Bank Bailouts, Bail-ins, or No Regulatory Intervention? A Dynamic Model and Empirical Tests of Optimal Regulation

Allen N. Berger
University of South Carolina
Wharton Financial Institutions Center
European Banking Center

Charles P. Himmelberg
Goldman Sachs & Co

Raluca A. Roman
Federal Reserve Bank of Philadelphia

Sergey Tsyplakov
University of South Carolina

Regulatory Resolution Regimes and Other Prudential Tools

- The failure of large financial institutions can cause or worsen a financial crisis and threaten the financial system and real economy.
- Regulators design resolution regimes for handling capital shortfalls and potential failure of large bank holding companies (BHCs) that pose systemic threats:
  - Bailouts (government provides capital).
  - Bail-ins (private sector provides capital).
  - No Regulatory Intervention (let them go bankrupt).
- Regulators also employ other prudential regulatory tools as first lines of defense to preempt the likelihood of distress:
  - Capital standards (backward-looking)
  - Stress Tests (forward-looking)
    - We neglect these for this short presentation.

Regulatory Regimes in the US

- Prior to the financial crisis, very large U.S. BHCs likely expected that they were “too big to fail,” and would be bailed out in the event of their financial distress.
  - During the crisis, these expectations were realized through TARP and other bailouts.
- After the crisis, the 2010 Dodd-Frank Act introduced a bail-in regime called the Orderly Liquidation Authority (OLA).
  - FDIC temporarily takes over, wipes out shareholders and fires and replaces management.
  - BHC subsidiaries, including the banks, continue to operate.
  - Some debtholders have part of their debt claims turned into equity, and the BHC is returned to the private sector.
- In 2017, the U.S. House of Representatives voted for the Financial CHOICE Act, which would replace OLA with a no regulatory intervention regime.
  - BHCs would go bankrupt under a new Chapter 14.

This Paper

- We develop a dynamic theoretical model of the bailout, bail-in, and no-regulatory-intervention regimes to address the following questions:
  - How should these regimes be optimally designed?
  - How aggressive should they be in taking actions against distressed banks?
  - How does anticipation of different regimes affect the *ex ante* capital structure and recapitalization decisions of the BHCs?
  - Which of the regimes is best?
- We also conduct an empirical analysis that tests some of the important implications of the model.

Theoretical Contributions of our Paper

- There are a few dynamic theory papers on capital requirements and stress tests.
  - In contrast, we dynamically model bailout, bail-in, and no regulatory intervention regimes and their optimal terms.
- There are static models of optimal regulatory interventions.
  - In contrast, our model is dynamic.
  - Our dynamic results are intuitive – such as that BHCs would hold higher capital ratios in advance to avoid losing their shares in a bail-in.
  - Such results could not be derived using static models.

Empirical Contributions of our Paper

- In the empirical literature,
  - Many studies of bailouts, mostly using U.S. data, and
  - Many studies of bail-ins using European data.
- In contrast, we study the effects of ***expectations*** of bailouts pre-crisis and ***expectations*** of bail-in post crisis on BHC capital decisions, rather than ***actual*** bailouts and bail-ins as in the literature.
  - Thus, we are able to see the effects of the bailout and bail-in regimes before any interventions occur.

Optimal Terms of Regulatory Regimes

- Regulators maximize a simple social welfare function:

  Max_{θ} (MV of Bank - Expected External Disruption Costs from Default)

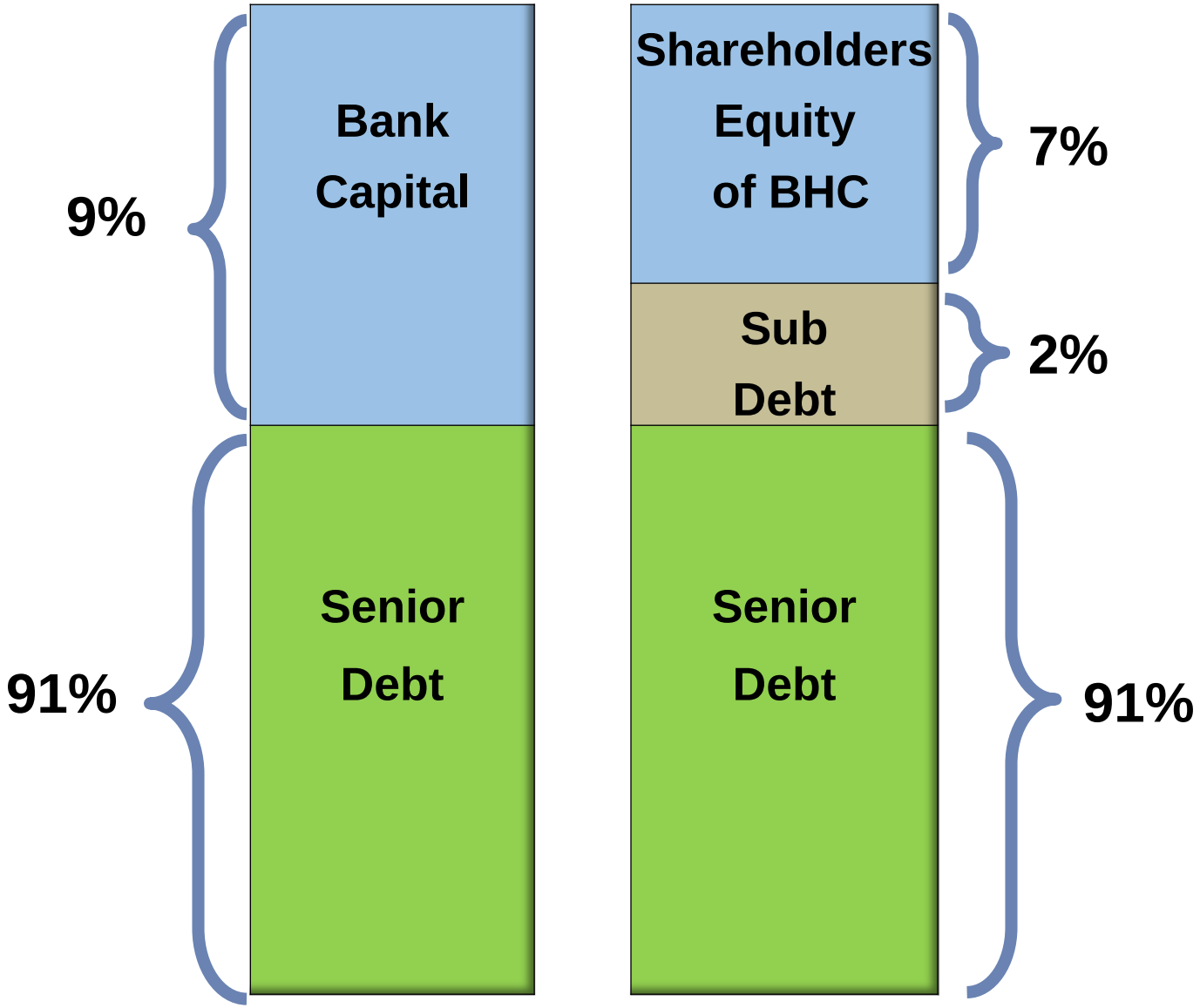
- Optimal bailout regime is characterized by:
  - Bailout capital ratio trigger, $\theta_{bailout*}$
- Optimal bail-in regime:
  - Bail-in capital ratio trigger, $\theta_{bail\text{-}in*}$
  - Stress test critical capital ratio, $\theta_{stress\_test\_bail\text{-}in*}$
- Optimal no regulatory intervention regime:
  - Stress test critical capital ratio, $\theta_{stress\_test\_no\ intervention*}$
- The BHC optimizes its capital structure for the trigger points enforced by the regulator, and the regulator optimally sets the trigger points, knowing how the BHC will react.

Solving the Model

- We solve the model for the different regimes numerically using values that are calibrated to data for large BHCs.

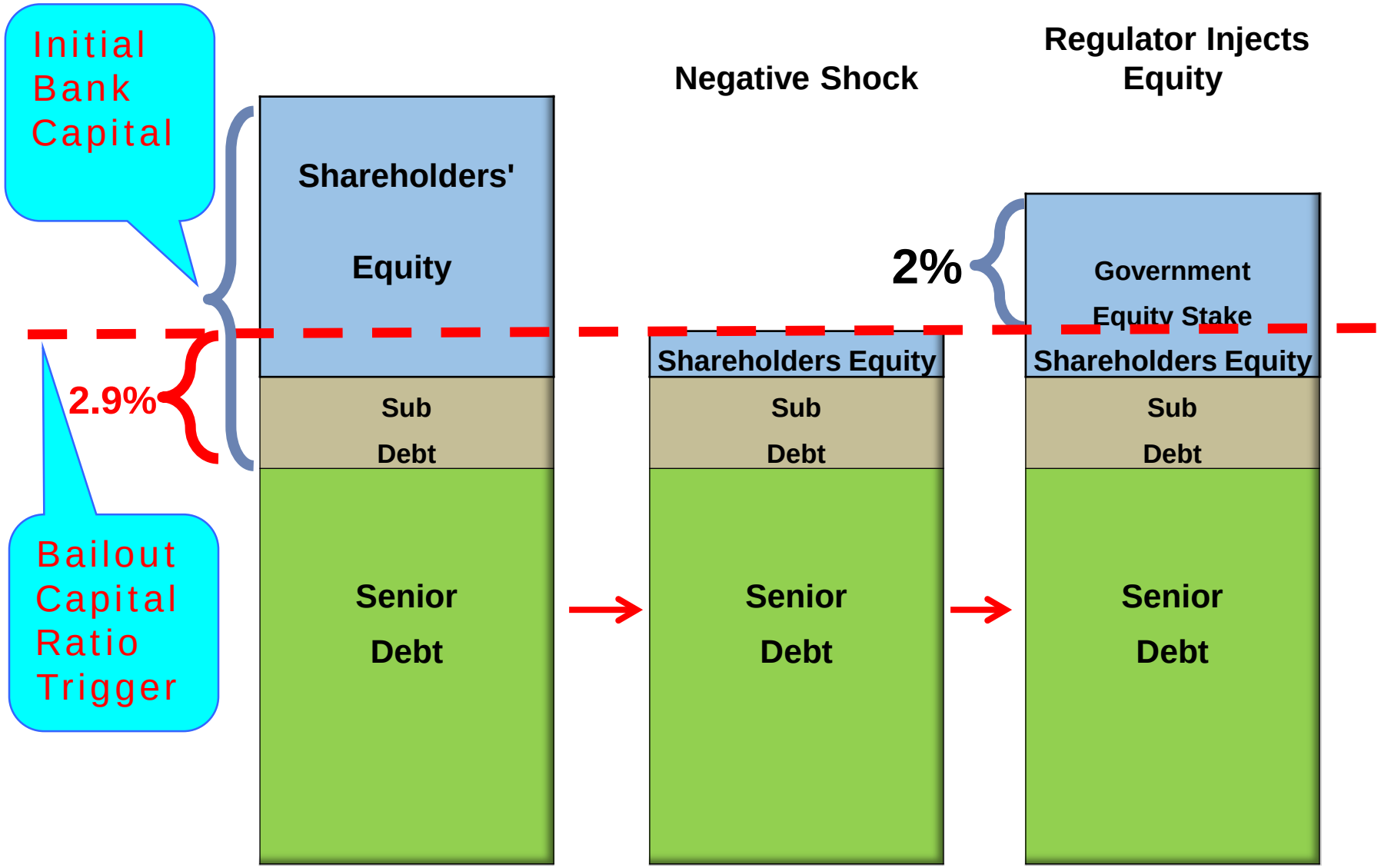
- **Max_{θ} (MV of Bank - Expected External Disruption Costs from Default)**
  - We initially assume that the expected external disruption costs to the financial system and real economy equal the expected private costs of default to the bank's stakeholders.
  - Our findings are robust to a "Lehman-like" external disruption costs of 10 times the private costs of default.

Capital Structure of the Bank and BHC

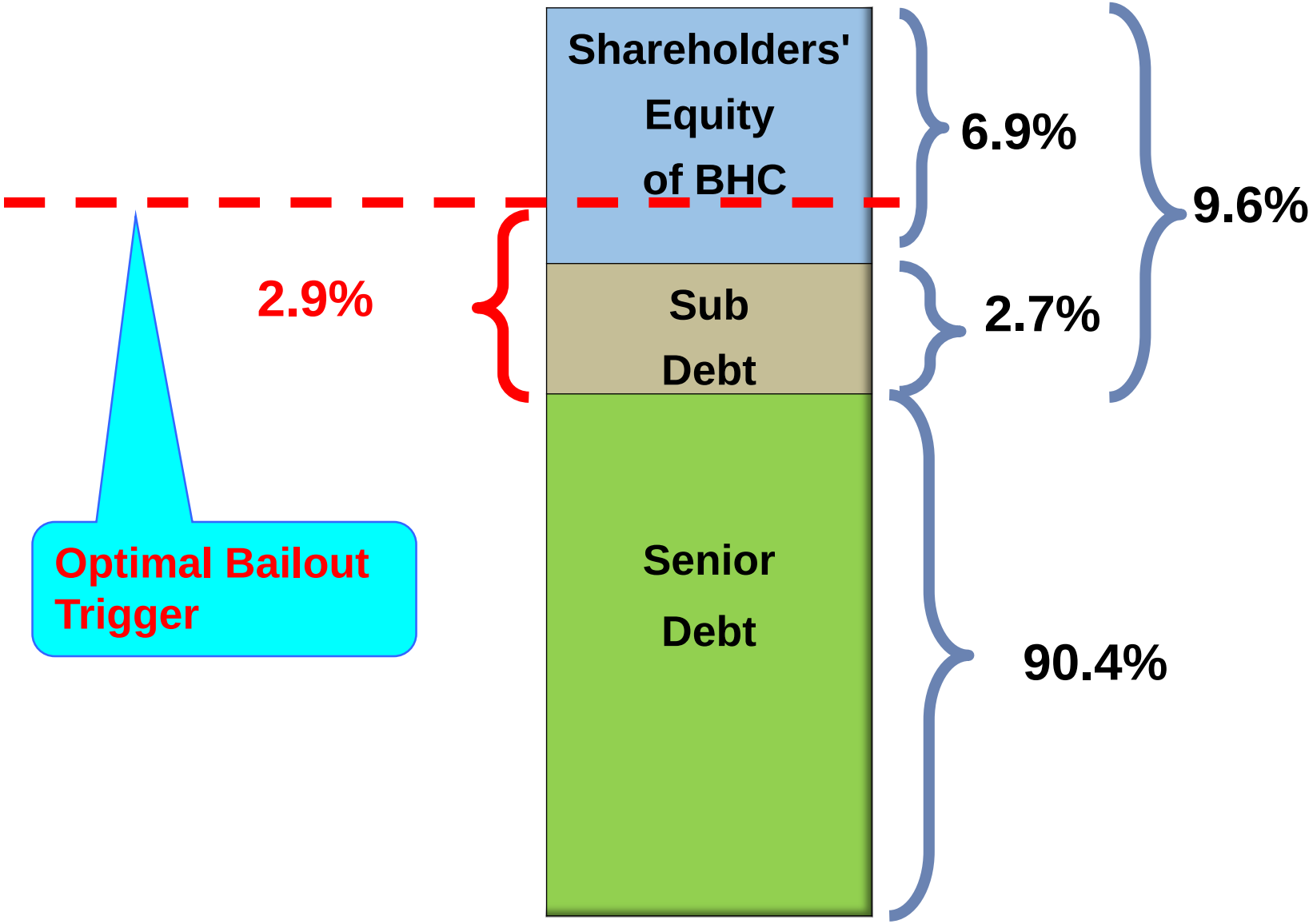


Amalgam of the capital structure of the bank and the BHC in which the capital structure of the BHC is superimposed over the capital of the bank.

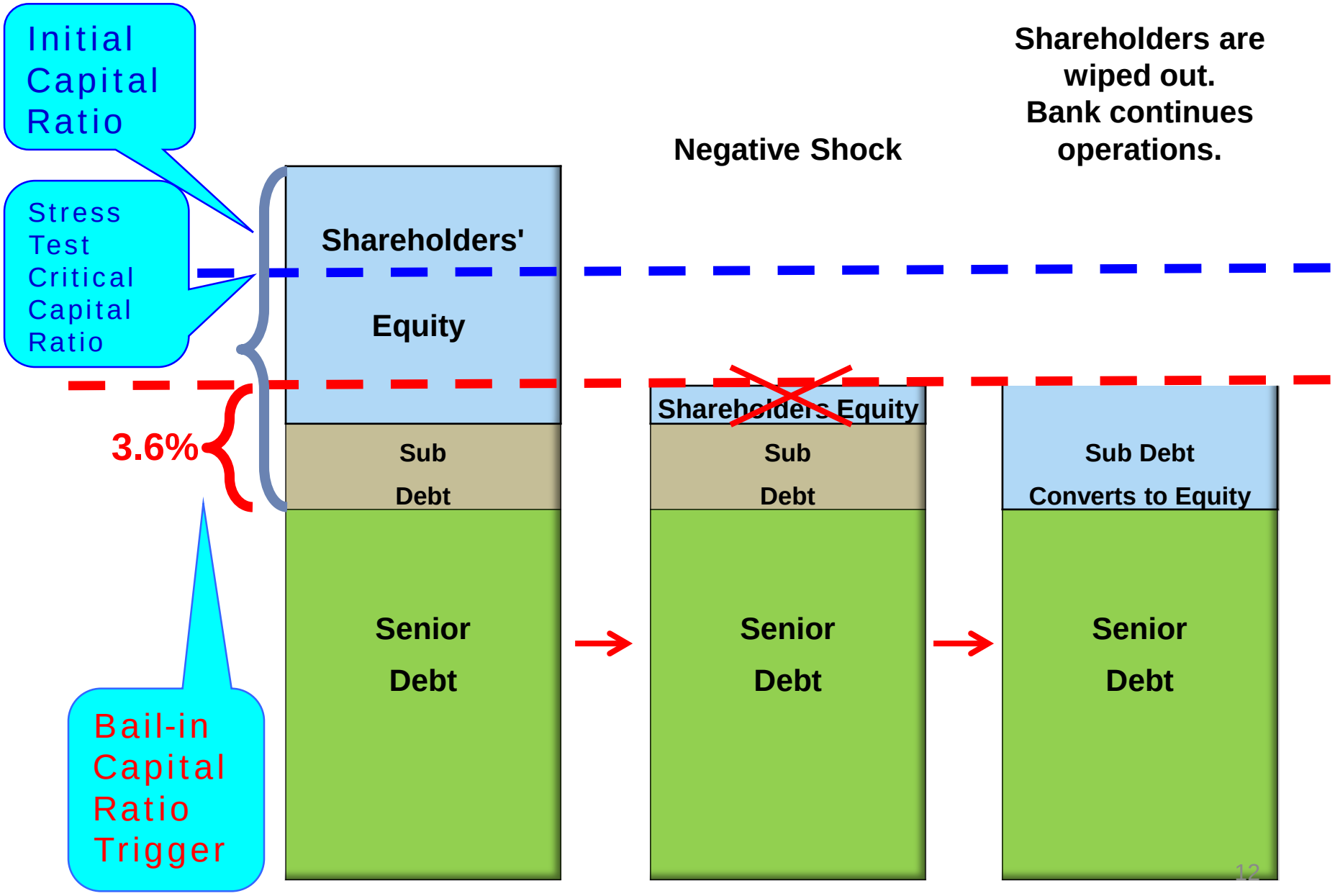
Bailout Regime



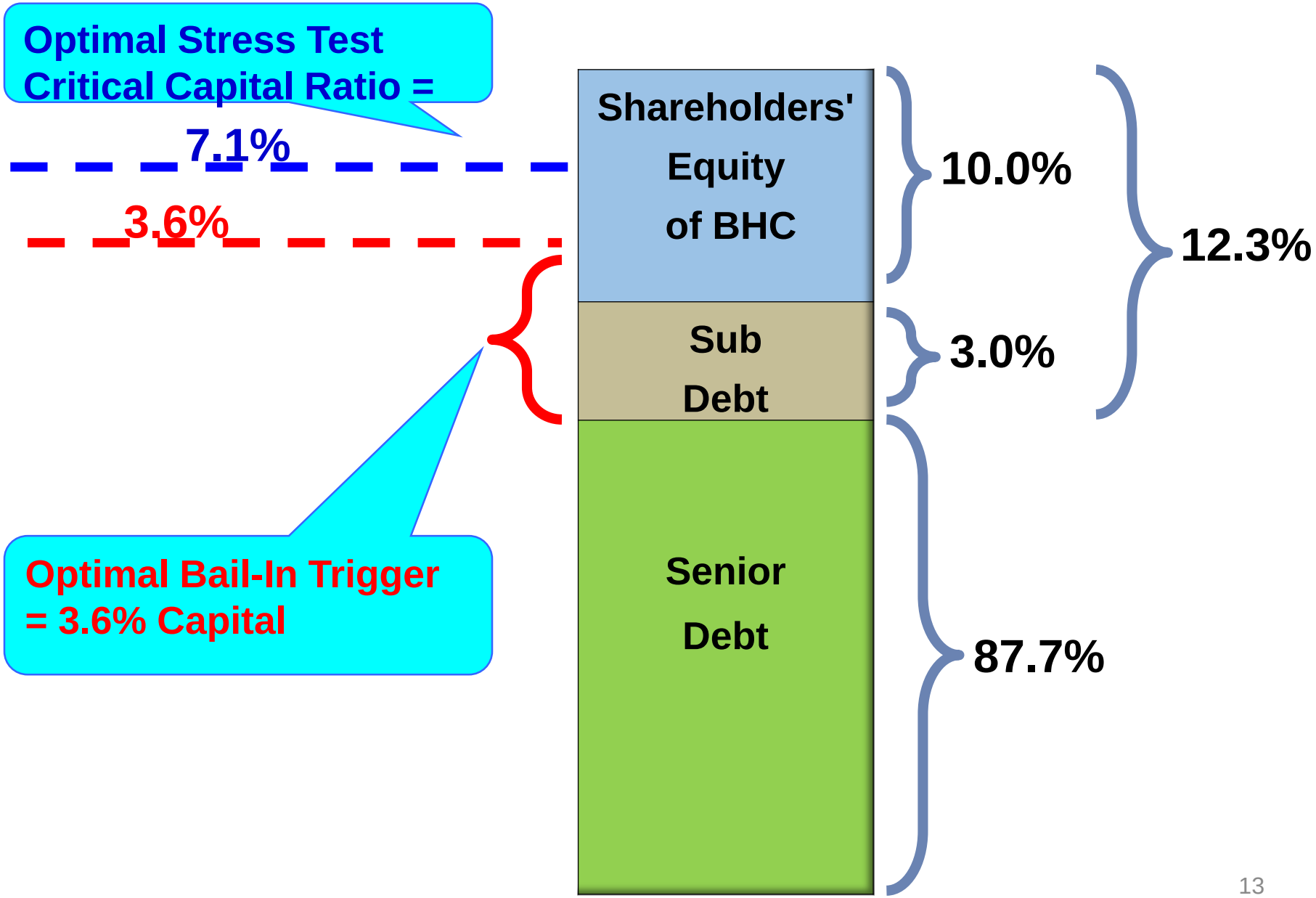
Optimal Capital Structure of BHC for Socially Optimal Bailout (base case calibrated to U.S. BHC data)



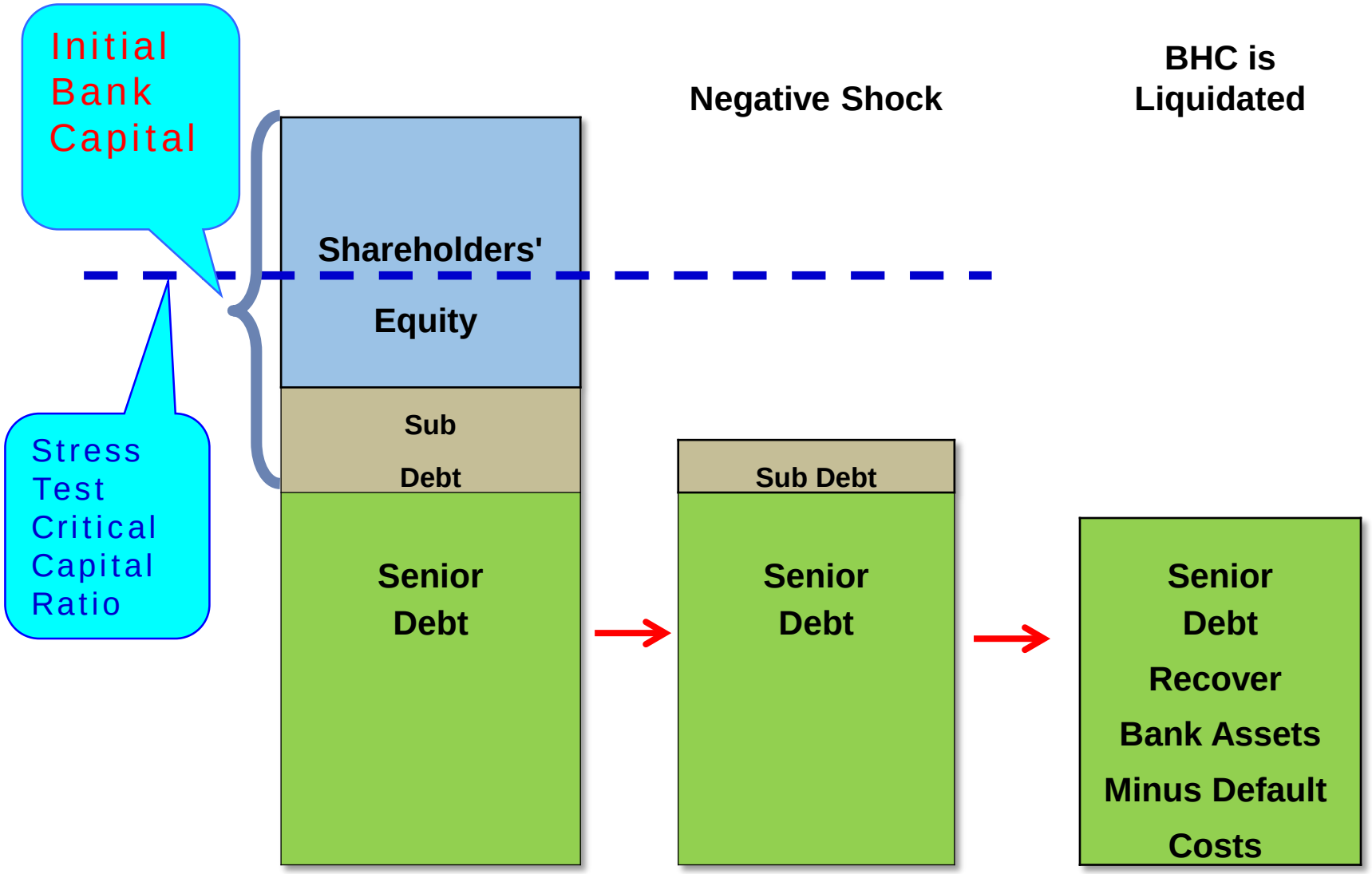
Bail-in Regime



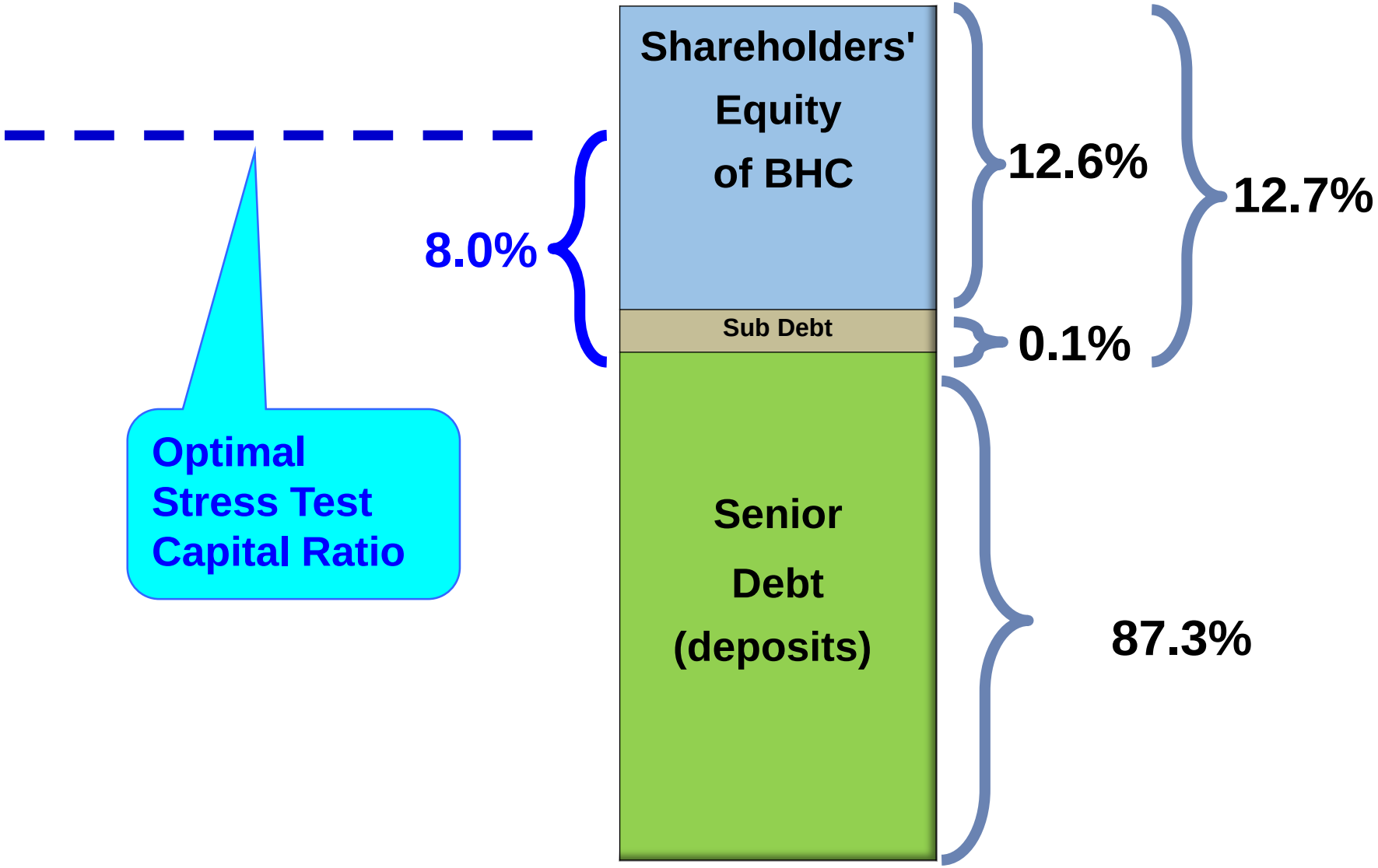
Optimal Capital Structure of BHC for Socially Optimal Bail-in (base case)



No Regulatory Intervention Regime



Optimal Capital Structure of BHC for Socially Optimal No Intervention Regime (base case)



Main Findings of Model (1)

- Bail-ins provide superior capital incentives for financial institutions.
  - Only the optimally-designed bail-in regime generates incentives for BHCs to recapitalize preemptively during financial distress to avoid having their equity shares wiped out in a bail-in.
  - Optimal bail-ins also result in higher initial capital ratios than optimal bailouts, in part because optimal bail-ins are triggered at higher capital ratios.
  - These two model implications are tested and corroborated in our empirical analysis.

Main Findings of Model (2)

- Optimally-designed bailouts and bail-ins clearly dominate the no-regulatory-intervention regime, which includes only a stress test.
  - The no-regulatory-intervention regime makes both the BHC shareholders and the rest of the society worse off.
  - Suggests that the more intrusive regulatory tools like bailouts and bail-ins are more effective than stress tests alone.
- We also find that bailouts and bail-ins result in roughly similar social welfare values.
  - However, optimal bailouts do relatively well in the model because they are optimally designed with prompt regulatory actions and involve no subsidies, and the simple social welfare function does not include all social costs of bailouts.

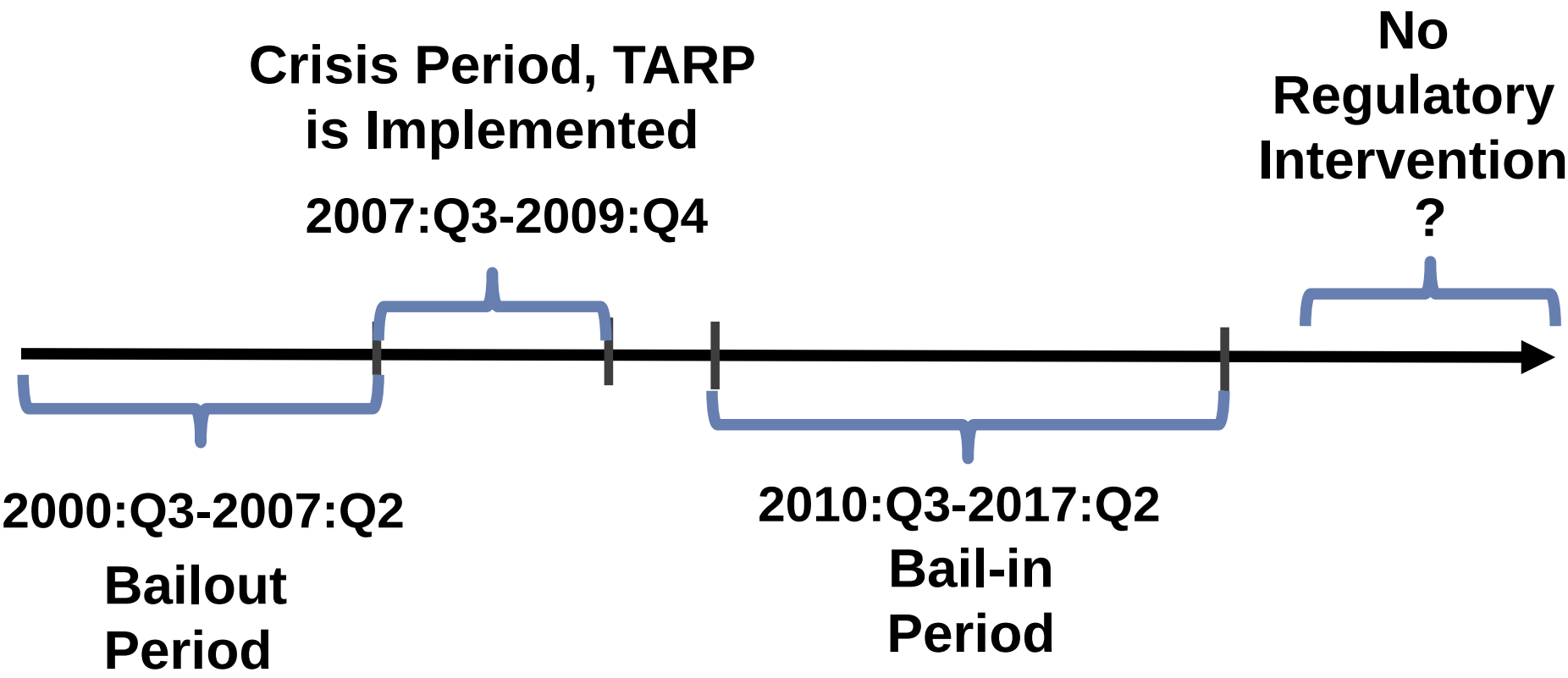
Main Findings of Model (3)

- When the simple social welfare function is altered and the regulator re-optimizes to take into account other reasonable bailout costs of:
  - Using and risking public taxpayers' funds to bail out private-sector BHCs, and/or
  - Transaction costs of raising and distributing these funds,
- Optimal bail-ins produce higher social welfare values than optimal bailouts.

Empirical Tests of the Dynamic Model

- We study the effects of switching from ***expectations*** of bailouts pre-crisis to ***expectations*** of bail-ins post crisis.
- The dynamic model predicts higher initial capital and subsequent capital adjustments in the bail-in regime relative to the bailout regime.
- Thus, we test for higher capital ratios and faster speeds of adjustment resulting from the change in regime.

Timeline for Bailout and Bail-in Periods



Data for Empirical Tests

- Data for the top 50 publicly traded U.S. BHCs for the bailout (2000:Q3-2007:Q2) and bail-in (2010:Q3-2017:Q2) periods.
- The 8 very large, complex U.S. banking organizations designated as Globally Systemic Important Banks (G-SIBs) is the treatment group.
  - G-SIBs are the most likely to be subject to bailouts and bail-ins.
    - All received TARP bailouts and all but one were in the initial involuntary participant group for TARP.
    - Since OLA, the rating agencies have removed most of the support or "uplift" from government guarantees from the G-SIB's credit ratings, sometimes citing OLA as the reason.
- Remaining 42 large BHCs are the control group.

Capital Ratios

❑ Three capital ratio variables, all of which regulators scrutinize for compliance with capital standards:

- CAPLEV is Tier 1 capital divided by total unweighted assets.
- CAPTIER1 is Tier 1 capital divided by risk-weighted assets.
- CAPTOTAL is Tier 1 plus Tier 2 capital divided by risk-weighted assets.

Regression Models

- Difference-in-difference (DID) models to test model predictions that in response to the change from bailout regime to bail-in regime, G-SIBs would increase capital ratios more than other BHCs.

$$\text{BANK CAPITAL}_{b,t} = \beta_1 \text{BAIL-IN PERIOD}_t \times \text{TREATED\_ BHC}_b + \beta_2 X_{b,t-1} + \beta_3 \text{TIME}_t + \beta_4 \text{ BHC}_b + \varepsilon_{b,t}$$

  - TREATED_BHC = 1 for G-SIBs, 0 for other BHCs.
  - BAIL-IN PERIOD = 1 during 2010:Q3-2017:Q2.
  - BAIL-IN PERIOD x TREATED_BHC captures the effect of the treatment (bail-in regime) on the treated BHCs (GSIBs).
    - $\beta_1 > 0$ would corroborate the model prediction that bail-ins generate higher capital ratios.
  - X is a vector of BHC characteristics, while TIME and BHC represent time and BHC fixed effects.

Regression Results

Difference-in-Difference (DID) Analysis			
	(1)	(2)	(3)
VARIABLES	**CAPLEV**	**CAPTIER1**	**CAPTOTAL**
BAIL-IN PERIOD × G-SIB	**0.010*** (6.79)**	**0.023*** (11.37)**	**0.027*** (13.10)**
ROA	0.052**	0.087**	0.093**
	(2.070)	(2.472)	(2.569)
STDEVROA	0.176***	0.351***	0.420***
	(6.081)	(8.754)	(10.178)
MKTBOOK	0.025***	0.029***	0.003
	(6.210)	(5.019)	(0.437)
LNASSETS	-0.010***	-0.012***	-0.013***
	(-9.447)	(-8.474)	(-9.094)
RETAILDEPOSITS	-0.007***	-0.006*	-0.007*
	(-2.636)	(-1.646)	(-1.725)
BUSINESSLOAN	0.016***	-0.028***	-0.015***
	(4.067)	(-5.077)	(-2.589)
LIQUIDITY	0.041***	0.069***	0.044***
	(5.371)	(6.495)	(4.011)
CDLOANS	-0.031***	0.011	0.033***
	(-3.700)	(0.928)	(2.789)
Other Controls	YES	YES	YES
TIME FE & BHC FE	YES	YES	YES
No. Observations	2,796	2,796	2,796
R-squared	0.928	0.917	0.899

Partial Adjustment Analysis

- The dynamic model also predicts that the bail-in regime provides incentives for treated BHCs to rebuild capital prior to financial distress, whereas the bailout regime does not.
  - We operationalize this model prediction by testing whether banks recapitalize faster to their targets in the bail-in period than the bailout period using a partial adjustment model.
  - In the interest of brevity, we skip the setup of the partial adjustment model and go right to the empirical results and show only the CAPLEV results.
    - λ is the speed of adjustment toward target capital.
    - λ increasing more for G-SIBs than for the control group from the bailout period to the bail-in period would corroborate the model prediction.

Partial Adjustment Analysis

	BAILOUT PERIOD (2000:Q3-2007:Q2)		BAIL-IN PERIOD (2010:Q3-2017:Q2)		Differences in Regression Coefficients
	(1)	(2)	(3)	(4)	
VARIABLES	CAPLEV	CAPLEV	CAPLEV	CAPLEV	
λ	0.886***		0.808***		
	(14.14)		(23.52)		
λ_1 × G-SIB		0.388***	→	0.926***	0.538***
		(2.882)		(29.754)	(3.884)
λ_2 × nonG-SIB		0.904***	→	0.811***	-0.093
		(14.5)		(23.98)	(-1.315)
Other BHC Controls	YES	YES	YES	YES	
G-SIB × Other BHC Controls	YES	YES	YES	YES	
No. Obs.	1,400	1,400	1,400	1,400	

Caveat to the Empirical Analyses

- We acknowledge that the capital levels of G-SIBs post crisis may also partially reflect G-SIB capital surcharges, stress tests, and other policies in addition to the effects of OLA.
  - However, our capital level results also hold when we use alternative broader treatment groups – BHCs subject to the initial SCAP stress tests and those designated as SIFIs.
- In contrast, our very strong capital adjustment results are less likely to be significantly affected by these other policies that are based on capital levels, rather than adjustment speeds.

Conclusions

- We present a dynamic model of socially optimal designs of three regulatory regimes for handling potential failure of large U.S. BHCs.
- Results suggest three main conclusions:
  - Bail-ins provide the best capital incentives for BHCs.
  - The no-regulatory-intervention regime is dominated by optimal bailouts and bail-ins that have roughly similar social values.
  - When taxpayer and transactions costs of bailouts are included in the social welfare function, bail-ins produce higher social values than bailouts.
- The empirical tests corroborate the key model predictions.

Policy Implications

- Our results have clear policy implications.
  - The no-regulatory-intervention regime is suboptimal.
  - Optimal resolution design requires a delicate balance in terms of the "aggressiveness" of the regulator.
    - For example, bail-ins should be aggressive enough to induce socially prudent behavior without significantly constraining banks' abilities to operate efficiently.
  - "One size fits all" resolution design is suboptimal.
    - Bailout, bail-in, and stress test triggers are best if tailored to individual institutions.

Going Beyond the Model

- Other factors outside the model may also matter for the comparison of bailouts, bail-ins, and no regulatory intervention.
- Actual bailouts may perform significantly worse than in the dynamic model.
  - Optimal bailouts involve no subsidies or “free money” for BHCs, as regulators intervene in a timely fashion and dilute the claims of shareholders.
  - In reality, regulators likely step in later than is optimal and provide government subsidies to BHCs in bailouts, rewarding BHCs that are too big to fail.

Going Beyond the Model (cont.)

- Actual bail-ins may perform better or worse than in the model.
  - Benefits: May better protect taxpayers, provide better market discipline, improve asset allocations, level competitive conditions across banks, and safeguard the financial system.
  - Costs: May result in reduced credit supply to borrowers, impose losses on debtholders that do not understand their exposures and are ill-prepared to monitor, be difficult to implement under simultaneous distress of multiple large institutions across countries.
- Actual no-regulatory-intervention regime may also have benefits outside of the model.
  - Market participants may take bank risk more seriously and provide better market discipline under this regime.