

Working Paper

Access to Credit and Stock Market Participation

Serhiy Kozak

Stephen M. Ross School of Business
University of Michigan

Denis Sosyura

Stephen M. Ross School of Business
University of Michigan

Ross School of Business Working Paper

Working Paper No. 1276

April 2015

This work cannot be used without the author's permission.

This paper can be downloaded without charge from the
Social Sciences Research Network Electronic Paper Collection:

<http://ssrn.com/abstract=2594976>

Access to Credit and Stock Market Participation*

Serhiy Kozak

Ross School of Business
University of Michigan
sekozak@umich.edu

Denis Sosyura

Ross School of Business
University of Michigan
dsosyura@umich.edu

Abstract

We exploit staggered removals of interstate banking restrictions to identify the causal effect of access to credit on households' stock market participation and asset allocation. Using micro data on retail brokerage accounts and proprietary data on personal credit histories, we document two effects of the loosening of credit constraints on households' financial decisions. First, households enter the stock market by opening new brokerage accounts. Second, households increase their asset allocation to risky assets and reduce their allocation to cash, consistent with a lower need for precautionary savings. The effects are stronger for younger and more credit constrained investors. Overall, we establish one of the first direct links between access to credit and households' investment decisions.

* We thank Sugato Bhattacharyya, Stefan Nagel, Stefan Zeume, and seminar participants at the University of Michigan for comments.

Introduction

At the forefront of an ongoing debate in consumer finance is the effort to promote competition among financial institutions and facilitate households' access to credit. This regulatory effort has fueled one of the largest transformations of the banking sector in recent history—the relaxation of geographic restrictions on bank expansion across state lines. As a result, the financial sector has been transformed from a system of highly fragmented regional markets to an integrated market with interstate banking.

We study how this transformation of the banking sector has affected households' financial decisions. We focus on two key decisions: stock market participation and asset allocation. This focus is motivated by several factors. First, a household's market participation and asset allocation are the most important drivers of long-term wealth. Second, stock market participation has significant implications for asset prices. For example, prior work establishes a direct link between stock market participation and the equity premium (e.g., Campbell 1993 and Heaton and Lucas 1999). Third, stock market participation is important for the macroeconomy, serving as an important driver of aggregate investment.

To study the effect of access to credit on market participation, we exploit the staggered passage of interstate banking laws, which permit the entry of large national banks—the primary issuers of personal credit cards and other forms of unsecured credit—into select geographic markets. These laws have several useful properties for identification. First, because the laws are specific to each state pair, they generate sharp temporal variation in the timing of a state's deregulation with the states that house the primary issuers of credit cards. Second, because many laws require reciprocity, they become effective not when the law is passed by the state permitting bank entry, but when the reciprocal law is passed by the other state in the pair. Third, the passage of these laws is often determined by the internal politics inside the state parliament (Kroszner and Strahan 1999), a factor plausibly exogenous to a household's investment opportunity set.

Using proprietary data on personal credit from TransUnion and a comprehensive panel of all bank branches in the U.S., we show that the relaxation of interstate banking restrictions leads to an immediate entry of large national banks into the deregulated states and a 34% increase in the annual number of new credit card issuances in these states within the first two years. Next, using the increase in credit cards

instrumented by the passage of interstate banking laws, we establish our main finding: access to credit increases stock market participation.

Using administrative data from a national discount brokerage, we find that a one percentage point increase in credit card issuances (instrumented by interstate banking laws) leads to a 32 bps increase in the number of new brokerage accounts and a 38 bps increase in the number of new brokerage clients. The entire increase in market participation is concentrated within the first two years after the deregulation and levels off thereafter. Combined with the estimated increase in credit card issuances attributable to banking deregulation, our evidence suggests that stock market participation increases by 13% over the first two years after a state removes legal barriers to interstate banking.

In the cross-section, the increase in market participation is stronger for younger and better-educated households who are likely to be credit constrained—those who have lower income, own less pledgeable assets, and reside in states with less competitive bank markets (low bank penetration and restrictions on intra-state banking). Because the discount brokerage is not affiliated with any banks, this effect is separate from the offerings of brokerage accounts or financial products by the entering banks. These estimates control for time-invariant state-level heterogeneity, time fixed effects, and the dynamic determinants of market participation, such as personal income and population. Furthermore, by focusing only on the households that reside in the affected states before and after the deregulation, we show that the effect is not driven by changes in demographics or migration across state lines.

To further distinguish the effect of credit supply from changes in the state economy that might be correlated with the deregulation events, we offer micro-level evidence at the zip level. In particular, to identify treated zip codes affected by the increase in credit, we exploit the locations of bank branches acquired by the entering banks inside a deregulated state, while controlling for county*year fixed effects. This specification captures all changes in economic variables at the county level, including changes in employment, output, and new business growth, among many others. We find that the entire increase in credit cards and market participation is confined to the 10-mile radius around the bank branches acquired by large national banks. In contrast, there is no increase in credit card issuances or market participation

for households unaffected by the bank entry—those who live more than 10 miles away from the branches acquired by the entering national banks.

While the state-level evidence relies on exogenous variation in bank laws, the zip-level evidence refines these estimates by exploiting geographic variation across the acquired bank branches, whose locations are not random. To address selection, we show that our zip-level evidence is not driven by banks' selective entry into booming neighborhoods which are coincidentally experiencing growth in stock market participation. First, interstate banking laws typically permit bank entry only via acquisitions of existing banks, thus preventing the entering banks from selectively opening branches in attractive zip codes. Second, to address the possibility that the entering banks selectively acquire banks with branches in booming neighborhoods, we show that there is no pre-trend either in credit card issuances or market participation before the national banks' entry. In contrast, stock market participation increases only after the entry of national banks. Finally, we show that access to credit leads to an even larger increase in market participation when we focus on a subset of banks that enter the deregulated states by acquiring their failed banks. In other words, the effect is even stronger when we focus on credit-constrained markets with no prior growth in credit or market participation.

Next, we examine how access to credit affects asset allocation. We obtain the complete financial balance sheets of households—both those who participate in financial markets and those who do not—from the Panel Study of Income Dynamics (PSID), which traces a nationally representative sample of 8,000 households from all states across time. We also obtain restricted data on each household's location, defined at the Census tract level.

In the PSID data, we use interstate deregulation laws as an instrument for a household's personal debt. In the first-stage regression, we show that the ratio of unsecured debt (a proxy for credit card debt) to a household's pledgable assets increases by 36% after the deregulation. In the second stage, we use the estimated changes in household credit attributable to interstate deregulation to study the effect of access to credit on market participation and asset allocation.

We find that an increase in access to personal credit leads to a higher likelihood of stock market participation, a greater share of assets kept in stocks, and a smaller share of assets kept in bonds and cash.

These effects are statistically significant and economically large. Our estimates indicate that a one percentage point increase in personal unsecured credit (scaled by the household's assets) increases the likelihood of stock market participation by 8 bps and increases the share of assets kept in stocks by 25 bps. Overall, our estimates indicate that in response to banking deregulation, stock market participation increases by 3 percentage points (or about 16%) and the share of assets held in stocks goes up by 9 percentage points (or about 11%). These effects are stronger for younger, better-educated, and more credit constrained households. In the household-level analysis, we show that our results are robust to controlling for household fixed effects, which capture all time-persistent determinants of stock market participation and asset allocation that remain invariant over this short period, such as education, race and ethnicity, professional status, sociability, intellect, and political activism, among others. These estimates also control for the dynamic drivers of stock market participation and asset allocation, such as personal income, wealth, and employment status, using data specific to each household.

Interpreted broadly, our evidence is consistent with the theoretical predictions that easier access to credit allows households to participate in financial markets by increasing their risk tolerance and reducing the need for precautionary savings. For example, the additional borrowing capacity on credit cards may help households hedge against consumption shocks (thus allowing for long-term investments in financial markets) or help fund future investments. Alternatively, access to credit cards can make households more comfortable with other financial products and increase their interest in financial markets and financial news.

Overall, our findings have several implications. First, we demonstrate one of the first direct links between individual investors' access to credit and their participation in financial markets. Our findings underscore the connection between consumer finance and capital markets. Second, policies aimed at improving household access to credit can improve households' long-term financial wealth through more active participation in the stock market and greater allocation to equity investments. Finally, financial deregulation in the banking sector generates positive spillovers on the stock market.

The central contribution of this paper is to provide micro-level evidence on how individuals' access to credit affects their participation in financial markets. Our findings add to two strands of the literature: household finance and financial intermediation.

In household finance, our work identifies an important time-varying driver of stock market participation that likely contributed to the dramatic rise in market participation from around 19% in 1980 to over 30% by the late 1990s. This finding complements prior work on market participation, which has focused on mostly its cross-sectional determinants that have remained comparable for the average U.S. household, such as age (Campbell 2006), intelligence (Grinblatt, Keloharju and Linnainmaa 2011), market awareness (Brown, Ivković, Smith, and Weisbenner 2008), sociability (Hong, Kubik, and Stein 2004), risk aversion (Vissing-Jørgensen 2002), trust in financial markets (Guiso, Sapienza and Zingales 2008), and political activism (Bonaparte and Kumar 2012).

In the banking literature, our work is one of the first to document the positive spillovers of banking deregulation on households' financial decisions. This evidence complements prior work in this literature, which has examined the effect of banking deregulation on corporate outcomes, such as incorporations (Black and Strahan 2002; Kerr and Nanda 2009), diversification (Goetz, Laeven, and Levine 2013), innovation (Amore, Schneider, and Žaldokas 2013), and borrowing costs (Rice and Strahan 2010), and macroeconomic outcomes, such as economic growth (Jayaratne and Strahan 1996), inequality (Beck, Levine, and Levkov 2010), and inter-state trade (Michalski and Ors 2012). Recent work demonstrates that local bank branches continue to play a key role in households' access to credit even in very competitive credit markets and after the complete deregulation of interstate banking (Gilje, Loutskina, and Strahan, 2014). Our findings show that the supply of credit by local bank branches has an important effect on investors' financial decisions, generating spillovers on capital markets.

1. Institutional Setting: Interstate Banking Laws

This section provides institutional details on banking deregulation and discusses the drivers of interstate banking agreements. This discussion motivates our instrumental variable analysis and serves as a starting point for evaluating the relevance and exogeneity criteria of interstate banking agreements as a plausible instrument for credit supply.

1.1. Overview of interstate banking

Until the early 1980s, financial institutions in the U.S. were prohibited from operating across state lines, the practice commonly referred to as interstate banking. In particular, the Douglas Amendment to the Bank Holding Company Act of 1956 prohibited bank holding companies from establishing or acquiring bank subsidiaries outside of the holding company's home state, unless such actions were authorized by the state of the target banks. As a result, interstate banking was prohibited until the state of a target bank passed a law that would explicitly permit the entry of out-of-state bank holding companies.

In 1978, Maine was the first state to enter into an interstate banking agreement that permitted the entry of out-of-state bank holding companies. Similar interstate banking agreements were subsequently introduced by other states. These agreements varied along two main dimensions: (i) regional vs. national and (ii) reciprocal vs. nonreciprocal. Regional agreements permit the entry of bank holding companies only from a specific region, whereas national agreements permit the entry of banks from any other state. Reciprocal agreements become effective only when the state of the acquiring holding company passes the reciprocal law that permits the entry of banks from the target state into the home state of the acquiring company. Nonreciprocal agreements do not require reciprocity and allow the unconditional entry of banks from all states in a specified region or the entire U.S.

To get detailed information on interstate banking agreements, we use several sources. First, we use the summaries of state banking laws in the various editions of the Profile of State Chartered Banking, a reference guide published by the Conference of State Bank Supervisors. Second, we cross-check these data with the state-by-state narrative summaries of state banking laws in Amel (2000). To ascertain the

nature of restrictive clauses and to resolve uncertain cases, we refer to the text of the banking agreements available from the respective state legislatures.

The structure of banking agreements and reciprocity clauses generates a well-defined, staggered schedule when a given state opens itself to bank holding companies from another state. To illustrate the structure of these agreements, consider the history of interstate banking in Maine.

Maine's first interstate banking agreement opened the state to the entry of out-of-state bank holding companies on a national reciprocal basis on January 1, 1978. However, since no other states allowed interstate banking at that time, Maine remained closed to every other state until 1982, when the next states – Alaska and New York – passed agreements that would permit the entry of bank holding companies from Maine. Correspondingly, the first bank holding companies that received the legal right to acquire banks in Maine were the holding companies from Alaska and New York, as of July 2, 1982, and June 28, 1982, respectively. Maine's initial interstate banking agreement was later superseded by the 1984 Maine interstate banking law, which took the form of a national nonreciprocal agreement. The 1984 law opened Maine to the entry of bank holding companies from all other states on an unconditional basis. As a result, although the first interstate banking agreement was passed in 1978, interstate banking became feasible for the first state pairs only in 1982, beginning the process of interstate deregulation. The wave of state-level deregulation continued through the mid-1990s.

The process of interstate banking deregulation was completed with the passage of the Interstate Bank and Branching Efficiency Act, also known as the Riegle-Neal Act. The Riegle-Neal Act, which was signed into law on September 29, 1994 and went into effect on September 29, 1995, repealed the restrictions on interstate banking introduced in Section 3(d) of the Bank Holding Company Act of 1956. In particular, Section 101 (a) of the Riegle-Neal Act permitted bank mergers and acquisitions across state lines by explicitly allowing “a bank holding company that is adequately capitalized and adequately managed to acquire control of, or acquire all or substantially all of the assets of, a bank located in a state

other than the home state of such bank holding company, without regard to whether such transaction is prohibited under the law of any State.”¹

Figure 1 provides the first effective deregulation date for each state. The dates shown correspond to the year when each state becomes open to the entry of bank holding companies from at least one other state, and darker colors indicates states with later deregulation dates. The figure demonstrates large variation across states. While most states start their deregulation in the 1980s, a number of states, such as Iowa, Montana, Nebraska, North Dakota, Kansas, and Hawaii, remain closed to the entry of out-of-state bank holding companies until the early 1990s. In addition to the effective dates for regular acquisitions, some state laws specify alternative effective dates for the entry of out-of-state holding companies via acquisitions of failed banks. We collect information on special clauses related to the acquisitions of failed banks and use such acquisitions in our robustness tests.

The dates when the interstate agreements are passed, the geographic scope of the agreements (regional vs. national), and the presence of reciprocity clauses generate rich cross-sectional and time-series heterogeneity in interstate banking restrictions. These features generate a state-by-state matrix of the opening dates between all state pairs that serves as the basis of our identification strategy. Next, we review the drivers of interstate banking agreements to assess whether these agreements can serve as plausible shocks to the availability of credit.

1.2 Drivers and consequences of interstate banking agreements

The differential pace of adoption of interstate banking across states is attributed to the political balance of power inside each state’s legislature. In a study of the drivers of banking deregulation, Krozsner and Strahan (1999) estimate a hazard model of deregulation events and show that the rate of adoption of banking deregulation across states is explained by each state’s political economy factors, such as the balance of power between Democrats and Republicans in the state parliament and the strength of private interest groups. The authors show that similar factors explain congressional voting on the Riegle-Neal Act at the federal level.

¹ The full text of the Riegle-Neal Act is available at: <https://www.govtrack.us/congress/bills/103/hr3841/text>

A number of additional restrictions in interstate agreements, such as reciprocity clauses, make the staggered adoption of these agreements plausibly exogenous to the investment opportunity set of a given household. For example, because over 70% bank agreements contain reciprocity clauses, they become effective only if the reciprocal law is passed by the other state in the pair. As a result, it is likely that the passage of banking laws in other states, required for such agreements, is beyond the control of a typical household and independent of its decision to participate in capital markets.

Figure 2 shows that interstate banking laws are binding, and that their passage triggers an immediate entry of large out-of-state holding companies into the newly-opened states. The figure plots the number of bank branches acquired by out-of-state bank holding companies in event time from three years before the deregulation to three years after. The annual acquisition volume by out-of-state holding companies (measured by the value of deposits in acquired branches) increases from \$3 billion in the year immediately before the deregulation to \$24 billion in the year after and to \$30 billion two years after the deregulation. The volume of acquisitions by out-of-state holding companies before the effective deregulation date is greater than zero because of the occasional exceptions made by state regulators to allow acquisitions of some failing banks.

The repeal of interstate banking restrictions significantly increases the supply of credit in deregulated states. Prior work shows that this effect manifests itself through lower interest rates (Jayaratne and Strahan 1998), more efficient screening of borrowers (Dick and Lehnert 2010), better geographic diversification of borrower risk (Goetz, Laeven, and Levine 2013), and higher loan volume (Amore, Schneider, and Žaldokas 2013). In further analysis, we find that the repeal of interstate banking restrictions and the subsequent entry of large national banks increase the volume of new credit cards in deregulated states, particularly for credit-constrained households.

2. Data and Summary Statistics

2.1 Financial institutions and credit markets

To provide micro-level evidence on credit supply, we construct a panel dataset of bank branches from the Summary of Deposits (SOD) data provided by the Federal Deposit Insurance Corporation (FDIC). These

data contain detailed historical information on all domestic branches, both existing and defunct, of all FDIC-insured financial institutions. For each branch, we obtain its physical address and opening date, as well as the amount of deposits as of June 30 of each year. For each branch-year, using the SOD data, we also identify the financial institution that owns a given branch and collect the date of the branch's last ownership change. This approach allows us to construct a full history of bank penetration in each geographic market and pin down the timing of banks' entry into and exit from each local market, both via branch openings/closings and branch ownership transfers.

Next, for each bank in our sample period, we obtain quarterly financial data from the FDIC's Reports of Condition and Income (commonly referred to as Call Reports), which comprise detailed financial reports for all FDIC-insured institutions, including privately-held banks. In addition to financial data on assets, deposits, and loans, Call Reports provide a bank's number of branches, type of charter (e.g., state vs. national), and location of headquarters. Using the quarterly number of branches from each bank's Call Reports and the database of bank mergers compiled by the Federal Reserve Bank of Chicago, we verify the timing of branch openings and ownership transfers obtained from the SOD data. Using the location of a bank's headquarters and the type of its charter, we identify the regulation-driven entries by out-of-state banks made possible by the relaxation of interstate banking restrictions.

Using Call Report data on credit card receivables, we compute banks' market shares in the credit card market. We aggregate information to the bank holding company level – the unit of regulation in interstate banking agreements. Appendix Table A1 shows the market shares of bank holding companies in the credit card segment at the start of interstate banking deregulation in 1982. Panel A reveals that the credit card market is dominated by a small number of large issuers. The top six banks – Citigroup, Bankamerica, First Chicago, Chase Manhattan, First Interstate, and Continental Illinois – account for a third of the entire credit card volume. Panel B shows that the market is even more concentrated when the data are broken down by the home state of the bank holding company, the criterion according to which interstate banking agreements regulate bank entry. About 42% of the credit card volume is attributed to bank holding companies in the top two states: New York and California. More than 50% of the credit

card volume is attributed to bank holding companies in the top four states, which also include Illinois and Pennsylvania.

The high concentration of the main credit card issuers in a handful of states creates a convenient empirical setting. In particular, the repeal of interstate banking restrictions with a small subset of states creates a distinct shock to credit supply by permitting the physical entry of large credit card issuers. While a bank's physical presence in a state is not required to issue credit cards to its residents (by phone or mail), the supply of credit to local borrowers dramatically increases with the establishment of physical branches, particularly before the adoption of computer technology. Recent work shows that physical branches continue to play an important role in credit supply even after the full deregulation of banking and the adoption of internet banking (Gilje, Loutskina, and Strahan 2014; Nguyen 2015).

2.2. Credit bureau data

To provide micro-level evidence on households' access to credit, we obtain proprietary data on individual credit histories from the credit bureau TransUnion. The dataset contains complete credit histories of a random sample of 3 million individuals from the TransUnion credit history database that covers 253.3 million people in 1996. To be covered by TransUnion, a person need not own credit products. Instead, TransUnion covers an individual if he or she holds a social security number and has ever made any regular financial payments (such as utility bills) or applied for any type of credit products, even if this application was unsuccessful. Our sample of credit histories is extracted at the end of 1996, one year after the completion of interstate banking deregulation.

For each sampled individual, the data provide the complete history of credit products, both current and closed. The credit products include credit cards, installment loans (e.g., mortgages, student loans, personal loans, and auto loans), and credit lines (e.g., home equity lines of credit). For each product, the data provide the type of loan or credit card, the date of issuance, the date the product is paid in full or closed (if applicable), the maximum balance, the maximum credit limit, and the maximum delinquency, if any. The financial institution issuing the credit product is not disclosed in our data. For each individual, identified by a unique time-invariant ID, the dataset provides the month and year of birth,

gender, zip code of primary address, zip code history of previous addresses, and the credit score as of 1996.

Panel A of Table 1 provides summary statistics for the TransUnion sample. In the sample, the average (median) individual is 51 (53) years old at the start of interstate deregulation in 1982. The average (median) credit score, measured on the scale of 300 to 950, is 800 (832). As expected for a large random sample, the geographic distribution of individuals in our data, depicted in Figure 3, matches well with the overall distribution of the U.S. population.

During our sample period of 1982 to 1996, 97.5% of consumers hold at least one credit card and 48% have outstanding installment loans, such as mortgages or auto loans. The average (median) credit card limit throughout the sample is \$4,215 (\$3,000), and the average (median) maximum balance accumulated on a credit card is \$1,423 (\$400).

We focus on credit cards because they provide the most direct measure of a consumer's access to credit which is not tied to a particular purchase decision. In contrast, other financial products typically result from a consumption decision (e.g., purchase of a home, car, or education services), and, therefore, reflect not only the supply of credit but also the demand for other products or services.

Panel A of Table 1 reveals a dramatic increase in consumers' access to credit cards during the period of banking deregulation. In 1982, only 68% of consumers have an open credit card. The fraction of credit card owners increases to 92% in 1988, reaches 95% in 1992, and peaks at 97% at the end of the sample in 1996. Data on the number of credit cards owned show a similar pattern. The average credit card owner holds 1.5 credit cards in 1982, 3.1 cards in 1988, and 4.6 cards in 1996. The more than three-fold increase in credit cards per capita far outpaces the cumulative increase in the average income per capita (45%) and consumer prices (22%) over the same period. In Section 3, we provide evidence that the overall increase in access to credit cards during banking deregulation was accompanied by two patterns: (1) a rapid increase in credit card penetration into deregulated states and (2) a decline in cross-state variation in the number of credit cards per capita, suggesting a more even access to credit cards across all states after the removal of interstate barriers.

2.3 Brokerage data

To measure stock market participation, we obtain administrative data on account openings from a large discount brokerage. We focus on a discount brokerage for several reasons. First, because the discount brokerage caters to a cost-conscious subset of investors, it is well-suited for the analysis of credit constraints, which are more binding for this clientele. Second, the discount brokerage's investors are more representative of the median U.S. household, compared to those of higher-end brokers serving the wealthier population segments. Third, the discount brokerage is a standalone firm that specializes solely in brokerage services and remains unaffiliated with any banks during our sample period. This property minimizes the possibility that banks advertise the discount brokerage to their borrowers or cross-sell its services. The discount brokerage dataset was first introduced to academic research in Odean (1998, 1999) and Barber and Odean (2000, 2001).

To measure investors' entry into the stock market across time and across geographic markets, we use the dates of investors' account openings and the zip codes of their primary addresses. The dates of account openings are available from January 1975 to December 1991 and cover 55,000 household investors. For each account opening event, we record the type of account (e.g., margin, non-margin, or retirement) and investor's demographic characteristics, such as age, gender, self-reported investment goals, and self-reported income and net worth. Data on investment goals, income bracket, and net worth are based on a survey filled out at the time of account opening (and not all investors respond to the survey). Beginning in 1991, we also have data on investors' portfolios and trades with the brokerage, but this information is unavailable at the time of account opening.

Figure 4, which plots the geographic distribution of brokerage accounts at the start of interstate deregulation, shows that investors' accounts are well-spread across the U.S., representing each of the 50 states and divided about equally between the two coasts. As expected, there is a higher concentration of investors in the densely populated areas – in California and the Northeast corridor. Consistent with these patterns, Korniotis and Kumar (2013) provide formal evidence that the distribution of households across states in the discount brokerage sample is very similar to the distribution of households in the U.S.

Census data. Because investors' geographic location is required for our identification strategy, we restrict our final sample to the 50,000 households with reliable location data and account opening dates.

Panel B of Table 1 provides summary statistics for investors in the discount brokerage sample. At the start of interstate deregulation in 1982, the average investor is 38 (36) years old. Of all trading accounts, 59% are general trading accounts, and the remaining 41% are retirement accounts, of which 97.5% are IRA accounts and 2.5% are Keogh accounts. The average (median) investor holds 2.03 (2) accounts with the discount brokerage. At the time of account opening, investors' self-declared goals are recorded as follows: conservative (23%), income (28%), growth (85%), and speculation (6%). The median annual income reported at the time of account opening is \$74,500, and the median net worth is \$100,000.² The median account value in 1991 (the first year when these data are available) is \$8,680.

2.3 Data on households' assets and liabilities

To obtain balance sheets of households' assets and liabilities, we use data from the Panel Study of Income Dynamics (PSID), a longitudinal panel that follows a representative sample of about 8,000 households over time. While the survey is conducted annually, the information on household investments and liabilities during our sample period is available at five-year intervals: 1984, 1989, and 1994 and 1999. To exploit cross-sectional variation across households' locations, we also obtain access to restricted data on the respondent's location at the level of a U.S. Census tract (a community of approximately 4,000 people, where several tracts comprise a zip code).

Panel C of Table 1 provides summary statistics for the PSID sample. The average (median) household head is 44 (40) years old, and 70% of household heads are male. The average household includes 3 family members, earns \$52,000 per year, has gross financial wealth of \$34,617, and owes \$3,770 in unsecured debt.

To measure stock market participation, we introduce an indicator *Stock market participation*, which is equal to one for households who hold stocks of publicly held corporations, mutual funds, or investment trusts during a given year. To measure the amount of assets held in stocks, we construct the

² Investors report their income and net worth by brackets. The estimates reported are based on averaging the upper and lower bounds of income and net worth brackets.

variable *Stock value*, which is equal to the estimated dollar value of proceeds a respondent would get from selling his stock investments at the time of the response. Similarly, we record the value of a household's investment in fixed income instruments and cash (certificates of deposit, checking and savings accounts).

Stock market participation rises sharply from before to after interstate banking deregulation: from 18% in 1984 to 25% in 1994. Over the same period, the average investment in stocks for market participants increases from \$4,457 to \$17,792. This increase is accompanied by an increase in households' use of unsecured credit (credit card debt and personal loans) from \$1,692 in 1984 to \$4,940 in 1994. The increases in stock investments and total credit manifest themselves strongly when measured relative to households' income or assets. These effects cannot be explained just by the growth of stock investments over time, and these patterns remain similar after controlling for stock market returns over this period.

2.4 Local economy

To account for changes in the local economic climate that may accompany banking deregulation, we collect two macroeconomic indicators from the Bureau of Labor Statistics: (1) per capita household income and (2) adult population (aged 18 or above). We obtain these data both at the state and county levels. Panel D of Table 1 shows summary statistics for these macro indicators. Over our sample period, the average (median) state has per capita household income of \$17,411 (\$17,072) and adult population of 4.8 (3.3) million.

3. Main Results

3.1. The effect of interstate banking agreements on credit supply

This subsection studies how the removal of barriers to interstate banking affects credit supply in deregulated states. We begin with providing descriptive evidence and proceed with formal analysis.

Figure 5 plots the effect of interstate banking agreements (in event time) on households' access to credit measured by the number of new credit cards issued to the residents of a deregulated state. The solid line shows the coefficients on state-specific year dummies defined relative to the deregulation event from the regression of the average number of new credit card accounts opened in a given state on event-time

deregulation dummies. The deregulation year is the first year when an interstate banking agreement removes barriers to entry into a given state for bank holding companies from any of the top four states that house the largest credit card issuers: New York, California, Illinois, and Pennsylvania. Year 0 is the first year when the deregulation agreement with any of the above states becomes effective. The four home states of the largest credit card issuers are excluded from the analysis.

Figure 5 shows two important patterns. First, there is no strong pre-trend in credit card issuances before the deregulation event. The number of new credit card accounts issued to the residents of a deregulated state remains relatively flat before the effective date of deregulation. This pattern is consistent with the assumption that interstate banking agreements are unrelated to pre-existing credit card growth. Second, interstate banking agreements lead to a rapid spike in credit card issuances in a deregulated state. The annual number of new credit card accounts increases by 17% in the first year after the deregulation and by another 25% in the second year, relative to the average number of account openings in a given state in the two-year period preceding the deregulation. The growth in credit card accounts flattens during the third year post-deregulation, consistent with a gradual saturation of the deregulated market.

Figure 6 shows the effect of banking deregulation on the distribution of credit card accounts across all states. The figure depicts the cross-sectional distribution of credit cards per capita at the start of interstate banking deregulation in 1982 (Panel A) and after the completion of banking deregulation in 1995 (Panel B), where darker colors indicate states with a higher number of credit card accounts per capita (scaled by the number of state residents aged 18 and older).

Panel A of Figure 6 shows that before the repeal of barriers to interstate banking, there is a large cross-sectional heterogeneity across states in their residents' access to credit cards. As expected, the states with a higher credit card penetration rate (indicated by darker colors) are the home states of the largest credit card issuers: New York, California, Illinois, and Pennsylvania, as well as some nearby states where bank clients commute across state lines: New Jersey and Connecticut. In contrast, the majority of other states have a significantly lower credit card penetration, including many states with large metropolitan areas and well-developed economies, such as Texas, Minnesota, Arizona, and Georgia.

Panel B of Figure 6 shows that after the full repeal of barriers to interstate banking, cross-state differences in their residents' access to credit cards decline sharply, and the distribution of credit cards across states becomes significantly more homogeneous. The decline in cross-state differences in households' access to credit is economically large. For example, the cross-state standard deviation in the number of credit cards per capita declines by 58% (from 1.30 to 0.54) from the start to the end of interstate deregulation. This descriptive evidence conveys the intuition for our identification strategy. We exploit the repeal of barriers to interstate banking which permits the entry of large credit card issuers into deregulated states as a positive shock to households' access to credit in these states. Next, we formally establish this effect and quantify its economic magnitude.

Column 1 in Table 2 studies the effect of interstate banking agreements on the number of new credit cards issued to the residents of a deregulated state. The dependent variable is the annual number of new credit card accounts issued to the residents of a given state. For ease of interpretation, the annual number of new credit cards in each state is scaled by the annual number of new credit cards in this state in the year immediately before the deregulation, so that the coefficients can be interpreted as percentage changes in the annual credit card issuance relative to the pre-deregulation level. The main independent variable of interest, *Interstate deregulation*, is a binary indicator, which equals one in the deregulation year and the first two years thereafter. The deregulation year is the first year when an interstate banking agreement removes barriers to entry into a given state for bank holding companies from any of the top four states that house the largest credit card issuers: New York, California, Illinois, and Pennsylvania. All dates correspond to the dates when an agreement goes into effect rather than the dates when the agreement is made. The unit of observation is a state-year. To control for time-invariant state-specific factors, all regressions include state fixed effects. To account for dynamic changes in a state's economy, all regressions control for state population growth and income growth. To absorb the national time trend in the credit card market, all regressions include year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the state level to account for within-state correlation of residuals.

The results in column 1 indicate the repeal of barriers to interstate banking has a large positive effect on the number of new credit cards issued to the residents of deregulated states. This is shown by the

positive coefficient on the indicator *Interstate deregulation*, which is statistically significant at the 1% level. The effect is economically large. Based on the coefficient estimate on the indicator *Interstate deregulation* in column 1 (coefficient = 0.343), interstate deregulation is associated with a 34.3% increase in the annual number of new credit cards issued to the residents of a deregulated state over the first two years since deregulation, after controlling for cross-state heterogeneity, time trends, and dynamic changes in household income and demographics. This economic estimate aligns well with the univariate evidence shown earlier in Figure 5, which indicates that deregulation events are followed by an approximately 30% increase in the annual number of new credit card accounts within the first three years of deregulation.

In summary, the removal of barriers to interstate banking is followed by a rapid and large increase in households' access to unsecured credit, as measured by the number of new credit cards issued to the residents of a deregulated state. The annual number of new credit cards issued in deregulated states increases by over one third relative to the pre-deregulation levels. This effect manifests itself within the first several years after the effective dates of interstate banking agreements.

3.2. Access to credit and stock market participation

In this subsection, we study the relation between households' access to credit and stock market participation. To evaluate whether this relation may have a causal interpretation, we build on the analysis in the previous section and focus on changes in credit attributable to interstate banking agreements.

Columns 2 and 3 of Table 2 examine the effect of access to credit on stock market participation. The dependent variables in these columns are two measures of stock market participation: (i) the number of new brokerage clients in a given state-year (column 2) and (ii) the number of new brokerage accounts opened in a given state-year (column 3). The difference between these measures is that one household can open multiple accounts. For example, instead of holding only a retirement account with the discount brokerage, a client may open a trading account for active investing or vice versa.

As in column 1, the dependent variables are scaled by their pre-regulation levels, so that the estimated coefficients can be interpreted as percentage changes in the number of new brokerage clients or the number of new brokerage accounts in a given state-year in response to a one percentage change in the

number of new credit card accounts opened in this state-year. The main independent variable of interest, *New credit cards*, captures the fitted values from the first-stage regression (shown in column 1) of new credit card accounts on interstate deregulation events. This variable measures the change in new credit cards attributable to the repeal of restrictions on interstate banking. The vector of control variables is the same as in column 1. As before, all regressions include state fixed effects and year fixed effects.

The results in columns 2 and 3 indicate that households' access to credit increases stock market participation, as measured by the number of brokerage clients or brokerage accounts. The coefficients on *New credit cards* across both columns are positive, statistically significant at the 5% level or better, and economically important. For example, based on the estimates in column 2, a one percentage increase in new credit card accounts attributable to interstate deregulation is associated with a 38 bps increase in the number of new brokerage clients in a given state-year. Similarly, a one percentage increase in new credit card accounts is associated with a 32 bps increase in the number of new brokerage accounts opened in a given state-year. As discussed earlier, these estimates represent an increase in stock market participation for households that open trading accounts unaffiliated with any commercial banks that enter local markets.

By combining the estimates from the first-stage regression, which suggest that the repeal of interstate banking is associated with a 34% increase in access to credit cards with the evidence on the elasticity of stock market participation to access to credit (coefficients of 0.316-0.375 in columns 2-3), we estimate that the repeal of restrictions on interstate banking leads to an 11-13% higher growth in new account openings. These estimates suggest the economic importance of the increase in credit supply as a likely contributing factor to the 40% rise in stock market participation during our sample period (from 18% in 1984 to 25% in 1994)³. To the extent that banking deregulation also increases households' access to the stock market via the cross-selling of brokerage services by the entering bank holding companies (uncaptured in the analysis of the independent discount brokerage), the economic effect of banking deregulation on stock market participation may be even more significant.

³ These estimates are based on a nationally representative sample of households surveyed in the 1984 and 1994 waves of the Panel Study of Income Dynamics, as discussed earlier.

In summary, using the repeal of interstate banking restrictions as an instrument for credit supply, we show that access to credit has a positive and economically significant effect on stock market participation. Our estimates suggest that stock market participation grows by up to 13% faster in response to the removal of barriers to interstate banking. These estimates suggest that the loosening of credit constraints attributed to the deregulation of credit markets was a likely contributing factor in the rapid increase in market participation from the early 1980s to the mid-1990s.

3.3. Cross-sectional evidence

If access to credit increases stock market participation, this effect should be stronger when credit constraints are more binding. In this subsection, we test this hypothesis by providing evidence on the role of credit constraints at the state level and at the household level.

Table 3 studies how the effect of access to credit on stock market participation varies with state-level measures of credit constraints and bank competition. We augment the base specification in Table 2 with two indicator variables that proxy for state-level credit constraints before interstate deregulation. In column 2, the indicator *Intra-state restrictions* is equal to one if, at the time of interstate deregulation, a state imposes intra-state restrictions on banks' geographic expansion. Examples of such restrictions include restrictions on setting up bank branches outside the bank's home county or outside a certain radius from the bank's headquarters. Prior work shows that such restrictions stifle bank competition and lead to higher interest rates for local borrowers (e.g., Rice and Strahan 2010). In column 3, we introduce the indicator *Low bank penetration*, which is equal to one for states with underserved bank markets—namely, the states in the bottom decile according to the number of bank branches per capita in the year before interstate deregulation. The main variables of interest are the interaction terms *Interstate deregulation * Intra-state restrictions* and *Interstate deregulation * Low bank penetration*, which show how the effect of credit supply on market participation varies with state-level measures of credit constraints.

The evidence in Table 3 shows that an increase in access to credit has a much stronger effect on market participation in states characterized by weaker bank competition and lower bank penetration. Both

interaction terms of interest are positive, statistically significant at the 5% level, and economically large. For example, column 3 shows that an increase in access to unsecured credit has a much stronger effect on stock market participation, both statistically and economically, in states characterized by low bank penetration before interstate banking agreements.

Table 4 refines state-level evidence by focusing on credit constraints of individual households. This table examines how the increase in access to credit driven by interstate banking affects stock market participation for various categories of households. Using data on income, demographics, and assets reported by brokerage clients, we provide evidence on account openings by brokerage clients sorted on income (columns 1-2), age (columns 3-4), access to premium credit cards (column 5-6), and access to collateral, proxied by home ownership (columns 7-8).

Columns 1 and 2 examine changes in new brokerage accounts opened by richer versus poorer brokerage clients in response to an increase in access to unsecured credit following interstate banking deregulation. Column 1 shows that an increase in access to credit has no significant effect on account openings by higher-income households – those with self-reported annual incomes over \$100,000. This can be seen from the point estimate on the variable *New credit cards*, which is not statistically significant from zero for this category of clients (t-statistic = 1.02). In contrast, an increase in access to credit attributable to interstate banking leads to large increase in new brokerage accounts for clients earning less than \$100,000 per year. For this category of brokerage clients, a one percent increase in new credit cards attributable to interstate banking is associated with a 44 bps increase in new brokerage accounts, a result significant at the 1% level. A similar dichotomy emerges when we compare the subsamples of younger and older investors (those below and above the age of 35 in 1995, respectively) in columns 3 and 4. An increase in credit availability has a much stronger effect, both statistically and economically, on the stock market participation of younger investors. Specifically, the estimated elasticity of new account openings to changes in credit availability (*New credit cards*) is two and a half times as large for younger than for older households. Columns 5 and 6 use the household's ownership of premium credit cards as a proxy for credit constraints. The effect on market participation is weaker for households who hold premium credit cards than for those who do not. Columns 7-8 use home ownership as a proxy for access to credit

(collateral assets and access to home equity loans). The evidence shows that the increase in the availability of unsecured credit has a much stronger effect on new account openings by investors who do not own a home than for investors that do.

In summary, an increase in access to credit has a stronger effect on market participation when credit constraints are more binding. This conclusion persists whether credit constraints are measured at the state level or at the household level. Access to new credit increases stock market participation for households who are younger, have fewer pledgable assets, and reside in states with less competitive bank markets. In contrast, the availability of credit has little effect on market participation for higher-income households, who are less likely to be credit constrained.

3.4. Micro-level evidence and robustness

In this subsection, we offer micro-level evidence on the effect of credit supply on stock market participation by exploiting within-state variation in the location of bank branches. We also conduct robustness tests that control for time-variant economic conditions at the county level.

Table 5 studies how interstate banking affects the availability of new credit for borrowers located close to bank branches acquired by out-of-state bank holding companies and for customers located further away from such branches. This evidence seeks to distinguish the effect of credit supply attributed to the entry of out-of-state credit card issuers from that attributed to changes in the state economy that might be correlated with the deregulation events.

The literature on relationship banking shows that retail banking is highly localized, and the survey of consumer finances shows that the average distance between a borrower and the branch where they choose to conduct their banking business is only 3.6 miles. If the increase in the supply of credit cards in deregulated states is attributed to the entry of out-of-state credit card issuers (rather than some omitted state-level variable coincident with deregulation), this increase should be concentrated around the branches acquired by out-of-state bank holding companies. Similarly, the increase in market participation should be driven primarily by the geographic clusters around such branches.

Table 5 provides evidence on these predictions by testing the differential effect of interstate deregulation on the supply of credit for borrowers located within 10 miles from the branch acquired by an out-of-state holding company (indicator *10-mile radius*), within 20 miles from such a branch (*20-mile radius*), and more than 20 miles from such a branch (omitted category). The location of credit card borrowers is proxied by the center of the zip code of their home address at the time of credit card issuance.

The table shows that the increase in credit cards and market participation is driven by borrowers located within a 10-mile radius around the set of bank branches acquired by large out-of-state credit card issuers. In contrast, the effect dissipates quickly with increasing distance from bank branches. Columns 2 and 3 show that the increase in stock market participation is reliably smaller for borrowers located between 10 and 20 miles from the branch than for borrowers located within a 10-mile radius (an effect captured by the difference on the coefficients *10-mile radius* and *20-mile radius*).

The evidence that the increase in credit cards and market participation is confined to the set of zip codes treated by out-of-state bank holding companies speaks against the interpretation that this increase is driven by an omitted state-level variable. However, it is possible that the branches acquired by out-of-state bank holding companies are located in counties that experience faster economic growth for reasons unrelated to banking deregulation. In this case, the simultaneous increase in credit card issuances and stock market participation exactly at the time of banking deregulation could be driven by an omitted variable that operates at the county level and coincides in time with banking deregulation. We address this possibility in Table 6.

Panel A in Table 6 introduces a specification with county*year fixed effects, which control for all observable and unobservable factors that operate at the county level, including changes in employment, investment opportunities, forecasts of future income, and new business growth, among others. In the first-stage regression in column 1, the main independent variable of interest is the indicator *Interstate branch*, which is equal to one for borrowers located with 10 miles from branches acquired by out-of-state credit card issuers within two years following interstate deregulation and zero otherwise. In the second-stage regressions shown in columns 2-3, the main independent variable of interest is *New credit cards*, which

shows how the increase in new credit cards within 10 miles from out-of-state bank branches affects the stock market participation of investors within this 10-mile radius. As before, stock market participation is proxied by the annual number of new brokerage clients (column 2) and new brokerage accounts (column 3), and the location of the brokerage client is inferred from the zip code of his primary address.

The evidence in column 1 shows that interstate banking deregulation is associated with an increase in the supply of unsecured credit around the branches of out-of-state bank holding companies, controlling for all county-level factors. This effect is captured by the coefficient on the variable *Interstate branch*, which is positive, statistically significant at the 1% level, and economically larger than that in the baseline state-level analysis. The evidence from columns 2-3 shows that the deregulation-driven increase in credit supply has a stronger effect on the market participation of households who are likely to benefit the most from easier access to credit – those located within 10 miles from out-of-state bank branches. This effect is significant at the 1% level after controlling for county*year fixed effects.

While the state-level evidence relies on exogenous variation in bank laws, the zip-level evidence exploits non-random geographic variation across the acquired bank branches. Therefore, one potential concern is that out-of-state bank holding companies choose to enter prosperous neighborhoods which are coincidentally experiencing growth in market participation. This concern is mitigated by several factors. First, as discussed earlier, interstate banking laws typically permit bank entry only via acquisitions of the existing banks, thus preventing selective branch openings in attractive zip codes or selective acquisitions of single branches. Second, the evidence shows no discernible pre-trend in credit card issuance or market participation before the state-specific dates of interstate deregulation.

In Panel B of Table 6, we provide tests of the selection hypothesis by focusing on acquisitions of failed banks – the subset of markets with no prior growth in credit or market participation. In particular, Panel B repeats the county*year fixed effect regressions in Panel A, but limits the treated areas to the 10-mile radius around the branches of failed banks acquired by out-of-state bank holding companies. The evidence is consistent with our previous conclusions: an increase in credit card issuances is associated with an increase in stock market participation, a relation significant at the 1% level in both second-stage specifications. Moreover, the point estimates in columns 2-3 suggest that an increase in credit has an

economically larger effect on market participation in such geographic markets—the domains of failed banks that were likely credit constrained before the entry of out-of-state bank holding companies. These results corroborate the earlier evidence on the role of credit constraints at the state level.

In summary, the increase in stock market participation following interstate deregulation is stronger for households who benefit the most from an expanded access to credit cards – those who live within 10 miles from the branches acquired by large out-of-state credit card issuers. The effect on stock market participation is stronger for households located near the acquired branches of failed banks, consistent with earlier evidence on the role of credit constraints. These conclusions hold after controlling for county-level economic factors captured by county*year fixed effects.

4. Access to Credit and Asset Allocation

This section studies how access to credit affects households' asset allocation. First, we evaluate whether the results on market participation from the discount brokerage hold out-of-sample and extend this analysis to a representative sample of U.S. population. Second, we document the aggregate effect of access to credit on asset allocation. Third, we zoom in on the asset mix of individual households, which allows us to account for cross-household heterogeneity and household-specific factors.

4.1. State-Level Analysis

In our first analysis, we provide state-level evidence on the effect of credit supply on stock market participation and asset allocation.

Using instrumental variable analysis, Table 7 studies the effect of households' access to credit (proxied by the number of new credit card accounts) on stock market participation and asset allocation. In this analysis, PSID data on households' assets and liabilities are aggregated to the state level. Column 1 shows the first-stage regression, where the annual number of new credit card accounts in a state is instrumented by the state-specific indicator *Interstate deregulation*, after controlling for state and year fixed effects and state-level annual changes in income per capita and population. Consistent with prior analysis, column 1 shows that that interstate banking agreements that permit the entry of large credit card

issuers lead to an economically large and statistically significant increase in the number of new credit card accounts in deregulated states.

Columns 2-5 show second-stage regressions that study the effect of credit supply (fitted values of new credit card accounts) on economic outcomes. Column 2 provides evidence on stock market participation, defined as the fraction of households that report investments in the common stock of publicly held corporations, mutual funds, or investment trusts. The evidence in column 2 confirms the prior finding that access to credit increases stock market participation. The point estimate on the instrumented value of *New credit cards* indicates that a one percentage point increase in the number of credit card accounts attributable to banking deregulation is associated with a 13 basis point increase in stock market participation.

Column 3 shows that an increase in access to credit leads to a higher fraction of financial assets held in stocks. The value of equity investments is measured by the self-reported value of proceeds a respondent would get from selling his stocks. The value of total assets is equal to the self-reported value of all financial assets, including equity investments, corporate and government bonds, insurance products, certificates of deposits, checking and savings accounts, and cash. Based on the point estimate in column 3, a one percentage point increase in new credit card accounts increases the fraction of assets held in stocks by 13 basis points, a result significant at the 5% level.

Columns 4 and 5 contrast the effect of a positive shock to credit supply on households' financial wealth kept in stocks (column 4) and bonds and cash (column 5). Column 4 shows that an increase in access to credit attributable to banking deregulation is associated with more money invested in equity products, measured by the natural logarithm of the dollar value of stock investments. In contrast, column 5 demonstrates that an increase in access to credit does not raise the amount of financial wealth kept in bonds and cash, measured by the natural logarithm of the combined dollar value of bonds, insurance products, certificates of deposit, checking and savings accounts, and cash. In particular, in column 5, the coefficient on *New credit cards* is not significantly different from zero (t-statistic of 0.60) and has a small point estimate, which is an order of magnitude below the point estimate for stock investments in column 4. Overall, the evidence indicates that an increase in access to credit leads to an increase in investments in

equity, but no increase in investments in fixed income products and cash. As a result, the share of financial assets allocated to equity increases, but the share of assets held in bonds and cash declines.

In summary, better access to credit increases households' entry into the stock market. This conclusion holds whether market entry is measured via new brokerage accounts or self-reported stock market investments of a representative sample of U.S. households. Investors that already hold equity products increase their financial investments in stocks, leading to a greater share of equity and a smaller share of fixed income products and cash in their asset mix.

4.2. Household-level evidence

In this subsection, we study market participation and asset allocation decisions at the level of individual households. This micro-level analysis allows us to account for time-invariant and dynamic factors unique to each household and provide additional evidence on how the relation between access to credit and financial decisions varies with households' characteristics.

Table 8 provides household-level instrumental variable regressions. In the first-stage regression, shown in column 1, we instrument household-level access to credit (measured by the household's ratio of unsecured debt to total assets) with the indicator *Interstate deregulation*, defined relative to the household's state of residence at the time of banking deregulation. In the second-stage regressions, we study the effect of access to credit on the household's stock market participation (column 2), share of financial assets invested in stocks (column 3), dollar investments in stocks (column 4), and dollar investments in bonds and cash (column 5). To account for time-invariant cross-household heterogeneity, all regressions include household fixed effects. To control for dynamic drivers of market participation and asset allocation, all regressions control for income and wealth at the household level. To absorb national time trends, all regressions include year fixed effects.

The evidence in column 1 shows that banking deregulation increases a household's borrowings relative to its asset base, which is measured by the sum of real and financial assets. This effect is statistically significant at the 1% level (t-statistic = 3.78) and economically large. Column 2 shows that an increase in access to unsecured debt attributable to banking deregulation has a strong positive effect on

the household's stock market participation, as shown by the coefficient estimate on the fitted value of the household's *Debt-to-assets* (coefficient = 0.084, significant at the 1% level). The economic magnitude suggests that an increase in the debt-to-assets ratio of 10 percentage points (e.g., from 0.3 to 0.4) is associated with an increase in the level of stock market participation by 84 basis points (e.g., from 25% to 25.8%). This effect is economically significant, given that the standard deviation of *Debt-to-assets* is 0.62 and the interquartile range is 0.75. Columns 3 and 4 show that an increase in a household's access to unsecured debt increases the fraction of financial assets invested in stocks and the dollar amount of stock investments, respectively. These results, significant at the 1% level, corroborate the state-level evidence reported in the previous section. Also, consistent with the state-level evidence, the household-level regressions show that an increase in access to credit increases the amount of equity investments, but not the amount of investments in bonds and cash, as shown in column 5.

Overall, the evidence suggests that an increase in a household's access to credit leads to a greater asset allocation to stocks and a smaller asset allocation to bonds and cash, and that this pattern is driven by an increase in stock investments rather than a decline in non-equity investments.

In our final analysis, we study how the effect of access to credit on market participation and asset allocation varies with households' characteristics, such as age, education, new debt, and personal leverage. Table 9 provides household-level second-stage regressions, where the effect of access to credit on economic outcomes is interacted with households' characteristics.

Panel A provides cross-sectional evidence on stock market participation. In this panel, the dependent variable is an indicator that equals one for households who own stocks of publicly held corporations, mutual funds, or investment trusts at a given point in time. Column 1 provides the baseline effect without the interaction terms. Column 2 shows that an increase in access to credit leads to a greater increase in stock market participation for more credit constrained households (those with a higher debt-to-assets ratio). Column 3 demonstrates that the increase in stock market participation is driven primarily by those households who report an increase in their borrowings, which is captured by the binary indicator *New personal debt*. The interaction term *Interstate deregulation * New personal debt* is positive and highly significant at the 1% level (coefficient of 0.076 with a t-statistic of 5.21). In contrast, the subset of

borrowers who do not increase their borrowings (the indicator *New personal debt* = 0), experience a much weaker increase in market participation (coefficient = 0.017 with a t-statistic of 1.65). Column 4 shows that the increase in market participation is stronger, both statistically and economically, for younger households (those with the household head below the age of 40) who are more likely to be credit constrained. Column 5 examines the effect of education and indicates that the increase in market participation in response to an improvement in access to credit is limited to better-educated households (proxied by the indicator *College degree*, which equals one if the household head has a college degree). In contrast, for household with lower educational attainment levels, access to credit has no reliable effect on market participation.

Panel B provides cross-sectional evidence on asset allocation. In this panel, the dependent variable is the fraction of a household's financial assets invested in equity products (stock of publicly traded companies, mutual funds, or investment trusts). The interaction terms that measure households' characteristics are defined analogously to Panel A. The results in Panel B indicate that an increase in access to credit leads to a greater share of equity investments in financial assets, especially if a household is more credit constrained before banking deregulation and if it increases new borrowings after the deregulation. Furthermore, the effect is much stronger for better-educated households. Based on the coefficient estimates in column 5 of Panel B, interstate banking deregulation is associated with a 7.1% increase in the share of equity investments for investors without college degrees (baseline effect), and a 15.5% increase in the share of equity investments for college-educated investors (sum of the baseline effect and the interaction effect *Interstate deregulation* * *College degree*).

The two final panels of Table 9 separately examine the value of financial assets invested in equity (Panel C) and bonds and cash (Panel D). The evidence in these panels shows that the increase in the ratio of equity to financial assets in response to banking deregulation is driven by an increase in the value of equity investments rather than a decline in the value of bonds and cash. Cross-sectional evidence is consistent with that in Panel B. In particular, the increase in equity investments in response to banking deregulation is stronger for households who are younger, better-educated, and more credit constrained.

In summary, an improvement in access to credit increases stock market participation and the share of financial assets invested in stocks. These effects are robust to controlling for cross-household heterogeneity, time trends, and changes in each household's income and wealth. Access to credit has a stronger effect on the financial decisions of younger, better-educated, and more credit-constrained households.

Conclusion

This article studies how access to credit affects households' stock market participation and portfolio allocation decisions. Using interstate banking agreements as positive shocks to credit supply, we show that an increase in access to credit leads to higher stock market participation among retail investors. For households who already invest in the stock market, the loosening of credit constraints increases the share of equity investments and reduces the share of investments in bonds and cash. These effects are stronger for younger and better-educated households who are likely to be credit constrained – those who have lower incomes, own less pledgable assets, and reside in states with less competitive bank markets.

Our findings indicate that credit constraints, which are often assumed away in standard models of portfolio choice, may have a significant effect on households' financial decisions. Our empirical results show that the relaxation of credit constraints was likely an important contributing factor to the dramatic rise in stock market participation over the past few decades.

Viewed broadly, our evidence suggests that an increased focus on the interplay between consumer finance and capital markets can provide novel insights into some long-standing questions in both areas of research, such as the high frequency of trading by individual investors, the surprisingly small savings rate, and the spillovers between household finance and stock prices. We hope that the growing interest in research at the intersection of these fields will continue to contribute to this line of inquiry.

References

- Amel, D., 2000. State laws affecting the geographic expansion of commercial banks. Board of Governors of the Federal Reserve System. Unpublished working paper.
- Amore, M., Schneider, C., Žaldokas, A., 2013. Credit supply and corporate innovation. *Journal of Financial Economics* 109, 835–855.
- Beck, T., Levine, R., Levkov, A., 2010. Big bad banks? The winners and losers from bank deregulation in the United States. *Journal of Finance* 65, 1637–1667.
- Black, S. E., Strahan, P. E., 2002. Entrepreneurship and bank credit availability. *Journal of Finance* 57, 2807–2833.
- Bonaparte, Y., Korniotis, G., Kumar, A., 2014. Income hedging and portfolio decisions. *Journal of Financial Economics* 113, 300–324.
- Bonaparte, Y., Kumar, A., 2012. Political activism, information costs, and stock market participation. *Journal of Financial Economics* 107, 760–786.
- Barber, B., Odean, T., 2000. Trading is hazardous to your wealth: The common stock investment performance of individual investors. *Journal of Finance* 55, 773–806.
- Barber, B., Odean, T., 2001. Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics* 116, 261–292.
- Barber, B., Odean, T., 2008. All that glitters: the effect of attention and news on the buying behavior of individual and institutional investors. *Review of Financial Studies* 21, 785–818.
- Brown, J., Ivković, Z., Smith, P., Weisbenner, S., 2008. Neighbors matter: causal community effects and stock market participation. *Journal of Finance* 63, 1509–1531.
- Campbell, J., 1993. Inter-temporal asset pricing without consumption data. *American Economic Review* 83, 487–512.
- Campbell, J., 2006. Household finance. *Journal of Finance* 61, 1553–1604.
- Cetorelli, N., Strahan, P. E., 2006. Finance as a barrier to entry: competition and industry structure in local US markets. *Journal of Finance* 61, 437–461.
- Dick, A., Lehnert, A., 2010. Personal bankruptcy and credit market competition. *Journal of Finance* 65, 655–686.
- Grinblatt, M., Keloharju, M., Linnainmaa, J., 2011. IQ and stock market participation. *Journal of Finance* 66, 2121–2164.
- Graham, J., Kumar, A., 2006. Do dividend clienteles exist? Evidence on dividend preferences of retail investors. *Journal of Finance* 61, 1305–1336.
- Gilje, E., Loutskina, E., Strahan, P., 2014. Exporting liquidity: branch banking and financial integration. Working paper.
- Goetz, M. R., Laeven, L., Levine, R., 2013. Identifying the valuation effects and agency costs of corporate diversification: evidence from the geographic diversification of U.S. banks. *Review of Financial Studies* 26, 1787–1823.
- Guiso, L., Sapienza, P., Zingales, L. 2008. Trusting the stock market. *Journal of Finance* 63, 2557–2600.
- Ivković, Z., Weisbenner, S., 2005. Local does as local is: Information content of the geography of individual investors common stock investments. *Journal of Finance* 60, 267–306.
- Ivković, Z., Poterba, J., Weisbenner, S., 2005. Tax-motivated trading by individual investors. *American Economic Review* 95, 1605–1630.

- Ivković, Z., Sialm, C., Weisbenner, S., 2008. Portfolio concentration and the performance of individual investors. *Journal of Financial and Quantitative Analysis* 43, 613–656.
- Ivković, Z., Weisbenner, S., 2009. Individual investor mutual fund flows. *Journal of Financial Economics* 92, 223–237.
- Jayaratne, J., Strahan, P., 1996. The finance-growth nexus: evidence from bank branch deregulation. *Quarterly Journal of Economics* 111, 639–670.
- Jayaratne, J., Strahan, P., 1998. Entry restrictions, industry evolution, and dynamic efficiency: evidence from commercial banking. *Journal of Law and Economics* 41, 239–274.
- Heaton, J., Lucas, D., 1999. Stock prices and fundamentals, *NBER Macroeconomics Annual* 14, 213–242.
- Hong, H., Kubik, J., Stein, J., 2004. Social interaction and stock-market participation, *Journal of Finance* 59, 137–163.
- Kelley, E., Tetlock, P., 2013. How wise are crowds? Insights from retail orders and stock returns. *Journal of Finance* 68, 1229–1265.
- Kerr, W. R., Nanda, R., 2009. Democratizing entry: banking deregulations, financing constraints, and entrepreneurship. *Journal of Financial Economics* 94, 124–149
- Korniotis, G., Kumar, A., 2011. Do older investors make better investment decisions? *Review of Economics and Statistics* 93, 244–265.
- Korniotis, G., Kumar, A., 2013. State-Level business cycles and local return predictability, *Journal of Finance* 68, 1037–1096.
- Kroszner, R. S., Strahan, P. E., 1999. What drives deregulation? Economics and politics of the relaxation of bank branching restrictions. *Quarterly Journal of Economics* 114, 1437–1467.
- Kumar, A., 2009. Hard-to-value stocks, behavioral biases, and informed trading, *Journal of Financial and Quantitative Analysis* 44, 1375–1401.
- Kumar, A., 2009. Who gambles in the stock market? *Journal of Finance* 64, 1889–1933.
- Levine, R., Rubinstein, Y., 2009. The impact of credit constraints on education. Working paper, Brown University.
- Michalski, T., Ors, E., 2012. (Interstate) Banking and (interstate) trade: Does real integration follow financial integration? *Journal of Financial Economics* 104, 89–117
- Nguyen, L., 2015. Do bank branches still matter? The effect of closings on local economic outcomes. Working paper.
- Odean, T., 1998. Are investors reluctant to realize their losses? *Journal of Finance* 53, 1775–1798.
- Odean, T., 1999. Do investors trade too much? *American Economic Review* 89, 1279–1298.
- Rice, T., Strahan, P. E., 2010. Does credit competition affect small-firm finance? *Journal of Finance* 65, 861–889.
- Vissing-Jorgensen, A., 2000. Toward an explanation of household portfolio choice heterogeneity: nonfinancial income and participation cost structure, NBER Working Paper No. W8884.
- Vissing-Jorgensen, A., 2002. Limited asset market participation and the elasticity of inter-temporal substitution. *Journal of Political Economy* 110, 825–853.

Figure 1: Effective dates of interstate banking agreements

This figure provides the effective deregulation year for each state. The dates shown correspond to the year when a state becomes open to the entry of bank holding companies from at least one other state as a result of an interstate banking agreement. Darker colors correspond to states with later deregulation dates.

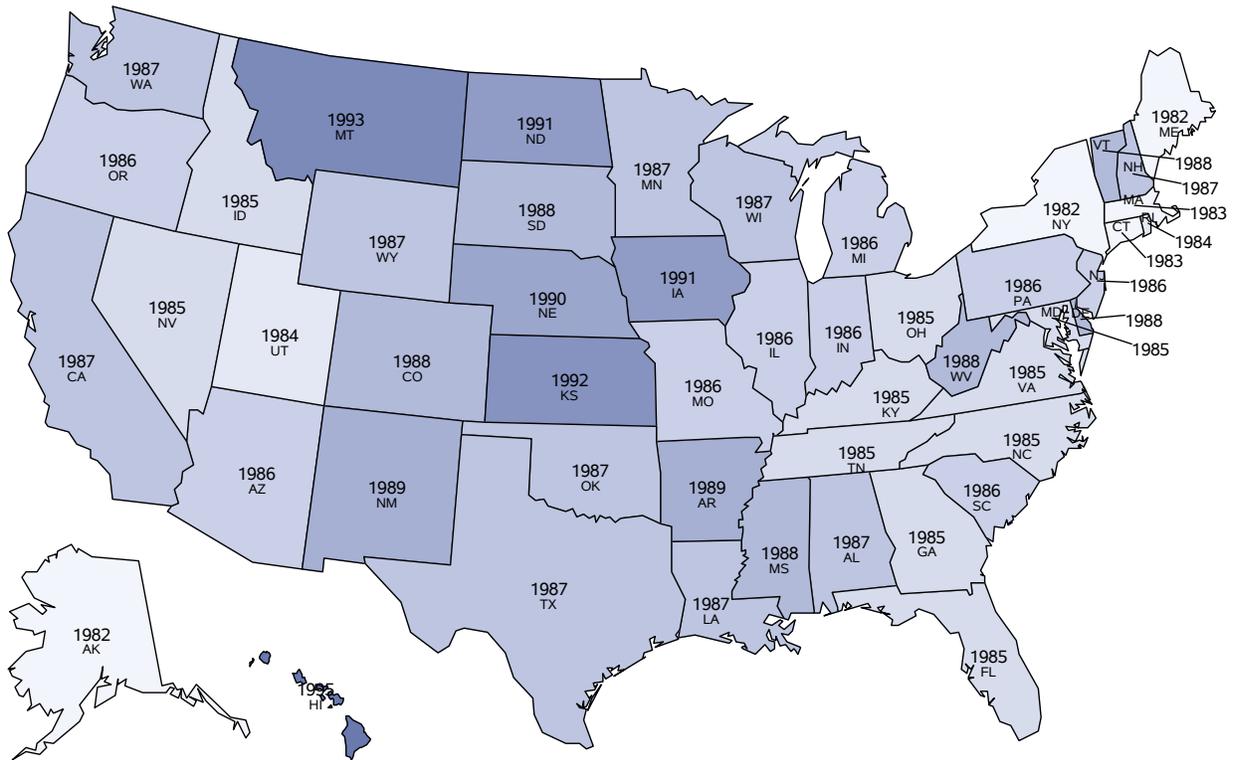
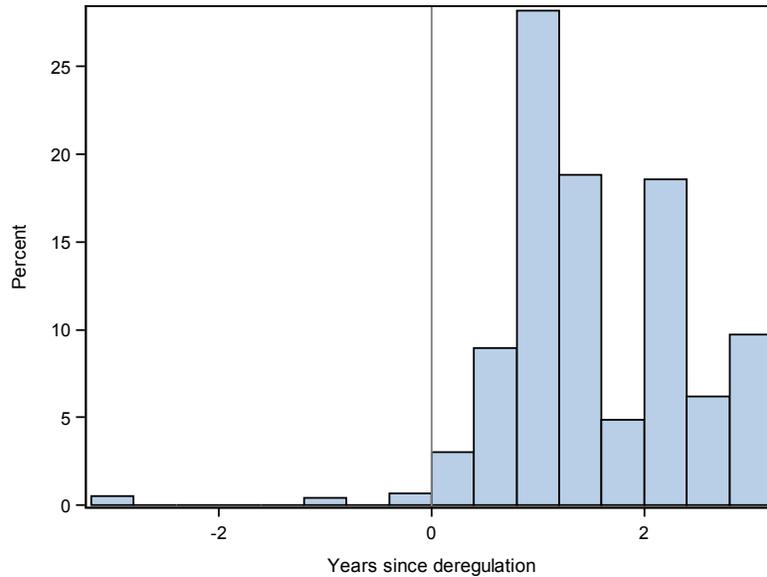


Figure 2: Bank acquisitions around interstate banking agreements

This figure shows the volume of bank acquisitions in event time relative to interstate banking agreements. The histogram in Panel A plots the fraction of bank branches acquired by the thirty largest out-of-state bank holding companies in event time from three years before the deregulation to three years after. Date 0 is defined as the deregulation year between the states where the target and acquiring banks are located. Panel B plots the number of bank branches acquired (blue solid line; right axis) and the total deposit volume of acquired branches in billions of dollars (red dashed line; left axis).

(a) Fraction of acquired bank branches



(b) Annual acquisition volume and number of acquired branches

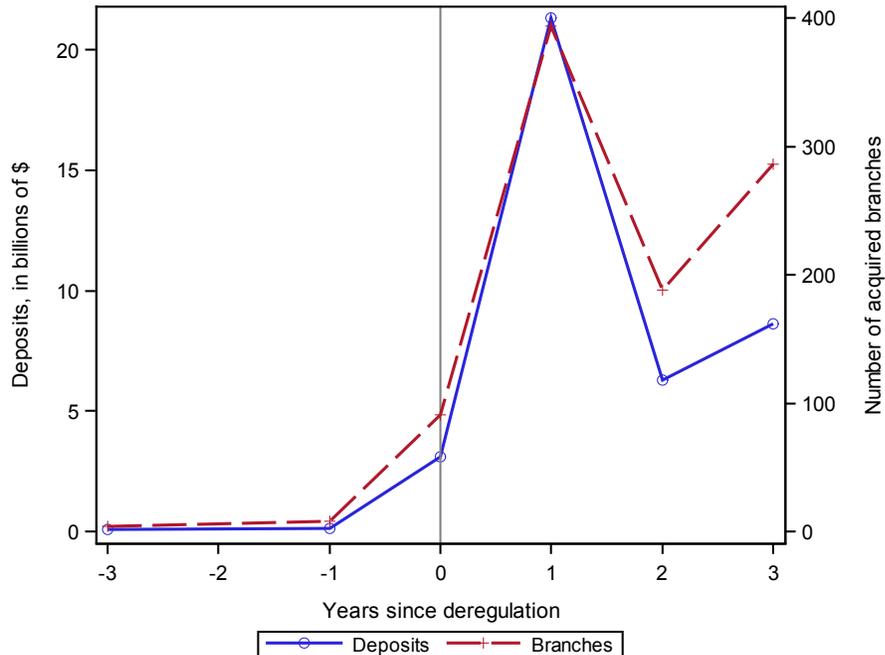


Figure 3: Geographic distribution of individuals in TransUnion data

This figure shows the geographic distribution of zip codes where individuals in the TransUnion sample reside. Each dot corresponds to one zip code. The sample consists of 3 million randomly selected U.S. adults covered by the credit bureau.

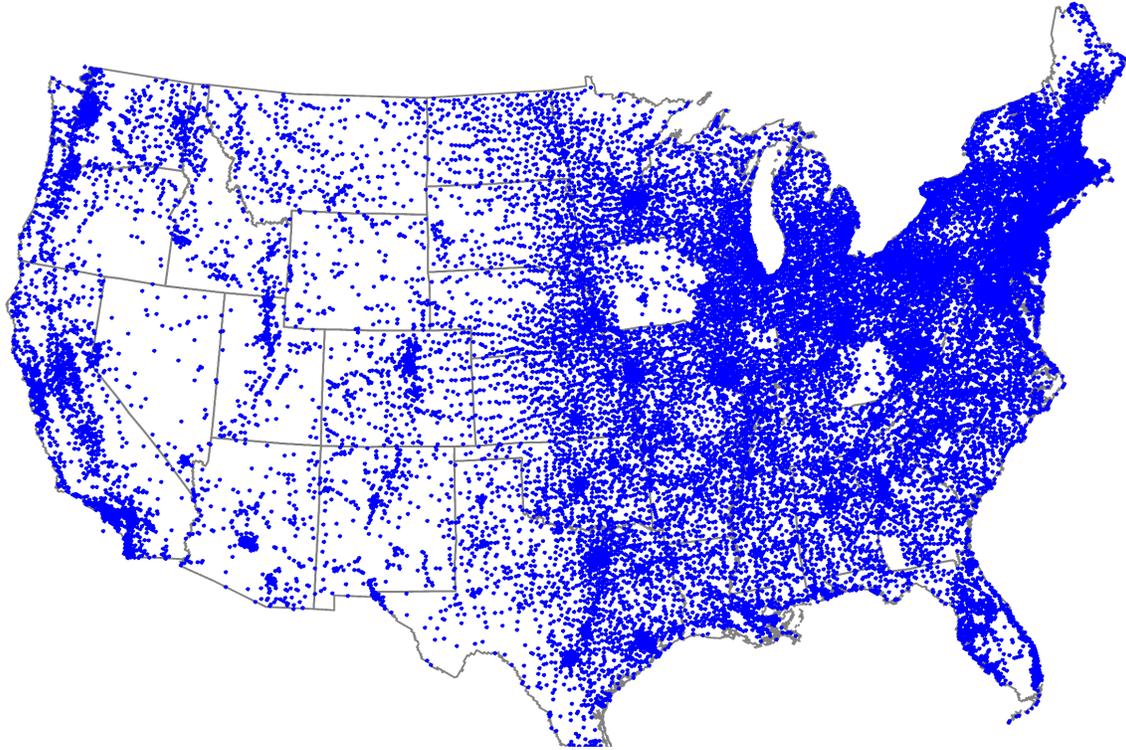
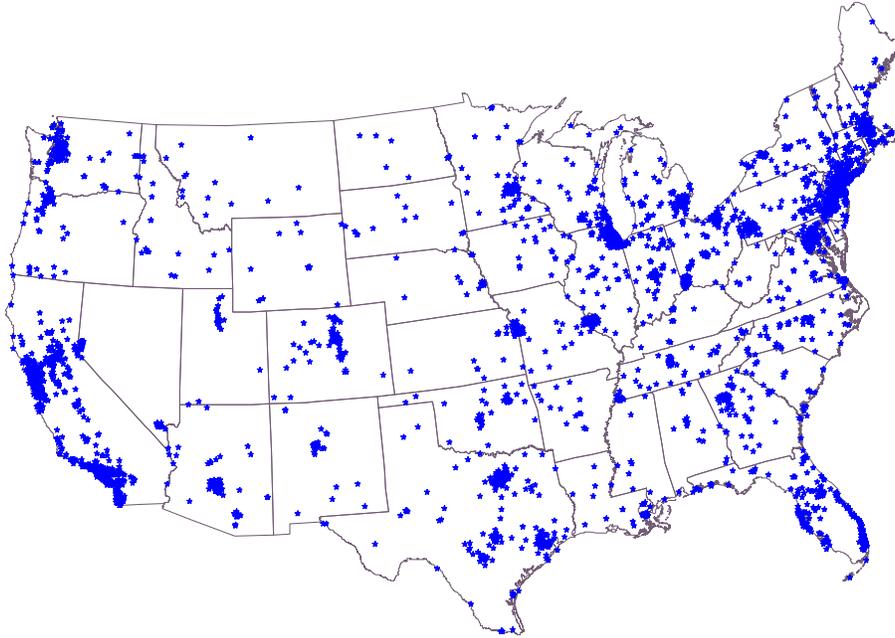


Figure 4: Geographic distribution of brokerage accounts

This figure shows the geographic distribution of investors in the discount brokerage sample in 1983 (Panel A) and 1991 (Panel B). Each dot corresponds to a zip code where at least one investor resides.

(a) 1983



(b) 1991

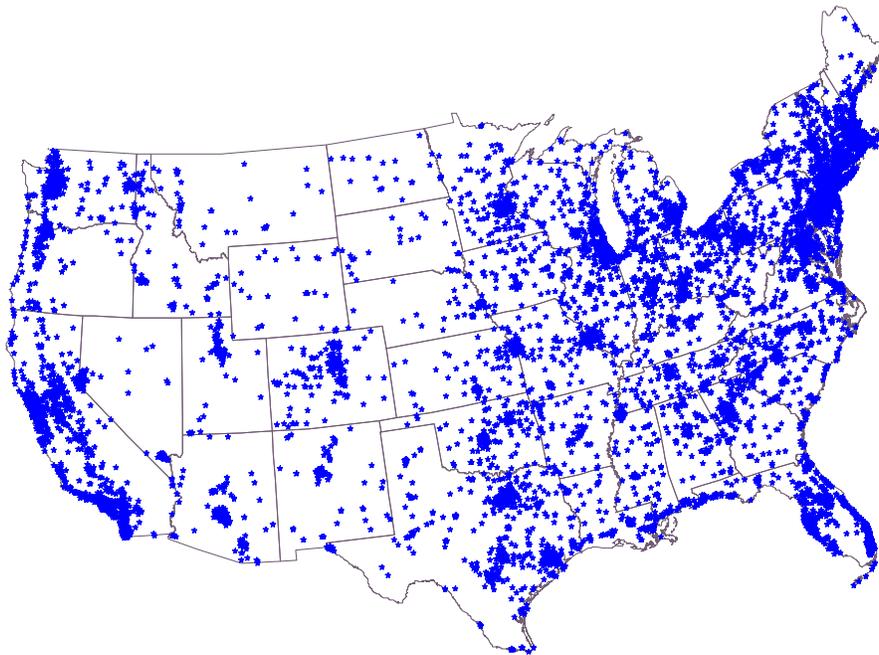


Figure 5: Effect of bank deregulation on new account openings

This figure plots the effect of interstate banking agreements (in event time) on households' access to credit measured by the number of new credit cards issued to the residents of a deregulated state. The solid line shows the coefficients on state-specific year dummies defined relative to the deregulation event from the regression of the average number of new credit card accounts opened in a given state on event-time deregulation dummies. The deregulation year is the first year when an interstate banking agreement removes barriers to entry into a given state for bank holding companies from other states. Coefficients on dummies b_k are defined by the following regression: $Y_{it} = a + \gamma_i + \delta_t + \sum_{k=-2}^3 b_k D_{i,t-k} + c'X_{it} + \epsilon_{it}$ for each state i in year t , where γ_i and δ_t are state and year fixed effects, correspondingly; $D_{i,t-k}$ is a deregulation indicator equal to one if a state was deregulated in year $t - k$, and zero otherwise; $X_{it} = [\text{Log state population}_{it}, \text{Log state income}_{it}]$ is a vector of controls; and Y_{it} is the dependent variable – the average number of new credit card/brokerage account openings relative to the average number of new account openings in a year before deregulation ($t = 0$). Y-axis thus shows the annual growth in new account openings in years following (preceeding) deregulation relative to the average number of new account openings in year $t = 0$. Both lines are smoothed using a two-year moving average window.

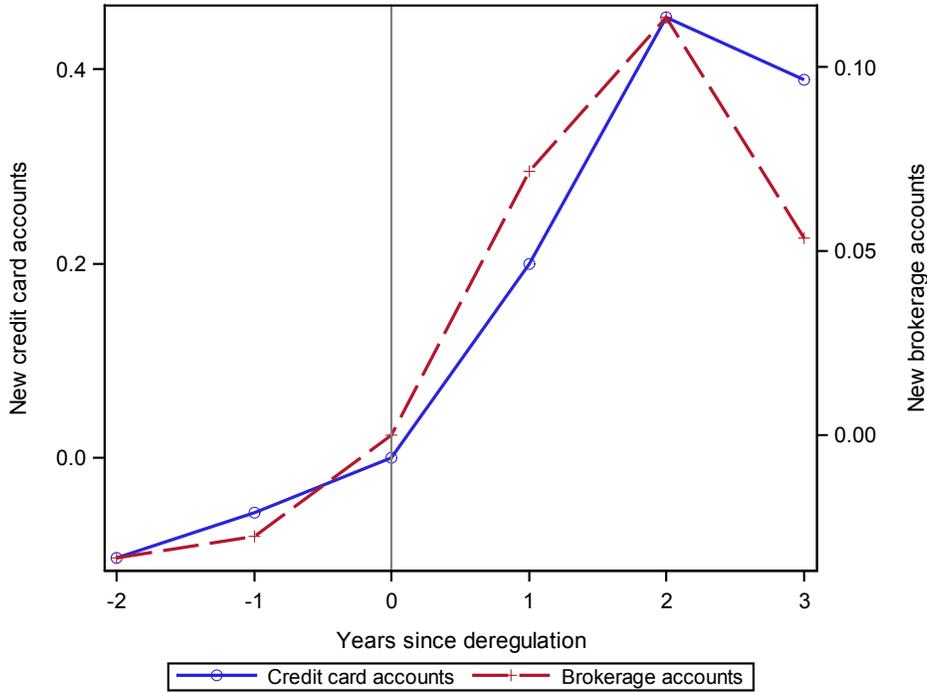
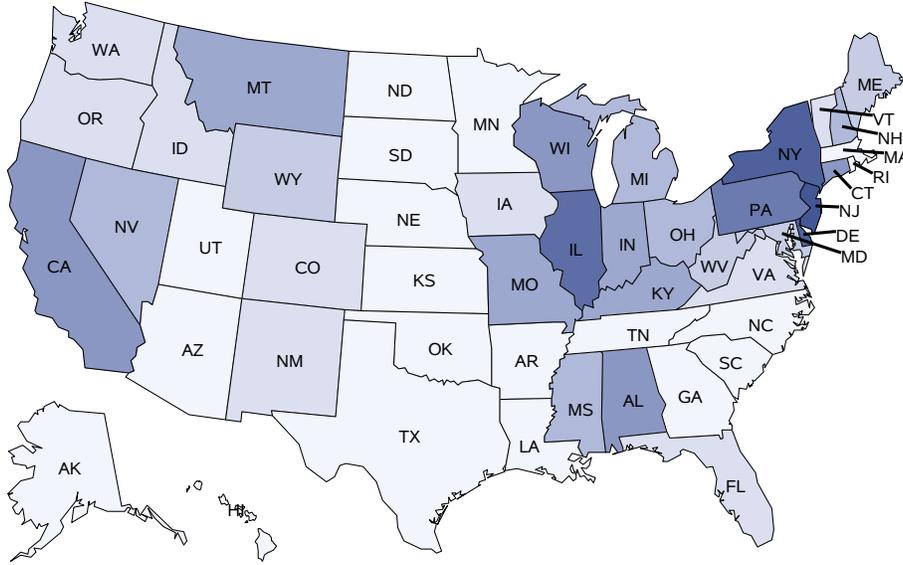


Figure 6: Credit card accounts per capita by state

This figure shows the effect of banking deregulation on the distribution of credit card accounts across states. The figure depicts the cross-sectional distribution of credit cards per capita at the start of interstate banking deregulation in 1982 (Panel A) and after the completion of banking deregulation in 1995 (Panel B). Darker colors indicate states with a higher number of credit card accounts per capita (scaled by the number of state residents aged 18 and older).

(a) 1982



(b) 1995

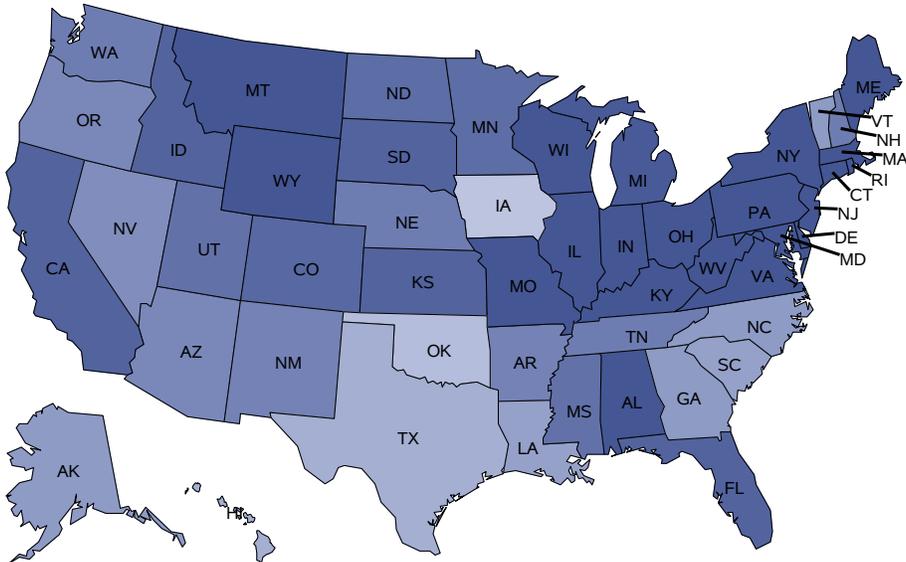


Table 1: Summary statistics

This table shows summary statistics. Panel A describes data on individual credit histories and financial products for a random sample of 3 million U.S. individuals from the credit bureau TransUnion. Panel B describes data on personal investment accounts from an anonymous discount brokerage. Panel C provides summary statistics for a nationally representative sample of U.S. households covered by the Panel Study of Income Dynamics (PSID). Panel D describes state-level macroeconomic variables from the Bureau of Labor Statistics. Mean and median values refer to sample-wide averages, except when presented separately by year.

Panel A: Credit cards and financial products							
	Full sample		By year				
	Mean	Median	1982	1984	1988	1992	1996
Age as of 1982	50.8	53	-	-	-	-	-
Percent male	59	-	-	-	-	-	-
TU credit score	800	832	-	-	-	-	-
High credit (\$)	1,423	400	-	-	1,071	1,261	1,508
Credit limit (\$)	4,215	3,000	-	-	1,522	3,443	4,754
% own at least 1 CC	98	-	67.6	81.1	92.1	94.9	96.9
% have mortgage	26	-	7.79	11.4	31.6	33	32.7
% have install. loans	48	-	14.8	16.7	22.3	22.6	22.3
Number of CC pp.	5.3	4	1.46	2.03	3.08	3.85	4.64

Panel B: Brokerage investment accounts						
	All accounts		Account types, % of total			
	Mean	Median	Cash	Investment	IRA	Keogh
Age as of 1982	37.9	36	24	35	40	1
Percent male	87	-				
Percent married	73	-				
Number of accounts	2.03	2				
			Investment objective, %			
Income (\$)	203,339	74,500	Conservative	Income	Growth	Speculation
Net worth (\$)	669,317	100,000	23	28	85	6
Account value as of 1991 (\$)	26,835	8,680				

Panel C: Panel Study of Income Dynamics						
	Full sample		By year			
	Mean	Median	1984	1989	1994	1999
Age	43.8	40	-	-	-	-
Percent male	70	-	-	-	-	-
Family members	2.8	2	-	-	-	-
Stock market particip. (%)	22	0	18	21	25	22
Value of stocks (\$)	15,156	0	4,457	8,023	17,792	29,739
Financial assets (\$)	34,617	2,000	23,870	24,428	38,951	50,259
Unsecured debt (\$)	3,770	0	1,692	2,714	4,940	5,456

Panel D: Macroeconomic variables		
	Mean	Median
Per-capita income (avg. per state, \$)	17,411	17,072
Adult population (avg. per state)	4,876,837	3,300,712

Table 2: State-level evidence on access to credit and stock market participation

This table examines the effect of credit supply on stock market participation. The analysis corresponds to instrumental variable regressions where credit supply is instrumented by interstate banking agreements. Column 1 shows the first-stage regression which studies the effect of interstate banking agreements on the number of new credit cards issued to the residents of a deregulated state. Each observation is a state-year. In column 1, the dependent variable is the annual number of new credit card accounts issued to the residents of a given state scaled by the annual number of new credit cards in this state in the year immediately before the deregulation. The main independent variable of interest, *Interstate deregulation*, is a binary indicator, which equals one within two years following the deregulation year and zero otherwise. The deregulation year is defined as the first year when an interstate banking agreement removes barriers to entry into a given state for bank holding companies from any of the four states that house the largest credit card issuers: New York, California, Illinois, and Pennsylvania. These four states are excluded from the analysis. Columns 2 and 3 show second-stage regressions which examine the effect of credit supply on stock market participation measured by new brokerage accounts. The dependent variables are the number of new brokerage clients in a given state-year (column 2) and the number of new brokerage accounts in a given state-year (column 3), both scaled by their pre-deregulation levels. The main independent variable of interest, *New credit cards*, captures the fitted values from the first-stage regression in column 1. All regressions include state and year fixed effects and control for growth in state population and income per capita. Standard errors are adjusted for heteroskedasticity and clustered at the state level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)
Dependent variable	New credit card accounts	New brokerage clients	New brokerage accounts
Interstate deregulation	0.343*** (2.77)		
New credit cards (fitted)		0.375*** (2.75)	0.316** (2.36)
Population growth	17.78* (2.02)	-7.35 (-1.58)	-5.87 (-1.42)
Income growth	-4.46 (-1.63)	-3.78 (-1.62)	-3.70 (-1.60)
State fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Number of obs.	385	385	385
R^2	0.83	0.85	0.85

Table 3: State-level measures of credit constraints

This table studies how the effect of access to credit on market participation varies with state-level measures of credit constraints and bank competition. Column 1 shows the first-stage regression where credit supply, measured by the number of new credit cards issued to residents of deregulated states, is instrumented by interstate banking agreements, as in the base specification in Table 2. Columns 2 and 3 show the second-stage regressions that examine the effect of access to credit on stock market participation in the presence of state-level measures of credit constraints: *Intra-state restrictions* and *Low bank penetration*. The dependent variable in columns 2 and 3 is the number of new brokerage accounts opened by state residents in a given year, defined as in Table 2. *Intra-state restrictions* is a binary indicator equal to one if, at the time of interstate deregulation, a state imposes intra-state restrictions on banks' geographic expansion. *Low bank penetration* is a binary indicator equal to one for states with underserved bank markets, defined as states in the bottom decile according to the number of bank branches per capita in the year before deregulation. All other variables are defined as in Table 2. Standard errors are adjusted for heteroskedasticity and clustered at the state level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)
Interstate deregulation (ID)	0.343*** (2.77)	0.119** (2.62)	0.089* (1.93)
ID×Intra-state restrictions		0.500** (2.73)	
ID×Low bank penetration			0.287** (2.54)
Population growth	17.78* (2.02)	-0.61 (-0.14)	0.29 (0.07)
Income growth	-4.46 (-1.63)	-5.43** (-2.47)	-5.26** (-2.35)
State fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Number of obs.	385	385	385
R^2	0.83	0.85	0.85

Table 4: Cross-sectional evidence

This table studies the relation between access to credit and stock market participation in subsamples sorted on investor characteristics. The table shows the estimates from the second-stage regressions of new brokerage clients on the fitted values of new credit cards instrumented by interstate banking agreements. Columns 1-2 compare between low-income and high-income investors, defined as those with an annual income below and above \$100,000, respectively. Columns 3-4 compare between younger and older investors, defined as those below and above the age of 35 in 1995, respectively. Columns 5-6 compare between investors who own premium credit cards and those who do not own premium credit cards, a proxy for creditworthiness. Columns 7-8 compare between investors who own a home and investors who rent their residence, a proxy for pledgeable assets. Data on new brokerage accounts and investor characteristics are from a discount brokerage. Standard errors are adjusted for heteroskedasticity and clustered at the state level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Condition	Low income inv.?		Young investor?		Premium cards?		Renter?	
	No	Yes	No	Yes	Yes	No	No	Yes
New credit cards (fitted)	0.192 (1.02)	0.442*** (3.06)	0.278** (2.08)	0.690*** (3.13)	0.269* (1.98)	0.468*** (3.02)	0.337** (2.53)	1.186** (2.43)
Population growth	-3.87 (-0.69)	-8.62* (-1.80)	-5.58 (-1.35)	-13.09 (-1.55)	-3.95 (-1.01)	-10.32* (-1.83)	-6.68 (-1.51)	-25.31** (-2.05)
Income growth	-3.93 (-1.54)	-3.72 (-1.61)	-2.77 (-1.35)	-7.04* (-1.73)	-2.90 (-1.38)	-4.54 (-1.66)	-3.37 (-1.55)	-2.94 (-0.49)
State fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Number of obs.	385	385	385	385	385	385	385	385
R^2	0.83	0.84	0.86	0.77	0.85	0.83	0.85	0.69

Table 5: The local effect of banking deregulation on stock market participation

This table provides evidence on the differential effect of interstate deregulation on the supply of credit for borrowers located within 10 miles from the branch acquired by an out-of-state holding company (indicator *10-mile radius*), within 20 miles from such a branch (indicator *20-mile radius*), and more than 20 miles from such a branch (omitted category). The location of credit card borrowers is proxied by the center of the zip code of their home address at the time of credit card issuance. The location of bank branches is from the summary of deposits data provided by the Federal Deposit Insurance Corporation. Column 1 shows the first-stage regression of new credit card issuances in each zip-year on the interstate deregulation dummy and controls. Columns 2-3 show the second-stage regressions of new brokerage clients (column 2) and new brokerage accounts (column 3) in each zip-year on the fitted values of new credit cards instrumented by interstate banking agreements. All dependent variables are scaled by their corresponding values as of the year immediately preceding the deregulation year. The indicators *10 (20) mile radius* are equal to one in the first two years after deregulation for zip codes located within 10 (20) miles of the branches acquired by out-of-state holding companies and zero otherwise. All regressions include zip code fixed effects and year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered at the county level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)
Dependent var.	New credit card accounts	New brokerage clients	New brokerage accounts
10-mile radius	0.243*** (2.83)		
New credit cards (fitted)		1.711*** (3.30)	1.644*** (2.87)
20-mile radius	0.04 (0.36)	-0.32*** (-3.42)	-0.24** (-2.29)
Population growth	0.000 (0.21)	0.001 (1.32)	0.000 (0.29)
Income growth	0.00 (0.07)	-0.06 (-1.63)	-0.04 (-1.07)
Zip fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Number of obs.	138,822	138,822	138,822
R^2	0.76	0.48	0.46

Table 6: Robustness

This table shows robustness tests that control for dynamic county-level economic factors captured by county \times year fixed effects. In the first-stage regression in column 1, the dependent variable is the number of new credit card accounts, scaled by its pre-deregulation value, and the independent variable of interest is the indicator *Interstate branch*, which is equal to one for borrowers located with 10 miles from branches acquired by out-of-state credit card issuers within two years following interstate deregulation and zero otherwise. In the second-stage regressions in columns 2-3, the dependent variables are the number of new brokerage clients and the number of new brokerage accounts, respectively, scaled by their pre-deregulation levels. The main independent variable of interest is *New credit cards*, which shows how the increase in new credit cards within 10 miles from out-of-state bank branches affects stock market participation within this 10-mile radius. Panel A studies all branches acquired by out-of-state holding companies within two years after interstate deregulation. Panel B studies branches of failed financial institutions acquired by out-of-state holding companies within two years after interstate deregulation. Standard errors are adjusted for heteroskedasticity and clustered at the county level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)
Dependent var.	New credit card accounts	New brokerage clients	New brokerage accounts
Panel A: All bank acquisitions			
Interstate branch	0.851*** (3.38)		
New credit cards (fitted)		0.946*** (4.62)	1.083*** (4.62)
County \times Year FE	Y	Y	Y
Number of obs.	148,834	148,834	148,834
R^2	0.52	0.28	0.25
Panel B: Acquisitions of failed bank			
Interstate branch	0.350*** (3.18)		
New credit cards (fitted)		2.423** (2.21)	3.060*** (2.62)
County \times Year FE	Y	Y	Y
Number of obs.	148,834	148,834	148,834
R^2	0.52	0.28	0.25

Table 7: State-level evidence on asset allocation

This table studies how access to credit affects households' asset allocation. Households' assets and liabilities, obtained from the Panel Study of Income Dynamics, are aggregated to the state level. Column 1 shows the first-stage regression in which the annual number of new credit card accounts in a state is instrumented by the state-specific indicator *Interstate deregulation*. Columns 2-5 show second-stage regressions that study the effect of credit supply (fitted values of new credit cards) on households' stock market participation and asset allocation. In column 2, the dependent variable is stock market participation, defined as the fraction of households who report investments in the common stock of publicly held corporations, mutual funds, or investment trusts. In column 3, the dependent variable is the fraction of financial assets held in stocks. The value of financial assets is equal to the self-reported value of equity investments, corporate and government bonds, insurance products, certificates of deposits, checking and savings accounts, and cash. In column 4, the dependent variable is the natural logarithm of the value of stock investments. In column 5, the dependent variable is the natural logarithm of the value of investments in fixed income instruments and cash, including checking and savings accounts. Standard errors are adjusted for heteroskedasticity and clustered at the state level, and t-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)	(5)
Dependent var.	New credit card accounts	Stock market participation	Share of equity in fin. assets	Log value of stocks	Log value of bonds and cash
Interstate deregulation	1.054** (2.27)				
New credit cards (fitted)		0.126** (2.12)	0.132** (2.04)	1.593** (2.41)	0.346 (0.60)
Log population	-0.6 (-0.16)	-0.9 (-1.67)	-0.3 (-0.51)	-8.3 (-1.39)	-4.1 (-0.78)
Log income	5.2 (1.33)	-1.1* (-1.68)	-0.8 (-1.04)	-14.1* (-1.88)	-10.8 (-1.65)
State FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Nobs	99	100	99	100	100
R^2	0.89	0.68	0.66	0.89	0.55

Table 8: Household-level evidence on asset allocation

This table provides household-level evidence on the effect of access to credit on asset allocation. Column 1 shows the first-stage regression in which a household's access to credit (measured by the ratio of unsecured debt to total assets) is instrumented by the indicator *Interstate deregulation*, defined relative to the household's state of residence at the time of banking deregulation. The second-stage regressions study the effect of access to credit on the household's stock market participation (column 2), share of financial assets invested in stocks (column 3), dollar value of stock investments (column 4), and dollar value of investments in bonds and cash (column 5). Control variables include household-level annual income and financial wealth. The debt-to-assets ratio is winsorized at 3%. All regressions include household fixed effects and year fixed effects. Standard errors are adjusted for heteroskedasticity and clustered by state \times year, and t-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)	(5)
Dependent var.	Debt-to- assets ratio (D/A)	Stock market participation	Share of equity in fin. assets	Log value of stocks	Log value of bonds and cash
Interstate deregulation	0.356*** (3.78)				
D/A (instrumented)		0.084*** (2.76)	0.251*** (3.04)	0.769*** (2.74)	0.292 (0.92)
HH income	0.01 (0.17)	0.01*** (2.68)	-0.01 (-1.17)	0.09*** (2.81)	0.01 (0.32)
HH wealth	-0.49*** (-12.11)	0.05*** (3.29)	0.14*** (3.35)	0.46*** (3.31)	0.46*** (2.93)
Household FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Number of obs.	8,318	11,900	8,575	11,900	11,900
R^2	0.73	0.76	0.68	0.79	0.86

Table 9: Household-level cross-sectional evidence on effect of bank deregulation in PSID data

This table provides cross-sectional evidence on the effect of interstate banking deregulation on households' investment decisions: stock market participation (Panel A), share of equity in financial assets (Panel B), dollar value of equity investments (Panel C), and dollar value of investments in bonds and cash (Panel D). Column 1 estimates the baseline effect of interstate banking deregulation on the average household in a deregulated state. Columns 2-6 study how this effect varies with household characteristics: financial constraints (debt-to-assets ratio in column 2), additional borrowing (the indicator *New personal debt* in column 3), age (the indicator *Young* in column 4, which denotes households under the age of 40), education (the indicator *College degree* in column 5), and all of the above characteristics included jointly (column 6). Control variables include household-level annual income and financial wealth. Standard errors are adjusted for heteroskedasticity and clustered by state \times year, and t-statistics are shown in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dependent variable: Stock market participation indicator						
Interstate deregulation (ID)	0.030*** (2.76)	0.119*** (5.34)	0.017 (1.65)	0.018 (1.52)	0.014 (1.39)	0.064*** (3.06)
ID×D/A		0.023*** (4.98)				0.017*** (3.82)
ID×New personal debt			0.076*** (5.21)			0.058*** (3.82)
ID×Young				0.030*** (3.17)		0.018* (1.89)
ID×College degree					0.103*** (6.89)	0.099*** (6.73)
HH income	0.01***	0.01***	0.01***	0.01***	0.01***	0.01**
HH wealth	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
Number of obs.	11,900	11,900	11,900	11,900	11,900	11,900
R^2	0.76	0.76	0.76	0.76	0.76	0.76
Panel B: Dependent variable: Share of equity in financial assets						
Interstate deregulation (ID)	0.089*** (3.04)	0.193*** (3.74)	0.077** (2.59)	0.076** (2.48)	0.071** (2.37)	0.145*** (2.68)
ID×D/A		0.027** (2.56)				0.023** (2.08)
ID×New personal debt			0.068** (2.55)			0.050 (1.48)
ID×Young				0.034 (1.02)		0.009 (0.25)
ID×College degree					0.084*** (3.52)	0.081*** (3.38)
HH income	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
HH wealth	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***
Number of obs.	8,575	8,575	8,575	8,575	8,575	8,575
R^2	0.68	0.68	0.68	0.68	0.68	0.68

...continuation from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Dependent variable: Log value of stocks						
Interstate deregulation (ID)	0.273*** (2.74)	1.039*** (5.65)	0.181* (1.86)	0.187* (1.74)	0.097 (1.03)	0.553*** (3.48)
ID×D/A		0.197*** (5.59)				0.147*** (4.59)
ID×New personal debt			0.561*** (4.59)			0.409*** (3.30)
ID×Young				0.213** (2.43)		0.128 (1.45)
ID×College degree					1.185*** (8.46)	1.147*** (8.35)
HH income	0.10***	0.09***	0.09***	0.09***	0.09***	0.08**
HH wealth	0.08***	0.09***	0.09***	0.08***	0.08***	0.09***
Number of obs.	11,900	11,900	11,900	11,900	11,900	11,900
R^2	0.79	0.79	0.79	0.79	0.79	0.79
Panel D: Dependent variable: Log value of bonds and cash						
Interstate deregulation (ID)	0.104 (0.92)	0.496*** (3.32)	0.007 (0.06)	0.056 (0.47)	0.090 (0.81)	0.263 (1.53)
ID×D/A		0.101*** (3.51)				0.069** (2.21)
ID×New personal debt			0.592*** (6.09)			0.534*** (4.80)
ID×Young				0.118 (1.37)		0.024 (0.26)
ID×College degree					0.090 (1.16)	0.068 (0.92)
HH income	0.02	0.01	0.01	0.01	0.02	0.01
HH wealth	0.31***	0.32***	0.32***	0.31***	0.31***	0.32***
Number of obs.	11,900	11,900	11,900	11,900	11,900	11,900
R^2	0.86	0.86	0.86	0.86	0.86	0.86

A Appendix

Table A1: Market shares in the credit card business in 1982

This table shows banks' market shares in the credit card segment at the start of interstate banking deregulation in 1982. Market shares are estimated based on the value of credit card receivables reported by all FDIC-insured financial institutions in their quarterly reports of condition and income. Panel A shows market shares for the top 25 bank holding companies. Panel B shows market shares aggregated to the state of headquarters of bank holding companies.

Regulatory Top Holding Company Name	State	Credit Card Receivables, %	Credit Card Receivables, cum. %
Panel A: By bank			
Citicorp	NY	10.80	10.80
Bankamerica Corporation	CA	8.73	19.53
First Chicago Corporation	IL	4.65	24.18
Chase Manhattan Corporation	NY	3.82	28.00
First Interstate Bancorp	CA	2.67	30.67
Continental Illinois Corporation	IL	2.05	32.71
Manufacturers Hanover Corporation	NY	1.95	34.66
Security Pacific Corporation	CA	1.63	36.29
Midland Bank Public Limited Company	CA	1.51	37.80
Michigan National Corporation	MI	1.48	39.29
Wells Fargo Bank NA	CA	1.48	40.76
Bank Of Virginia Company	VA	1.08	41.85
Mellon National Corporation	PA	0.99	42.83
First Atlanta Corporation	GA	0.94	43.78
Chemical New York Corporation	NY	0.93	44.71
Southeast Banking Corporation	FL	0.89	45.59
Valley National Corporation	AZ	0.87	46.46
First City Bancorporation Of Texas Inc.	TX	0.85	47.31
European-American B t Co	NY	0.77	48.09
First Wisconsin Corporation	WI	0.76	48.84
Rainier Bancorporation	WA	0.75	49.59
Barnett Banks Of Florida Inc.	FL	0.74	50.33
Southwest Bancshares Inc.	TX	0.72	51.04
Ncnb Corporation	NC	0.69	51.73
Norwest Corporation	MN	0.68	52.41
Harris Bankcorp Inc.	IL	0.67	53.07
Panel B: By state			
	NY	23.89	23.89
	CA	17.85	41.74
	IL	8.43	50.17
	PA	3.88	54.05
	MI	3.73	57.79
	OH	3.38	61.17
	TX	3.14	64.31
	VA	2.80	67.10
	FL	2.57	69.67
	MA	2.04	71.71