

Online Internet Appendix

Big Bad Banks?
The Winners and Losers from Bank Deregulation in the United States

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In this appendix, we provide additional information and results from the paper “Big bad banks? The winners and losers from bank deregulation in the United States.”

Appendix Table 1 lists the year in which each state relaxed restrictions on intrastate bank branching.

Appendix Table 2 and Annex 1 provide detailed information on the construction of the measures of income inequality. Annex 1 provides a more lengthy description of the Theil decomposition.

Appendix Table 3 describes how we move from the full March Supplement of the Current Population Survey (CPS) to the sample that we use in the core regression analyses.

Appendix Table 4 presents basic descriptive statistics on the measures of income inequality, which are measured at the state-year level.

Appendix Figure 1 presents the variation in the impact of deregulation on income inequality across the four quartiles of initial unemployment using the different income inequality measures. In all cases, the impact of deregulation on income inequality increases linearly in the rate of unemployment. This is consistent with the emphasis in the paper on the labor market channel: Bank deregulation lowers

interest rates, which increases output, and increases demand for labor, where the demand falls disproportionately on lower-skilled workers. This effect is larger where there is a larger pool of unemployed workers because it can pull more workers into the labor force. However, as we show in numerous robustness tests below, the paper's results hold when (1) conditioning on unemployment and various lag and (2) eliminating the unemployed from the sample. Thus, while the impact of bank deregulation on inequality varies positively with the initial unemployment rate, the paper's core results hold even when excluding the unemployed. We discuss these results in the text. Finally, as discussed more fully below, we find that bank deregulation is followed by a significant reduction in the unemployment rate. This suggests that both a lower unemployment and higher relative wage rates and working hours of low-income workers are channels through which branch deregulation reduces income inequality.

Appendix Table 5 shows that the paper's results hold when eliminating the unemployed from the sample.

Appendix Table 6 presents (1) the R squares with and without the deregulation dummy and (2) reports three types of standard errors to assess the robustness of the inferences. As is typical, the largest part of variation is explained by state- and year-fixed effects. On average two percent of the R-square is accounted for by the deregulation dummy. On average, another three percent is explained by other time-varying state characteristics (Panel B). While this might seem low, this has to be contrasted with the fact that branch deregulation explains 60% of the within-state, within-year variation in income inequality, i.e. after we strip income

inequality of the time-invariant state-level variation and state-invariant year-level variation, 60% of the remaining variation is explained by the deregulation episode. In terms of the standard errors, we report standard errors clustered at the state-level (as in the paper), bootstrapped standard errors and SUR standard errors. The results are robust to applying these different standard errors.

Appendix Table 7 shows that the results are robust to using alternative samples. The results hold when using different age groups (18-64 and 25-54) as well as to the inclusion or exclusion of outlier observations (those below the 1st and above the 99th percentiles of the year-specific real income distribution).

Appendix Table 8 shows that the results are robust to excluding outlier states and when limiting the sample to the years 1976-1999.

Appendix Table 9 decomposes the impact of branch deregulation on income inequality by ethnic and gender. The table shows the decomposition of income inequality across ethnic groups (black and white) and across gender (men and women), using the Theil index and the same technique as in Table IV. First, when splitting the sample according to race, we find that only 20% of the reduction in income inequality is due to a tightening between incomes of whites and black, while 80% of the reduction is due to a tightening of income inequality within the group of whites. Second, when splitting the sample according to gender, we find that the reduction in income inequality is due to a tightening of the distribution of income among men and among women, but not between the two groups.

Appendix Tables 10A and 10B show that the results are robust to controlling for lagged unemployment. The tables differ in that Table 10A uses the natural logarithm of

the Gini coefficient as the dependent variable, while Table 10B uses the logistic transformation of the Gini coefficient. Column (1) in Table 10A replicates our findings in the paper's Table II, column (1), panel A. Column (2) in Table 10A replicates our findings in the paper's Table II, column (1), panel B. The next columns add additional lags of unemployment rate. As can be seen, deregulation significantly reduces income inequality after controlling for up to five lags of unemployment rate.

Appendix Table I
Timing of Intrastate Bank Deregulation

State	Postal code	Year of deregulation	State	Postal code	Year of deregulation
Alabama	AL	1981	Montana	MT	1990
Alaska	AK	1960	Nebraska	NE	1985
Arizona	AZ	1960	Nevada	NV	1960
Arkansas	AR	1994	New Hampshire	NH	1987
California	CA	1960	New Jersey	NJ	1977
Colorado	CO	1991	New Mexico	NM	1991
Connecticut	CT	1980	New York	NY	1976
Delaware	DE	1960	North Carolina	NC	1960
District of Columbia	DC	1960	North Dakota	ND	1987
Florida	FL	1988	Ohio	OH	1979
Georgia	GA	1983	Oklahoma	OK	1988
Hawaii	HI	1986	Oregon	OR	1985
Idaho	ID	1960	Pennsylvania	PA	1982
Illinois	IL	1988	Rhode Island	RI	1960
Indiana	IN	1989	South Carolina	SC	1960
Iowa	IA	1999	South Dakota	SD	1960
Kansas	KS	1987	Tennessee	TN	1985
Kentucky	KY	1990	Texas	TX	1988
Louisiana	LA	1988	Utah	UT	1981
Maine	ME	1975	Vermont	VT	1970
Maryland	MD	1960	Virginia	VA	1978
Massachusetts	MA	1984	Washington	WA	1985
Michigan	MI	1987	West Virginia	WV	1987
Minnesota	MN	1993	Wisconsin	WI	1990
Mississippi	MS	1986	Wyoming	WY	1988
Missouri	MO	1990			

Appendix Table II
Different Measures of Income Inequality

Measure	Mathematical Expression	Interpretation	Advantages	Disadvantages
Gini coefficient	$1 - 2\int L(x)dx$, where $L()$ is the Lorenz curve showing the relation between the percentage of income recipients and the percentage of income they earn.	The Gini coefficient is equal to 0 in the case of perfect equality when exactly s percent of total income is held by bottom s individuals ($s=1, \dots, 100$). The Gini coefficient is equal to 1 if all the income is held by one individual.	[1] Very intuitive and widely used. [2] Makes use of all information about the distribution.	[1] Sensitive to changes in the middle of the distribution. [2] Not easily decomposable to between- and within-group inequality.
Theil index	$n^{-1}\sum_i (y_i/\mu)\ln(y_i/\mu)$, where i indexes individuals ($i=1, \dots, n$), y is personal income, and μ is the mean value of y . The first term inside the sum is individual's share of total income and the second term is that individual's income relative to the mean.	If all individuals have the same (i.e., mean) income, then the Theil index is 0. If one individual has all the income, then the index is $\ln(n)$.	Easily decomposable to between- and within-group inequality.	Hard to interpret.
Log(75/25)	$\ln(y_{75}) - \ln(y_{25})$, where y_{75} and y_{25} are the 75 th and the 25 th percentiles of personal income distribution (y), respectively.	The ratio is equal to 0 if the 75 th and the 25 th percentiles of the distribution are equal. There is no upper bound to the ratio.	[1] Intuitive measure of the percentage difference between the third and the first quartiles of a distribution. [2] Robust to extreme values.	Does not measure the entire distribution.
Log(90/10)	$\ln(y_{90}) - \ln(y_{10})$, where y_{75} and y_{25} are the 90 th and the 10 th percentiles of personal income distribution (y), respectively.	The ratio is equal to 0 if the 90 th and the 10 th percentiles of the distribution are equal. There is no upper bound to the ratio.	[1] Intuitive measure of the percentage difference between the top and the bottom deciles of a distribution. [2] Robust to extreme values.	Does not measure the entire distribution.

Appendix Table III
Sample Construction

March Current Population Surveys (CPS) are available at <http://cps.ipums.org/cps/>. We start with the 1977 survey because exact state of residence is not available prior to 1977. We follow the literature and exclude Delaware and South Dakota because of large concentration of credit card banks in these states. From 1977 to 1982, group quarters included housing units containing five or more people unrelated to the person in charge. As of 1983, group quarters were defined in the CPS as non-institutional living arrangements for groups not living in conventional housing units or groups living in housing units containing ten or more unrelated people or nine or more people unrelated to the person in charge. Because we use sampling weights to construct measures of income inequality, we exclude persons with missing or zero sampling weights.

Total number of observations in the March Current Population Surveys in the years 1977-2007:	5,085,135
<u>Sample restrictions (observations deleted):</u>	
1. Persons between the ages of 25 and 54 with personal income above the 1 st and below the 99 th percentiles of income distribution	(3,154,652)
2. Non-missing years of completed education and ethnicity	(21,786)
3. Not residing in group quarters	(2,142)
4. Not residing in Delaware or South Dakota	(45,780)
5. With positive total household income	(1,276)
6. Positive and non-missing sampling weights	(88)
Total number of observations that satisfy sample restrictions above:	1,859,411

Appendix Table IV
Descriptive Statistics on Income Inequality

The table provides descriptive statistics for the following measures of income inequality: (1) the logistic transformation of the Gini coefficient, (2) log Gini coefficient, (3) log Theil index, (4) log ratio of the 90th and 10th percentiles of the income distribution, and (5) log ratio of the 75th and 25th percentiles of the income distribution. Each measure of inequality is based on total personal income of respondents to March Current Population Surveys. We use sampling weights in all calculations of inequality measures. Inequality measures are discussed in more details in Appendix Table II. The number of observations in the table corresponds to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006. For each measure of inequality we report the mean, the minimum and the maximum values, as well as the standard deviation. We report three types of standard deviations: cross-state, within-state, and within state-year.

	N	Mean	Min	Max	Standard deviation of logs		
					Cross-states	Within-states	Within state-years
Logistic Gini coefficient	1,519	-0.280	-0.692	0.129	0.080	0.082	0.065
Log Gini coefficient	1,519	-0.844	-1.098	-0.631	0.045	0.047	0.037
Log Theil index	1,519	-1.129	-1.675	-0.681	0.105	0.098	0.080
Log 90/10 ratio	1,519	2.772	1.653	10.797	0.635	0.379	0.329
Log 75/25 ratio	1,519	1.218	0.747	2.637	0.146	0.127	0.094

Appendix Table V
The Impact of Deregulation on Income Inequality:
Excluding the Unemployed

The table shows estimates of the impact of bank branch deregulation on the different measures of income inequality. When calculating the different measures of income inequality we exclude the unemployed. Bank deregulation indicator equals one during all years in which a state permits in-state branching and equals zero otherwise. The measures of income inequality are: (1) logistic transformation of the Gini coefficient, (2) natural logarithm of the Gini coefficient, (3) natural logarithm of Theil index, (4) natural logarithm of the ratio of 90th and 10th percentiles, and (5) natural logarithm of the ratio of 75th and 25th percentiles. The number of observations in each regression corresponds to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006. All regressions control for state and year fixed effects. Standard errors are clustered at the state level and appear in parentheses. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

	Logistic Gini (1)	Log Gini (2)	Log Theil (3)	Log 90/10 (4)	Log 75/25 (5)
Bank deregulation	-0.036 (0.013)***	-0.020 (0.007)***	-0.038 (0.016)**	-0.154 (0.060)**	-0.071 (0.020)***
R^2	0.35	0.34	0.43	0.73	0.59
Observations	1,519	1,519	1,519	1,519	1,519

Appendix Table VI
The Impact of Deregulation on Income Inequality
Robustness to Standard Errors

The table shows estimates of the impact of bank branch deregulation on the different measures of income inequality. Bank deregulation indicator equals one during all years in which a state permits in-state branching and equals zero otherwise. The measures of income inequality are: (1) logistic transformation of the Gini coefficient, (2) natural logarithm of the Gini coefficient, (3) natural logarithm of Theil index, (4) natural logarithm of the ratio of 90th and 10th percentiles, and (5) natural logarithm of the ratio of 75th and 25th percentiles. The number of observations in each regression corresponds to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006. All regressions control for state and year fixed effects. There are no other control variables in panel A. In panel B, we control for growth rate of real per capita GDP, proportion of blacks, proportion of high-school dropouts, proportion of female-headed households, and unemployment rate in a state. We report three types of standard errors: standard errors clustered at the state level, bootstrapped standard errors, and SUR standard errors. ** and *** indicate statistical significance at 5% and 1%, respectively.

	Logistic Gini (1)	Log Gini (2)	Log Theil (3)	Log 90/10 (4)	Log 75/25 (5)
Panel A: No Controls					
Bank deregulation (clustered s.e.s)	-0.039 (0.013)***	-0.022 (0.008)***	-0.041 (0.016)**	-0.134 (0.058)**	-0.077 (0.019)***
[bootstrapped s.e.s]	[0.006]***	[0.004]***	[0.007]***	[0.035]***	[0.009]***
{SUR s.e.s}	{0.006}***	{0.003}***	{0.007}***	{0.031}***	{0.009}***
R^2	0.36	0.35	0.43	0.74	0.60
R^2 with fixed effects only	0.34	0.33	0.42	0.73	0.58
Observations	1,519	1,519	1,519	1,519	1,519
Panel B: With Controls					
Bank deregulation (clustered s.e.s)	-0.031 (0.011)***	-0.018 (0.006)***	-0.032 (0.013)**	-0.100 (0.050)**	-0.065 (0.017)***
[bootstrapped s.e.s]	[0.006]***	[0.003]***	[0.007]***	[0.036]***	[0.009]***
{SUR s.e.s}	{0.006}***	{0.003}***	{0.007}***	{0.031}***	{0.008}***
R^2	0.40	0.39	0.46	0.75	0.63
Observations	1,519	1,519	1,519	1,519	1,519

Appendix Table IX

Decomposing the Impact of Deregulation on Income Inequality to Between- and Within-Groups

The table reports the impact of bank branch deregulation on the Theil index of income inequality. Bank deregulation indicator equals one during all years in which a state permits in-state branching and equals zero otherwise. The number of observations in each decomposition is 1,519, corresponding to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006. All decompositions control for state and year fixed. In panel A, we divide the sample into two mutually exclusive groups: (a) whites, and (b) blacks. In panel B, we divide the sample into two mutually exclusive groups: (a) men, and (b) women. In the first column of each panel we estimate the overall impact of intrastate deregulation on the Theil index of inequality using all groups. In the next column we estimate the impact of deregulation on inequality *between* the different groups, whereas in the third column we estimate the impact of deregulation on inequality *within* the groups combined. The second and the third columns add up to the first column. In the next columns we estimate the impact of deregulation on income inequality separately within *each* of the groups. Standard errors are adjusted for state level clustering and appear in parentheses. * and ** indicate statistical significance levels at 10% and 5%, respectively.

A. Decomposition by		Between	Within	Ethnicity Groups:	
Ethnicity	Total	Groups	Groups	White	Non White
Bank deregulation	-.0103 (.0043)**	-.0021 (.0012)*	-.0082 (.0036)**	-.0087 (.0033)**	-.0058 (.0082)
B. Decomposition by		Between	Within	Gender Groups:	
Gender	Total	Groups	Groups	Men	Women
Bank deregulation	-.0103 (.0043)**	-.0021 (.0013)	-.0082 (.0038)**	-.0075 (.0041)*	-.0137 (.0053)**

Appendix Table XA

Robustness to Inclusion of Lagged Values of Unemployment Rate

The table shows the impact of bank branch deregulation on the *natural logarithm* of the Gini coefficient of income inequality. All specifications control for state and year fixed effects. Standard errors are adjusted for state level clustering and appear in parentheses. ** and *** indicate statistical significance at 5% and 1%, respectively.

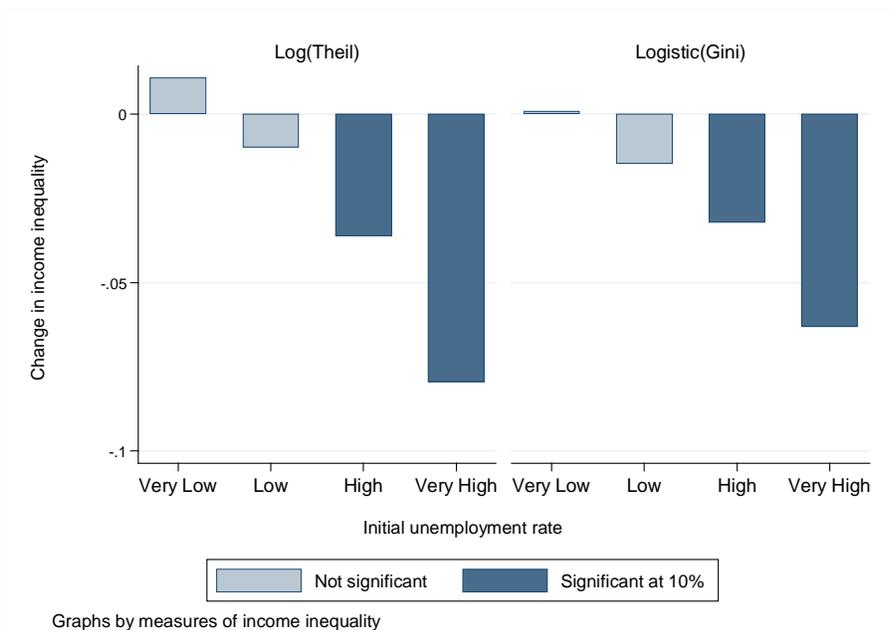
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bank deregulation	-0.022 (0.008)***	-0.018 (0.006)***	-0.019 (0.006)***	-0.020 (0.006)***	-0.021 (0.006)***	-0.021 (0.006)***	-0.022 (0.006)***
Growth rate of per capita GDP (2000 dollars)		-0.028 (0.041)	-0.062 (0.039)	-0.058 (0.037)	-0.088 (0.039)**	-0.090 (0.042)**	-0.112 (0.042)***
Proportion blacks		-0.218 (0.154)	-0.168 (0.140)	-0.153 (0.147)	-0.131 (0.156)	-0.115 (0.152)	-0.105 (0.156)
Proportion high-school dropouts		0.140 (0.071)*	0.152 (0.074)**	0.155 (0.075)**	0.189 (0.080)**	0.195 (0.086)**	0.214 (0.088)**
Proportion female-headed households		0.017 (0.058)	0.010 (0.063)	0.002 (0.063)	-0.001 (0.065)	0.005 (0.062)	0.008 (0.061)
(Unemployment rate) _t		0.006 (0.001)***	0.003 (0.002)	0.003 (0.002)	0.002 (0.002)	0.003 (0.002)	0.003 (0.002)
(Unemployment rate) _{t-1}			0.005 (0.002)**	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.005 (0.003)*
(Unemployment rate) _{t-2}				0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.000 (0.002)
(Unemployment rate) _{t-3}					0.002 (0.002)	0.000 (0.002)	0.001 (0.002)
(Unemployment rate) _{t-4}						0.003 (0.002)	0.003 (0.002)
(Unemployment rate) _{t-5}							0.001 (0.002)
R ²	0.35	0.39	0.37	0.34	0.35	0.36	0.37
Observations	1,519	1,519	1,470	1,421	1,372	1,323	1,274

Appendix Table XB

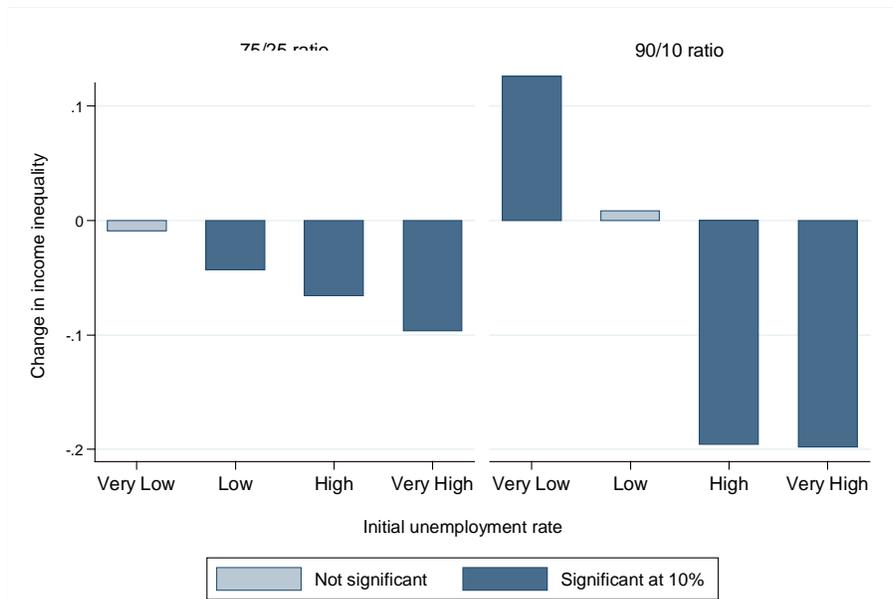
Robustness to Inclusion of Lagged Values of Unemployment Rate

The table shows the impact of bank branch deregulation on the *logistic transformation* of the Gini coefficient of income inequality. All specifications control for state and year fixed effects. Standard errors are adjusted for state level clustering and appear in parentheses. ** and *** indicate statistical significance at 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bank deregulation	-0.039 (0.013)***	-0.031 (0.011)***	-0.033 (0.011)***	-0.036 (0.011)***	-0.037 (0.011)***	-0.038 (0.011)***	-0.039 (0.011)***
Growth rate of per capita GDP (2000 dollars)		-0.053 (0.072)	-0.110 (0.070)	-0.104 (0.066)	-0.155 (0.068)**	-0.161 (0.073)**	-0.200 (0.073)***
Proportion blacks		-0.390 (0.265)	-0.309 (0.245)	-0.285 (0.258)	-0.248 (0.274)	-0.222 (0.267)	-0.209 (0.274)
Proportion high-school dropouts		0.256 (0.124)**	0.279 (0.130)**	0.285 (0.131)**	0.347 (0.140)**	0.360 (0.151)**	0.397 (0.155)**
Proportion female-headed households		0.030 (0.100)	0.020 (0.109)	0.005 (0.110)	0.001 (0.112)	0.012 (0.108)	0.015 (0.106)
(Unemployment rate) _t		0.011 (0.002)***	0.006 (0.004)	0.005 (0.004)	0.005 (0.004)	0.006 (0.004)	0.005 (0.004)
(Unemployment rate) _{t-1}			0.008 (0.004)**	0.007 (0.005)	0.006 (0.005)	0.006 (0.005)	0.008 (0.005)*
(Unemployment rate) _{t-2}				0.004 (0.003)	0.003 (0.004)	0.002 (0.004)	-0.000 (0.003)
(Unemployment rate) _{t-3}					0.004 (0.003)	0.001 (0.004)	0.001 (0.004)
(Unemployment rate) _{t-4}						0.005 (0.004)	0.006 (0.004)
(Unemployment rate) _{t-5}							0.001 (0.004)
R ²	0.36	0.40	0.38	0.35	0.36	0.37	0.38
Observations	1,519	1,519	1,470	1,421	1,372	1,323	1,274



Graphs by measures of income inequality



Graphs by measures of income inequality

Appendix Figure 1. The Impact of Deregulation on Income Inequality by Pre-Existing Unemployment Rate. The figure shows the impact of branch deregulation on income inequality for states with different levels of unemployment rate in 1976. We divide states into four groups, according to unemployment rate in 1976: states with “very low” unemployment rate are states with unemployment rate below the 25th percentile of unemployment distribution in 1976; states with “low” unemployment rate are states with unemployment rate below the median; states with “high” unemployment rate are states with above median unemployment in 1976; and states with “very high” unemployment are states with unemployment rate above the 75th percentile of unemployment distribution in 1976. When estimating the impact of branch deregulation on income inequality we account for state and year fixed effects and cluster the standard errors at the state level.