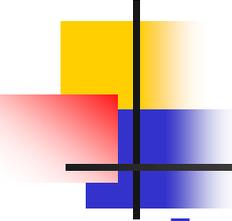


# Labor Scarcity, Finance, and Innovation: Evidence from Antebellum America

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Yifei Mao and Jessie Wang

Discussion By: Debarshi Nandy  
Chicago Financial Institutions Conference, April 2018

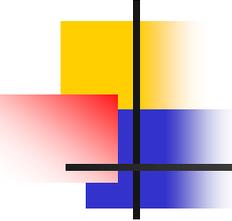


# Overview and Summary of Results

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- Analyzes the impact of access to financing on innovation (patenting activity) in antebellum America, using the entry of “free banks” as an exogenous shock to the supply of funds.
- Argues that labor scarcity is an important economic channel through which access to finance shapes innovation.
- Argues that access to finance encourages innovation that substitutes for labor in states with higher marginal cost of labor, that is states which had abolished slavery.
- Primarily an empirical analysis with a short motivating stylized model.
- I learned a lot about antebellum America and the about banking and the structure of the economy at that time.

# Main Ideas and Thoughts



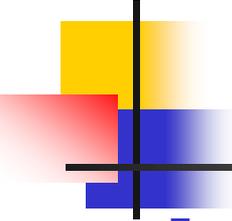
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- There is no question about the link between finance and innovation.
  - Successful innovation leads to increased efficiency, increased productivity, increased profitability.
  - There is a lot of direct evidence on this in the literature:
    - Cetorelli, N., and P. E. Strahan. (2006). Finance as a barrier to entry: Bank competition and industry structure in local U.S. markets. *Journal of Finance* 61: 437–461.
    - Butler, A. W., and J. Cornaggia. (2011). Does access to external finance improve productivity? Evidence from a natural experiment. *Journal of Financial Economics* 99:184–203.
    - Krishnan, K., D. K. Nandy, and M. Puri. (2015). Does Financing Spur Small Business Productivity? Evidence from a Natural Experiment. *Review of Financial Studies*, 28 (6), pp. 1768 – 1809.

# Main Ideas and Thoughts

- There is confusion in my mind though regarding the idea of interactions between “inputs” into the production process and the nature of innovation.
- Think of a 3-factor Cobb-Douglass production function
$$\ln(Y_{ijt}) = A_{jt} + \beta_{jt} \ln(K_{ijt}) + \gamma_{jt} \ln(L_{ijt}) + \delta_{jt} (M_{ijt}) + \varepsilon_{ijt}$$
- Inputs are:  $K$ ,  $L$ ,  $M$ . Technology parameter is  $A$ . If cost of  $L$  is lower, with same technology productivity would be higher.
- Innovation would naturally target the costliest input or bottleneck in the production process.
- In antebellum America, that was the lack of industrialization and competition from England.

# Main Ideas and Thoughts

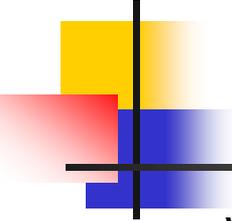


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- Textile manufacturing and industrial revolution came to the East coast first since the merchants who brought it, lived in Boston, Philadelphia, New York.
  - Direct Shipping routes.
- Precision parts mass manufacturing also started here in order to support the growth of industrialization in New England.
- Comparative advantage of New England was distance from and trade with England; early innovation in industrialization; and industrial agglomeration.
- Comparative advantage of the South was much better weather suited for crops and cotton plantations.
- The primary supply of cotton to England came from India.

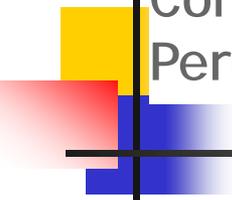


# Industrial Revolution and Innovation in Textile Manufacturing



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- Waltham, MA – the birthplace of Industrial Revolution in America – the power loom ~ 1813/1814.
  - Boston Manufacturing Company opened the first factory in America.
  - A series of innovations related to power transmission for more efficient use of water turbines.
  - Very profitable ~ employed around 300 women (mill girls).
  - Financing was through common shares.
- Replicated widely after this in MA and New England – Lowell, Lawrence, Manchester.....
- Labor was NOT scarce; it just wasn't free slave labor.
- Kenton Beerman, "The Beginning of a Revolution: Waltham and the Boston Manufacturing Company." *The Concord Review* (1994)



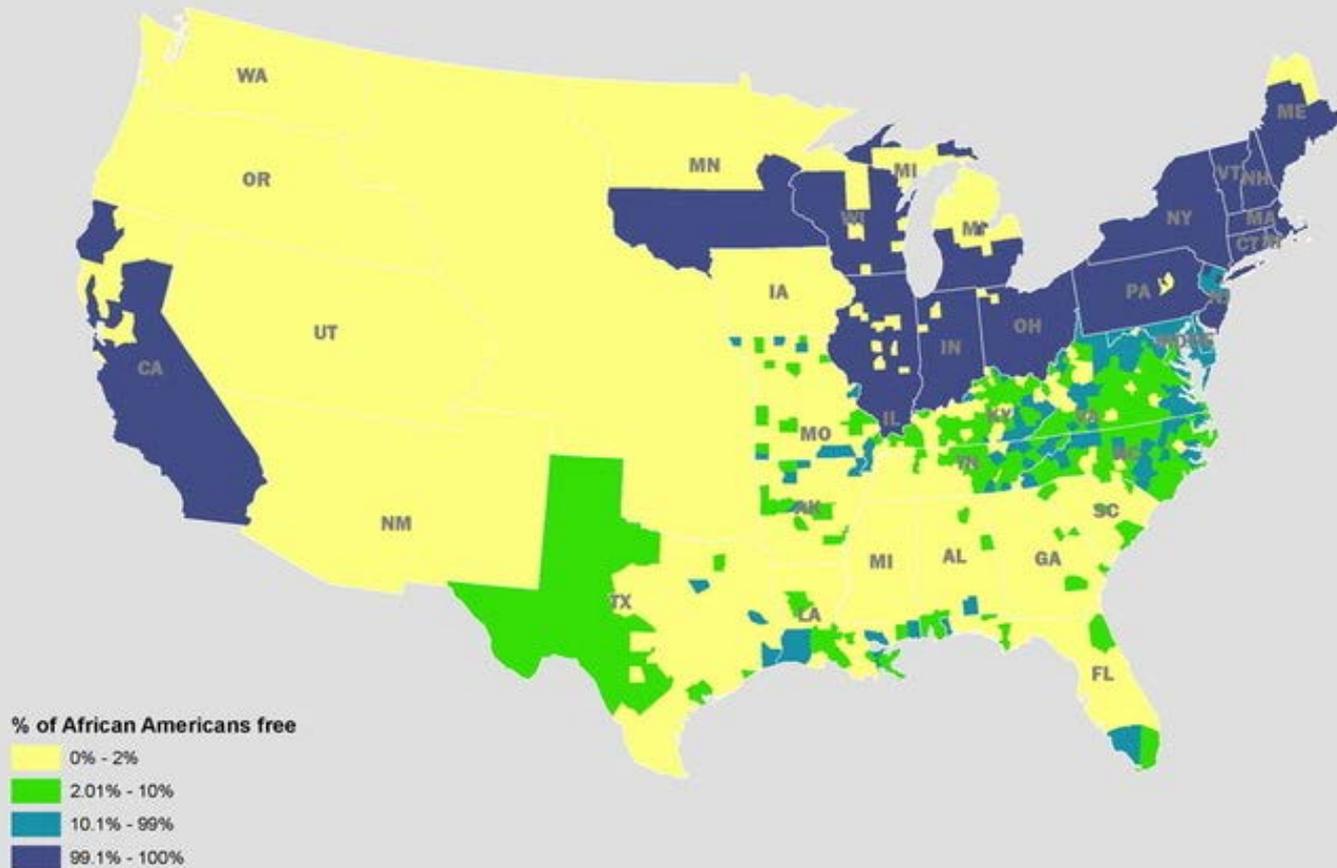
## Manufacturing Employment in the Metropolitan Industrial Complexes of New York, Philadelphia, Boston, and Baltimore as a Percentage of National Manufacturing Employment in 1840

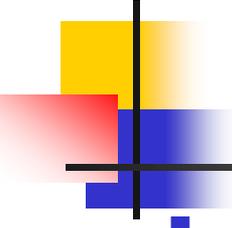
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	Metropolis	Satellites	Complex
New York	4.1%	3.4%	7.4%
Philadelphia	3.9	2.9	6.7
Boston	0.5	6.6	7.1
Three Complexes	8.5	12.9	21.2
Baltimore	2.0	0.2	2.3

Source: U.S. Bureau of the Census, *Compendium of the Sixth Census, 1840* (Washington, D.C.: Blair and Rives, 1841).

# Free African-Americans as a Percent of All African Americans, 1850

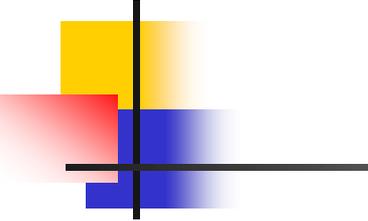




# Understanding Banking in antebellum America

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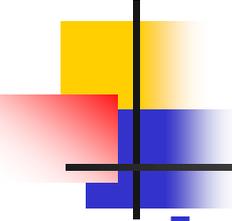
- *A History of Banking in Antebellum America – Howard Bodenhorn*



A History of  
Banking in  
Antebellum  
America

*Financial Markets and  
Economic Development  
in an Era of  
Nation-Building*

Howard Bodenhorn



# Understanding Banking in antebellum America

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- *A History of Banking in Antebellum America – Howard Bodenhorn*
- Obtaining a legislative charter during this time was difficult to say the least.
  - Both federal as well as state charter processes were political
  - Corruption and bribery were commonplace in obtaining a charter and had little to do with competence in banking.
- Free banking emerged during this time with states starting to pass legislation from 1837 onwards.
- Anyone could operate a bank under the condition (among others) that all notes issued were backed by proper security.
- Thousands of different banknotes in circulation at different discount rates.
- Suffered from instability with several banking crisis during this time.

THOMPSON'S REPORTER.

Rules to be observed in referring to this Bank Note List.

- 1st. The States are placed in geographical order, commencing with the eastern.
2d. The number of the note is in full-faced type; the rate of discount is to the right of the Bank.
3d. If the letter (S) is found between the name of the Bank and the rate of discount, it is to be understood that the Bank is liable to fail; if two n's, that it is quite doubtful. In the City and State of N. Y., the safety of the paper is designated by an (S) and the free bank by an (F).
4th. The names of the present President and Cashier, are generally to be immediately under the name of the Bank, and the description of counter-foils, altered notes, &c., follow next.
5th. If a note is altered on a Bank, which cannot be found in this list, it is worthless. If a bank is dashed (S) its notes are worthless.
6th. Our first page is filled with money articles, tables, statistics, &c., except when specially used for Mercantile Cards.
The four quotations are made to correspond with the rates of doing business at our Exchange Office, 64 Wall-street; where every branch of a Money and Stock Broker's business is done, upon fair and honorable principles.

INDEX.

Table with 3 columns: State, Page, Page. Lists states from Alabama to Michigan with corresponding page numbers.

UNITED STATES. Treasury Notes, Washington, per

MAINE.

- Androscoggin Bank, Topsham. [Chas. Thompson, Pres., John Coburn, Cash.]
Augusta Bank, Augusta. [Thos. W. Smith, Pres., George W. Allen, Cash.]
Bank of Bangor, Bangor. [Samuel Vezzie, Pres., W. S. Bennett, Cash.]
Bangor Commercial Bank, (Closed)
Belmont Bank, Belfast. [James White, Pres., N. H. Bradbury, Cash.]
Brunswick Bank, Brunswick. [Richard A. Dunlap, Pres., A. C. Robbins, Cash.]
Calais Bank, Calais. [G. Downie, Pres., J. A. Lee, Cash.]
Cann Bank, Portland. [Chas. E. Barrett, Pres., J. B. Scott, Cash.]
Central Bank, Portland. [Eliphlet Greeley, Pres., John Chute, Cash.]
Central Bank, Hallowell. [Wm. Moulton, Pres., Samuel Small, Cash.]
City Bank, Portland.
Commercial Bank, Bath. [J. Robinson, Pres., Thos. Agry, Cash.]
Cumberland Bank of Portland. [Wm. Moulton, Pres., Samuel Small, Cash.]
Eastern Bank, Bangor. [A. M. Roberts, Pres., W. H. Mills, Cash.]
Exchange Bank, Portland. (Closing) -

- Franklin Bank, Gardiner. [Henry Pres., Hiram Stevens, Cash.]
Freeman's Bank, Bangor. [Benj. Davis, Pres., Wm. Caldwell, Cash.]
Gardiner Bank, Gardiner. [Sam. C. Grant, Pres., Joseph Adams, Cash.]
Globe Bank, Bangor. [Wm. Woodbury, Pres., W. W. Woodbury, Cash.]
Kendusken Bank, Bangor. [John Williams, Pres., T. S. David, Cash.]
Lafayette Bank, Bangor. [Lafayette Bank, Bangor, (Closed)
Lincoln Bank, Bath. [Geo. P. Patten, Pres., John Shaw, Cash.]
Manufacturers' Bank, Saco. [Wm. P. Haines, Pres., S. S. Fairbairn, Cash.]
Mariners' Bank, Wiscasset. [Henry Clark, Pres., S. P. Baker, Cash.]
Mechanic Bank, Bangor. [James Covey, Pres., P. M. Cobb, Cash.]
Meguntcook Bank, Camden. [Joseph Jones, Pres., Nathl. Dillingham, Cash.]
Merchants' Bank, Portland. [Wm. Woodbury, Pres., W. W. Woodbury, Cash.]
New-Hampshire Bank, Portsmouth. [John Agry, Pres., W. M. Vaughan, Cash.]
Old Town Bank of, Orono. (fraud)
Oxford Bank, Fryeburgh. (fraud)
People's Bank, Bangor. (closed)
Portland Bank of, Portland. (Closed)
Sagadahoc Bank, Bath. [Wm. Woodbury, Pres., F. M. Baker, Cash.]
St. Croix Bank, Calais. (Closed)
Shewhegan Bank, Bloomfield. [Wm. Allen, Pres., Wm. Woodbury, Cash.]
South Berwick Bank, South Berwick. [W. A. Hayes, Pres., Chas. E. Norton, Cash.]
Thomaston Bank, Thomaston. [Richard Robinson, Pres., J. D. Barnard, Cash.]
Ticonic Bank, Waterville. (Closed)
Union Bank, Brunswick. (Closed)
Waldo Bank, Belfast. [James White, Cash.]
Western Bank, Bangor. [C. Godman, C. O. Alden, Cash., R. C. Johnson, Pres.]
Westbrook Bank of, Westbrook. [S. Jordan, Pres., A. Fobes, Cash.]
York Bank, Saco. [Jonathan King, Pres., H. D. Thatcher, Cash.]

NEW-HAMPSHIRE.

- Manchester Bank, Keene. [Sam'l Dixmoor, Pres., T. H. Leveret, Cash.]
Cheshire Bank, Keene. (New.) [John Elliot, Pres., Geo. W. Chase, Cash.]
Concord Bank, Concord. (closing)
Commercial Bank, Portsmouth. (closed)
Farmington Bank, Farmington. (closing)
Manchester Bank, Portsmouth. (closing)
Manchester Bank, Portsmouth. [Richard James, Pres., Jas. F. Shores, Cash.]
Farmington Bank, Farmington. [E. S. Young, Pres., Geo. A. Cossitt, Cash.]
Farmington Bank, Farmington. [E. S. Young, Pres., Geo. A. Cossitt, Cash.]

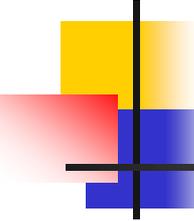
- Derry Bank, Derry. [A. Tucker, Pres., Jas. Thom, Cash.]
Dover Bank, Dover. [Dana M. Christie, Pres., John Damm, Cash.]
Granite Bank, Exeter. [John Harvey, Pres., James Burley, Cash.]
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VERMONT.

- Bank of Orange County, Chelsea. [John Francis, Pres., Jason Steele, Cash.]
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Thompson's Bank Note Reporter, issued in February 1846,

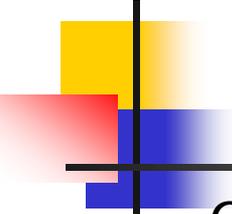
# Banking in antebellum America



Year	No. Banks	Authorized Capital (in millions \$U.S.)	Estimated Assets (in millions \$U.S.)
1810	103	66.19	108.87
1811	118	76.29	142.65
1812	143	84.49	161.89
1813	147	87.00	187.23
1814	202	110.02	233.53
1815	212	115.23	197.16
1816	233	158.98	270.30
1817	263	172.84	316.47
1818	339	195.31	331.41
1819	342	195.98	349.66
1820	328	194.60	341.42
1821	274	181.23	345.93
1822	268	177.53	307.86
1823	275	173.67	283.10
1824	301	185.75	328.16
1825	331	191.08	347.65
1826	332	190.98	349.60
1827	334	192.51	379.03
1828	356	197.41	344.56
1829	370	201.06	349.72
1830	382	205.40	403.45

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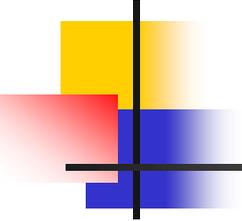
*Origins of  
Commercial  
Banking in the  
United States  
– Robert E.  
Wright*



# Main Comments and Questions

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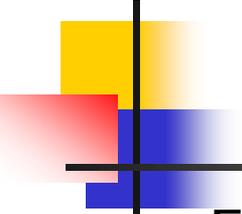
- Given the large heterogeneity in the quality of banks - need to understand better how the entry of free banks affected the availability of financing in different states.
- Alternate sources of financing – federal banks? equity financing?
  - Most large industrial/manufacturing companies that started followed the BMC model of raising capital to support innovation and growth.
- Alternative use of financing.
  - Building infrastructure – canals and railroads.
  - Communication – telegraph.
- Need to show a clear link between availability of financing and innovation.



# Main Comments and Questions

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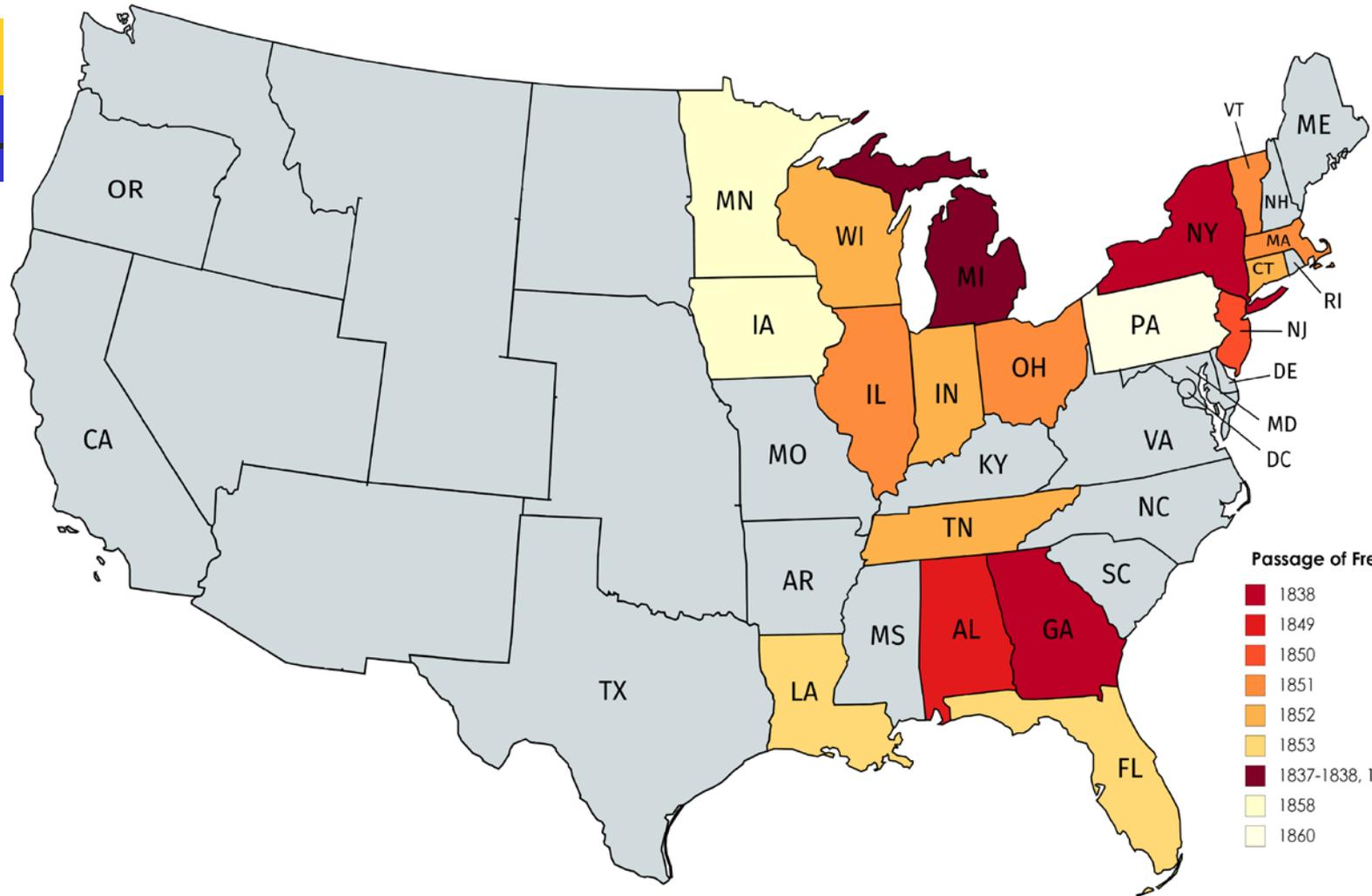
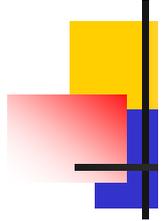
- Broad question: How does innovation develop?
  - Links to factors of production.
- Several other possibilities come to mind which may have a bigger policy impact.
  - Infrastructure development
  - Industry agglomeration
  - Demand conditions
- While financing is critical, they may be offset by lack of above conditions.



# Main Comments and Questions

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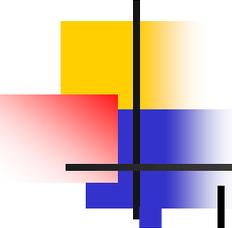
- Econometric issues:
  - Unbalanced panel with a lot of heterogeneity.
  - Look at Iowa: statehood in 1838; free banking in 1858.



**Passage of Free Banking Laws**

- 1838
- 1849
- 1850
- 1851
- 1852
- 1853
- 1853
- 1837-1838, 1857-
- 1858
- 1860





# Main Comments and Questions

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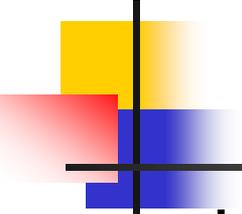
## ■ Issues with panel construction:

- Unbalanced panel with a lot of heterogeneity. Need to be more clear on how you are treating these issues.
- Look at Iowa: statehood in 1838; free banking in 1858.
- State fixed effects are inadequate.

## ■ Prior trends:

- Show test for parallel trends in a simple picture.
- Current econometric specification is somewhat inadequate:
  - Include Before variable in main regression
  - Restrict Before variable to 5 years before free-banking given the huge heterogeneity within and across states both in quantity and quality of free banks.

## ■ Clustering of SE: need to cluster at state or at the minimum state-year level.

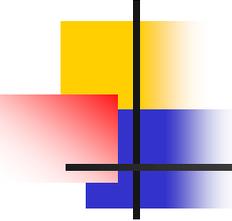


# Main Comments and Questions

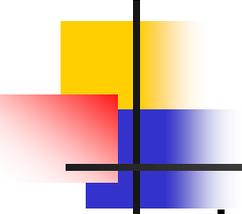
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- Interaction effects in regression:
  - Marginal vs. total effects

# Table 5 of paper...



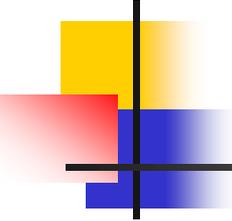
	Ln(Patents)		
	t+1	t+2	t+3
	(1)	(2)	(3)
<i>Free banking</i> × <i>Free state</i>	0.442*** (0.084)	0.469*** (0.148)	0.558*** (0.172)
<i>Free banking</i>	0.092 (0.090)	0.146 (0.087)	0.094 (0.095)
<i>Free state</i>	-1.509*** (0.361)	-1.215** (0.503)	-1.085** (0.500)



# Main Comments and Questions

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- Interaction effects in regression:
  - Marginal vs. total effects
- Need to focus on total effect and not the marginal.
- Split *Free-banking* into
  - *Free-banking\*Free State*
  - *Free banking\*Slave State*
  - Several papers you can look at including my own on "Access to Financing....."



# Final Thoughts

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- Overall a very nice and interesting time in history to study for innovation.
- Brings to attention an interesting fact of how to think about the developmental process of innovation. What factors matter and how do these interact?
- I enjoyed reading it and I learned a lot about antebellum America!
- Look forward to the next iteration!