Banking market concentration and consumer credit constraints: Evidence from the Survey of Consumer Finances

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Abstract

Consumer borrowing is a large and growing part of the American financial landscape, amounting to over $1.5 trillion in 2000, or 15 percent of GDP. This credit helps households improve the timing of consumption expenditure, allowing consumers to purchase goods and services when they are needed. Still, many households report being credit constrained, with requests for credit rejected or discouraged by potential lenders. Stiglitz and Weiss (1981) formalize models where credit is rationed in equilibrium, and Petersen and Rajan (1995) extend this model to banking markets with varying degrees of local competition. Local banking market competition can be thought of as one element of the more general set of factors influencing the 'captivity' of a bank's consumer borrowers. This paper uses data from the 1983 Survey of Consumer Finances to empirically test the relationship between banking market concentration and households' self-reported measures of credit rationing and constraint. There is strong evidence that more concentrated markets have fewer constrained borrowers, a result consistent with the Petersen-Rajan model of credit markets. Interest rates on consumer borrowing appear to decrease more sharply with age in competitive markets than in concentrated markets. This result is consistent with the cross-subsidization between new and existing borrowers that is central to the Petersen-Rajan model.

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Access to credit raises welfare by allowing households to improve the timing of their purchases of goods and services. Without credit, purchases are constrained by the level of financial assets on hand; with credit, households can smooth the path of consumption in ways that significantly improve utility. Reflecting its important position in the American economy, consumer credit outstanding amounted to over 15 percent of GDP in 2000. Commercial banks held over $500 of the $1.57 trillion in credit outstanding, with the remainder being securitized or held at finance companies, savings institutions, credit unions, and non-financial companies.

This paper assesses the relationship between the market concentration of local financial sectors and households' reports of being credit constrained. The market concentration of the local financial sector reflects the number of competing banks, and is one element of a larger set of factors that affect how 'captive' consumer borrowers become once they establish a relationship with a lending institution. We find evidence that households living in areas where banks enjoy **more** market power are **less likely** to feel that they are credit constrained. This paper also finds evidence that interest rates on consumer borrowing decrease much more sharply with the age of the borrower in competitive markets than they do in more concentrated markets.

Both of these results are consistent with recent models of credit markets, especially those of Petersen and Rajan (1995). Starting with Stiglitz and Weiss (1981), economists have proposed models of credit provision in which rationing is an equilibrium outcome; in these models credit markets may fail to clear because of the impact of interest rates on the composition and behavior of borrowers. In particular, as interest rates rise, the pool of borrowers may become riskier and actually reduce the net return to lenders. This effect prevents price increases from bringing markets with excess demand into equilibrium, as would happen in traditional markets.

Petersen and Rajan extend these models to explore the relationship between local banking market concentration and lending activity. Their model focuses on the fact that banks are often unsure about the likelihood of repayment among new potential borrowers. Banks in concentrated markets, because they earn monopoly rents on borrowers who eventually prove to be good risks,

will have more ex-ante incentive to lend to new borrowers and invest in learning whether these borrowers are in fact good risks. This model of competition and credit has been motivated and tested using data on the borrowing practices of small firms. In this paper, I present the first evidence that this type of model can help us understand **consumer** borrowing patterns.

It is important to note that this paper uses data from the Federal Reserve Board's 1983 Survey of Consumer Finances (SCF). 1983 is the first year of the modern triennial SCF, and is also the only year in which the SCF contains geographic identifiers that can link households to local banking markets.[1] Financial markets have changed significantly since 1983 due to changes in technology and reductions in the legal barriers that traditionally restricted entry into banking markets. Nevertheless, the underlying economic forces in this model are still at play: the prices at which financial institutions buy and sell 'portfolios' of credit card customers suggest that–-whether because of local market concentration or consumer switching costs—banks still enjoy something resembling ex-post market power over 'captured' borrowers in consumer credit markets. Local banking market concentration is just one element of a larger set of factors reflecting the ex-post 'captivity' of consumer borrowers.

The paper proceeds in four sections. The first section documents the importance of consumer debt in the American economy, focusing both on figures that aggregate consumers and on microeconomic data that allow analysis of the distributions of various types of liabilities. The second section outlines a simple model of banking market concentration, along the lines of Petersen and Rajan, and develops several empirical hypotheses regarding the relationship between market concentration and consumer credit. The third section uses the Federal Reserve Board's Survey of Consumer Finances to test the hypotheses developed in the second section. A brief final section concludes and places the results in context in the rapidly changing American financial market.

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[1] The Federal Reserve Board conducted similar surveys in 1962 (the Survey of Financial Characteristics of Consumers) and in 1963 (the Survey of Changes in Family Finances).

1. Consumer debt in the American economy

This section documents the increasing importance of debt in American household balance sheets between 1983 and 1998. Aggregate data on stocks of financial assets come from the Federal Reserve Board's Flow of Funds accounts, and additional aggregate data come from the Federal Reserve's monthly G19 releases. These releases contain detailed information on the set of institutions that hold consumer credit. The microeconomic data used in this paper come from the Federal Reserve Board's Surveys of Consumer Finances. The SCF, conducted every three years, is an extremely valuable resource for economists working on questions related to household saving and balance sheet behavior. These surveys are uniquely useful because the SCF samples a large number of households and asks enough questions to allow a high degree of disaggregation of assets, liabilities, and income streams. The SCF also contains a great deal of information about household demographics and attitudes about financial markets.

Table 1 is based on data from the Flow of Funds Accounts and documents changes in the *aggregate* household balance sheet between 1975 and 2000. The numbers in the first panel of Table 1 are in trillions of current dollars, while the second panel of the table presents figures in terms of per-capita 2000 dollars. Total household liabilities in 1975 amounted to $770 billion, or about 21 percent of financial assets. This amount also corresponds to $9500 per capita in 2000 dollars. While the bulk of this debt, $460 billion, was secured by residential property, consumer borrowing in 1975 was already substantial, accounting for $210 billion of household liabilities. This amount corresponded to 5.6 percent of financial assets, or $2533 per capita in 2000 dollars. Total household consumption in 1975 was $1030 billion dollars, $134 billion of which went toward purchases of durable goods; the stock of consumer borrowing in that year was 57 percent larger than the flow of purchases of consumer durables.

The level of consumer borrowing in 1975, while large, is dwarfed by current levels. In 2000, the total borrowing of the household sector amounted to $7.46 trillion, of which $4.92 trillion was secured by home mortgages. Of the remainder, $1.57 trillion was accounted for by

consumer loans, or $5700 per person. This $1.57 trillion in consumer debt was equal to about 15 percent of gross domestic product and about 23 percent of the flow of personal consumption expenditures.

While Table 1 documents the *aggregate* magnitude of consumer borrowing, Table 2 focuses on the distribution across *individual* households of the ratio of total borrowing and consumer borrowing to income. The top panel of Table 2 focuses on the ratio of total borrowing to income, and shows that, while the share of households with positive borrowing has remained fairly steady between 1983 and 1998, the ratio of the means and the median of the ratio have been drifting upward over this period. In particular, median total debt as a share of income has risen from 16.8 percent to 40.4 percent between 1983 and 1998. Consumer debt has seen a similar increase; while the share reporting any consumer borrowing has remained constant between 1983 and 1998, the mean of the ratios has risen from 11.5 percent to 19.1 percent. This increase has come largely from the most highly indebted households; the ratio at the 90^{th} percentile has risen from 31.2 percent to 63 percent. Both in the aggregate and for a significant number of individual households, total borrowing and consumer borrowing have been increasingly important.

There is substantial heterogeneity in the interest rates that households report paying on this debt. Table 3 shows these interest rates by category of borrowing. Not surprisingly, interest rates on loans secured by residential property are relatively low. This may reflect two factors: first, being secured by a residence reduces the credit risk (though not the interest rate risk) of mortgage lending. Second, many of these mortgage loans were taken out at fixed rates long before 1983, during periods when interest rates were far lower than the rates of the early 1980s. Of the 64 percent of households who report positive amounts of consumer borrowing, the mean interest rate paid on all types of consumer borrowing, including credit card balances, auto loans, and non-auto loans, was 14.5 percent. There was substantial variation around this mean, with 25 percent of households reporting interest rates of 11 percent or less, and 25 percent reporting that they were paying interest rates in excess of 18 percent.

The data documented in this section point to the significance of consumer credit in the American economy. At the aggregate level, this type of borrowing amounts to about 15 percent of GDP. In addition, for a sizable share of households, this type of borrowing is large relative to current income; 10 percent of households in 1998 had outstanding consumer debt in excess of 63 percent of income. This points to the importance of consumer credit in smoothing consumption across income shocks and to meet the desired pattern of spending.

2. Banking market concentration and consumer lending

This section illustrates how the ex-post level of 'captivity' of a bank's borrowers can affect a bank's ex-ante incentives to extend credit on a speculative basis to new borrowers. Models outlining how credit rationing can be a feature of equilibrium in financial markets go back at least to the work of Stiglitz and Weiss (1981). The intuition behind these models is that lenders can neither perfectly evaluate nor perfectly monitor potential borrowers, leaving banks uncertain about whether an individual borrower will repay a particular loan. Increasing interest rates can affect both the pool of borrowers applying for credit and how they behave once they are extended credit, possibly in ways that substantially reduce the likelihood of repayment. In particular, in a model where firms borrow to fund investment projects, increasing interest rates may be relatively discouraging to borrowers whose projects are safer[2]. In such a model, by raising interest rates, banks may find their net return on lending falling because of a decline in the odds that loans are repaid. With the price of credit no longer able to equilibrate supply and demand, credit rationing can become a part of equilibrium in financial markets.

A recent line of research (see Petersen and Rajan 1995) explores the impact of credit market competition on the credit constraints of potential borrowers. The intuition of the Petersen-

[2] For example, consider two types of entrepreneur borrowers, the 'safe' borrower with access to a project paying a return of X with certainty. The 'risky' borrower has access to a project paying X+K (K > X) with probability 0.5 and X-K with probability 0.5. If the project pays X-K the borrower's downside risk is limited to 0 by limited liability; the borrower gets all of the upside in the good state. In this model, raising the interest rate at which the entrepreneur borrows will discourage the 'safe' borrower from obtaining a loan before the 'risky' borrower is discouraged.

Rajan model is that banks are again uncertain about the potential quality of borrowers, but the innovation in this model is that banks will have the opportunity to make additional loans to borrowers after the initial loan, having observed the borrower's performance in repaying the first loan. When making a loan to a new borrower, Stiglitz-Weiss type effects may limit the ability to raise the interest rate. In subsequent periods, having observed borrowers' repayment performance, the balance of information is tilted toward the bank, and their ability to raise interest rates is limited more by competitive pressures than by information problems. On subsequent loans to borrowers, banks with market power will earn ex-post rents that allow an intertemporal cross-subsidization; monopolist banks can make negative NPV loans to young borrowers firms if those who prove to be good risks will continue to purchase credit from the bank at interest rates that are kept high by market power. Because competition among banks reduces their ability to extract these ex-post rents, as markets become less concentrated credit constraints on new borrowers may bind more tightly.

Consider the following example. A bank faces a population of potential borrowers; a share p of these borrowers are 'good' types, with a taste for repaying loans. The remaining share, of measure (1-p), are 'bad'; these are borrowers with no taste for repaying loans. The bank, ex-ante, is unable to distinguish between these types, knowing only the frequency of these types in the population. The interest rate on both first-period loan and second-period loans is limited to R_* by the presence of usury laws or by the impact of rate increases on the pool of borrowers.

After extending the first loan to a borrower and observing repayment, the bank does know whether the borrower is 'good' or a 'bad' type. And with probability c(n), the bank in the second period will have the opportunity to make additional profitable loans to the borrowers revealed to be 'good' types. This probability is assumed to be a function of the number of other banks competing in the market place (n); it could also be a function of 'switching costs' faced by borrowers in a particular pool. The remainder p*(1-c(n)) of the 'good' borrowers have both the taste and the ability to take their good credit record and borrow from another bank.

The bank's total profit on a loan to a borrower from this pool is a function of two parts: the net profit on the first period loans, and the net profit on the loans extended to the set of borrowers who are both revealed to be 'good' types and who choose to stick with their first-period lender. For simplicity the bank's gross cost of capital is assumed to be 1. Equation (1) below gives the ex-ante net profit of the bank to a pool of borrowers defined by p and c(n):

$$(1)\quad \Pi_t(p,c(n)) = \overbrace{pR_* - 1}^{\Pi_1} + \overbrace{pc(n)(R_* - 1)}^{\Pi_2}$$

In this model, banks will make loans to populations in which $\Pi_t(p,c(n))$ is at least zero. The first part of equation (1), Π_1, reflects the net profit on the loan to the pool of borrowers about whom the bank is relatively uninformed; the bank will extend loans to these borrowers but be repaid by only the share p who are 'good' types. The second part of equation (1), Π_2, reflects the firm's profits on the set of borrowers who are both revealed to be 'good' types and who remain customers of the bank in the second period. This equation defines a break-even level of p, as a function of c(n), above which the bank will find lending to be profitable on an ex-ante basis. Equation (2) below presents this relationship:

$$(2)\quad p^*(c(n)) = \frac{1}{[R_* + c(n)[R_* - 1]]}$$

In the context of the empirical work that follows, it is assumed that c(n) is decreasing in n, meaning that increasing levels of competition in the banking market reduce the probability that a borrower will ex-post stick with a bank that extends them a speculative loan. Equation (3) below implies that increasing ex-post competition in the banking market increases the equilibrium level p* required for a bank to find ex-ante loans profitable:

$$(3)\quad \frac{dp^*(c(n))}{dn} = \frac{c'(n)[R_* - 1]}{[R_* + c(n)[R_* - 1]]^2} > 0$$

This relationship forms the basis for the first empirical test in the following section, the test of the hypothesis that borrowers in more concentrated credit markets are less likely to report that they

are credit constrained. In monopolistic markets, banks earn enough profit on borrowers revealed ex-post to be 'good' that the initial loan is profitable, for the sake of a potential relationship. The second empirical test is based on the cross-subsidization that occurs between new and existing borrowers. These second empirical procedure compares the relationship between interest rates on consumer borrowing and borrower age across different regimes of competitiveness. The Petersen-Rajan model suggests that the slope should be more negative in more competitive markets, and less negative in more concentrated markets.

The empirical work that follows is based on data from 1983 and on a model where banking markets are defined at the local metropolitan area level. Banking markets have changed enormously in the period since 1983; states have opened their markets to competition from both within-state and outside competitors. In addition, the relative importance of depository institutions in these markets has fallen over time. The underlying economic forces at work in this model are still at play, however. If consumers vary for any reason in their reluctance to 'switch' credit providers, and this variation is correlated with observable factors, then everything in the model above is still valid, with 'apparent reluctance to switch, once captured' substituted for 'local market-concentration-derived market power.'

3. Empirical approach and results.

The analysis that follows uses data from the 1983 Survey of Consumer Finances (SCF), a survey conducted every three years since 1983 by the Federal Reserve Board. The 1983 Survey sampled 4262 households and asked a range of questions about household characteristics, income, and asset and liability totals. Most importantly, this was the last and only Survey for which information about the respondent's MSA of residence is publicly available. More recent Surveys do not include this information because of concerns about maintaining confidentiality for the households that respond to the Survey. Knowing a household's MSA allows a link between SCF data and data describing banking market concentration at the MSA level, as well as data describing the banking regulation and political environment at the state level.

Of the 4262 households sampled in the 1983 SCF, 438 were part of a high-income oversample group designed to provide a detailed picture of the asset holdings of the very wealthiest households. Confidentiality concerns dictate that the locations of these households are not revealed on the public-use SCF dataset. The remaining observations come from an area sample, and of these households 2553 are in 59 MSAs and can be linked to local information on financial market structure. Table 4 presents summary statistics for the variables used in the analysis that follows. The first row presents the distribution of the variable used to measure credit constraint. This variable is based on responses to two survey questions; the first question asks whether the respondent has been turned down from credit in the past few year, or has not been given as much credit as requested. The precise wording of the first question is below:

TURNED DOWN FOR CREDIT IN LAST FEW YEARS?
Respondents were asked if he/she (or their spouse) had had a request for credit turned down by a particular lendor or creditor in the past few years, or had been unable to get as much credit as he/she had applied for.

1. yes, turned down
3. yes, unable to get as much credit as he/she wanted
5. not turned down

Households that either report being turned down for credit or report being unable to get as much credit as requested are considered credit constrained. The second question asks whether they have been dissuaded from applying for credit, meaning that they had thought about applying for credit at a particular place but changed their mind because they thought they might be turned down. Again, the text of the question is outlined below:

DISSUADED FROM APPLYING FOR CREDIT?
Respondents were asked if there had been any time in the past few years that he/she (or their spouse) had thought about applying for credit at a particular place, but changed their mind because he/she thought he/she might be turned down.

1. yes
5. no

In almost all of the analysis that follows, households are viewed to consider themselves credit constrained if they answer yes to either of the questions documented above. It is important to have both questions, because without the second question, changes in the share of households whose credit requests are turned down could reflect either true changes in credit constraint or changes in the share of households applying for credit, making the results more ambiguous than when the 'discouraged from applying' question is included as well. By the measure that includes both rejection and discouragement, I find that 23.3 percent of households in the recent sample consider themselves credit constrained. As the next row reports, 17.8 percent of households have had credit requests turned down, and 11.7 percent of households have resisted applying for credit because of concerns about being turned down. 6.2 percent of these households report both having credit requests denied *and* having failed to apply for credit because of concerns about being turned down.

Column 2 documents the range in income in the sample. The mean in the sample is $25266, and the range between the 10th and the 90th percentiles is $5712 to $50000. The median income in the sample is $21000. For net worth, the mean is $78605, and the median is $34025. The 10th-90th percentile range is $150 to $180658, reflecting the great variation in wealth observed across American households. The mean household head age is 45.4 years, and the median is 42. As noted earlier, there is substantial variation in the interest rates that households report paying on their consumer and credit card debt. The mean rate paid is 14.4 percent, and the median is 16.1 percent. The range from the 25th to the 75th percentile is 10.9 percent to 18.3 percent.

Conceptually, this paper focuses the relationship between ex-post switching costs of borrowers and ex-ante access to credit. The empirical implementation of this concept uses the Herfindahl Index, a measure of banking market concentration. This index is 10000 times the sum of squared market shares of the banks in each MSA, computed on the basis of deposits. Both the Justice Department and the Federal Reserve use the Herfindahl measure to capture the amount of

competition in local banking markets. A completely monopolized market would have a Herfindahl Index of 10000, while a market with 5 equal-size banks would have a Herfindahl Index of 2000. The SCF respondents live in 59 MSAs, and the mean Herfindahl index across these MSAs is 1643. The median is 1561, and the range between 25th and 75th percentiles is 1013 to 2003. Reflecting the fact that more populous MSAs tend to have somewhat lower Herfindahl Indexes, these numbers are lower when weighted by household than when weighted by MSA. The subsections that follow use these data to assess the relationship between market concentration and consumer credit constraint.

3.1 Concentration and unsatisfied borrowers

The first regressions estimate the relationship between market concentration and the share of borrowers reporting that they have had credit requests turned down or discouraged. Equation (5) below shows the basic form of these regressions:

$$(5) \qquad I(\textit{constrained})_i = \alpha + \beta * HHI_i^{MSA} + X_i\beta + \varepsilon_i$$

The first column of Table 5 reports the coefficient from the model estimated with no control variables of any kind. As with all of the columns of Table 5, the results are based on a linear probability model for the dependent variable. In this most simple reduced form, there appears to be some correlation between concentration and the share of borrowers reporting being constrained, although the relationship is statistically significant only at the 10 percent level. In this sample, an increase of 500 Herfindahl points is associated in this sample with an increase of 9.5 percent in the share of borrowers reporting that they are credit constrained in either of the two ways mentioned earlier.

The second and third columns of Table 5 include linear controls for household age, income, and net worth. The second column applies linear controls for these factors, and the third column uses dummy variables that allow a nonlinear relationship between income and net worth and the dependent variable. In each of these specifications, the impact of banking market concentration on the share reporting credit constraint is negative, meaning that fewer borrowers in

concentrated markets are reporting being unable to borrow. Not surprisingly, in this sample increases in both household income and wealth are associated with reductions in reports of credit constraint. Households with incomes above $50000 were about 12 percent less likely to report constraint than households with incomes below $20000, and households reporting net worth in excess of $100000 were 20 percent less likely to report credit constraint than households reporting negative net worth. The coefficient on age suggests that older households, controlling for other factors, are less likely to report being credit constrained. The magnitude of the effect is large: moving from age 30 to age 50 is associated with a 15-17 percentage point drop in the probability that the household considers itself credit constrained.

A possible problem with the empirical analysis in columns (1) through (3) is that concentration and household reports of credit constraint may be correlated for reasons other than a causal effect of concentration on borrowing constraints. Concern is alleviated, however, by the fact that my analysis links concentration from a survey of banks to constraints from a survey of households and thus removes any mechanical connections between the two variables. If, however, there is variation across the business cycle in concentration, one might find a spurious correlation between credit constraint and concentration, one that does not reflect any causal impact of one on the other. Controlling for household income and local macroeconomic conditions is one approach to dealing with this problem, and the results below are strikingly robust to this control function approach. An additional approach to identifying the causal relationship is to use instrumental variables (IV) techniques. These techniques regress the credit constraint variable on concentration using only the part of the statistical variation in concentration that is correlated with a set of third variables, called instrumental variables. The idea is to purge the variation in concentration of components that might be spuriously correlated with credit constraint. The identifying assumption is that variation in these instrumental variables only affects borrowing activity through their impact on concentration.

The instruments used in table 8 include a set of dummy variables for the political environment in the state in 1983. The motivating assumption is that the major political parties in the United States are differentially hostile to deregulation and market power on the part of banks. As such, we use 5 instruments: dummy variables for whether the governorship and two houses of congress are controlled by Democrats, a dummy variable for uniform Democrat control of the three branches of government, and a dummy variable for uniform Republican control.[3]

Columns (4) through (6) document the results of this empirical exercise. They show that the variation in Herfindahl Index that can be described by these political variables is much more strongly associated with credit constraints than the other variation. The results are consistent with the intuition that market power and credit constraints are linked. The estimated magnitude of these coefficients is fairly large, perhaps large enough to be implausible that it holds throughout the distribution. According to the coefficient estimate in column (6), a 250 basis point increase in concentration is associated with a 12.7 percentage point drop in the share of consumers reporting credit constraint.

As noted earlier, the results in Table 5 are based on OLS and IV specifications of a linear probability model. Linear probability models for dummy dependent variables have some weaknesses, however. In particular, the linear probability model is not able to constrain the fitted value $\hat{\beta}' X$ to lie between 0 and 1, as required of a probability. To evaluate the robustness of the results Table 6 broadens the empirical specification by presenting results for the OLS model alongside results for both Probit and Logit specifications of the dichotomous dependent variable. The first row of the results presents the coefficients from these models, while the second row, presents the change in the probability that a household is credit constrained as the local HHI changes. The similarity of the results of the OLS specification to the Probit and Logit models is heartening and motivates the use of the OLS model through the rest of the paper.

[3] See Kroszner and Strahan (1999) for an empirical evaluation of the relationship between partisan control of state governments and banking market deregulation.

The results in Table 5 are based on a dependent variable that aggregated households responses to two questions: one question for whether the household had had a credit request turned down, and another for whether the household had avoided applying for credit because they thought they might get turned down. Table 7 presents results based on the responses to these two questions separately. Focusing on columns (3) and (6), which contain a rich set of controls for income and for net worth, the magnitude of the effect of market concentration on being turned down for credit ('TURN DOWN') is precisely the same as the magnitude of the effect on not asking for credit in the first place ('DON'T ASK'.) The impact on 'TURN DOWN' is statistically significant at the 10 percent level but not the 5 percent level, while the impact on the 'DON'T ASK' variable is statistically significant at the 5 percent level. Focusing on the control variables in columns (3) and (6), the marginal impact of age on each measure of credit constraint is roughly similar. The same is true for net worth; wealthy households are roughly 15 percent less likely to report not having requested credit and 15 percent less likely to report having a credit request denied. With respect to income, there is evidence that low-income households are much more likely to report having avoided requesting credit for fear of being turned down. The marginal impact of income on actually being turned down, however, in a regression that controls for net worth and other variables, is not significant.

Other government policies may affect the share of consumers having trouble borrowing. Foremost among these, as emphasized in a recent paper by Gropp, Scholz, and White (1997), are state policies toward borrowers who declare bankruptcy. There is important variation across states in the amount of assets that bankrupt borrowers are allowed to shield from their creditors. In many states, consumers who declare bankruptcy are able to shield substantial assets from creditors. States like Texas have been particularly generous, protecting the entire value of borrowers' homes from creditors in the event of bankruptcy. Other states, such as Iowa, have policies that are much less generous toward borrowers who declare bankruptcy. Because these differences in state bankruptcy exemptions affect the return to bank lending, they may also affect

the share of consumers who find that they are unable to get credit. The rest of the results presented in this paper control for these cross-state differences in bankruptcy exemption.

Table 8 controls for bankruptcy exemptions using data from Gropp, Scholz, and White (1997) to construct dummy variables based exemption generosity. States have different exemption limits for residential assets and other types of assets; the dummy variables are constructed by aggregating these limits to form a total bankruptcy exemption limit. The results in this table are even stronger than in the previous tables, suggesting that concentration-constraint relationship is robust to controlling for this other element of policy. Looking in particular at columns (3) and (6) of Table 8, both OLS and IV models suggest that an increase of 250 Herfindahl Indexes is associated with a reduction in the share reporting credit constraints of between 7 and 12 percentage points. Focusing on the coefficients on the bankruptcy exemption dummy variables, there is evidence that borrowers living in states with more bankruptcy law that is more generous toward defaulting borrowers are more likely to report that they are credit constrained. Households residing in states where defaulting borrowers are allowed to shield more than $25000 from creditors are between 5 and 9 percent more likely to report credit constraint than households living in less generous states. By way of comparison, in this sample a 1000 point increase in a locale banking market Herfindahl Index is associated with a roughly 3.5 percent reduction in households' probability of reporting credit constraints.

Another concern about the results documented in Tables 5 through 8 would be that the correlation between credit constraints and MSA banking market concentration reflects some joint correlation with MSA size or with local urbanization levels rather than a causal effect of concentration on credit constraints. Table 9 controls for locale-specific effects with dummy variables for different types of locations and with variables capturing the size of the metropolitan area in which the household resides. The regression documented in column (2), in particular, contains 5 dummy variables to the respondent's 'locale': one for respondents living in the central cities of the 10 major metropolitan areas, another for respondents residing in other MSAs, dummy

variables for respondents in living the suburbs of large and small MSAs, and an additional dummy for respondents living in parts of MSAs that are not suburban but still within 50 miles of the MSA center. The excluded dummy variable is for a small number of households living within MSAs but more than 50 miles from the MSA center. These households reside almost exclusively in the western part of the United States, where such a location is possible. The regression reported in column (2) also controls for the natural logarithm of MSA size. Together, these controls account in a very rich way for the size and the level of urbanization of the respondent's locale. Adding these controls, the coefficient on the MSA Herfindahl Index is negative and statistically significant at the 5 percent level. Focusing on the added control variables, there is evidence that households living in larger metropolitan areas, and households living in the central cities of metropolitan areas, are more likely to report that they are credit constrained.

The magnitude of the results in Table 5 and Table 9 seems large, and these large coefficients may perhaps not accurately reflect the slope of the relationship throughout the distribution of concentration. The Justice Department uses a Herfindahl Index of 1800 to separate moderately from highly concentrated markets, and scrutiny of mergers depends largely on whether the local market Herfindahl index exceeds this figure. Table 10 performs the same analysis as table 8, using a dummy variable for MSAs where the Herfindahl Index exceeds 1800. These equations fit variations of the following model:

(6) $I(constrained)_i = \alpha + \beta * I(HHI_i^{MSA} \geq 1800) + X_i\beta + \varepsilon_i$

I(X) represents an indicator function, set equal to 1 if the expression X is true. The results in Table 10 are consistent with a strong impact of concentration on credit constraint. Taking the estimate in column (3), households in markets which are highly concentrated are 5 percent less likely to report credit constraint; the IV results suggest that households in highly concentrated markets are as much as 23 percent less likely to report constraints. The magnitude of this effect appears to be approximately same order of magnitude as the impact of generous state bankruptcy exemptions.

Tables 11 performs the same analysis as Table 8, with an expanded set of control variables, including education, race, and region dummy variables. All regressions in these tables include the full set of dummy variables for state bankruptcy exemptions, household income, household net worth, as well as a linear term for the age of the household head. These results are broadly consistent with the earlier results. Only in the IV regression which includes dummy variables for region is the impact of concentration on constraint not statistically significant. In column (6) of Table 11, the estimated coefficient of 7.47, with a standard error of 4.74, is not different from 0 using standard measures of statistical confidence, a fact that may reflect the collinearity between region and the political control variables. All of the regressions show strong evidence that black households are more likely to report credit constraints. The largest point estimate among the race coefficients is for American Indians; the point estimate of 0.24 with a standard error of 0.13, while suggestive, is statistically significant at the 10 percent level but not at the five percent level. There is weak evidence that, controlling for other household characteristics, households with some college are more likely to report being credit constrained. There is also evidence, statistically significant at the 10 percent level, that households living in the North Central states are less likely than households in the East to report being credit constrained.

Table 12 looks separately at the marginal impact of market concentration among younger borrowers (households where the household head is younger than 40 years old) and older borrowers (households where the head is 40 and older.) This exercise provides another way of testing for Petersen-Rajan type effects. For a bank, holding all else equal, the value of investing in a relationship with a new borrower is greater when that new borrower is younger. In particular, for a monopolist bank, the future stream of rents earned on a new customer who is 20 years old would be greater than the rents on a new customer whose age is 80. The results documented in Table 12 provide some evidence that the marginal impact of market concentration is larger among younger households. In the OLS estimates in columns (1) and (4), the difference

between the coefficients on young and old borrowers is large both in the statistical sense and in the economic sense. However, for the IV results in columns (2),(3),(5), and (6), the differences are not as large. Among the other control variables, the most striking difference between older and younger borrowers is among households reporting Native American ethnicity; the coefficient on these households among the young cohorts is a whopping 60 percentage points, while among the older households the coefficient on the Native American dummy variable represents a negative 15 percentage point marginal effect.

All of the results documented so far have used the Herfindahl-Hirschman Index, constructed using commercial bank deposits, as a measure of local banking market concentration. Table 13 broadens the analysis by presenting results corresponding to different measures of financial market concentration. Column (1) uses the Herfindahl Index of the commercial banks in the MSA. Column (2) uses a dummy variable for MSAs whose commercial bank HHI exceeds 1800. Column (3) reports results using a Herfindahl Index, this time constructed for all depository instutitions rather than just commercial banks. Most importantly, this measure of concentration includes depository institutions in the savings and loan industry, an important sector in many areas of the country. Columns (4) and (5) use 3-firm concentration ratios, which measure the share of deposits in the market held at the three largest institutions. Column (4) uses a concentration ratio constructed on commercial banks, and column (5) is based on all depository institutions.

Across all of these results measures of market concentration, there is a statistically and economically significant effect on the share of households reporting credit constraint. The marginal impact of the commercial banking industry Herfindahl Index, as estimated earlier, is –3.47 percentage points per 1000 point index change. Using a dummy variable for MSAs with commercial banking Herfindahl Indexes in excess of 1800 gives a marginal effect of –5.20 percentage points. Using the Herfindahl measure of concentration based on the entire set of depository institutions gives a coefficient of –4.56, larger in magnitude than the measure based

only on the commercial banking industry. The final two columns of Table 13 use concentration ratios. Results based both on the commercial banking sector and on the entire set of depository institutions suggest that a 10 percentage point increase in the share of assets held at the 3 largest institutions is associated with approximately a 2 percentage point reduction in the probability that a household reports being credit constrained.

3.2 Lending interest rates and borrower age across different competitiveness regimes

Cross-subsidization between new and existing borrowers is key to the Petersen-Rajan model: a monopolist can recoup losses on loans to new borrowers through higher interest rates on subsequent loans to borrowers who turn out to be good risks. Table 14 tests an implication of this cross-subsidization: that the slope of interest rates on consumer loans should be steeper in more competitive markets than in concentrated markets.

Table 14 presents evidence supportive of the cross-subsidization hypothesis. Equation (7) below is the empirical model fit in these equations:

(7) $\text{INTRATE}_i^{MSA} = \alpha + \beta * \text{AGE}_i^{MSA} + X_i\Gamma + \varepsilon_i$,

This model is fit separately on a sample of concentrated MSAs (with Herfindahl indexes above 1800) and a sample of less concentrated MSAs (Herfindahl indexes below 1800). In the more concentrated sample, the coefficient on the age variable is –0.31 (standard error 0.26), meaning that as age rises by 10 years, the reported interest rate on consumer borrowing falls by 30 basis points. In less concentrated markets, reported interest rates decline much more steeply with age. In equation (6), which controls for the full set of demographic control variables, the coefficient of –0.64 (0.18) implies that a 10 year increase in age is associated with a 64 basis point drop in the interest rate on consumer borrowing. The difference between these estimated coefficients is statistically significant; nesting the equations in the same model along the lines of equation (8)

(8) $\text{INTRATE}_i^{MSA} = \alpha + \beta * \text{AGE}_i^{MSA} + \gamma * \text{AGE}_i^{MSA} * \text{I}(HHI_i^{MSA} \geq 1800) + X_i\beta + \varepsilon_i$

the coefficient γ is positive and significant at the 5 percent confidence level.

4. Conclusion

This paper presents the first evidence on the relationship between market concentration in the banking sector and household reports of credit constraints. There is substantial evidence both that more concentrated banking markets have fewer constrained borrowers and for the type of cross-subsidization across borrowers that is the key to theoretical models of concentration and credit constraint. The magnitude of these effects is large: moving from concentrated to competitive banking market regimes in 1983 is associated with a change in credit constraint similar to moving from a state where assets are unprotected in bankruptcy to a state offering substantial opportunities to shield assets from creditors.

American financial markets have changed substantially over the 18 years since the data used in this paper were collected. Many of these changes may have affected the relationship between banking market concentration and credit constraints, especially at the local level. In particular, banking markets may have become increasingly regional and national, as the relaxation of branching restrictions has enabled bank holding companies to expand and compete across a number of local markets. Perhaps most important, the proliferation of information technology and information about borrowers allows lenders to assess credit-worthiness of potential borrowers from afar almost as effectively as local banks can. Nevertheless, one can view local market concentration has one element of a set of factors influencing lenders' ex-post level of 'capture' of new borrowers. This paper provides strong evidence that the level of ex-post 'capture' matters for financial institutions' speculative lending to borrowers whose credit quality, ex-ante, they observe imperfectly.

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Table 1. Household sector balance sheets, 1975-2000. Data from Federal Reserve Flow of Funds Z1 releases. and from the 1983, 1989, 1992, 1995, and 1998 Surveys of Consumer Finances.

	Assets			Liabilities			
Year	Financial	Tangible	Total	Consumer	Mortgage	Total	Net Worth
Trillions of current dollars							
1975	$3.73 Tr	$2.25	$5.98	$0.21	$0.46	$0.77	$5.22
1980	6.64	4.38	11.02	0.36	0.93	1.46	9.57
1985	10.04	6.57	16.61	0.60	1.46	2.38	14.23
1990	14.85	9.33	24.17	0.81	2.53	3.75	20.43
1995	21.64	10.70	32.33	1.12	3.38	5.11	27.22
2000	33.14	15.28	48.42	1.57	4.92	7.46	40.96
Per-capita 2000 dollars							
1975	$46.0 k	$27.7	$73.8	$2.6	$5.7	$9.5	$64.4
1980	54.6	36.0	90.6	3.0	7.6	12.0	78.7
1985	61.0	39.9	101.0	3.6	8.9	14.5	86.5
1990	73.3	46.1	119.3	4.0	12.5	18.5	100.9
1995	89.5	44.2	133.7	4.6	14.0	21.1	112.5
2000	119.9	55.3	175.2	5.7	17.8	27.0	148.2

Table 2. Summary statistics for **debt ratio** variables, 1983-1998. Data from 1983-1998 Federal Reserve Surveys of Consumer Finances. Mean reported is the ratio of the means. Percentiles listed are the percentiles of the distribution.

			Percentiles of ratio				
	Share > 0	Ratio of means	10th	25th	50th	75th	90th
Ratio of total borrowing to income							
1983	72.2%	69.0%	0%	0%	16.8%	84.2%	166.1%
1989	72.7	82.5	0	0	23.9	94.0	184.6
1992	71.3	87.4	0	0	22.2	104.1	198.9
1995	74.9	88.9	0	0	33.0	123.4	232.4
1998	74.3	96.5	0	0	40.4	138.3	252.3
Ratio of consumer borrowing to income							
1983	64.1	11.5	0	0	2.6	13.5	31.2
1989	64.5	16.8	0	0	4.6	22.7	50.2
1992	61.1	12.4	0	0	2.8	18.1	41.7
1995	66.5	16.0	0	0	5.2	25.2	54.0
1998	63.9	19.1	0	0	5.1	28.2	63.0

Table 3. Summary statistics for **interest rates paid on debt**, 1983 SCF. Data from 1983 Federal Reserve Survey of Consumer Finances. All figures are percentages.

			Percentiles				
	Mean	Std. Dev.	10th	25th	50th	75th	90th
Home mortgages	9.5%	2.9%	6.0%	7.7%	9.0%	11.0%	13.2%
Other real estate mortgages	10.4	3.1	7.0	8.6	10.0	12.0	14.5
Consumer borrowing:	14.5	6.8	4.7	10.9	16.6	18.3	21.0
Credit card	15.0	7.6	0.0	15.0	18.0	18.0	21.0
Closed-end consumer debt:	14.6	6.4	5.6	10.7	15.5	18.6	21.9
Auto	16.7	5.4	10.5	14.3	16.8	18.9	23.4
Non-auto	12.9	7.2	2.0	7.0	13.6	18.5	22.2

Table 4. Sample summary statistics. Data based on sample from 1983 Federal Reserve Board Survey of Consumer Finances. Banking market concentration provided by Philip Strahan, political variables from 1984 U.S. Statistical Abstract.

					Percentiles				
Variable	Unit	Obs.	Mean	S.D.	10th	25th	50th	75th	90th
SCF variables:									
Credit denied or discouraged	HH	2553	0.233	0.423	0	0	0	0	1
(denied)	HH	2553	0.178	0.382	0	0	0	0	1
(discouraged)	HH	2553	0.117	0.322	0	0	0	0	1
(both)	HH	2553	0.062	0.240	0	0	0	0	0
Income	HH	2553	$25266	19922	5712	11303	21000	34050	50000
Net Worth	HH	2553	$78605	196872	150	4225	34025	89550	180658
Head age	HH	2553	45.4	16.9	25	31	42	59	70
Interest rate on consumer debt	HH		14.5%	6.8	4.7	10.9	16.6	18.3	21.0
Banking market concentration variables:									
Herfindahl Index	HH	2553	1586	846	562	991	1468	1935	2729
Herfindahl Index	MSA	59	1643	841	633	1013	1561	2003	2794
Political control variables:									
Democrats control:									
Governor	MSA	59	0.559	0.501	0	0	1	1	1
Senate	MSA	59	0.814	0.393	0	1	1	1	1
House	MSA	59	0.915	0.281	1	1	1	1	1
All branches	MSA	59	0.475	0.504	0	0	0	1	1
Republicans control:									
All branches	MSA	59	0.051	0.222	0	0	0	0	0

Table 5. Regressions of **consumer credit discouragement** on **market concentration**. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, and wealth. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Technique	(OLS)	(OLS)	(OLS)	(IV)	(IV)	(IV)
Variable						
HHI (/ 10000)	-1.91*	-2.75**	-2.49***	-4.38	-6.04*	-5.08*
	(1.08)	(1.11)	(0.92)	(2.74)	(3.34)	(2.58)
	[0.99]	[0.92]	[0.91]	[2.01]	[1.88]	[1.86]
Age (/ 100)		-0.85***	-0.72***		-0.86***	-0.72***
		(0.04)	(0.05)		(0.04)	(0.05)
Income variables:						
Income (/ 10000)		-0.40***			-0.41***	
		(0.04)			(0.04)	
Income ≥ $ 10000			-0.01			-0.01
			(0.03)			(0.03)
Income ≥ $ 20000			-0.09***			-0.09**
			(0.03)			(0.03)
Income ≥ $ 35000			-0.14***			-0.14**
			(0.03)			(0.03)
Income ≥ $ 50000			-0.13***			-0.14**
			(0.04)			(0.03)
Net worth variables:						
Net worth (/ 10000)		0.01			0.01	
		(0.00)			(0.00)	
Net worth ≥ $ 0			-0.06*			-0.06
			(0.04)			(0.04)
Net worth ≥ $ 10000			-0.09**			-0.09*
			(0.04)			(0.04)
Net worth ≥ $ 25000			-0.18***			-0.18***
			(0.03)			(0.03)
Net worth ≥ $ 100000			-0.21***			-0.21***
			(0.04)			(0.04)
Net worth ≥ $ 250000			-0.18***			-0.18***
			(0.04)			(0.04)
Constant	0.26***	0.76***	0.79***	0.30***	0.82***	0.83***
	(0.02)	(0.04)	(0.05)	(0.04)	(0.07)	(0.05)
R^2	0.002	0.141	0.172	-	0.135	0.168
N	2553	2553	2553	2547	2547	2547
Coefficients from first-stage regression (multiplied by 10000)						
Governor Democrat				-579.61	-580.00	-589.67
Senate Democrat-controlled				47.76	52.31	44.01
House Democrat-controlled				-1157.83	-1147.63	-1139.73
All 3 branches Democrat				735.19	730.73	739.14
All 3 branches Republican				794.72	797.68	795.98
Additional variables				none	see above	see above
Constant				2590.72	2647.30	2553.2
R^2 (first stage)				0.2433	0.2467	0.2518

*/**/*** : Significant at 10 / 5 / 1 % level.

Table 6. Regressions of **consumer credit discouragement** on **market concentration**. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, and wealth. Probit regressions fit model $Prob(I(\textit{credit discouraged})_i^{MSA}) = \Phi(\alpha + \beta * HHI^{MSA} + X_i\Gamma)$, and Logit regressions fit model $Prob(I(\textit{credit discouraged})_i^{MSA}) = \Lambda(\alpha + \beta * HHI^{MSA} + X_i\Gamma)$, where $\Lambda(.)$ represents the logistic CDF. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

Technique	(1) (OLS)	(2) (OLS)	(3) (Probit)	(4) (Probit)	(5) (Logit)	(6) (Logit)
Variable						
HHI (/ 10000)	-1.91*	-2.49***	-6.42*	-10.42***	-11.09*	-18.35***
	(1.08)	(0.92)	(3.62)	(3.65)	(6.32)	(6.50)
	[0.99]	[0.91]	[3.31]	[3.65]	[5.76]	[6.36]
$\left.\frac{\partial E(discouraged\|\vec{x})}{\partial HHI}\right\|_{\vec{x}=\bar{\vec{x}}}$	-1.91	-2.49	-1.96	-2.80	-1.98	-2.71
Age (/ 100)		-0.72***		-2.81***		-4.82***
		(0.05)		(0.22)		(0.39)
Income variables:						
Income ≥ $ 10000		-0.01		-0.09		-0.13
		(0.03)		(0.09)		(0.15)
Income ≥ $ 20000		-0.09***		-0.31***		-0.51***
		(0.03)		(0.09)		(0.16)
Income ≥ $ 35000		-0.14***		-0.51***		-0.84***
		(0.03)		(0.12)		(0.22)
Income ≥ $ 50000		-0.13***		-0.43***		-0.70**
		(0.04)		(0.15)		(0.28)
Net worth variables:						
Net worth ≥ $ 0		-0.06*		-0.15		-0.23
		(0.04)		(0.10)		(0.17)
Net worth ≥ $ 10000		-0.09**		-0.20		-0.33
		(0.04)		(0.12)		(0.21)
Net worth ≥ $ 25000		-0.18***		-0.52***		-0.86***
		(0.03)		(0.11)		(0.19)
Net worth ≥ $ 100000		-0.21***		-0.76***		-1.37***
		(0.04)		(0.15)		(0.27)
Net worth ≥ $ 250000		-0.18***		-0.81***		-1.47***
		(0.04)		(0.21)		(0.41)
Constant	0.26***	0.79***	-0.63***	1.18***	-1.02***	2.02***
	(0.02)	(0.05)	(0.06)	(0.14)	(0.10)	(0.24)
R^2	0.002	0.172	0.001	0.171	0.001	0.169
N	2553	2553	2553	2553	2553	2553

* / ** / *** : Significant at 10 / 5 / 1 % level.

Table 7. Regressions of **consumer credit discouragement** on **market concentration**. Columns (1)-(3) present OLS regressions of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having been denied a loan in the past 5 years. Columns (4)-(6) present OLS regressions of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports not having for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, and wealth. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable is TURN DOWN only			Dependent variable is DON'T ASK only		
Technique	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
Variable						
HHI (/ 10000)	-0.91	-1.44*	-1.49*	-1.27*	-1.85**	-1.49**
	(0.82)	(0.85)	(0.78)	(0.75)	(0.77)	(0.67)
	[0.90]	[0.86]	[0.85]	[0.75]	[0.73]	[0.72]
Age (/ 100)		-0.66***	-0.53**		-0.46***	-0.40***
		(0.04)	(0.06)		(0.04)	(0.04)
Income variables:						
Income (/ 10000)		-0.23***			-0.29***	
		(0.03)			(0.04)	
Income ≥ $ 10000			0.04*			-0.05*
			(0.02)			(0.02)
Income ≥ $ 20000			0.00			-0.12***
			(0.03)			(0.03)
Income ≥ $ 35000			-0.04			-0.13***
			(0.03)			(0.03)
Income ≥ $ 50000			-0.05			-0.12***
			(0.03)			(0.03)
Net worth variables:						
Net worth (/ 10000)		0.00			0.05	
		(0.04)			(0.04)	
Net worth ≥ $ 0			-0.02			-0.07**
			(0.04)			(0.04)
Net worth ≥ $ 10000			-0.04			-0.08*
			(0.04)			(0.04)
Net worth ≥ $ 25000			-0.13***			-0.13***
			(0.04)			(0.04)
Net worth ≥ $ 100000			-0.15***			-0.14***
			(0.04)			(0.04)
Net worth ≥ $ 250000			-0.14***			-0.12***
			(0.04)			(0.04)
Constant	0.19*	0.57***	0.53***	0.14***	0.42***	0.50*
	(0.02)	(0.04)	(0.04)	(0.02)	(0.04)	(0.03)
R^2	0.000	0.096	0.116	0.001	0.081	0.114
N	2553	2553	2553	2553	2553	2553

*/**/***: Significant at 10 / 5 / 1 % level.

Table 8. Regressions of **consumer credit discouragement** on **market concentration**, including controls for state-level bankruptcy exemptions. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, and wealth. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

Technique	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (IV)	(5) (IV)	(6) (IV)
Variable						
HHI (/ 10000)	-2.97**	-3.66***	-3.47***	-4.15*	-5.68**	-5.06**
	(1.15)	(1.17)	(0.98)	(2.14)	(2.55)	(1.97)
	[1.03]	[0.96]	[0.95]	[1.95]	[1.82]	[1.80]
Age (/ 100)		-0.84***	-0.71***		-0.84***	-0.70***
		(0.04)	(0.05)		(0.05)	(0.05)
Bankruptcy exemption variables:						
Exemption ≥ $ 10000	0.01	0.01	0.01	0.00	0.01	0.01
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Exemption ≥ $ 25000	0.09**	0.08**	0.08**	0.09**	0.09**	0.09**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Exemption ≥ $ 50000	0.05	0.07	0.06	0.06	0.08	0.08
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)
Exemption ≥ $100000	0.06	0.05	0.06*	0.07	0.05	0.06*
	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Income variables:						
Income (/ 10000)		-0.40***			-0.40***	
		(0.04)			(0.04)	
Income ≥ $ 10000			-0.01			-0.01
			(0.03)			(0.03)
Income ≥ $ 20000			-0.09***			-0.09**
			(0.03)			(0.03)
Income ≥ $ 35000			-0.14***			-0.13**
			(0.03)			(0.03)
Income ≥ $ 50000			-0.12***			-0.13**
			(0.04)			(0.04)
Net worth variables:						
Net worth (/ 10000)		0.00			0.00	
		(0.00)			(0.00)	
Net worth ≥ $ 0			-0.06*			-0.07*
			(0.04)			(0.04)
Net worth ≥ $ 10000			-0.09**			-0.09**
			(0.04)			(0.04)
Net worth ≥ $ 25000			-0.18***			-0.18***
			(0.03)			(0.03)
Net worth ≥ $ 100000			-0.22***			-0.22***
			(0.04)			(0.04)
Net worth ≥ $ 250000			-0.20***			-0.20***
			(0.04)			(0.05)
Constant	0.25***	0.74***	0.77***	0.27***	0.77***	0.79***
	(0.03)	(0.04)	(0.05)	(0.04)	(0.06)	(0.05)
R^2	0.008	0.145	0.172	0.007	0.142	0.174
R^2 (first stage)				0.343	0.346	0.349
N	2553	2553	2553	2547	2547	2547

*/ **/ ***: Significant at 10 / 5 / 1 % level.

Table 9. Regressions of **consumer credit discouragement** on **market concentration**, including additional locale-specific controls. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, wealth, state bankruptcy exemptions, and locale-specific controls. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Technique	(OLS)	(OLS)	(OLS)	(IV)	(IV)	(IV)
Variable						
HHI (/ 10000)	-3.64***	-2.32**	-3.36***	-5.24**	-3.40*	-4.86**
	(0.82)	(0.91)	(0.80)	(2.02)	(2.02)	(2.05)
	[1.04]	[1.18]	[1.06]	[2.10]	[2.34]	[2.08]
Age (/ 100)	-0.72***	-0.72***	-0.72***	-0.71***	-0.71***	-0.71***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Locale						
Central cities of 10 largest MSAs	0.07	-0.01	0.04	0.07	-0.00	0.04
	(0.05)	(0.06)	(0.06)	(0.05)	(0.07)	(0.06)
Central cities of other MSAs	0.07	0.02	0.05	0.08	0.04	0.07
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)
Suburbs of 10 largest MSAs	0.04	-0.03	0.01	0.03	-0.02	0.01
	(0.05)	(0.06)	(0.05)	(0.05)	(0.06)	(0.05)
Suburbs of other MSAs	0.03	-0.02	0.01	0.03	-0.01	0.02
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)
Other areas within 50 miles of	-0.01	-0.04	-0.02	-0.01	-0.04	-0.02
MSA center	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)
MSA size:						
Log(MSA size) (/ 100)		2.42**			2.01*	
		(1.05)			(1.20)	
MSA size ≥ 1 million			2.82			2.20
			(2.46)			(2.52)
Constant	0.71***	0.43***	0.73***	0.74***	0.49***	0.74***
	(0.05)	(0.14)	(0.05)	(0.05)	(0.16)	(0.05)
Other dummy variables:						
Bankruptcy exemptions	Yes	Yes	Yes	Yes	Yes	Yes
Income	Yes	Yes	Yes	Yes	Yes	Yes
Net worth	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.180	0.182	0.181	0.174	0.181	0.179
R^2 (first stage)				0.435	0.565	0.469
N	2553	2553	2553	2547	2547	2547

* / ** / *** : Significant at 10 / 5 / 1 % level.

Table 10. Regressions of **consumer credit discouragement** on **market concentration**. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * I(\textit{HHI}^{MSA} \geq 1800) + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. $I(\textit{HHI}^{MSA} \geq 1800)$ is set equal to 1 if the Herfindahl Index in the household's MSA's commercial banking sector equals or exceeds 1800, and X_i includes controls for age, income, and wealth. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

Technique	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (IV)	(5) (IV)	(6) (IV)
Variable						
HHI ≥ 1800 (/100)	-5.03**	-5.45**	-5.21***	-18.67**	-22.90**	-19.38**
	(2.21)	(2.20)	(1.93)	(9.05)	(9.60)	(7.78)
	[1.84]	[1.71]	[1.69]	[6.81]	[6.40]	[6.30]
Age (/ 100)		-0.84***	-0.70***		-0.83***	-0.69***
		(0.04)	(0.05)		(0.04)	(0.06)
Bankruptcy exemption variables:						
Exemption ≥ $ 10000	0.02	0.02	0.02	0.04	0.05	0.04
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Exemption ≥ $ 25000	0.09**	0.08**	0.08**	0.13**	0.14**	0.13***
	(0.04)	(0.04)	(0.03)	(0.05)	(0.06)	(0.05)
Exemption ≥ $ 50000	0.05	0.07	0.07	0.13	0.17	0.15
	(0.05)	(0.05)	(0.05)	(0.10)	(0.11)	(0.10)
Exemption ≥ $100000	0.07	0.05	0.06*	0.10**	0.10*	0.10*
	(0.04)	(0.03)	(0.03)	(0.06)	(0.06)	(0.05)
Income variables:						
Income (/ 10000)		-0.39***			-0.41***	
		(0.04)			(0.05)	
Income ≥ $ 10000			-0.01			-0.01
			(0.03)			(0.03)
Income ≥ $ 20000			-0.09***			-0.09***
			(0.03)			(0.03)
Income ≥ $ 35000			-0.13***			-0.13***
			(0.03)			(0.04)
Income ≥ $ 50000			-0.12***			-0.13***
			(0.04)			(0.04)
Net worth variables:						
Net worth (/ 10000)		0.00			0.00	
		(0.00)			(0.00)	
Net worth ≥ $ 0			-0.06*			-0.06*
			(0.04)			(0.04)
Net worth ≥ $ 10000			-0.09**			-0.08*
			(0.04)			(0.04)
Net worth ≥ $ 25000			-0.18***			-0.18***
			(0.03)			(0.03)
Net worth ≥ $ 100000			-0.22***			-0.22***
			(0.04)			(0.04)
Net worth ≥ $ 250000			-0.20***			-0.20***
			(0.04)			(0.05)
Constant	0.21***	0.69***	0.72***	0.23***	0.71***	0.73*
	(0.02)	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)
R^2	0.007	0.144	0.175	.	0.107	0.151
R^2 (first stage)				0.136	0.138	0.141
N	2553	2553	2553	2547	2547	2547

*/**/*** : Significant at 10 / 5 / 1 % level.

Table 11. Regressions of **consumer credit discouragement** on **market concentration**, including additional demographic controls. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, wealth, age, race, education, and state bankruptcy exemptions. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Technique	(OLS)	(OLS)	(OLS)	(IV)	(IV)	(IV)
Variable						
HHI (/ 10000)	-3.47***	-3.19***	-2.67***	-5.06**	-4.79**	-2.99*
	(0.98)	(1.00)	(1.01)	(1.97)	(2.13)	(1.69)
	[0.95]	[0.95]	[1.04]	[1.80]	[1.83]	[1.91]
Age (/ 100)	-0.71***	-0.68***	-0.69***	-0.70***	-0.68***	-0.69***
	(0.05)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)
Education dummy variables:						
9-12 Years of education		0.01	0.01		0.01	0.01
		(0.03)	(0.03)		(0.03)	(0.03)
High school diploma		0.02	0.02		0.02	0.02
		(0.03)	(0.03)		(0.03)	(0.03)
Some college		0.06*	0.05		0.06	0.05
		(0.04)	(0.04)		(0.04)	(0.04)
College degree		0.01	0.01		0.01	0.01
		(0.03)	(0.03)		(0.03)	(0.03)
Race dummy variables:						
Black except Hispanic		0.13***	0.14***		0.13***	0.14***
		(0.03)	(0.03)		(0.03)	(0.03)
Hispanic		-0.01	-0.02		-0.02	-0.02
		(0.05)	(0.04)		(0.05)	(0.04)
American Indian		0.24*	0.23*		0.23*	0.23*
		(0.13)	(0.13)		(0.13)	(0.13)
Asian or Pacific Islander		-0.00	-0.01		-0.01	-0.01
		(0.09)	(0.09)		(0.09)	(0.09)
Region dummy variables:						
North central			-0.05*			-0.05*
			(0.02)			(0.02)
South			-0.02			-0.03
			(0.03)			(0.03)
West			0.01			0.16
			(0.03)			(0.03)
Constant	0.77***	0.68***	0.70***	0.79***	0.70***	0.71***
	(0.05)	(0.06)	(0.08)	(0.05)	(0.07)	(0.08)
Other dummy variables:						
Bankruptcy exemptions	Yes	Yes	Yes	Yes	Yes	Yes
Income	Yes	Yes	Yes	Yes	Yes	Yes
Net worth	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.176	0.190	0.192	0.174	0.188	0.190
R^2 (first stage)				0.349	0.356	0.471
N	2553	2553	2553	2547	2547	2547

*/**/***: Significant at 10 / 5 / 1 % level.

Table 12. Regressions of **consumer credit discouragement** on **market concentration**, by age of household head. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * HHI^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. HHI^{MSA} is the Herfindahl Index in the household's MSA's commercial banking sector, and X_i includes controls for age, income, wealth, age, race, education, and state bankruptcy exemptions. IV regressions instrument HHI^{MSA} with a set of variables describing state-level political control. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

Sample	(1)	(2)	(3)	(4)	(5)	(6)
	Household head < 40			Household head ≥ 40		
Technique	(OLS)	(IV)	(IV)	(OLS)	(IV)	(IV)
Variable						
HHI (/ 10000)	-4.83***	-5.93**	-3.14	-0.80	-3.14	-2.20
	(1.29)	(2.54)	(2.18)	(1.06)	(1.93)	(1.66)
	[1.83]	[3.05]	[3.41]	[1.15]	[2.11]	[2.12]
p value: test of				(0.069)	(0.464)	(0.896)
H_0: $\beta_{(<40)} = \beta_{(\geq 40)}$				[0.003]	[0.202]	[0.815]
Age (/ 100)	-0.31	-0.26	-0.30	-0.59***	-0.59***	-0.58***
	(0.27)	(0.27)	(0.27)	(0.10)	(0.08)	(0.10)
Education dummy variables:						
9-12 Years of education	0.08	0.08	0.08	-0.01	-0.01	-0.01
	(0.11)	(0.11)	(0.11)	(0.03)	(0.03)	(0.03)
High school diploma	0.06	0.06	0.06	-0.01	-0.01	-0.01
	(0.10)	(0.10)	(0.10)	(0.03)	(0.03)	(0.03)
Some college	0.09	0.09	0.09	0.04	0.04	0.03
	(0.10)	(0.10)	(0.10)	(0.03)	(0.03)	(0.03)
College degree	0.01	0.01	0.01	0.03	0.03	0.03
	(0.10)	(0.10)	(0.11)	(0.03)	(0.03)	(0.03)
Race dummy variables:						
Black except Hispanic	0.14***	0.14***	0.15***	0.12***	0.12***	0.12***
	(0.04)	(0.05)	(0.05)	(0.04)	(0.03)	(0.04)
Hispanic	-0.05	-0.05	-0.05	0.01	-0.00	0.00
	(0.07)	(0.07)	(0.07)	(0.05)	(0.05)	(0.05)
American Indian	0.60***	0.60***	0.60***	-0.15***	-0.16***	-0.15***
	(0.07)	(0.07)	(0.07)	(0.04)	(0.04)	(0.04)
Asian or Pacific Islander	-0.00	0.01	0.00	-0.07	-0.07	-0.07
	(0.11)	(0.10)	(0.10)	(0.14)	(0.14)	(0.14)
Region dummy variables:						
North central	-0.07*		-0.08**	-0.03		-0.02
	(0.04)		(0.04)	(0.02)		(0.03)
South	-0.03		-0.02	0.00		-0.03
	(0.04)		(0.06)	(0.03)		(0.03)
West	0.03		0.03	0.01		0.01
	(0.05)		(0.06)	(0.02)		(0.03)
Constant	0.61***	0.59***	0.57***	0.59***	0.59***	0.61***
	(0.16)	(0.16)	(0.17)	(0.09)	(0.08)	(0.09)
Other dummy variables:						
Bankruptcy exemptions	Yes	Yes	Yes	Yes	Yes	Yes
Income	Yes	Yes	Yes	Yes	Yes	Yes
Net worth	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.135	0.130	0.133	0.124	0.117	0.120
R^2 (first stage)		0.377	0.496		0.346	0.460
N	1130	1127	1127	1423	1420	1420

* / ** / *** : Significant at 10 / 5 / 1 % level.

Table 13. Regressions of **consumer credit discouragement** on **market concentration**, using different measures of market concentration. OLS regressions are of form $I(\textit{credit discouraged})_i^{MSA} = \alpha + \beta * CONC^{MSA} + X_i\Gamma + \varepsilon_i$, where $I(\textit{credit discouraged})_i^{MSA}$ is set equal to 1 if the respondent reports having either been denied a loan in the past 5 years or has not applied for credit because of the anticipation of being denied a loan. $CONC^{MSA}$ is the measure of financial market concentration in the household's MSA's commercial banking sector, and X_i includes controls for age, income, wealth, age, race, education, and state bankruptcy exemptions. Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)
Technique	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
Measure of concentration	HHI, commercial banks	Dummy for commercial bank HHI ≥ 1800	HHI, all depository institutions	3-firm concentration ratio, commercial banks	3-firm concentration ratio, all depository institutions
Variable					
HHI (/ 10000)	-3.47***	-5.20***	-4.56***	-1.98***	-2.18***
	(0.98)	(1.93)	(1.38)	(0.64)	(0.74)
	[0.95]	[1.69]	[1.36]	[0.60]	[0.65]
Age (/ 100)	-0.71***	-0.70***	-0.71***	-0.71***	-0.71***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)
Constant	0.77***	0.72***	0.77***	0.84***	0.81***
	(0.05)	(0.05)	(0.05)	(0.07)	(0.06)
Dummy variables:					
Bankruptcy exemptions	Yes	Yes	Yes	Yes	Yes
Income	Yes	Yes	Yes	Yes	Yes
Net worth	Yes	Yes	Yes	Yes	Yes
R^2	0.176	0.175	0.177	0.176	0.176
N	2553	2553	2553	2553	2553

*/ **/ ***: Significant at 10 / 5 / 1 % level.

Table 14. Regressions of **consumer credit interest rates** on **age**, by concentration of market.
OLS regressions are of form $INTRATE_i^{MSA} = \alpha + \beta * AGE_i^{MSA} + X_i\Gamma + \varepsilon_i$, where $INTRATE_i^{MSA}$ is the interest rate on consumer and credit card borrowing. X_i includes controls for income and wealth. .
Standard errors in parenthesis corrected for MSA-level clustering; uncorrected standard errors in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Concentrated MSAs (HHI ≥ 1800)			Competitive MSAs (HHI < 1800)		
Technique	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
Variable						
Age (/10)	-0.32	-0.27	-0.31	-0.60**	-0.69**	-0.64**
	(0.23)	(0.24)	(0.27)	(0.19)	(0.20)	(0.18)
	[0.21]	[0.24]	[0.26]	[0.15]	[0.17]	[0.20]
p value: test of				(0.280)	(0.230)	(0.213)
H_0: $\beta_{(<1800)} = \beta_{(\geq 1800)}$				[0.349]	[0.273]	[0.288]
Dummy variables:						
Bankruptcy exemptions		Yes	Yes		Yes	Yes
Income		Yes	Yes		Yes	Yes
Net worth		Yes	Yes		Yes	Yes
Education			Yes			Yes
Race			Yes			Yes
Region			Yes			Yes
Constant	16.30**	12.08**	9.66**	16.64**	15.18**	12.34**
	(0.92)	(2.50)	(2.81)	(0.66)	(1.48)	(1.70)
R^2	0.004	0.063	0.075	0.014	0.057	0.084
N	570	570	570	1062	1062	1062

* / ** / *** : Significant at 10 / 5 / 1 % level.

Figure 1. Predicted interest rates on consumer borrowing, by age, concentrated and competitive banking market