Online Appendix
Access to Finance and Technological Innovation: Evidence from Pre-Civil War America

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Description of online appendices

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Online Appendix I: A Brief Legislative History of Free Banking Laws

One concern about our identification strategy, which uses the staggered passage of free banking laws across states as a shock, is that the timing might be anticipated by the agents in our analysis or in response to market trends. Anticipation could lead to delayed or accelerated actions by inventors and manufacturers, confounding the assumption of parallel trends. This section addresses this concern by describing the events leading up to the law's passage.

Records documenting the legislative history of early banking are rare. We reference the Annual Report of the Comptroller of the Currency (1876) and Sumner (1896) as well as other historical studies (e.g., Bodenhorn (2006), Du (2010), Murphy (2017), and Gandhi (2003)) to provide background on those states where records are available. Evidence shows that laws passed in different states often reflected contradictory political impulses, suggesting that the passage of free banking laws was plausibly exogenous.

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New York (1838) Economic historians consider the law's passage in New York in 1838 to have been a serendipitous event. It made its way against a great deal of opposition. The elimination of special charters and their replacement with general incorporation procedures was not a sudden post-1835 revelation for the proponents of free banking (Bodenhorn (2006)). In 1825 the New York Senate considered a bill that would have repealed the restraining acts that forbade private banking in the state—a first step toward free banking (New York State Senate (1825)). The original 1829 bill that established New York's Safety Fund system included a provision that would have liberalized entry, though the provision was removed from the bill's final version (Hammond (2006)).

While several political leaders, for example, William Leggett, Richard Hildreth, and William Marcy, had advocated the abandonment of special charters in the 1830s, the law's passage in 1838 was triggered by an unlikely event, the kidnapping of a man named William Morgan after he threatened to reveal the secrets of Freemasonry. Within a year of Morgan's disappearance, Freemasonry's critics called a series of conventions and formed a political movement. The Antimasonic Party was born and, although its central philosophy remained anti-freemason, it attracted voters unhappy with the Regency's spoils and patronage. When the Regency lost support, the Whig Party (formed when the Antimasons joined with the National Republicans) gained more power. Governor Marcy ultimately signed the Free Banking Act into law on April 18, 1838, a sequence of events economist Bodenhorn calls the "serendipitous nature of economic reform" (Bodenhorn, 2006, p. 21).

Illinois (1851) The law's passage in Illinois was a long and challenging process, and the specific timing of the Act was somewhat unexpected. In the constitutional convention of 1847, the banking issue became one focus of the delegates' attention. Whigs were considered as speaking on behalf of banks, and Democrats insisted on an anti-bank provision. In the convention, Democrats outnumbered Whigs ninety-one to seventy-one, and Democrats were dominant in political affairs (Cornelius (1969)). As a result, the new constitution still prohibited the establishment of banks. In 1848, a convention was held in Chicago, where representatives of the state's leading commercial and financial interests drafted a memorandum to the legislature and the governor, urging them to abandon their attitude of hostility toward banks and to provide the state with a system of banking to supply some type of convenient and convertible circulating medium. Their appeal was successful, and a general banking law with the purpose of establishing a free banking system was passed by the legislature of 1848, to be submitted to the people at a general election.

The next general election would have taken place in 1852, but the legislature deprived all the county treasurers of their offices and provided that their successors should be elected in 1851 (Du, 2010, p. 6). This exception made it possible to pass the free banking law a year earlier.

Louisiana (1853) Free banking in Louisiana was rooted in the repercussions of the anti-banking philosophy (Murphy (2017)). Beginning in 1804, the state chartered several commercial banks; whereas these banks accommodated the commercial interests of merchants in New Orleans, restrictions on their lending practices meant that they failed to meet the needs of the planters who were rich in terms of land and enslaved labor but poor in cash. Thus, beginning in 1828, Louisiana pioneered a new banking system known as plantation banks, which allowed planters to use their vast wealth in land and enslaved workers as security. When this system came crashing down after the Panics of 1837 and 1839, Louisianans turned against all banks, joining in an anti-banking wave initiated by Andrew Jackson and hard-money Democrats. This culminated in the Louisiana Bank Act of 1842, which imposed restrictive measures on banking and the rewriting of the state constitution in 1845, which banned both new banks and the renewal of existing banking charters (Gandhi (2003)). The state economy suffered under this contractionary banking policy. By 1851, public opinion in Louisiana had also shifted back decisively in favor of banking. While the law's passage might be associated with a political economy story in some other states, this was not the case in Louisiana. Both Democrat and Whig parties alike were scrambling to keep up with these shifts in public opinion, virtually erasing any differences in their political rhetoric with regard to banking.

During the constitutional convention of 1852, however, four of the eleven members of the Committee on General Provisions expressed their discontent with the proposed bill. The convention proceeded to debate and vote on these proposals and, in the end, the convention accepted the original language of the committee report, which would allow banking under both special acts of the legislature and general incorporation. By mid-August, the new constitution was complete; the convention overwhelmingly ratified the final document by a vote of 98-8. The last step was the approval by the voters of the state. However, quite unexpectedly, as the statewide vote on the new document approached, an apportionment clause became the central issue for the opposition. In November of 1852, the voters of Louisiana eventually voted to accept the new constitution, which symbolized the enactment of the free banking law in 1853.

Massachusetts (1851) Massachusetts prior to the Civil War possessed greater banking experience than other states; since a thriving banking system was already in place, the passage of the free banking law in 1851 had relatively little impact on the state.

The Massachusetts Bank of Boston was the earliest chartered bank in Massachusetts. Petitioners for this bank wanted to provide credit, a money supply and convenience for business transactions to the community (Gras (1937)). By the 1820s, motives for the petition for bank charters were more in the interest of a subset of the community, for example, the mechanics or planters (Lamoreaux (1996)). By the 1830s, obtaining a charter to erect a new bank did not seem to be a

prohibitive barrier to entry. Until the 1830s demand for credit was large and the banking sector expanded considerably from 1830 to 1837. The 1837 Panic hit the Massachusetts banks and caused bank suspensions. After banks resumed payments in specie in 1844, the sector expanded steadily. Therefore, when a free banking law was passed in Massachusetts in 1851, a thriving banking system was already in place and had been working for quite some time. The free banking law, known for easing barriers to entry, had little impact on the size of the Massachusetts banking sector as evidenced by the fact that only seven banks were founded under it (Gandhi (2003)).

Several features and bank regulations explain why the Massachusetts banking sector outperformed. A distinctive feature was the existence of a clearinghouse system called the Suffolk System. This system began in 1818 and facilitated note redemption by allowing member banks to share the cost of transporting and redeeming country banknotes. Moreover, in response to the Panic of 1837, in 1838 the state created a Board of Bank Commissioners that annually conducted bank examinations. Lamoreaux (1996) proposes that the 1838 law also marked the beginning of a trend of Massachusetts's lawmakers attempting to protect bank stockholders relative to bank directors.

Ohio (1851) The timing of the free banking law's passage in 1851 was somewhat unexpected for Ohio as that was the first year Democrats won the election after a long six-year control of the governorship by the Whigs. The constitutions adopted after that also made the experience of Ohio unique.

During the 1830s there was a great demand for credit; Ohio banks met this demand with a rapid increase of bank paper. Like other states, Ohio banks suspended payment in the Panic of 1837. The suspensions led to the Bank Commissioner Law in 1839, which restricted the maximum legal ratio of circulating notes to specie reserves and also established a committee to examine the state's banks regularly (Gandhi (2003)). Even though many bank charters were to expire by 1843, the Democrats passed the Latham Banking Act in 1842. This act created a special tax on circulation and capital, and made bankers personally liable for the banks' losses. While this act was not appealing to bankers, the public supported it and a Democrat won the election for governor in 1842 with an anti-bank campaign. The shortage of credit and currency due to bank closings provoked a split within the Democratic party: those legislators allied with bankers passed the Wooster Bank Bill in 1844, which extended the charter of five banks. The cleavage among Democrats allowed Whigs to regain the governorship in 1844 and to pass the Kelley Bank Act of 1845. This act created a state bank and a safety fund system. Many independent banks were organized under this act. The public's perception of the new banking system was positive, and the banking system remained unchanged for six years (Huntington (1915)).

On March 21, 1851, Ohio passed the free banking law despite some opposition. However, a

new constitution, adopted in June 1851, contained an article prohibiting the organization of additional banks, without the approval by the people at the next succeeding general election following the law authorizing the same (OCC (1876)). Moreover, the legislature passed a tax law in 1852, which levied upon the banks double, and in some instances triple, the rate imposed upon any other property. Most banks organized under the free banking law were ultimately obliged to go into liquidation because of the oppressive taxation (OCC (1876)).

Tennessee (1852) In Tennessee, a small, primarily state-controlled banking system dominated the state from 1830 until 1852, when the free banking law was passed.

In response to the Panic of 1819 but despite protest, the charter for the State Bank of Tennessee in Nashville was granted in 1820. However, by the end of the decade, anti-bank forces occupied the state congress and ordered the banks to be discontinued. The legislature also passed a law in 1827 that mandated that any firm wishing to carry on banking activities must obtain a charter. Later, this contraction would worsen the pressure on the community, causing popular demand for a new bank. The legislature satiated this demand by chartering the Union Bank in 1832 and the Planters' Bank in 1833. In 1839, the Democrats, who had just regained the governorship, attempted to have the banks surrender their charters. Fortunately for the banks, this never occurred because some Democratic legislators crossed party lines to vote against it. Not only did these banks survive the Panic but also the suspension actually incited the legislature to found another state bank in 1839 (Gandhi (2003)).

Little bank entry occurred during the pre-Civil War era until 1853. In 1852, Tennessee passed a free banking law, authorizing the organization of banks upon a deposit of bonds of the State equal to the amount of their capital (OCC (1876)). The free banking law was rectified in 1856 with market valuation restriction.

Connecticut (1852) The free banking law was passed in 1852, after a hard two-year struggle. A special stress was laid upon the provision that every bank must be one of discount and deposit, and not simply of circulation. The free banking law, however, was so modified in 1855 as to be in effect repealed, by converting all the free banks into joint-stock banks under a general law. The notes were to be surrendered and the securities taken up. Circulation was limited under the new law to one hundred and fifty percent of the capital. In case of failure, the note-holders "shall have a lien on all the estate of said corporation of every description." By June 26, 1855, all the banks under the free banking law were compelled to accept subscriptions of charitable and educational societies, according to the Connecticut custom (Sumner (1896)).

New Jersey (1850) The Constitution of 1844 required a three-fifths vote in each House for granting or renewing bank charters, which were also to be limited to twenty years' duration. In 1855, the bank circulation was made a preferred debt, for which, according to each charter, all the assets were pledged; also, each stockholder was liable for double his stock, and the directors were individually liable without limit. It was reported that, in 1857, all banks under the free banking law of February 27, 1850, were trying to get special charters. The free bank system had fallen into disfavor in New Jersey and was being abandoned (Sumner (1896)).

Alabama (1849) The tax collectors of Alabama appear to have been speculating on the depreciation of the currency, for an act was passed February 4, 1846, to prevent them from doing so. It was enacted March 4, 1848, that no foreign corporation should do discount banking in Alabama, unless it did so using gold and silver or notes issued under the authority of the State. Notes discounted contrary to this law were to be void. The Southern Bank of Alabama was chartered February 12, 1850. On the same day, a free banking law was adopted. The lowest note was set at $5, which was changed in 1852 to $2. At that time, also, the Southern Bank was authorized to make its circulation thrice its capital. Then, the Northern Bank of Alabama was chartered similarly to the Southern Bank (Sumner (1896)).

Indiana (1852) The State Bank of Indiana was incorporated in 1834. In November 1851, the new constitution prohibited the organization of banks except under a general law (OCC (1876)), which, if passed, must provide for registry of notes by a State officer, with ample security, in the custody of a State officer. On May 28, 1852, the free banking law was passed and provided that United States stocks or stocks of the several States, including those of Indiana, should be deposited with the auditor as security for circulating notes, the stocks to be made equal to one bearing six percent interest. The law did not require a board of directors, nor that the stockholders should be citizens of the State. In October 1854 there were 83 free banks in Indiana (Sumner (1896)).

Wisconsin (1853) In the 1830s and 1840s, few banks were chartered by the Territorial Legislature. An act creating a State Bank of Wisconsin at Prairie du Chien was disallowed on June 12, 1838, but the Wisconsin Marine and Fire Insurance Company of Milwaukee was chartered in 1839. In the Constitution of 1848, the legislature was forbidden to create any bank in any way, unless the question of bank or no bank should have been decided at a general election in favor of banks. Then it might create banks by general or special law, but every such law must be ratified by a majority at a general election before it should be valid. A free banking law was passed in 1853. The possibilities of mischief in Wisconsin's free banking system were amply manifested (Sumner (1896)).

Iowa (1858) The Miners' Bank of Dubuque, chartered by the Territory of Wisconsin, was the only bank in Iowa in 1840. It suspended in March 1841 and resumed July 1, 1842; its charter was repealed in 1844, by virtue of a power reserved to the legislature to do so. While a number of Whigs joined with Democrats in various attempts to repeal the bank's charter, the struggle did not have an ultimate political impact. The sorry showing of the Miners' Bank strengthened the hand of the anti-bank wing of the Iowa Democratic Party so that in the Constitutional Convention of 1846 they controlled the party and were able to pass a constitutional prohibition of all banks of issue in Iowa—a prohibition that lasted until 1857 (Erickson (1969)). The free banking law of 1858 forbade the payment of interest on deposits, required a specie reserve of 25 percent of deposits, prescribed that stocks deposited for circulation must pay six percent or more and that the circulation issued should not exceed 90 percent of the value of the bonds (Sumner (1896)).

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Online Appendix II: Additional Tables

Table A.1. List of States

This table lists the 39 states in our sample, the year of territory/statehood, their status regarding abolished enslavement or not, the fraction in percentage of a state's population that was enslaved when the state entered the pre-Civil War era (*Labor exploitation*), and the fraction in percentage of a state's population that was enslaved (*Fraction enslaved*) in 1860.

State	Year of territory/statehood	Status of abolishment	*Labor exploitation* (%)	*Fraction enslaved* in 1860 (%)
Alabama	1819	No	32.7	45.1
Arkansas	1819	No	11.3	25.5
California	1850	Yes	0	0
Connecticut	1788	Yes	0.12	0
Delaware	1787	No	5.75	1.60
District of Columbia	1790	No	22.5	4.24
Florida	1822	No	44.6	44.0
Georgia	1788	No	41.7	43.7
Illinois	1809	Yes	1.37	0
Indiana	1800	Yes	0.97	0
Iowa	1838	Yes	0.04	0
Kansas	1854	Yes	0	0
Kentucky	1792	No	19.8	19.5
Louisiana	1804	No	45.3	46.9
Maine	1788	Yes	0	0
Maryland	1788	No	29.3	12.7
Massachusetts	1788	Yes	0	0
Michigan	1805	Yes	0.50	0
Minnesota	1849	Yes	0	0
Mississippi	1798	No	42.3	55.2
Missouri	1812	No	14.4	9.72
Nebraska	1854	Yes	0.05	0.05
New Hampshire	1788	Yes	0	0
New Jersey	1787	Yes	4.42	0
New Mexico	1850	No	0	0
New York	1788	Yes	1.57	0
North Carolina	1789	No	30.4	33.4
Ohio	1803	Yes	0	0
Oregon	1848	Yes	0	0
Pennsylvania	1787	Yes	0.10	0
Rhode Island	1790	Yes	0.14	0
South Carolina	1788	No	47.3	57.2
Tennessee	1796	No	17.0	24.8
Texas	1846	No	27.4	30.2
Utah	1850	No	0.23	0.07
Vermont	1791	Yes	0	0
Virginia	1788	No	40.3	30.7
Washington	1853	Yes	0	0
Wisconsin	1836	Yes	0.04	0

Table A.2. Determinants of the Free Banking Law's Passage

This table reports the results from Cox proportional hazards model analyzing the hazard of a state passing the free banking law. A "failure event" is the passage of the free banking law in a state, and states are excluded from the sample once they passed the law. For Michigan, which passed the law twice, we use 1857 as the free banking year for this analysis. The dependent variable is the log of the expected time to the law's passage. *Common laborer wage*, *Agricultural output*, and *Manufacturing output* are deflated to real values using the CPI with 1860 as the base year. All independent variables, except for the dummy variable (*Political party*), are standardized to have a mean of zero and a standard deviation of one. Robust standard errors clustered at the state level are reported in parentheses below each point estimate for the hazard ratio. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

	Duration model for the time until the law's passage				
	1	2	3	4	5
Ln(*Population*)	1.382	1.367	1.367	1.606	1.619
	(0.300)	(0.334)	(0.438)	(0.938)	(0.968)
Urban ratio	0.716	0.710	0.710	0.443	0.304
	(0.277)	(0.282)	(0.335)	(0.575)	(0.488)
Labor exploitation	0.592	0.609	0.608	0.402	0.482
	(0.222)	(0.242)	(0.261)	(0.360)	(0.372)
Common laborer wage		0.996	0.996	0.789	0.633
		(0.305)	(0.293)	(0.536)	(0.490)
Innovation growth			1.012	1.052	1.070
			(0.015)	(0.083)	(0.101)
Ln(1+*Banks*)			0.998	0.627	0.365
			(0.364)	(0.223)	(0.352)
Political party				1.560	1.410
				(1.079)	(0.950)
Agricultural labor ratio				0.396	0.275
				(0.370)	(0.286)
Agricultural output				0.927	1.095
				(1.074)	(1.118)
Manufacturing output				1.032	0.862
				(1.046)	(0.765)
Education					0.090
					(0.179)
Railway					2.995
					(5.074)
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	1,256	925	925	137	137
Pseudo R-squared	0.082	0.065	0.065	0.101	0.112

Table A.3. Temporal Dynamics

This table reports the temporal dynamics of innovation before and after free banking. In column (1), we decompose *Free banking* in equation (1) into four dummy variables associated with four periods around the enactment: all years up to and including one year prior to free banking ($Before^{1-}$), one to two years after free banking ($After^{1\&2}$), three to four years after free banking ($After^{3\&4}$), and five years or more after free banking ($After^{5+}$). For Michigan, which passed the law twice, we use 1857 as the free banking year for this estimation. In column (2), we further decompose $After^{5+}$ into five to six years after free banking ($After^{5\&6}$) and seven years or more after free banking ($After^{7+}$). Robust standard errors clustered at the state level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

	Ln(1+*Patents*)	
	t+1	t+1
	1	2
$Before^{1-}$	-0.146	-0.146
	(0.141)	(0.141)
$After^{1\&2}$	0.266**	0.265**
	(0.117)	(0.117)
$After^{3\&4}$	0.328**	0.328**
	(0.160)	(0.160)
$After^{5+}$	0.361**	
	(0.157)	
$After^{5\&6}$		0.367**
		(0.164)
$After^{7+}$		0.359**
		(0.167)
Ln(*Population*)	0.461***	0.461***
	(0.091)	(0.091)
Urban ratio	1.488*	1.489*
	(0.844)	(0.842)
White ratio	1.767	1.765
	(2.076)	(2.078)
State FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,449	1,449
R-squared	0.893	0.893

Table A.4. Robustness of the Relation between Free Banking and Innovation

This table reports the robustness checks of the baseline results. Panel A addresses the skewness of patents and potential issues due to observations with zero patents. Columns (1)–(2) report results estimating a Poisson regression model, in which the dependent variable is the total number of patents granted in a state in year t+3. We additionally include state-specific pre-trends in column (2). Columns (3)–(4) report subsample analyses of our baseline OLS regression, in which the dependent variable is the natural logarithm of one plus the total number of patents granted in a state in year t+3. Column (3) includes only the state-year observations with non-zero patents. Column (4) excludes states ranked in the bottom quintile of total patents granted over the sample period. Panel B reports additional robustness checks. Columns (1)–(4) report subsample analyses of our baseline OLS regression, in which the dependent variable is the natural logarithm of one plus the total number of patents granted in a state in year t+3. Column (1) restricts the sample period to 1837–1860. Column (2) restricts the sample period to 1850–1860. Column (3) excludes the "wildcat banking" states, i.e., Michigan, Indiana, Illinois, Wisconsin, Minnesota, and New Jersey, as listed in Rockoff (1974). Column (4) excludes states in the west, i.e., California, Kansas, Nebraska, New Mexico, Oregon, Texas, Utah, and Washington. Columns (5)–(6) control for contemporaneous laws and regulation changes. Column (5) controls for the maximum interest rate limit imposed by the usury laws. Column (6) controls for the general incorporation statutes for manufacturing firms. Robust standard errors clustered at the state level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

Panel A: Patent skewness	Poisson		OLS	
	Baseline	State-specific pre-trends	Non-zero patents	Excluding low patenting states
	1	2	3	4
Free banking	0.136**	0.091**	0.263***	0.370***
	(0.068)	(0.044)	(0.096)	(0.122)
Ln(*Population*)	1.589***	1.648***	0.815***	0.656***
	(0.197)	(0.213)	(0.124)	(0.113)
Urban ratio	0.427	1.779**	2.759***	3.182***
	(0.505)	(0.695)	(0.975)	(1.086)
White ratio	-2.299	-1.421	0.482	0.883
	(1.702)	(2.034)	(1.863)	(2.160)
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1,449	1,449	1,208	1,361
R-squared			0.893	0.881

Panel B: Subsample analyses	Ln(1+*Patents*)					
	Year>1836	Year>1849	No "wildcat"	No west	Usury law	Incorporation law
	1	2	3	4	5	6
Free banking	0.293**	0.562**	0.359**	0.469***	0.455***	0.539***
	(0.143)	(0.210)	(0.132)	(0.137)	(0.137)	(0.162)
Ln(*Population*)	0.737***	0.581**	0.552***	0.589***	0.735***	0.604***
	(0.188)	(0.272)	(0.144)	(0.100)	(0.122)	(0.098)
Urban ratio	5.203***	5.911	2.862***	3.056***	3.333***	2.811**
	(1.574)	(4.645)	(0.998)	(1.056)	(1.077)	(1.059)
White ratio	0.593	-0.218	3.062	3.126	3.631	2.905
	(2.838)	(4.846)	(1.852)	(2.251)	(2.198)	(2.127)
Max rate					-0.443	
					(0.561)	
Incorporation law						-0.212
						(0.139)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	783	399	1,221	1,391	1,392	1,449
R-squared	0.908	0.913	0.891	0.883	0.883	0.884

Table A.5. Little Free Banking and Large Free Banking

This table reports how free banking affected innovation based on the intensity of free bank entry. Dependent variables are the natural logarithm of one plus the total number of patents granted in a state in year t+1, t+2, and t+3, respectively. Columns (1)–(3) show how *Little free banking* affected innovation, and columns (4)–(6) show how *Large free banking* affected innovation. *Little (Large) free banking* is an indicator variable that takes the value of one if *Free banking* equals one and the state had little (significant) free banking activities, and zero otherwise. Of the 18 states that adopted free banking, seven had only little activity by free banks, and 11 had significant or "large" levels of activity by free banks. We include the same set of controls (Ln(*Population*), *Urban ratio*, and *White ratio*) as in Table 4. Robust standard errors clustered at the state level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

	Ln(1+*Patents*)					
	t+1	t+2	t+3	t+1	t+2	t+3
	1	2	3	4	5	6
Little free banking	0.078	0.139	0.119			
	(0.149)	(0.169)	(0.200)			
Large free banking				0.488***	0.534***	0.559***
				(0.152)	(0.160)	(0.171)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.889	0.882	0.878	0.893	0.887	0.883

Table A.6. Free Banking and Agricultural Innovation: Contemporaneous Measure of Labor Exploitation

This table presents robustness checks for the results in Table 6. We measure *Labor exploitation* alternatively as the contemporaneous *Fraction enslaved*, i.e., the fraction of a state's (county's) population that was enslaved in a given year. The controls include Ln(*Population*) and *Urban ratio*. We do not include *White ratio* in the model because it is highly colinear with *Fraction enslaved*. For the state-level analysis, robust standard errors clustered at the state level are reported in parentheses below each point estimate; for the county-level analysis, robust standard errors clustered at the county level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

	Ln(1+*Agricultural patents*)								
	State-level regressions			County-level regressions					
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
	1	2	3	4	5	6	7	8	9
Free banking ×	-2.729***	-2.914***	-3.080***						
Fraction enslaved	(0.539)	(0.534)	(0.523)						
Free banking	0.840***	0.934***	1.005***						
	(0.187)	(0.182)	(0.188)						
Ln(1+*Free banks*) ×				-0.648***	-0.691***	-0.753***	-0.383***	-0.408***	-0.475***
Fraction enslaved				(0.106)	(0.112)	(0.115)	(0.104)	(0.109)	(0.111)
Ln(1+*Free banks*)				0.151***	0.166***	0.179***	0.110***	0.123***	0.141***
				(0.023)	(0.025)	(0.025)	(0.033)	(0.035)	(0.036)
Fraction enslaved	-2.519*	-2.711*	-3.075**	-0.133***	-0.140***	-0.152***	0.083***	0.087***	0.082***
	(1.491)	(1.386)	(1.421)	(0.031)	(0.032)	(0.034)	(0.027)	(0.028)	(0.029)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	No	No	No	No	No	No
County FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
State-by-year FE	No	No	No	No	No	No	Yes	Yes	Yes
Observations	1,449	1,449	1,449	51,585	51,585	51,585	51,585	51,585	51,585
R-squared	0.712	0.724	0.735	0.275	0.286	0.300	0.345	0.352	0.364

Table A.7. Free Banking and Innovation: Midwest vs. Northeast

This table reports the regression estimates on the relation between access to free banks and future innovation outcomes in Midwest versus Northeast. The dependent variable is the natural logarithm of one plus the total number of patents granted in a state (county) in year t+3 in Panel A, and is the natural logarithm of one plus the total number of agricultural patents granted in a (state) county in year t+3 in Panel B. *Northeast* is a dummy variable that equals one if a state/county was in the Northeast census region, and zero if a state/county was in the Midwest census region. We only include the states (counties) that abolished slavery and were in either the Northeast or the Midwest census regions. For the state-level analysis, robust standard errors clustered at the state level are reported in parentheses below each point estimate; for the county-level analysis, robust standard errors clustered at the county level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

Panel A: Total patents	Ln(1+*Patents*)						
	States	All Midwest & Northeast counties			Contiguous border counties		
	1	2	3	4	5	6	7
Free banking ×	-0.466*						
Northeast	(0.246)						
Free banking	0.627***						
	(0.197)						
Ln(1+*Free banks*) ×		-0.033			-0.080		
Northeast		(0.081)			(0.120)		
Ln(1+*Free banks*)		0.198***			0.209**		
		(0.059)			(0.092)		
Ln(1+*Free bank assets*) ×			-0.005			-0.009	
Northeast			(0.007)			(0.011)	
Ln(1+*Free bank assets*)			0.012**			0.019**	
			(0.005)			(0.007)	
Ln(1+*Free bank loans*) ×				-0.006			-0.010
Northeast				(0.008)			(0.012)
Ln(1+*Free bank loans*)				0.012**			0.021**
				(0.005)			(0.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No	No	No
State FE	Yes	No	No	No	No	No	No
State-by-year FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	692	20,305	20,305	20,305	8,264	8,264	8,264
R-squared	0.927	0.721	0.720	0.720	0.727	0.727	0.727

Panel B: Agricultural patents	Ln(1+*Agricultural patents*)						
	States	All Midwest & Northeast counties			Contiguous border counties		
	1	2	3	4	5	6	7
Free banking ×	-0.420						
Northeast	(0.355)						
Free banking	0.931***						
	(0.239)						
Ln(1+*Free banks*) ×		0.059			0.018		
Northeast		(0.066)			(0.060)		
Ln(1+*Free banks*)		0.099***			0.070		
		(0.035)			(0.043)		
Ln(1+*Free bank assets*) ×			-0.000			-0.003	
Northeast			(0.005)			(0.006)	
Ln(1+*Free bank assets*)			0.007**			0.008**	
			(0.003)			(0.004)	
Ln(1+*Free bank loans*) ×				-0.001			-0.004
Northeast				(0.005)			(0.006)
Ln(1+*Free bank loans*)				0.007**			0.008*
				(0.003)			(0.005)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No	No	No	No
State FE	Yes	No	No	No	No	No	No
State-by-year FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	692	20,305	20,305	20,305	8,264	8,264	8,264
R-squared	0.784	0.364	0.358	0.358	0.360	0.360	0.360

Table A.8. Free Banking under Exploitative Labor Practices: Agricultural vs. Non-Agricultural Patents

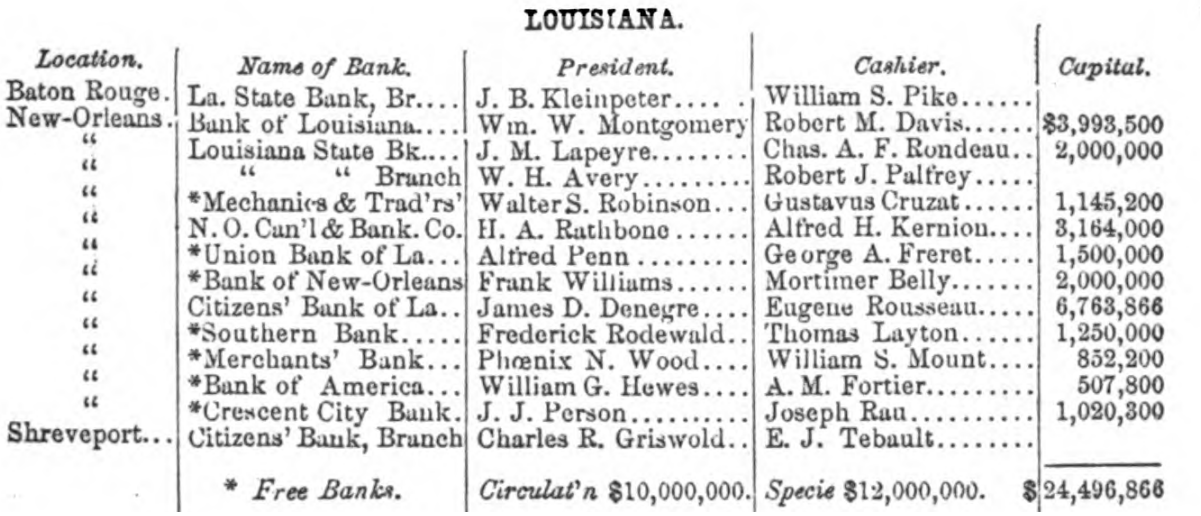
This table examines the differential impact of free banking on agricultural patents relative to non-agricultural patents in states with *Labor exploitation* above the sample median. The dependent variables in columns (1)–(3) are the natural logarithm of one plus the total number of agricultural or non-agricultural patents granted in year t+1, t+2, and t+3, respectively. The indicator variable, *Agriculture dummy*, takes the value of one if the dependent variable measures the agricultural patents and zero if it measures the non-agricultural patents. Each state-year observation appears twice in the sample of this test, once when the dependent variable is for agricultural patents and once for non-agricultural patents. We include the same set of controls (Ln(*Population*), *Urban ratio*, and *White ratio*) as in Table 6. Robust standard errors clustered at the state level are reported in parentheses below each point estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The definitions of all variables are provided in Appendix A.

	Ln(1+*Patents: agricultural or non-agricultural*)		
	t+1	t+2	t+3
	1	2	3
Free banking	0.390**	0.407**	0.375**
	(0.164)	(0.159)	(0.174)
Free banking × *Agricultural dummy*	-0.730**	-0.696**	-0.665**
	(0.271)	(0.259)	(0.273)
Agricultural dummy	-1.093***	-1.108***	-1.127***
	(0.152)	(0.150)	(0.148)
Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	1,440	1,440	1,440
R-squared	0.806	0.806	0.805

Online Appendix III: Historical Documents and Additional Figures

Figure A.1. The Merchant's and Banker's Almanac: Louisiana Banks

This figure illustrates that seven out of a total of 11 Louisiana banks in 1859 were free banks according to the *Merchant's and Banker's Almanac*, 1860 edition.



LOUISIANA.

Location.	*Name of Bank.*	*President.*	*Cashier.*	*Capital.*
Baton Rouge.	La. State Bank, Br....	J. B. Kleinpeter....	William S. Pike.....	
New-Orleans.	Bank of Louisiana....	Wm. W. Montgomery	Robert M. Davis.....	$3,993,500
"	Louisiana State Bk....	J. M. Lapeyre.....	Chas. A. F. Rondeau..	2,000,000
"	" " Branch	W. H. Avery.....	Robert J. Palfrey.....	
"	*Mechanics & Trad'rs'	Walter S. Robinson...	Gustavus Cruzat.....	1,145,200
"	N. O. Can'l & Bank. Co.	H. A. Rathbone.....	Alfred H. Kernion....	3,164,000
"	*Union Bank of La...	Alfred Penn.....	George A. Freret.....	1,500,000
"	*Bank of New-Orleans	Frank Williams.....	Mortimer Belly.....	2,000,000
"	Citizens' Bank of La..	James D. Denegre....	Eugene Rousseau.....	6,763,866
"	*Southern Bank.....	Frederick Rodewald..	Thomas Layton.....	1,250,000
"	*Merchants' Bank...	Phœnix N. Wood....	William S. Mount....	852,200
"	*Bank of America...	William G. Hewes....	A. M. Fortier.....	507,800
"	*Crescent City Bank.	J. J. Person.....	Joseph Rau.....	1,020,300
Shreveport...	Citizens' Bank, Branch	Charles R. Griswold..	E. J. Tebault.....	
	* *Free Banks.*	*Circulat'n* $10,000,000.	*Specie* $12,000,000.	$24,496,866

Figure A.2. The Merchant's and Banker's Almanac: Tennessee Banks

This figure illustrates that 16 out of a total of 36 Tennessee banks in 1855 were free banks according to the *Merchant's and Banker's Almanac*, 1856 edition.

TENNESSEE.

Location.	*Name of Bank.*	*President.*	*Cashier.*	*Capital.*
Brownsville..	Agricultural Bank....	R. C. Hamil.....	William McConihe...	$100,000
Chattanooga..	Bank of Chattanooga..	William Williams....	W. D. Fulton.....	212,000
Clarksville..	*Northern Bk.of Tenn.	D. N. Kennedy.....	James L. Glenn.....	50,000
Cleveland....	Ocoee Bank.....	Thomas H. Callaway..	Thomas J. Campbell..	100,000
Dandridge...	*Dandridge Bank.....	John Roper.....	William A. Branner..	500,000
Lebanon.....	*Bank of Middle Tenn.	S. T. Mottley.....	C. W. Jackson	50,000
Tazewell.....	*Bank of Tazewell....	E. H. Skaggs.....	C. Hitchings	100,000
"	*Bank of Clairborne..	R. J. Foster.....	I. L. Evans	50,000
Knoxville....	Bank of East-Tenn....	W. M. Churchwell....	A. A. Barnes.....	500,000
Chattanooga..	" " Branch	.....	W. F. Ragsdale	
Jonesville....	" " "	.....	W. G. Gammon.....	
Nashville....	*Bank of Nashville...	Nicholas Hobson.....	Wesley Wheless.....	500,000
"	*Bank of Commerce..	J. D. James.....	A. Wheless	50,000
"	*Merchants' Bank....	W. B. Shapard, Jr....	J. Porterfield.....	50,000
"	*City Bank	Dyer Pearl.....	E. G. Pearl.....	50,000
"	*Traders' Bank	W. B. Dortch.....	.....	50,000
"	Bk. of Tennessee	Cave Johnson.....	James Morton.....	1,325,916
Athens.....	" " Branch	.....	J. Blizard.....	249,150
Clarksville...	" " "	R. W. Humphreys....	B. H. Wisdom	223,931
Columbia.....	" " "	James Akin.....	J. C. Rye	190,130
Rogersville...	" " "	William Hutchesson..	H. Fain.....	254,208
Shelbyville ..	" " "	Robert Mathews.....	R. N. Wallace,.....	223,931
Somerville...	" " "	H. Owen.....	James Pettit.....	254,208
Sparta.....	" " "	J. G. Mitchell.....	William M. Young....	223,931
Trenton.....	" " "	John S. Davis.....	John A. Taliaferro....	254,208
Memphis....	*Commercial Bank ...	Daniel B. Turner.....	W. A. Jones.....	50,000
"	*Bank of Memphis...	R. C. Brinkley	W. F. Barry	50,000
"	Citizens' Bank.....	S. P. Walker.....	.....	50,000
Murfreesboro'	*Exchange Bank	William Spence.....	J. Spence.....	100,000
Knoxville....	*Farmers' Bank.....	W. B. Shepherd, Jr...	William T. Wheless..	50,000
"	Miners & Manuf. Bk..	J. L. King.....	A. L. McClung.....	100,000
"	*Bank of Knoxville...	Dyer Pearl.....	E. G. Pearl	50,000
Nashville....	Planters' Bk. of Tenn.	Orville Ewing.....	D. Weaver.....	1,498,300
Athens.....	" " Branch	James H. Reagan.....	David Cleage.....	150,000
Clarksville...	" " "	H. F. Beaumont.....	William P. Hume	150,000
Franklin.....	" " "	J. H. Otey.....	William S. Campbell..	150,000
Memphis	" " "	J. Elder	James Penn.....	150,000
Pulaski.....	" " "	A. M. Ballentine	G. W. Petway.....	150,000
Nashville....	Union Bk. of Tenn.....	John Kirkman.....	James Correy	2,017,284
Chattanooga ..	" " Branch	J. G. Glass.....	J. Correy, Jr.....	200,000
Columbia.....	" " "	William Park.....	S. A. Hamner.....	150,000
Memphis	" " "	A. R. Herron.....	Frederick W. Smith..	150,000
Knoxville....	" " "	J. H. Cowan	John Craig.....	150,000
Jackson	" " "	.....	F. H. McNight, *agent*.	200,000
Memphis	*Southern Bank.....	W. J. Davie	W. S. Macrae	500,000
Lawrenceb'rg	Lawrenceburg Bank..	S. E. Rose	William Simonton....	100,000
	Total 36 *Banks.*	*Circulation* $4,900,000.	*Specie* $2,300,000.	$11,627,197

* **Free Banks.**

Figure A.3. Spatial Variation in Agricultural Patents per Thousands of Population

This figure visualizes the cross-sectional variation in agricultural patenting across states based on the total number of agricultural patents for 1812–1860 per thousands of population in 1860 in each state.

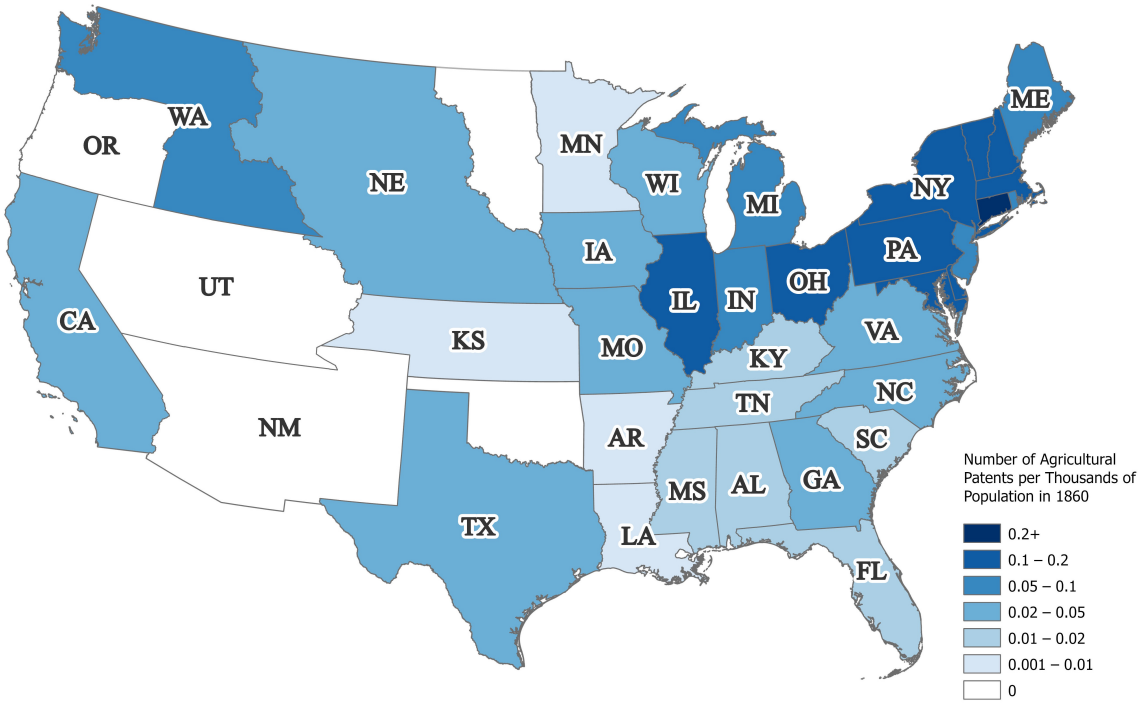


Figure A.4. Spatial Variation in the Influx of Irish Immigrants per Thousands of Population

This figure visualizes the cross-sectional variation in the influx of Irish immigrants across states based on the estimated total Irish immigrants that arrived in each state during 1820–1860 per thousands of population in 1860 in each state.