

A Century of Capital Structure: The Leveraging of Corporate America

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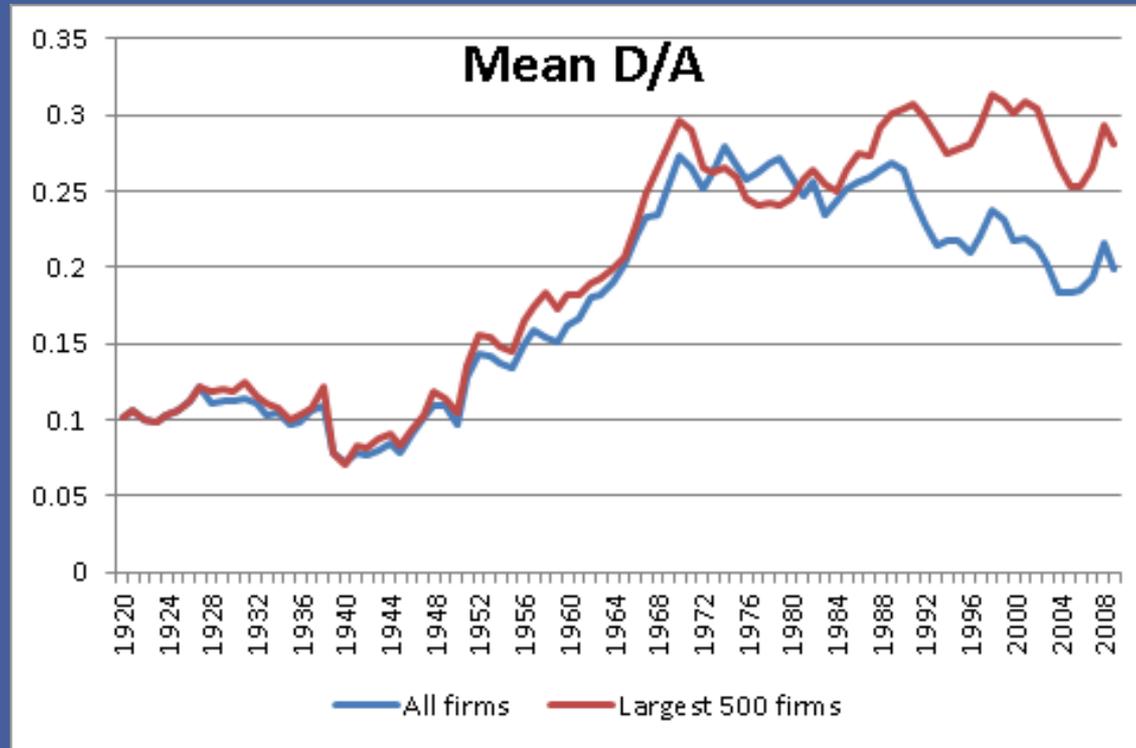
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July 28, 2011

Motivation

- Most capital structure studies rely on Compustat data after 1971.
- Why consider historical data?
 - Examine corporate policies over longer horizon
 - Leverage and macro conditions (Bhamra, Kueh, Strebulaev 2008)
 - Within-firm dynamics (DeAngelo and Roll, 2011)
 - Additional sources of exogenous variation in market frictions
 - Tax law changes
 - Securities regulation, disclosure requirements
 - Shocks to capital market liquidity

Average Leverage 1920 - 2009



- Research questions:
 - Why did corporate leverage triple from the pre-war years to the 1970s?
 - Do these same motives generalize to explain capital structure decisions more broadly?

Outline

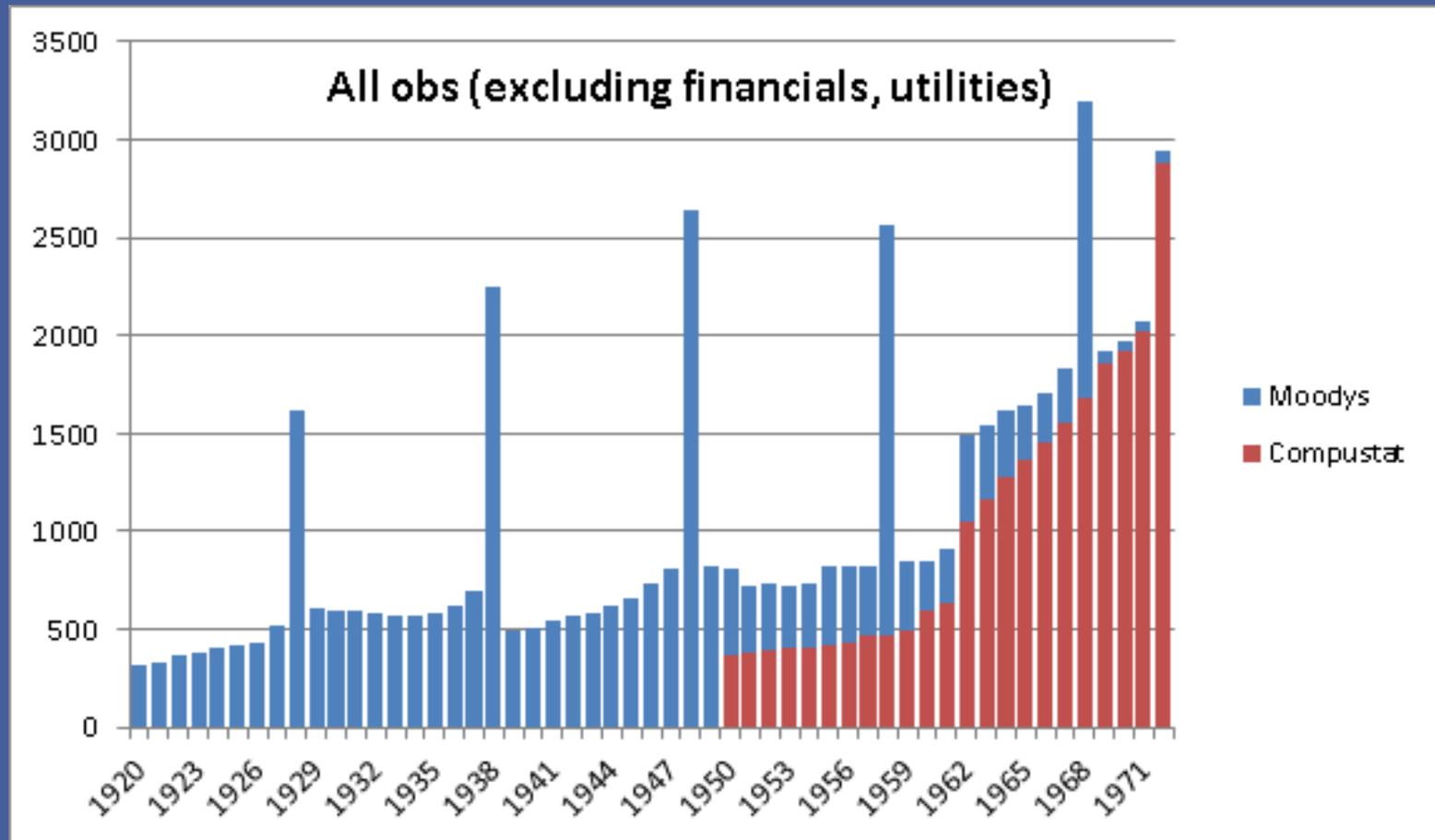
- Data sources
- Leverage trends
- Evaluation of explanations
 - Industry composition
 - Firm characteristics and macro variables
 - Corporate tax rates
 - Credit supply conditions
 - Nature of assets/investments

New (old) Corporate Data

- Large panel of balance sheet and income statement data back to 1918
- Hand-entered from Moods Industrial manuals
- Coverage:
 - Pre-1950: all CRSP firms, excluding financials, utilities and railroads
 - Post-1950: all firms in CRSP not covered by Compustat
 - Every “8” year (i.e. 1928, 1938...): all firms in Moody’s Industrial Manual

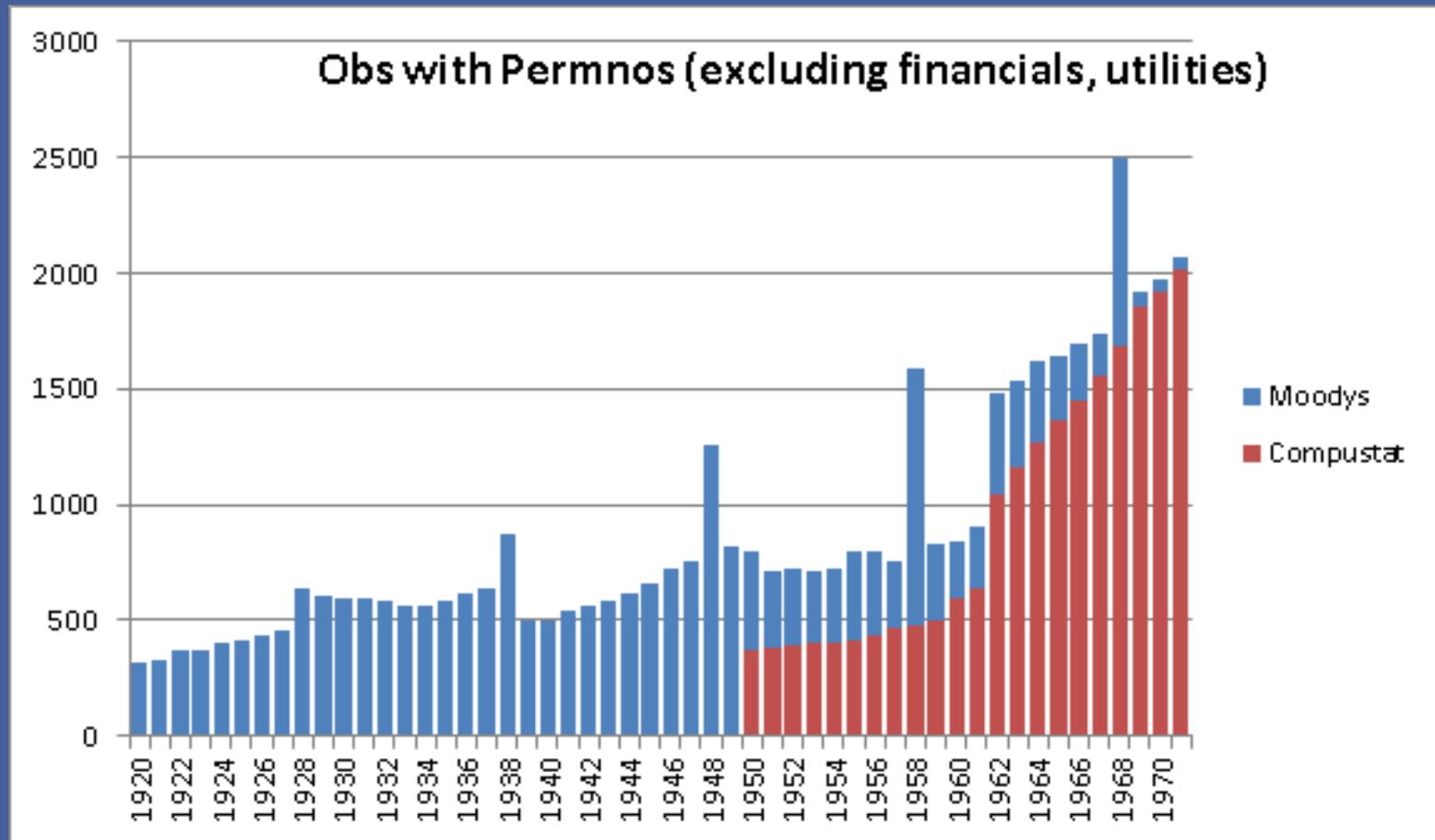
New (old) Corporate Data

- Observation counts:



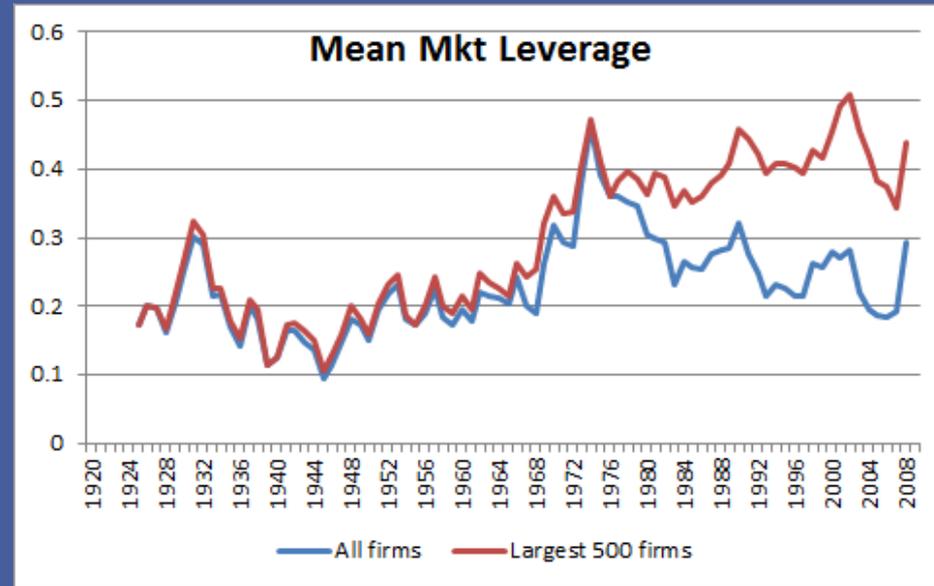
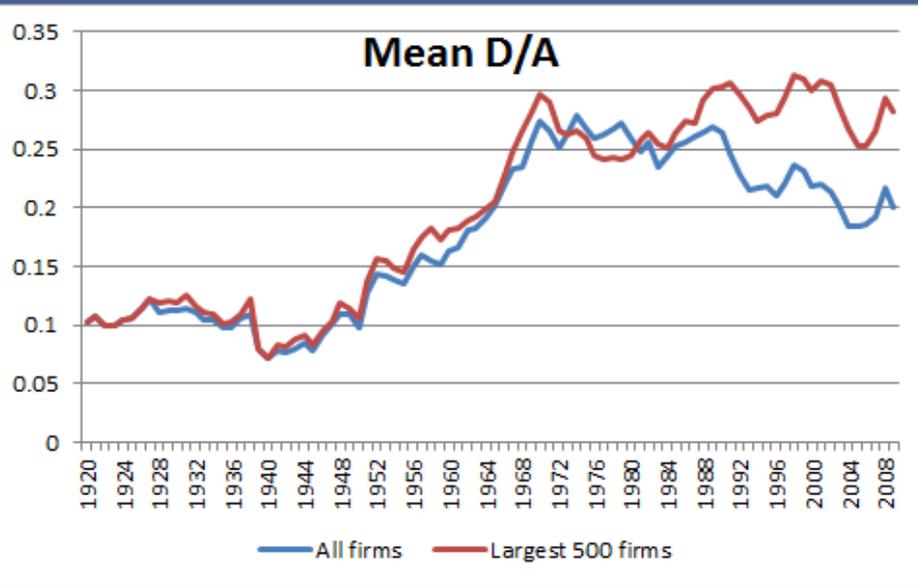
New (old) Corporate Data

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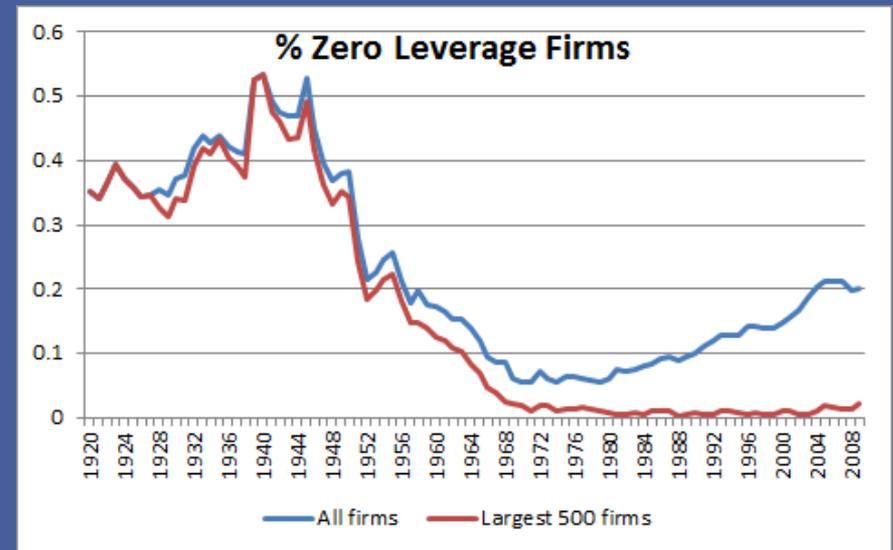
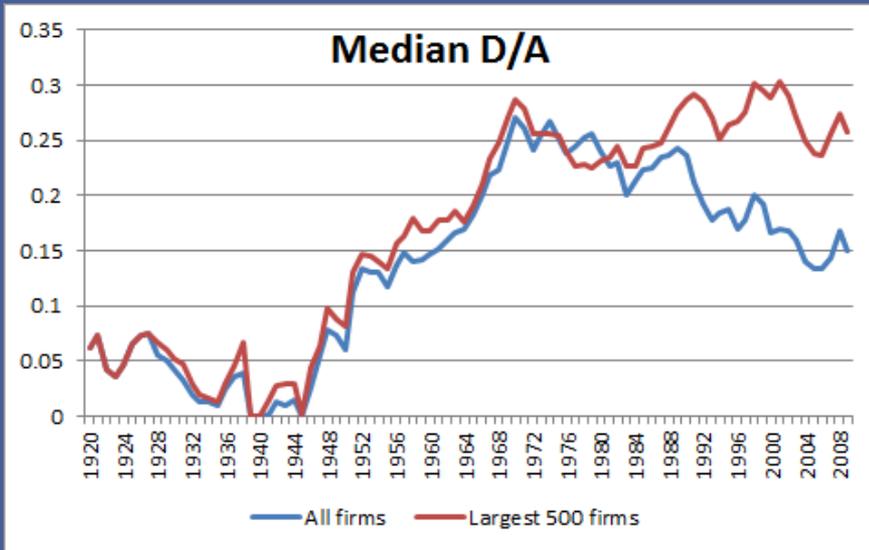
Leverage Trends

- Book and Market leverage:



Leverage Trends

- Not driven by outliers, many more firms using debt:

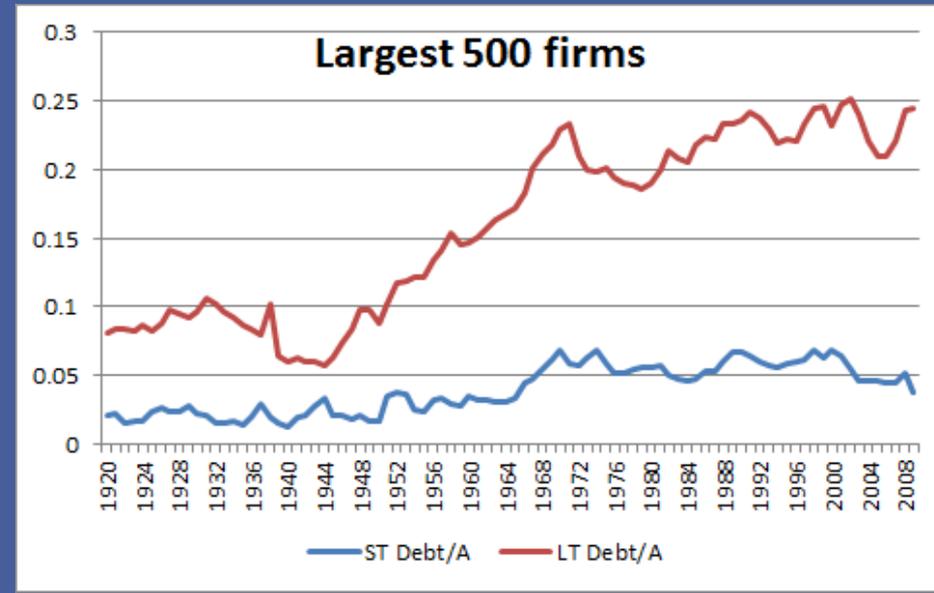
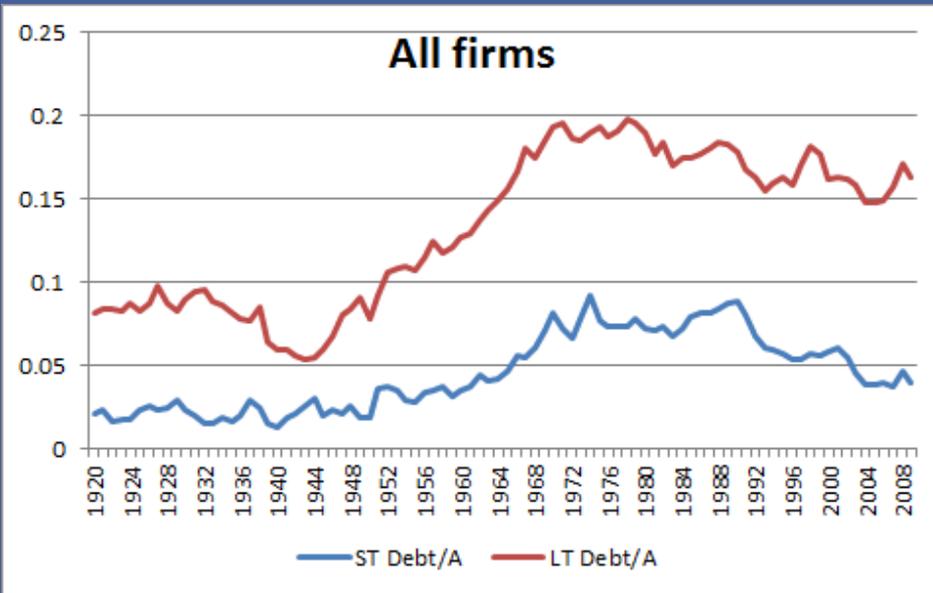


- Distribution of leverage changes across periods:

	<u>1930 - 1949</u>	<u>1950 - 1969</u>	<u>1970-1989</u>
$\Delta\text{lev} < -10\%$	18.8%	4.0%	26.6%
$\Delta\text{lev} < -5\%$	27.4%	7.8%	35.1%
$-5\% < \Delta\text{lev} < 5\%$	43.7%	22.3%	24.2%
$\Delta\text{lev} > +5\%$	28.9%	69.9%	40.7%
$\Delta\text{lev} > +10\%$	22.9%	56.6%	31.0%
n (survivors)	446	449	730

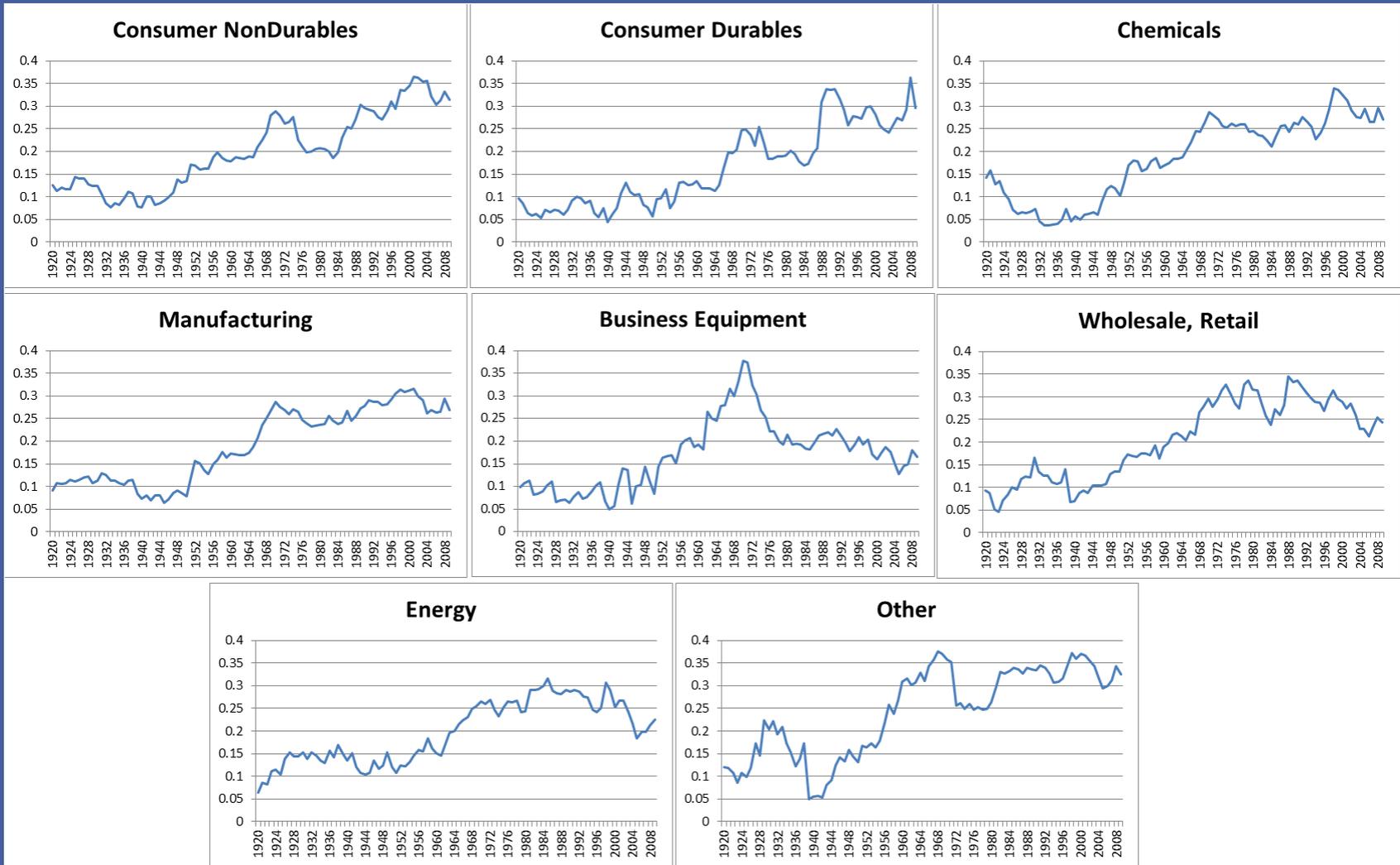
Leverage Trends

- Largely driven by increased long-term borrowing:



Consistent patterns across industry sectors

- Mean leverage by Fama-French 12 industry group:



Stable Industry Composition through 1970

- Industry distribution of full sample (Fama-French 12 industry groups):

	1920	1930	1940	1950	1960	1970	1980	1990	2000	2009
1 Consumer NonDurables	21%	20%	18%	19%	17%	16%	12%	8%	6%	6%
2 Consumer Durables	8%	9%	7%	7%	5%	7%	5%	4%	3%	3%
3 Manufacturing	33%	29%	37%	33%	37%	27%	23%	16%	12%	11%
4 Energy	12%	9%	7%	7%	5%	6%	9%	7%	4%	6%
5 Chemicals	5%	6%	7%	6%	6%	5%	4%	3%	2%	3%
6 Business Equipment	4%	5%	5%	5%	8%	9%	13%	20%	28%	22%
7 Telecom	0%	0%	0%	1%	1%	1%	1%	2%	5%	5%
9 Wholesale, Retail	8%	13%	11%	10%	10%	13%	14%	13%	12%	11%
10 Healthcare	1%	1%	2%	2%	2%	3%	4%	10%	11%	14%
12 Other	8%	8%	7%	9%	8%	13%	15%	18%	17%	20%
# firms	311	581	503	783	839	1925	3213	4404	5729	3451

The Role of Standard Determinants

- Marginal effects and explanatory power; panel regressions with firm fixed effects; dependent variable = Book Leverage; all independent variables lagged one year

	Levels		Changes	
	<u>1925-1970</u>	<u>1971-2009</u>	<u>1925-1970</u>	<u>1971-2009</u>
Firm Size	0.037***	0.038***	0.186***	0.197***
MA/BA	-0.002	-0.010***	0.079	-0.276***
Profitability	-0.025***	-0.033***	0.153***	-0.245***
Tang. Assets	0.031***	0.036***	0.404***	0.417***
Aaa Bond yield	0.019***	0.002**	0.467***	0.165***
Baa - Aaa spread	-0.005**	-0.005***	0.030	-0.086***
Inflation	0.004***	0.001	0.128***	-0.198***
Market Return	-0.001	-0.000	0.121**	0.213***
GDP	0.006	-0.010***	0.094**	0.454***
Tc	0.005	-0.004***	0.045	-0.093***
adj. R-sq	0.171	0.046	0.012	0.010

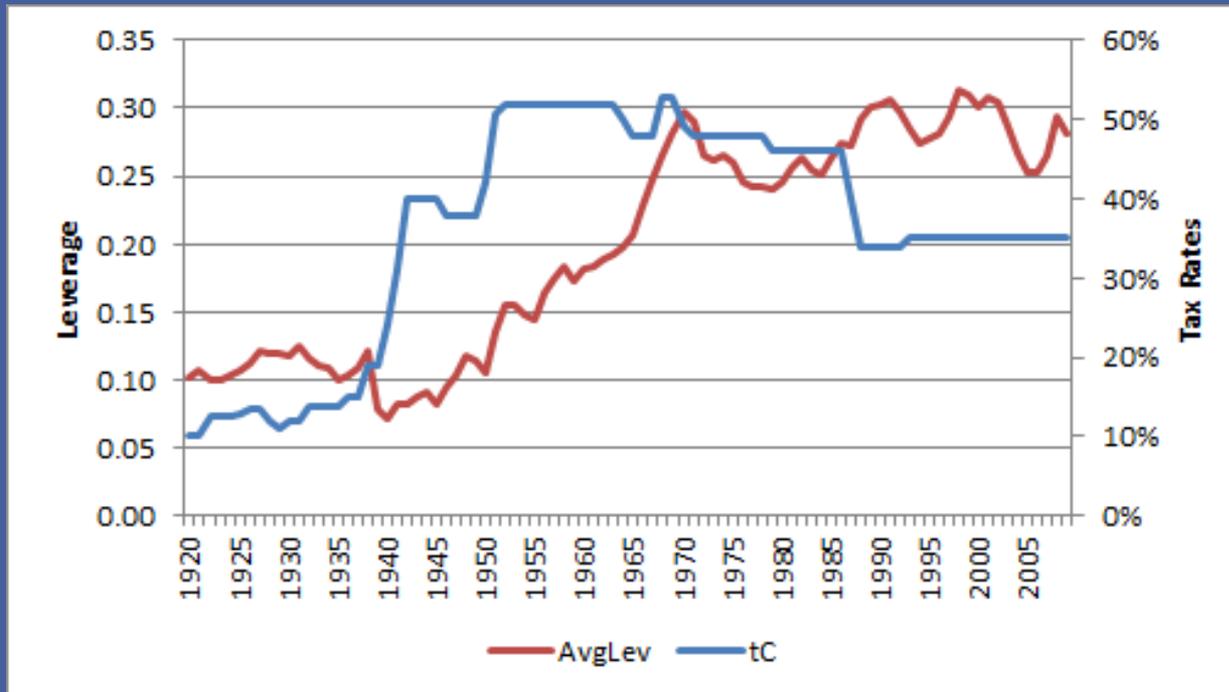
The Role of Standard Determinants

- Time series regression of change in average Book Leverage on lagged changes in average characteristics and macro variables:

	Full Sample				Large Firm Sample		
	<u>All Years</u>	<u>1925-1970</u>	<u>1971-2009</u>		<u>All Years</u>	<u>1925-1970</u>	<u>1971-2009</u>
Firm Size	-0.0012	-0.0011	0.0000	Firm Size	-0.0009	0.0019	-0.0036*
MA/BA	-0.0046**	-0.0008	-0.0066*	MA/BA	-0.0024	-0.0002	0.0047
Profitability	0.0027*	0.0045*	-0.0018	Profitability	0.0038**	0.0039*	-0.0025
Tang. Assets	0.0009	0.0011	-0.0024	Tang. Assets	0.0008	0.0008	-0.0061**
Aaa Bond yield	0.0026**	0.0039**	0.0009	Aaa Bond yield	0.0026*	0.0037	0.0027
Baa - Aaa spread	-0.0011	0.0004	-0.0023	Baa - Aaa spread	-0.0006	-0.0004	0.0043
Inflation	-0.0014	0.0011	0.0007	Inflation	-0.0005	0.0028	0.0014
Market Return	0.0035	0.0016	0.0027	Market Return	0.0034	0.0012	-0.0019
GDP	0.0018	0.0003	0.0042*	GDP	0.0002	-0.0033	0.0079***
Tc	0.0010	0.0008	0.0006	Tc	0.0008	0.0018	-0.0003
adj. R-sq	0.093	0.196	0.284	adj. R-sq	0.063	0.286	0.334

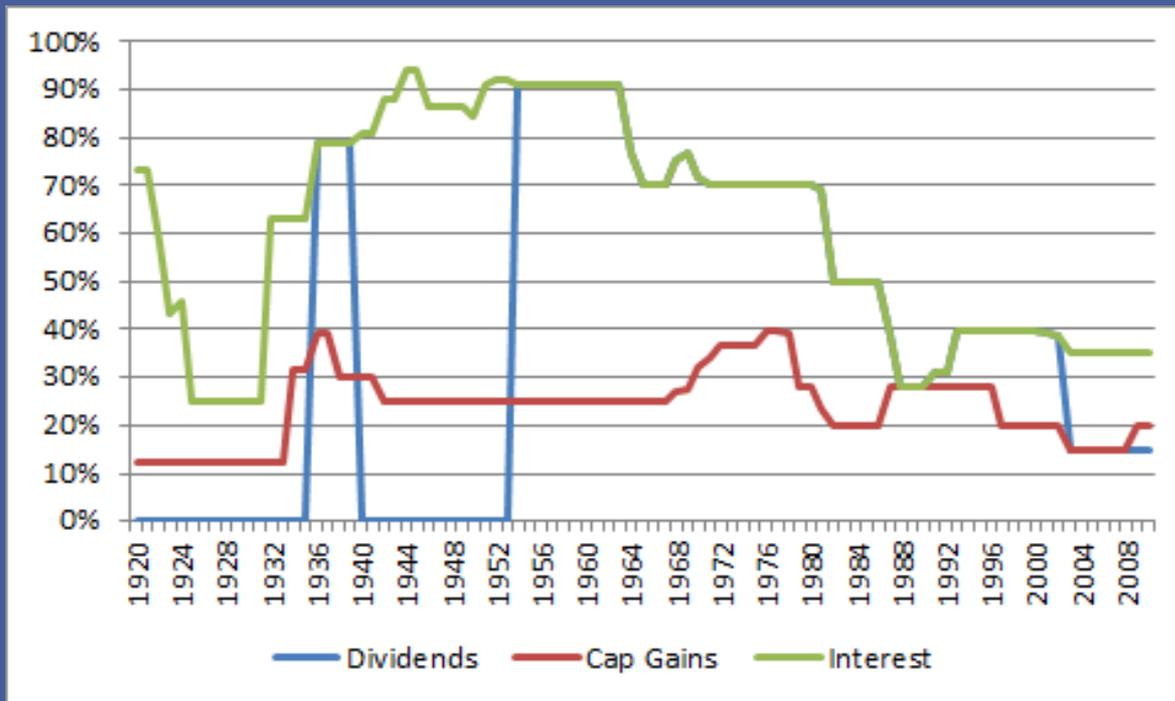
The Role of Taxes

- “The rise in corporate tax rates..., the growing institutionalization of savings, the upward surge of commodity prices, and the relatively low level of stock prices as compared with bonds, all served to encourage bond and discourage stock financing during the postwar period.” (Hickman 1953)
- Top corporate tax rate and average leverage ratios:



The Role of Taxes

- “The rise in corporate tax rates..., the growing institutionalization of savings, the upward surge of commodity prices, and the relatively low level of stock prices as compared with bonds, all served to encourage bond and discourage stock financing during the postwar period.” (Hickman 1953)
- Top personal tax rates:



The Role of Taxes

- Two major corporate tax rate changes:
 - Revenue Acts of 1940 – 1942
 - T_c : 19% (1939) to 40% (1942) in three increments.
 - “Excess profits tax”: top rate 50% (1940) up to 90% (1942)
 - Revenue Acts of 1950 – 1951
 - T_c : 38% (1949) to 51% (1951) in two increments.
 - Temporary “excess profits tax” (through 1953) with top rate 30%

Tax Event Leverage Changes

Revenue Acts 1940-42

	<u>1939</u>	<u>1943</u>	<u>Diff</u>	<u>Signif.</u>
All firms	0.069	0.070	0.001	
Profitability Tertiles				
1	0.100	0.081	-0.019	**
2	0.071	0.067	-0.004	
3	0.038	0.059	0.021	**

Revenue Acts 1950-51

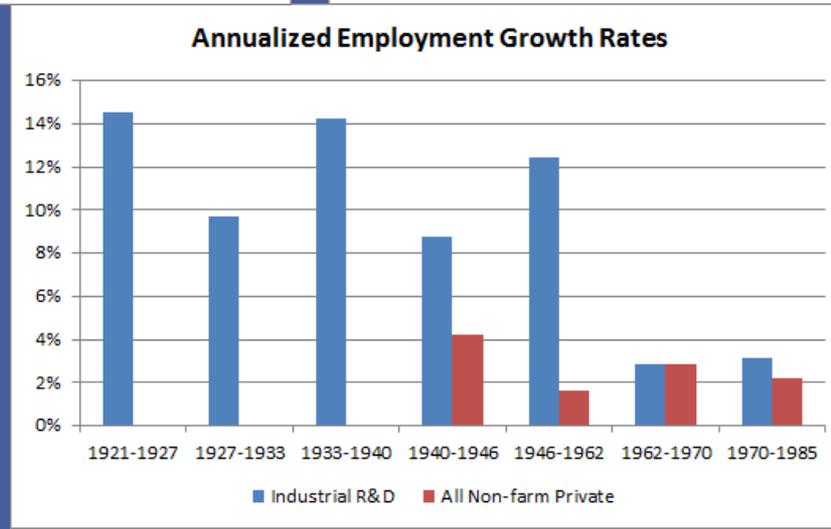
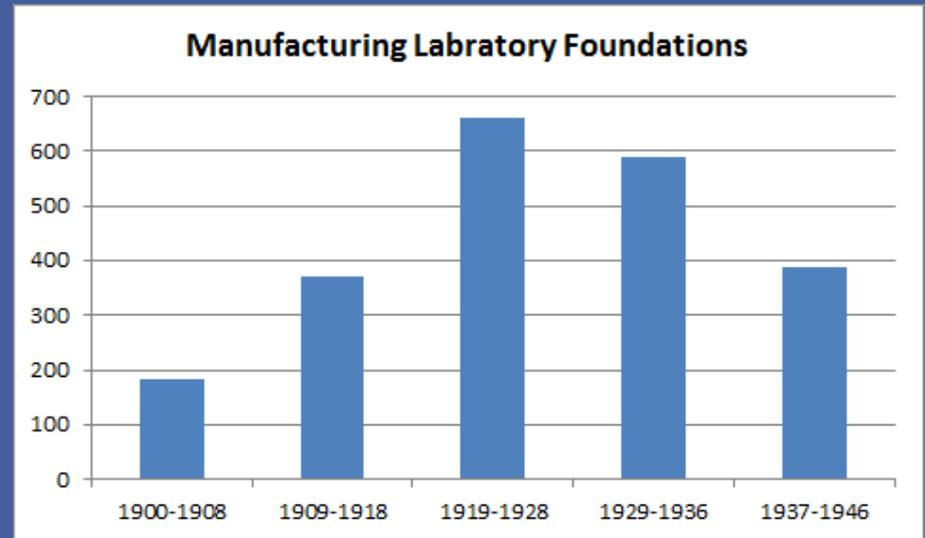
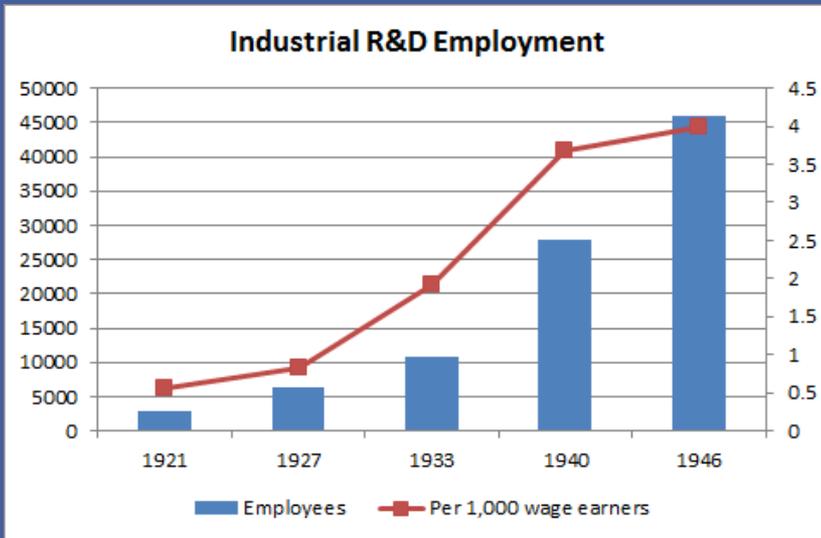
	<u>1949</u>	<u>1952</u>	<u>Diff</u>	<u>Signif.</u>
All firms	0.109	0.140	0.031	***
Profitability Tertiles				
1	0.152	0.176	0.023	***
2	0.126	0.155	0.028	***
3	0.053	0.098	0.045	***

Dif-in-Dif Regressions

	Revenue Acts of 1940-42		Revenue Acts of 1950-51	
Post	-0.019**	-0.014	0.023***	0.030***
	(-2.38)	(-1.31)	(3.00)	(3.58)
High Profit	-0.062***	-0.044***	-0.100***	-0.066***
	(-5.40)	(-2.91)	(-9.16)	(-5.32)
High Profit x Post	0.041***	0.034**	0.022**	0.011
	(3.40)	(2.38)	(2.27)	(1.06)
MA/BA		-0.005		-0.005
		(-1.04)		(-1.07)
Size		0.011***		0.016***
		(2.89)		(3.96)
Profitability		-0.047		-0.336***
		(-0.60)		(-5.07)
Tang. Assets		0.064**		0.055
		(2.24)		(1.59)
Constant	0.100***	0.033	0.152***	0.106***
	(10.04)	(1.54)	(15.81)	(4.28)
Observations	562	440	878	790
Adjusted R-squared	0.049	0.082	0.141	0.202

Changing Nature of Assets?

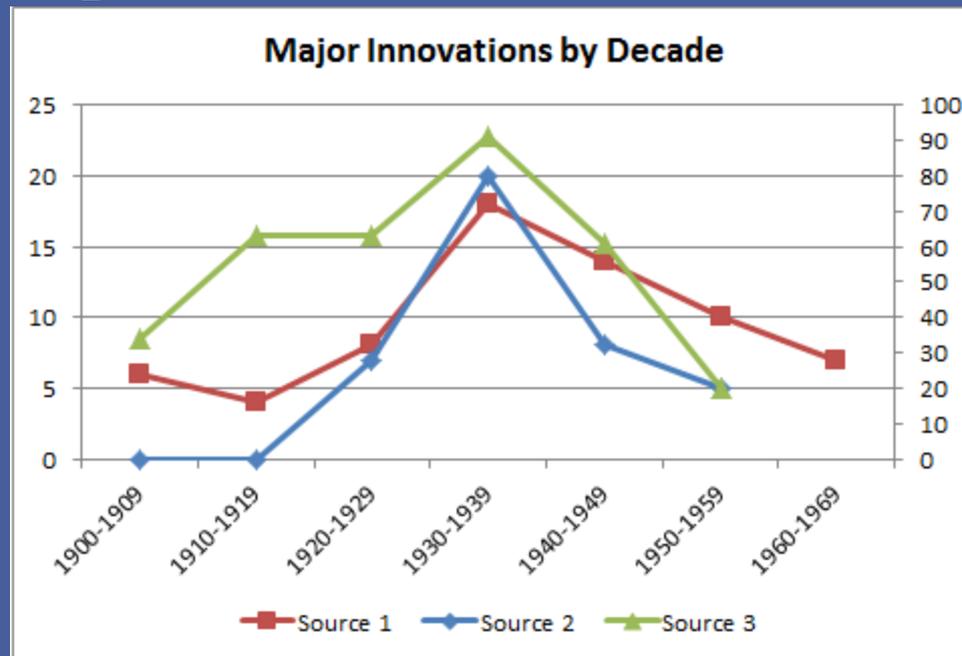
- Surge in industry R&D activity in the pre-war period:
 - R&D expenditure increased 150% in real terms from 1930 to 1940



Source: Mowery and Rosenberg (1989), BLS

Changing Nature of Assets?

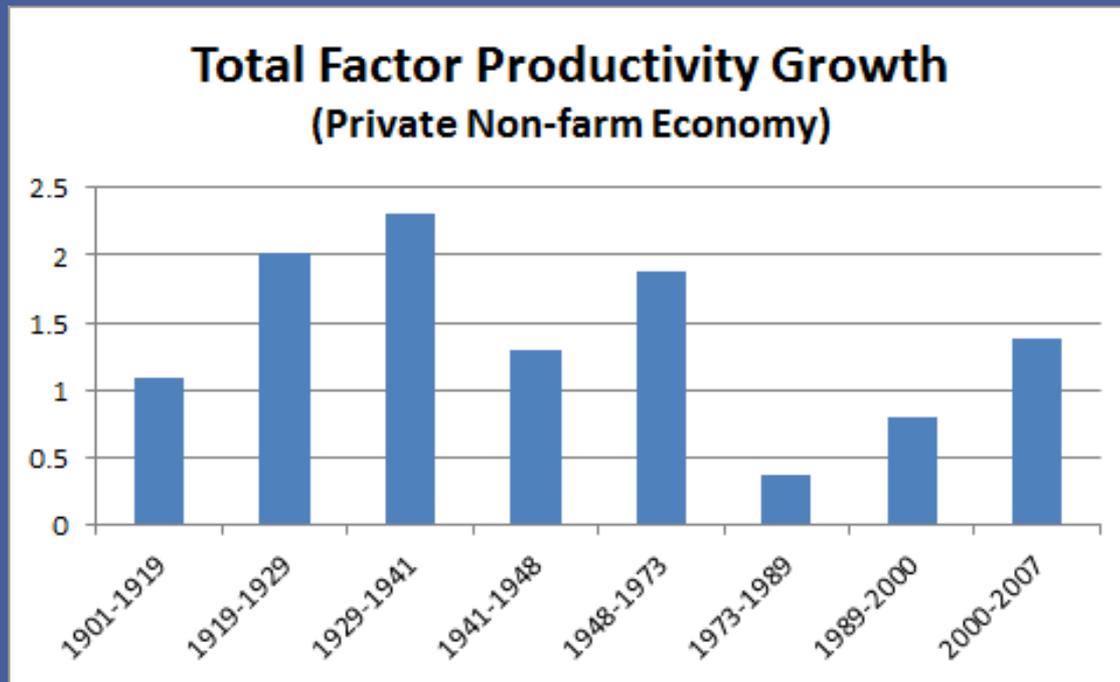
- Several authors document that the pace of innovation in the U.S. peaked in the 1930s:



- Source 1: Kleinknecht (1981), “radically new products” plus “improvement and process innovations”
- Source 2: Mensch (1975), Basic innovations put into regular production
- Source 3: Schmookler (1966): Basic and improvement innovations

Changing Nature of Assets?

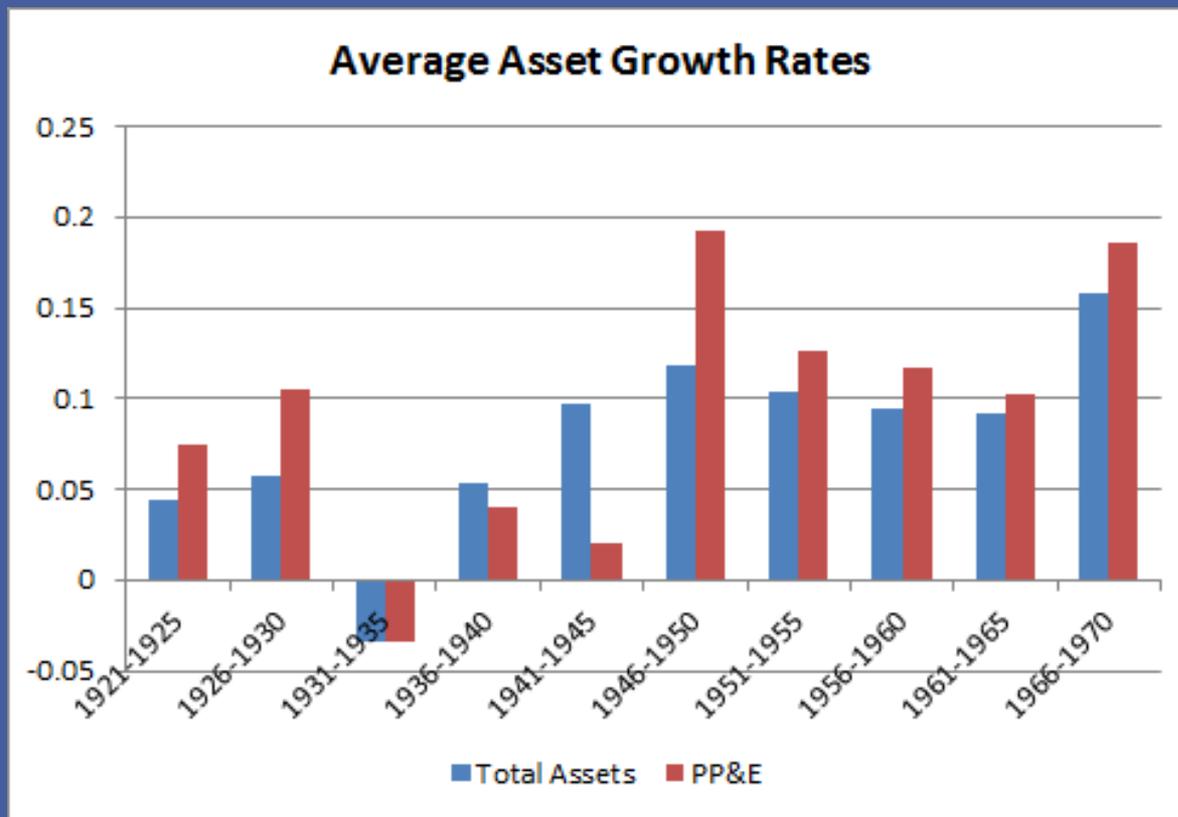
- Total Factor Productivity growth also peaked in the 1930s:



Source: Field (2011)

Changing Nature of Assets?

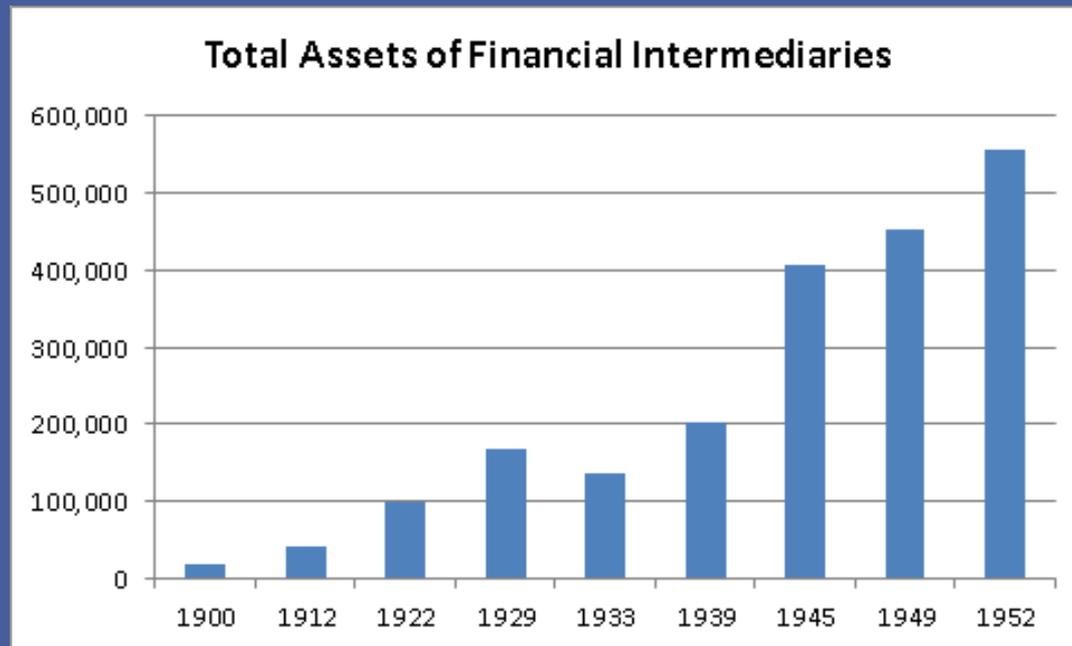
- While the *post*-War period began with rapid investment in tangible assets:



Source: Moodys data

Changes in Capital Markets

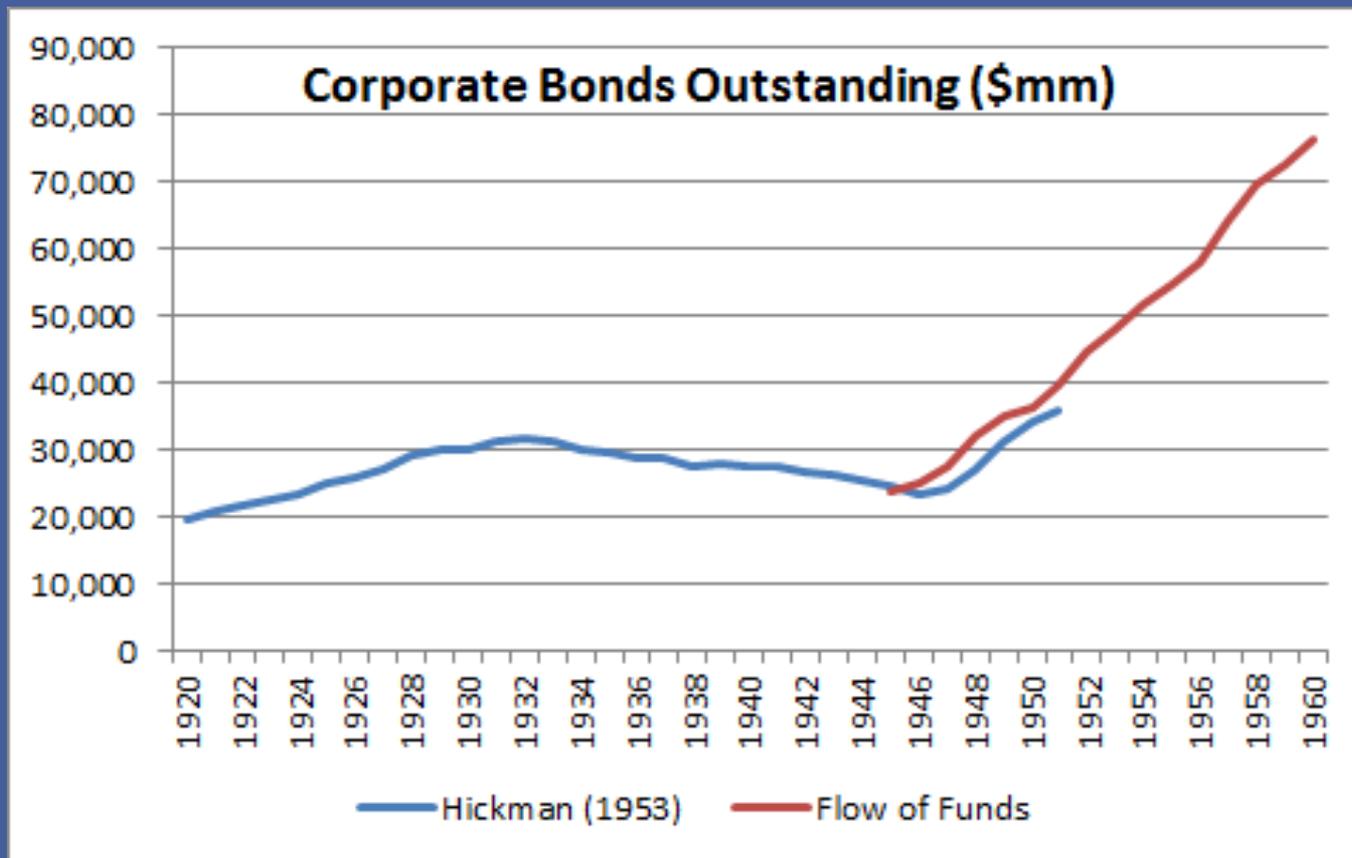
- “The rise in corporate tax rates..., the growing institutionalization of savings, ...served to encourage bond and discourage stock financing during the postwar period.” (Hickman 1953)
- Investment funds of institutional investors grew dramatically in the early 1940s:



Source: Goldsmith (1958)

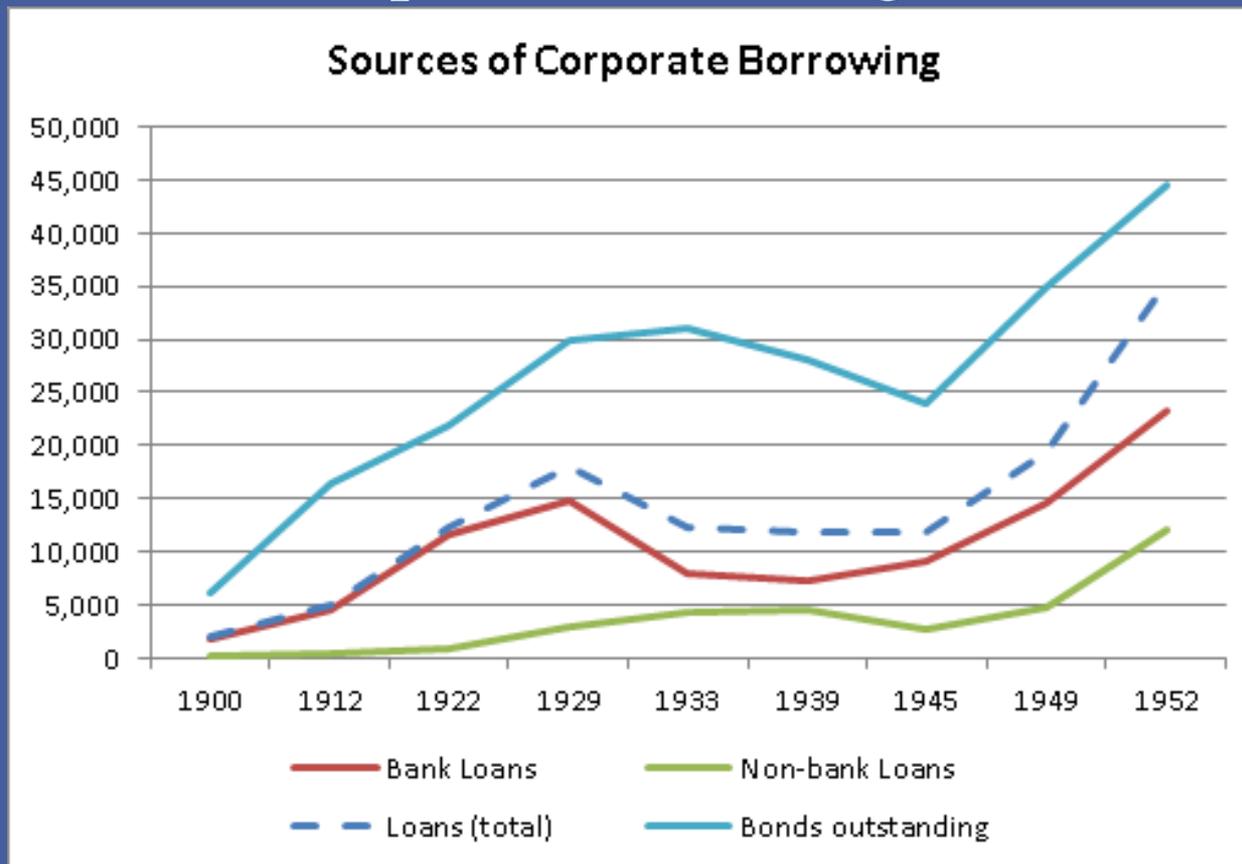
Sources of Debt

- 1946 was a turning point in the corporate bond market



Sources of Debt

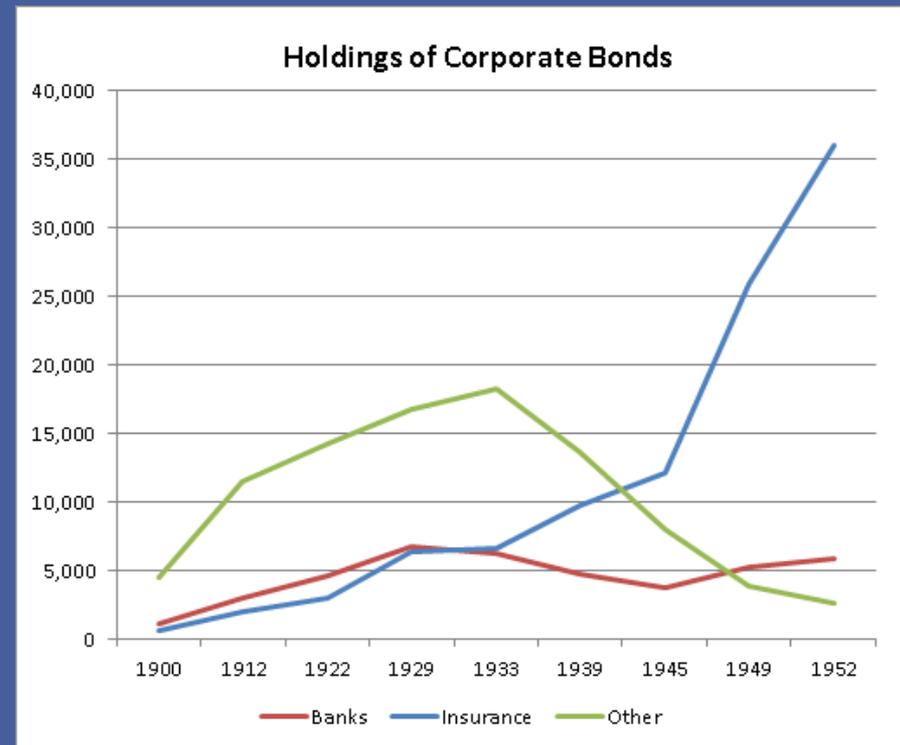
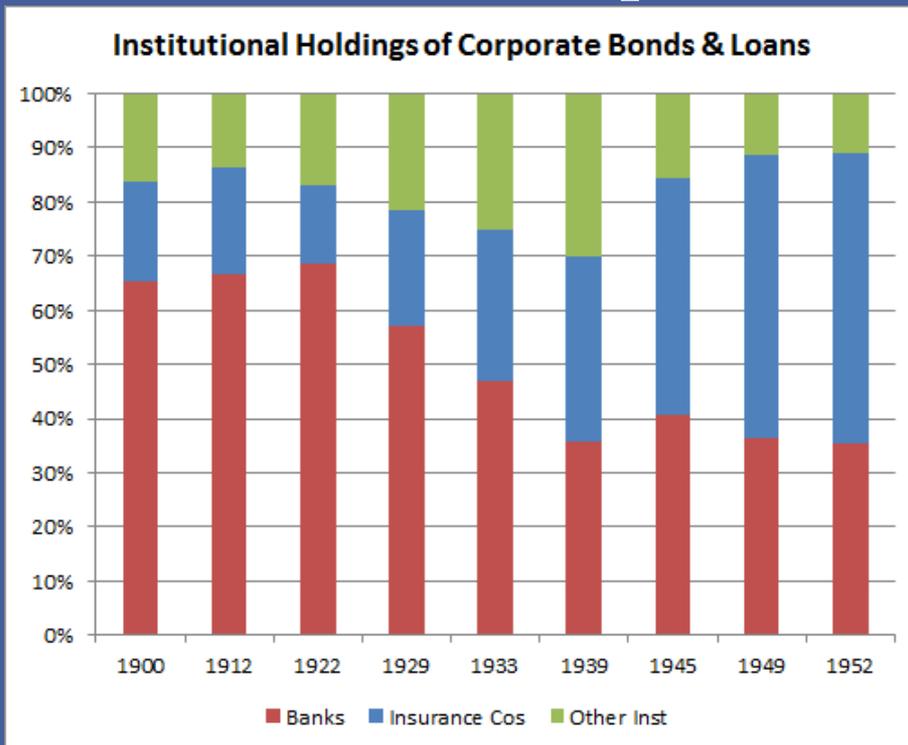
- Bonds, bank debt and non-bank debt all contributed to the increased corporate borrowing:



Source: Goldsmith (1958)

Growth of Insurance Companies

- Increased bond issuance facilitated by growth in insurance companies:

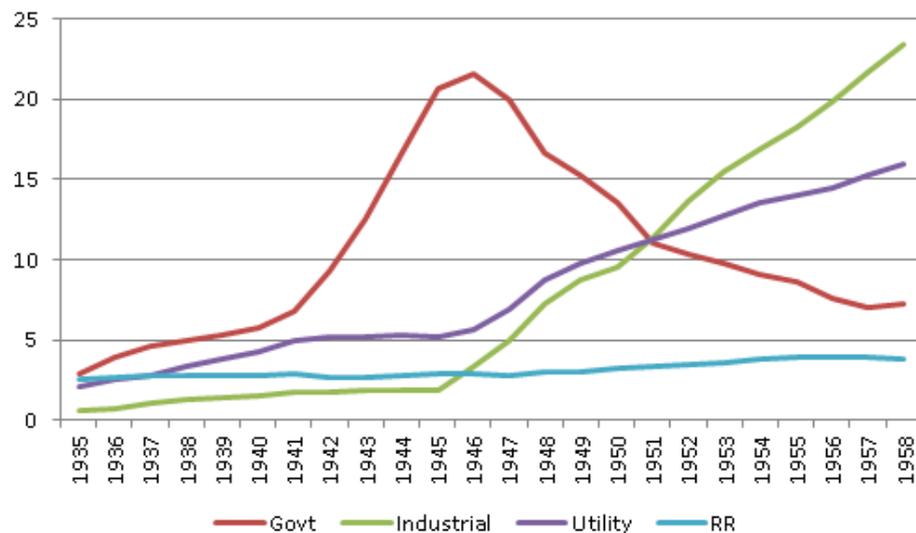


Source: Goldsmith (1958), Hickman (1953)

Changing Composition of Bond Holdings

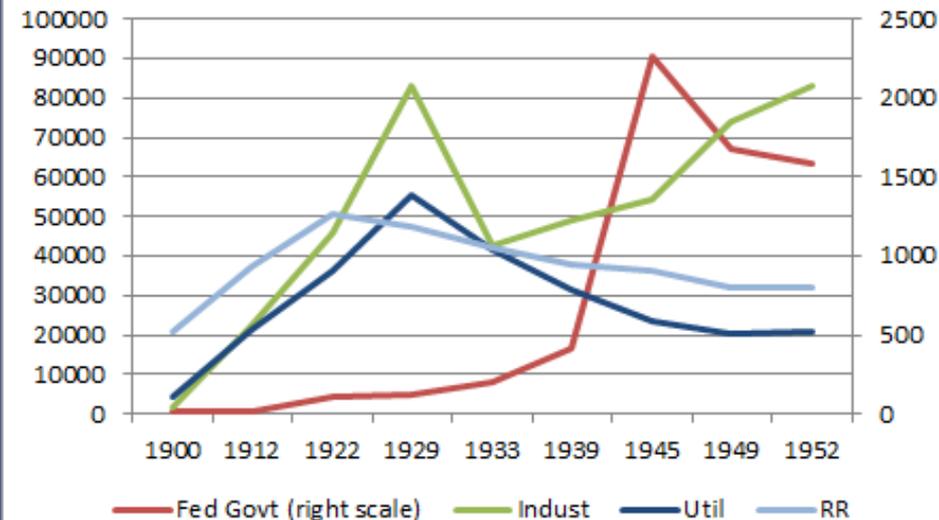
- Corporate bonds replaced government debt in insurance company portfolios
- In banks, Industrial bonds replaced railroad, utility bonds

Composition of Life Insurance Co Assets



Source: Life Insurance Fact Book (1959)

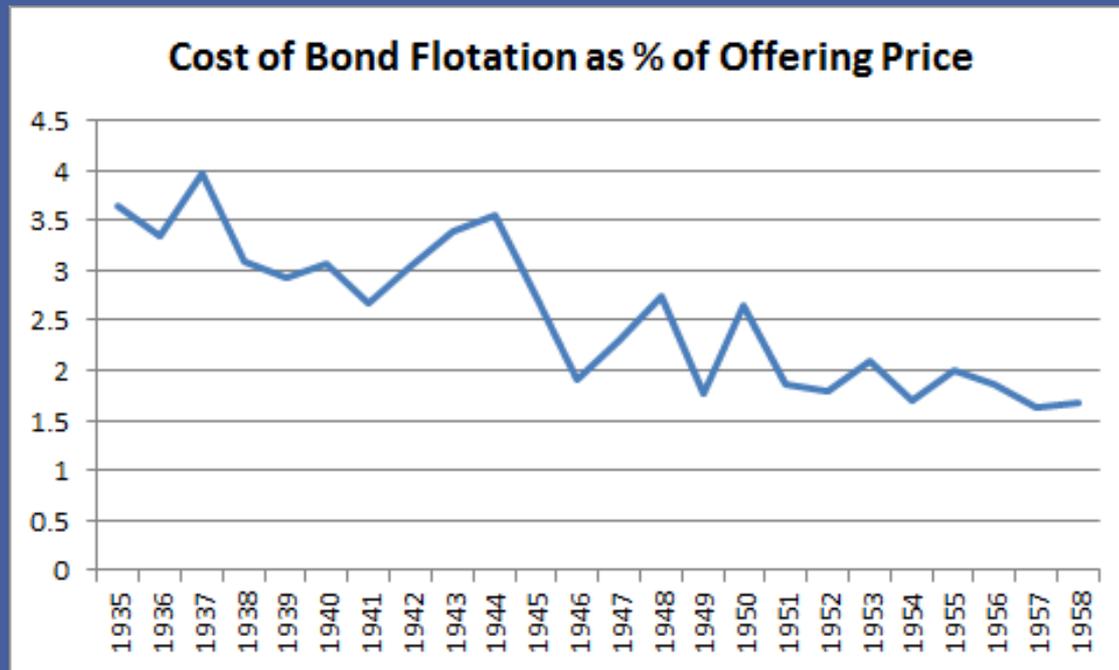
Commercial Bank Bond Holdings



Source: Hickman (1953)

Reduction in Issuance Costs

- Issuance costs fell by roughly half from 1935 to early 1950s:



Source: Cohan (1961)