Investment Banks as Corporate Monitors in the Early 20th Century United States

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Bankers and Corporate Governance

Financial frictions arising from asymmetric information may deter access to external finance and, consequently, economic growth

To address this problem, firms often form relationships with intermediaries

Theoretical models suggest potential benefits, but also costs

- Enable bank to obtain information, monitor management
- May also give bank informational monopoly that they can exploit (Sharpe 1990; Rajan 1992)

Empirical research analyzing effects of bank-firm affiliations produced mixed findings

- Germany, Japan: (Gorton & Schmid 2000, Agarwal & Elston 2001, Weinstein & Yafeh 1998, Morck & Nackamura 1999)
- Modern US (Kroszner & Strahan 2001, Guner, Malmedier & Tate 2007)
- Historical US (Delong 1991, Ramirez 1995, Cantillo Simon 1998)

Fundamental problem for empirical analysis: endogeneity of bank-firm relationships

Using history to estimate the effects of relationships with financial intermediaries

Bankers were once commonly represented on boards of American public companies – particularly railroads

Political concerns regarding the power of financiers in the economy, and the conflicts of interest inherent in their positions as directors, led to a backlash

Section 10 of the Clayton Antitrust of 1914 (implemented 1921) prohibited securities underwriters from holding board seats with their client railroads

In this paper: we use the implementation of Section 10 to address the endogeneity problem and estimate the effects of underwriters on firm boards

We present a simple theoretical framework of bankers as monitors to generate specific predictions we can take to the data

Use new data on board composition, debt underwriting, stock prices, and firm balance sheets & income statements in empirical tests

Contributions

Evidence that prohibition of bank-firm affiliations can be harmful, at least within context with acute asymmetries of information

> Addresses endogeneity problem faced by most earlier work

Evidence of the significance of board composition for firm outcomes

> Endogenous board formation only addressed by looking at gender quotas in Norway, or using regulations (Sarbanes-Oxley) that mandated outside directors on certain committees

Implication that rules intended to address conflicts of interest may impede valuable flows of information

Beginnings of an analysis of forces that led to departure of bankers from American firms' boards generally

Preview of Results

Empirical framework uses the pre-existing variation in the strength of RRs' relationships with underwriters represented on their boards

Among the RRs with stronger relationships with their underwriters (who were therefore more affected by the regulation):

- Valuations, investment rates, and leverage fell, while interest rates rose
- Most magnitudes modest (2%-5%), but effect on investment larger (28%)

Consistent with banker-directors acting as monitors, resolving frictions

Falsification test: perform same analysis on industrial firms, which were not bound by the terms of Section 10. The industrials with stronger relationships with their underwriters experienced no changes in the years after Section 10 was implemented.

Railroads, Bankers and Politics

Late 19th c.: *major* problems in governance of RRs

Financed mostly by mortgage bonds; small number of firms capable of underwriting major issues

Gradually, and particularly following reorganizations following 1893, bankers assert greater role in their client firms' governance (Carosso, 1970)

By early 20th century, banker representation on the boards of major railroads nearly universal

Populist hostility towards "money trust" becomes stronger in years following Panic of 1907; Pujo Committee investigations held in 1912-13

Top 25 Underwriters, 1905-29

Institution	Underwriting volume (Millions of Dollars)
Kuhn, Loeb & Co	2,490
J P Morgan & Co	1,540
National City Bank	724
First National Bank	542
Speyer & Co	475
Guaranty Trust Co	379
Bankers Trust Co	163
Lee, Higginson & Co	149
Blair & Co	119
Harris, Forbes & Co	116
Dillon, Read & Co	114
J & W Seligman & Co	107
Hallgarten & Co	98
Kidder, Peabody & Co	93
Wm A Read & Co	91
White, Weld & Co	79
Brown Brothers & Co	76
Ladenburg, Thalmann & Co	70
Halsey, Stuart & Co	67
Union Trust Co of Pittsburgh	67
Kissel, Kinnicutt & Co	58
Hayden, Stone & Co	47
Equitable Trust Co	46
Goldman, Sachs & Co	38
William Salomon & Co	37

Clayton Antitrust Act (1914)

Section 10: No common carrier engaged in commerce shall have any dealings in securities...to the amount of $50,000, in the aggregate, in any year, with another firm, partnership, or association, when the said common carrier shall have upon its board of directors or as its president, manager or as its purchasing or selling officer... any person who is at the same time a director, manager, or purchasing or selling officer of, or who has any substantial interest in, such other corporation, firm, partnership or association...

Intended to eliminate conflicts of interest in banker-directors' role, prevent them from profiting from self-dealing at expense of RRs

Fundamentally changed role of investment bankers:
    -could remain as directors, but stop underwriting
    -could resign from board, continue underwriting

Implementation of Section 10

Repeatedly postponed by Congress; Wilson vetoes additional postponement at end of 1920—goes into effect in 1921

Firms with stronger ties to bankers on their boards more severely affected; but after 1914 ultimate implementation likely anticipated

In empirical analysis, we define "treatment" in 1913:

1913 1914   1921

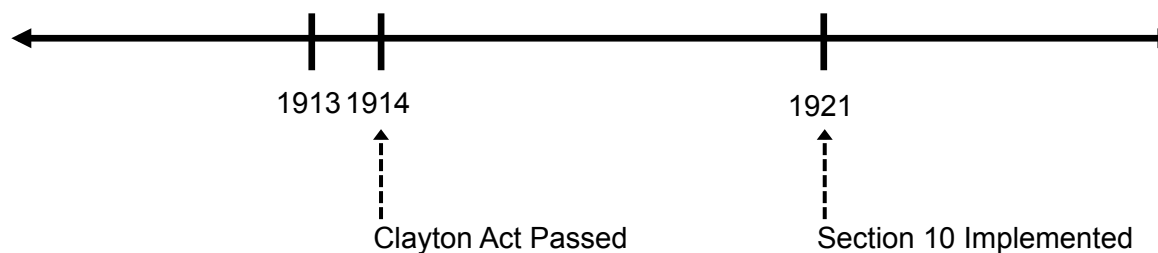Clayton Act Passed   Section 10 Implemented

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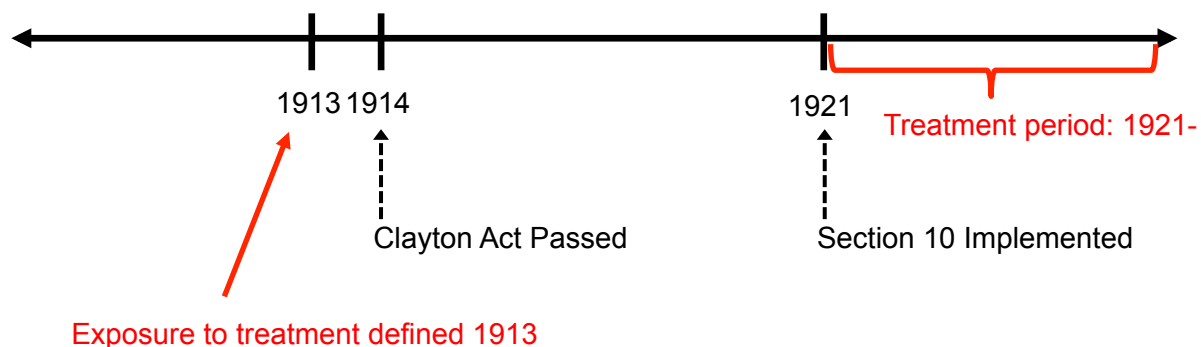In empirical analysis, we define "treatment" in 1913:

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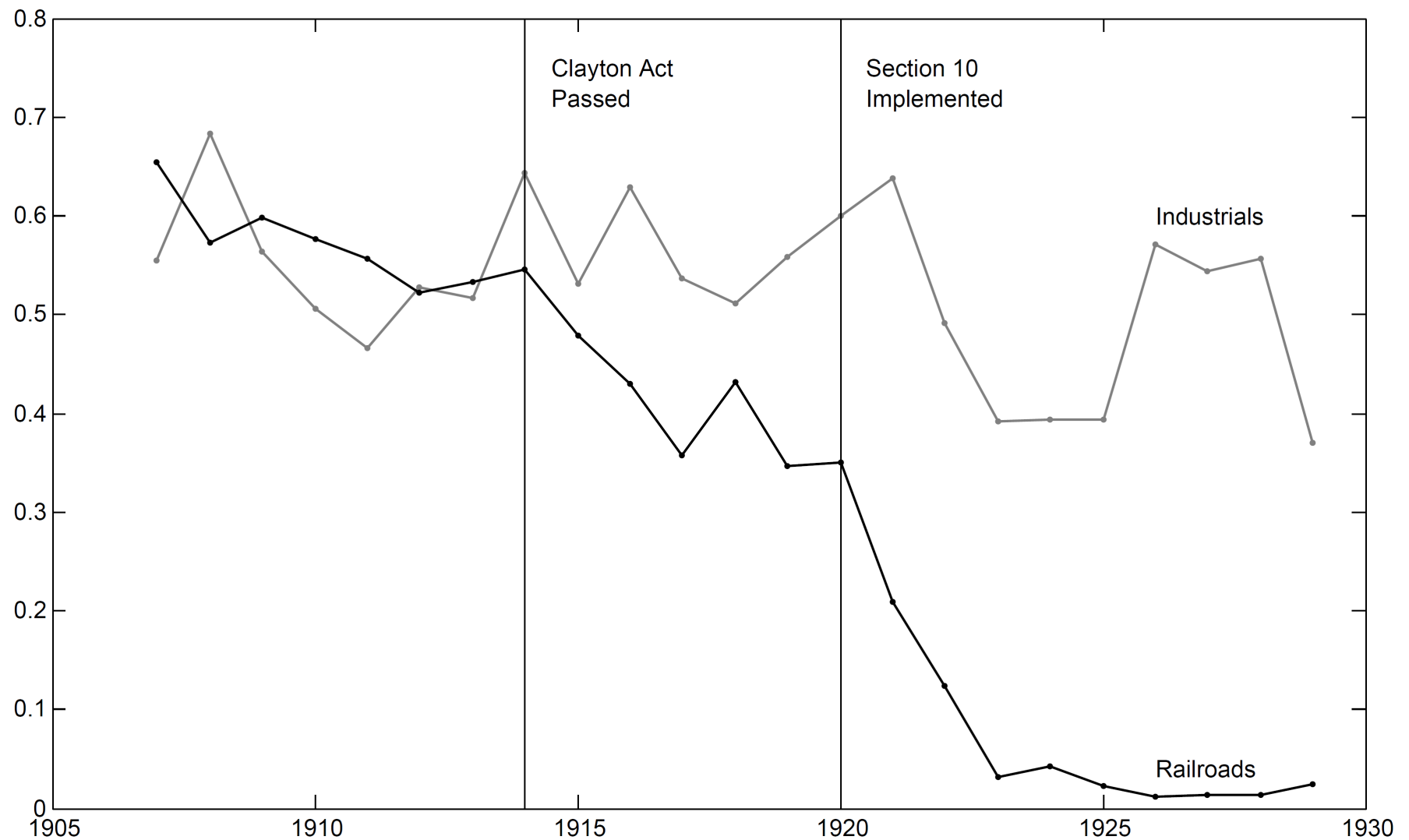
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Exposure to treatment defined 1913

Bond Underwriting by Banks on Firms' Boards, 1907-29

Resignations Noted in Press

MANY CHANGES SOON IN RAILROAD BOARDS

To Be Caused by Clayton Act's Provisions Regarding Interlocking Directorates.

DEPLORED BY OFFICIALS

Regulations for Carriers Asking Bids Confuse an Unsatisfactory Condition, Railroad Men Say.

A great many changes in the personnel of railroad corporation directorates are expected to take place within the next few months in compliance with the provisions of Section 10 of the Clayton act, which went into effect Jan. 1. Already there have been resignations from such companies as the Pennsylvania, the Chicago, Milwaukee & St. Paul and the Lehigh Valley Coal Company of such men as A. W. Mellon of Pittsburgh, John D. Ryan and E. E. Loomis, respectively.

Schiff and Kahn Quit Union Pacific.

Mortimer L. Schiff and Otto H. Kahn of Kuhn, Loeb & Co. resigned yesterday as Directors of the Union Pacific Railroad Company at a special meeting of the Directors. Their resignations were accepted, but no successors have as yet been decided upon, it was stated. The resignations were tendered in compliance with Section 10 of the Clayton act, which prevents interlocking directorates between officers of banks or equipment companies and railroads.

MELLON LEAVES THE P. R. R.

Pittsburgh Banker Resigns on Interlocking Directorate Issue.

PHILADELPHIA, Jan. 12.—The Pennsylvania Railroad announced today the acceptance of the resignation of A. W. Mellon, the Pittsburgh banker, as a Director in the company. Mr. Mellon was elected a director last February.

"Mr. Mellon's resignation," the company announced, "was presented so as to save both himself and the Pennsylvania Railroad Company from any possible embarrassment that might arise because of the stringent and as yet undefined requirement of the Federal laws which became effective on Jan. 1, 1921, respecting so-called interlocking Directors, and so as to give him more time to devote to other companies in which he is a Director."

DIRECTORS QUIT UNDER LAW

J. P. Morgan and Two Others Out of Northern Pacific Board.

Three more resignations were announced yesterday from the directorate of a railroad company and four new members of boards were announced in conformation with the Clayton act against interlocking railroad directorates.

At the meeting of the Northern Pacific Railway Company, J. P. Morgan, Lewis Cass Ledyard and Payne Whitney resigned as members of the Board of Directors, and Frank L. Polk, former Acting Secretary of State; E. M. Willis and A. H. Gillard were elected to succeed them.

Samuel McRoberts was elected a member of the Chicago, Milwaukee & St. Paul Board of Directors to succeed John D. Ryan, who resigned some days ago because of the Clayton act.

Similar resignations are expected from time to time among the railroad companies in compliance with the law, in spite of the fact that an amendment to some of its sections is being prepared. The changes now would have been much more numerous if there had not been a great many changes when the law was originally passed.

Number of Major Underwriters on Public Companies' Boards
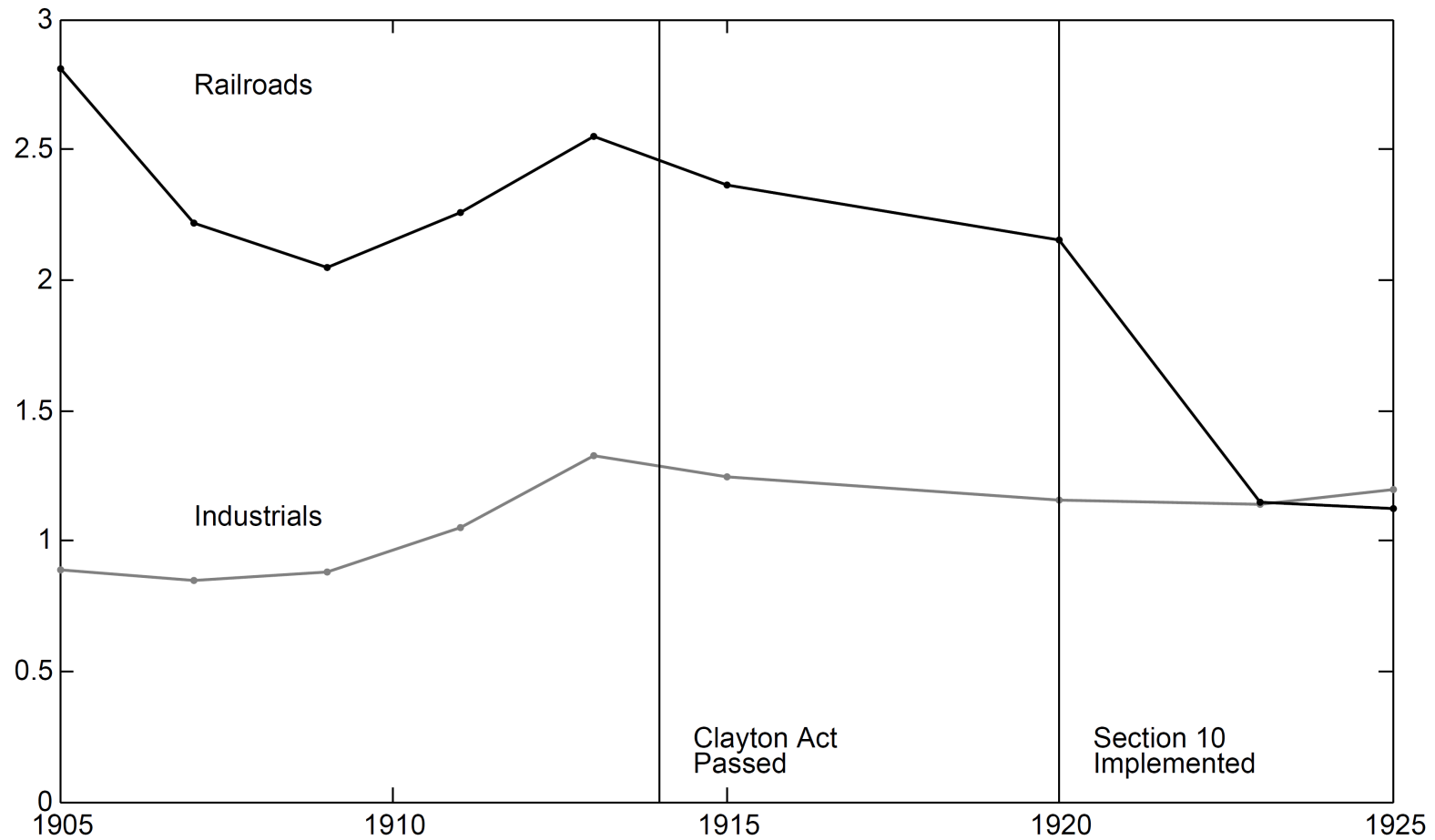
Sample & Data Sources

Sample: 84 railroads listed on NYSE; 64 industrials that were listed on NYSE in 1913 and issued debt

Annual accounting data for 1905-1929 period (from *Moody's Manuals*)

Directors' names at two- to five-year intervals (1905-1925)

Bankers' names for all investment banking partnerships that were members of NYSE, plus commercial banks and securities affiliates, and trust companies that underwrote debt (from directories at two- to five-year intervals)

Underwriting data from Fitch Bond Book, various editions starting in 1913

Stock prices at annual frequency (or daily) from the *New York Times*

Matching bankers to boards

Kansas City Southern Ry., Moodys' Manual 1920

Chase National (New York), Randy McNally
Bankers' Directory 1920

Blair & Co., NYSE Directory 1920

Balance Sheet
Denver & Rio Grande RR

GENERAL BALANCE SHEET, AS OF JUNE 30.

Assets—	1910.	1909.	Liabilities—	1910.	1909.
*Road & equipment...	$163,059,097	$157,956,557	Common stock........	$38,000,000	$38,000,000
Securities of proprietary, affiliated & controlled cos......	484,721	483,395	Preferred stock.......	49,779,800	45,779,800
Physical property.....	213,568	210,774	Bonded debt.........	115,556,000	105,556,000
Securities pledged.....	29,034,953	22,571,155	Equipment trusts......	1,575,000	1,875,000
Cash	4,053,176	3,531,074	Traffic balances.......	255,055	334,373
Securities in treasury.	8,499,719	8,933,931	Vouchers and payrolls.	1,447,337	1,662,576
Traffic balances.......	273,572	212,215	Int. divds. & rents unpaid	1,356,056	1,267,205
Agents and conductors	151,271	119,985	Miscellaneous accounts payable	46,263	52,536
Materials and supplies	1,385,666	1,296,382	Other working liabilities	41,305	34,826
Miscellaneous accounts receivable	618,902	808,745	Int. divds. & rents accrued	2,191,053	1,868,022
Other working assets.	27,770	19,308	Taxes accrued........	360,989	327,829
Provisional fund......	600,523	567,423	Deferred credit items.	120,836	576,492
Western Pacific deficiency fund......	5,759,256	....			
Proceeds of first & ref. 5% bonds......	3,055,459	4,250,000	Total liabilities...	$210,729,694	$197,334,658
Special renewal fund.	333,658	333,925	Deferred income from securities owned....	1,152,844	....
Loans & bills receivable	....	908,625	Appropriated surplus: Additions to property since June 30, 1907 through income......	974,180	674,180
Land proceeds with trustee	....	250,000	Renewal fund.........	333,658	333,934
Other deferred debit items	125,618	97,959	Special equip. fund....	43,081	43,081
			Profit and loss.......	4,443,472	4,165,609
Total	$217,676,929	$202,551,453	Total	$217,676,929	$202,551,453

* Cost of road and equipment includes investment in road June 30, 1907, $144,321,866; equip. expenditures, $150,219.
ment, $11,285,679; improvements since June 30, 1907, $2,144,559; equipment, $5,156,774; general

Underwriting information

ATLANTIC COAST LINE R. R. CO. 1st Cons. 4s. Due July 1, 1952.
Dated July 1, 1902. Interest payable March and Sept. 1, at United States Trust Co., New York.
Authorized—$80,000,000.
Outstanding—$51,326,750 (closed mortgage).
Denomination—Coupon, $1,000. Registerable as to principal or fully registerable. Registered, $1,000, $5,000, $10,000 and $50,000. C. & R. interchangeable.
Trustee—Farmers' Loan & Trust Co., New York.
Lien—A lien by direct mortgage on 3,947.71 miles of road and equipment, terminals, etc.: (1) first mortgage 1,020.98 miles; (2) second mortgage 2,623.17 miles; (3) third mortgage on 303.56 miles; (4) also a lien on 50.70 miles of leased road.
Prior Liens—$29,764,000.
Underlies—The At. C. L. R. R. Unified 4s, 1959, which provide for retirement of this issue.
Legal for Conn., N. H., N. J., Mich., Minn., and Wis.
Listed on New York, Baltimore and Richmond Stock Exchanges.
Original Market—$10,500,000 offered July, 1902, at 100½ and interest by Brown Bros. & Co., New York, Philadelphia and Boston; Hallgarten & Co., New York, and Vermilye & Co., New York. $4,500,000 offered March, 1909, at 97½ and interest by Redmond & Co. and Moffat & White (now White, Weld & Co.), both firms of New York.
Market—1912.
New York—Crawford, Patton & Cannon, Coffin & Co., Hornblower & Weeks, Redmond & Co., E. & C. Randolph, Gilman & Clucas, Newborg & Co., Harris, Forbes & Co., Kissel, Kinnicutt & Co., J. S. Farlee & Co., Farson, Son & Co., Guaranty Trust Co., Kean, Taylor & Co.
Baltimore—Poe & Davies, Jenkins, Whedbee & Poe.
Boston—N. W. Harris & Co.
Chicago—Harris Trust & Sav. Bank.
(93¼ Nov., 1912—95 Feb., 1912)

Stock Mkt Reaction: Wilson's Veto

Veto at least partly a surprise; stock-market reaction gives assessment of expected impact

Use strength of affiliations with bankers on board in 1920 as measure of expected impact

	Railroads			Falsification Test: Industrials	
	Daily returns: December 31, 1920 (1)	Cumulative Returns, One-day Window (2)	Placebo: Daily returns, December 1, 1920 (3)	Daily returns: December 31, 1920 (4)	Cumulative Returns, One-day Window (5)
Percent board underwriting, 1920	-0.0466*	-0.0579+	-0.001	0.00170	0.0213
	(0.0207)	(0.0328)	(0.010)	(0.0173)	(0.0228)
Constant	0.0646**	0.0546**	-0.009	0.0520**	0.0783**
	(0.0193)	(0.0152)	(0.007)	(0.008)	(0.0164)
Dependent variable stats:					
Mean	0.038	0.052	-0.010	0.053	0.052
SD	0.068	0.094	0.027	0.088	0.091
Observations	47	44	40	52	52
R-squared	0.115	0.061	0.0002	0.0002	0.012

Response from Noted Banker

"The great bulk of capital of the railways of this country has been raised by bond issues and the investors holding these bonds naturally look to the issuing bankers to protect their interests and watch the management of the companies in question. The best way in which they can keep in the close touch that this requires…is by service as directors and this service they are now prohibited from performing on pain of ceasing all business connections with such companies."

Mortimer L. Schiff [Kuhn Loeb & Co.], 1921

Effects on Firm Outcomes

Rationale for Section 10: bankers' dual role as directors and financiers led them to profit from self-dealing in transactions with clients

Implies that implementation should improve RRs' valuations, lower their borrowing costs, (possibly) raise investment

What if banker-directors actually did act as monitors? What are the implications for firm outcomes?

Theoretical Framework—Intuition

Based on Diamond's (1984) <u>delegated monitoring</u> framework: firms need to issue debt to undertake investment project, can choose whether to have an underwriter on their board, or do arm's length transaction

<u>Key friction</u>: cash flows not observable to outsiders. Insiders would underreport cash flows and reduce payouts to bondholders. Bondholders use threat of liquidation to induce truthful revelation of cash flows, which raises cost of debt and reduces range of investments that can be financed

Underwriter on the board can monitor the firm and report the true value of the cash flows to the bondholders, avoiding inefficient liquidations

Monitoring is costly – underwriter charges a fixed fee. Large firms with more investment opportunities more likely to pay the fee and avoid liquidations ⟶ <u>self-selection into bank-firm relationships</u>

Theoretical Framework—Predictions

Without constraints, firms self-select into relationships with underwriters

Section 10 restricted only railroads that would have chosen to have a monitor. For these firms, enactment of the Act would result in:

- Lower borrowing levels
- Higher borrowing costs
- Lower investments
- Lower market valuations

Investment Banks as Monitors

Firms differ at time $t=0$ on probability λ_f of having an investment opportunity at $t=1$; if undertaken, payoff at $t=2$ either V_H with prob. p or V_L with prob. $(1-p)$.

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Chose whether to use monitor M or arm's length N

Obtain investment project with prob. λ_f Requires 1 unit capital

Obtain cashflows V_H with prob. p, V_L with prob. $(1-p)$.   Creditors can liquidate, get $L < V_L$; insiders get 0.
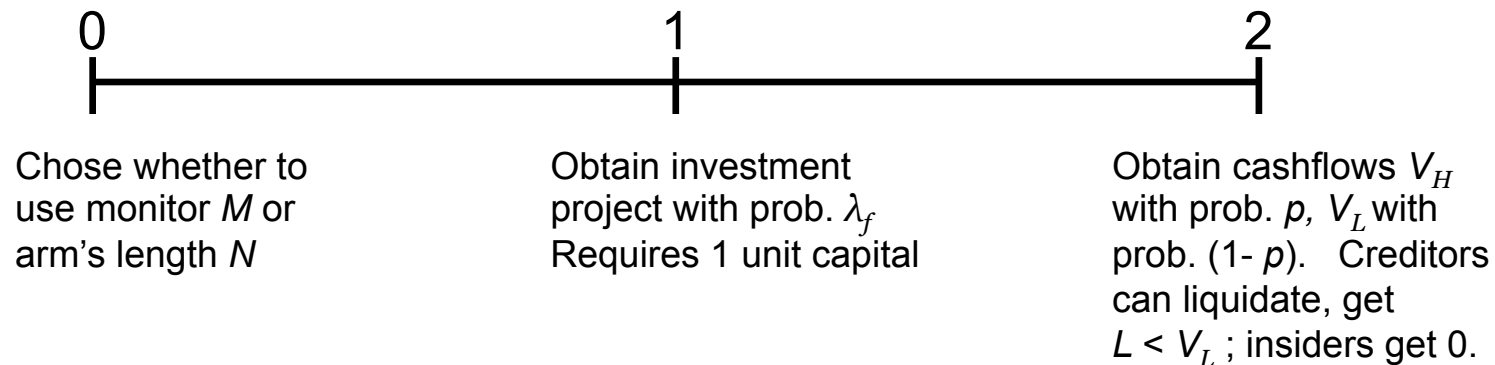
Debt: investors give firm 1 for a promised repayment F

Outside investors risk neutral; required rate of return R: $V_L < R < V_H$

Observable $p \sim U[0,1]$. Cashflows not observable. Insiders have incentive to report V_L when V_H is obtained; to induce truth-telling, investors liquidate whenever V_L is reported

Effects of Monitoring

If firm chooses not to have an underwriter-monitor N:

- Creditors liquidate whenever V_L reported. If face value of debt is F_N, creditors get $pF_N + (1-p)L = R$

- Therefore, and value of firm is $V_N = p(V_H - F_N) + (1-p)0$

- Investment occurs if $p \geq p^* \equiv \dfrac{R-L}{V_H - L}$

If firm chooses to have an underwriter-monitor M:

- No costly liquidations; face value can be lower:

$$F_M = \frac{R - (1-p)V_L}{p}$$

- Value of firm is $V_M = p(V_H - F_M) + (1-p)0$

- Investment occurs if $p \geq \underline{p} \equiv \dfrac{R - V_L}{V_H - V_L}$

- Efficient investment: projects with $\underline{p} \leq p < p^*$ will now be realized

Choice of underwriter-monitor

Value to shareholders at t=0 is expected value of implemented projects

$$S_M = \lambda_f \int_{\underline{p}}^{1} V_M(p)\, dp = \frac{1}{2}\lambda_f \frac{(V_H - R)^2}{V_H - V_L}$$

-

$$S_N = \lambda_f \int_{p^*}^{1} V_N(p)\, dp = \frac{1}{2}\lambda_f \frac{(V_H - R)^2}{V_H - L}$$

Assume fixed monitoring cost M. Then firms choose monitoring if:

$$S_M - S_N \geq M$$

$$\frac{1}{2}\lambda_f \frac{(V_H - R)^2(V_L - L)}{(V_H - V_L)(V_H - L)} \geq M$$

Let λ^* be firm that is indifferent between monitoring and arm's length. Then firms $\lambda_f \geq \lambda^*$ choose to have an underwriter on the board that monitors—i.e., larger firms choose relationship underwriting.

These will be the firms affected by the implementation of Section 10 of the Clayton Act.

Effects of Implementing Section 10

Market values

$$\Delta S = S_N - (S_M - M) = (M - \frac{1}{2}\lambda_f \frac{(V_H - R)^2(V_L - L)}{(V_H - V_L)(V_H - L)})$$

For firms $\lambda_f > \lambda^*$, $\Delta S < 0$. Expect lower valuations for affected firms.

- **Investment**

$$\Delta I = \lambda_f \left(\int_{p^*}^1 1\, dp - \int_{\underline{p}}^1 1\, dp \right) = -\lambda_f \frac{(V_H - R)}{(V_H - V_L)} \frac{(V_L - L)}{(V_H - L)} < 0$$

Inefficiency in investment since projects $p \in (\underline{p}, p^*)$ not implemented for firms $\lambda_f > \lambda^*$

Borrowing levels and costs

Change in debt level mimics change in investment

Calculate interest as difference between amount the firm has promised to repay investors and amount borrowed. Difference in rates for a new loan for firms $\lambda_f > \lambda^*$:

$$\Delta \hat{R} = \frac{\int_{p^*}^1 F_N(p)\, dp}{\int_{p^*}^1 1\, dp} - \frac{\int_{\underline{p}}^1 F_M(p)\, dp}{\int_{\underline{p}}^1 1\, dp} \approx \frac{1}{2} \frac{(V_H - R)^2(V_L - L)}{(V_H - V_L)(V_H - L)} > 0$$

Marginal interest rate increases. For a project of given quality, pay higher rate when underwriter cannot monitor— dominates effect of passing up on ex-ante riskier investment opportunities.

	Mean, 1913 [Std Dev]	Difference: High Board Underwriting Minus Low, 1913 (SE)
	(1)	(2)
A. Relationships with underwriters		
Number of major underwriters on board	2.549 [1.850]	0.975* (0.425)
Percent of debt underwritten by banks on board in 1913	0.409 [0.438]	0.814** (0.040)
Concentration index, lead underwriters (HHI)	0.705 [0.298]	0.281** (0.072)
Average rank of lead underwriters (1=top, 96=bottom)	13.927 [19.294]	-10.817* (4.276)
B. Other firm characteristics		
Board Size	12.423 [3.636]	0.476 (0.880)
Board interlocks with NYSE-listed industrials	6.254 [4.795]	0.256 (1.200)
Board interlocks with NYSE-listed railroads	12.028 [8.020]	4.874* (2.415)
Indicator: firm has a 10% owner (in 1909)	0.674 [0.474]	0.088 (0.146)
Firm age (years)	30.000 [22.540]	4.149 (5.992)
Firm location: ICC region (1-8)	4.696 [2.322]	0.638 (0.672)
Fraction total revenues from freight	0.706 [0.098]	-0.014 (0.025)
Fraction total assets from railway, land and equipment	0.731 [0.205]	-0.084 (0.053)

"High" = in the top 25% of the distribution of the amount of underwriting done by firms represented on board up to 1913

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2.5 major underwriters on boards; 41% of underwriting done by bankers on boards on avg.

Many interlocks with other RRs, and Industrials

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Those in the 'high board undw' group using fewer lead underwriters, higher-ranked ones

Groups similar in most other respects

	Mean, 1913 [Std Dev]	Difference: High Board Underwriting Minus Low, 1913 (SE)	Differential Trend: High Board Underwriting Minus Low, 1905-1912 (SE)
	(1)	(2)	(3)
Mileage operated, in thousands	2.732 [2.905]	1.520* (0.751)	0.041 (0.029)
Log(assets)	18.720 [1.213]	1.013** (0.268)	0.006 (0.007)
Book leverage	0.460 [0.157]	0.061+ (0.032)	0.004 (0.004)
Average interest rate	0.043 [0.017]	-0.008** (0.003)	-0.0004 (0.0004)
Return on Equity (ROE)	0.137 [0.068]	0.016 (0.022)	0.001 (0.024)
Tobin's Q	0.893 [0.198]	0.015 (0.069)	-0.0001 (0.005)
Dividend rate	0.187 [0.200]	0.001 (0.058)	0.005 (0.008)
Investment (growth of fixed capital)	0.026 [0.052]	0.021 (0.018)	0.002 (0.002)

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Average interest rate	0.043 [0.017]	-0.008** (0.003)	-0.0004 (0.0004)
Return on Equity (ROE)	0.137 [0.068]	0.016 (0.022)	0.001 (0.024)
Tobin's Q	0.893 [0.198]	0.015 (0.069)	-0.0001 (0.005)
Dividend rate	0.187 [0.200]	0.001 (0.058)	0.005 (0.008)
Investment (growth of fixed capital)	0.026 [0.052]	0.021 (0.018)	0.002 (0.002)

High board undw group larger, more levered, and with lower interest rates; but *no differential changes* over time

Empirical Framework

Main specification:

$$y_{it} = \alpha_i + \gamma_t + \lambda_1 \text{Percent Undw by Banks on Board in } 1913_i * \text{Post}1920$$
$$+ \lambda_2 \text{Percent Undw by Banks on Board in } 1913_i * \text{trend}_t + \varepsilon_{it}$$

- *Percent Undw by Banks on Board* is the percent of value of debt issuances from 1905 to 1913 underwritten by banks on the railroad's board in 1913
- *Post 1920* =1 for the period 1921-1929
- Addresses concern that ongoing trends may influence estimates

Annual Differences: High Board Underwriting vs. Other
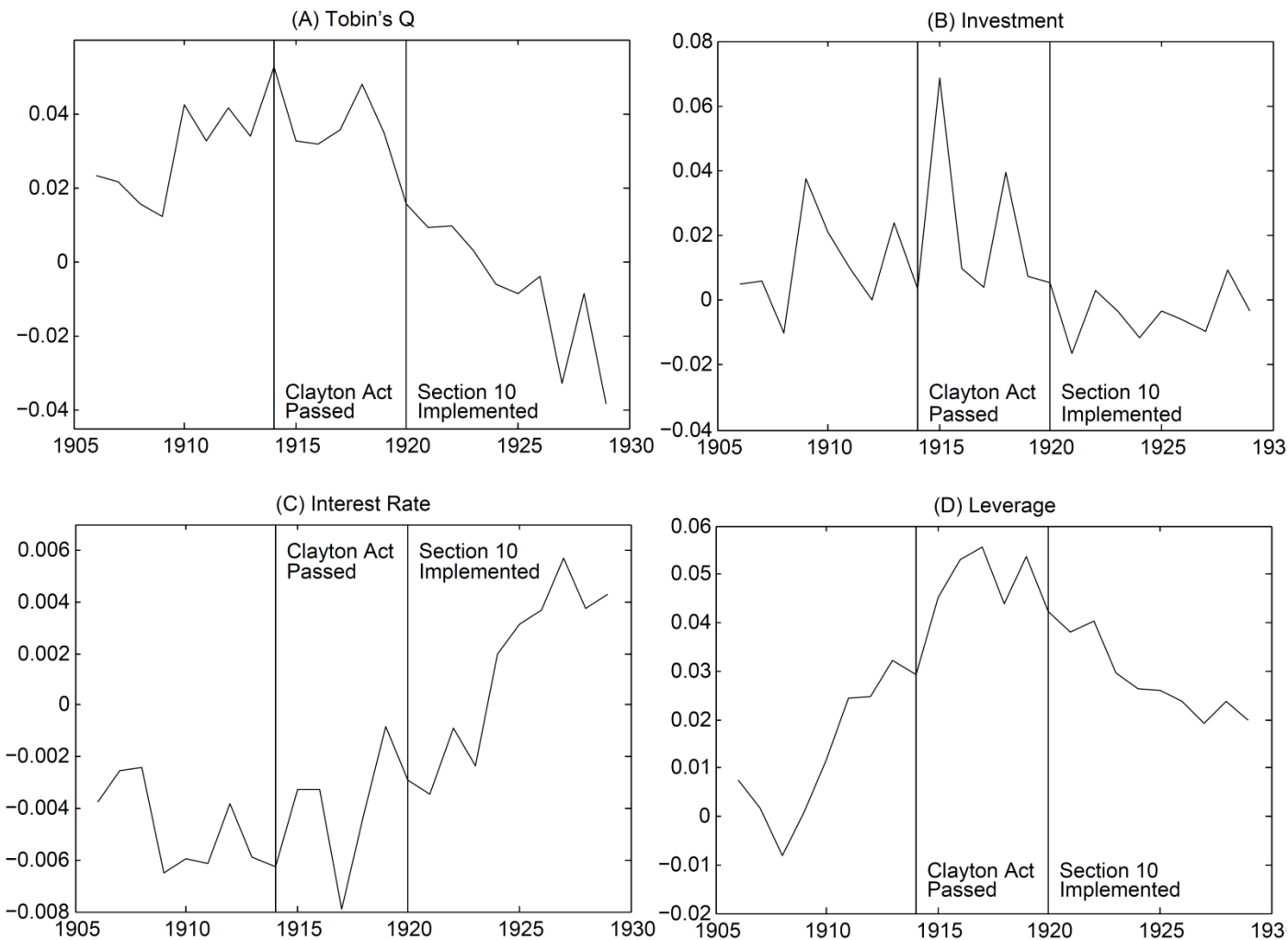
Regressions: Firm Outcomes

	Railroads				Falsification Test: Industrials			
	Tobin's Q	Invstmt Rate	Interest Rate	Leverage	Tobin's Q	Invstmt Rate	Interest Rate	Leverage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pct board undw 1913 × post-1920	-0.044*	-0.022**	0.005+	-0.045**	0.065	0.009	-0.010	-0.022
	(0.021)	(0.008)	(0.002)	(0.016)	(0.083)	(0.034)	(0.007)	(0.023)
Pct board undw 1913 × time trend	0.003	0.001	0.0002	0.001	0.006	-0.004	0.001	-0.002
	(0.003)	(0.001)	(0.0002)	(0.002)	(0.011)	(0.003)	(0.001)	(0.003)
Log(lag assets)	-0.118*	-0.015	-0.004	0.003	-0.324	-0.021	-0.007+	-0.008
	(0.053)	(0.011)	(0.004)	(0.029)	(0.105)	(0.017)	(0.003)	(0.025)
Constant	3.208**	0.299	0.110	0.404	1.395	0.448	0.166**	0.231
	(1.002)	(0.208)	(0.079)	(0.526)	(1.853)	(0.300)	(0.061)	(0.431)
Dependent variable stats, 1920:								
Mean	0.783	0.032	0.048	0.350	0.696	0.127	0.067	0.103
SD	0.095	0.029	0.013	0.142	0.191	0.177	0.028	0.100
Observations	1,084	1,286	1,473	1,552	824	1,237	727	1,248
R-squared	0.776	0.192	0.456	0.856	0.565	0.224	0.485	0.658
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Alternative Specifications

Potential concerns:

1) Firms with close ties to underwriters not comparable to others (in post-20 years, relative to earlier years)

      -Add as regressors firm characteristics where 'high underwriting' group is different, interacted with trends

      -Use propensity score approach to balance firms on observables, eliminate firms outside of common support in propensity to have a close relationship with an underwriter

2) Ongoing trends responsible for results

      -Create placebo "1909 Clayton Act," test for effects

	Tobin's Q (1)	Investment rate (2)	Interest rate (3)	Leverage (4)
A: Controls for 1913 assets, leverage, interlocks with railroads, mileage, and number of underwriters on board, interacted with trends				
Pct underwriting, bankers on board 1913 × post-1920	-0.045+	-0.022**	0.005+	-0.045**
	(0.024)	(0.008)	(0.002)	(0.016)
Pct underwriting, bankers on board 1913 × trend	0.006	0.001	0.0001	0.0004
	(0.004)	(0.001)	(0.0002)	(0.002)
Observations	1,059	1,264	1,448	1,552
R-squared	0.804	0.197	0.481	0.857
B: Binary Treatment				
High underwriting by bankers on board 1913 × post-1920	-0.044+	-0.024**	0.004+	-0.039**
	(0.023)	(0.007)	(0.002)	(0.014)
High underwriting by bankers on board 1913 × trend	0.001	0.001	0.001	0.003
	(0.003)	(0.001)	(0.0002)	(0.002)
Observations	1,084	1,286	1,473	1,552
R-squared	0.777	0.194	0.454	0.856
C: Common Support; Propensity Score Weighted				
High underwriting by bankers on board 1913 × post-1920	-0.068*	-0.035**	0.005+	-0.042**
	(0.033)	(0.008)	(0.002)	(0.016)
High underwriting by bankers on board 1913 × trend	0.003	0.001	-0.0001	0.004+
	(0.004)	(0.001)	(0.0002)	(0.002)
Observations	1,057	1,183	1,380	1,429
R-squared	0.777	0.186	0.442	0.773
D: Placebo 1909 Clayton Act				
Pct underwriting, bankers on board 1913 × post-1909	-0.017	0.020	-0.004	-0.003
	(0.023)	(0.037)	(0.002)	(0.017)
Pct underwriting, bankers on board 1913 × trend	0.001	-0.002	0.0002	0.0004
	(0.009)	(0.008)	(0.001)	(0.005)
Observations	327	451	460	498
R-squared	0.950	0.263	0.749	0.928

Other Effects of Section 10

1. <u>Other self-dealing</u>. Section 10 applies not only to banker-directors, but all directors: no 'related-party transactions' (self-dealing)

Look for other directors with opportunities to profit from self-dealing: firms that supplied RRs with equipment. RRs with director interlocks with those firms should benefit from Section 10

(Far less likely relationships with such suppliers could benefit RRs in the way that relationships with bankers did)

2. <u>Collusion.</u> Authors of Section 10 hoped banker resignations would undermine ability of bankers to facilitate collusion among competing RRs.

Look for interlocks among competing RRs created by underwriters (those most likely to resign) – see if those firms are hurt

Important to remember that interlocks among RRs are very very dense; those created by bankers only a small fraction

	Tobin's Q (1)	Investment rate (2)	Interest rate (3)	Leverage (4)
A: Interlocks With Capital Equipment Suppliers				
Pct underwriting by bankers on board 1913 × post-1920	-0.050*	-0.024**	0.005+	-0.045**
	(0.022)	(0.008)	(0.003)	(0.015)
Pct underwriting by bankers on board 1913 × trend	0.004	0.001	0.0002	0.001
	(0.003)	(0.001)	(0.0002)	(0.002)
Interlocks with equipment suppliers 1913 × post-1920	0.014*	0.004*	0.0001	0.002
	(0.006)	(0.002)	(0.001)	(0.004)
Interlocks with equipment suppliers 1913 × trend	-0.001+	-0.0001	0.00003	-0.001
	(0.001)	(0.0002)	(0.0001)	(0.001)
Observations	1,084	1,286	1,473	1,552
R-squared	0.779	0.194	0.457	0.857
B: Interlocks With Competitors Through Firm's Underwriters				
Pct underwriting by bankers on board 1913 × post-1920	-0.042+	-0.022**	0.004	-0.034*
	(0.024)	(0.008)	(0.003)	(0.016)
Pct underwriting by bankers on board 1913 × trend	0.001	0.001	0.0003	0.002
	(0.003)	(0.001)	(0.0002)	(0.002)
Competitor interlocks via bankers on board 1913 × post-1920	-0.001	-0.001	0.0001	-0.002
	(0.004)	(0.001)	(0.001)	(0.002)
Competitor interlocks via bankers on board 1913 × trend	0.001	0.0001	-0.0001	-0.0003
	(0.001)	(0.001)	(0.0001)	(0.0003)
Observations	1,034	1,227	1,405	1,488
R-squared	0.783	0.196	0.469	0.862

Resignations

Between 1914 and 1920, significant resignations in anticipation of Section 10

Which relationships were severed, and which were retained?

Approach:
- Estimate specification with underwriting data from 1920 (instead of 1913) with OLS – will be biased, reflecting selection effects of resignations
- Re-estimate using 1913 data as IV
- Compare OLS and IV estimates to get a sense of direction of bias.

Selection Effects in Resignations

	Tobin's Q		Investment Rate		Interest Rate		Leverage	
	OLS	IV-2SLS	OLS	IV-2SLS	OLS	IV-2SLS	OLS	IV-2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pct underwriting, bankers on board 1920 × post-1920	-0.056*	-0.066*	-0.026**	-0.031**	0.005*	0.006	-0.034+	-0.054*
	(0.025)	(0.032)	(0.008)	(0.010)	(0.003)	(0.003)	(0.017)	(0.022)
Pct underwriting, bankers on board 1920 × trend	0.001	0.005	0.001	0.001	0.0001	0.0002	0.002	0.001
	(0.004)	(0.005)	(0.001)	(0.001)	(0.0002)	(0.0003)	(0.003)	(0.003)
Kleinbergen-Paap F-statistic	–	20.440	–	41.872	–	32.297	–	37.096
Observations	1,025	1,025	1,224	1,224	1,399	1,399	1,470	1,470
R-squared	0.773	0.411	0.197	0.084	0.452	0.199	0.851	0.309
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Conclusions

Used regulation imposed on RRs to estimate value of underwriter relationships cemented with board seats

For RRs that had stronger relationships with underwriters in 1913, the regulation resulted in
      -Lower valuations, investment rates, and leverage
      -Higher interest costs

Consistent with banker-directors acting as monitors, resolving frictions; inconsistent with Progressive critique of bankers (at least in their capacities as directors)

Regulation harmed the firms it was intended to help

Extra Slides

	Railroads			
	Tobin's Q	Invstmt Rate	Interest Rate	Leverage
	(1)	(2)	(3)	(4)
Pct board undw 1913 × post-1920	-0.044+	-0.021*	0.004	-0.047*
	(0.023)	(0.008)	(0.003)	(0.018)
Pct board undw 1913 × federal control and transition (1918-21)	0.0003	0.0003	-0.0007	-0.004
	(0.024)	(0.006)	(0.003)	(0.014)
Pct board undw 1913 × time trend	0.003	0.001	0.0002	0.001
	(0.003)	(0.001)	(0.0002)	(0.002)
Log(lag assets)	-0.118*	-0.015	-0.004	0.002
	(0.053)	(0.011)	(0.004)	(0.029)
Constant	3.207**	0.299	0.110	0.409
	(1.002)	(0.209)	(0.079)	(0.532)
Observations	1,084	1,286	1,473	1,552
R-squared	0.776	0.192	0.456	0.856
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

	Mean, High Board Underwriting Railroads (1)	Mean, Low Board Underwriting Railroads (2)	Difference, High Board Underwriting vs. Low (3)	Correlation, Pct. Board Underwriting, 1913 (4)
A. Federal Operations (1918-20)				
Guaranteed income, fraction of 1918 assets	0.036 (0.002)	0.036 (0.002)	0.0001 (0.003)	-0.029
Revision to income guarantee, fraction of 1918 assets	-0.0001 (0.0002)	-0.0002 (0.0002)	0.00002 (0.0003)	0.009
B. Transition Period (1920-21)				
Income support, 1920, fraction of 1920 assets	0.016 (0.002)	0.017 (0.001)	-0.0008 (0.003)	-0.118
Borrowed from federal government (binary), 1920	0.438 (0.128)	0.410 (0.080)	0.027 (0.149)	0.055
Amount borrowed from gov't, fraction of 1920 assets	0.017 (0.007)	0.028 (0.017)	-0.011 (0.027)	-0.096

Table A6:
First-Stage Regressions, Railroads: Q, Investment Rates

	Tobin's Q		Investment Rate	
	Pct undw, bankers on board in 1920 × post-1920 (1)	Pct undw, bankers on board in 1920 × trend (2)	Pct undw, bankers on board in 1920 × post-1920 (3)	Pct undw, bankers on board in 1920 × trend (4)
Pct underwriting, bankers on board 1913 × post-1920	0.731** (0.102)	0.541 (0.469)	0.763** (0.081)	0.243 (0.210)
Pct underwriting, bankers on board 1913 × trend	-0.0004 (0.002)	0.681** (0.111)	-0.001 (0.001)	0.737** (0.084)
Observations	1,025	1,025	1,224	1,224
R-squared	0.767	0.758	0.809	0.811
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: Standard errors clustered by firm. **, *, and + denote significance at 1%, 5%, and 10%, respectively. All specifications include the same controls as those of Table 5.

Table A7:
First-Stage Regressions, Railroads: Interest Rates, Leverage

	Interest Rate		Leverage	
	Pct undw, bankers on board in 1920 × post-1920 (1)	Pct undw, bankers on board in 1920 × trend (2)	Pct undw, bankers on board in 1920 × post-1920 (3)	Pct undw, bankers on board in 1920 × trend (4)
Pct underwriting, bankers on board 1913 × post-1920	0.762** (0.081)	0.589 (0.378)	0.761** (0.081)	0.445 (0.370)
Pct underwriting, bankers on board 1913 × trend	-0.001 (0.001)	0.699** (0.093)	-0.0002 (0.001)	0.722** (0.086)
Observations	1,399	1,399	1,470	1,470
R-squared	0.807	0.797	0.809	0.803
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Change in Underwriting Relationships

	HHI Concentration index Underwriting among bankers		
	High board undw (1)	Low board undw (2)	Difference: High-Low (3)
Time Period:			
1900-1920	0.812	0.491	0.321**
	(0.075)	(0.049)	(0.089)
1921-1929	0.625	0.638	-0.013
	(0.075)	(0.046)	(0.086)
Change: 1921-1929 vs. 1900-1920	-0.187+	0.147*	-0.334**
	(0.106)	(0.066)	(0.114)