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## Estimating the Costs of Financial Regulation

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**Estimating the Costs of Financial Regulation<sup>1</sup>**

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## EXECUTIVE SUMMARY

**This study shows that financial reform will likely result in a modest increase in bank lending rates in the United States, Europe, and Japan in the long term.** Higher safety margins in terms of capital and liquidity will lead to an increase in lenders' operating costs, affecting bank customers, employees, and investors. Yet banks appear to have the ability to adapt to the regulatory changes without actions that would harm the wider economy.

**In response to the estimated rise in regulatory costs, average bank lending rates are likely to increase by 28 bps in the United States, 17 bps in Europe, and 8 bps in Japan in the long term.** By comparison, the smallest increment by which major central banks adjust their short-term policy rates is 25 bps, which tends to have a small effect on economic growth.

**A simple framework is used to estimate the likely increase in lending rates.** These rates reflect the cost of allocated capital, other funding costs, credit losses, administrative costs, and several other factors. There is considerable uncertainty about these cost assumptions, but a sensitivity analysis shows that reasonable changes in assumptions do not dramatically alter the conclusions of this study. Cost estimates are based on several references, including academic theory, empirical analyses from industry and official sources, as well as financial disclosures by large banks.

**The findings are based on methodologies that were used in previous studies by academics and the official sector.<sup>3</sup> This study, however, estimates that lending rate increases will likely be significantly smaller,** for the following reasons. First, the baseline scenario implies a smaller regulatory effect, with market forces accounting for some of the expected increases in safety margins. Second, banks are expected to absorb part of the higher costs by cutting expenses. Third, investors are expected to reduce their required rate of return on bank equity modestly as a result of the safety improvements. Debt investors are expected to follow suit, although to a much lesser extent.

**There are important limitations to the analysis presented here.** It does not address the potential transition costs as banks adjust to the new regulations. Nor does it assess the economic benefits of financial reforms. A number of regulatory reforms are not modeled; judgment has been required in making many of the estimates; and the modeling approach is relatively simple. Nevertheless, the results appear to be a balanced, albeit rough, assessment of the likely effects on bank lending. Further research would be useful to translate these credit impacts into effects on economic output.

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<sup>3</sup> See Slovik and Cournède (2011) and BCBS (2010).

## I. INTRODUCTION

**Reforming the regulation of financial institutions and markets is critically important and should provide large benefits to society.** The recent financial crisis underlined the huge economic costs produced by recessions associated with severe financial crises. However, adding safety margins in the financial system comes at a price. Most notably, the substantially stronger capital and liquidity requirements created under the new Basel III accord have economic costs during the good years, analogous to insurance payments.<sup>4</sup>

**There is serious disagreement about how much the additional safety margins will cost.** The Institute of International Finance (IIF, 2011) projected that the proposed reforms will reduce annual output in the advanced economies by approximately 3 percent by 2015. Official estimates, particularly those from the Bank for International Settlements (BIS), suggest a far smaller reduction.

**Finding an intellectually sound consensus on the costs of reform is critical.** If the true price is too high, reforms must be reassessed to improve the cost-benefit ratio. But, if the reforms are economically sound, they should be pursued to increase safety and reduce the uncertainty about rules that creates inefficiencies and makes long-term planning difficult.

**This discussion note assesses the overall impact on credit of the global financial regulatory initiatives in Europe, Japan, and the United States. It is accompanied by a working paper containing considerably greater detail and discussion.**<sup>5</sup> The study first reviews relevant academic theory and then examines three principal sets of sources: official sector impact analyses of the financial reforms; disclosures by financial institutions of their pro-forma impact of Basel III rules; and impact analyses by equity and debt analysts in investment banks, industry associations, and consulting companies. Separate estimates are provided for Europe, Japan, and the United States.

**The study focuses on the long-term outcomes, rather than transitional costs, and does not attempt to measure the economic benefits of these reforms.** Good policy requires true cost-benefit analyses and it would certainly be a mistake to ignore transitional costs, but resource constraints required a narrower focus on the central question of the long-term effects on credit. Further research would be useful to translate the credit effects into their impacts on economic output. The analysis here does not address the significant adjustments

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<sup>4</sup> The Basel Committee on Banking Supervision (Basel Committee or BCBS) is the global coordinating body for bank regulators. The Basel III accord is their latest comprehensive agreement on minimum regulatory standards for bank capital and liquidity requirements, which will be implemented starting in 2013.

<sup>5</sup> Elliott, Salloy, and Santos (2012).

triggered by the financial and Eurozone crises and the potential transitional effects of adjusting to the new regulations.

**The study focuses principally on the effects of regulatory changes on banks and their lending.** This is for three reasons: banks dominate finance; the reforms are heavily focused on them; and it is harder to estimate the effects on other parts of the system, such as capital markets. Loans, in particular, are a major part of overall credit provision and there is substantially greater data available on lending activities. Where possible, the study also looks at the effects of new regulations on securities holdings by banks and on securities markets.

**Measuring the cost of financial reform requires careful consideration of the baseline for comparisons.** At first glance this might seem simple, since one can compare the new regulatory requirements with the old. However, this misses the crucial point that financial institutions often carry significantly stronger safety margins than the minimums required by the rules, as a result of their own desire to operate safely and because of pressure from the markets and rating agencies. Nor can it be assumed that the additional buffers on top of the regulatory requirements will remain the same as in pre-crisis times. In general, this study assumes that market forces would have produced levels of safety margins equal to the actual end-2010 levels, even without the prospect of regulatory changes.

**Several other areas of important uncertainty are not directly addressed in this study.** First, it is assumed that regulations are implemented in an appropriate manner, thereby avoiding unnecessary costs. This is more likely to be true in the long run than when regulations are first introduced. Second, regulatory arbitrage, shifts of business to the “shadow banking” sector, and “gaming” of the system are only lightly addressed in this study. They would generally decrease both the cost to banks and overall effectiveness of reforms.

**Five categories of reform were initially selected for quantitative analysis, based on a detailed qualitative assessment.** They are the most important and amenable to quantitative estimates. For each of the categories, cost estimates are presented based on external analyses, supplemented by calculations by the authors. The cost estimates are then translated into a common framework of changes in the average cost of credit for borrowers resulting from the reforms, since this is of most concern to the rest of the economy. There was sufficient information to evaluate the impact of most regulatory changes, except securitization reform, which proved impossible to quantify.

**Finally, an overall, integrated cost estimate for the categories taken together is considered.** This involves examining the interactions between these categories and including the effects of mitigating actions likely to be taken by the financial institutions as a result of the reforms in totality. This includes, for example, expense cuts to counteract the need for price increases, to the extent such cuts were not already included in stand-alone estimates.

## II. LITERATURE REVIEW

**The study that provides the most detailed estimate of the overall cost impact of comprehensive financial reforms is IIF (2011).** The Institute of International Finance is an association representing over 400 financial institutions across the world. Its study, although admirably comprehensive and detailed, shows a far larger cost to financial reform measures than seems plausible. For instance, their model predicts that the price of credit in the United States will average almost 5 percentage points higher on average over the period 2011–15 as a result of the regulatory changes alone. Overall, they estimate that GDP in major economies would be about 3 percent smaller in 2015 than they would be without the effects of comprehensive financial reforms.

**This study differs substantially from IIF (2011).** One major difference, which comes through in multiple ways, is the focus on the long-term effects while the IIF looks primarily at the transition effects in the short- to medium-term. Beyond that, there are a number of other different technical choices, including:

- The IIF baseline appears to correspond more with the levels of safety margins held pre-crisis than it does with the levels banks would choose to hold in light of the lessons learned from the financial crisis.
- The IIF assumes that the expected return demanded by investors in bank securities is heavily influenced by the volume of securities being issued, at least in its main scenario. It takes some increase in expected returns to lure investors to absorb a large amount of issuance, but the assumed magnitude of that effect seems too big.
- There is greater scope for cost-cutting by banks than the IIF assumes.

**Slovik and Cournède (2011) at the Organisation for Economic Co-operation and Development (OECD) estimated effects well below those found in IIF (2011).** They used a simple model that assumes that bank funding costs would rise by the difference between the starting cost of capital and the starting cost of debt, multiplied by the amount of new capital required. This higher cost is directly passed through as an increase in interest rates on loans. Thus, their model excludes any decrease in the returns required by investors from the presumably safer banking system and assumes no expense costs or any other adjustments besides a simple rise in loan pricing. They also assumed that banks would maintain the same discretionary capital buffers above regulatory minimums as these minimums increased, despite referencing studies that showed banks do tend to lower their discretionary buffers under these circumstances. Despite making these key assumptions that should overstate the impact on credit spreads, they still concluded that spreads would rise by much less than the IIF estimates. They went on to use an OECD macroeconomic model to translate the credit spread increases into declines in economic growth. They concluded the major economies would be about 0.75 percent smaller after five years, rather than the IIF's 3-percent estimate.

**Finally, BCBS (2010) estimated that the Basel III capital and liquidity changes would reduce the steady-state level of economic activity by 0.6 percent in total, or 0.08 percent annually, if spread over the eight-year transition period.** This study did not examine the other regulatory changes, but it is likely that the capital and liquidity changes taken together account for a significant majority of the costs. It also estimates the liquidity changes by looking solely at the Net Stable Funding Ratio (NSFR) requirements and not the Liquidity Coverage Ratio (LCR), although its technique appears likely to capture most of both effects. Key assumptions in BCBS (2010) include a full pass-through of capital and funding costs to loan rates, no reduction in operating expenses, no increase in non-interest sources of income, no credit rationing, no changes in the cost of capital and debt arising from higher capital and liquidity ratios, a possible reduction in the liquidity requirements arising from compliance with the capital requirements, a 15 percent return-on-equity (ROE), and a 100 bps yield difference between illiquid and liquid assets and long and short liabilities,

**Thus, as shown in Table 1, previous studies differ greatly in their cost estimates.**<sup>6,7</sup>

Because of these major differences in outcome and methodology, it has been necessary to go beyond these studies to look at analyses that examine different parts of the overall picture and to build up from there.

**Table 1. Basel III Impact on Credit and GDP Growth**

| Basel III impact                 | Impact on credit spreads |       |      | Impact on annual GDP growth |       |       | Credit        | GDP   |
|----------------------------------|--------------------------|-------|------|-----------------------------|-------|-------|---------------|-------|
|                                  | (bps)                    |       |      | (%)                         |       |       | (bps)         | (%)   |
| Zone                             | Europe                   | Japan | U.S. | Europe                      | Japan | U.S.  | Global impact |       |
| IIF 2012-2019                    | 328                      | 181   | 243  | -0.40                       | -0.30 | -0.10 | 281           | -0.20 |
| IIF 2011-2015                    | 291                      | 202   | 468  | -0.60                       | -0.80 | -0.60 | 364           | -0.70 |
| OECD 5 years transition          | 54                       | 35    | 64   | -0.23                       | -0.09 | -0.12 | 53            | -0.16 |
| BIS Long-term (capital) 1/ 2/ 3/ | 52                       | N.A.  | 52   | -0.07                       | N.A.  | -0.03 | 52            | -0.06 |
| BIS Long-term (liquidity) 3/ 4/  | 25                       | N.A.  | 25   | -0.03                       | N.A.  | -0.03 | 25            | -0.03 |
| BIS Long-term (combined) 3/ 5/   | 66                       | N.A.  | 66   | -0.08                       | N.A.  | -0.04 | 66            | -0.08 |

1/ BIS estimates an increase in credit spread of 13 bps for each one point increase in the ratio of Tangible Common Equity to Risk-Weighted Assets, but does not estimate the total required change in that ratio.

For broad consistency with the IIF and OECD figures, a 4 point change in the ratio is assumed.

2/ U.S. and European figures for needed capital increases are assumed to be the same for this table.

3/ BIS estimates the permanent, steady-state change in level of GDP. For comparison with the other studies, the cost is spread over 8 years.

4/ BIS does not provide a breakdown by region on the credit spread effects of liquidity changes, so global figures are used for both regions.

5/ There are synergies between the capital and liquidity requirements, reducing the combined effects.

<sup>6</sup> It should be noted that a number of simplifying assumptions had to be made to put the results on a reasonably consistent basis for the table, given their disparate approaches.

<sup>7</sup> MAG (2010) estimated loan spreads that are slightly higher over a period of 35 quarters than then ones estimated by BCBS (2010) and slightly lower over a period of 48 quarters.

### III. QUANTITATIVE ANALYSIS OF STAND-ALONE REFORMS

**Higher costs for banks and other credit providers clearly will affect credit pricing and availability, but not via a direct 100 percent pass-through.** Like other industries under pressure, credit providers will respond in a variety of ways, with the mix of actions dependent on specifics of the cost increases and of the competitive situation of the credit providers. There are eight broad categories of bank responses to cost increases in this study:

- *Absorbing the costs by lowering returns to shareholders.* In the long run, investors in financial institutions should accept smaller returns in exchange for reduced volatility and a lower probability of insolvency.
- *Reducing funding costs.* Fund providers that do not benefit from guarantees ought to reduce their required interest rates at least marginally to reflect the greater safety provided by higher bank capital, better liquidity, and the benefits of other reforms. There may also be room for the banking industry to decrease the rates paid on retail deposits.
- *Reducing expenses.* Industries that come under external pressure almost invariably reduce their costs as one response to the threat, as seen to a significant extent already in the financial industry. A substantial portion of the cost of credit provision comes from administrative and marketing expenses, where there is considerable room to cut expenses if necessary. In addition to reductions in expense ratios at individual banks, there are likely to be market share gains by the more efficient banks, lowering the average expense ratio for the industry as a whole.
- *Decreasing the expected credit losses.* Credit providers can alter the terms and conditions under which they lend, in order to reduce the probability of a credit loss and the size of any resulting loss. This can occur without necessarily cutting out marginal loans per se.
- *Limiting the regulatory impacts through technical means.* In some cases, there is scope for a credit provider to reduce the effect of a regulatory change by taking specific actions designed to meet the particular challenge. For example, improving data collection and modeling efforts may allow a firm to justify a lower risk weighting under the internal modeling approach.
- *Rationing credit.* Credit providers could also choose to reject loan applications that fail to meet newly heightened credit standards or to withdraw from lines of business that do not meet minimum profitability criteria.
- *Raising prices for credit.* Finally, of course, credit providers can simply charge more for their loans. This option will be limited by competitive market conditions within the banking industry and with regard to other types of credit providers.

- *Restructuring their businesses.* Many credit providers are in the process of rethinking what business lines they wish to be in and how they manage those businesses. Such restructuring will include strategic decisions to sell or buy businesses or to merge with other financial firms or to sell the entire organization.

### A. Estimating Changes to Lending Rates

**The effects on lending rates of higher capital levels and other safety margins can be estimated using a loan pricing formula.**<sup>8</sup> The core of any lending decision boils down to a fairly simple mathematical formulation to determine whether a requested credit provides sufficient return to merit making the loan:

$$L*(1-t) \geq (E*r_e) + ((D*r_d)+C+A-O)*(1-t),$$

where:

$L$  = effective interest rate on the loan, including the annualized effect of fees;

$t$  = marginal tax rate for the bank;

$E$  = proportion of equity backing the loan;

$r_e$  = required rate of return on the marginal equity;

$D$  = proportion of debt and deposits funding the loan, assumed to be the amount of the loan minus  $E$ ;

$r_d$  = effective marginal interest rate on  $D$ , including indirect costs of raising funds, such as from running a branch network;

$C$  = the credit spread, equal to the probability-weighted expected loss;

$A$  = administrative and other expenses related to the loan;

$O$  = other income and expense items related to the loan.

**In simple terms, the rate on the loan needs to cover the cost of capital and other funding sources, any expected credit losses, and administrative expenses.** Regulatory reforms will change a number of the variables in the loan pricing formula, forcing the banking industry to make offsetting adjustments to one or more other variables. For example, higher proportions of capital would require a higher price for credit, except to the extent offset by other adjustments, such as a lower cost of equity demanded by investors, reflecting reduced risk, or a reduction in administrative expenses at the bank. In the remaining sections, there is no treatment of lending under uncertainty and, therefore, no impact of any potential offsetting adjustments on the credit risk of different borrowers. In addition, the risk of credit rationing for less creditworthy borrowers is not analyzed in detail, although, as noted below, it would

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<sup>8</sup> Portions of the following discussion are taken from Elliott (2009). See also King (2010) for a similar approach.

be relatively limited. Adding both uncertainty and credit rationing would add complexity to the analysis, but the broad conclusions would still remain intact.

**Versions of this simple formula are an important building block in all of the studies described earlier, because it allows researchers to translate costs arising from regulatory reforms into loan rate increases and GDP changes.**<sup>9</sup> Among others, Elliott (2009 and 2010a), BCBS (2010), MAG (2010), and Slovik and Cournède (2011) all use this pricing model (also named accounting-based approach) with small variations and IIF (2011) uses a closely related model.<sup>10</sup> The formula has the flexibility to capture many key attributes of credit provision. For example, the varying risks of different loan classes can be captured by creating a weighted average capital requirement and a weighted average credit cost. Elliott (2010a) applied the formula to different types of loans, borrowers, and lenders to explore the differential impact of capital requirements on different types of credit. This study focuses on aggregate credit provision in order to simplify the analysis. Further research could use the same approach to examine various categories of lending. Once loan rate increases are obtained, the impact of regulatory reforms on GDP can then be estimated.

## **B. Capital Requirements**

**Minimum capital requirements for banking groups are sharply increased under Basel III.** One of the lessons from the recent financial crisis is that banks need to hold significantly higher levels of capital. Therefore, the Basel Committee members, with the ultimate endorsement of the G-20 leaders, raised the minimum common equity capital ratio from, in practice, 2 percent of risk-weighted assets to 7 percent, which includes a 2.5 percent “conservation buffer.” Banks with capital below the basic 4.5 percent ratio can be taken over by regulators. Banks above this level but below the 7 percent target will have serious operating limitations, including limits on compensation and on payments to shareholders.

**The minimum quality of capital is also raised by Basel III.** Another lesson of the crisis was that some financial instruments, and some types of assets, were not actually available to protect banks in a severe, widespread financial crisis. As a result, Basel III drops subordinated debt, and some other securities, from the definition of capital and limits the ability of certain assets to be counted when calculating core common equity.

**Basel III capital requirements remain based primarily on risk-weighted assets (RWA).** The key tests look at the ratio of capital to an adjusted size of total assets that reflects the presumed risk levels of the various assets. Many government obligations are treated as

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<sup>9</sup> This is especially true in economic and econometric models featuring neither bank capital nor bank liquidity.

<sup>10</sup> Individual country studies that build on the pricing equation above include Koop et al. (2010), Schanz et al. (2011), de-Ramon et al. (2012), for instance.

riskless by being given a zero-percent risk-weighting and therefore do not require any capital. Standard loans have a 100 percent risk-weighting, so that a bank owning only such loans as its assets would have risk-weighted assets equal to its total assets. Most mortgages are weighted at 50 percent. There are specific weights for many other asset categories as well.

**Many risk weights are increased quite substantially under Basel III compared to Basel II.** The crisis also demonstrated that risk-weightings were often considerably too low compared to the actual risk of the assets. Some risk weights are directly increased under Basel III, while others rise due to changes to the formulas for how to calculate risk weights.

**Systemically Important Financial Institutions (SIFIs) will have an incremental capital requirement.** The most important banking groups will have required minimum capital to RWA ratios of 0.5 to 2.5 percentage points above those applied to other banks. This can even rise to 3.5 percentage points if a SIFI is perceived to be growing its risks excessively despite already being subject to the 2.5 percentage point incremental requirement.

**A new leverage ratio will provide a safety net to ensure RWA calculations do not encourage excessively large balance sheets.** Basel III introduces a straight leverage ratio as an additional minimum requirement. This is essentially just the level of capital divided by the total asset size, although there are adjustments to reflect off-balance sheet items and certain unfunded commitments. This ratio should seldom be binding, since it is set low enough that the tests using RWAs would normally produce higher capital requirements.

**In theory, under idealized conditions, adding equity capital does not increase bank costs.** Modigliani and Miller (1958) proved that, under specific conditions, including perfect markets and no distortions induced by government policy, the proportion of a firm's funding coming from equity is immaterial to its weighted average cost of funds.<sup>11</sup> This is because investors in equity and debt do not charge as much for supplying funds to a safe company as they do to a riskier one. Modigliani and Miller showed that increasing a firm's safety by switching from debt towards equity results in a reduction of the cost of each unit of equity and each unit of debt that exactly counteracts the cost increase from having more units of equity, which will always be more expensive than debt because of its inferior position in liquidations.

**In practice, though, higher equity levels *do* increase a bank's costs.** There are three significant distortions created by public policy that interfere with the offsetting mechanism described by Modigliani and Miller. First, virtually all jurisdictions provide a tax advantage to debt issuance by allowing corporate deductions for interest payments, but not for dividends. Therefore, the after-tax weighted cost of funding does go up as the portion of

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<sup>11</sup> See Modigliani and Miller (1958).

equity capital rises. Second, there are a host of explicit and implicit guarantees of bank liabilities. For instance, when deposits are guaranteed by the government, then deposit rates will be very insensitive to the relative safety of the bank. An increase in equity will not create a significant offsetting decrease in the rate demanded by depositors. Third, there may also be agency costs and market imperfections that increase equity costs. Some researchers believe that the cost of raising equity is significantly higher than traditional theory would dictate.<sup>12</sup>

**Different analysts make different assumptions about how much the increase in safety reduces the costs of switching to equity from debt.** The most common assumption, also used here, is that the return on equity and debt demanded by investors adjusts to be about halfway (50 percent) between the complete offset assumed by Modigliani and Miller and a complete absence of any offset, which would mean no change in demanded returns. This is consistent with Miles, Yang, and Marcheggiano (2010) who found that, under simplifying assumptions, U.K. banks showed a Modigliani-Miller pass-through of 45 percent under one test (linear specification) and of 75 percent under another (log specification).

**The impact of higher capital on lending rates does not seem large in economic terms.**

Table 2 shows the *net* stand-alone effect of changes in expected capital levels on lending rates produced by the loan pricing formula. It is less than the 25 bps that generally represents the smallest increment in which major central banks adjust their short-term policy rates, and is comparable to the 11 bps increase in lending rates in U.K. banks found in Miles, Yang, and Marcheggiano (2010) after allowing for the 45 percent offsetting effect arising from the Modigliani-Miller proposition holding partially.<sup>13,14</sup> In addition, the *gross* stand-alone effect of higher capital on lending rates in Europe and the United States is also similar to the 20 bps and 36 bps increase in lending rates for U.K. and U.S. banks found in Miles, Yang, and Marcheggiano (2010) and Gorton, Lewellen, and Metrick (2011), respectively.

**However, the effect is significant compared to pre-tax returns on assets for the banking industry.** Pre-tax return on assets (ROA) in banking is generally in the range of 100 bps or

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<sup>12</sup> Researchers include, for instance, Myers (1984) and Myers and Majluf (1984) who proposed the pecking order hypothesis in the capital structure.

<sup>13</sup> The comparison to the 25 bps that generally represents the smallest increment in which major central banks adjust their short-term policy rates, is an approximation. For example, central bank moves usually only directly affect short-term rates, whereas loans have an average duration of several years. In addition, long-term rates could react to the tightening of short-term rates in different ways. They could move by the same amount of short-term rates in a parallel shift of the yield curve; they could move less than short-term rates with an inversion of the yield curve; or, finally, they could move more than short-term rates with a steepening of the yield curve.

<sup>14</sup> The changes in lending rates in the United Kingdom and the United States in Miles, Yang, and Marcheggiano (2010) and Gorton, Lewellen, and Metrick (2011) are adjusted for a change in the capital-to-total assets ratio of 1.24 percent and 2.65 percent, respectively.

less. Thus, the need to pass along even 20 bps to some combination of customers, employees, and investors can loom large in comparison with existing profit margins. This is one reason why banks are likely to take mitigating actions, including expense cuts, as explained below.

**A target minimum ratio of 10 percent common equity Tier 1 capital to risk-weighted assets is assumed.** This represents a buffer of 3 percentage points above the Basel III minimum of 7 percent, reflecting both Systemically Important Financial Institutions (SIFI) surcharges and a further discretionary buffer to minimize the probability of regulatory intervention. Table 7 in the Appendix shows how the starting capital positions were arrived at for each region.

**Another important assumption is that bank equity investors would require a 12 percent return on equity (ROE) in Europe and the United States and 7 percent in Japan, prior to any effects of regulatory changes.** This is below the 15 percent ROE figure that some in the industry have said is the minimum investors will accept.<sup>15</sup> In practice, BCBS (2010) found that banks had returned an average of 14.8 percent over the preceding 15-year period. Since investors generally paid well above book value for bank stocks during that period, they must have been willing to accept a significantly lower return on their own equity investment.<sup>16</sup> The 12 percent ROE for the United States and Europe is chosen in this study as a conservative figure that falls between the oft-stated 15 percent requirement and the presumably more realistic required returns shown by historical measures. The 7 percent figure for Japan follows similar logic.

**Several assumptions, explained further in an appendix, have a substantial effect on these calculations.** Most basically, the figures assume that financial markets and bank managements would cause banks to move to at least end-2010 capital levels as a result of the lessons learned from the financial crisis, regardless of regulatory changes. The changes in capital levels would be higher, and the costs increased, if a lower base case capital level were assumed. Equally importantly, it matters how much credit equity investors are likely to give in the long run to the reduced volatility and risk in a banking system with higher capital. Assuming there is no such credit would double the net effects shown below, while assuming a 75 percent pass-through to equity markets would halve the net effects.

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<sup>15</sup> Haldane, Brennan, and Madouros (2010) point out that the high 20 percent ROE in international banks before the financial crisis was the result of increased leverage (on and off-balance sheet), increased share of assets held at fair value, and writing deep out-of-the money options.

<sup>16</sup> An investor's required expected return can be estimated by dividing the expected ROE of a bank by the multiple of book value paid by the investor. Thus, investors who paid twice book value for shares in a firm with a 20 percent expected ROE were implicitly willing to accept a 10 percent return on their own investment.

**Table 2. Effects of Higher Capital Levels on Lending Rates**  
(In percent)

|  | Europe | Japan | U.S.   |
|--|--------|-------|--------|
| End-2010 pro forma Basel III common equity Tier 1 capital ratio          | 7.12   | 6.57  | 6.69   |
| Capital-to-total assets ratio, without risk weighting                    | 3.06   | 2.95  | 5.36   |
| Assumed minimum capital-to-RWA ratio in equilibrium                      | 10.00  | 10.00 | 10.00  |
| Implied capital -to-total assets ratio, without risk weighting           | 4.30   | 4.49  | 8.01   |
| Necessary increase in capital-to-total assets ratio                      | 1.24   | 1.54  | 2.65   |
| Assumed base case return on equity required by market                    | 12.00  | 7.00  | 12.00  |
| Assumed base case cost of other funding sources                          | 2.00   | 1.25  | 2.00   |
| After-tax unit cost of switching to capital as funding source            | 10.60  | 6.13  | 10.60  |
| Stand-alone effect of higher capital on pre-tax loan interest rate       | 0.19   | 0.13  | 0.40   |
| Assumed offset from reduction in return required by market <sup>1/</sup> | -0.09  | -0.07 | -0.20  |
| Net stand-alone effect on pre-tax loan interest rate                     | 0.09   | 0.07  | 0.20   |
| <i>Memorandum items</i>  |        |       |        |
| Total assets (in US\$ billion)   | 33,961 | 6,038 | 11,522 |
| Total RWA after Basel II.5 and III (in US\$ billion)                     | 14,597 | 2,713 | 9,233  |
| Tax rate (in percent)  | 30.00  | 30.00 | 30.00  |

Source: Staff calculations and Table 7.

<sup>1/</sup> Effect arising from Modigliani-Miller proposition holding partially.

### C. Liquidity Requirements

**The crisis underlined how critical liquidity problems can be in determining the fate of individual institutions and in transmitting problems across banking systems and overall financial markets.** As a result, the Basel III accord includes two new liquidity requirements, the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR).

**The LCR is basically a stylized stress test of an institution's ability to withstand a severe liquidity freeze that lasts 30 days.** When liabilities mature, they are assumed to be very difficult to roll over. Each category of liability is assigned a percentage roll-over figure representing the portion of that liability that either remains a source of funding during the 30 days or is replaced by funds in the same category. Similarly, each asset category is assigned a percentage haircut. This represents the loss that would be incurred if that asset were to be liquidated in the middle of a severe financial crisis. Safe, short-term assets have no haircut or a relatively small one while riskier or longer-term assets have higher haircuts.

**The LCR is the ratio of total assets, after the liquidity haircuts, to the total cash outflows under the stress assumptions.** The ratio will be required to exceed 100 percent, meaning that the assets, after haircuts, can provide more than enough funds to cover the cash outflows. Supervisors started monitoring the LCR in 2011, but the ratio will only be required as a minimum standard starting in 2015. However, there has been a great deal of objection by many in the financial industry and other observers and the Basel Committee has indicated the

likelihood of further refinements in the formulas prior to the start of the mandatory period. Data gathered during the observation period may lead to further changes.

**The NSFR is intended to cover risks that stem from excessive maturity mismatches between assets and liabilities.** This ratio relates the total amount of assets to the total amount of liabilities maturing in less than one year. The NSFR ratio requires that illiquid assets and a small portion of off-balance sheet commitments and contingencies be matched with stable funding sources. Asset and liabilities are then weighed according to their liquidity and stability characteristics, respectively.

**Similar to the LCR, supervisor also started to monitor the NSFR in 2011, but the ratio will become a binding requirement only in 2017.** The NSFR has received even more strenuous objections than the LCR and there is a strong expectation that the NSFR will be modified prior to its implementation.

**Banks that would not meet the 100-percent ratio requirements for the two tests could take several types of actions.** These include: (i) increasing the length of liabilities; (ii) raising capital; (iii) shortening the maturity of assets; (iv) switching to higher quality assets; and (v) shrinking, in combination with other actions

**Under normal circumstances, each of the potential adjustment actions by banks would reduce profits.** When there is a normal upward-sloping yield curve, longer-term liabilities will cost more than shorter-term ones and shorter-term assets will earn less than those of longer term. Capital, for its part, is more expensive than other funding sources. Similarly, higher-quality assets virtually always yield less than lower-quality ones, since risk aversion by investors means that riskier assets must generally pay higher returns. Finally, shrinking a bank's book usually means reducing otherwise profitable business.

**Estimating the funding and liquid assets needed to comply with a 100 percent NSFR and LCR, respectively, is particularly difficult.** There is a fairly wide range of uncertainty around the estimates. First, unlike with Basel III capital requirements, few banks have provided any detailed information about their liquidity needs under the new rules. Nor has there been a history of reporting such figures even under older rules. Second, the NSFR, and, to a lesser extent, the LCR rules are certain to change and also to be implemented with some differences across countries. Despite all these uncertainties, the estimates do provide a useful starting point for understanding the potential magnitude of liquidity effects.

**The total estimated stand-alone cost of the liquidity changes is similar to that produced by the capital changes.** Table 3 shows the estimated impact of higher liquidity requirements, using the credit pricing formula. Banks will experience an increase in the average cost of their funds as they lengthen liability maturities or a decrease in their investment returns if they instead shorten the maturity of their assets. The level of impact is intuitively reasonable,

since the vast majority of a bank's funding sources are covered by these requirements. The liquidity requirements also represent a much larger change from previous regulation than is true for the capital reforms, since regulators had generally treated liquidity as a lower priority item.

**Table 3. Estimated Effects of Liquidity Changes on Lending Rates**

|   | Europe   | Japan  | U.S.     |
|---|----------|--------|----------|
| Liquid assets needed for a 100% LCR (in US\$ billion) <sup>1/</sup>             | 1,434.66 | 54.21  | 700.00   |
| Reduction in liquid assets from capital increases (in US\$ billion)             | 128.23   | 27.93  | 92.20    |
| Net liquid assets needed (in US\$ billion)                                      | 1,306.43 | 26.27  | 607.80   |
| Increase in pre-tax funding cost or reduction in investment income (in percent) | 2.00     | 1.25   | 2.00     |
| Reduction in pre-tax interest margin (in US\$ billion)                          | 26.13    | 0.33   | 12.16    |
| Reduction in pre-tax interest margin (in percentage of total assets)            | 0.08     | 0.01   | 0.11     |
| Funding needed for a 100% NSFR (in US\$ billion)                                | 1,843.29 | 563.26 | 1,000.00 |
| Reduction in the funding needed from capital increases (in US\$ billion)        | 128.23   | 27.93  | 92.20    |
| Net funding needed (in US\$ billion)  | 1,715.06 | 535.33 | 907.80   |
| Increase in pre-tax funding cost or reduction in investment income (in percent) | 2.00     | 1.25   | 2.00     |
| Reduction in pre-tax interest margin (in US\$ billion)                          | 34.30    | 6.69   | 18.16    |
| Reduction in pre-tax interest margin (in percentage of total assets)            | 0.10     | 0.11   | 0.16     |
| Elimination of overlap between actions to meet LCR and NSFR (in percent)        | -0.04    | 0.00   | -0.05    |
| Total net effect of LCR and NSFR (in percent)                                   | 0.14     | 0.11   | 0.21     |
| <i>Memorandum items</i>   |          |        |          |
| Total assets (in US\$ billion)  | 33,961   | 6,038  | 11,522   |
| CS (2011), Citi (2011), and Barclays (xxxx) total assets (in US\$ billion)      | 31,378   | 5,942  | N.A.     |
| Tax rate (in percent)   | 30.00    | 30.00  | 30.00    |

Source: Staff calculations and Tables 7 and 8.

<sup>1/</sup> The liquid assets needed for a 100% LCR and NSFR in Table 8 are grossed up to account for a larger sample of banks in Table 7.

**There are three key assumptions influencing the costs.** First, the size of the assumed liquidity gap is central to the analysis. There are few good sources for this, limiting any ability to cross check. Public reports do not give sufficient detail on asset and liability structures to independently calculate the gaps with any certainty.<sup>17</sup> Second, the cost of altering the maturity of the assets or liabilities can only roughly be estimated. The figures used above are broadly consistent with those of the equity analysts who have reported on this, but are significantly higher than the 100 bps assumed by the BIS based on historical averages for interest rates.<sup>18,19</sup> It would be helpful to have more precise and accurate figures,

<sup>17</sup> Appendix III shows how the starting points were arrived at for each region.

<sup>18</sup> See Abouhossein (2011), for a particularly detailed analysis.

<sup>19</sup> See BCBS (2010).

but this is not feasible without a much more detailed study. Third, it is impossible to estimate with any precision the overlap between the actions taken to meet the LCR needs and those to meet the NSFR requirements. It is assumed that half the cost of the smaller of the two changes would be eliminated through that overlap.

#### **D. Derivatives Requirements**

**The G-20 has committed to a number of actions to make derivatives safer and more transparent.** Standardized derivatives will be pushed towards trading on exchanges and clearing through central counterparties (CCPs), also known as clearing houses. CCPs reduce, and better manage, counterparty risk by standing between the counterparties to a derivatives transaction, so that each external party's exposure is to the clearing house and not to each other. Other technical reforms also increase transparency and safety.

**Exchange trading is much more transparent than the current dominant mechanism of bilateral transactions where a client contacts at most a few dealers and compares their prices before transacting with one dealer.** Clients will have a clearer idea about market conditions before they commit to a trade and there will be much more information available afterwards to market participants about what trades have taken place.

**Those derivatives that remain too customized for clearing houses will trigger stronger safety margins.** Dealers will have to hold significant amounts of capital against their customized derivatives risks, more than for exchange-traded positions. They will also face a new mandate to require collateral from most counterparties with whom they transact, in order to reduce their risk of losses if the counterparty fails to perform as promised.

**The derivatives market has been dominated by very large banks.** These firms have been perceived as highly creditworthy, which was important in light of the credit risk created when entering into a derivatives contract, given the reliance on promises of future performance. These leaders have also generally had the necessary sophistication to create and manage derivatives transactions and positions, as well as the extensive customer relationships that can help to generate such transactions.

**Large banks will likely be relative losers as a result of derivatives reforms.** Customized derivatives, which have been a product with high profit margins, will be replaced to a large extent by standardized derivatives, which will tend to have lower profit margins as a result of the greater competition and transparency. Offsetting this, bank capital requirements will go down as trades shift to exchanges and clearing houses, although the benefits will be partially reduced since the customized derivatives that remain will carry considerably higher capital requirements. Finally, Deloitte (2011) concludes that, even if margins are compressed, larger dealers will benefit to some extent from the derivatives reforms as they earn fees for

collateral management and clearing and share revenues with CCPs. These gains would partially offset the losses from the direct effects of reform.

**There is a debate about the extent to which banks will try to recoup lower derivatives profits by raising prices of other products.** The answer depends in part on the extent to which derivatives have been treated as separate profit centers rather than as one part of the total profitability of dealing with a particular client or counterparty. If derivatives were a completely separate profit center, and priced accordingly, then there would be no cross-subsidies with other products. On the other hand, it is clear that, in many instances, derivatives profits were one piece of a larger customer relationship. To the extent that there are cross-subsidies, a reduction in derivatives profitability for a bank could lead to increases in the price of other products.

**For simplicity and conservatism, the analysis here assumes that the cost to the large banks represents the total effect on the economy, potentially overstating the net costs.** In reality, it is likely that there are net economic gains for the other participants in the derivatives market, which would reduce the total cost to the economy and perhaps even turn it into a gain. However, it is too difficult to quantify these benefits and it seemed useful to show that even a conservative estimate does not suggest a large net cost. That said, without further clarity from the final rules, the effects of the derivatives reforms cannot be pinned down easily.

**The effects of derivatives reforms on bank credit pricing appear to be quite low,** despite assuming that the losses by big banks will not be offset by economic gains to other market participants.<sup>20</sup> The estimates used here are from early in the reform process and are fairly crude. Nonetheless, the very low size of the impact suggests that more refined numbers are unlikely to produce figures that rise to the importance of the capital or liquidity reforms.

**Table 4. Estimated Effects of Derivatives Changes on Lending Rates**

|  | Europe | Japan | U.S.   |
|--|--------|-------|--------|
| Total estimated effect on net income (in US\$ billion) | 2.84   | N.A.  | 2.26   |
| Effect on pre-tax income (in US\$ billion)             | 4.06   | N.A.  | 3.23   |
| Cost per dollar of assets (in percent)                 | 0.01   | N.A.  | 0.03   |
| <i>Memorandum items</i>                                |        |       |        |
| Total assets (in US\$ billion)                         | 33,961 | 6,038 | 11,522 |
| Tax rate (in percent)                                  | 30.00  | 30.00 | 30.00  |

Source: Staff calculations and Table 9.

<sup>20</sup> See Appendix I for further discussion on the effect of collateral requirements on other market participants.

### E. Deposit Insurance and Similar Fees

**The financial sector will also face higher fees, in response to the financial crisis.** Many countries require banks, and sometimes other financial institutions, to pay insurance premiums to support a fund to protect depositors or other customers of financial institutions. The large losses in the financial crisis have generally caused these premium levels to increase and, in some cases, for new funds to be established. The aggregate premium levels are generally set with the intention of bringing in sufficient revenue to be self-supporting over time. The specifics of the premium structure are often designed to provide incentives to operate on a safer basis, such as by charging a higher premium for riskier institutions.

**Taxes and fees that have already been passed, or are probable, do not appear likely to have a very large effect on credit pricing, although not a negligible one either.** The methodology here is quite straightforward, simply taking the expected tax costs described above and dividing them into the total asset base.

**Table 5. Estimated Effects of Tax and Fee Changes on Lending Rates**

|                                  | Europe | U.S. |
|----------------------------------|--------|------|
| Financial stability contribution | 5.9    | ...  |
| Deposit insurance fee changes    | 8.8    | 2.0  |
| Orderly liquidation fund         | ...    | 0.6  |
| Other fees                       | ...    | 0.7  |

Source: Schorer, Michael et al (2011) and Elmendorf (2011)

### F. Integrated Effects on Credit Provision

**The overall estimated impact of the regulatory reforms analyzed here on lending rates would be low in the long term, with relatively small economic effects.** Table 6 summarizes the overall impact on lending rates of the regulatory reforms analyzed here, in the long run. As noted earlier, the effects measured here are similar to, or smaller than, the 25 bps increment that central banks usually increase or decrease their short-term policy rates. A single such adjustment is not usually regarded as significant for the economy as a whole, except for the signaling effect it provides about future central bank actions. Also, a change in central bank policy rates usually affects market rates more widely, whereas these effects are concentrated on banks in the first instance.

**Nor is the size of these effects likely to be high enough to spur much reduction in credit availability.** Although there will be areas of exceptions, where credit rationing might occur, credit price increases in this range are highly likely to be feasible for the industry as a whole, so there is no particular reason for banks to pull back in general, rather than simply

increasing their pricing. This conclusion depends on the industrial structure of the financial industry, particularly whether there are alternative credit providers who could step in and steal business if bank credit spreads moved in these relatively small amounts. One of the coauthors addressed this issue specifically for the United States (Elliott 2009, 2010a) and found it unlikely that competing segments could do this to any great extent. Similar logic appears to apply in Europe and Japan. Should this be wrong, the effects on the banking system would be worse, as business would be lost and more of the adjustment would fall on bank investors and employees, but the effect on the economy would be smaller. Bank credit would shrink, but non-bank credit would rise to replace it.

**Again, all of the analysis is based on the long-run outcome, not taking account of a transition being made in today's troubled circumstances.** To the extent that bank capital or liquidity is difficult or very expensive to raise during the transition period—as they are currently in Europe, a reduction in credit supply would be expected and any increase in credit spreads would be magnified, perhaps substantially. Deleveraging is clearly occurring at European banks under today's conditions in response to financial market, economic, regulatory, and political factors. It is impossible to tell whether any appreciable portion of this reaction is due to anticipation of the Basel III rules. Regardless of the transitional effects, it will be possible, over time, for banks to find the necessary capital and liquidity to provide credit, as long as the pricing is appropriate. Capital and liquidity will flow to banks from other sectors if the price of credit rises more than is justified by the fundamental underlying factors.

**As with any other industry under cost pressures, expense reduction in the banking industry will help reduce the regulatory impact.** The analysis below assumes that banks are capable of reducing their expense bases by at least 5–10 percent, especially as approximately half of the expenses are compensation. Studies by management consulting firms support this belief, indeed they suggest the assumed adjustments are conservative. Further, earnings reports from financial firms, and a great deal of anecdotal evidence, show that large adjustments in expenses are already taking place.<sup>21</sup> The cumulative impact of the various regulatory changes analyzed below is greatest in the United States, so it is assumed that a full 10 percent of expenses will be eliminated eventually there. Since the impact from regulatory reform may be less in Europe and Japan, based on the numerical analysis shown here, a more conservative 5 percent reduction is used.

**The banking industry will be able to adjust in other ways, so another five basis points of expense cuts or revenue improvements are assumed.** For example, as noted in Elliott (2009), banks in the United States compete only somewhat loosely with money market funds for deposits, leaving the industry room to reduce deposit rates slightly from what they would

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<sup>21</sup> McKinsey (2010) and Oliver Wyman (2011) support this belief.

otherwise have paid. Banks may also be able to persuade customers to direct a little more of their lucrative investment banking or other business to them, in exchange for acting as their core credit providers. Even credit losses may be reduced marginally without credit rationing by modest tightening of covenants and other loan terms. Each of these actions could create economic costs for bank customers, but possibly at substantially lower levels than the gain for the banks, making them easier adjustments than pure pricing moves would be. In total, it appears quite conservative to assume that the combination of such non-price adjustment mechanisms could yield 5 bps of benefit for the banks.

**Table 6. Cumulative Impact of Regulatory Reforms on Lending Rates**  
(In basis points)

|  | Europe    | Japan     | U.S.      |
|--|-----------|-----------|-----------|
| Capital  | 19        | 13        | 40        |
| Modigliani-Miller pass-through                     | -9        | -7        | -20       |
| Liquidity Coverage Ratio (LCR)                     | 8         | 1         | 11        |
| Net Stable Funding Ratio (NSFR)                    | 10        | 11        | 16        |
| Overlap of LCR and NSFR actions (half of smallest) | -4        | 0         | -5        |
| Derivatives  | 1         | N.A.      | 3         |
| Taxes and fees                                     | 6         | 0         | 4         |
| <b>Total gross effects</b>                         | <b>31</b> | <b>18</b> | <b>48</b> |
| Expense cuts (at 5% for Europe, 10% for US)        | 8         | 8         | 15        |
| Other aggregate adjustments                        | 5         | 3         | 5         |
| of which: Planned capital mitigating actions       | 3         | N.A.      | 2         |
| <b>Total adjustments</b>                           | <b>13</b> | <b>10</b> | <b>20</b> |
| <b>Net cost</b>                                    | <b>18</b> | <b>8</b>  | <b>28</b> |

Source: Tables 2 to 5.

**All that said, there remains considerable uncertainty about the exact size of the regulatory impacts.** The analysis here necessarily makes a number of assumptions that may turn out to be wrong, particularly in regard to the liquidity requirements, which are novel and in flux. The analysis also assumes that regulation will be implemented appropriately and not in a manner that adds unnecessary costs. It is possible for badly structured regulation to substantially increase the costs of the system. Figure 1 in Appendix IV shows lending rates as a function of key parameter assumptions. Except for the marginal tax rate, lending rates are a linear function of key parameter assumptions. Even under extreme parameter assumptions, changes in lending rates are still lower than 100 bps.

#### IV. CONCLUSION

**Financial reform comes at a price.** Higher safety margins, particularly in terms of greater capital and liquidity, do add operating costs for lenders. Those costs will be passed on, at least partially, to the wider economy. Lending rates appear likely to rise 17 bps in Europe, 8 bps in Japan, and by 26 bps in the United States, according to the base case. There is considerable uncertainty about the true cost levels, but the sensitivity analysis demonstrates that reasonable changes in assumptions would not dramatically alter the conclusions.

**There are some important limitations to the analysis presented here.** Transition costs are not examined, a number of regulatory reforms are not modeled, judgment has been required in making many of the estimates, the overall modeling approach is relatively simple, and regulatory implementation is assumed to be appropriate, not creating unnecessary costs. Despite these limitations, the results appear to be a balanced, albeit rough, assessment of the likely credit costs. In addition, the results are also broadly in line with previous studies from the official sector, partially because similar methodologies are employed. This study finds similar first-order effects to those from the official BIS assessments of Basel III (BCBS (2010) and MAG (2010)) and the analysis at the OECD by Slovik and Cournède (2011).

**Three extensions of the methodologies from the official studies, though, lead to substantially lower net economic costs.** The base case figures show increases in lending rates of roughly a third to a half of those found in the BIS and OECD studies, despite important common modeling approaches between all of these studies. First, the baselines chosen here assume a greater increase in safety margins due solely to market forces, and therefore less of a regulatory effect, than the OECD study and certainly than the industry-sponsored IIF study. Second, this study explicitly assumes that banks will react by reducing costs and taking certain other measures that have little or no effect on credit prices and availability, in addition to the actions assumed in the other studies. The official studies do not assume expense cuts and other adjustments of this type and the IIF study assumes a fairly low level of change. This accounts for 13 bps of cost reduction in Europe, and 10 bps in Japan, 20 bps in the United States. Third, this study explicitly assumes that investors will reduce their required rate of return on bank equity as a result of the safety improvements. Debt investors are assumed to follow suit, although to a much lesser extent. For conservatism, the official studies assume zero benefit from investor reactions and the IIF study essentially assumes that these benefits, although real, will arise over a longer time-frame than is covered by their projections.

**The relatively low levels of economic costs found here strongly suggest that the benefits in terms of less frequent and less costly financial crisis would indeed outweigh the costs of regulatory reforms in the long run,** although this study does not attempt to estimate the economic benefits of the regulatory changes. Put another way, banks around the world appear to have a considerable ability to adapt to the regulatory changes without radical actions that would harm the wider economy.

## APPENDIX I. REGIONAL INPUTS FOR THE CREDIT PRICING EQUATION

### *Capital*

#### **The new Basel regulations affect European, Japanese, and U.S. banks differently.**

Table 7 summarizes the disclosures by 21 banks in the United States, 38 European banks, and 6 Japanese banks of their pro-forma Basel III common equity Tier 1 capital ratios, supplemented with estimates from Da Silva et al. (2011) and Cannon et al. (2010) for banks that have not provided any disclosure.<sup>22</sup> Table 7 shows that the impact of the increase in RWAs and the qualification standards for capital (deductions) arising from Basel III reduces common equity Tier 1 capital ratios by 2.5–3 percentage points on average.<sup>23</sup> However, the effects of increases in RWAs and deductions on U.S., European, and Japanese banks are asymmetrical. The effect of increases in RWAs is larger in U.S. banks than in European and Japanese banks on average while the effect of the deductions against capital is higher in Japanese banks than in European and U.S. banks.<sup>24</sup> As a result of the two effects, pro-forma Basel III common equity Tier 1 capital ratios in European banks are larger than in U.S. and Japanese banks on average.<sup>25,26</sup> Finally, Table 3 also shows that European banks plan to rely more on mitigating actions to comply with the Basel III minimum required ratios than U.S. banks. However, this also seems to be the result not only of new Basel III regulations but also of the current European financial crisis, which makes raising new capital unattractive, creating a premium for mitigation activities.

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<sup>22</sup> The disclosures by the banks are incomplete in many cases, not homogeneous, and reported in different documents and ways. This implies that there is some interpretation involved to understand the effects of the new Basel III capital rules on the banks.

<sup>23</sup> EBA (2012) reports that, for a sample of 48 European banks, the common equity Tier 1 capital ratio would fall from 10.2 percent to about 6.6 percent on a pro-forma basis under Basel III. In a sample of 103 global and regional banks from advanced and emerging economy member jurisdictions, BCBS (2012) reports that the impact of Basel 2.5 and Basel III on a pro-forma basis is a reduction in common equity Tier 1 capital ratio from 10.2 percent to 7.1 percent on average, as of end-June 2011.

<sup>24</sup> Hansen et al. (2012) find similar asymmetric effects of Basel 2.5 and III on RWAs.

<sup>25</sup> Samuels et al. (2012) also find that European banks have higher projected 2013 Basel III core Tier 1 capital ratios than U.S. banks.

<sup>26</sup> If public sector capital injections in European banks are excluded, pro-forma Basel III common equity Tier 1 capital ratios for European banks would be slightly lower than in U.S. banks on average. As Basel III only grandfathers the public sector capital injections until 2018, most European banks with public sector capital injections plan to repay them before 2018. This would lead to a reduction in their pro-forma Basel III common equity Tier 1 capital ratios. Indeed, Dayal et al. (2011) report pro-forma Basel III core Tier 1 capital ratios that exclude public sector injections, resulting in lower pro-forma Basel III core Tier 1 capital ratios in European banks (5.8 percent) than in U.S. banks (6.7 percent) as of end-2010.

**Table 7. Pro-Forma Basel III Common Equity Tier 1 Capital Ratios by Region, End-2010**  
(In percent)

|   | Europe 2/  | Japan      | U.S.       |
|---|------------|------------|------------|
| <b>Initial Basel I/II common equity Tier 1 capital ratio 1/</b>   | <b>9.7</b> | <b>9.2</b> | <b>9.7</b> |
| RWA increase arising from Basel II.5 and III 1/   | -1.6       | -1.1       | -2.4       |
| Pro forma Basel III common equity Tier 1 capital ratio after RWA increase 1/  | 8.1        | 8.1        | 7.3        |
| Deductions arising from Basel III 1/  | -1.1       | -1.5       | -0.6       |
| <b>Pro forma Basel III common equity Tier 1 capital ratio after RWA increase and capital deductions (without mitigation) 1/</b>       | <b>7.1</b> | <b>6.6</b> | <b>6.7</b> |
| Mitigation 1/   | 1.0        | N.A.       | 0.3        |
| Basel III pro forma common equity Tier 1 capital ratio after RWA increase, mitigation, and capital deductions 1/                      | 8.0        | 6.6        | 7.0        |
| Da Silva et al. (2011), Nozaki and Saito (2011), and TCH (2011a) Basel III pro forma common equity Tier 1 capital ratio, respectively | 6.2        | ...        | 7.0        |
| <i>Memorandum items</i>   |            |            |            |
| Number of banks   | 38         | 6          | 21         |
| Total assets (in US\$ billion) 2/   | 33,961     | 6,038      | 11,522     |
| Da Silva et al. (2011), Nozaki and Saito (2011), and TCH (2011a) number of banks, respectively  | 33         | 15         | 10         |
| Da Silva et al. (2011), Nozaki and Saito (2011), and TCH (2011a) total assets, respectively (in US\$ billion)                         | 31,378     | 7,916      | 8,300      |

Source: Staff calculations, Da Silva et al. (2011), Nozaki and Saito (2011), TCH (2011a) and bank reports.

1/ Average across the sample of banks.

2/ Instead of their initial common equity Tier 1 capital ratios, some European banks have reported their core Tier 1 capital ratios, which will generally be very similar.

3/ Sum across the sample of banks.

**The estimated long-term minimum capital levels are driven by the ratio of capital to risk-weighted assets, on which the three regions are very broadly equal.** This contrasts with the ratio of capital to total assets, which appears to be the main focus of financial market fears, where Europe and Japan are at about 3 percent, with the United States at over 5 percent. This latter ratio is roughly the same as the Basel III leverage ratio, which appears likely to be the binding constraint only for a relatively small portion of the industry, in the long run.

**The differential cost of meeting the higher target for capital to risk-weighted assets results from very different average risk weightings across the regions.** Since European banks have an average risk weighting of about half the level the United States runs (roughly 40 percent versus 80 percent), they need to raise only half as much capital per dollar of *total* assets in order to meet any given increase in the ratio of capital to RWAs. An explanation of the complex topic of average risk weightings lies outside the scope of this study, but appears to reflect at least three principal factors.<sup>27</sup> European banks have a different business model from U.S. banks, with larger balance sheets of lower-risk assets. Accounting differences between International Accounting Standards and U.S. Generally Accepted Accounting Principles play a substantial role as well. Finally, European banks appear to have worked

<sup>27</sup> See Le Leslé and Avramova (2012).

harder to optimize their balance sheet on a risk-weighted basis, reflecting both their longer use of Basel II rules and the pressures they are currently under to minimize the need for additional capital.<sup>28</sup>

### *Liquidity*

**As previously mentioned, estimating the funding and liquid assets needed to comply with a 100 percent NSFR and LCR, respectively, is particularly difficult. In the U.S. case, there are no available estimates from official sector sources of the extent of the gaps under the LCR and NSFR.** However, it is possible to make a rough estimate by starting with the figures compiled by the BCBS (2012) for 103 large banks around the world, which are likely to comprise most of the global banking assets. Given the estimates for European banks in EBA (2012) that include most of the banking system assets, the difference between BCBS and EBA totals should approximate the gaps for the rest of the world. Further subtracting the Japanese estimates from Nozaki and Saito (2011) provides an upper bound for the portion of the gaps associated with the United States, assuming that the rest of the world has no gap. This gives estimates of US\$695 billion for the LCR and US\$622 billion for the NSFR in the United States. In the case of the NSFR, Table 8 uses a significantly higher figure of US\$1 trillion to reflect the fact that some private sector estimates are much higher.

**Figures from EBA (2012) suggest Basel III liquidity ratios may also be modestly smaller than shown in Table 8.** EBA banks reported an average LCR of 71 percent and an average NSFR of 89 percent as of end-June 2011, with a shortfall of liquid assets at approximately €1.2 trillion and of long-term funding at €1.9 trillion. The difference between Table 8 and EBA figures could also result from the EBA imposing a common definition across banks or from a sample bias in the figures in Da Silva et al (2011).<sup>29</sup>

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<sup>28</sup> Samuels et al. (2012) surveyed 130 Asian, European, and U.S. equity investors to collect their views on RWA calculations. They found that most investors mistrust reported RWAs. For investors, the major differences between European banks' risk weightings reflect not only their business mix but also the Basel II approach (standardized or the IRB approach) used by banks, the way internal model works, and the way that national regulators apply the rules.

<sup>29</sup> BCBS (2012) also reported that the average LCR and NSFR in the sample of 103 global banks are 90 and 94 percent, respectively, as of end-June 2011. The associated shortfall of liquid assets and of long-term funding are EUR1.76 trillion and EUR 2.78 trillion, respectively, as of end-June 2011.

**Table 8. Pro-Forma Basel III Liquidity Ratios, End-2010**

|  | Europe | Japan | U.S.  |
|--|--------|-------|-------|
| <b>Liquidity Coverage Ratio</b>  |        |       |       |
| Da Silva et al. (2011), Nozaki and Saito (2011), and adjusted BCBS (2012), respectively (in percent) 1/            | 76     | 121   | N.A.  |
| Additional liquid assets needed for a 100% LCR (in US\$ billion) 2/  | 1,326  | 53    | 700   |
| <b>Net Stable Funding Ratio</b>  |        |       |       |
| Da Silva et al. (2011), Nozaki and Saito (2011), and adjusted BCBS (2012), respectively (in percent) 1/            | 89     | 87    | N.A.  |
| Additional long-term funding needed for a 100% NSFR (in US\$ billion) 2/   | 1,703  | 554   | 1,000 |
| <i>Memorandum items</i>  |        |       |       |
| Da Silva et al. (2011)-Abouhossein (2011) and Nozaki and Saito (2011) number of banks, respectively                | 33     | 3     | N.A.  |
| Da Silva et al. (2011)-Abouhossein (2011) and Nozaki and Saito (2011) total assets, respectively (in US\$ billion) | 31,378 | 5,942 | N.A.  |

Source: Staff calculations.

1/ Average across the sample of banks.

2/ Sum across the sample of banks.

## *Derivatives*

**Estimates of the costs of derivatives reforms on European and U.S. banks contain a high degree of uncertainty.**<sup>30,31</sup> Even though the large dealers will be the most affected, the wide range of estimates in Table 9 is an indication that, without further clarity from the final rules, the effects of the derivatives reforms on banks cannot be pinned down easily. In addition, banks will need to post initial margins and default funds for any CCPs in which they will clear their derivatives transactions. The levels for these have yet to be determined and, therefore, their costs cannot be estimated. However, given the magnitudes in Table 10, it appears that the costs to the economy as a whole of derivatives reforms may not be substantial.

<sup>30</sup> While Japanese banks might be affected by the derivatives reforms, cost estimates are not available for them.

<sup>31</sup> Abouhossein and Ranjan (2012) estimate that two thirds of the 7 percentage point reduction in the projected 2013 ROE in global investment banks are associated with Basel III capital and liquidity rules while the other one third is related to the Dodd-Frank Act, the Independent Commission on Banking, and the French proposal.

**Table 9. Effects of Derivatives Reforms on Banks per Year**  
(In US\$ million)

|   | Europe | U.S.  |
|---|--------|-------|
| Da Silva, Goel, and O'Donohoe (2010)            |        |       |
| No. of banks                                    | 14     | 4     |
| Derivative Reform Gross Loss                    | 4,738  | 3,766 |
| Derivative Reform Net Loss after Cost Reduction | 2,843  | 2,260 |
| Goldberg, Blyakher, Keating, and Nash (2010)    |        |       |
| No. of banks                                    | ...    | 25    |
| Derivative Reform Gross Loss                    | ...    | 2,651 |
| Derivative Reform Net Loss after Cost Reduction | ...    | ...   |
| Horowitz, Foundos, Ketron, and Fandetti (2010)  |        |       |
| No. of banks                                    | ...    | 4     |
| Derivative Reform Gross Loss                    | ...    | 6,911 |
| Derivative Reform Net Loss after Cost Reduction | ...    | 1,235 |
| Moszkowski, Goldschneider, and Chubak (2010)    |        |       |
| No. of banks                                    | ...    | 4     |
| Derivative Reform Gross Loss                    | ...    | 3,428 |
| Derivative Reform Net Loss after Cost Reduction | ...    | ...   |

### *Taxes and fees*

**Table 9 includes anticipated cost increases of the following amounts, based on national fiscal estimates.** The methodology here is quite straightforward, simply taking the expected tax costs based on official estimates over a period and dividing by the respective number of years.

**Table 10. Annual Fees and Taxes on European and U.S. Banks**

|                                  | Europe | Japan | U.S. |
|----------------------------------|--------|-------|------|
| Financial stability contribution | 5.9    | ...   | ...  |
| Deposit insurance fee changes    | 8.8    | ...   | 2.0  |
| Orderly liquidation fund         | ...    | ...   | 0.6  |
| Other fees                       | ...    | ...   | 0.7  |

Source: Schorer, Michael et al (2011) and Elmendorf (2011)

### *Derivatives requirements*

**The primary risk in assuming that the net effects on all participants in the derivatives market other than the major dealers rounds to zero is that the effects of new collateral requirements might turn out to more than offset the other advantages for non-dealers.** At first glance, this concern appears plausible, since there are estimates that CCPs may require US\$1 trillion or more of initial margin for the positions that they clear, as a result of

massive increases in central clearing, combined with more conservative margin requirements resulting from the lessons of the financial crisis.

**However, a more detailed review suggests that this will not more than offset the benefits for non-dealers, although it is impossible to be sure.** Heller and Vause (2012) estimate that the initial margin required by CCPs for all interest rate and credit default swaps might be US\$0.7 trillion in an intermediate case. They indicate that such swaps account for about two-thirds of all swaps by both notional amount and by market value. Grossing the US\$0.7 trillion up to reflect the missing one-third of swaps raises the figure to approximately US\$1.1 trillion. Singh (2010) estimates that collateral at the major dealers already covered about 44 percent of their swap exposures. If this can serve as a reasonable proxy for the level of existing collateralization of the swaps which would be cleared by CCPs, then the net new collateral required as a result of moving to CCPs would be approximately US\$0.6 trillion.

**There will be a cost to funding the additional collateral.** For dealers, this would likely involve either selling some longer-term securities to replace them with the short-term government notes that CCPs will generally require, using repos of longer-term securities to achieve the same effect, or raising some additional funding to purchase the necessary collateral outright. For non-dealers, the most likely approach will be to borrow funds in order to buy appropriate securities for the collateral needs. For newly raised funds, the net cost will be the difference between the rate on the borrowing and the rate earned on the securities to be used as collateral, since interest on the securities used as collateral remains with the owner of the securities. For a switch from longer-term to shorter-term securities or the use of repos, the cost will be the difference in interest earnings. On average, it appears reasonable to assume that the net cost will be in the range of 200bps.

**Thus, the first-order effect of the higher collateral requirements would be to raise credit costs by approximately US\$12 billion a year (US\$0.6 trillion times 2 percent).** Even without the offsets described next, this could be offset by raising lending rates by about 3 bps on the total size of assets held by banks in Europe and the United States. However, even this figure is likely to exaggerate the net effects, since there are a number of offsets:

- *Implicit credit spreads in bilateral derivatives transactions.* The pricing of derivatives by dealers already includes a credit component when a counterparty does not provide collateral up-front. This cost is no less real for being unstated. It will no longer be necessary when dealing with a CCP or will be at a far lower level to reflect the much higher safety of a CCP. Unfortunately, it is impossible to make a good estimate of the total implicit credit spreads built into existing bilateral deals.
- *Lower capital requirements.* Dealers will have lower capital requirements, and therefore lower costs, when clearing through a CCP rather than bilaterally.
- *Lower margins on exchange-traded products.* There is a strong consensus that dealers will have lower margins on exchange-traded transactions than on their existing bilateral derivatives deals. This cost is built into the estimates in this study for the cost to dealers, but would be exactly offset by reduced costs for non-dealers.

**In sum, it appears reasonable to assume, as this study does, that the various effects will at least net out for everyone but the major derivatives dealers, although it is impossible to establish this with certainty.** More positively, it is also quite probable there would be a net benefit to the economy rather than the cost conservatively assumed here. It should also be emphasized that this study looks at the cost in non-crisis years, without taking account of the benefits of a reduction in the frequency of financial crises and the damage they cause. So, even if there is indeed a “cost” as shown here in the non-crisis years, this does not imply that the derivatives reforms do more harm than good.

## APPENDIX II. CONSIDERATIONS IN THE CHOICE OF BASELINE SCENARIOS

**A key consideration in any quantitative study of the effect of regulatory changes is the baseline against which to compare.** This would be relatively simple if financial institutions always ran exactly at the minimum levels required by regulation or even if they always maintained the same buffer above those minimums, regardless of economic and financial market conditions. However, this is clearly not true.

**Financial institutions decide their target capital and liquidity levels based on a number of factors, not just regulatory requirements.** Managements will choose their levels of safety margins so as to meet the maximum of: (i) the regulatory requirements plus whatever chosen buffer the institution prefers to hold to lower the risk of regulatory intervention if things go wrong; (ii) the economic capital that their own risk models tell them they need in order to minimize risks of bankruptcy or other bad outcomes; (iii) the level the rating agencies demand for the institution to maintain its targeted credit rating; and (iv) the level that counterparties and financial markets demand.

**The financial crisis substantially increased the safety margins demanded under all four methods, not just the requirements of regulators.** Banks’ own economic risk models have been adjusted to reflect substantially higher risk perceptions, in addition to automatic increases as the data from the financial crisis became part of the historical database. Rating agencies clearly became more conservative, even aside from their perceptions about how regulators might change requirements. Finally, counterparties, financial markets, and customers have shed the considerable complacency that they exhibited prior to the financial crisis.

**The fair test, therefore, would be to compare expected post-reform levels of safety margins, such as capital ratios, with what those levels would be in the absence of regulatory changes, but taking account of changes in the behavior of other parties as a result of the financial crisis.** Unfortunately, the latter levels cannot be observed and some subjective judgment is necessary to determine the appropriate baseline. However, it is imperative to reflect changes in safety margins demanded by non-regulatory constituencies, including banks’ internal risk managers, even though it requires judgment to estimate the

figures. Otherwise, the calculations would unfairly penalize regulatory changes for costs that would have been incurred anyway as a result of the demands of other constituencies.

**The baseline assumptions are shown in the individual sub-sections dealing with the different regulatory changes.** In general, end-2010 figures on capital and liquidity in the United States, Japan, and Europe are used as a reasonable approximation of what market forces would have demanded even without regulatory changes. This has the potential of understating the effects of regulation, since some in the industry argue that a substantial portion of the reaction to Basel III was already included in the capital and liquidity levels by then.<sup>32</sup> This does not appear to the authors to be the case, however. There has been clear market pressure for banks to carry substantially higher capital ratios, post-crisis, and for the quality of capital to be increased. This has been most obvious in Europe, where the end-2010 figures for the European banks probably overstate the regulatory impact since markets are clearly demanding more capital and liquidity than those banks had at end-2010, at least in aggregate. For Japan, the end-2010 figures seem reasonable and consistent with the other continents, although it is less clear what a reasonable baseline is for that nation. A few figures illustrate the rationale for using end-2010 ratios for the three regions. Financial markets became much more focused on the ratio of tangible common equity to total assets as a result of the financial crisis. Yet, even by the end of 2010, the Basel III equivalent of this ratio was only at about 3 percent in Europe and Japan and a bit over 5 percent in the United States.<sup>33</sup> It is very unlikely that financial markets would be comfortable with lower ratios than this in Europe and Japan in the long run. This also appears unlikely in the United States, where asset holdings are generally riskier, and the accounting creates higher levels of the ratio than under International Accounting Standards.

**It is even less likely that new requirements for minimum liquidity levels had a substantial impact on bank balance sheets by end-2010.** The Basel liquidity rules take effect after a multi-year delay and it is already widely believed that there will be significant changes in the rules on the liquidity coverage ratio and probably even more substantial revisions to the net stable funding ratio rules. Since the balance sheet adjustments could, in practice, be put in place by banks within a couple of years, the long transition periods and regulatory uncertainty make it improbable that banks had already acted on this in any major way by end-2010. Indeed, there is little anecdotal evidence that they have. On the other hand, they have presumably already reacted to market forces resulting from the crisis. Thus, end-2010 levels appear to be a good baseline for liquidity.

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<sup>32</sup> For comparison, end-2009 capital ratios were approximately 0.5 to 1.5 percentage points lower, depending on the region.

<sup>33</sup> Tier 1 common equity under Basel III appears to be a reasonable proxy for the tangible common equity ratio and may even capture investors' intent better.

**Similarly, the other major categories of proposed regulatory changes are unlikely to have been reflected in banks' financial statements by end-2010.** Transition periods and regulatory uncertainties in these areas also appear to have given banks enough breathing space that they have not dramatically altered their activities yet.

### APPENDIX III. ASSUMPTIONS FOR THE CREDIT PRICING EQUATION

**Marginal tax rate:** A 30 percent rate was used for the United States, based on the analysis in Elliott (2009). This assumes that tax management techniques reduced the effective marginal rate somewhat below the statutory 35 percent federal rate plus applicable state taxes. 30 percent was also used for Europe based on Kopp et al. (2010) and Schanz et al. (2011) for the United Kingdom. The effective statutory tax rate for Japan is currently higher, but it is assumed that tax management techniques lower this to 30 percent.

**Minimum ratio of capital to RWA:** This is explained in the text related to Table 2.

**RWA as a percentage of total assets:** This is taken from company reports in the sample and assumed to remain constant at end-2010 levels.

**Required return on equity (ROE):** As discussed in the body, the ROE in the loan pricing equation is 12 percent for European and U.S. banks. For Japanese banks, it is 7 percent.

**Base cost of other funding sources:** This is a rough estimate of the weighted cost of deposits and debt funding in equilibrium, some years hence. As such it is necessarily quite imprecise. Rates are assumed to be higher than the present historically low levels that have resulted from the financial crisis, ensuing severe recession, and resulting policy actions.

**Administrative expenses:** For Europe, this is based on Kopp et. al. (2010). For the United States, this is based on Elliott (2009). This figure is somewhat difficult to calculate since it requires the allocation of total costs to lending and to other activities. For example, non-interest expense at United State's banks is much higher than 150 bps, but much of this is directly related to insurance brokerage and other activities which do not involve lending and which bring in higher levels of related income. Fortunately, the imprecision here is only tangentially relevant to the analysis, since it does not affect the marginal cost of the regulatory changes. The one impact is that it influences the authors' estimates of how much expenses could be cut in response to the cost pressures on the banking industry.

**Base liquidity gap:** Taken from Table 8.

**Percentage of capital that replaces short-term funding:** For illustrative simplicity, the marginal cost calculation for capital requirements assumes that additional capital replaced other funding sources pro rata. Therefore, a portion of short-term funding was replaced with capital, which counts as longer-term funding for the LCR and NSFR calculations. It is assumed that 30 percent of the additional capital replaces short-term funding.

**Increase in pre-tax funding cost or reduction in investment income:** This represents the increased cost of shifting from short-term to long-term funding sources or the decreased

investment earnings from switching from less liquid or longer-term assets to more liquid or shorter-term assets. As shown in Abouhossein (2011), European banks have multiple avenues to adjust their asset and liability portfolios. That analysis showed that the more expensive, but more likely, methods would cost modestly more than 200bps. The exact 200bps reduction in interest margin for Europe and the United States in Table 9 is based on the assumption that some of the adjustment would be done with cheaper methods. As noted in the body, BCBS (2010) assumes a 100 bps difference in short-term and long-term interest rates based on historical figures. For Japan, an adjustment cost of 125 bps is used. Kato et. al. (2010) suggests a significantly lower cost would exist currently, but it is assumed here that this would be higher in equilibrium, as rates and related spreads likely resume more normal long-term patterns.

**Reduction in interest margin as percentage of total assets:** Since no sources provided a breakdown of the liquidity gaps between lending and other activities, the costs of meeting the LCR and NSFR requirements is assumed to be spread evenly across the full range of bank activities.

**Cost of derivatives changes:** Taken from Table 9.

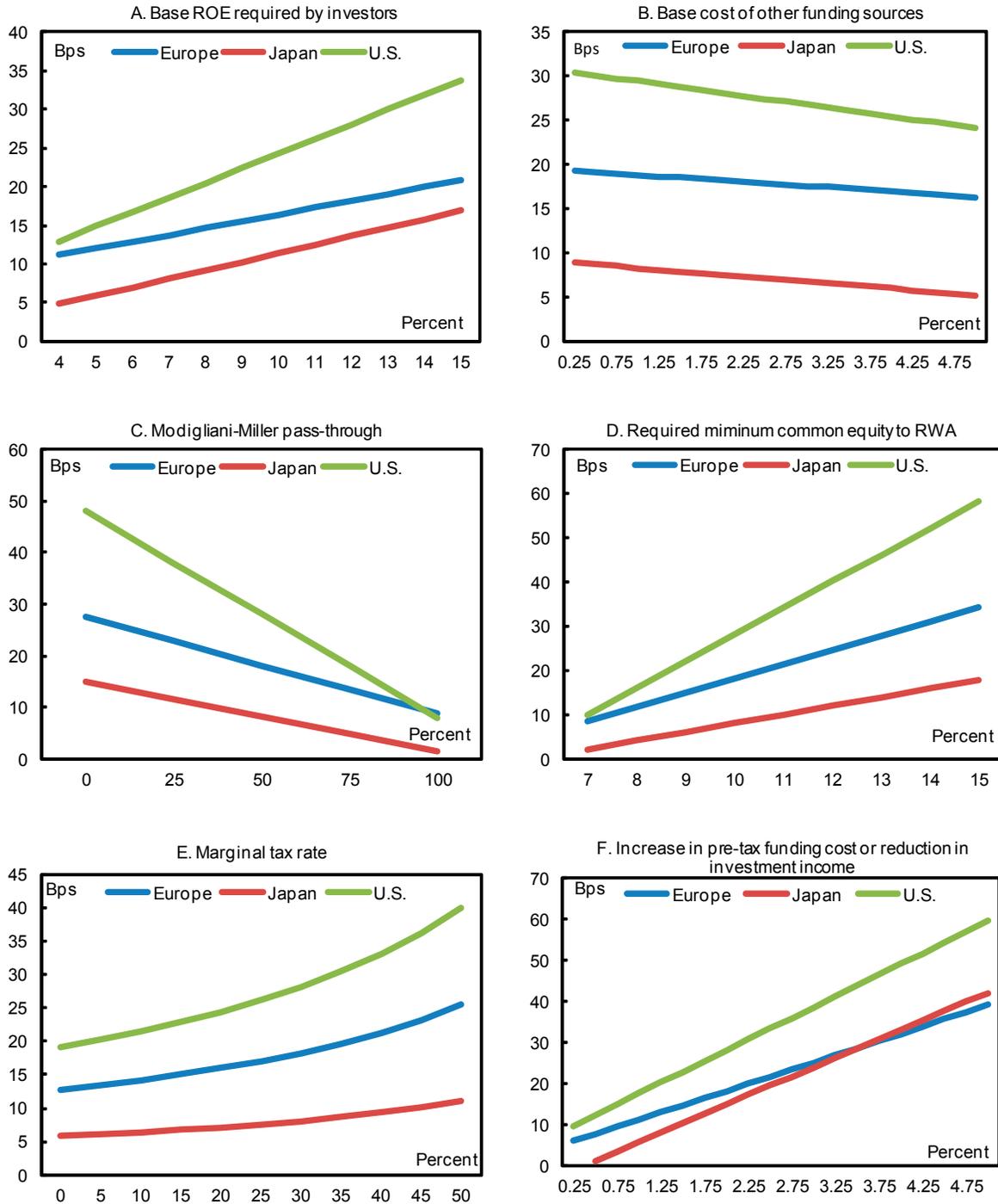
**Cost of new tax and fee measures:** Taken from Table 10. Taxes and fees are assumed not to be tax-deductible and therefore need to be offset by after-tax income from other sources.

**Cost per dollar of assets, for derivative reforms and tax changes:** The costs are assumed to be spread evenly across the full range of bank activities.

#### APPENDIX IV. SENSITIVITY ANALYSIS

**Changes in key parameter assumptions can have a significant impact on the estimated cost of regulatory reforms.** Figure 1 shows the impact of changes in key parameter assumptions. Increases in the minimum required common equity Tier 1 capital ratio, the base ROE, or the marginal tax rate can have an adverse effect on lending rates while increases in the base cost of other funding sources and in the Modigliani-Miller adjustment on capital reduce costs. The first set of increases works as an additional cost to banks that needs to be covered with an increase in lending rates. The second set reduces the effect of ROE on lending rates by either replacing equity with a cheaper source of funding or by offsetting the costs of adding equity. Except for the marginal tax rate, lending rates are a linear function of key parameter assumptions.

**Figure 1. Effects of Changes in Key Parameter Assumptions on Lending Rates**  
(In bps)



Source: Table 14 on page 21.

## APPENDIX V. SUPPLEMENTARY TABLES

Table 11. European, Japanese, and U.S. Banks in the Sample

| <b>1-European banks</b>              | <b>2-Japanese banks</b>                    |
|--------------------------------------|--|
| <b>1.1-European investment banks</b> | <b>2.1-Japanese investment banks</b>       |
| Barclays                             | Nomura                                     |
| Credit Suisse                        |  |
| Deutsche Bank                        | <b>2.2-Japanese universal banks</b>        |
| UBS                                  | Mizuho                                     |
|                                      | MUFG                                       |
| <b>1.2-European universal banks</b>  | Resona                                     |
| BNP                                  | Shinsei                                    |
| BPCE                                 | Sumitomo Holdings                          |
| Commerzbank                          |  |
| Credit Agricole Group                | <b>3-U.S. banks</b>                        |
| HSBC                                 |  |
| ING                                  | <b>3.1-U.S. investment and trust banks</b> |
| KBC                                  | Bank of New York                           |
| RBS                                  | Goldman Sachs                              |
| Société Générale                     | JPMorgan                                   |
| Standard Chartered                   | Morgan Stanley                             |
|                                      | State Street                               |
| <b>1.3-European commercial banks</b> | <b>3.2-U.S. universal banks</b>            |
| Alpha bank                           | Bank of America                            |
| Banco Popular Español                | Citigroup                                  |
| Bank of Cyprus                       |  |
| Bank of Ireland                      | <b>3.3-U.S. commercial banks</b>           |
| BBVA                                 | American Express                           |
| BMPS                                 | BB&T Corporation                           |
| Danske                               | Capital One Financial Group                |
| Dexia                                | COMERICA                                   |
| DnB NOR                              | Fifth Third Bancorporation                 |
| EFG                                  | Huntington Bancshares                      |
| Erste                                | Keycorp                                    |
| Handelsbanken                        | M&T Bank                                   |
| Intesa                               | Northern Trust                             |
| La Caixa                             | PNC  |
| Lloyds Group                         | Regions Financial Corporation              |
| NBG                                  | SunTrust Banks                             |
| Nordea                               | U.S. Bancorp                               |
| Piraeus                              | Wells Fargo                                |
| Raiffeisen Bank International AG     |  |
| Sabadell                             |  |
| Santander                            |  |
| SEB                                  |  |
| Swebank                              |  |
| UniCredit                            |  |

**Table 12. Planned De-Risking Measures, End-2010**

| Country               | Planned de-risking measures   |
|-----------------------|---|
| <b>European banks</b> |   |
| Alpha Bank            | Loan deleveraging.  |
| Banco Popular Español | IRB Model optimization, RWA improvements and others.  |
| Bank of Ireland       | Wind-down and disposal of non-core loan portfolios and through repayments/redemptions in non-core book. They include portfolios of U.K. Intermediary sourced residential mortgage; selected international niche businesses such as project finance, asset based lending and certain international corporate banking portfolios; certain international commercial investment property portfolios; and certain land and development loans.      |
| Barclays              | Sale of legacy assets and other management actions including hedging of counterparty exposures and tail risks, selling down the correlation book, and continued model refinement.   |
| BBVA                  | RWA optimization and asset and portfolio management.  |
| BMPS                  | Optimization of RWAs, product company structure, and real estate portfolio.   |
| BNP                   | Asset repricing, strict origination policies for short-term facilities and medium-term loans, asset sales and business disposals. Downsize of mortgage specialized businesses (Hungary, the Netherlands, Norway, Spain, and Switzerland) and brokers' activity in France and exit from leasing non-core activities (real estate leasing, specific asset leasing, etc.) and subscale countries (the United Kingdom, Hungary, Switzerland).     |
| BPCE                  | Asset disposal, CVA optimization.   |
| Commerzbank           | Central clearing of OTC derivatives and adjusted framework for hedging counterparty risk. Accelerated reduction of prolongation rates and natural portfolio wind-down in the asset based finance unit and restructuring and sale of assets in the portfolio restructuring unit.   |
| Credit Agricole Group | Run-off of discontinuing operations through natural amortization of outstanding loans and active management positions, potential asset disposals, and optimization of RWAs. Withdrawal from businesses in equity derivatives and commodities.   |
| Credit Suisse         | Reduction of fixed income RWAs by accelerating exit from low revenues long-dated and unsecured trades in foreign exchange rates, selling/running off low rated positions in securitized products, right-sizing investment grade positions in credit products, focusing on executing flow-based model in larger emerging markets, optimizing towards private banking client demand in commodities, and acceleration of wind-downs.             |
| Deutsche Bank         | Sale, unwind, run-off, hedging, and optimization of securitizations, correlation trading, trading book exposures to certain emerging market sovereigns, and uncollateralized derivatives exposures (shift to OTC derivatives towards central clearing), with limited dependency on sales.   |
| Dexia                 | Asset disposals and sale of Dexia banka Slovenko, DenizEmeklilik, Dexia Crediop, and Dexia Sabadell.  |
| Eurobank              | Liability management, IRB methodology, deleveraging and de-risking in Greece, Tekfen strategic sale, other (net of PSI impact).   |
| HSBC                  | Reduction of non-core portfolios and legacy positions (for instance, in HSBC Finance Corporation and GB&M), correlation books, CVA and market risk mitigation, and securitization actions. Actions improving capital allocation include expanding in attractive markets, turnaround efforts, increase in efficiency, and disposals and closure of non-strategic business (retail banking in Russia).  |
| ING                   | Sale of Real Estate Investment Management businesses in the US, Europe, and Asia.   |
| Intesa                | Active capital allocation including sale of the remaining 25% of Fındomestic, Cassa di Risparmio della Spezia, and 96 branches to Cr dit Agricole Group, and the acquisition of control of Banca Monte Parma; optimization of sources and uses of capital (eg., extension of internal models, and gradual disposal of unprofitable assets).   |
| KBC                   | Mitigation consisting of selling Kredyt Bank and Wart in Poland, limiting international lending and capital market activities (sale of German corporate activities, Diamond Financing, international leasing, global trade and project finance), divesting European Private Banking, complementary channels in Belgium (Fidea) and non-EU CEE countries (Russia and Serbia) and accelerated sale or unwinding of selected ABS and CDO assets. |
| Lloyds                | Run-off of non-core assets, including treasury and customer assets (commercial real estate, wholesale, wealth and international, and retail).   |
| NBG                   | Use of collective provisions, release of excess provisions in Turkey as asset quality improves, Finansbank stake offering, balance sheet management, deleveraging, sale of non-core assets and other actions.   |
| Nordea                | Credit portfolio management (portfolio composition reviews, capital efficient products, improved transparency on profitability, netting and collateral agreements) and models and process refinements (advanced IRB roll-out; foundation IRB for Standardized portfolios; internal models for counterparty credit risk; sourcing and treatment of collaterals and guarantees, and refining and improving credit processes).                   |
| RBI                   | Further run-down of remaining non-core financial institutions and sovereigns loan portfolio.  |
| RBS                   | Run-off, impairments, and asset disposals and closures of undrawn commitments and non-core assets consisting of commercial real estate, markets, retail, corporates, SMEs, and others.  |
| Santander             | Deleveraging in mature markets.   |
| Soci t  G n rale      | Run-off and disposal of legacy assets (CDOs, RMBS and CMBS) and selected structured lending portfolios. Possible additional optimization of market RWAs (active management of counterparty risk), optimization of portfolio of activities, and releasing goodwill and RWAs.   |
| Swedbank              | Deleveraging in Baltic countries.   |
| UBS                   | Reduction of investment bank assets by scaling down investment bank, CVA mitigation and optimization, reducing securitization, moving OTC derivatives to CCPs, hedging, reducing student loan auction rate securities and sales and restructuring of other legacy assets.   |
| UniCredit             | Migration of OTC derivatives to exchanges, portfolio optimization, capital management, and other mitigating actions.  |
| <b>Japanese banks</b> |   |
| Shinsei               | RWA optimization, reduction of capital deductions through disposal and run-off of non-core assets, including real estate equity investment, asset-backed investment/securities, CLO/ACPM/CFI, housing loan warehousing, etc.  |
| <b>U.S. banks</b>     |   |
| Bank of America       | Wind-down of proprietary trading, reduction in high RWA positions, reduction of equity exposures, reduction of low-quality investments subject to deduction under Basel III, run-off of loan portfolio (excluding GNMA repurchases), and other measures including mitigation of counterparty and CVA exposures.   |
| Bank of New York      | Quarterly payoff of sub-investment grade securities.  |
| Goldman Sachs         | Roll-offs of the correlation book and the ratio rate of mortgages and securitizations.  |
| Morgan Stanley        | Run-off of existing inventory and new mitigation opportunities such as scheduled takedown of new inventory.   |
| PNC                   | Paydown of 30 percent of sub-investment grade securities.   |

Source: Company reports.

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