



“How much capital is enough?”

**Capital Levels and
G-SIB Capital Surcharges**

September 26, 2011

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Executive Summary

The Clearing House (TCH) commissioned this study to answer four questions:

1. How much additional capital would be required by U.S. banks to meet the proposed Basel III minimum-capital ratios and the proposed G-SIB capital surcharge?
2. What does the crisis experience indicate is 'enough' capital for banks to hold?
3. Using forward-looking stress tests, how much stronger are the new definitions of capital and how much stronger are banks' balance sheets?
4. What would be the impacts of the Basel III capital proposals?

We conducted this analysis using proprietary data, current as of 4Q 2010, collected from 10 U.S. institutions representing \$8.3 trillion in assets, or 54% of the U.S. banking system, and supplemented it with publicly available information.

Summary of Results:

1. We believe that Basel III's capital requirements, without a G-SIB surcharge, would promote a safe and prudent banking system.
2. If the Basel Committee's G-SIB capital surcharge is implemented in the U.S., these banks would have to either increase the borrowing costs to their customers by 60 basis points (a 15% increase in their net interest margin) or reduce their non-interest expense ratios by almost 11 percentage points (a 19% reduction in expenses).

Key Findings:

1. Relative to pre-crisis levels, banks would have to raise an additional 100% more capital, or \$525 billion in common equity, to meet Basel III's 7% common equity capital requirement (from \$525 to \$1050 billion).¹

If the G-SIB surcharge is imposed, banks will need to raise an additional 66% more capital, or \$500 billion, over year-end 2010 levels (from \$750 to \$1250 billion). This shortfall is approximately as large as all of the capital held by U.S. banks pre-crisis.

2. The capital levels of 123 large global banks were analyzed over the financial crisis period. No bank that met Basel III's 7% common equity requirement (1) went bankrupt, (2) was taken over by the government, (3) was forced into a distressed takeover by another bank, or (4) received government assistance greater than 30% of its Tier 1 capital.²

We believe that Basel III's capital requirements, without a G-SIB surcharge, would promote a safe and prudent banking system.

¹ See presentation slide 13.

² See presentation slide 18. We believe this is a fair definition of "distress" as some firms were forced to accept limited government support during the crisis.

Executive Summary

3. Using the Federal Reserve's adverse stress scenario (March 2011), we collected internal stress tests from seven large U.S. banks to study the impact of Basel III's improvements on the quality of capital and to analyze how much more resilient bank balance sheets have become.³ We found that, if banks began at Basel III minimum common equity ratios of 7%, the banks on average would see only a 0.6 percentage point reduction in their Basel III common equity ratios (from 7% to 6.4%).

The worst bank in the sample would only see a 1.4 percentage point reduction in its common equity ratio (from 7% to 5.6%). These seven banks represent 51% of U.S. banking assets.

4. We estimate that the cumulative impact of the Basel III minimum capital requirement and G-SIB surcharges would decrease bank return on equity (ROEs) by up to 4.9 percentage points.⁴ Based on empirically estimated relationships from the academic literature,⁵ required returns on equity could fall by as little as 0.7 %.⁶

To make up for the greater reduction in return on equity relative to the reduction in returns required by investors, **U.S. banks would have to either increase the borrowing costs to their customers by 60 basis points (a 15% increase in their net interest margin) or decrease their non-interest expense ratio by almost 11 percentage points (a 19% reduction in non-interest expenses).**

³ See presentation slide 20.

⁴ See presentation slide 24.

⁵ David Miles, Jing Yang and Gilberto Marcheggiano, *Optimal Bank Capital*, (April 2011) available at <http://www.bankofengland.co.uk/publications/externalmpcpapers/extmpcpaper0031.pdf>.

⁶ See presentation slide 25.

The Basel III Capital Requirements: Frequently Asked Questions

What is bank capital?

Capital represents the portion of a bank's liabilities that does not have to be repaid (like common equity) and therefore is available as a buffer in case the value of the bank's assets becomes lower than the value of the bank's other liabilities. As banking is a regulated industry, bank supervisors in every country specify the type of financial instruments that can be used to calculate capital for purposes of bank safety and soundness. This is known as "regulatory capital." There are many kinds of regulatory capital that are used to measure different levels of capital strength, including "Total Risk-Based Capital," "Tier 1 Capital," and "Common Equity Tier 1 Capital."

How is bank capital measured?

Capital requirements are often expressed as a ratio of capital to assets held by a bank. Capital is the numerator and the assets are the denominator. To better account for the risks associated with individual asset types, regulators rely on a concept called "risk-weighted assets" (RWA). There are several ways that banks can calculate Risk Weighted Assets, and the method used often depends on the national regulator. In the simplest method, assets are multiplied by an associated "risk weight." The riskier the asset, the greater the risk weight assigned to that asset class. For example, in the U.S., residential mortgages are usually assigned a 50% risk weight and U.S. Treasury bonds are assigned a 0% risk weight. To be considered "well capitalized" in the U.S., a bank must have a Total Risk-Based Capital Ratio of at least 10% and a Tier 1 Risk-Based Capital Ratio of 6%.

What is the Basel Committee?

The Basel Committee on Banking Supervision is based at the Bank for International Settlements in Basel, Switzerland, and is made up of bank supervisors from 27 countries. The Basel Committee is best known for its work drafting international agreements on bank capital standards, known as the Basel Accord or Basel I (1988), Basel II (2004), and Basel III (2010).

Are the recommendations of the Basel Committee binding on the U.S. or U.S. banks?

No. The Basel Committee has no founding treaty and does not issue binding regulations. Instead, it formulates broad supervisory standards, guidelines, and recommended best practices. National implementation must occur according to each national system, whether by law or regulation.

How does Basel III change the *quality* of capital that banks will be required to hold?

Under Basel II, the primary capital measurement for a bank was its Tier 1 capital ratio which had to be at least 4%. Tier 1 capital could be comprised of half common equity (2%) and half noncumulative preferred stock (2%). Basel III relies less on Tier 1 capital, focusing instead on only common equity capital ratios, as common equity is the most robust form of capital during a stress event. Basel III also disallows certain instruments from capital treatment, including deferred tax assets, mortgage servicing rights, and investments in common shares of unconsolidated financial institutions. All of these changes will increase the cost of capital for banks, as common equity shares are the most expensive form of attracting investment.

The Basel III Capital Requirements: Frequently Asked Questions

How does Basel III change the *amount* of capital that banks are required to hold?

Basel III requires that banks maintain a common equity ratio of 7%, three and a half times the 2% common equity capital ratio required before the crisis. The Basel Committee has also proposed that Global Systemically Important Banks (G-SIBs, sometimes also called G-SIFIs) be required to hold additional common equity capital between 1% and 2.5% depending on the size, global footprint, and activities of each bank.

How do Basel III's changes compare to the amount of Tier 1 capital banks held before the crisis?

Basel III changes both the denominator and the numerator of the capital ratio for banks. Because of changes in the risk weightings of assets in the denominator (which increase it approximately 66% over Basel I), and changes in allowed capital in the numerator, the 7% requirement under Basel III is equivalent to a 14% Tier 1-capital ratio for the U.S. banking system under the pre-crisis Basel I rules. If the G-SIB capital surcharge is imposed in the U.S., it would result in the U.S. banking system holding the equivalent of 16% capital in Basel I terms, or 400% the Tier 1 capital required before the crisis (4%).

How are banks trying to meet the Basel III capital increases?

Banks are relying on two methods to meet Basel III capital requirements. First, they are working to increase their capital levels. Because it would be too costly to issue new shares, banks are paying little to no dividends to shareholders as they build capital internally. Second, banks are managing the denominators of their capital ratios to meet Basel III's high standards. Banks have increased their holdings of low risk weighted assets and decreasing their holdings of loans.

In light of the recent crisis, how much capital should banks hold?

If banks had met Basel III's 7% common equity capital requirement, we believe that vast majority of these institutions would have weathered the crisis without requiring extraordinary government assistance.

We conducted a retrospective analysis using the actual stresses experienced by banks during the recent financial crisis, which has been described by Fed Chairman Bernanke as more stressful than the Great Depression. We analyzed the capital levels of 123 large global banks from before the crisis (December 2007) and determined that no bank that met the Basel III 7% common equity to risk-weighted asset ratio (1) went bankrupt, (2) was taken over by the government, (3) was forced into a distressed takeover by another bank or (4) received government assistance greater than 30% of its Tier 1 capital. We believe that this is a fair definition of "distress," as some firms were forced to accept limited government support during the crisis and a minimal capital investment would not have been determinative of a bank's survival. Our analysis showed that 35 of the analyzed banks met our definition of distress, representing 28% of the sample and 30% of the sample's assets and none of these would have met the Basel III minimum capital standards prior to the onset of the crisis.

We believe that Basel III's capital requirements, without a G-SIB surcharge, would promote a safe and prudent banking system.

The Basel III Capital Requirements: Frequently Asked Questions

According to the Federal Reserve's stress tests, how much capital should banks hold?

As a result of the crisis, banks have become much more conservative in their activities and in choosing what assets to hold. We conducted an analysis, based on the Federal Reserve's adverse stress scenario (March 2011), to see how resilient bank balance sheets would be after Basel III's 7% common equity requirement is implemented. Tested against the Fed's adverse stress scenarios, seven large U.S. banks on average would see only a 0.6% reduction in their Basel III common equity ratios. The worst bank in the sample would see only a 1.4% reduction in its common equity ratio. These seven banks represent 51% of U.S. banking assets.

How much capital is enough? Capital Levels and G-SIB Capital Surcharges



September 2011

Executive summary (1/2)

Scope of our work

This report addresses two questions: first, what are the impacts of Basel III capital requirements based on what is known about the G-SIB surcharge? Second, what do historical crisis experience and forward-looking analyses indicate is 'enough' capital?

We conducted this analysis using proprietary data, current as of 4Q 2010, collected from 10 U.S. institutions representing \$8.3 trillion in assets (or 54% of the U.S. banking system) and supplemented it with publicly available information

Additional Capital Required

- Between 4Q 2007 and Q4 2010, US Banks increased Basel III Tier 1 Common capital by ~\$200-250Bn
- From 4Q 2010 levels, Basel III minimums still require an additional ~ \$300 billion of common equity, or an approximately 40% increase in aggregate for the US industry
- Relative to pre-crisis levels, this is an increase of more than 100% or ~\$525 billion in common equity and is equivalent to banks holding a Tier 1 Common to RWA ratio under Basel I definitions of 12-14%
- Further, the estimated G-SIB surcharges of 100-250 bps would require the industry to hold an additional ~\$200 billion in common equity or an additional ~25% over 4Q2010 levels

Impact of higher capital ratios

- Over the 2007-2010 period, banks have improved capital ratios by growing equity and by reducing the riskiness of their assets; bank holdings of Treasuries and cash have increased, whereas consumer, C&I, and other loans have been flat or down
- Unmitigated, the impact of Basel III minimum capital requirements and a G-SIB surcharge of 150-250 bps would reduce bank ROEs by ~430-490 bps
- In order to offset this impact on returns, banks would have to increase NIMs by 40-100 bps or decrease the non-interest expense ratio by 8-19 percentage points

Executive summary (2/2)

Assessing capital needs from crisis experience

We conducted two analyses to quantify how much capital is 'enough' and identify the level of capital at which there are diminishing benefits to bank solvency:

- **Historical likelihood of financial distress compared to initial capital levels:**

- Based on an analysis of 123 global banks' experience between Q4 2007 and Q4 2009, we found that no institutions that began the crisis with greater than 7% Tier 1 Common (Basel III definition) suffered financial distress
 - Distress was defined as going bankrupt, being acquired by another institution, being taken over by the government, or receiving >30% government capital infusion relative to Tier 1 capital on Dec. 31, 2007; based on this definition, 35 banks are considered distressed
- The probability of distress also decreased significantly for banks with >4.5% CET1, and even for those banks that began the crisis with 5.5-7.0% Tier 1 Common under Basel III

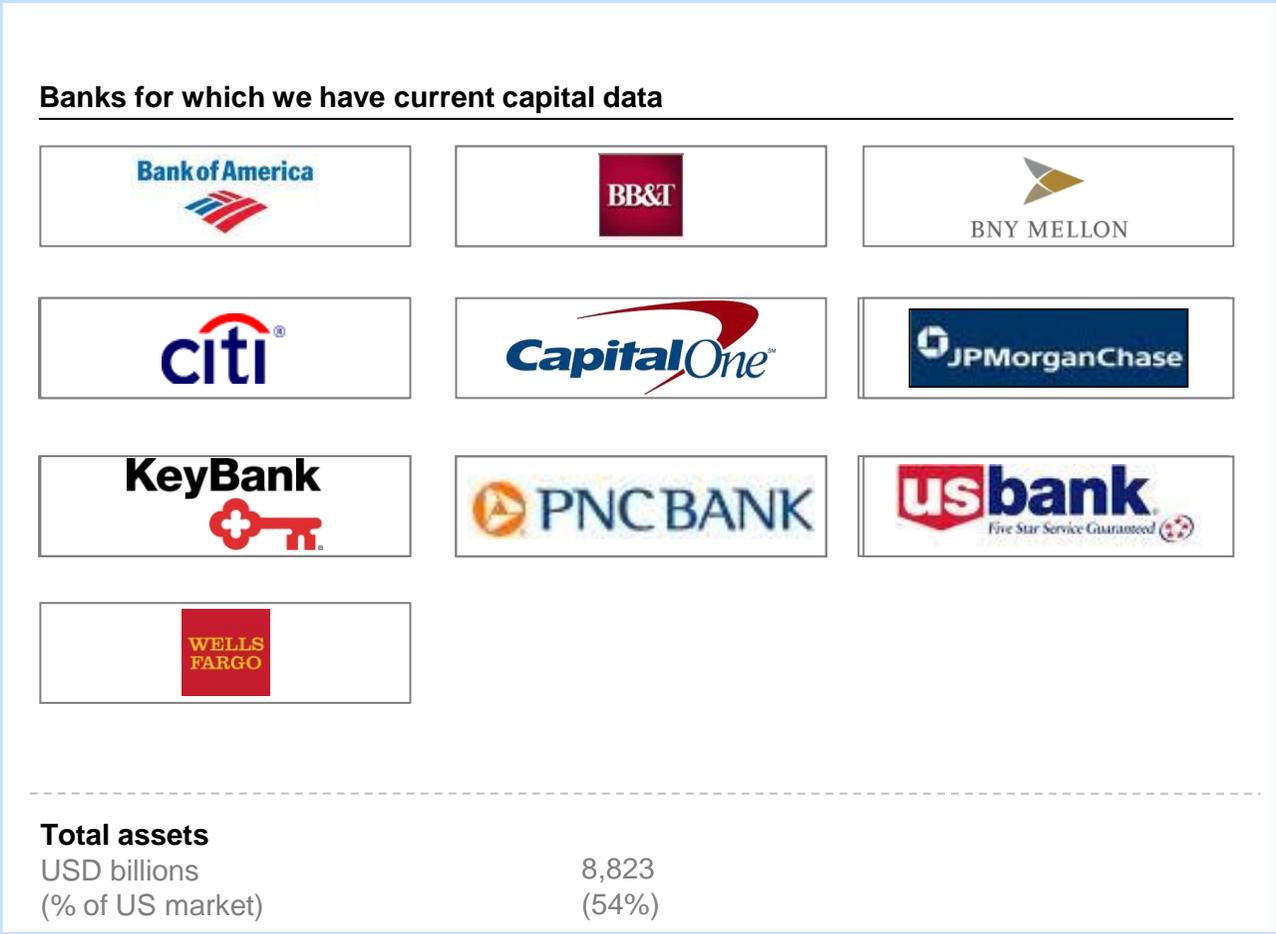
- **Forward-looking stress test:**

- Bank by bank stress test analysis of an adverse economic environment, similar to the scenario released by the Federal Reserve in March 2011, shows an average reduction of 60 bps in Basel III CET1/RWA with a maximum reduction of 140 bps.

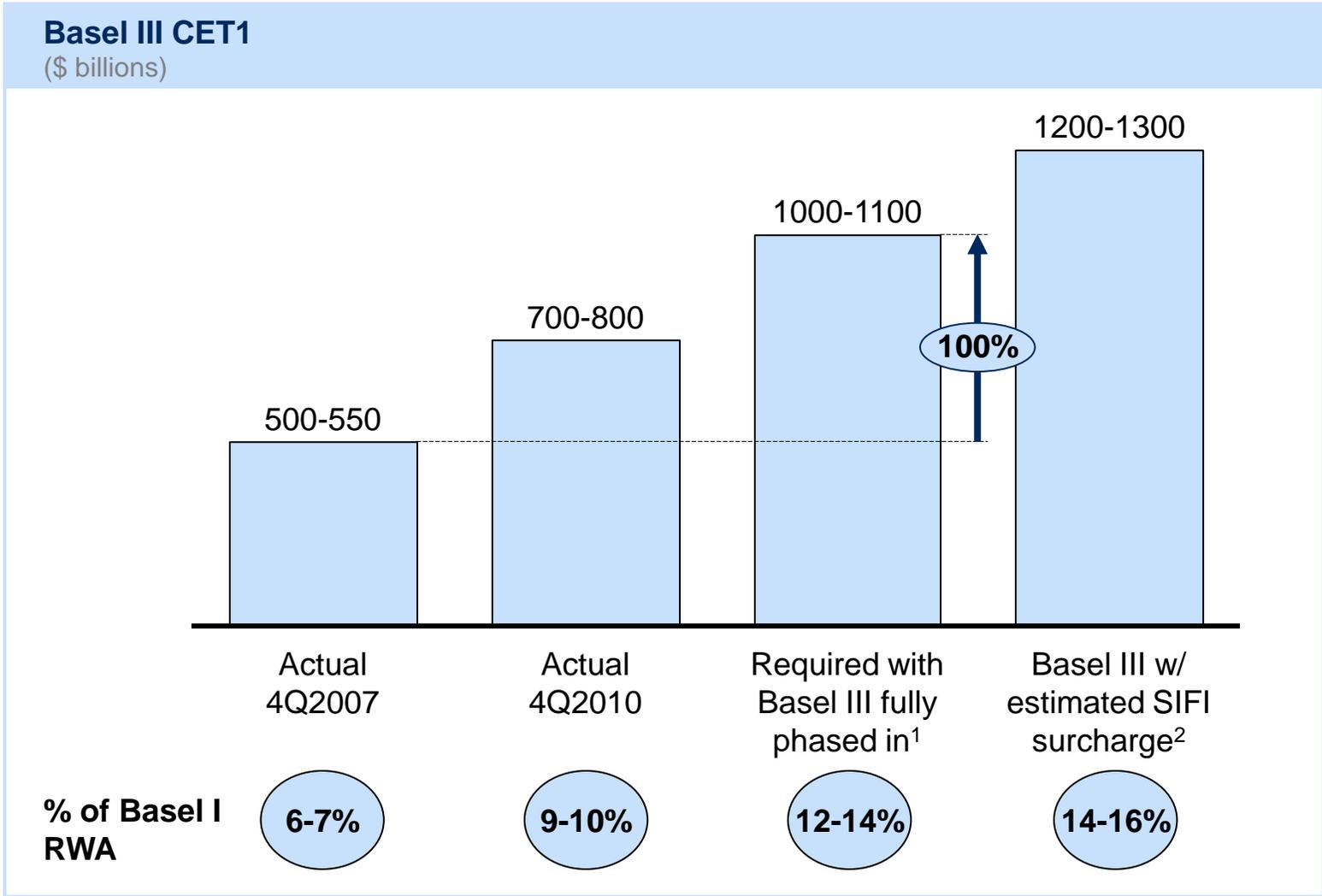
Contents

- **Additional capital required**
 - Assessing capital needs from crisis experience
 - Impact of higher capital ratios

Estimates of additional capital requirements are based on data from 10 US banks, which account for 54% of total US banking assets



Relative to pre-crisis levels, Basel III requires US banks to hold over 100% more common equity



¹ Fully phased in at CET1 as 7% of RWA

² Estimated G-SIB surcharge of 100-250bps for the industry

Contents

- Additional capital required
- **Assessing capital needs from crisis experience**
- Impact of higher capital ratios

We have used 2 approaches to assess the necessity of G-SIB surcharges based on crisis experience and forward-looking stress tests

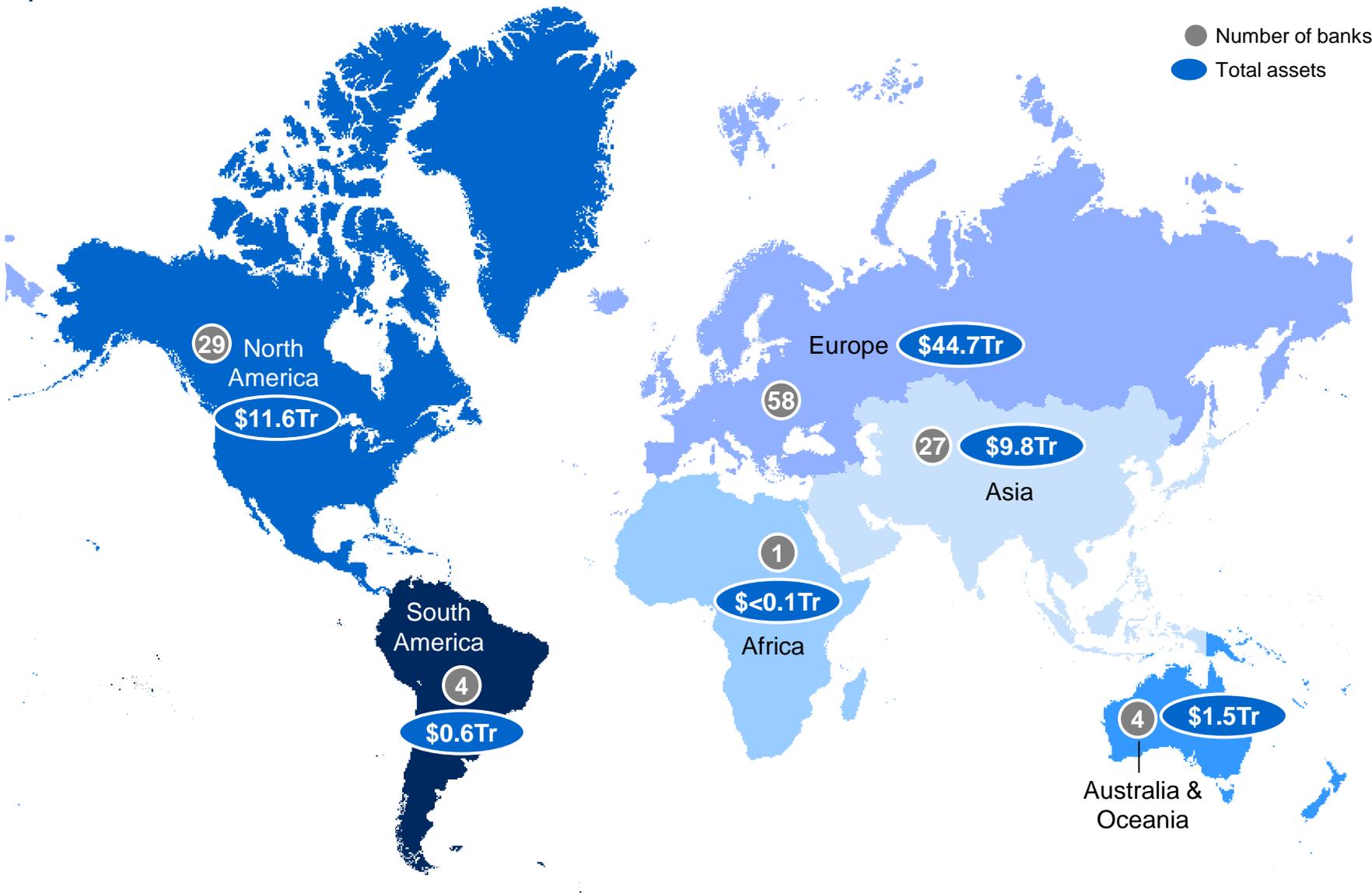
1 Distressed bank analysis

Analyzed the relationship between Basel III capital ratios of large global banks at the onset of the financial crisis (defined as December 2007), and subsequent Bank distress during the crisis

2 Stress test analysis

Measured peak-to-trough drop in Tier 1 common ratios for US banks on forward looking basis under stress conditions (based on Federal reserve adverse scenario published on March 18, 2011) assuming banks hold capital at fully-phased-in Basel III minimum levels (7% of Basel III RWA)

1 The sample includes 123 banks worldwide, with more than \$68 trillion in assets



● Number of banks
● Total assets

1 Methodology for analyzing the relationship between pre-crisis bank capital ratios and the likelihood of a bank going into distress

Approach

- Analyzed the relationship between capital ratios of large global banks, at the onset of the financial crisis (defined as December 2007), and subsequent Bank distress during the crisis
 - Initial capital ratios as defined in both Basel III and Basel I terms used to study relationship to Bank distress

Banks in sample

- 123 large global banks with minimum asset size of \$30 billion
 - Represent \$68.2 trillion in total assets
 - About 85% of developed-market banking and 65% of total banking assets worldwide
 - Broker-dealers excluded as risk-weighted assets data unavailable in December 2007.

Definition of distress

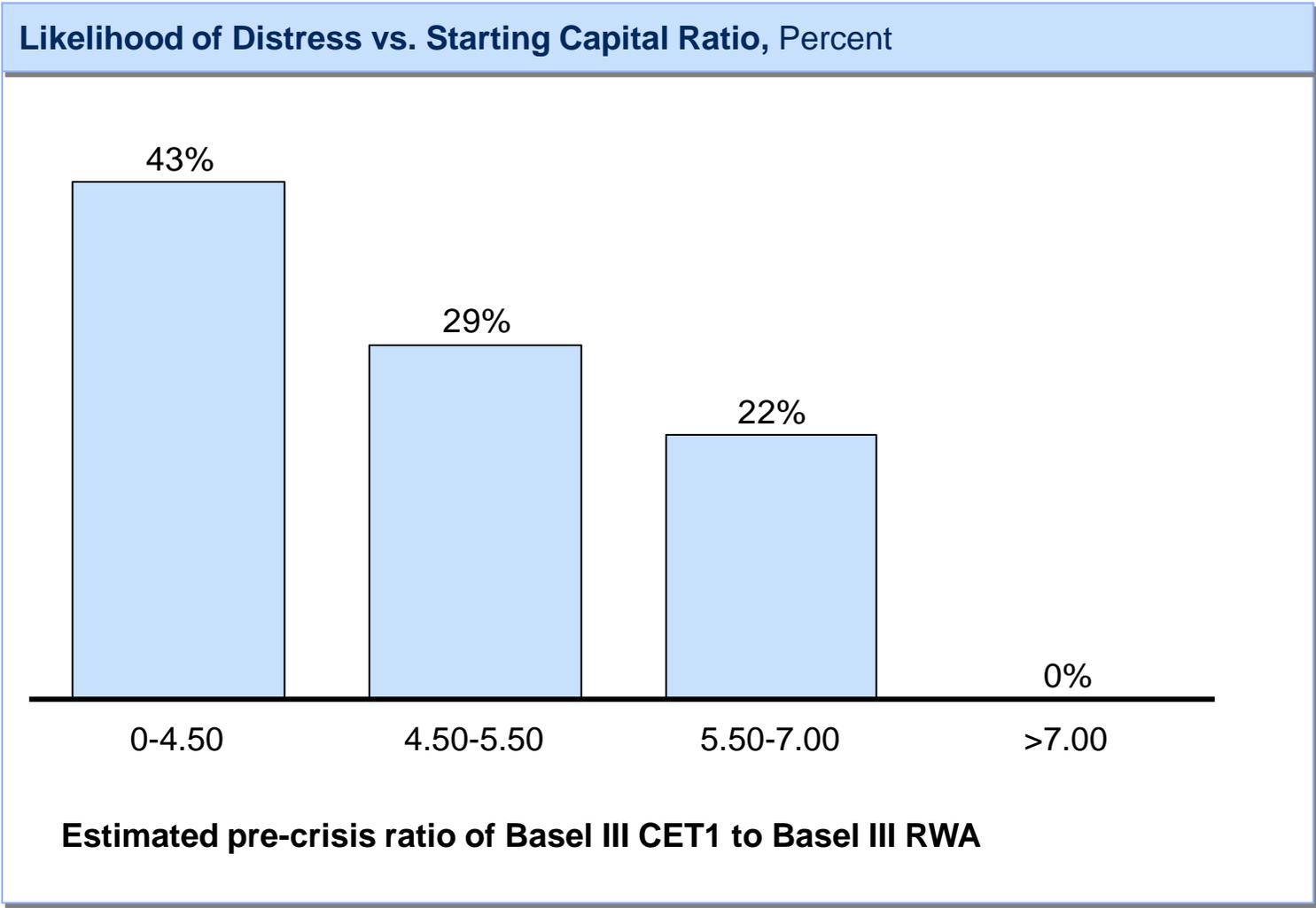
- An institution is defined as distressed if any of the following conditions was met 2007-09:
 1. Bankruptcy
 2. Government takeover or placement into government conservatorship
 3. Merger under duress with another bank
 4. Receipt of a substantial direct government capital investment or bailout¹
- Using the above definition, a total of 35 banks were deemed distressed (28% of banks in the sample, covering 30% of the assets)

Adjustments for Basel III

- Adjustments developed to convert December 2007 capital and RWA for each bank into estimates of what Basel III capital ratios would have been, had Basel III rules existed at the time
 - Adjustment factors estimated for different type of banks (e.g., by country, by mix of business such as wholesale vs. retail, trading assets)

¹ Defined as total government capital investment greater than 30% of the bank's starting Tier 1 capital as of December 31, 2007

1 Measured under Basel III definitions, no bank with a Basel III common equity to RWA over 7.00% experienced distress



Bins chosen to have approximately equal number of banks per bin for all Basel III CET1 / Basel III RWA ratios > 4.5
SOURCE: Company 10Ks, regulatory filings

2 Methodology for stress test analysis

Approach

- Analyzed how much banks capital levels would drop under stress conditions if they started with 7% Basel III Tier 1 Common Equity (B3 CET1)
 - Starting with 7% B3 CET1 in the initial quarter, analyzed forward over eight quarters

Banks in sample

- 7 large US banks with minimum asset size > \$150 billion
 - Represent \$8.2 trillion in total assets
 - About 51% of US banking assets

Definition of stress conditions

Conditions over the 9 quarters are consistent with stress scenario released by the Federal Reserve in March 2011:

- Real GDP decline of 0.9% in first 5 quarters
- CPI increase of 4.5%
- Real Disposable Personal Income decline of 0.7%
- Unemployment rate starting at 9.6% and peaking at 11.0%
- 3-Month T-Bill rate decline of 18.8%
- 10-Year Treasury Bond rate increase of 31.4%
- BBB Corporate Bond rate increase of 22.7%
- Dow Jones decline of 23.7% in first 3 quarters
- National House Price Index decline of 8.5%

Methodology

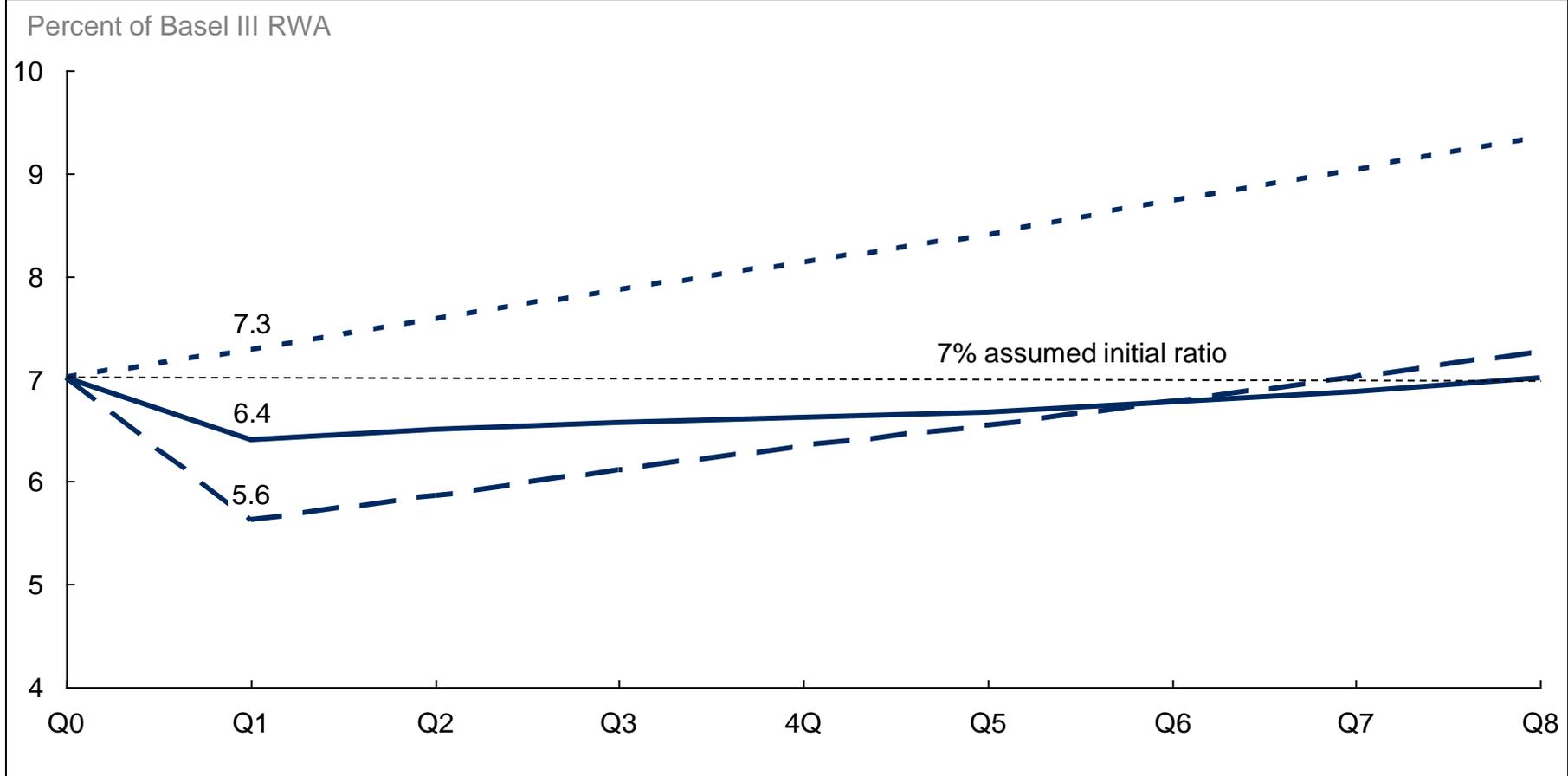
- Started with 4Q 2010 Basel III Risk-weighted Assets (B3 RWA) in the initial quarter
- Set B3 CET1 to 7% of B3 RWA in the initial quarter
- Calculate the Basel III CET1 Ratio for subsequent quarters based on projections of PPNR, loss provisions, realized gains (losses) on held-to-maturity securities, realized gains (losses) on available-for-sale securities, other gains (losses), income tax expense, income attributable to non-controlling interest, and other comprehensive income.

¹ Defined as the drop from the initial 7% (rather than from the absolute peak).

2 Stress test results have an average 60 bps reduction in CET1 to RWA under stress, and a maximum reduction of 140 bps

- Average
- - Bank with Largest Decline
- · - Bank with Smallest Decline

Tier 1 Common/RWA Ratios for US Banks under stress test scenario



Contents

- Additional capital required
- Assessing capital needs from crisis experience
- **Impact of higher capital ratios**

Overall balance sheet structures have changed significantly since Q4 2007

U.S. \$ Trillions, Q1 2011

**4Q 2007
balances**

1Q 2011 balances of aggregate US Commercial Banks

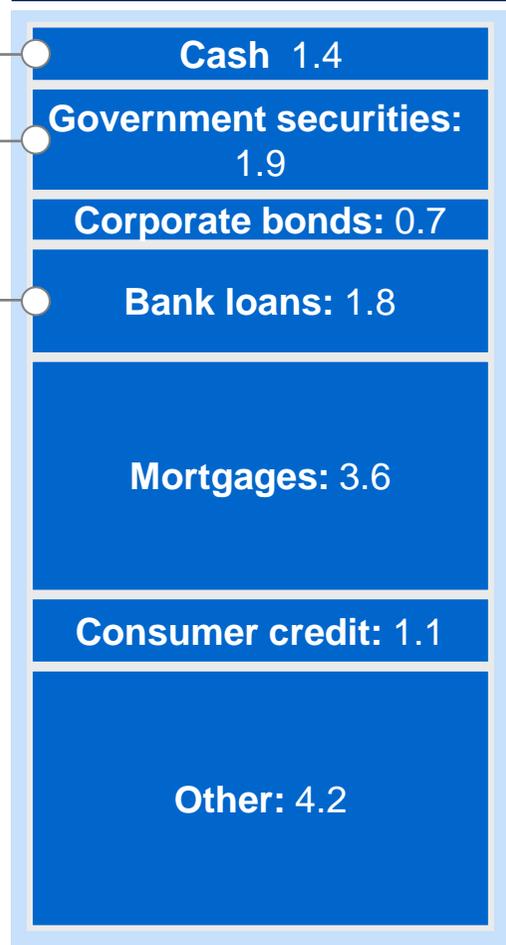
**4Q 2007
balances**

**0.1
(+1300%)**

**1.3
(+45%)**

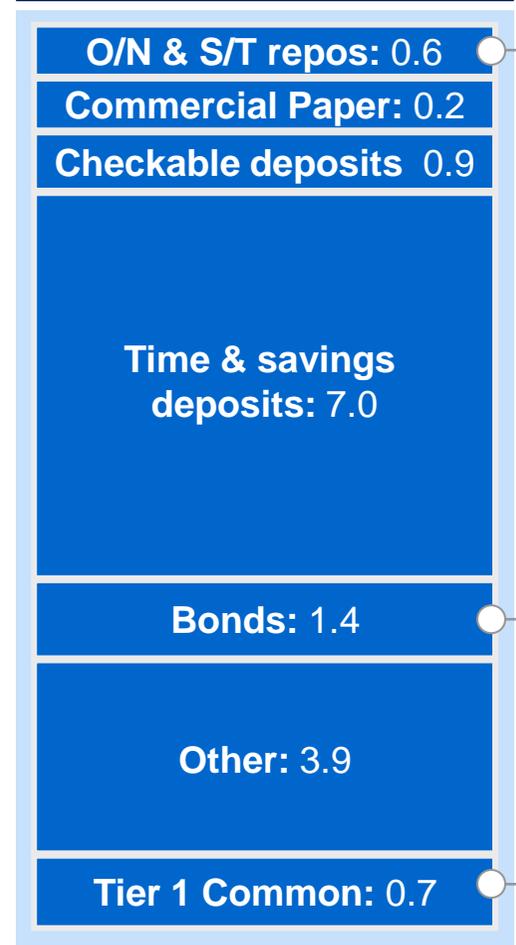
**2.0
(-10%)**

Assets



14.7

Liabilities



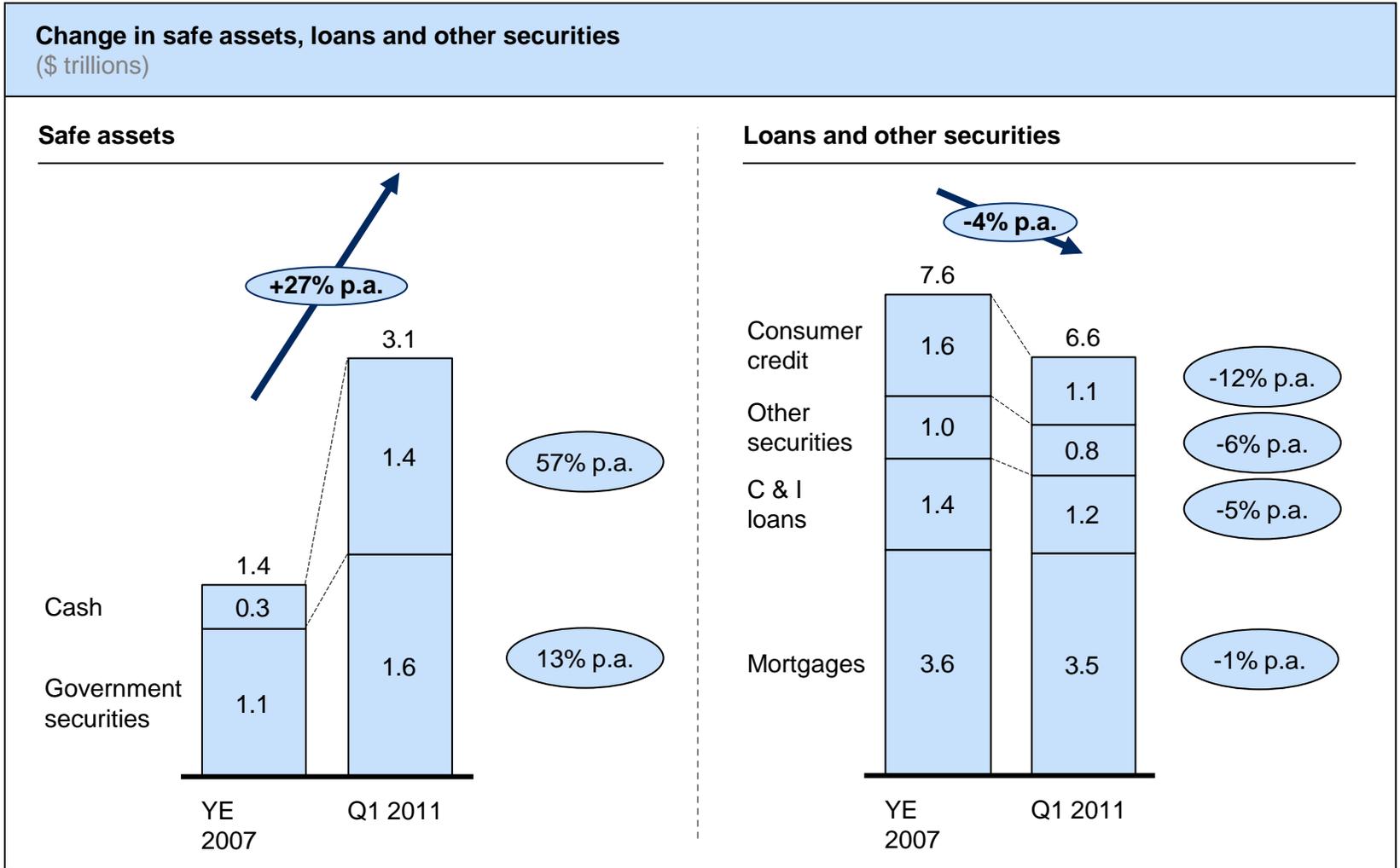
14.7

**0.8
(-25%)**

**0.7
(+100%)**

**0.5
(+40%)**

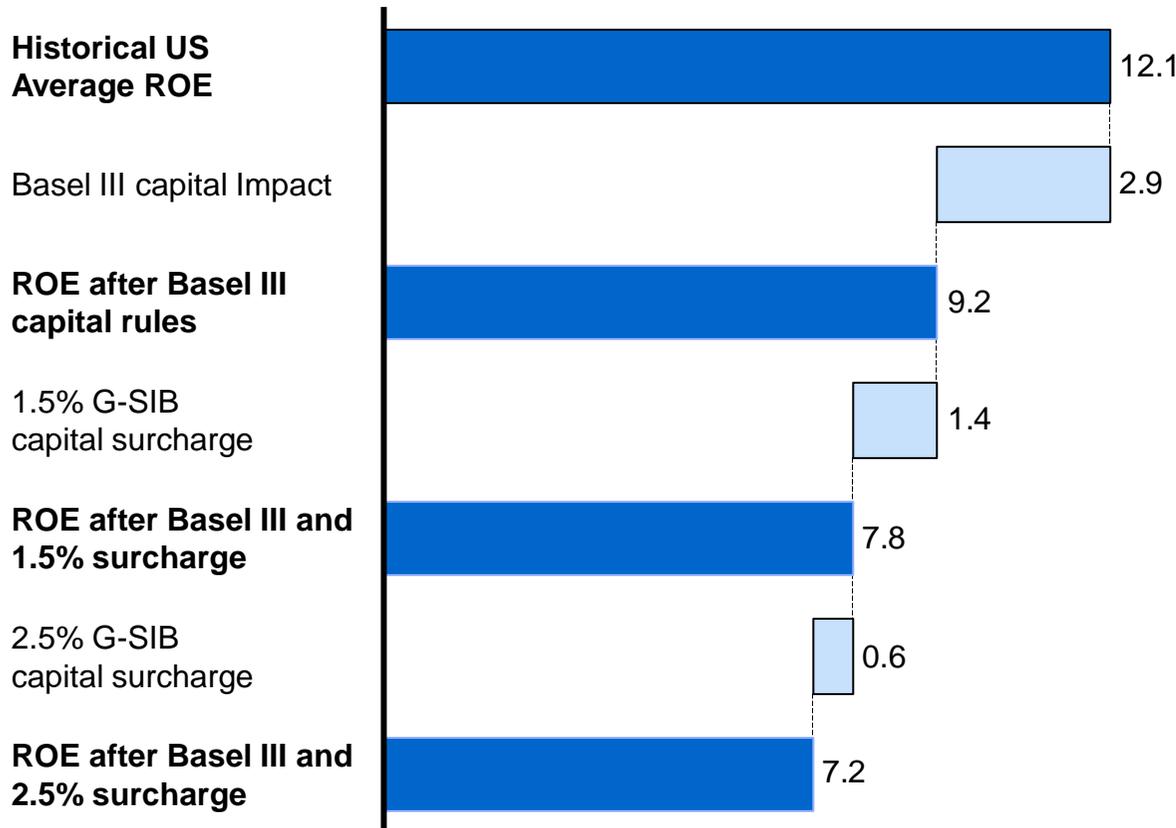
Coming out of the crisis, banks are holding more safe assets and there has been a decline in loans and “other securities”



Unmitigated, Basel III capital requirements would reduce RoE by 290 bps and a 2.5% G-SIB surcharge would reduce ROE by a further 200 bps

Unmitigated ROE impact of Basel III capital proposals, as of Q4 2010¹

Percentage points



- Key question as to where the incidence of regulatory changes will fall; i.e.,
 - On customers, through higher loan pricing and fees
 - On banks, through cost reduction (e.g., non-compensation, compensation consolidation among small banks)
 - On shareholders
- Analysis does not consider likely business model changes
- Even in an environment where banks are better capitalized and more liquid, the reduction in return on equity will likely be greater than the reduction in cost of equity

¹ Not including ROE impacts of the LCR and NSFR

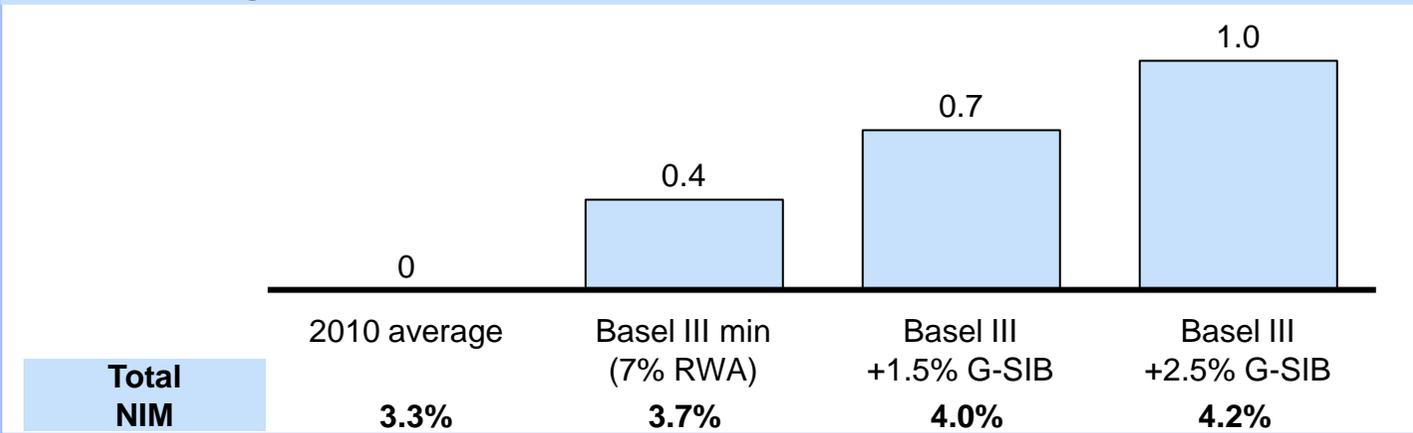
Banks would have to increase NIM or decrease NIX ratio to meet new capital requirements and maintain shareholder returns

Impact on required return on equity

- 8 banks provided us with of their internal costs of equity (including risk free rate, beta, and equity premium). The change in cost of equity is found by applying estimates from the academic literature¹ to compute change in levered beta
- Basel III requirements (including 2.5% G-SIB buffer) could reduce cost of equity by as little as ~70 bps (compared to an ROE reduction of 490 bps)
- We estimate how much margins and costs need to change to equalize reduction in ROE with reduction in COE

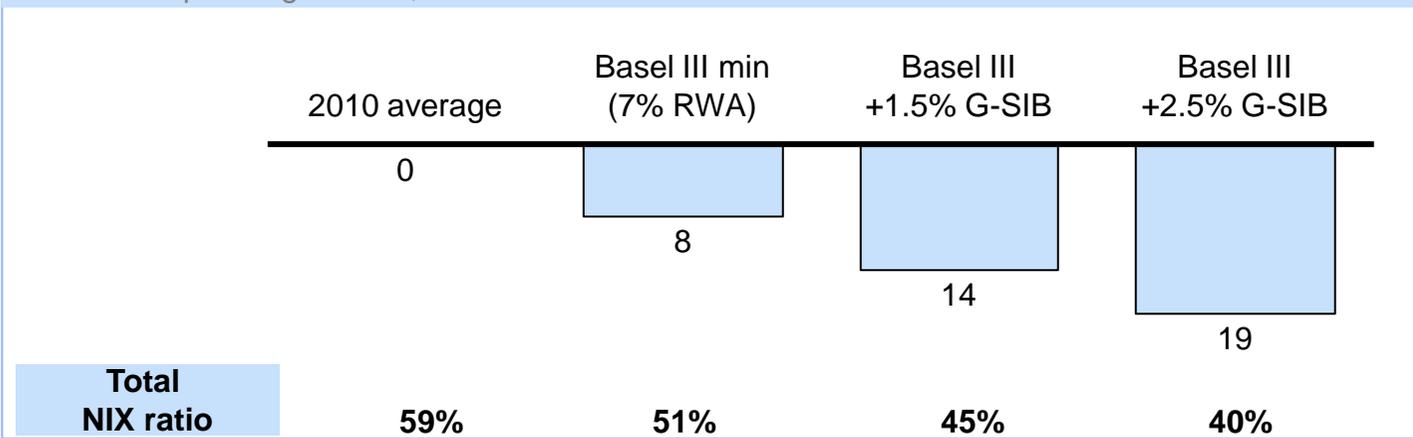
Net interest margin (NIM) increase accounting for reduced cost of equity

Percent of average assets, 2010



Non-interest expense (NIX) decrease accounting for reduced cost of equity

Percent of operating income, 2010



¹ Miles et al, 2011 estimates empirically the change in levered betas from changing capital ratios. Specifically: Change in Levered Beta = 0.031 * Change in Assets/Equity. Required rate of return = Risk-free Rate + Levered Beta * Market Risk Premium.

Financial Services

July 13, 2011

SIFI Capital Policy

Review of related research

Executive summary

- Given international efforts to impose additional capital requirements on banks considered Systemically Important Financial Institutions (SIFIs), Oliver Wyman has reviewed relevant academic literature on the impact of additional capital requirements
- Proponents of a SIFI capital surcharge beyond Basel 3 standards argue that a surcharge policy:
 - Will force SIFIs to internalize the large negative externalities associated with their disorderly failure
 - Will offset any funding advantages SIFIs derive by virtue of being perceived as too big to fail
 - Will not disrupt economic activity, as financial intermediation provided by SIFIs can transition to other institutions
- We found no independent academic research into the potential effects of differentially raising capital requirements for the largest banks
 - The assertion that activities that become uneconomic for SIFIs with higher capital requirements will be assumed by smaller institutions is untested
- A number of recent studies have attempted to estimate the costs and benefits of higher across-the-board bank capital
 - Broadly speaking, the dominant macroeconomic models in use today do not adequately incorporate financial markets or the dynamics of financial intermediation
 - Unsurprisingly, significant assumptions are needed to quantify the economic costs and benefits of higher bank capital, and different assumptions lead to very different results
 - Overall, the academic literature is inconsistent in its results, reflecting the difficulty of robustly estimating the magnitude of offsetting costs and benefits of requiring higher overall bank capital

Executive summary

- Claims by some academics that sharply higher bank capital can produce social benefits with minimal or no costs are unconvincing
 - These “equity is cheap” arguments are based on the Modigliani-Miller theorem – but the idea that the Modigliani-Miller theorem applies in any substantive way to banks is incorrect
 - Modigliani-Miller is an idealized theory of firm financing that requires the absence of taxes, bankruptcy costs, agency costs, and asymmetric information
 - Modigliani-Miller does not explain bank financing costs, because it ignores the presence of socially desirable bank funding arrangements (such as deposit insurance) and assumes that external investors have access to the same information on bank assets that banks themselves do
 - The prevailing view reflected in most research is that higher bank capital would result in a higher cost of credit, with ultimately a cost in terms of economic output
- Capital requirements are a very blunt policy tool with which to address systemic risk
 - A systemic capital surcharge co-opts the Basel framework for microprudential risk measurement for a completely new purpose
 - Given that every capital framework is the imperfect result of tradeoffs, this co-opting exposes the regulatory capital regime to additional strain
- Working to directly address “too big to fail” via the policies and processes to enable the orderly resolution of any institution is likely to be the most effective SIFI policy response
 - Externalities associated with disorderly failure and potential SIFI funding advantages can be directly remedied if any firm can “fail cleanly”

Research landscape: Publications most relevant to current policy debates on bank capital levels

Quantitative analysis of costs and benefits of higher bank capital

- **Basel LEI working group (BIS, 2010)** assesses long-term economic impact of Basel 3 capital and liquidity requirements
- **Macroeconomic Assessment Group (BIS, 2010)** assesses economic costs of the transition to higher Basel 3 capital standards
- **IIF (2010)** estimates the costs of new bank regulations and reviews approaches to estimating associated benefits
- **Slovik and Cournède (OECD, 2011)** also assess economic costs of transition to higher capital under Basel 3
- **Cosimano and Hakura (IMF, 2011)** estimate the increase in lending rates due to Basel 3 increases in bank capital
- **Miles et al (BoE, 2011)** estimate costs and benefits of different levels of bank capital
- **Hanson et al (2011)** argue for a suite of policy tools including higher capital to address macroprudential concerns

Evaluation of SIFI capital surcharge

- We found no independent research into the potential effects of requiring differentially higher capital for the largest and most complex banks
- **Suttle et al (IIF, 2011)** estimate the impact of SIFI capital surcharges on GDP growth
- Remarks by Fed Governor **Tarullo (2011)** discuss desirable elements of a SIFI capital surcharge

“Equity is cheap” arguments based on Modigliani-Miller theorem

- **Admati et al (2011)** review arguments for the prevailing view that equity is an expensive form of financing for banks and conclude they are “fallacious, irrelevant, or very weak”
- **Miles et al (BoE, 2011)** empirically estimate the extent to which Modigliani-Miller holds for banks

Research landscape:

Selected additional publications with relevance to bank capital regulation

- **Acharya, Mehran, and Thakor (2011)** develop a theoretical model to examine the privately optimal level of bank capital given the tension between two agency problems: the role of leverage in disciplining bank managers and the role of bank capital in diminishing the risk-shifting incentives of bank shareholders. **Acharya, Mehran, Schuermann, and Thakor (2011)** use this model to further discuss a novel approach to bank capital regulation that emphasizes the disciplining role of bank debt.
- **Diamond and Rajan (2000)** develop a model to examine the tradeoffs among three effects of higher bank capital: increased banker rents, increased buffer against shocks, and changes to the amounts extracted from borrowers.
- **Berlin (2011)** reviews theoretical explanations of why banks held capital above regulatory minimums during the last 20 years
- **Rubin (2010)** assesses reasons bank capital proved inadequate during the crisis, including lack of discipline from bank funding markets
- **Benes and Kumhof (IMF, 2011)** develop a theoretical model that demonstrates large welfare gains from adjusting capital requirements when there is a contractionary shock to borrower riskiness

Section 1

Cost/benefit analyses of higher bank capital

Recent research on costs and benefits of higher bank capital have broadly used a similar framework for analysis

Costs of higher capital

- Increased cost of funding for banks
- Higher lending rates / decrease in lending activity
- Long term output loss / decline in growth
- Moral hazard associated with ‘too-big-to-fail’
- Growth of shadow banking sector

Focus of quantification

Benefits of higher capital

- Less frequent financial crises
- Less severe crises with less lost economic output/growth
- More effective monetary policy (less constrained by zero bound)
- Buffer against all bank activities instead of specific risks
- Discourages systemically significant growth

Focus of quantification

Costs: Wide range of estimates regarding long term output loss; some consensus around increasing lending rates and cost of funds

Comparison of key findings	
Increased cost of funding for banks	<ul style="list-style-type: none"> ▪ General consensus that some increase in cost of funds will occur ▪ Cosimano argues that increased cost of funding will remain in the long run
Higher lending rates / decreased lending	<ul style="list-style-type: none"> ▪ General consensus that increase in lending rates will occur and estimates are roughly similar ▪ Consensus around need for phasing
Long term output loss / decline in growth	<ul style="list-style-type: none"> ▪ Very wide range of estimates, e.g., BIS estimates a 0.38% cumulative GDP decline by 2015, while Slovik et al. estimate the annual impact to be three times larger and the IIF takes the most pessimistic view estimating a 3.1% decline by 2015 ▪ IIF claims BIS study includes jurisdictions where “effects are most likely smaller to non-existent” driving average results down ▪ BIS claims several IIF assumptions are very aggressive, notably: ROE will return to pre-crisis level and link between aggregate credit growth and real GDP will be similar to pre-crisis levels ▪ Slovik et al. claim BIS assumption of no discretionary capital buffers is unrealistic and assume that banks will retain their current additional buffers
Increased moral hazard associated with too big to fail	<ul style="list-style-type: none"> ▪ Industry views designation of SIFIs as a potential moral hazard ▪ Tarullo counters saying “moral hazard is already undermining market discipline on firms that are perceived to be too-big-to-fail”
Growth of ‘shadow banking’ sector	<ul style="list-style-type: none"> ▪ Consensus regarding increase in risk from growth in shadow banking sector, however no attempts to quantify this risk ▪ Notably, Tarullo’s speech does not address this point

Benefits: Consensus regarding benefits of financial stability but significant variance in the estimated magnitude of any net benefits

Comparison of key findings

Less frequent financial crises

- BIS and Tarullo agree that there are clear benefits to enhanced capital requirements (in terms of less frequent financial crises and enhanced stability)
- IIF on the other hand claims that benefits are overstated

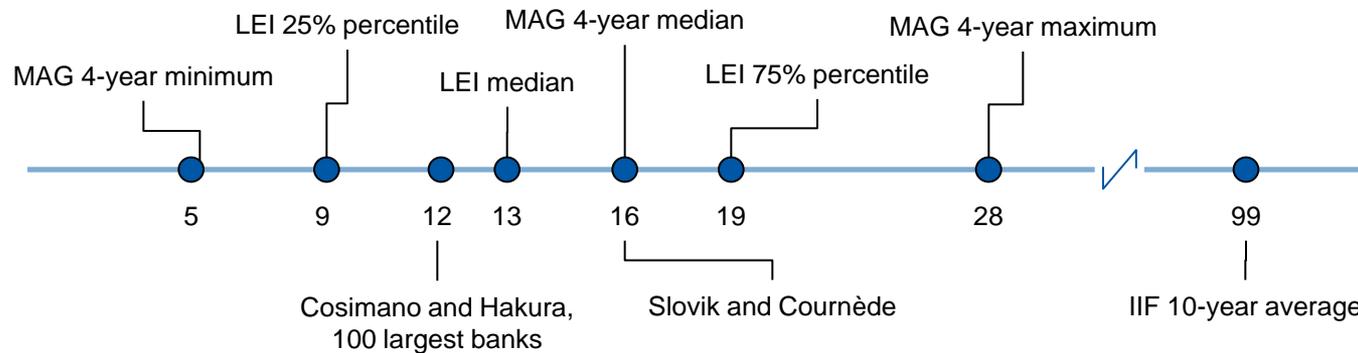
Less severe crises, with less lost economic output / growth

- Range of views regarding impact of capital requirements on severity of crises
 - For example, BIS finds a weak statistical relationship between severity of crises and higher capital, and contends that balance sheets will be less risky. While the IIF contends that the overall cost of crises might not be reduced by any significant amount
-

Key studies agree that higher bank capital will come with economic costs, but the range of estimates indicate a significant degree of uncertainty

Selected estimates of increase in bank lending rates (in bps)

Assuming 1% increase in bank capital across major global economies



- Official BIS studies (LEI and MAG) readily acknowledge the significant uncertainty involved in estimating costs and benefits of higher bank capital
- This reflects the inherent difficulty of modeling macroeconomic effects of different financial intermediation structures using existing techniques

Section 2

Critique of “equity is cheap” arguments

“Equity is cheap” arguments are erroneously based on the assumption that Modigliani and Miller at least partially holds for banks

- Two prominent “equity is cheap” articles (Admati et al. and Miles et al.) are based to a large extent on Modigliani-Miller (MM), which proposes that the value of a firm is independent of how it is financed. The theorem requires the absence of agency costs, bankruptcy costs, taxes and asymmetric information. It also requires that the costs of investor financing and firm financing are the same. There are a number of problems with applying MM to levered financial institutions:
 1. **Costs of investor financing and firm financing are markedly different** e.g., FDIC deposits, liquidity, array of financing structures only available to financial institutions, stringent regulation etc. significantly lower the cost of firm financing. There is no way for investors to reconstruct the levered returns from an unlevered firm. Additionally, deposits (debt) are a factor of production for banks (i.e. debt is both a means of financing assets and debt is itself an input to the production of assets), removing tax subsidies would in effect be taxing banks on their revenues instead of profits
 2. **There is substantial asymmetric information** for banks. First, bank assets and risk are highly firm specific, highly dependent on firm underwriting standards, require substantial specialized expertise to risk manage etc. Secondly, banks can quickly change their asset mix (unlike GM or Ford, for example). Given this asymmetry of information, there is no way an investor could prudently re-lever an unlevered financial institution to achieve the same return
 3. **There are constraints on investors that prevent replication of the unlevered firm.** Vast majority of equity investors invest unlevered capital (this is probably also true for fixed income investors but to a much lesser extent). There is simply not enough equity capital with a mandate to invest in a levered fashion that they could operationalize a MM replicating strategy. It is more likely that fixed income investors would end up owning a substantial fraction of bank assets
 4. **Shadow banking system would substantially increase and it would have more leverage** as a result of #3. Obviously, a larger and more leveraged shadow banking system opposes the outcomes that regulators are seeking. Also, recourse to the banking system is not needed to grow the shadow banking system meaning a large part of the shadow banking system will be difficult to regulate

Additionally, some proposals in the Admati et al. and Miles et al. articles are challenging to implement or are simply not accurate

- **Changes to tax subsidies are difficult to implement**
 - Admati suggests that subsidies for debt financing should be removed because they are ‘paradoxical’ and create systemic risk. Miles suggests that the increased tax revenue from using stricter equity financing requirements could be used to neutralize any impact on the wider economy
 - Reform of tax subsidies would be very challenging to implement and it is unclear what framework could be used to ‘neutralize’ effects on the wider economy
- **Mandatory equity issuance and limits on payouts would be challenging to implement and oversee**
 - Admati suggests applying restrictions on equity payouts and mandate equity issuance on a pre-specified schedule, for a period of time for all banks
 - Firstly, this is a significant and unnecessary intrusion into the private sector
 - Secondly, implementation of this proposal would require a very complex and robust legal framework. Applying a uniform rule across banks would not be practical and a mechanism to tailor the rule to specific banks and update the rule periodically would need to be in place

Section 3

Forms of systemic risk and effective policy tools to address them

Systemic risk arises from root causes in the financial system, that ultimately affect the broader economy by one or more transmission mechanisms

- Root causes are vulnerabilities that when manifested, can cause distress to the financial system and the broader economy
- Historically, root causes of financial crises have included one or more of the following:
 - Large-scale uncertainty around asset values
 - Large-scale asset-liability mismatches
 - Problems in design or operations of financial ‘plumbing’ (such as payments, clearing, settlement)
- These root causes often interact once they manifest – for example, uncertainty around asset values and asset/liability mismatches can spark a vicious cycle of fire sales
- Once manifested, these vulnerabilities transmit distress throughout the financial system by interruptions to the core functions of the financial system, including:
 - Enabling flow of liquidity among financial institutions and their customers
 - Facilitating orderly capital markets, including price discovery, two-way markets, and extensions of counterparty credit and funding to market participants
 - Providing credit to the real economy, including households and companies
 - Engendering a broad sense of trust among the processes and institutions that make financial and economic transactions possible

Capital has limited ability to address systemic risk, compared to other policy tools now being considered and implemented

- To be effective, policy should be developed to address both the causes and mechanisms of systemic risk
- Capital fundamentally serves to absorb unexpected losses from asset uncertainty
 - Capital requirements do not address asset/liability mismatches or financial plumbing problems, and can only partially mitigate the transmission mechanisms of systemic distress
- Other policy tools more directly and effectively address other aspects of systemic risk
 - Resolution and recovery plans
 - Provision for orderly liquidation of a failed firm
 - OTC derivatives reform
 - Liquidity requirements (e.g. Basel 3)
 - Restrictions on concentrated exposures
 - Targeted asset policies (e.g. exposure concentration restrictions, underwriting restrictions)

Examples of systemic risk root causes and transmission mechanisms

Root causes

Large-scale uncertainty around asset values

- US mortgage lending circa 2005-2007, and related RMBS and CDO securitizations
- Unsound real estate lending leading to S&L crisis
- Japanese property bubble of the 1980s

Large-scale asset/liability mismatches

- Mismatch between short-term funding and fixed-rate mortgages leading to S&L crisis
- Reliance on repos and other short-term funding at large securities firms prior to 2008 crisis
- Asset-back commercial paper (ABCP) and structured investment vehicles (SIVs)

Financial plumbing problems

- Plumbing design problems occur when arrangements for vital services (such as payments, clearing, and settlement) create vulnerabilities (e.g. 1974 Herstatt Bank failure)
- Plumbing operational problems include operational breakdowns due to natural and man-made disaster (e.g. 9/11)



Transmission mechanisms

Interruptions to flow of wholesale liquidity

- Cascading failures in wholesale payment flows (e.g. Barings failure near-breakdown of trade settlement)
- Breakdowns in routine extensions of liquidity and intraday and short-term credit (e.g. interbank lending stresses in 2008)

Breakdown in orderly markets

- Evaporation of trading liquidity and absence of price discovery for mortgage-related securitizations in 2008
- May 2010 Flash Crash

Lack of access to credit

- Concerns about ability of corporates to roll over commercial paper given stresses in money market funds in 2008

Broad-based loss of confidence

- Bankruptcy of Lehman Brothers and fear of cascading collapses as market participants lost confidence in wholesale financial institutions in 2008

Capital addresses just one source of systemic risk

Root causes

Large-scale uncertainty around asset values



- Capital requirements
- Restrictions on concentrated exposures
- Underwriting restrictions (e.g. caps on LTV ratios)

Large-scale asset/liability mismatches



- Liquidity and funding requirements
- Traditional bank safety net (including deposit insurance and access to lender of last resort)
- Resolution planning
- Provision for orderly liquidation of failed firms

Financial plumbing problems



- Redesign of institutional arrangements
- Regulation of financial utilities
- Resolution planning
- Provision for orderly liquidation of failed firms

Among policy tools to address systemic transmission mechanisms, capital plays at best a supporting role

Effective policy tools

- Redesign of institutional arrangements
 - OTC derivatives reform
 - Changes to tri-party repo market
- Liquidity requirements
- Resolution planning
- Provision for orderly liquidation of failed firms
 - Ability to transfer vital functions to new institutions without disruption
- Capital requirements

Transmission mechanisms

Interruptions to flow of wholesale liquidity

Breakdown in orderly markets

Lack of access to credit

Broad-based loss of confidence