bankruptcies, which highlights the stringency of our state

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fixed effects model.

The literature has found a series of positive developments following banking deregulation, including increases in market efficiency, business formation, and higher economic growth [Jarayatne and Strahan, 1996, 1998; Black and Strahan, 2002]. Thus, deregulation, by increasing the dynamism of the economy, in the form of Schumpeterian "creative destruction", could be followed by greater consumer bankruptcy. Small business bankruptcies could show up as consumer bankruptcies since many small business owners (such as those of sole proprietorships or partnerships with unlimited liability) file under the personal bankruptcy code, and not business bankruptcy, when the business they own enters distress.[7] To account for this possibility, we augment our base specification a proxy for business churning, measured as the log of new business incorporations, adjusted by the state population, in non-bank sectors.[8] Column (vi) of Table IV shows the results, where we find that greater firm creation is associated with a lower rate of personal bankruptcy, though the effect is not statistically significant. Thus, small business bankruptcies do not appear to be responsible for the increase in consumer bankruptcies, while the coefficient on interstate banking deregulation remains positive and significant.

In the last column of the table the model is expanded to include all of the demand controls as well as the earlier market structure controls. Even after taking into account the joint effect of these diverse factors, interstate banking deregulation still explains 13% of the increase in bankruptcy rate, with a statistically significant coefficient.

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[7]Moreover, the empirical evidence suggests that personal wealth plays a significant role in the allocation of small business loans [Avery et al. 1998]. Pledges of personal assets and guarantees are used as substitutes for business collateral, and these make owners *personally* liable for business debts.

[8]Our data on new firm entry are those used in Black and Strahan (2002), who kindly provided it for our purposes. The original source of the data is Dunn and Bradstreet.

D. Controls for state bilateral agreements before deregulation

Before interstate banking deregulation took place, some states had already engaged in bilateral agreements with other states, usually neighboring ones, that effectively opened up (to various extents) the markets in both states to banks operating in either state. While many papers use banking deregulation to measure exogenous changes in competition, none to our knowledge control for the possibility of any gradual steps taken at the state level toward deregulation. We use the deposit share of out-of-state banks operating in a given state to capture the presence of any out-of-state banks before interstate deregulation.

The results in columns (viii) and (ix) of Table IV indicate that the estimated effect of interstate deregulation is robust to controlling for the presence of out-of-state banks. We introduce the out-of-state bank deposit share alone, as well as exploring interactions with interstate deregulation. In column (ix) we introduce all of our previous controls for banking market structure and the enlarged set of demand factors. In both specifications, we find no effect related to the deposit share of out-of-state banks. This may suggest that the real shift in market contestability happened only with full deregulation. Bilateral agreements, by contrast, may not have had much of an effect because they were usually among neighboring states who likely resembled one another. This might increase competition somewhat, but not enough to induce technological change. Note that there is no straightforward way to measure the intensity of deregulation: unlike other forms of market liberalizations (e.g. capital market liberalization studied in Bekaert et al. (2005)), banking deregulation did not necessarily lead to entry. By removing barriers to entry, interstate banking deregulation made banking markets more contestable, such that the threat of entry could in itself be enough

to pressure in-state banks to be more competitive. Moreover, the degree of entry is likely to depend on the state of development of the banking market at the time of deregulation, such that the more competitive markets might experience less entry. [9]

Even after controlling for time-varying banking market factors, demand and a state's gradual steps toward deregulation, we find that interstate deregulation explains at least 10% of the rising trend in consumer bankruptcy.

E. Credit supply

Determining the effect on loan supply from deregulation is important for several reasons. While it is not straightforward to make welfare inferences resulting from changes in loan supply, it is likely that an increase in the loan supply, as opposed to a portfolio reallocation, would make consumers relatively better off, especially if previously excluded consumers are given access to credit. Moreover, there is a large literature that documents that greater access to credit and decreased financing constraints lead to increases in economic growth [Beck and Levine 2003; Bekaert, Harvey and Lundblad 2005]. Previous studies have found evidence of an increase in credit following banking deregulation. In their study of branching deregulation and economic growth, Jarayatne and Strahan (1996) found some evidence of an increase in credit, though they attribute the increase in economic growth to improvements in

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[9]Another possibility is that deregulation could be clustered by region, with states in a given region following each other. To explore this, we introduce region fixed effects (as opposed to state fixed effects) and allow for arbitrary shock correlations within region (so that a shock to NY today may be correlated to a shock to NJ tomorrow), given our concerns that the date of deregulation is related to unobserved factors related to geographic location. As we saw in columns (iv) and (v) of Table IV, our results are much stronger when we do this, both in significance and in economic magnitudes (they more than doubled). This suggests that the regional factor is not a concern, and also highlights how much more demanding of the data our state fixed effects model is. Moreover, our fixed effects model already allows for correlation of the time-invariant group effect across groups (e.g. states that are geographically clustered), as long as we expect to capture most of that correlation though the unobserved effect α_j which is eliminated by the within transformation.

bank lending quality. Black and Strahan (2002) also find that deregulation increases the rate of business incorporations, thus suggesting an increase in credit availability for this sector.

Not surprisingly, we find an expansion in consumer credit following deregulation. Table V shows the results of regressing state loan growth on deregulation and state and year fixed effects. This is similar to the methodology applied in Jarayatne and Strahan (1996). Column (i) shows results for total loans, while column (ii) focuses on credit card loans. We build our state loan growth figures from individual banks' balance sheet data, which we aggregate to the state level to obtain the change in overall loans from one year to the next. Note that we have winsorized the state-year observations in the 1th and 99th percentiles of the distribution to minimize measurement error and the presence of potential outliers.[10] We find that both intrastate branching and interstate banking deregulation increase the rate of total loan growth by over 4% (based on the sample median). Credit card loan growth, in particular, also increases by around 4% following each deregulation. Although this reduced-form approach is in general not suitable for efficiency analysis, an increase in the supply of credit is likely to reduce interest rates and to decrease financial constraints for consumers, potentially providing credit access to new borrowers.

V. How does deregulation affect financial innovation and credit risk?

So far we found that deregulation led to an increase in the supply of credit, with a resulting increase in bankruptcy. This is certainly an important result, irrespective of the mechanism behind it and of welfare effects. We now turn to the underlying mechanism

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[10]This is a procedure similar to trimming but instead of throwing out the N extreme values, we replace them with the two extreme values left after removing them. We follow this approach in order to keep a balanced panel.

by examining whether financial innovations such as improvements in screening technology played a role in the increase in lending, and whether, as banks expanded credit, they made relatively more bad loans.

A. New credit evaluation technologies

Interstate banking deregulation removed barriers to entry by out of state banks, which in turn enabled the entry of larger, more efficient and technologically savvy banks, who were more likely to use better screening technologies. The evidence indicates that larger banks adopted new borrower scoring technologies earlier than small banks in the 1990s.[11] This is hardly surprising, given that the adoption of these technologies should have been easier for large banks who may exploit scale economies in consumer lending, both in terms of their geographic scope and operations scale, and have greater access to secondary loan markets for loan securitization. The new technologies automated underwriting standards through the use of a credit score, thereby allowing banks to adjust interest rate premiums to better reflect underlying consumer risk (a faster computer for the loan officer, more data storage capability, and a software program that allows her to compute a score for each consumer based on certain observed characteristics). This was an important innovation in consumer credit markets: at one time, banks would simply post one "house rate" for a given consumer loan type, rationing out very high risk consumers in order to avoid adverse selection problems (as in Stiglitz and Weiss (1981), given the difficulty in telling risks apart), as well as low risk individuals not willing to pay such rates.[12]

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[11]Berger et al. (2004) find that the adoption of small business credit scoring by larger banking organizations in the mid 1990s is associated with increased credit availability, higher average loan spreads, and greater risk, likely as a result of banks' expansion into more risky segments.

[12]The technologies used by banks in consumer lending have changed significantly since the 1980s, including

We explore here the use of new credit evaluation technologies following interstate deregulation. Ideally, we would like to use the variance in quoted interest rates (conditioned on consumer characteristics) over time. With greater use of risk-based pricing, the interest rate variance should increase. These data, unfortunately, are not available. Instead, we follow Petersen and Rajan (2002) who use lending productivity as a proxy for the banks' use of information technology. They find that the distance between small businesses and their lenders increases over time as a result of improvements in lender productivity, as the greater use of credit scoring models and other investments in information technology should allow a loan officer to generate a larger number of loans. Given the lack of data on loan originations, their measure of lender productivity is normalized by the total volume of loans. We follow a similar approach and use the ratio of credit card loans to total bank employees as a proxy for the adoption of credit scoring technologies. Column (iv) in Table V presents the results. We find that the removal of entry restrictions on out-of-state banks increases credit card loan productivity, and the effect is economically significant. In particular, we find that productivity increases by 2.5% following interstate deregulation. One might be concerned that if lenders rewarded their employees solely on the basis of origination volume–maximizing our measure of productivity–that bank employees would have an incentive to originate any loan without regard to quality. We consider the matter of incentives in the context of the subprime crisis in section VI below. As we note in the next section, this increase in productivity occurred while bank risk fell, suggesting that incentives were properly aligned.

the automation of underwriting standards and use of credit scoring in consumer loans (Johnson 1992; Mester 1997), the advent of securitization in mortgages and credit cards (Johnson 2002) and the reduction in data storage costs (Bostic 2002). Edelberg (2006) finds that lenders increasingly adopted risk-based pricing in consumer loans during the mid 1990s.

B. Credit risk

The previous results suggest that technology played a role in the post-deregulation expansion of consumer lending. This raises the following question: as banks increased their lending to consumers, did they shift from less risky borrowers to more risky borrowers? In theory, competition has an ambiguous effect on the distribution of borrowers. Clearly, the rise in bankruptcy indicates that the number of bad loans went up. However, we would like to know whether higher risk loans increased more than total lending during our sample.

We use charge-offs divided by total loans as our measure of loan portfolio risk, which we also derive from the banks' balance sheet and income statement data and aggregate at the state level. Column (iii) in Table V presents results for the effect of deregulation on loan portfolio quality. If competition forced banks to increase their portfolio share of riskier loans we would expect positive coefficients on our deregulation measures. Instead, we find that deregulation increases loan quality by reducing charge-off rates, though the effect is larger for interstate deregulation (we will return to this result a bit later). This result is similar to that found by Jarayatne and Strahan (1996).[13] It is also similar to Jarayatne and Strahan (1998) who argue that the decrease in loan losses results from the improvement in the screening and monitoring quality of borrowers by banks – implying that banks might even be lending to some higher risk categories despite the observed increase in loan portfolio quality.

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[13]Note that while our methodology is similar to that found in Jarayatne and Strahan (1996), there are some differences. First, while the latter focus only on intrastate deregulation, we also analyze the interstate banking deregulation. Second, Jarayatne and Strahan (1996) do find a significant increase in credit following deregulation in one of their models (weighted least squares) but not in another (ordinary least squares). This leads the authors to conclude that the evidence on loan growth is not as robust as their finding of improvements in loan portfolio quality following deregulation. The sample in Jarayatne and Strahan (1996) covers 1972-1992, while our sample covers 1980-1994. Thus, the seventies could be driving the result in Jarayatne and Strahan (1996).

Our finding that bankruptcies rose while charge-off rates fell following interstate deregulation suggest a credit schedule that was decreasing in consumer risk; that is, the amount of credit extended to high risk individuals was less than that extended to low risk individuals.[14] Indeed, this fits nicely with the anecdotal evidence on subprime lending by credit card companies during this period: lenders offered small credit lines to higher risk consumers, keeping them on a tight leash at the outset, but increased their credit lines as these consumers made timely payments, built a good credit history, and therefore moved down the risk schedule. With such schedule, consumer bankruptcies per person should increase following the extension of credit to new borrowers in higher risk categories, while overall bank risk, measured as bad loans per dollar lent, should decrease due to the relatively larger extension of credit to borrowers in lower risk categories.

In this respect, it is also interesting that while both the interstate and the intrastate deregulations appear to increase the supply of credit and decrease bank risk, only interstate deregulation leads to an increase in bankruptcies. This is not surprising. The removal of branching restrictions did not allow entry by new banks, but rather it forced a redistribution of the state market among the set of state banks. Thus, there is no reason to expect a change in the technologies used in loan pricing, which involve a fixed cost investment. Indeed, the effects associated with intrastate deregulation are consistent with a kind of end to the "quiet life," as state banks faced more competition from each other – they could now buy competitors' branches – and were forced to profit maximize and therefore allocate credit

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[14]Note that the technology shock should also affect consumers that were obtaining credit before. The new screening technology allows for the previous pooling equilibrium on the middle risk consumers to become a separating equilibrium, such that higher risk consumers within this pool are likely to receive relatively less credit than before deregulation while lower risk consumers within this pool are likely to receive relatively more credit.

more efficiently. Such behavior would naturally lead to lower credit risk. This is similar to the findings in the literature on banking deregulation. As already mentioned, Jarayatne and Strahan (1996) study intrastate deregulation and find that it led to an improvement in the allocation of credit. In a recent paper, Bertrand et al. (2007) study banking deregulation in France in the 1980s (involving the privatization of many state banks) and find that, after deregulation, banks were much less willing to bail out poorly performing firms. The second stage of deregulation, by contrast, opened up state markets to ownership by potentially any bank in the U.S. Our results confirm that this second stage of deregulation was different from the earlier one, with technological improvements in the evaluation of credit playing a central role.

Our results indicate that bankruptcies increased and credit expanded even as bank portfolio risk fell. This suggests that the distribution of borrowers changed, with some lending to new households. Not only did previously excluded high risk customers get credit, but also low risk customers got more credit, presumably as banks were able to manage risks more efficiently and price them appropriately. Put differently, if banks were extending the new credit only to their existing borrowers – the intensive margin– it would not be possible to have both an increase in bankruptcies and a decrease in bank risk, which is what we find. Either existing borrowers borrow more, increasing both bankruptcies and charge-offs, or banks are allocating credit more efficiently, which reduces charge-off rates and should have no effect on bankruptcies. While geographic diversification is likely playing a role it alone cannot explain the fact that bank risk decreases after deregulation. This suggests a role for technology. Indeed, previous literature suggests that the credit card industry has been progressively targeting higher risk consumers since the 1980s [Morgan and Toll, 1997;

Black and Morgan, 1999], as well as the increasing use of risk-based pricing in consumer loans [Edelberg, 2006; Mester, 1997].

VI. Implications for the subprime crisis

We find that deregulation and the ensuing increases in competition and technological advances in the 1980s and 1990s led to an expansion of credit to, among others, new and higher risk borrowers. This led to higher rates of bankruptcy among the population as a whole, but lower losses among lenders. A similar broad expansion of *mortgage* credit occurred in the early part of the 2000s: mortgage origination volumes hit record highs, several new entrants competed for borrowers, and a flood of novel and heterodox mortgage products were marketed to a variety of higher risk borrowers.[15] This credit expansion, however, was followed by a sharp increase in U.S. mortgage defaults that began in late 2006. These defaults, in turn, appear to have precipitated the ensuing global financial crisis. This crisis has been characterized by credit losses so severe that several major lenders have been driven out of business. This episode of increased lending followed by increased bank risk raises doubts about the generalizability of our results.

We view our results as broadly consistent with, and able to shed some light on, the current episode. However, it is worth emphasizing that the recent mortgage credit boom was fundamentally different from the credit expansion we study here. First, there was no exogenous increase in credit supply caused, for example, by a fundamental change in regulations restricting competition. At most, long-term real interest rates were unusually

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[15]According to the flow of funds accounts, mortgages owed by households doubled from 2000 to 2006. See Mayer and Pence (2009) and Mayer, Pence and Sherlund (2009) on the growth of mortgage products.

low, perhaps because of "global imbalances", as argued by Caballero, Farhi and Gourinchas (2008). Instead, as Gerardi et al. (forthcoming) argue, lenders were willing to make more loans because they expected house price appreciation to be sufficient to keep credit risk on mortgages low. Second, as shown by Sherlund (2008) and many others, credit risk on mortgages, as opposed to the uncollateralized debt we study here, is driven mainly by house prices. Estimating the credit risk of uncollateralized loans, as emphasized by Edelberg (2006) among others, requires sophisticated analysis of borrower characteristics. We use personal bankruptcy rates as an outcome of interest because bankruptcy has the potential to wipe out unsecured claims; however, bankruptcy has only a limited effect on mortgages. Third, the mortgage credit boom of the 2000s was accompanied by significant growth in secondary markets for mortgages. Asset-backed securities markets were still in their infancy during the period we study, so that bankers had to hold the loans they extended on portfolio. Many of the riskiest mortgages made during the recent boom were sold into mortgage-backed securities. Keys et al. (2009) argue that securitization can weaken screening and monitoring incentives.

Our results also shed some light on the potential role for incentives in lending. We showed in Section V that lending productivity, defined as loans per bank employee, increased in response to increased competition. We argued that this productivity increase was most likely due to improved screening technology, in part because bank risk also fell at the same time. Had bank risk increased, we might have suspected that the productivity increase merely reflected less careful underwriting. If bank employees had been compensated just for their lending volume, credit card lending in the 1990s would have resembled the "originate to distribute" model of mortgage originations in the 2000s. Calomiris (2008), among others,

argues that this business model, in which originators transferred all of the credit risk on loans to investors, contributed to poor underwriting which in turn led to a flood of bad loans. However, for a variety of reasons[16], credit card securitization markets generally expect the issuing bank to retain the junior tranche of securities backed by credit card receivables. Thus, although credit cards were also funded by issuance of securities, originators always had some "skin in the game" and did not have the incentive to let underwriting standards slip.

Even restricting attention to unsecured credit, we acknowledge that the effects of increased competition and credit supply explain only part of the rise in consumer bankruptcy. Indeed, consumer bankruptcy rates and lending continued to increase steadily until recent times, as shown in Figure 1, well beyond the deregulation period we focus on.[17] That the series do not appear to reach a steady-state even after a decade following deregulation is something of a puzzle. This suggests that other factors might have been at play later in the period, perhaps contributing to the crisis episode. For example, Fay, Hurst and White (2002) find some evidence of spillover or peer effects: all else equal, borrowers may be more likely to default if their neighbor has defaulted in the past. Thus the increased credit supply from deregulation we identify might have supplied the initial impulse to bankruptcy, which then amplified over time. With more of their peers defaulting on unsecured loans, borrowers might have been readier to default on their mortgages.

As we discussed in section V, the adoption of improved screening and monitoring tech-

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[16]Revolving trusts like credit card portfolios allow the issuer more scope for adverse selection, and as a result, investors require the issuer to absorb the first loss in order to align incentives. In addition, implicit recourse is more valued as credit cards have generally been perceived as riskier than mortgages.

[17]Bankruptcy rates decreased substantially following the 2005 reform which requires a consumer to pass an income test as a prerequisite for a discharge of unsecured debts.

nologies allowed banks to better quantify and limit risk, especially when making loans to higher risk or untested borrowers. However, an increasing fraction of loans made over the 2002 to 2007 period carried only limited documentation ([Gerardi et al., Forthcoming] track the popularity of these so-called "low doc" loans). In other words, lenders during the recent credit boom supplied loans precisely without the screening and monitoring technology that we argue is one of the benefits of increased competition, and, indeed, the main mechanism by which supply increases lead to lower institution-level loss rates.

More speculatively, because we show that competition among lenders increased credit supply in the 1990s, and the recent episode was characterized by increased supply, it may be that credit supply played at least some role in the recent crisis. As competition increases, margins get squeezed, consumers have more and better options, banks are able to retain fewer customers and the pool of borrowers worsens progressively as the marginal borrower becomes riskier. In itself, this is just the usual competition effect and not negative *per se.* However, credit risk might be correlated across households, so that increasing individual risk might increase aggregate risk. In turn, lenders might not internalize this increase in aggregate risk. Thus, competition coupled with unpriced externalities may have exacerbated existing problems in credit markets.

It seems likely that the subprime crisis will engender a set of new consumer protection laws and regulations.[18] Together with tougher financial regulation, decreased competition resulting from recent mergers and increased risk premia on U.S. household credit risk, this may lead to the exclusion of borrowers who had been reached prior to the crisis. Our re-

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[18]For example, U.S. federal regulators recently approved tougher rules on credit card lending (December 18, 2008), such as restricting the ability of credit card issuers to raise interest rates on outstanding balances. Several European countries are currently trying to apply similar rules.

sults suggest that credit can safely be extended to higher risk or historically underserved borrowers. Thus, blanket legal restrictions designed to cut off such lending could be counterproductive. Ideally, regulations would distinguish between truly unfair credit practices — such as obfuscating contract information from the borrower — and the need for pricing that adjusts to the underlying credit risk and the flexibility to offer a menu of contracts to the consumer. The key differences between the relatively benign credit expansions we study and the recent subprime credit boom appear to be that subprime mortgages were collateralized, allowing originators to forgo evaluating borrowers and simply to focus on collateral value, and that subprime lenders did not retain the credit risk of the loans they made, skewing their incentives. These differences suggest potentially useful avenues for regulators to explore.

VII. Conclusion

The last quarter century saw a sharp increase in the rate of personal bankruptcy, accompanied by a similar increase in the availability of credit, with only small modifications to personal bankruptcy law. We explore this rise in bankruptcies, studying various factors leading to personal bankruptcy, but focusing on the role played by credit market conditions. Using variation from state-level banking deregulation over a fifteen year period, we find that deregulation, by removing the barriers to out-of-state bank entry, explains between 10-16% of the increase in bankruptcies from 1980 to 1994. This occurred via two channels: increase in credit and the use of new screening technologies, introduced after deregulation, which allowed credit to be extended to new consumers. Thus, although the risk of any given borrower defaulting did not necessarily rise, the presence of many extra borrowers in the population

perforce increased the bankruptcy rate.

We believe that these results are both quantitatively and qualitatively important, especially in light of the lack of statistical evidence documenting the effects of credit market characteristics and demand factors on the incidence of personal bankruptcy. Thus, we hope our results may shed light on the ongoing debate about consumer bankruptcy in the U.S., which has usually focused on the design of optimal bankruptcy law. Our findings suggest that credit market liberalization, aside from changes in bankruptcy law, has been an important factor associated with the increase in bankruptcies.

The rapid increase in mortgage defaults that began in late 2006 and has continued since was preceded by an expansion of credit. Our results suggest that increases in credit supply can lower bank risk, at odds with the current wave of bank failures. Our results, in line with the literature, suggest that increased competition leads banks to adopt better screening and monitoring technologies. Thus, in our study, credit expansion is accompanied by investment in risk management technology. A hallmark of the recent mortgage credit boom was the loan made without verification of income or assets. Manifestly, institutions making such loans were not investing in monitoring and screening technology.

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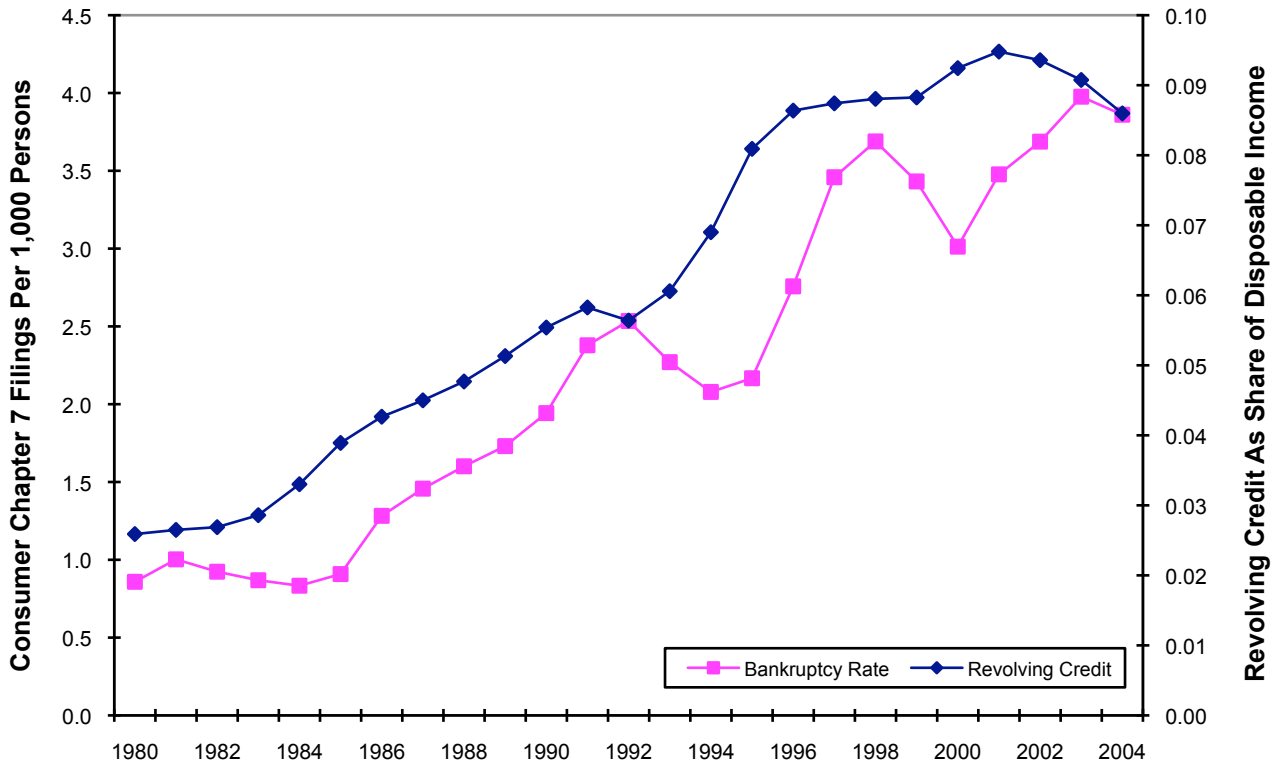
Figure 1: US personal bankruptcy rate and revolving consumer credit as share of disposable income (1980-2004). [Source: Personal bankruptcy rates are based on data from the Administrative Office of the U.S. Courts. Revolving credit data are taken from the Federal Reserve G.19 Statistical Release.]
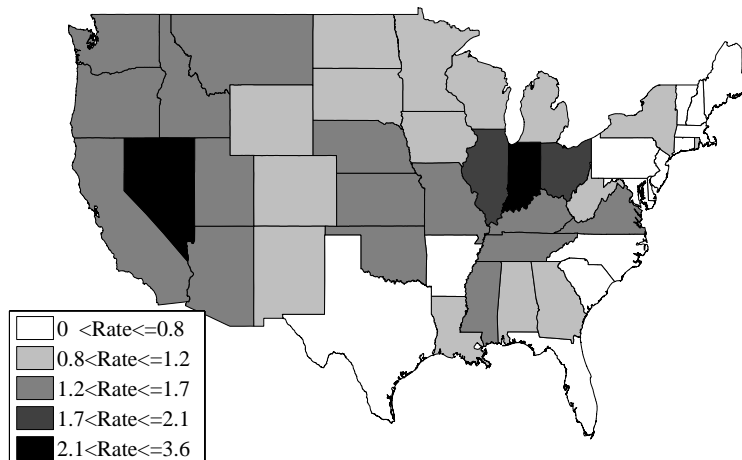

Figure 2: Chapter 7 bankruptcy rate by US state in 1980 (per 1,000 persons)
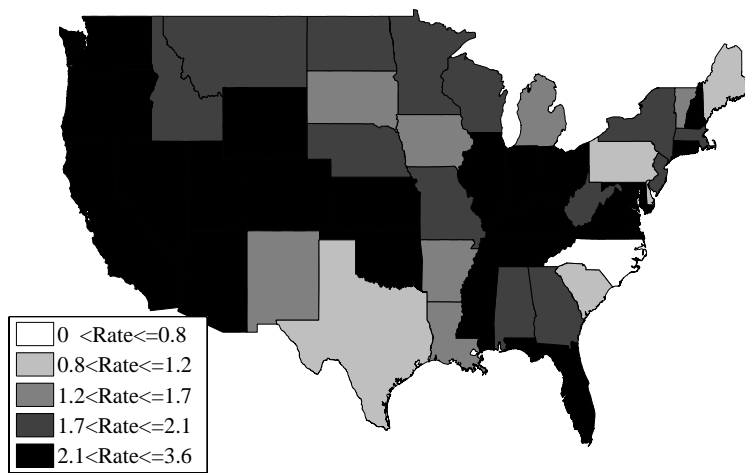
Figure 3: Chapter 7 bankruptcy rate by US state in 1994 (per 1,000 persons)

Table I: States by year of intrastate and interstate deregulation

The table indicates the dates of banking deregulation for each US state. Intrastate branching refers to the deregulation allowing banks to buy branches within the state by merger and acquisition. Interstate banking refers to the deregulation allowing out-of-state bank holding companies to buy banks in the state that deregulates.

Year	Intrastate branching	Interstate banking
Before 1980	AK, AZ, CA, DC, DE, ID MD, ME, NC, NJ, NV, NY OH, RI, SC, SD, VA, VT	ME
1980	CT	-
1981	AL, UT	-
1982	PA	AK, NY
1983	GA	CT, MA
1984	MA	KY, RI, UT
1985	NE, OR, TN, WA	DC, FL, GA, ID, MD, NC NV, OH, TN, VA
1986	HI, MS	AZ, IL, IN, MI, MN, MO NJ, OR, PA, SC
1987	KS, MI, ND, NH, WV	AL, CA, LA, NH, OK, TX WA, WI, WY
1988	FL, IL, LA, OK, TX, WY	CO, DE, MS, SD, VT, WV
1989	IN	AR, NM
1990	KY, MO, MT, WI	NE
1991	CO, NM	IA, ND
1992		KS
1993	MN	MT
1994	AR	-
After 1994	IA	HI

Figure 4: State average credit card productivity in 1980 and year of interstate deregulation

Table II: State level summary statistics

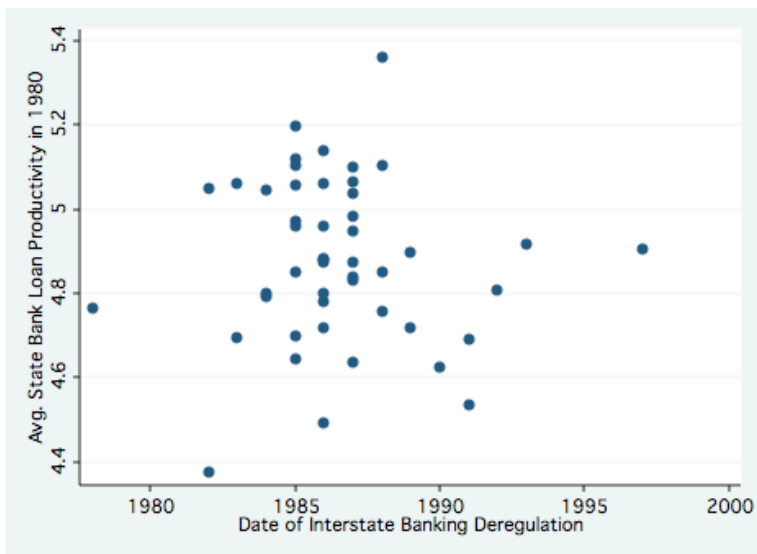The table presents summary statistics for observations defined as state*year combinations. Sample: 1980-1994. The variable divorce rate is based on N=635 due to data limitations. The HHI is the Herfindahl-Hirschman index at the state level. The homestead exemption is capped at $ 999,999 for unlimited homestead exemption states.

Variable	Mean	Std.Dev.
Personal bankruptcy rate (per 1,000) - Ch. 7	1.683	0.903
Interstate banking indicator (0/1)	0.567	0.496
Intrastate banking indicator (0/1)	0.668	0.471
Personal income growth	0.072	0.036
Personal income growth (t-1)	0.077	0.038
Unemployment rate (%) (t-1)	6.779	2.158
Number of top state banks (t-1)	21	25
HHI (t-1)	828.867	852.703
Deposit share of small banks (deposits <$100M)	0.162	0.142
Out-of-state bank deposit share (t-1)	0.153	0.190
% Out-of-state banks(t-1)	0.049	0.071
Divorce rate (per 1,000) (t-1)	5.230	2.854
Homestead exemption ('000)	143.363	298.525
Unlimited homestead exemption state (0/1)	0.122	0.328
Republican state (0/1)	0.826	0.379
New incorporations per capita (logs) (t-1)	0.845	0.420
Loan growth: Total loans (t)/Total loans (t-1)	1.076	0.092
Loan growth (credit card)	1.055	0.110
Charge-offs / Total loans (%)	0.315	0.314
Credit card productivity (CC loans '000/#employees) (logs)	5.156	0.503
Number of observations	720	

Table III: Panel regression of the effect of banking deregulation, demand factors and bank market structure on personal bankruptcy

Standard errors are obtained using Arellano (1987)'s robust variance matrix estimator to allow for arbitrary correlation among within-state shocks. N=720. The results are based on a balanced panel of all states excluding Delaware and South Dakota for the period 1980-1994. State and year fixed effects are included to control for national trends and state-specific time-invariant factors. The dependent variable is the number of Chapter 7 filers (debt discharge) as a share of total population in the state. The interstate banking and intrastate branching indicators take the value of one starting the year in which the state allows interstate banking and intrastate branching, respectively, and zero otherwise. The market structure variables are lagged one year. The number of top state banks is determined as the number of banks in the set that together hold over fifty % of state deposits. Small banks are defined as those with assets less \$100M. Geographic diversification is the deposit share weighted average of the number of states in which a bank operates. * significant at 10%; **significant at 5%; ***significant at 1%.

	Dependent Variable: Personal bankruptcy rate (per 1,000 persons)							
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(vii)
Supply-side factors								
Interstate banking indicator	0.175	0.185	0.233	0.169	0.071	0.179	0.173	0.177
	(0.061)***	(0.062)***	(0.075)***	(0.058)***	(0.070)	(0.064)***	(0.062)***	(0.059)***
Intrastate branching indicator	0.020	0.040	0.050	0.019	0.075	0.031	0.039	0.057
	(0.080)	(0.076)	(0.072)	(0.079)	(0.074)	(0.082)	(0.077)	(0.073)
Demand-side factors								
Personal income growth	−2.121	−2.057	−2.020	−2.096	−2.139	−2.084	−2.130	−2.048
	(0.518)***	(0.542)***	(0.540)***	(0.516)***	(0.510)***	(0.503)***	(0.511)***	(0.523)***
Personal income growth (t-1)	−2.166	−2.133	−2.157	−2.172	−2.218	−2.125	−2.154	−2.123
	(0.736)***	(0.725)***	(0.738)***	(0.737)***	(0.754)***	(0.711)***	(0.728)***	(0.706)***
Unemployment rate (%)	0.120	0.118	0.121	0.120	0.122	0.118	0.124	0.122
	(0.026)***	(0.025)***	(0.025)***	(0.026)***	(0.027)***	(0.026)***	(0.028)***	(0.027)***
Market structure controls								
Number of top state banks		0.003	0.004				0.003	
		(0.002)	(0.002)				(0.002)	
No. top banks * Interstate			−0.002					
			(0.002)					
HHI				−1.116	−2.077			−0.889
				(1.184)	(1.082)*			(1.132)
HHI * Interstate					1.495			
					(0.479)***			
Deposit share of small banks						0.483	0.063	
						(0.643)	(0.633)	
Banks' geographic diversification							0.045	
							(0.035)	
R^2 (within)	0.83	0.83	0.84	0.83	0.84	0.83	0.83	0.84
R^2 (overall)	0.41	0.41	0.41	0.38	0.38	0.41	0.44	0.42

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Table IV: Panel regression of the effect of banking deregulation, additional demand factors and out-of-state bank presence on personal bankruptcy

Standard errors are obtained using Arellano (1987)'s robust variance matrix estimator to allow for arbitrary correlation among within-state shocks. N=720 (except in cols. (i), (viii), and (ix) where N=635 due to data limitations on the divorce rate). The results are based on a balanced panel of all states excluding Delaware and South Dakota for the period 1980-1994. State (or region) and year fixed effects are included to control for national trends and state-specific time-invariant factors. The regressions include personal income growth and its lag, as well as the lagged unemployment rate, to control for the business cycle and time-varying demand factors. The dependent variable is the number of Chapter 7 filers (debt discharge) as a share of total population in the state. The interstate banking and intrastate branching indicators take the value of one starting the year in which the state allows interstate banking and intrastate branching, respectively, and zero otherwise. New incorporations in logs and lagged. * significant at 10%; **significant at 5%; ***significant at 1%.

| | Dependent Variable: Personal bankruptcy rate (per 1,000 persons) | | | | | | | | |
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
Supply-side factors									
Interstate banking indicator	0.181	0.175	0.175	0.300	0.301	0.182	0.194	0.185	0.157
	(0.064)***	(0.061)***	(0.061)***	(0.115)**	(0.115)**	(0.062)***	(0.063)***	(0.065)***	(0.076)**
Intrastate branching indicator	0.028	0.025	0.023	0.165	0.173	0.013	0.044	0.024	0.051
	(0.083)	(0.081)	(0.081)	(0.072)**	(0.071)**	(0.082)	(0.085)	(0.078)	(0.083)
Additional demand factors									
Divorce rate (per 1,000)	0.002						0.002		0.003
	(0.005)						(0.004)		(0.004)
Homestead exemption		0.034		0.051					
		(0.026)		(0.006)***					
Unlimited exemption state			0.109		0.415		0.046		0.001
			(0.062)*		(0.063)***		(0.080)		(0.081)
New incorporations (per 1,000)						-0.183	-0.166		-0.150
						(0.152)	(0.154)		(0.150)
Market structure controls									
Number of top state banks							0.004		0.004
							(0.002)*		(0.002)*
HHI							-0.563		-0.475
							(1.280)		(1.228)
Deposit share of small banks							0.157		-0.177
							(0.679)		(0.683)
Out-of-state bank presence									
Out-of-state bank deposit share								0.367	-0.182
								(0.297)	(0.498)
Out-of-state bank dep. sh. * Interstate									0.546
									(0.386)
Fixed effects	State	State	State	Region	Region	State	State	State	State
R² (within)	0.83	0.83	0.83	0.58	0.57	0.83	0.83	0.83	0.83
R² (overall)	0.39	0.42	0.41			0.37	0.35	0.37	0.35

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Table V: Panel regression relating loan growth, loan quality and credit card loan productivity to banking deregulation Standard errors are obtained using Arellano (1987)'s robust variance matrix estimator to allow for arbitrary correlation among within-state shocks. N=720 (except in cols. (i) and (viii) where N=635 due to data limitations on the divorce rate). The results are based on a balanced panel of all states excluding Delaware and South Dakota for the period 1980-1994. State and year fixed effects are included to control for national trends and state-specific time-invariant factors. The regressions include personal income growth and its lag, as well as the lagged unemployment rate, to control for the business cycle and time-varying demand factors. The loan growth dependent variable is defined as $loans(t)/loans(t-1)$ in the state, where loans include those in the indicated category. The charge-off dependent variable is the proportion of loans that are charge-offs in the state. The credit card loan productivity dependent variable, which proxies for the introduction of new screening technologies, is measured as the log of credit card loans (in thousands) over the number of full-time equivalent employees (average over state banks). The interstate banking and intrastate branching indicators take the value of one starting the year in which the state allows interstate banking and intrastate branching, respectively, and zero otherwise. State*year observations in the 1th and 99th %iles of the distribution have been winsorized to reduce the influence of extreme values. * significant at 10%; **significant at 5%; ***significant at 1%.

	Dependent Variable:			
	Total loans	Credit card	Charge-offs	C.C. loan productivity
	(i)	(ii)	(iii)	(iv)
Supply-side factors				
Interstate banking indicator	0.044	0.037	−0.153	0.125
	(0.015)***	(0.017)**	(0.042)***	(0.059)**
Intrastate branching indicator	0.036	0.041	−0.092	−0.033
	(0.013)***	(0.016)**	(0.036)**	(0.097)
R^2 (within)	0.82	0.82	0.83	0.83
R^2 (overall)	0.37	0.34	0.34	0.38