

# Government Guarantees and the Valuation of American Banks

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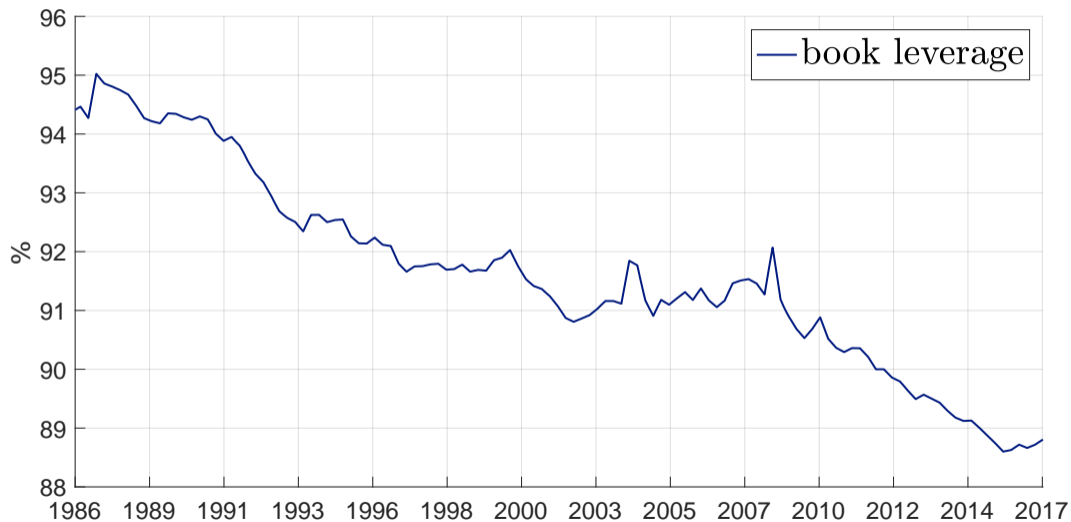
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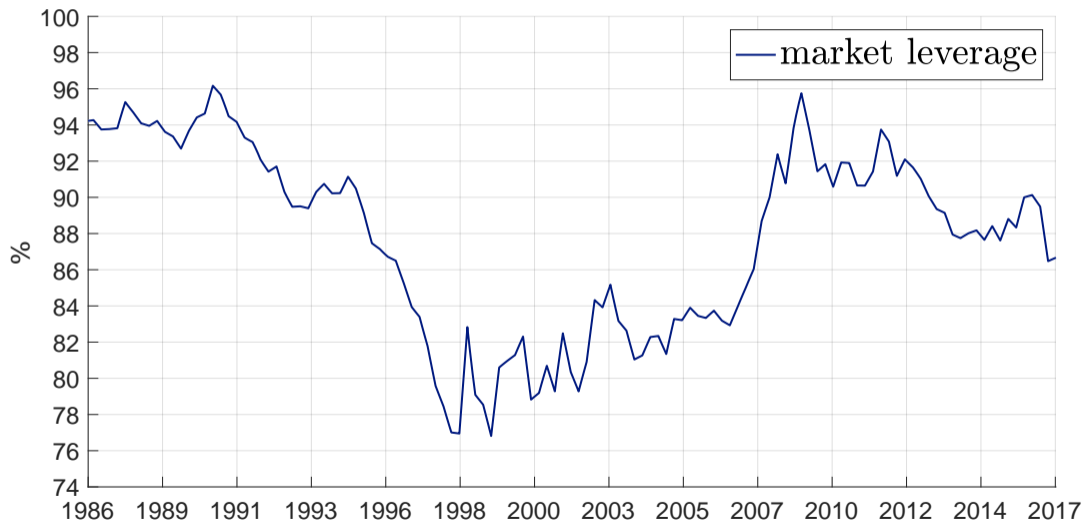
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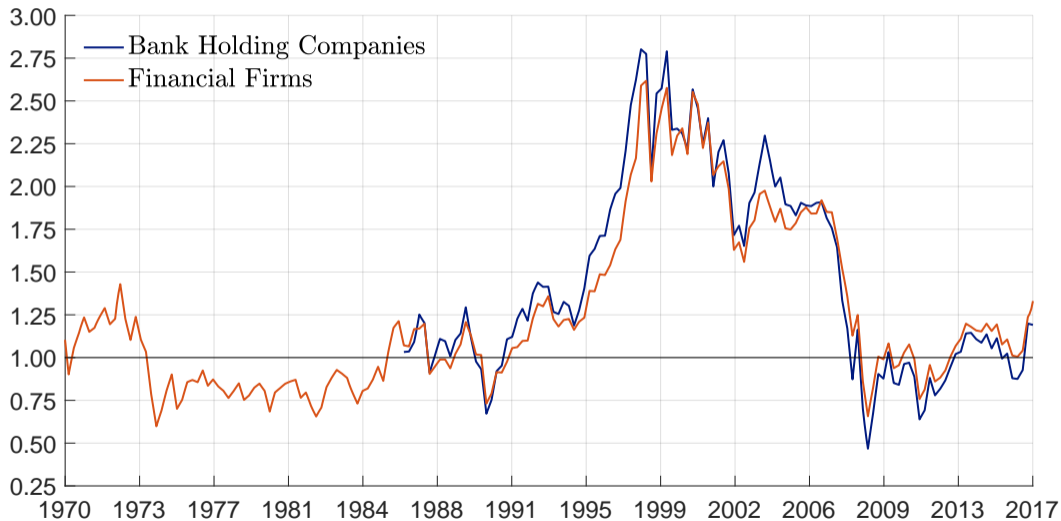
## Are Banks Safer Now ? Yellen: Yes !



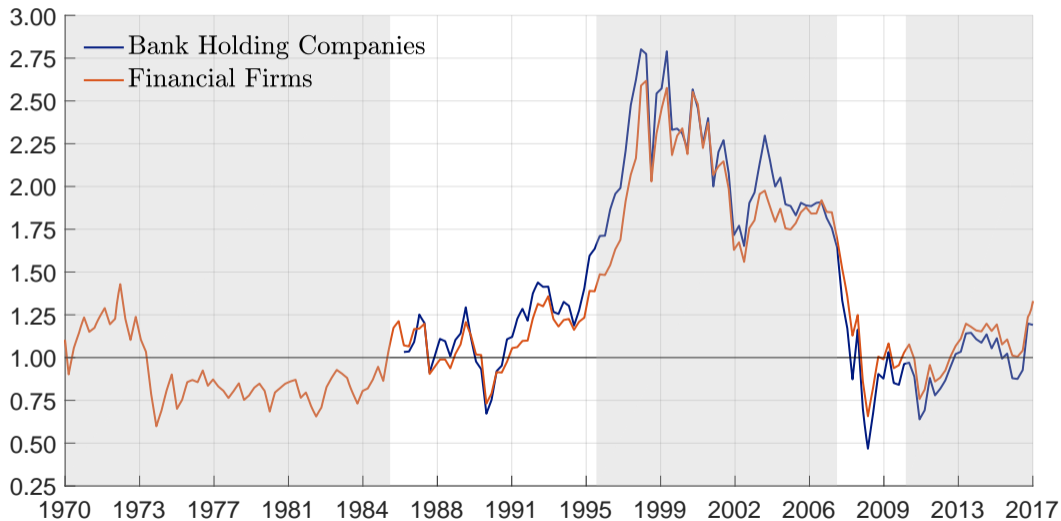
## Are Banks Safer Now ? Sarin and Summers: No !



## Market to Book Ratio of Equity



## Market to Book Ratio of Equity



# 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

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

$$ME/BE = 1 + FE/BE + GOV/BE$$

# Outline

## 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

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

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## Gordon Growth Model for Accounting

- Time  $t \in \{1, 2, 3, \dots\}$
- States  $s \in S$  are i.i.d. under risk-neutral probability  $q(s)$
- Constant risk-free rate  $i$
- Assets: loans  $L$
- Liabilities: gov't guaranteed deposits  $D$  and book equity  $BE$
- Assets and liabilities grow at the same rate  $g(s)$



## Franchise Value of Equity (FE)

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

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

$$v_L > \text{book value} = 1$$

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

PV of: interest + servicing costs + principal payments

$$v_D < \text{book value} = 1$$

- **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 loan portfolio bought at  $v_L$

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

- Market value of equity with default decision

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

- What happens upon default?

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

## Gov't Guarantees (GOV)

- Define the market value of gov't guarantees

$$\text{GOV} = \text{PV of all future cash injections}$$

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

- Match realized excess returns on corporate 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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	RATING	AA	A	BBB	BB
DATA	2008 97-07/11-17	-4.9% 9bp	-12.5% 38bp	-16.3% 60bp	-25.9% 165bp
MODEL	$q(s^n) = 0.95$	26bp	66bp	86bp	136bp

**Realized Annualized Excess Returns on Corporate Bonds**

## Decline in GOV Accounts for Drop in ME/BE

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

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

		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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- Debt and equity holders still at risk (Sarin and Summers)

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## Full Accounting Procedure

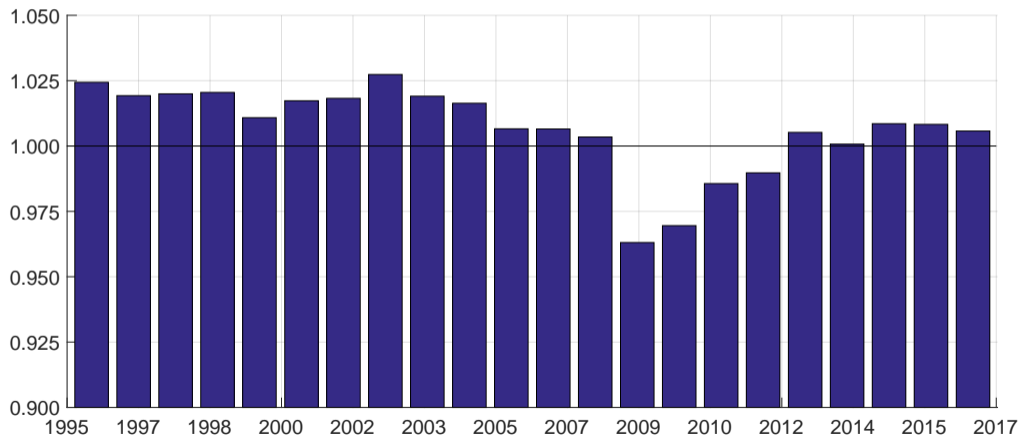
- Step 1: measure fair values to construct franchise value
  - fair value of loans  $v_L$  from bank annual report footnotes
  - fair value of deposits  $v_D$  from OTS and core deposit intangibles
- Step 2: full accounting
  - get  $i$ ,  $g$ , and  $ROE(s^n)$  from data

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



## Fair Value of Loans

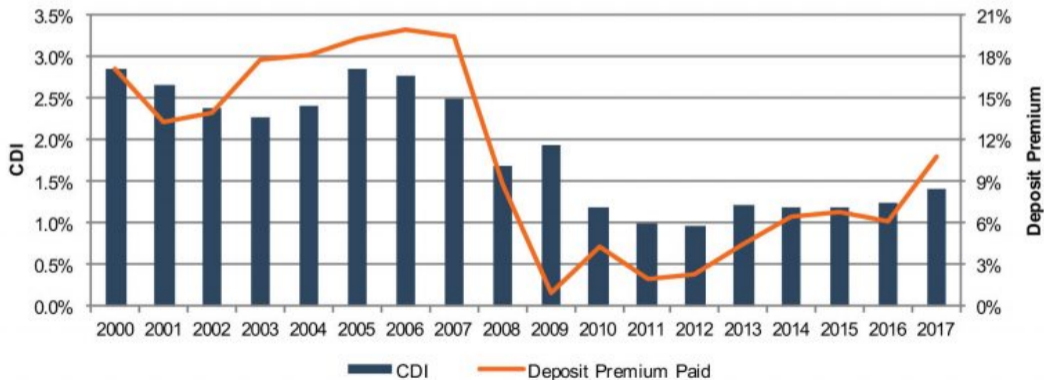
Data from footnotes of 19 large bank annual reports



# Fair Value of Deposits

Data from the Office of Thrift Supervision and whole bank transactions

**Chart 3: CDI Recorded vs. Deposit Premiums Paid**



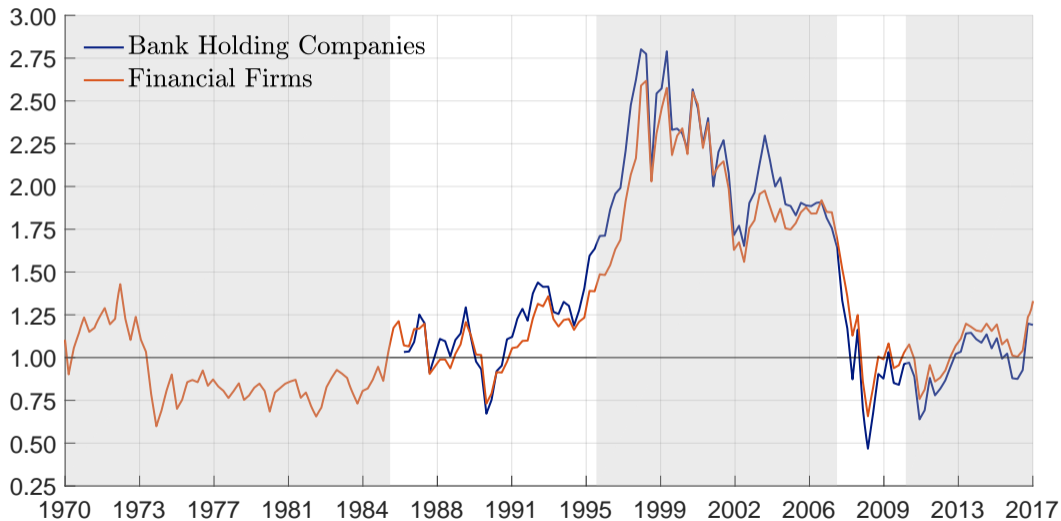
## Valuation of American Banks

$$ME/BE = 1 + FE/BE + GOV/BE$$

	ME/BE	FE/BE	GOV/BE
1996 - 07	2.06	0.48	0.58
2011 - 17	1.19	0.10	0.09

- Taxpayers' contingent liability almost disappeared (Yellen)
- Debt and equity holders still at risk (Sarin and Summers)

## Market to Book Ratio of Equity Rise from 1 to 2



## Big Increase in Profitability and Risk Taking after 1985

- Benchmark  $ROE$  for a bank with no asset risk

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

	$\overline{ROE}$	$ROE(s^n) - \overline{ROE}$
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 value of equity
- Value of gov't guarantees highly sensitive to risk taking and leverage
- Concerns about future deregulation and bank recovery