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

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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 the 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 they were “too big to fail,” and would be bailed out if in 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 passed the Financial CHOICE Act, which would replace OLA with a no-regulatory-intervention regime.
  - BHCs would go bankrupt under a new Chapter 14.
  - In February 2018, the U.S. Treasury recommended continuing OLA for the largest institutions, and making bankruptcy easier for others.”

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 regime 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 – but such results could not be derived using static models.

Empirical Contributions of our Paper

- In the empirical literature,
  - Many studies of ***actual*** bailouts, mostly using U.S. data, and
  - A number of studies of ***actual*** 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.

Regulator's Optimization Problem

- Regulators optimize their regimes to maximize a simple social welfare function:

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

  - Regulators balance efficient provision of financial services by the BHCs with the external costs of disruptions to the financial system and the real economy associated with their failure.
  - Expected external disruption costs are assumed to be equal to the expected private costs of default to the bank's stakeholders.
    - In effect, we assume that these disruption costs amount to the private costs of another similar bank defaulting.

- We use this simple social welfare function in order to avoid imposing relatively arbitrary assumptions about bailout costs.
  - We add some additional costs of bailouts below.

Optimal Terms of Regulatory Regimes

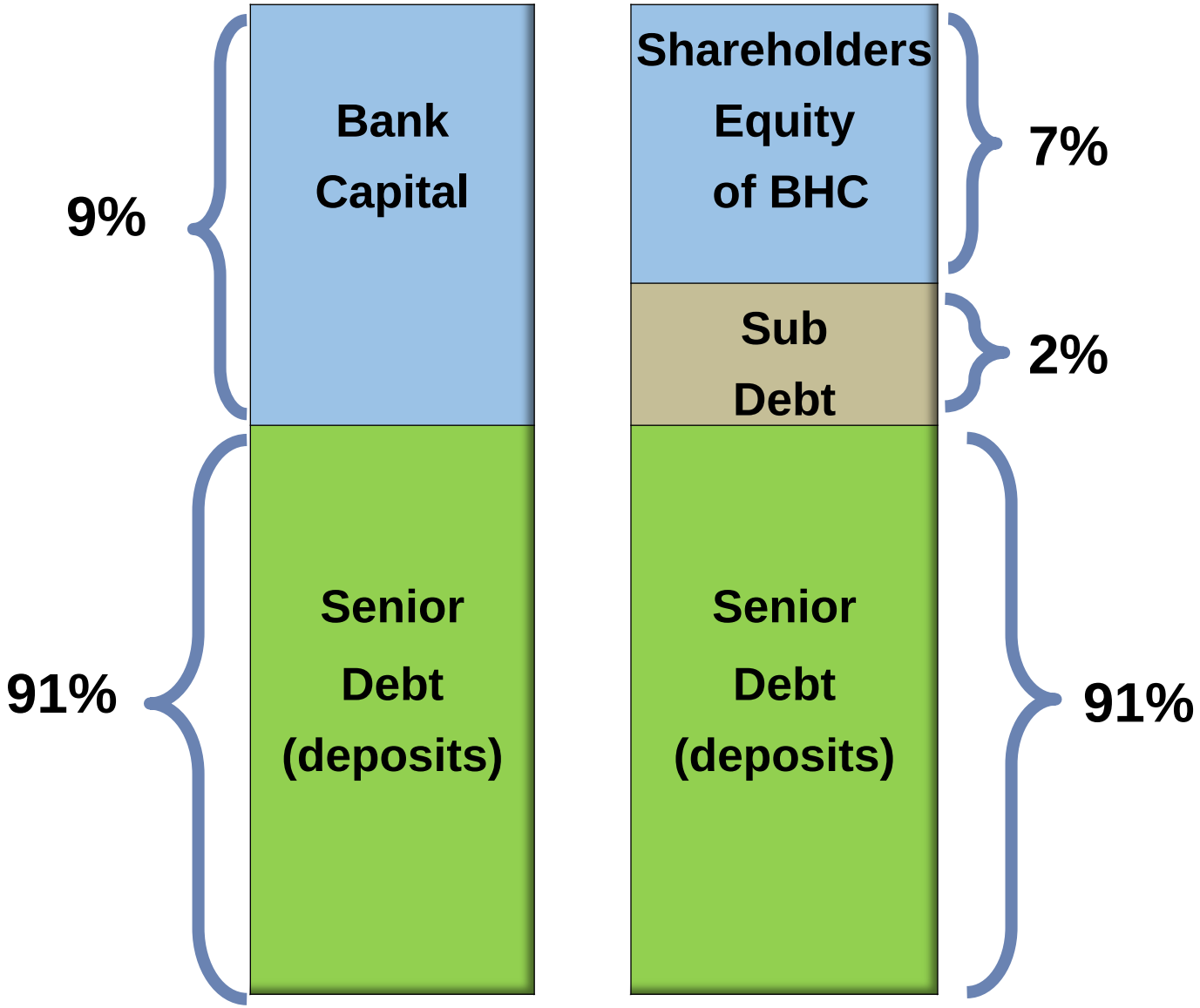
- Optimal bailout regime is characterized by:
  - Bailout capital ratio trigger, $\theta_{bailout*}$
- Optimal bail-in regime:
  - Bail-in capital ratio trigger, $\theta_{bail\text{-}in*}$
  - Stress test critical capital ratio, $\theta_{stress\_test\_bail\text{-}in*}$
- Optimal no regulatory intervention regime:
  - Stress test critical capital ratio, $\theta_{stress\_test\_no\ intervention*}$

- In all cases, we assume that the BHC optimizes its capital structure for the trigger points enforced by the regulator, and the regulator sets the trigger points knowing how the BHC will react in choosing its privately optimal capital structure.
- All regulator choices are tailored to individual financial institutions, rather than “one size fits all” policies.

Solving the Model

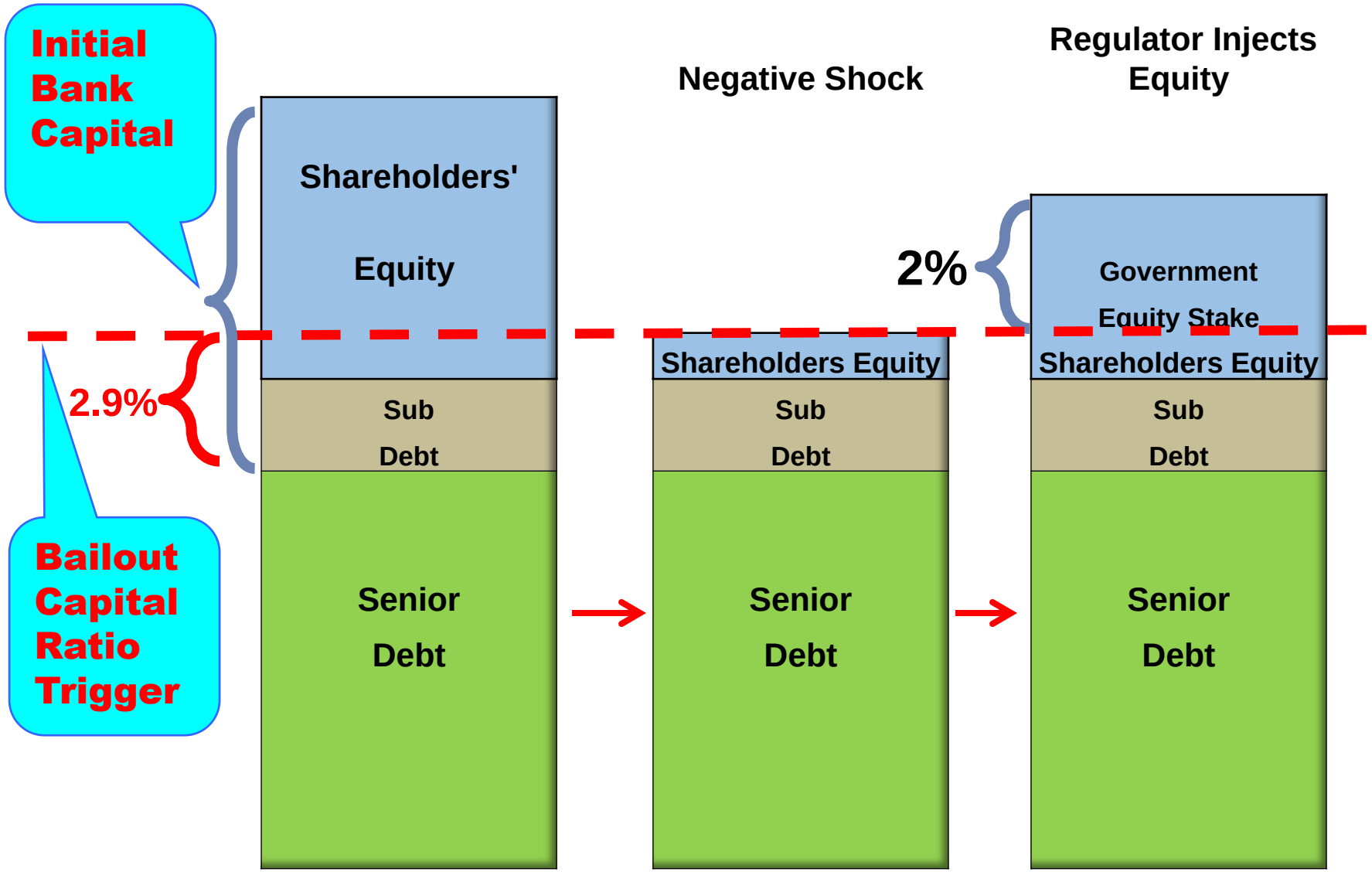
- We solve the model for the different regimes numerically using values that are calibrated to data for large BHCs.
  - We check the model results for sensitivity to using alternative values.
  - We also try alternative social welfare functions that include different values for:
    - The external disruption costs (up to 10 times private default costs),
    - Social costs of using and risking taxpayer funds for bailouts (up to 50% of the equity injection), and
    - Transactions costs of collecting and distributing bailout funds (up to private sector transactions costs of raising and using the same amount of funds).

Capital Structure of the Bank and BHC

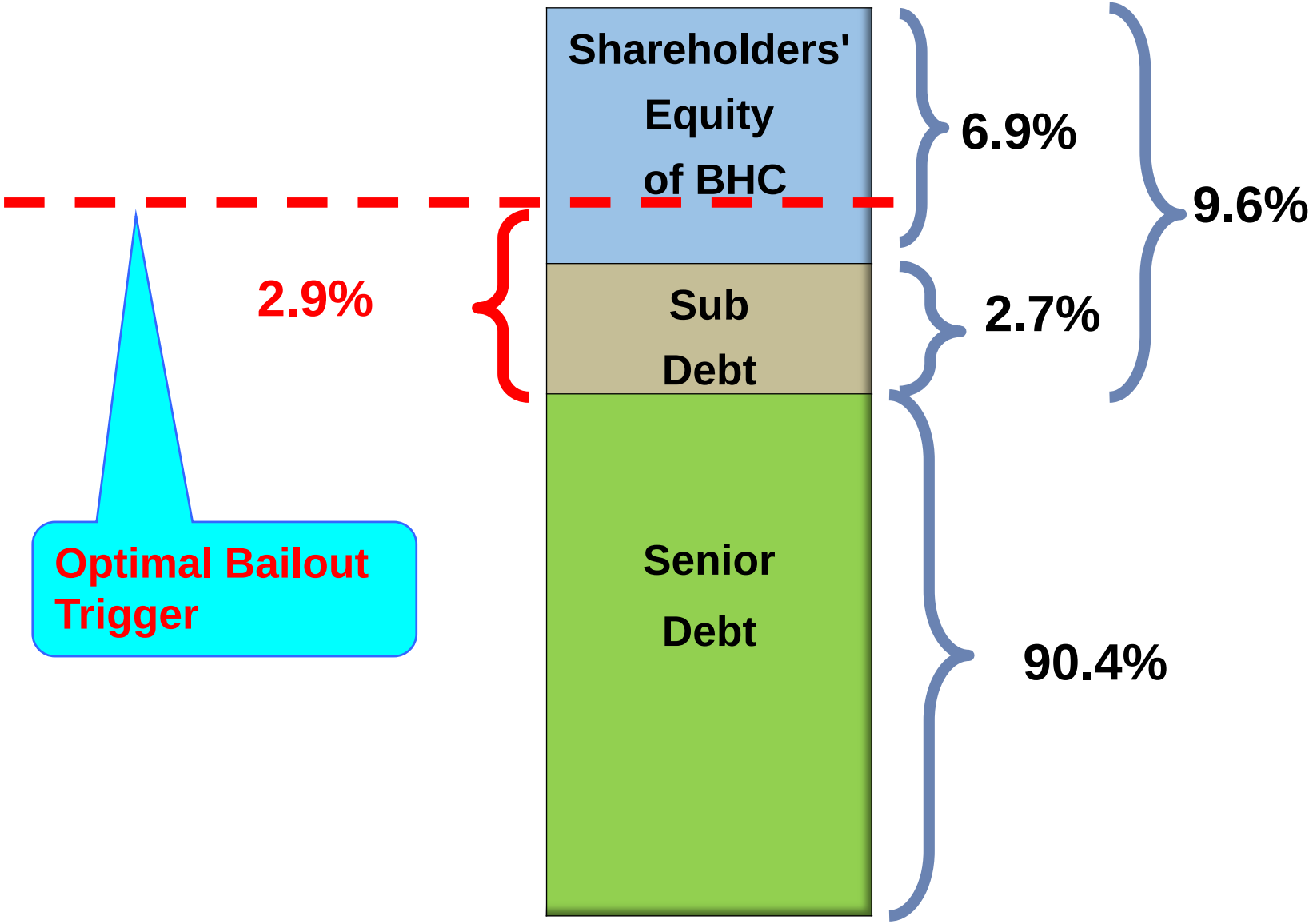


Amalgam of the capital structure of the bank and the BHC in which the capital structure of the BHC is superimposed over the capital of the bank.

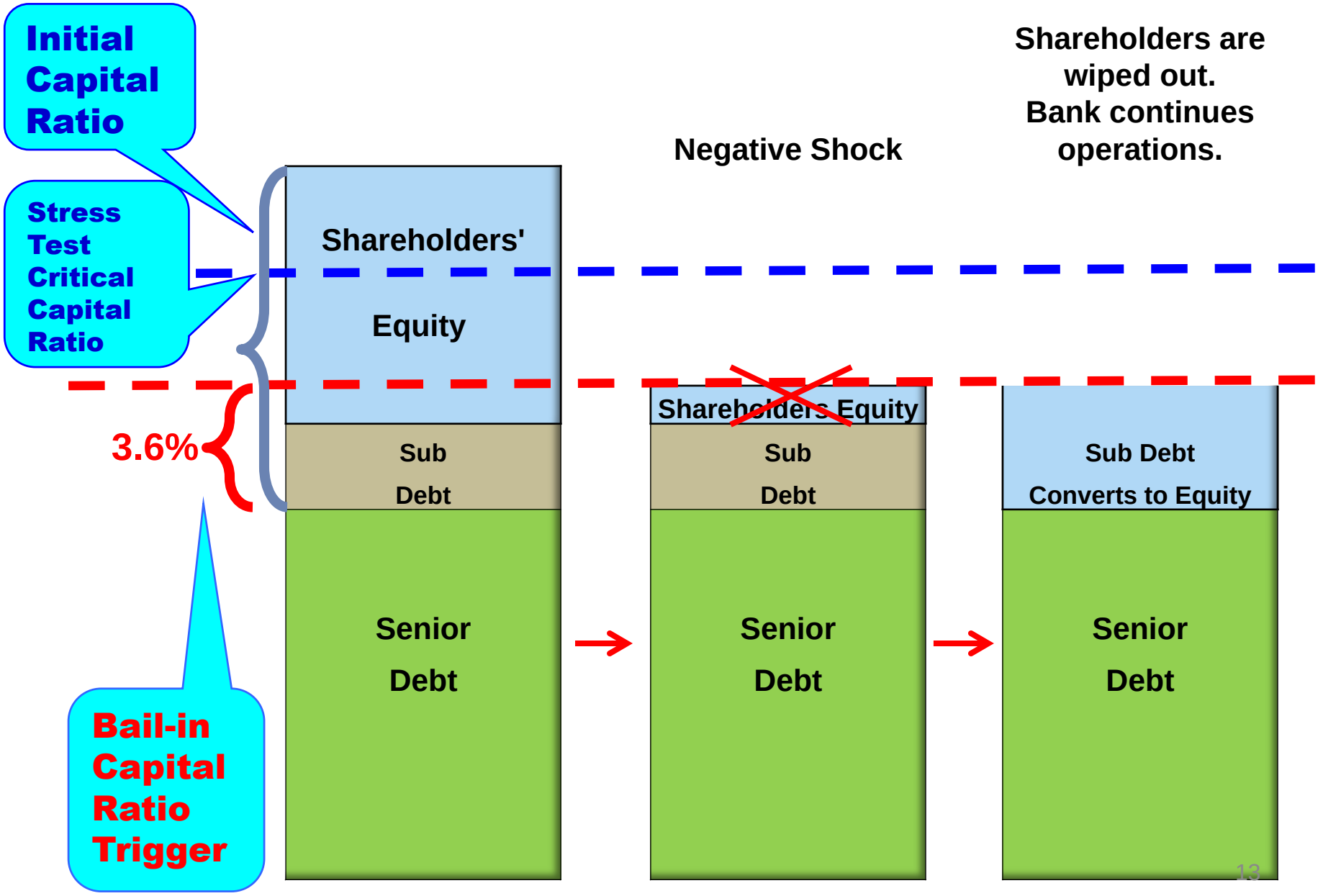
Bailout Regime



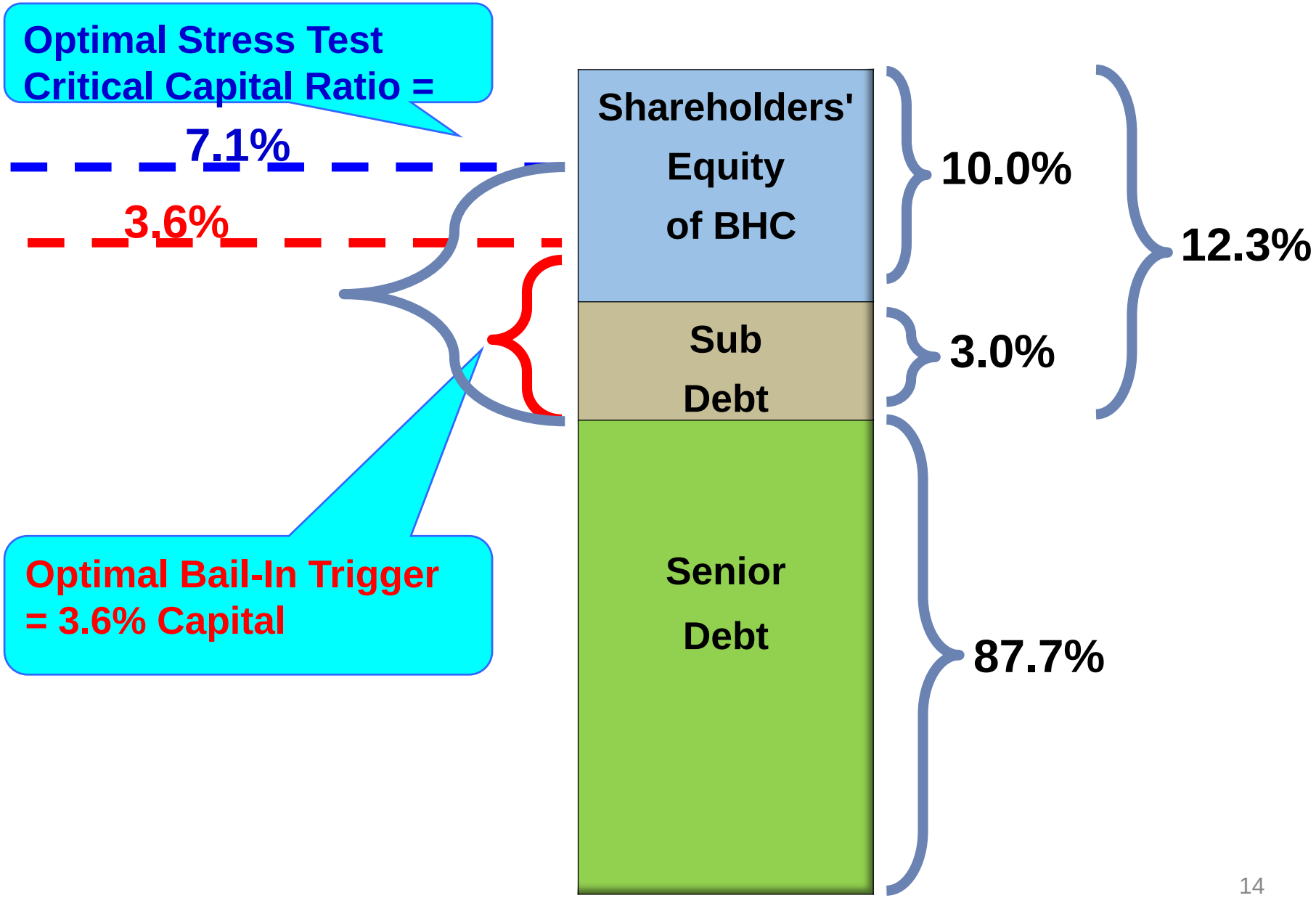
Optimal Capital Structure of BHC for Socially Optimal Bailout (base case calibrated to U.S. BHC data)



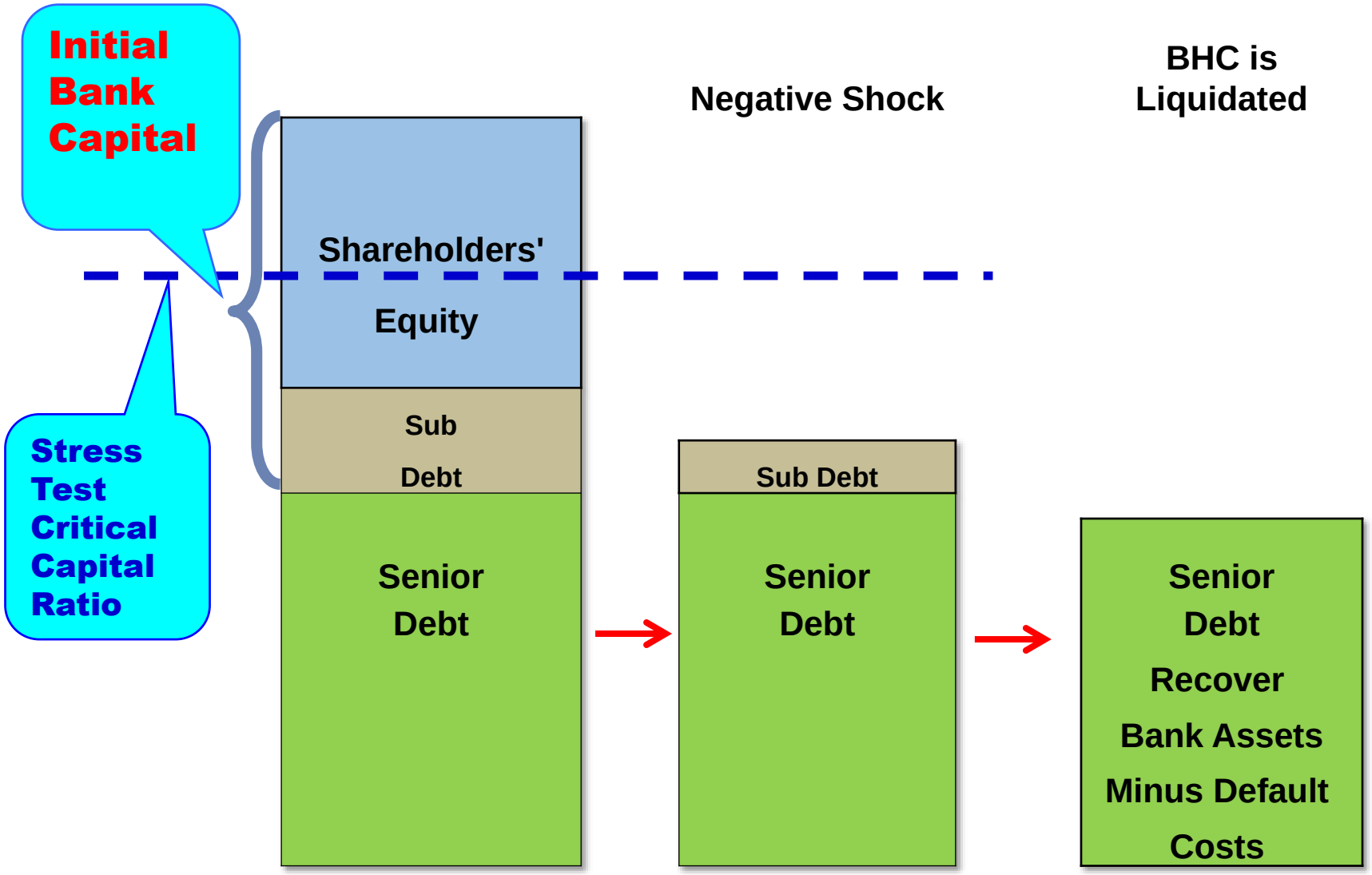
Bail-in Regime



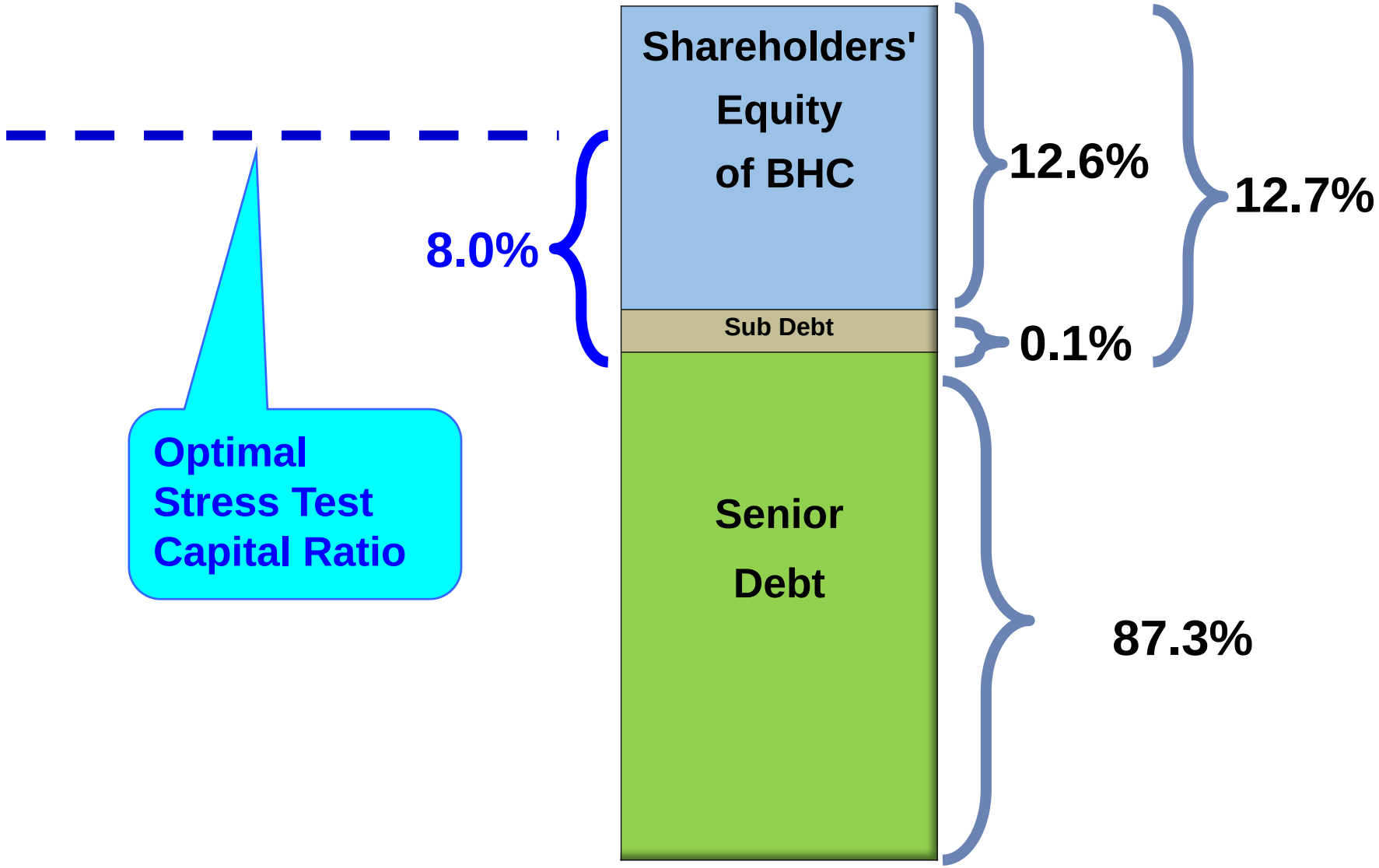
Optimal Capital Structure of BHC for Socially Optimal Bail-in (base case)



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.
  - Of the three regimes, 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 are 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)

- Based on our simple social welfare function, optimally-designed bailouts and bail-ins clearly dominate the no-regulatory-intervention regime, which only includes a stress test that restricts capital payouts.
  - This suggests that the more intrusive regulatory tools like bailouts and bail-ins are more effective in reducing the likelihood of bank default than stress tests alone.
  - Importantly, no regulatory intervention makes **both** the BHC shareholders and the rest of the society worse off.
- We also find that bailouts and bail-ins result in roughly similar social welfare values.
  - However, optimal bailouts do relatively well 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.

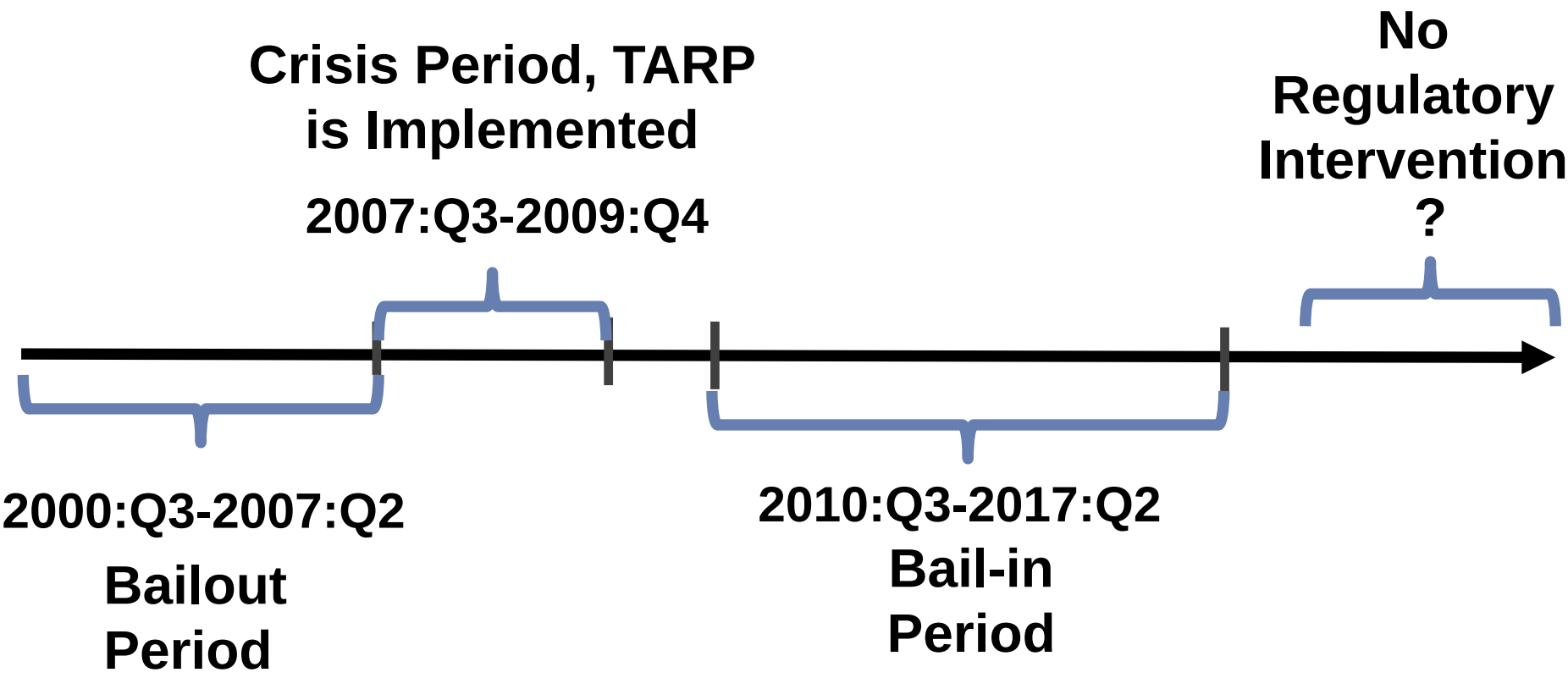
Going Beyond the Model

- Other factors outside the model also favor bail-ins over bailouts.
- Actual bailouts may perform significantly worse than the optimal bailouts 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.
  - In contrast, even suboptimal bail-ins do not involve government subsidies.

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.
- Results are largely robust to using different treatment and control groups.

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***	0.023***	0.027***
	(6.79)	(11.37)	(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 bail-out 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 that bail-ins generate faster speeds of adjustment.

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	

Conclusions

- We present a dynamic model of socially optimal designs of three regulatory regimes for handling potential failure of large U.S. BHCs.
  - The regulator sets the trigger points knowing that the BHC will self-optimize in choosing its capital structure.
  - The trigger points are tailored to the individual financial institutions, rather than “one size fits all” policies.
- The empirical tests corroborate the key model predictions.
- Three main conclusions:
  - Bail-ins provide the best capital incentives for BHCs.
  - Using a simple social welfare function, no regulatory intervention is dominated in terms of social welfare by optimal bailouts and bail-ins that have roughly similar social values.
  - Other factors tip the scales towards bail-ins rather than bailouts.
    - Including taxpayer and transactions costs of bailouts in the social welfare function, bail-ins produce higher social values than bailouts.
    - Other factors such as real bailouts are likely to involve subsidies also point towards bail-ins.

Policy & Research Implications

- Our results have policy implications.
  - The optimal resolution design requires a delicate balance in terms of the "aggressiveness" of the regulator.
  - "One size fits all" resolution design is suboptimal.
  - Our results also suggest which regime is best.
- Finally, we suggest several directions for future research.
  - Our focus on benefits and costs of the "pure-play" regimes requires us to assume regulatory pre-commitment and abstract from ambiguity.
    - Future research on the role of this ambiguity may be fruitful in enlightening policy for incentivizing financial institutions.
    - Future research can also explore other types of regulatory mechanisms or hybrids of regimes that might be more efficient than the pure play regimes.
  - Researchers can also explore the effects of other regulatory and market frictions or other important differences among the three regimes.