

Internet Appendix

This appendix presents the results of robustness tests for the main results in the paper.

Bank size. We examine whether our findings for deposits vary with bank size. We measure bank size with an indicator variable for whether a bank is at or above the 75th percentile of the size distribution by assets in a given year and add the indicator variable to regression (16) as triple interaction with concentration and the change in the Fed funds rate (in addition to the two-way interactions and main effects). The results are in Table IA.1. The triple interaction coefficients are statistically insignificant when using savings deposit spreads (Panel A, columns 1 to 3) and deposit flows as outcome variables (Panel B). There is weak evidence that large banks increase time deposits spreads more than small banks (Panel A, columns 4 to 6). Our results are therefore robust (or even larger) for large banks, which suggests that they are robust when aggregating up for the entire banking system. This evidence is also consistent with the aggregate evidence on deposit rates in Figures 1 and 2 in the paper.

Market size. Our main results are based on market concentration at the county level. As an alternative, we compute concentration within a more localized area. Specifically, using branch coordinates provided by the FDIC, we compute Herfindahl indexes within a 2-, 5-, 10-, and 25-mile radius of each branch. The results are presented in Table IA.2. We find similar results on deposit spreads and flows to the ones in Tables 2 and 3 in the paper.

Pre-financial crisis. Our main sample includes the 2008 financial crisis. To make sure that the results are not driven by the crisis, we run our main tests using only data up to June 2008. The results are presented in Table IA.6. They are similar to Tables 2 and 3 in the paper. This may not be surprising because our estimates are identified from variation in the Fed funds rate and there is no such variation after the Fed funds rate reached the zero lower bound in December 2008. Nevertheless, it shows that our results are robust to only using pre-2008 data.

Time-varying concentration. Our results are based on the average concentration in a county over the sample. One may instead want to exploit yearly variation in concentration to get the most timely measure. We do so by replacing the average concentration with the time-varying concentration, which we lag by one quarter. Table IA.4 presents the results on deposit spreads (Panel A) and flows (Panel B). The results are similar to the ones in Tables 2 and 3 in the paper.

Branch market shares. It is possible that local deposit competition is driven by branch managers that maximize branch revenue. In this case, the relevant competition is across branches instead of across banks. We therefore compute an alternative measure of concen-

tration based on branch market shares. Table IA.5 presents the results on deposit spreads (Panel A) and flows (Panel B). The results are similar to the ones in Tables 2 and 3 in the paper.

Alternative deposit products. Our benchmark results on deposit spreads use the most widely offered deposit products in the U.S. In Table IA.6 we instead use the next most widely offered products (\$10K money market accounts and \$10K 6-month CDs). The results are similar to the ones in Table 2 in the paper.

Estimation in levels. Our results on deposit spreads are estimated in first differences, implicitly imposing the strict timing assumption that differential changes in deposit spreads occur in the same period as changes in the Fed funds rate. This assumption strengthens the identification of our results because the effects are estimated solely off variation within a narrow window of a rate change making them less likely to be contaminated by other factors. Yet the timing assumption also potentially ignores effects that occur with a lag. As an alternative, we also estimate our benchmark regression (16) in levels. The results are presented in Table IA.7 and are similar to the ones presented in Table 2 in the paper.

Table IA.1: **Deposits, monetary policy, and bank size**

This table estimates the effect of monetary policy on deposit spreads and deposit growth by bank size. The data is quarterly from January 1997 to June 2013. The variable “Large” is an indicator variable equal to one if a bank is at or above 75th percentile of bank size (measured as total assets) in a given year. All other variables are defined in Table 2. Columns 1 to 3 of in Panel A report results on savings deposit spreads corresponding to Columns 4 to 6 in Panel A of Table 2. Columns 4 to 6 in Panel A report results on time deposit spreads corresponding to Columns 4 to 6 in Panel B of Table 2. Panel B reports results on deposit growth corresponding to Panel B in Table 3. All specifications include two-way interactions and main effects (coefficients not shown). Standard errors are clustered by county.

	Panel A: Δ Spread					
	Savings			Time		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta FF \times \text{Branch-HHI} \times \text{Large}$	-0.043 [0.058]	-0.083 [0.057]	-0.075 [0.055]	0.048 [0.039]	0.094** [0.043]	0.091** [0.042]
Two-way interactions	Y	Y	Y	Y	Y	Y
Observations	409,709	409,709	409,725	427,412	427,412	427,427
R^2	0.660	0.652	0.646	0.680	0.667	0.664

	Panel B: Deposit growth ≥ 2 Counties					
				All		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta FF \times \text{Branch-HHI} \times \text{Large}$	0.506 [0.621]	-0.706 [0.882]	-0.007 [0.889]	0.469 [0.792]	0.166 [0.981]	0.153 [0.873]
Two-way interactions	Y	Y	Y	Y	Y	Y
Observations	1,137,993	1,137,993	1,137,993	1,297,051	1,297,051	1,297,051
R^2	0.344	0.336	0.027	0.231	0.222	0.027

Table IA.2: Market size

This table estimates the effect of monetary policy using alternative measures of market size. The Herfindahl index in Columns 1 to 4 is computed from banks' deposit market shares within 2, 5, 10, and 25 miles of a given branch, respectively. In Columns 1 and 4 the sample consists of banks with branches in two or more counties. Panel A reports results for savings deposit spreads. Panel B reports results for deposit growth. Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Distance	Panel A: Δ Spread			
	2 miles	5 miles	10 miles	25 miles
	(1)	(2)	(3)	(4)
Δ FF \times Branch-HHI	0.077*** [0.007]	0.088*** [0.008]	0.115*** [0.012]	0.119*** [0.033]
Bank \times quarter f.e.	Y	Y	Y	Y
State \times quarter f.e.	Y	Y	Y	Y
Branch f.e.	Y	Y	Y	Y
County f.e.	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y
Observations	392,389	392,389	392,389	392,389
R^2	0.661	0.661	0.661	0.661

Distance	Panel B: Deposit growth			
	2 miles	5 miles	10 miles	25 miles
	(1)	(2)	(3)	(4)
Δ FF \times Branch-HHI	-0.791*** [0.068]	-1.178*** [0.074]	-1.632*** [0.113]	-1.951*** [0.285]
Bank \times quarter f.e.	Y	Y	Y	Y
State \times quarter f.e.	Y	Y	Y	Y
Branch f.e.	Y	Y	Y	Y
County f.e.	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y
Observations	1,278,025	1,278,025	1,278,025	1,278,025
R^2	0.199	0.199	0.199	0.198

Table IA.3: **Pre-financial crisis results**

This table estimates the effect of monetary policy using only data before the U.S. financial crisis (until June 2008). The estimation and variables are the same as the ones in Tables 2 (Panel A and B) and 3 (Panel C). Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Panel A: Savings deposits						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times Branch-HHI	0.153*** [0.037]	0.106*** [0.036]	0.112*** [0.043]	0.208*** [0.031]	0.163*** [0.029]	0.168*** [0.029]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	84,282	84,282	84,282	275,451	275,451	275,451
R^2	0.780	0.767	0.499	0.607	0.598	0.589
Panel B: Time deposits						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ T-Bill \times Branch-HHI	0.076*** [0.027]	0.084*** [0.027]	0.168*** [0.037]	0.163*** [0.027]	0.136*** [0.025]	0.135*** [0.024]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	86,928	86,928	86,928	287,928	287,928	287,928
R^2	0.853	0.844	0.595	0.664	0.649	0.646
Panel C: Deposit growth						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times Branch-HHI	-0.863*** [0.273]	-1.256*** [0.334]	-1.298*** [0.240]	-2.290*** [0.215]	-2.399*** [0.252]	-1.369*** [0.208]
Bank \times qtr. f.e.	Y	Y	N	N	N	N
State \times qtr. f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	779,096	779,096	779,096	906,125	906,125	906,125
R^2	0.390	0.380	0.023	0.286	0.275	0.022

Table IA.4: **Time-varying market concentration**

This table estimates the effect of monetary policy on deposit spreads and flows using time-varying market concentration. Time-varying Herfindahl is the one-quarter lagged Herfindahl index. All other variables are defined in Tables 2 and 3. Panel A presents results on saving deposits spreads. Panel B presents results on deposit growth. Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Panel A: Δ Spread						
	Δ Spread			All		
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times lagged HHI	0.113*** [0.030]	0.081*** [0.028]	0.062 [0.038]	0.172*** [0.025]	0.139*** [0.023]	0.141*** [0.023]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter	Y	N	N	Y	N	N
Branch f.e.	Y	Y	Y	Y	Y	Y
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	117,683	117,683	117,683	412,008	412,008	412,008
R2	0.810	0.799	0.555	0.659	0.650	0.644

Panel B: Deposit growth						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times lagged HHI	-0.739*** [0.252]	-0.969** [0.395]	-0.761** [0.303]	-1.782*** [0.198]	-1.691*** [0.311]	-0.914*** [0.265]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter	Y	N	N	Y	N	N
Branch f.e.	Y	Y	Y	Y	Y	Y
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	1,150,049	1,150,049	1,150,049	1,310,111	1,310,111	1,310,111
R2	0.344	0.337	0.026	0.230	0.222	0.025

Table IA.5: **Branch market shares**

This table estimates the effect of monetary policy on deposit spreads and flows using an alternative measure of market concentration. We compute the Herfindahl based on branch market shares (instead of bank market shares). All other variables are defined in Tables 2 and 3. Panel A presents results on saving deposits spreads. Panel B presents results on deposit growth. Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Panel A: Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times HHI	0.113*** [0.030]	0.081*** [0.028]	0.062 [0.038]	0.172*** [0.025]	0.139*** [0.023]	0.141*** [0.023]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter	Y	N	N	Y	N	N
Branch f.e.	Y	Y	Y	Y	Y	Y
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	117,683	117,683	117,683	412,008	412,008	412,008
R2	0.810	0.799	0.555	0.659	0.650	0.644

Panel B: Deposit Growth						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times HHI	-0.990*** [0.237]	-1.356*** [0.288]	-1.020*** [0.222]	-2.484*** [0.196]	-2.386*** [0.212]	-1.231*** [0.194]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter	Y	N	N	Y	N	N
Branch f.e.	Y	Y	Y	Y	Y	Y
Other f.e.	Y	Y	Y	Y	Y	Y
Observations	1,150,049	1,150,049	1,150,049	1,310,111	1,310,111	1,310,111
R2	0.344	0.337	0.025	0.230	0.222	0.025

Table IA.6: **Alternative deposit products**

This table estimates the effect of monetary policy on deposit spreads using alternative deposit products. All variables are defined in Table 2. Panel A presents results for \$10K money market accounts. Panel B presents results for \$10K 6-month CDs. Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Panel A: \$10K Money market						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ FF \times Branch HHI	0.124*** [0.032]	0.086*** [0.029]	0.105*** [0.039]	0.187*** [0.027]	0.142*** [0.024]	0.144*** [0.024]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	117,214	117,214	117,284	411,177	411,177	411,177
R^2	0.839	0.829	0.616	0.709	0.702	0.697

Panel B: \$10K 6-Month CD						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ T-Bill \times Branch HHI	0.074** [0.029]	0.074*** [0.028]	0.106*** [0.035]	0.113*** [0.025]	0.093*** [0.023]	0.095*** [0.022]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	122,016	122,028	122,108	429,809	429,809	429,809
R^2	0.733	0.698	0.396	0.483	0.462	0.458

Table IA.7: **Estimation in levels**

This table estimates the effect of monetary policy on deposit spreads in levels (instead of changes). All variables are defined in Table 2. Panel A presents results for savings deposit spreads. Panel B presents results for time deposit spreads. Fixed effects are denoted at the bottom of each panel. Standard errors are clustered by county.

Panel A: Savings deposits						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
FF \times Branch-HHI	0.227*** [0.046]	0.153*** [0.043]	0.129*** [0.039]	0.243*** [0.028]	0.189*** [0.027]	0.176*** [0.026]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	126,545	126,551	126,587	429,173	429,203	429,264
R^2	0.889	0.875	0.817	0.891	0.886	0.832

Panel B: Time deposits						
Δ Spread						
	≥ 2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
FF \times Branch-HHI	0.150*** [0.028]	0.106*** [0.031]	0.067** [0.029]	0.110*** [0.018]	0.078*** [0.018]	0.053*** [0.018]
Bank \times quarter f.e.	Y	Y	N	N	N	N
State \times quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	130,392	130,392	130,408	447,234	447,234	447,253
R^2	0.831	0.805	0.702	0.831	0.816	0.727