Government Guarantees and the Valuation of American Banks

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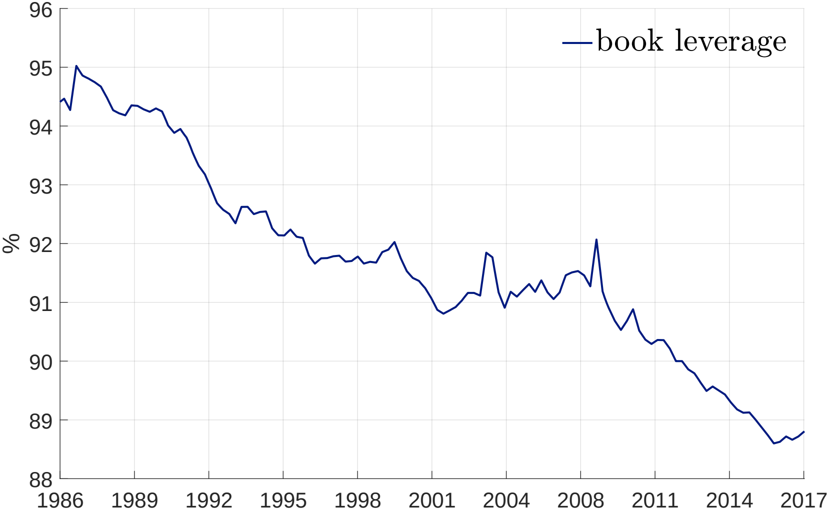
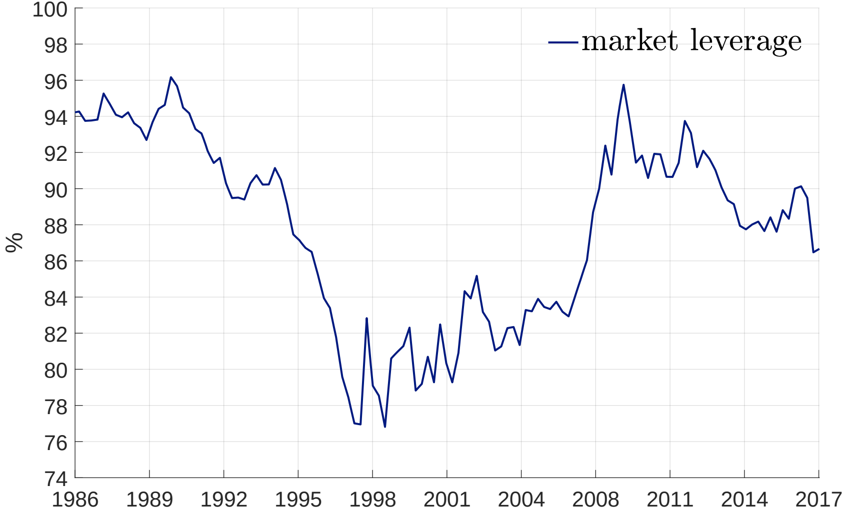
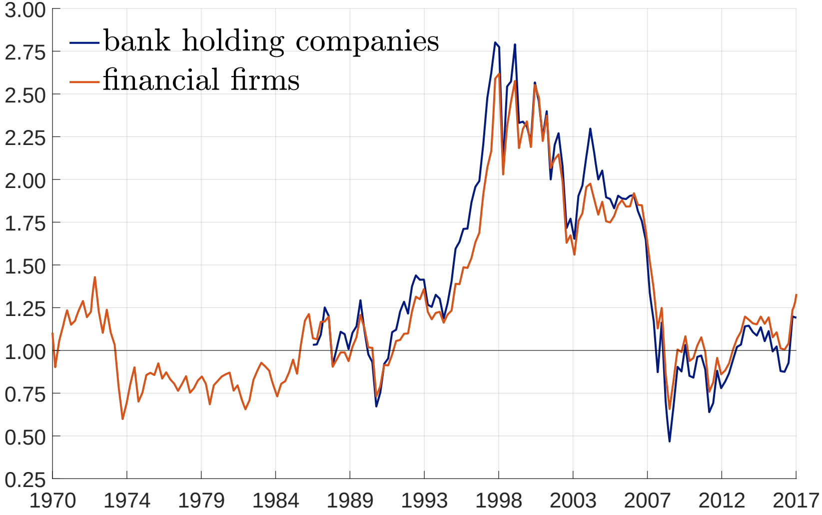
Are Banks Safer Now ? Yellen: Yes !



Are Banks Safer Now ? Sarin and Summers: No ! spreads



Market to Book Ratio of Equity



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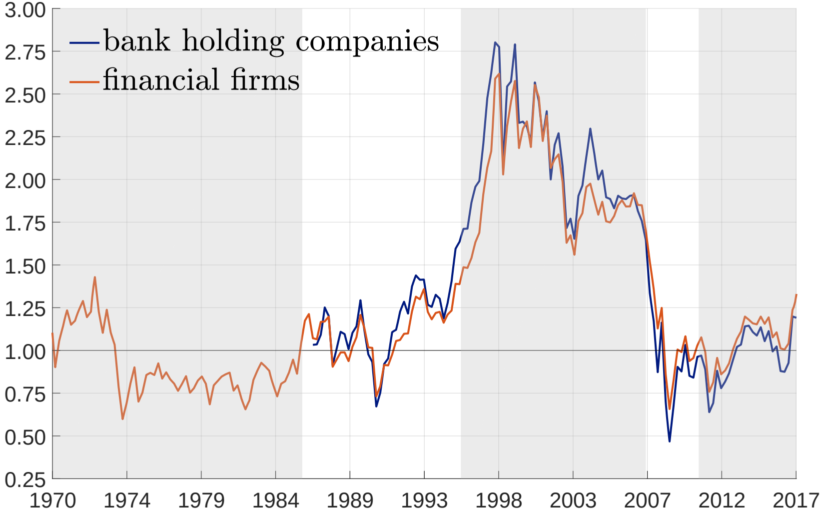

Franchise Value and Gov't Guarantees

Franchise Value of Equity (FE)

- value of intangible capital
- if franchise value drop, bank is closer to bankruptcy

Value of Gov't Guarantees (GOV)

- value of taking risk backed by gov't guarantees
- if gov't guarantee drop, lower taxpayer's liability

Accounting identity for market (ME) to book (BE) ratio of equity

$$\text{ME}/\text{BE} = 1 + \text{FE}/\text{BE} + \text{GOV}/\text{BE}$$

Measurement

Franchise Value of Equity (FE)

- fair value of loans v_L from bank annual report footnotes
- fair value of deposits v_D from core deposit intangibles

Value of Gov't Guarantees (GOV)

- Gordon growth dividend model
- data on accounting profitability and leverage

Accounting identity for market (ME) to book (BE) ratio of equity

$$\text{ME}/\text{BE} = 1 + \text{FE}/\text{BE} + \text{GOV}/\text{BE}$$

Empirical Accounting

We measure FE and GOV with banks accounting data

▷ Before crisis, gov't guarantees account for 73% of ME/BE

▷ After crisis, both components dropped a lot

- banks would still default in a crisis, creditors at risk
- gov't guarantees are now smaller, taxpayers safer

Our results reconcile Yellen with Sarin and Summers

Outline of Talk

- Accounting Model
- Calibration of Aggregate Credit Risk
- Valuation of Stylized Bank
- Valuation of American Bank

Gordon Growth Model for Accounting

- Time $t \in \{1, 2, 3, \ldots\}$
- States $s \in S$ are i.i.d. under risk-neutral probability $q(s)$
- Constant risk-free rate i
- Assets: loans L
- Liabilities: deposits D, debt B, and book equity BE
- Assets and liabilities grow at the same rate $g(s)$
- Competitive markets in L and D subject to origination costs

Franchise Value of Equity (FE)

- **Fair value** of a one-dollar loan

  PV of: interest - servicing costs + principal payments - default

  $v_L >$ book value $= 1$

- **Fair value** of a one-dollar deposit

  PV of: interest + servicing costs + principal payments

  $v_D <$ book value $= 1$

- **Franchise value** of equity per dollar of loans

  FE $= (v_L - 1) \times$ L $- (v_D - 1) \times$ D

  lend at high rates, borrow at low rate

Market Value of Equity (ME)

- Dividends with excess return $R^e(s)$ on loans bought at v_L

$$\mathsf{div}(s) = R^e(s) \times v_L \times \mathsf{L} + (i - g(s)) \times (v_L \times \mathsf{L} - v_D \times \mathsf{D} - \mathsf{B})$$
$$- (1 - v_B) \times (1 + g(s)) \times \mathsf{B}$$

- Market value of equity with default decision

$$\mathsf{ME} = \frac{1}{1+i} \sum_s q(s) \max\{0, \mathsf{div}(s) + (1 + g(s))\mathsf{ME}\}$$

- What happens upon default?

gov't seizes the bank and injects cash to assist sale

Subordinated Debt

- Residual claimant in event of default by equity

$$v_B \times \mathsf{B} = \frac{1}{1+i} \sum_s q(s) \left\{ (1 - I(s))(1+i) \times \mathsf{B} + I(s) R(s) \right\}$$

where $I(s) = 1$ if equity holders decide to default

- Residual value of the bank is given by

$$R(s) = (1+i) \times \mathsf{B} + \mathsf{div}(s) + (1 + g(s)) \times \mathsf{ME} + T(s)$$

sale of bank plus injection of taxpayer funds $T(s)$

- To preserve limited liability of subordinated debt holders

$$0 \leq R(s) \leq (1+i) \times \mathsf{B}$$

Gov't Guarantees (GOV)

- Define the market value of gov't guarantees

$$\text{GOV} = \text{PV of all future cash injections T(s)}$$

- Modigliani Miller with gov't as negative stakeholder

$$\text{ME} = \text{BE} + \text{FE} + \text{GOV}$$

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Calibration of Risk-Neutral Probability $q(s)$

- Two states: normal times s^n and crisis s^c

	RATING	AA	A	BBB	BB
DATA	2008	-4.9%	-12.5%	-16.3%	-25.9%
	97-07/11-17	9bp	38bp	60bp	165bp
MODEL					

Realized Annualized Excess Returns on Corporate Bonds

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- Match realized excess returns on bonds to calibrate $q(s^n)$

$$q(s^n)R^e(s^n) + (1 - q(s^n))R^e(s^c) = 0$$

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MODEL	$q(s^n) = 0.95$	26bp	66bp	86bp	136bp

Realized Annualized Excess Returns on Corporate Bonds

Stylized Bank

- No franchise value: assets and liabilities all marketable
- Bank assets have excess returns of corporate bond portfolios

  $R(s^c) - i$ from 2008 $\qquad R(s^n) - i$ from $q(s^n) = 0.95$

- Bank liabilities fully insured

  $ROE(s) = (R(s) - i) \times \mathsf{L/E} + i$

$$\frac{\mathsf{ME}}{\mathsf{BE}} = \max\left\{1, \frac{q(s^n)}{1 + i - q(s^n)(1 + g(s^n))} \left(ROE(s^n) - g(s^n)\right)\right\}$$

Decline in GOV Accounts for Drop in ME/BE

- Assume no franchise value, $i = 5\%$, $g(s^n) = 7.5\%$

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		rating of bank assets			
		AA	A	BBB	BB
BK LEV $= 0.90$	$ROE(s^n)$	7.5%	11.6%	13.6%	18.6%
	ME/BE	1	1.35	2.0	3.68
BK LEV $= 0.85$	$ROE(s^n)$	6.6%	9.4%	10.7%	14.1%
	ME/BE	1	1	1.06	2.2

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- Taxpayers' contingent liability almost disappeared (Yellen)

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Full Accounting Procedure

- Step 1: measure fair values to construct franchise value

  fair value of loans v_L from bank annual report footnotes

  fair value of deposits v_D from OTS and deposit intangibles

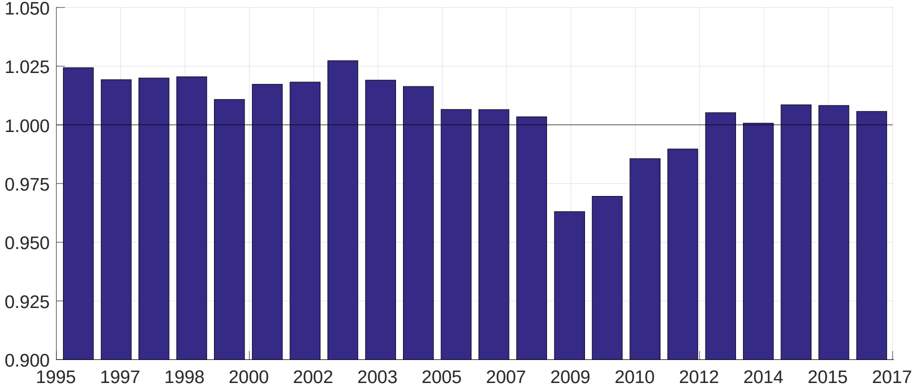
- Step 2: full accounting

  get i, g, and $ROE(s^n)$ from data

$$\frac{\mathsf{ME}}{\mathsf{BE}} = \max\left\{\frac{\mathsf{BE} + \mathsf{FE}}{\mathsf{BE}}, \frac{q(s^n)}{1 + i - q(s^n)(1 + g(s^n))}(ROE(s^n) - g(s^n))\right\}$$

Fair Value of Loans

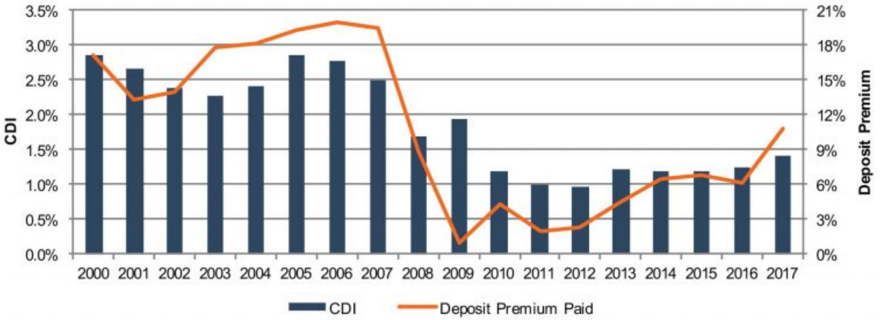
Data from footnotes of 19 large bank annual reports



Fair Value of Deposits

From Office of Thrift Supervision and whole bank transactions

Chart 3: CDI Recorded vs. Deposit Premiums Paid



Valuation of American Banks

$$\text{ME/BE} = 1 + \text{FE/BE} + \text{GOV/BE}$$

	ME/BE	FE/BE	GOV/BE
1996 - 07	2.24	0.33	0.91
2011 - 17	1.19	0.10	0.09

- Taxpayers' contingent liability almost disappeared (Yellen)
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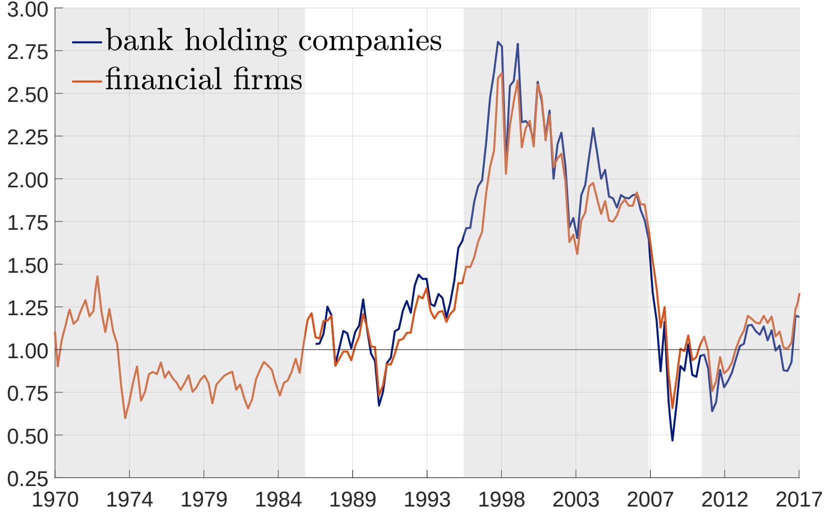
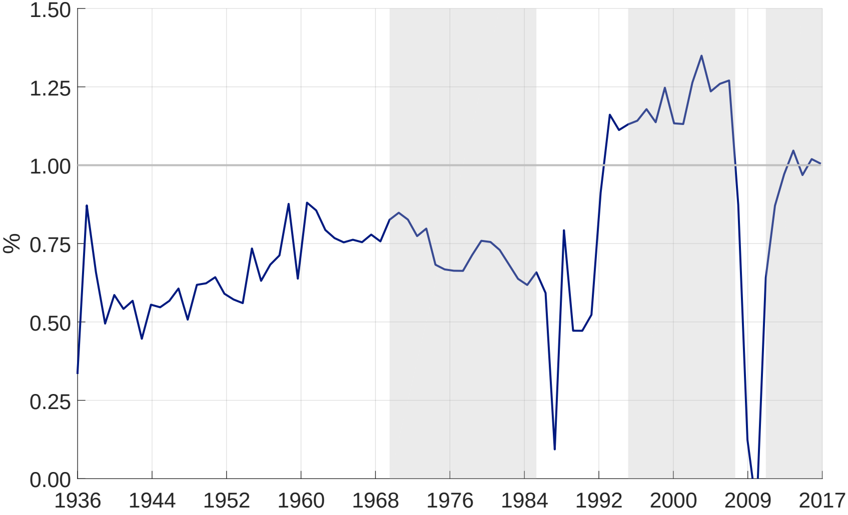
Market to Book Ratio of Equity Rises from 1 to 2



Return on Assets for FDIC-Insured Banks

ROE



Big Increase in Profitability and Risk Taking after 1985

- Benchmark ROE for a bank with no asset risk

$$\overline{ROE} = i + (i - \overline{g}) \times \text{FE/BE}$$

	$\overline{ROE}$	$ROE(s^n) - \overline{ROE}$
1970 - 85	9.1%	262bp
1996 - 07	6.2%	781bp
2011 - 17	1.6%	596bp

Benchmark Return on Equity and Excess Returns

Conclusion

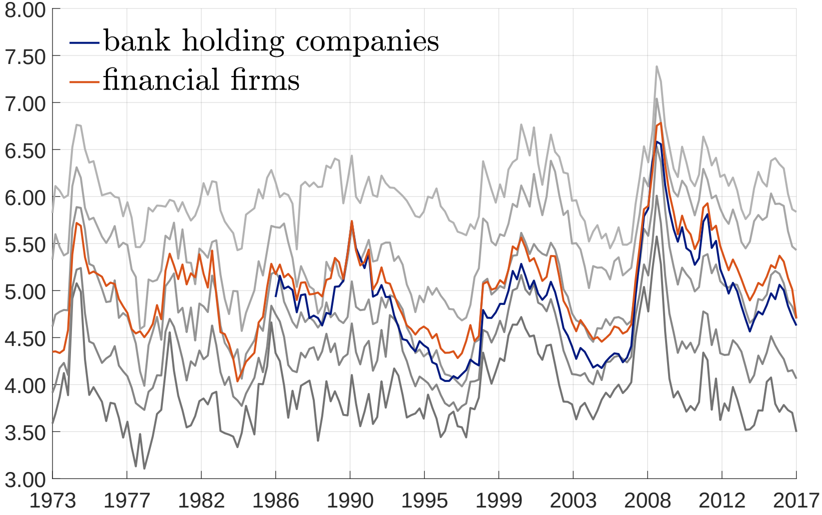
- Gov't guarantees important for profitability and market valuation
- Value of gov't guarantees highly sensitive to risk taking
- Concerns about future deregulation and bank recovery

Future Work

- Extend analysis to European banks
- Investigate the cross-section

Spreads on Subordinated Debt

back



Return on Equity for FDIC-Insured Banks

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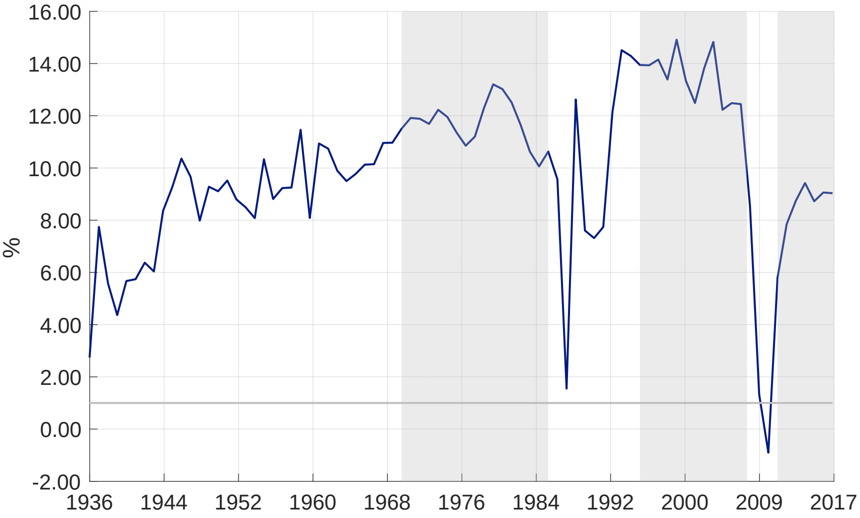

Book and Fair Values