Online Appendix

A1 Sample Comparison with Rice & Strahan (2010)

The existing evidence on the effects of IBBEA implementation on interest rates in Rice & Strahan (2010) is based on data from the Survey of Small Business Finance (SSBF). In order to interpret the results presented in this paper, we believe it is instructive to compare this data source with the matched DealScan-Compustat sample we are using here. For illustrative purposes, we compare the 2003 edition of the SSBF with the data for 2003 in our sample.[32] As may be expected, the differences are staggering. Figure A1 visualizes these differences for firm size (as measured by total assets). The overlap of the two samples is minor. Table A1 in the appendix further summarizes the mean, median, and standard deviation of a host of other relevant borrower, loan, and lender characteristics in both samples. While the median SSBF borrower has total assets equal to 850,000 USD, the median DealScan-Compustat borrower has 978,300,000 USD, a difference by a factor of 1,000. All Compustat firms are incorporated, and with a few exceptions publicly listed, where we define non-publicly listed as firms with no credit rating and no ticker information as in Sufi (2007). This contrasts strongly with the SSBF, where only a negligible part of borrowers has issued public equity, and about 25% of firms are not incorporated businesses.

[32]The comparison yields the equivalent insights if we instead use the average characteristics over our whole sample or include the years 2002 and 2004 to enlarge sample size.

The differences, however, do not stop at borrower characteristics. The median SSBF loan is only 0.15% of that in our sample in terms of size and comes with a 50% higher interest rate, but half the maturity.[33] The main distinguishing feature of the DealScan data is that most loans are syndicated, i.e. include multiple lenders. This is the case for about 80% of the contracts in our sample. Strikingly, *none* of the firms in the SSBF report loans including multiple lenders, likely because of the smaller loan size. We conclude that the sample we are using in this paper differs in many dimensions from the data used in previous efforts. As we will show below, these differences matter a great deal for the impact of the IBBEA on loan contracts.

To alleviate concerns regarding endogenous deregulation timing, we regress a dummy for states that allowed interstate branching early (between 1994 and 1996) or the deregulation year on the average state-level syndicated loan market size prior to the lifting of branching restrictions. Syndicated loan market size is simply the average total volume of syndicated loans issued in a given state in the pre-reform years, which we scale over the Gross State Product (GSP).[34] The results are shown in table A2. For both the pre-reform syndicated loan volume and the HHI in 1994, the estimated coefficients are small and indistinguishable from zero; the regression models also yield tiny (pseudo) R^2 values. In the online appendix table A3, we further show that deregulation timing is uncorrelated with the market share of commercial banks or the share of risky

[33] DealScan reports interest rates as spreads over a reference rate, usually LIBOR. We approximate actual interest rates here by adding the daily LIBOR to interest rate spreads.

[34] The results are qualitatively similar when we scale over alternative variables such as total outstanding C&I loans or the number of firms or define pre-reform syndicated loan volume using only the year directly before the reform.

TABLE A1

Sample Comparison: DealScan-Compustat and SSBF in 2003

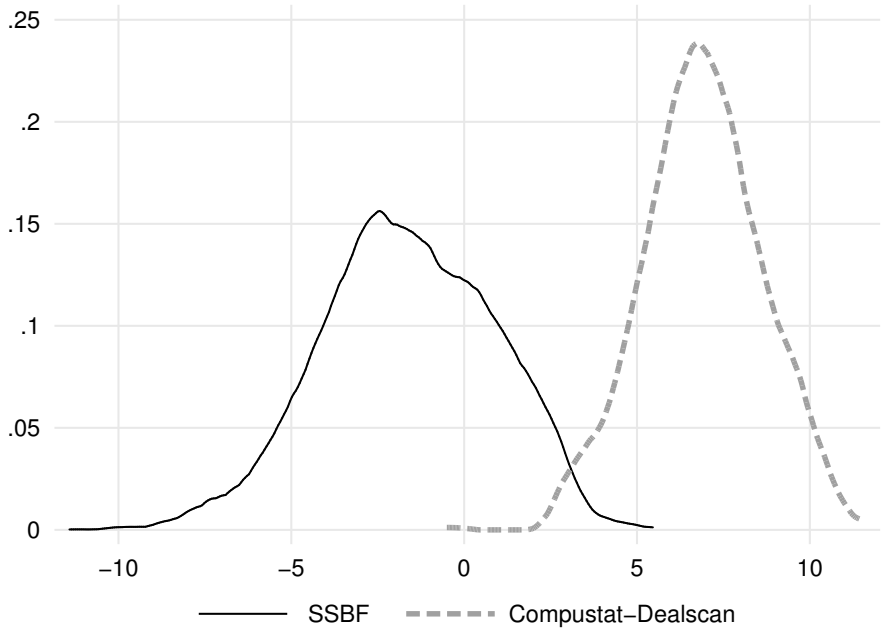
Table A1 compares descriptive statistics for the sample we use in our baseline regression (model 3 from table 2) with the data from the 2003 Survey of Small Business Finance. To enable comparability, only observations from 2003 are used from our merged DealScan-Compustat file. For Compustat-DealScan, ROA is defined as oibdp/at; the number of employees excludes zero employee firms; depreciable /total assets is (ppent+intan)/at; debt/asset ratio is (dltt+dlc)/at; interest is allindrawn + LIBOR; "single lender" includes all loans that are signed by only one lead bank; "credit lines" include revolving loans; age is computed from the date of incorporation from Jay Ritter's website; for the share of publicly listed companies, private is defined as firms with missing ticker information and no credit rating as in Sufi (2007). As in Rice & Strahan (2010), statistics for SSBF only include firms which had a recent loan application and only loans and lenders which are associated with the most recent loan approved; a firm is defined as publicly listed if raised equity publicly; "credit lines" include renewables and new lines; debt includes total loans; "single lender" includes all loans that are not syndicated or signed by multiple institutions. For both files, leverage is only calculated for firms with a positive net worth.

	SSBF 2003			**DealScan-Compustat**		
	Mean	Median	SD	Mean	Median	SD
Borrower characteristics						
ROA	0.714	0.116	4.850	0.133	0.125	0.101
Employees	54.157	23	74.59	17,701	4,487	40,377
Total assets (million USD)	4.43	0.85	13.89	3,764.5	978.3	8,853.7
Land/total assets	0.053	0	0.139	0.149	0.093	0.189
Depreciable/total assets	0.375	0.301	0.319	0.503	0.501	0.237
Debt/asset ratio	0.322	0.262	0.28	0.314	0.262	0.262
Borrower age (years)	18.3	16	13.1	79.5	103	36.8
Share publicly listed	0.013	0	0.113	0.943	1	0.227
Share incorporated	0.754	1	0.431	1	1	0
Loan characteristics						
Amount (million USD)	1.091	0.15	3.891	191.7	100	295.4
Interest rate	0.058	0.055	0.027	0.038	0.036	0.015
Maturity (months)	45.3	18	59.7	40.5	36	21.9
Share floating	0.553	1	0.497	1	1	0
Share credit lines	0.63	1	0.483	0.678	1	0.467
Lender characteristics						
Relationship length (years)	10.31	7	10.51	7.05	6.01	6.07
Share single lender	1	1	0	0.209	0	0.407
Share commercial banks	0.787	1	0.41	0.636	1	0.482

FIGURE A1

Distribution of Firm Size in 2003, SSBF versus DealScan-Compustat

Figure A1 plots the distribution of firm size (as measured by the log of total assets) for the Survey of Small Business Finance (SSBF) and the DealScan-Compustat estimation sample in 2003. To make the data comparable with Rice & Strahan (2010), we only include borrowers who indicate having at least one banking connection in the SSBF.



borrowers in the syndicated loan market. Taken together, we reject the hypothesis that the timing of IBBEA implementation was influenced by a state's characteristics related to the syndicated loan market.

TABLE A2

Do Syndicated Loan Market Features Predict Deregulation Timing?

Table A2 reports cross-sectional regressions of deregulation timing variables on measures of state-level aggregate syndicated loan volume in the year prior to IBBEA implementation and market concentration in 1994. The sample spans the 43 states included in the baseline regression (see equation 3 in table 2). *Early deregulation dummy* is 1 if a state started allowing interstate branching in the years 1994, 1995, or 1996, and 0 otherwise. *Deregulation year* is the year a state deregulated. *SYN_LOAN_VOL_GDP* is the average syndicated loan volume in a state in the years prior to deregulation, where GDP is the Gross State Product from the BEA. *HHI*_1994 is the deposit-weighted average county-level Herfindahl index of deposits in 1994. Robust standard errors are reported in parentheses.

Dependent Variable:	Early Deregulation		Deregulation Year	
	1	2	3	4
SYN_LOAN_VOL_GDP	1.658		0.624	
	(9.393)		(10.394)	
HHI_1994		0.989		-1.442
		(1.132)		(1.287)
Estimation Method	Probit	Probit	OLS	OLS
Observations	43	43	43	43
(Pseudo) R^2	0.002	0.012	0.000	0.030

A2 Additional Tables and Figures

TABLE A3

Do Syndicated Loan Market Features Predict Deregulation Timing?

Table A3 reports cross-sectional regressions of deregulation timing variables on measures of state-level syndicated loan activity in the years prior to IBBEA implementation. The sample spans the 43 states included in the baseline regression (see equation 3 in table 2) but shrinks with data availability. *Early deregulation dummy* is 1 if a state started allowing interstate branching in the years 1994, 1995, or 1996, and 0 otherwise. *Deregulation year* is the year a state deregulated. *COMM_BANK_SHARE* is the average share of commercial banks in issued syndicated loans. *JUNK_GRADE_SHARE* is the share of rated borrowers with ratings of BAA+ or worse. *RATED_BORROWER_SHARE* is the share of borrowers with a credit rating. Robust standard errors are reported in parentheses.

Dependent Variable:	Early Deregulation			Deregulation Year		
	1	2	3	4	5	6
COMM_BANK_SHARE	-0.311			-2.218		
	(2.521)			(2.133)		
JUNK_GRADE_SHARE		1.311			-0.479	
		(0.944)			(1.027)	
RATED_BORROWER_SHARE			-0.517			-0.031
			(1.182)			(1.296)
Estimation method	Probit	Probit	Probit	OLS	OLS	OLS
Observations	41	38	41	41	38	41
(Pseudo) R^2	0.001	0.049	0.001	0.005	0.010	0.001

TABLE A4

First Stage Results – Pre-Reform HHI and Reform Impact

Table A4 reports simple OLS regressions of the change in the log number of branches or the change in the county deposit HHI (aggregated to the state-level as deposit-weighted average) on a state's deposit HHI in 1994. We omit Hawaii and Rhode Islands, which are clear outliers; results are still highly significant when we include them. Robust standard errors are reported in parentheses.

	$\Delta\ln(1+\text{branches})$	$\Delta\text{HHI}_{t-1,t+4}$
	1	2
HHI_1994	0.746***	-0.394***
	(0.239)	(0.116)
Observations	41	41
R^2	0.242	0.280

TABLE A5

Loan-Level Results: Robustness

Table A5 reports the results of regressing the interest rates spreads of syndicated loans (in natural logarithm) on *DEREG*, a dummy that equals 1 if a state has lifted one or more branching restrictions, and interaction variables. *EXP* refers to the variable in the panel header. Column 2 adds SIC 4-digit and state fixed effects. In column 3, we add numerical credit ratings (as dummies) as additional control variable. Column 4 adds a control variable for a firm's market share, based on Compustat data. Column 5 is estimated without loan controls. In column 6, we calculate a borrower's spreads as the weighted average spread before and after deregulation, and re-estimate the main effect on the firm-level. Column 7 replaces the *DEREG* dummy with the Rice & Strahan (2010) deregulation index. Column 8 limits the sample to states that eventually deregulated until 2007. Column 9 excludes loans of the type "Term Loan" or "Term Loan B", which may be structured for institutional investors. The sample is restricted to syndicated loans for the regressions in panel C and to syndicated loans by commercial banks for the regressions in panel D. Robust standard errors (in parentheses) are clustered on the state-level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

	Baseline Bank FE 1	Industry FE 2	Rating Control 3	Market share Control 4	Drop Loan Controls 5	Collapsed Panel 6	Continuous Index 7	Deregulated Sample 8	Drop Term Loans 9
Panel A: Deregulated dummy only									
DEREG	0.067***	0.138***	0.071***	0.064**	0.045**	0.085***	0.017**	0.048**	0.052**
	(0.025)	(0.037)	(0.024)	(0.025)	(0.022)	(0.014)	(0.008)	(0.023)	(0.022)
Panel B: Interaction with syndicated loan dummy (SYN)									
DEREG × EXP	0.148***	0.137***	0.153***	0.143***	0.152***	–	0.108***	0.136***	0.141***
	(0.031)	(0.032)	(0.030)	(0.033)	(0.031)		(0.027)	(0.032)	(0.035)
Panel C: Interaction with commercial bank dummy (COMM_BANK)									
DEREG × EXP	0.184***	0.143***	0.188***	0.198***	0.182**	–	0.131***	0.212***	0.205***
	(0.071)	(0.039)	(0.073)	(0.067)	(0.072)		(0.043)	(0.069)	(0.066)
Panel D: Interaction with out-of-state bank dummy (OOS_BANK)									
DEREG × EXP	0.215**	0.108*	0.204**	0.211**	0.232**	–	0.133*	0.215**	0.214**
	(0.099)	(0.059)	(0.088)	(0.102)	(0.102)		(0.072)	(0.099)	(0.100)
Loan controls	Yes	Yes	Yes	Yes		–	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes	Yes	–	Yes	Yes	Yes
Borrower FE	Yes		Yes	Yes	Yes	–	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	–	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	–	Yes	Yes	Yes

TABLE A6

Loan-Level Results: Robustness with Interacted Fixed Effects

Table A6 reports the results of regressing the interest rates spreads of syndicated loans (in natural logarithm) on *DEREG*, a dummy that equals 1 if a state has lifted one or more branching restrictions, and interaction variables. *EXP* refers to the variable in the panel header. Column 2 is estimated without loan controls. Column 3 replaces the *DEREG* dummy with the Rice & Strahan (2010) deregulation index. Column 4 limits the sample to states that eventually deregulated until 2007. Column 5 excludes loans of the type "Term Loan" or "Term Loan B", which may be structured for institutional investors. The sample is restricted to syndicated loans for the regressions in panel B and to syndicated loans by commercial banks for the regressions in panel C. Robust standard errors (in parentheses) are clustered on the state-level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

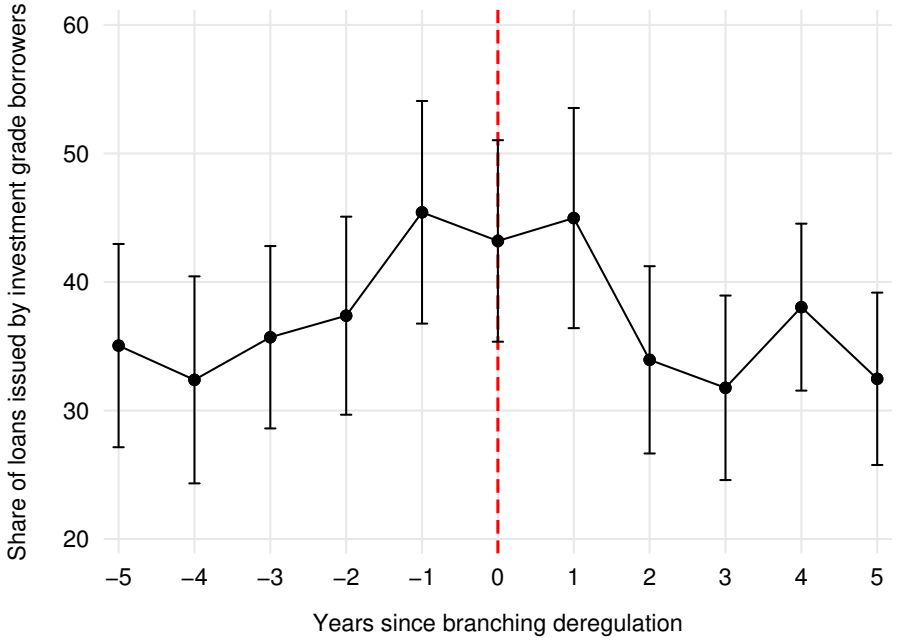
	Baseline Two-Way FE 1	Drop Loan Controls 2	Continuous Index 3	Deregulated Sample 4	Drop Term Loans 5
Panel A: Interaction with syndicated loan dummy (SYN)					
DEREG × EXP	0.130**	0.126**	0.073	0.120**	0.137*
	(0.051)	(0.059)	(0.047)	(0.059)	(0.074)
Panel B: Interaction with commercial bank dummy (COMM_BANK)					
DEREG × EXP	0.248***	0.253***	0.106*	0.131	0.257*
	(0.081)	(0.086)	(0.059)	(0.149)	(0.147)
Panel C: Interaction with out-of-state bank dummy (OOS_BANK)					
DEREG × EXP	0.609***	0.623***	0.531***	0.609***	0.691***
	(0.072)	(0.070)	(0.138)	(0.072)	(0.119)
Loan controls	Yes		Yes	Yes	Yes
Borrower × Year FE	Yes	Yes	Yes	Yes	Yes
Bank × Year FE	Yes	Yes	Yes	Yes	Yes

FIGURE A2

Borrower Risk Composition around Deregulation

Graph A plots the share of loans issued by firms with an investment grade rating (as a fraction of all loans with rating data) around the deregulation date. Graph B plots the share of loans issued by borrowers which have a long-term issuer rating from S&P.

Graph A: Share of Investment Grade Borrowers (in %)



Graph B: Share of Rated Borrowers (in %)

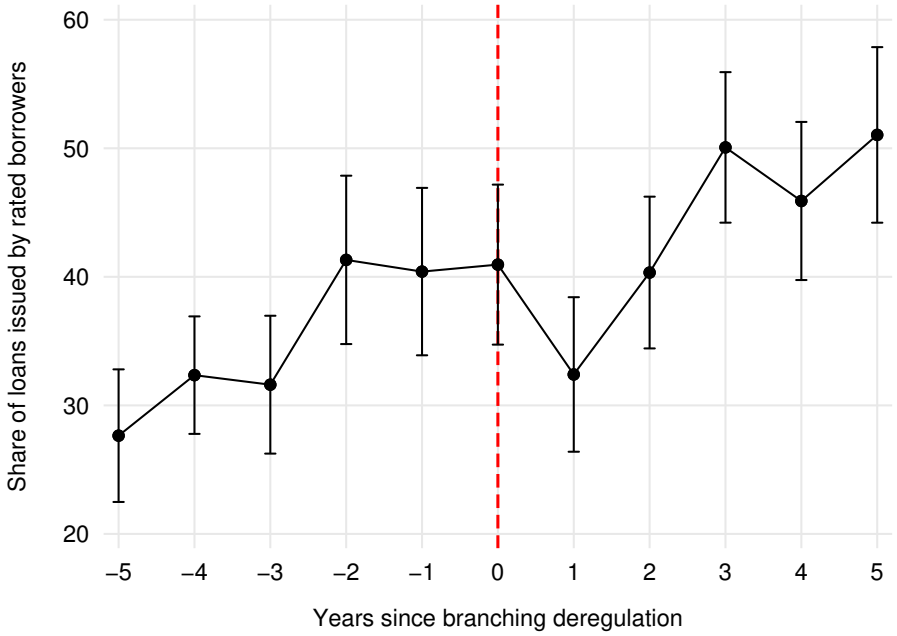


TABLE A7

Were "Treated" Loans Riskier Post-Deregulation?

Table A7 reports the results of regressing a dummy for loans issued by investment grade borrowers on *DEREG*, a dummy that equals 1 if a state has lifted one or more branching restrictions, and interaction variables. *SYN* is a dummy for loans with more than a single creditor. *COMM_BANK* is a dummy equal to 1 for commercial banks, i.e. lenders with a SIC code starting with 602; and 0 for other lenders where industry classification is available. *OOS_BANK* are banks without branches in the borrower's state prior to IBBEA implementation. The sample in columns 3 is restricted to syndicated loans only, and in column 4 to syndicated loans issued by commercial banks, as indicated by the ✓. Robust standard errors (in parentheses) are clustered on the state-level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

		Exposure Variable:		
	Baseline	SYN	COMM_BANK	OOS_BANK
	1	2	3	4
DEREG	0.003	0.003	-0.005	-0.048
	(0.035)	(0.035)	(0.056)	(0.057)
DEREG × EXP		-0.013	0.005	-0.020
		(0.035)	(0.045)	(0.046)
EXP		0.010		-0.049
		(0.036)		(0.045)
Loan controls	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Only syndicated loans			✓	✓
Only commercial banks				✓
Observations	5,841	5,841	5,175	1,766
Adjusted R^2	0.871	0.871	0.875	0.896

TABLE A8

Placebo Test: Assume IBBEA Happened Seven Years Earlier

Table A8 reports the results of regressing the interest rates spreads of syndicated loans (in natural logarithm) on placebo values for *Deregulated*, a dummy that equals 1 if a state has lifted one or more branching restrictions. In particular, we move the dummy values forward so that it equals one if a state lifts at least one branching restriction seven years later. For example, it is 1 for Alabama after 1990, which in fact deregulated in 1997. The estimation sample is 1987 through 1994, the year when the IBBEA was in fact first implemented. See the text for included control variables. Robust standard errors (in parentheses) are clustered on the state-level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

		Exposure Variable:		
	Baseline	SYN	COMM_BANK	OOS_BANK
	1	2	3	4
DEREG	-0.020	–	–	–
	(0.078)			
DEREG × EXP		0.130	-0.079	0.021
		(0.099)	(0.191)	(0.465)
EXP		-0.219**	–	1.153
		(0.110)		(0.896)
Loan controls	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	–	–	–
State × Year FE		Yes	Yes	Yes
Only syndicated loans			✓	✓
Only commercial banks				✓
Observations	2,236	2,187	872	542
Adjusted R^2	0.858	0.894	0.944	0.955

FIGURE A3

Pre-Reform HHI and Change in HHI (t-1 to t+4)

Figure A3 plots a state's deposit HHI in 1994 (deposit-weighted county average) against the post-deregulation change in the HHI. We omit the outliers Hawaii and Rhode Island.

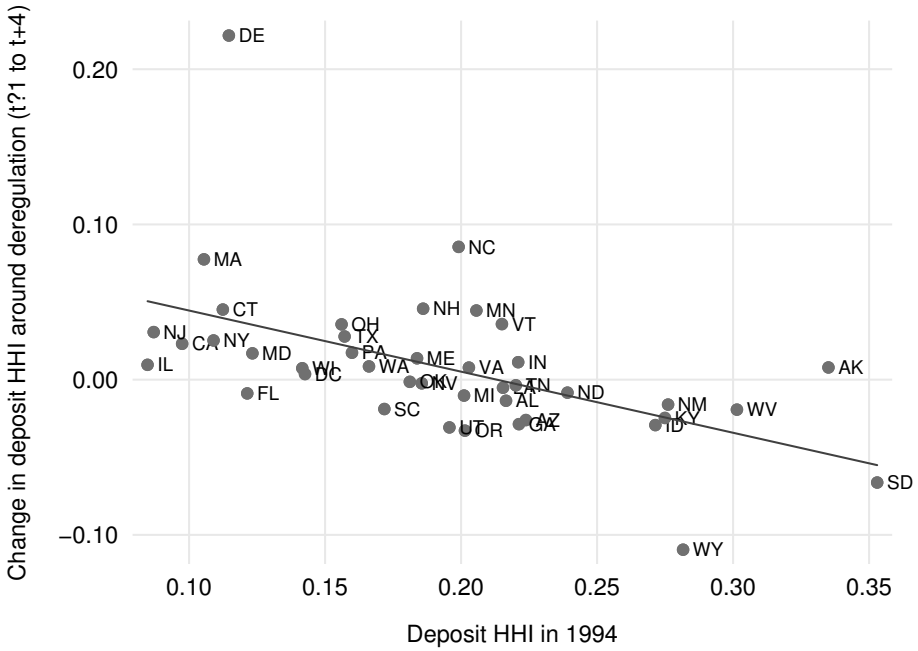


FIGURE A4

Checking for Outliers by Excluding States in Turn

Figure A4 shows the distribution of estimated coefficients $\hat{\beta}$ from the baseline regression $ln(SPREAD)_f = \beta DEREG_{st} + \gamma Borrower\,Controls_{i,t-1} + \delta Contract\,Controls_f + \alpha_i + \alpha_t + \varepsilon_f$, where all states in the sample are excluded in turn. The point estimate of the baseline regression is just under 0.055 (dark grey bar). The outlier on the upper tail is the regression excluding Texas ($p = 0.016$), which refers to more than 12% of the total number of facilities in the sample. This suggests that the overall effect we estimate is conservative, and likely much larger outside of Texas.

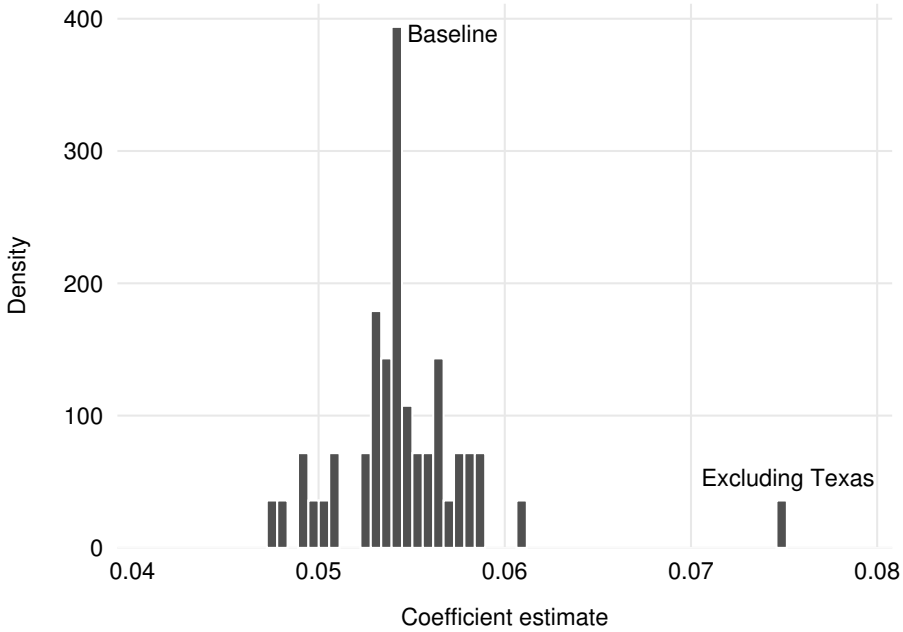


TABLE A9

The Effect of Deregulation on Syndicated Loan Rates (1987 to 2012)

Table A9 reports the impact of interstate bank branch deregulation on interest rates spreads of US syndicated loans (in natural logarithm) in a sample from 1987 to 2012. *DEREG* is a dummy that equals 1 if a state has lifted one or more branching restrictions. See the text for included control variables. *SYN* is a dummy for loans with more than a single creditor. *COMM_BANK* is a dummy equal to 1 for commercial banks, i.e. lenders with a SIC code starting with 602; and 0 for other lenders where industry classification is available. *OOS_BANK* are banks without branches in the borrower's state prior to IBBEA implementation. The sample in columns 4 and 5 is restricted to syndicated loans, and in columns 6 and 7 to syndicated loans issued by commercial banks, as indicated by the ✓. "–" indicates absorbed estimates. Robust standard errors (in parentheses) are clustered on the state level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

		Exposure Variable:					
	Borrower FE (Baseline)	SYN		COMM_BANK		OOS_BANK	
	1	2	3	4	5	6	7
DEREG	0.062***	-0.079***	–	-0.049	–	-0.069	–
	(0.024)	(0.025)		(0.057)		(0.084)	
DEREG × EXP		0.093***	0.104**	0.120**	0.248***	0.165*	0.613***
		(0.023)	(0.049)	(0.060)	(0.082)	(0.084)	(0.072)
EXP		-0.163***	-0.080*	-0.177***	–	-0.118	-0.232*
		(0.021)	(0.046)	(0.058)		(0.088)	(0.135)
Loan Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	–	Yes	–	Yes	–
Borrower FE	Yes	Yes	–	Yes	–	Yes	–
Year FE	Yes	Yes	–	Yes	–	Yes	–
Borrower × Year FE			Yes		Yes		Yes
Bank × Year FE			Yes		Yes		Yes
Only Synd. Loans				✓	✓	✓	✓
Only Comm. Banks						✓	✓
Observations	16,438	16,438	10,846	11,644	8,038	3,664	2,392
Adjusted R^2	0.799	0.800	0.951	0.824	0.958	0.874	0.967

TABLE A10

Branching Deregulation and State-Level Loan Issuance (1987 to 2012)

Table A10 reports results from state-level regressions of syndicated and bilateral loan issuance volumes (from DealScan) on a branching deregulation dummy, interacted with a state's market concentration in 1994. The sample period is 1987 to 2012. Loan volumes are scaled by state GDP. State controls are real GSP growth and house price growth. All regressions include state and year fixed effects. Robust standard errors (in parentheses) are clustered by state. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	Syndicated Loan Volume			Bilateral Loan Volume		
	1	2	3	4	5	6
DEREG	-0.535	1.363	1.033	-0.033	-0.510**	-0.510**
	(0.707)	(0.977)	(0.940)	(0.074)	(0.201)	(0.219)
DEREG × HHI_1994		-9.770***	-7.497**		2.454***	2.480**
		(3.266)	(2.817)		(0.855)	(0.930)
State Controls			Yes			Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,275	1,275	1,224	1,275	1,275	1,224
Adjusted R^2	0.599	0.605	0.623	0.337	0.368	0.379

TABLE A11

Robustness – Within Contract Changes in Spreads

Table A11 reports the impact of a interstate bank branch deregulation on changes in interest rates of existing loans in the syndicated market in the US. The dependent variable is the basis point change in the lending rate spread from contracts included in the Dealscan database. *DEREG* is a dummy that equals 1 if a state lifts one or more branching restrictions for the first time. See the text for included control variables. Robust standard errors (in parentheses) are clustered on the borrower × year level, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels.

		Exposure Variable:		
	Baseline	COMM_BANK	SYN	OOS_BANK
	1	2	3	4
DEREG	1.450	0.924	-18.650**	-25.538
	(7.630)	(12.003)	(9.500)	(17.772)
DEREG × EXP		0.674	21.046*	30.362*
		(12.056)	(11.678)	(18.507)
Loan Amendment Controls	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	19,745	19,745	21,029	12,520
Adjusted R^2	0.304	0.304	0.301	0.303