



Capital Management for Banking: Dawn of a New Era

WHITE PAPER

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The Financial Crisis and Risk Regulations

From 2001 until 2006, when housing prices in the US were on an upward trajectory buoyed by low interest rates and high demand, many banks and financial intermediaries dramatically increased their exposure in the mortgage-backed securities market. An aggressive “originate-and-distribute” business model grew rapidly along with the mortgage market – and that model soon became a popular and seemingly safe way to earn higher returns when the prime rates were low.

Banks made many different bets on the mortgage market that included exposure both on and off the balance sheet. They held direct trading positions in mortgage-based securities, supported credit enhancement of securitized investments and extended large credit to the subprime lending category. Often the motive of the banks was to earn short-term returns on a highly leveraged balance sheet and take advantage of leaner capital adequacy requirements on the trading book exposure. At that time, the market risk value-at-risk (VaR) models were not tuned to capture the tail risk or the risk of an extreme loss with a very low probability emanating from the banks’ trading book positions. The originate-and-distribute business model relied on high leverage that was created based on revolving short-term funding with a majority of the underlying collateral mortgage linked.

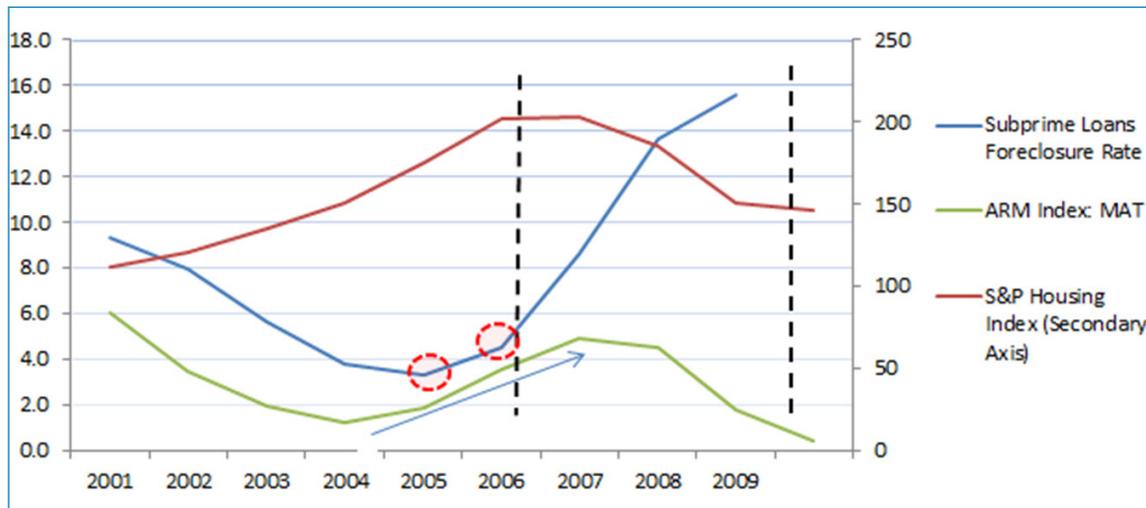


Figure 1: Correlation between market growth and subprime loan foreclosure rates.

Defaults and foreclosure rates in the subprime loan market started increasing rapidly following an increase in adjustable rate mortgages (ARMs). Figure 1 shows that there were significant spikes in the subprime loan foreclosure rates following the period when ARM rates were also inching up. This trend signaled caution – so credit institutions began tightening credit to this sector. Soon housing demand started tapering off, and there was a drastic drop in prices (see the S&P housing index between 2006 and 2009 in Figure 1). Financial intermediaries no longer wanted to fund assets that were backed by mortgage collateral because their balance sheets were already saddled with illiquid assets that could not even be securitized.

As the short-term lenders stopped rolling over their funding to the structured investment vehicles (SIVs), asset-backed commercial paper (ABCPs) and other conduits, a massive

liquidity problem ensued. To obtain liquidity, many banks deleveraged and tried to offload their mortgage-backed investments. But they were not very successful in doing that, even at fire-sale prices – because there were no buyers. To complicate matters, many banks had heavily written credit default swaps on non-agency, mortgage-backed collateralized debt obligations (CDOs), thereby guaranteeing investors who demanded credit protection. Banks were also left with investments (by way of credit enhancements) in equity tranches of mortgage-backed security (MBS) or CDOs that were now trading at junk rates.

Things took a more serious turn when the news broke out about the distress of some key funds and financial institutions. The news triggered a crisis – individuals and organizations alike lost confidence in financial markets. Interbank lending froze, leading to a credit crisis. Banks stopped lending to each other because they didn't know exactly how creditworthy their counterparts were in this crisis. The problem spread quickly, engulfing banks in other countries. It quickly became a global crisis.

Eventually governments around the world had to intervene. To tackle the systemic crisis, they encouraged some large banks that had survived to buy assets of the failing banks at fire-sale prices, relying on government-backed liquidity support. The governments also recapitalized some financial institutions that had been miserably weakened by the substantial write-downs to valuation of credit instruments in their trading books.

After causing some major financial institutions to fail, this chain of events prompted serious scrutiny of existing risk regulations. Since 2009, the Basel Committee for Banking Supervision (BCBS) has been overhauling risk regulations on many fronts. The Basel 2.5 norms (market risk reforms) defined the changes in capital required for exposures held in the trading book and the treatment of securitization exposure. Basel III regulations require quantitative treatment for some additional risks that previously were part of a supervisory review process. These areas are:

- Leverage in relation to balance sheet assets.
- Funding-side liquidity risk.
- Capital charge for credit valuation adjustment.

Regulators have also been actively devising a means to address systemic risks that lead to an entire system's financial instability. This approach requires forward-looking stress testing of the entire banking system (called systemic tests) to check resilience to adverse macroeconomic scenarios provided by regulators. Under these programs, individual banks are checked for the minimum amount of capital they need to hold unique to their risks. If a bank fails to produce the necessary capital, regulators can impose restrictions on the institution's dividend distribution plan.

The current regulatory environment requires banks to hold capital not just on the current portfolio; they're also required to plan capital for the next three years. Banks carefully identify the way their businesses, projected revenues, losses, reserves and capital levels will evolve under adverse macroeconomic scenarios. The quantum of capital needed will be progressively increased from 8 percent in 2013 to 10.5 percent in 2019. To ensure maximum loss absorbency of capital during times of stress, the level of Core Tier 1 equity capital is raised to 4.5 percent out of 8 percent minimum capital.

Banks will face much pressure to sustain return on equity targets as the level of capital needed substantially increases and as curbs are placed on the activities a bank can engage in (for example, rules that separate traditional commercial banking from investment banking, private equity and proprietary trading). In response, banks will need to efficiently plan and deploy capital and funds to achieve the profitability targets.

This paper provides banks with an approach to managing capital that will enable them to proactively steer the vital components of the strategic plan – product mix evolution, revenue growth and risk appetite. It postulates that banks must manage the strategic planning life cycles in tandem with risk appetite and forward capital position. Forward capital position should not create a huge capital surplus or a deficit. This paper illustrates ways to make capital management – that is, forward-looking planning and short- to midterm utilization – more efficient and more oriented to risk-adjusted performance measures.

The Regulatory Environment for Banking Capital: What's Changing?

Regulations governing the amount of capital a bank needs to have relative to its risk profile have existed for many years. However, since the 2008 financial crisis, regulators around the world have consistently increased the level of regulatory capital required. Until a few years ago, the Internal Capital Adequacy Assessment Process (ICAAP) was the sole supervisory tool to assess an individual institution's risk profile and risk measurement models and methods – and to determine whether the regulatory capital as per Pillar III disclosure was adequate. Now regulators also prominently conduct microprudential (at a bank level) and macroprudential (for all banks equally in a system) stress testing of the entire balance sheet, taking into account future projections. Regulators have become very prescriptive in their approaches to stress testing and capital planning. Now regulators not only provide banks with an adverse scenario data set and ask them to tune existing risk models to take into account shocks from macroeconomic variables – they also ask banks to evaluate the impact on a slew of prescribed measures, and then report back on certain standard pro formas. See the table in the appendix to get a snapshot of recent capital stress testing regulations in different countries, highlighting their objectives, assumptions and methodical requirements.

The new Basel III norms, which will be phased in until 2019, require banks to hold 10.5 percent capital, including a conservation buffer; out of that, a minimum of 6 percent must be Tier 1 capital.

It is, therefore, critical for banks to accurately measure the quantity of adequate capital. To arrive at the right calculation, banks need to take into account the balance sheet and P&L impact of business growth (including restructuring and change in product mix). They also need to consider the regulatory capital needed under various macroeconomic scenarios. Banks' evaluations should include judgment about changes in risk appetite so they can allocate and measure risk in a planned fashion. Banks need to follow this

exploratory process as a way to evaluate every possible business strategy for its ultimate impact on capital before choosing the best course of action. A capital management process that involves measuring capital adequacy not on the current portfolios but in the context of future business plans will be crucial for banks to optimize capital demand and supply.

Proactive Capital Planning

Basel III regulations have prompted banks to comprehensively understand and assess the impact of their business portfolios on a wide range of measures. For example, banks may examine each instrument in terms of its contribution to the balance sheet, leverage, liquidity, P&L, regulatory and economic capital, and risk-adjusted profitability. Analyzing the portfolios in such a holistic fashion is a challenge for banks – both from a data and systems perspective.

The data challenge arises because producing such an information mix requires banks to integrate information from the risk side (for regulatory capital and economic capital) with information from the finance side (for financial statements, general ledger accounts, liquidity, Generally Accepted Accounting Principles [GAAP] and International Financial Reporting Standards [IFRS] compliance). Until recently, these departments operated independently and had no business compulsion to share their information to create a unified business across risk and finance. But important regulations – such as balance sheet stress testing, IAS 39, IAS 9 and Dodd-Frank – are now motivating risk and finance groups to work together for compliance. An integrated view of risk and finance data is valuable because it conveys far more insights to a bank than a disjointed view. Further, banks can use these insights for effective future strategic planning – the main goal underlying capital optimization.

Figure 2 shows various banking divisions – strategy, risk management, finance, treasury and business units. Each division and business unit is responsible for certain key functions that influence a bank's future risk and profitability.

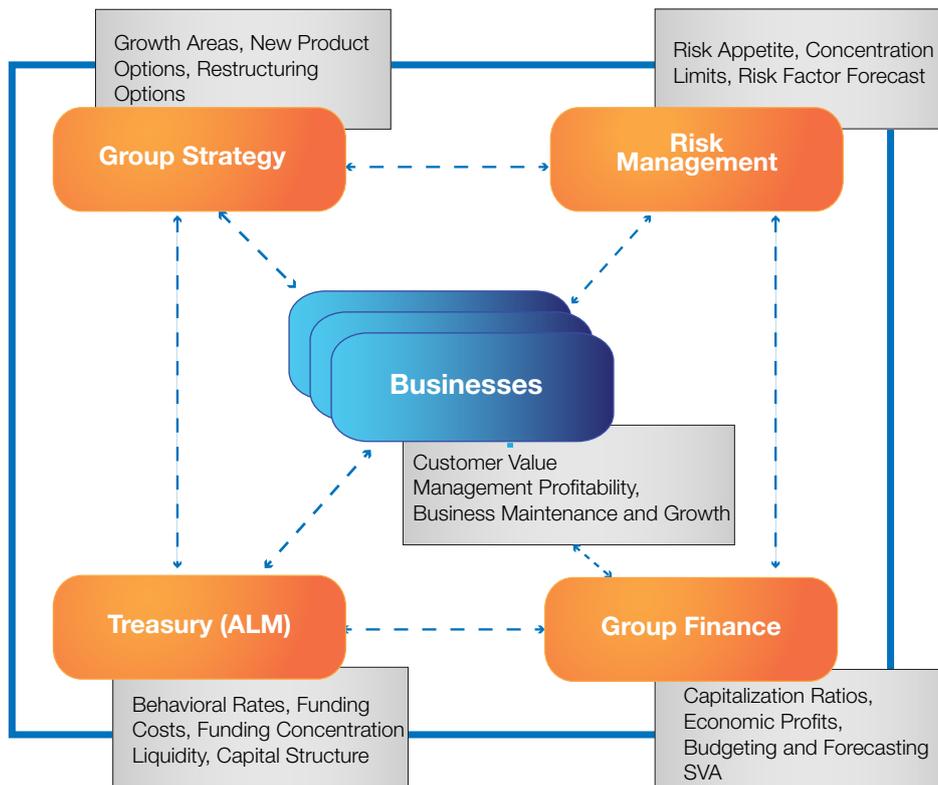


Figure 2: Different divisions participate in strategy formulation and capital planning.

A capital management system manages the data flow between different units to enable banks to perform risk and profitability planning. Following are the main goals of a capital management system:

- Estimate capital needed over the planning horizon – for example, capital needed over the next five years. This estimate will take into account business projections from various business units under different scenarios and convert them into required regulatory and economic capital. Banks will have complete visibility into the structuring aspect of capital – including Tier 1 and Tier 2 capital instruments and different types of capital adjustments as mandated in Basel III.
- Calculate capital surplus or deficit over the planning horizon. Banks need exact information on capital availability and capital demand going forward to calculate deficit or surplus in capital over the capital-planning horizon. With this information, banks can plan different capital management strategies. For example, they may divest in businesses, restructure businesses, grow businesses, manage risk concentration, raise more equity, perform liability management exercises, etc.
- Capital allocation to businesses. Under a regular financial cycle, banks allocate capital to sustain current businesses and ensure future growth. However, the incremental capital allocation may be positive or negative for a business unit, depending upon whether a bank wants the business unit to contain its risks by exploring options such as improving asset quality, exiting businesses with high risk, increasing customer rates for greater risk compensation, etc.

To perform these tasks effectively, the capital management system provides unique workspaces and views for different participants in the process. Following is a list of the work modules in the capital management system:

- **Finance module:**
 - » Compilation of balance sheet and P&L, current and projected (including GAAP accounting rules).
 - » Templates for new business planning.
 - » Definitions of stress, comprising adverse macroeconomic scenarios (regulatory or internal).
 - » Forecast loan loss reserves and provisioning.
- **Risk management module:**
 - » Regulatory capital estimation and aggregation along business hierarchies (taking into account the impact of the new macroeconomic variables on all the risk parameters and risk factors in modeling credit and market risk).
 - » Economic capital estimation and aggregation along the business hierarchies.
 - » Risk contribution estimation along the business hierarchies.
 - » Risk analysis, which is an analysis of credit exposure across multiple dimensions such as counterparties, regions, business units and products.
 - » Risk appetite and risk-based limits for the entire organization.
- **Business units working module:**
 - » Business and profitability planning tasks under new business templates, under both normal and stressed scenarios.
 - » Business restructuring based on inputs from risk management about different types of risk limits.
- **Treasury module:**
 - » Capital structuring.
 - » Capital allocation.
 - » Capital optimization.
 - » Rate consolidation. This includes FTP rates, customer rates and behavioral predictions for businesses on the ALM system – prepayment rates, rollovers, runoffs, etc., under both normal and stressed conditions.

Using the system, senior managers can explore the outcome of various decision-making options. These options are like what-if scenarios that the capital management system can answer. Consider these potential scenarios:

- Evaluate the impact on capital and profitability if we reduce subprime mortgage business to 50 percent of its current size over the next two years and correspondingly increase our lending to the small and medium enterprise segment.
- Evaluate the impact on capital and profitability if we do not grow our existing commercial portfolio but only restructure it to increase exposure to AAA-rated borrowers by 20 percent over the next three years.

- Evaluate the impact on overall profitability and capital if we increase customer rates in the BBB commercial lending segment by 50 basis points in the next six months.
- Evaluate the impact on capital and profitability if we grow our mortgage portfolio at 8 percent annually in a declining-rate-of-interest scenario.
- Evaluate the impact of a credit exposure redistribution based on customer ratings on capital and profitability.
- Evaluate the impact on profitability and capital if there were a cut in funding costs of 125 basis points.
- Evaluate the impact of a 2 percent versus a 5 percent dividend distribution on Tier 1 capital – and do this analysis over the next five years.

Following are examples of the actions that different individuals (based on their roles) would be responsible for in a planning cycle.

- **Create a set of consistent stress test scenarios that the bank's board approves for business and capital planning purposes.** Start with a macroeconomic model that allows scenario construction over some baseline forecast, and then use it for predicting some key financial variables, credit risk parameters (PDs, LGDs) and market-risk factors (yield and swap rates, exchange rates, rating migrations, credit spreads, volatility index, equity index, etc.).
- **Set risk appetite over the next few years.** Set an appetite for maximum loss absorption in a given time period provided through bank capital. This will be established by the chief risk officer based on the board's directive, and will be continually measured and monitored against risk limits.
- **Create new business templates.** Templates will be simple and should include manifestation of risk and finance attributes that have to be captured in the planning stage. Examples are new business growth, prepayment rates, customer rates applicable for the product, and distribution (or redistribution) of businesses into different credit quality categories.
- **Perform business planning.** This exercise will lead to some desired evolution of future balance sheets (see Figure 3) and P&Ls with the business mix changing over time according to management's vision.

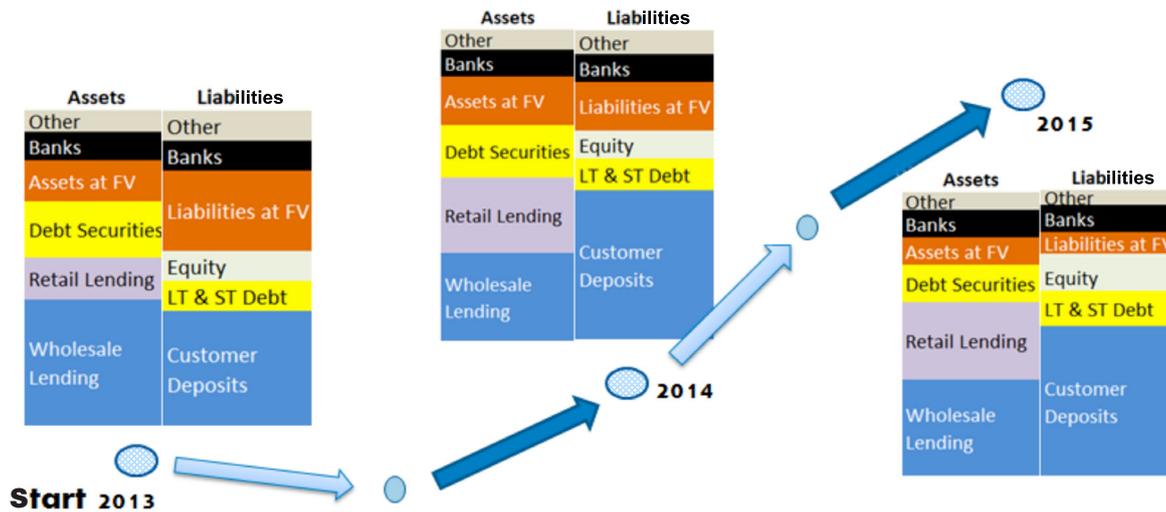


Figure 3: The evolution of the balance sheet over time.

- Plan the business’s risk profile going forward.** Risk managers will review the current distribution of credit exposures-at-default (EAD) and corresponding risk-weighted assets (RWA) across the bank’s internal rating grades for each of the major portfolios. Then they can determine an optimized risk distribution and risk profile of portfolios that meets their goal to minimize risk (subject to the constraints of the risk appetite construct). Figures 4 and 5 are outputs from this exercise. Figure 4 shows the existing distribution of exposures into different rating grades, whereas Figure 5 shows a planned distribution based on an optimization exercise. The resulting distribution of the existing portfolio (subject to constraints like committed facility amounts) leads to a higher credit rating, resulting in a lower RWA. Banks can implement and monitor this by setting steep transfer rates that reflect the way the bank wants to manage incentives, positive or negative.

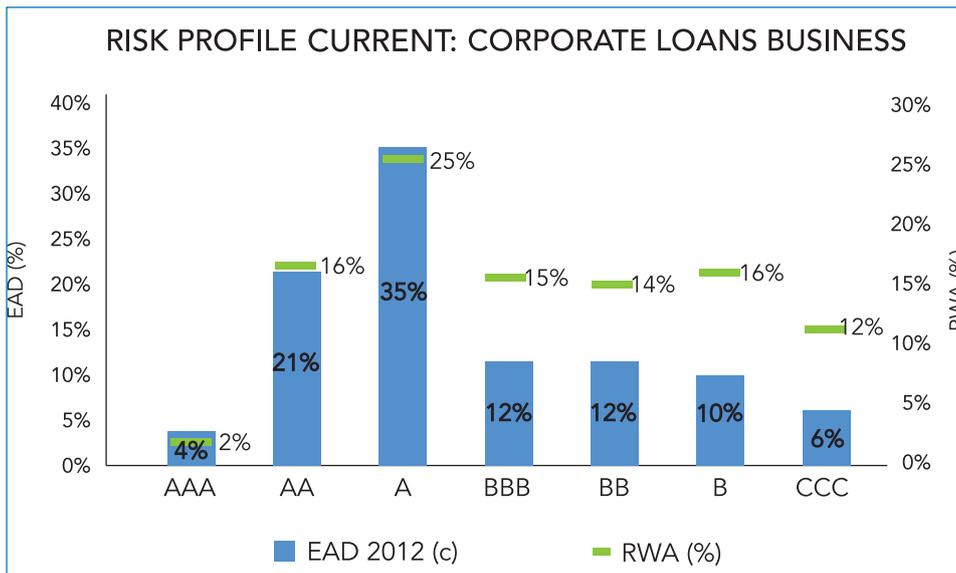


Figure 4: The current distribution of portfolios across the rating grades.

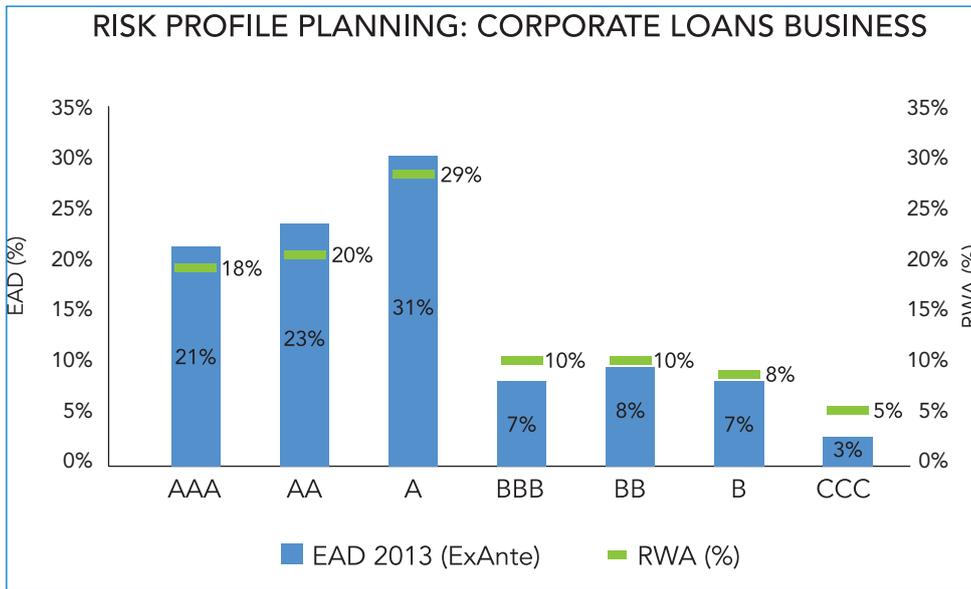


Figure 5: The desired distribution of portfolios across the rating grades.

- Create capital-required scenarios.** By consolidating business and profitability projections from different business units, banks can create the capital planning output (capital required) over the next 12 months. The output shown is a consolidated level output for the entire banking group. The way the output is created, senior management personnel can view capital required under any pre-specified stress scenarios.

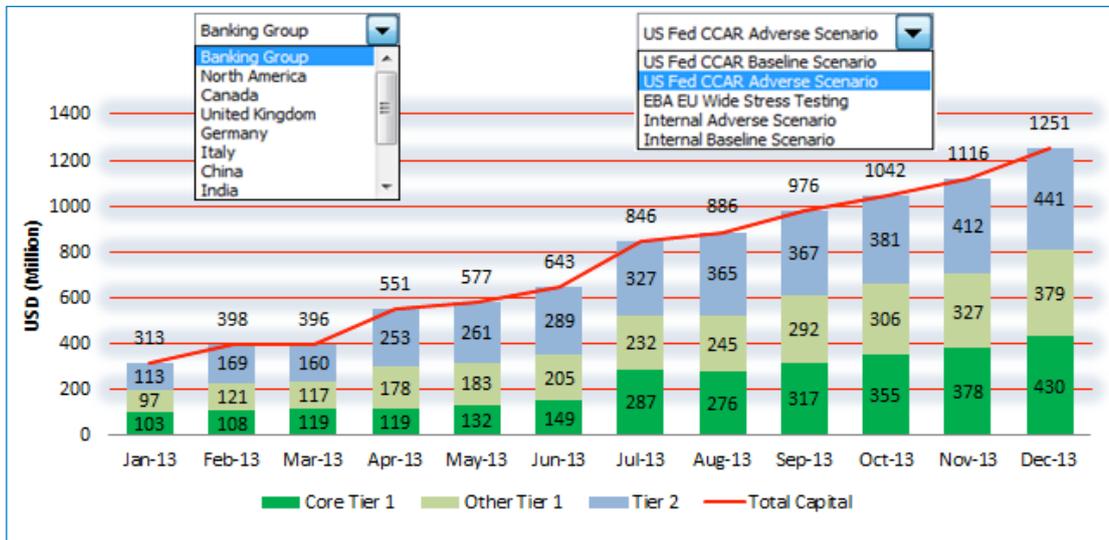


Figure 6: Projection of required capital.

- Compare capital required versus capital available.** By comparing required capital with the projection for available capital, banks can discover deficits. In this example, the bank discovers that with its current version of planning, the amount of capital required will exceed available capital roughly in May 2013. Clearly, this situation would lead to capital inadequacy and the bank would not be able to meet the capitalization level Basel III requires.

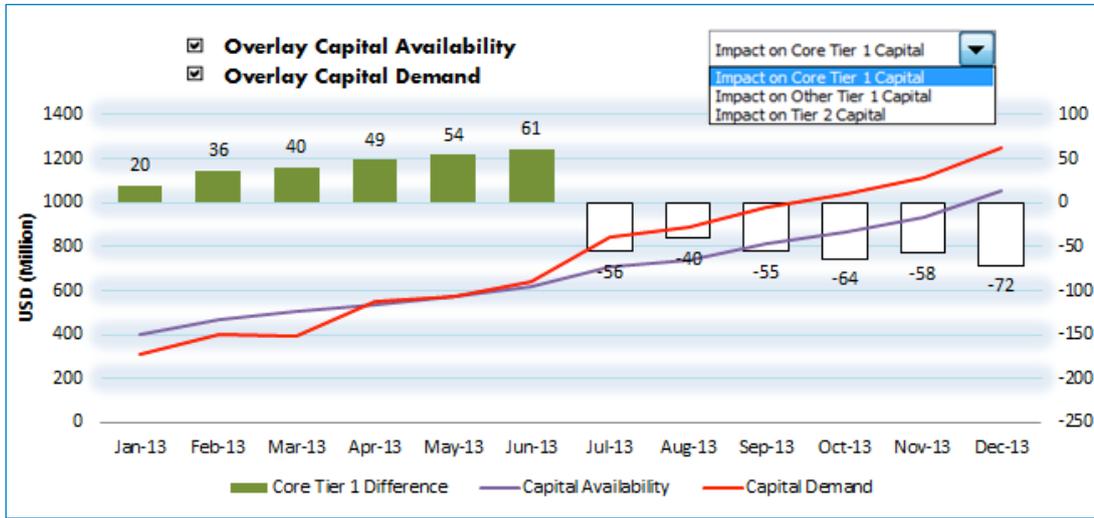


Figure 7: Capital surplus or deficit over the planning horizon.

To avoid that situation, the bank would have to explore more what-if scenarios to adjust capital demand and capital availability to meet Basel III mandated capitalization.

The bank may explore a number of steps. Let's imagine that the bank is able to create a strategy response to the base planning version that meets regulatory capitalization by bringing down the required level of regulatory capital.

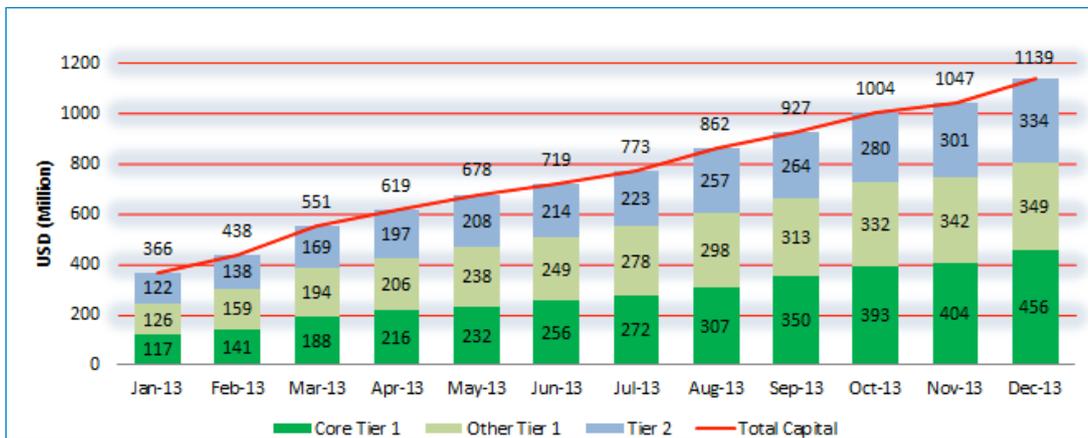


Figure 8: Projection of required capital – strategic response.

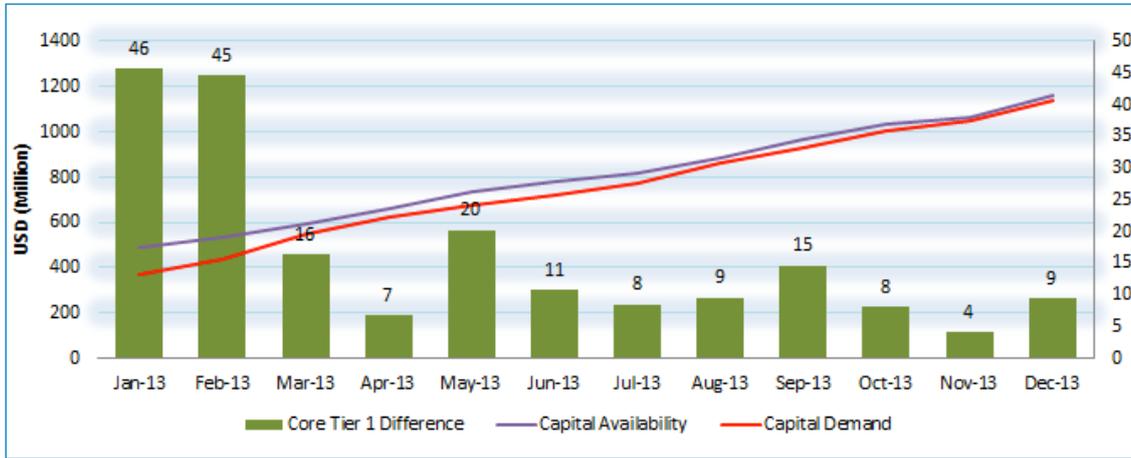


Figure 9: Strategic response of capital surplus or deficit over the planning horizon.

Figure 10 shows the outcome of the capital planning exercise over a one-year planning horizon. It shows the strategic decisions that the bank will eventually make to influence the requirement and the availability of capital and quantification of its impact on capital individually.

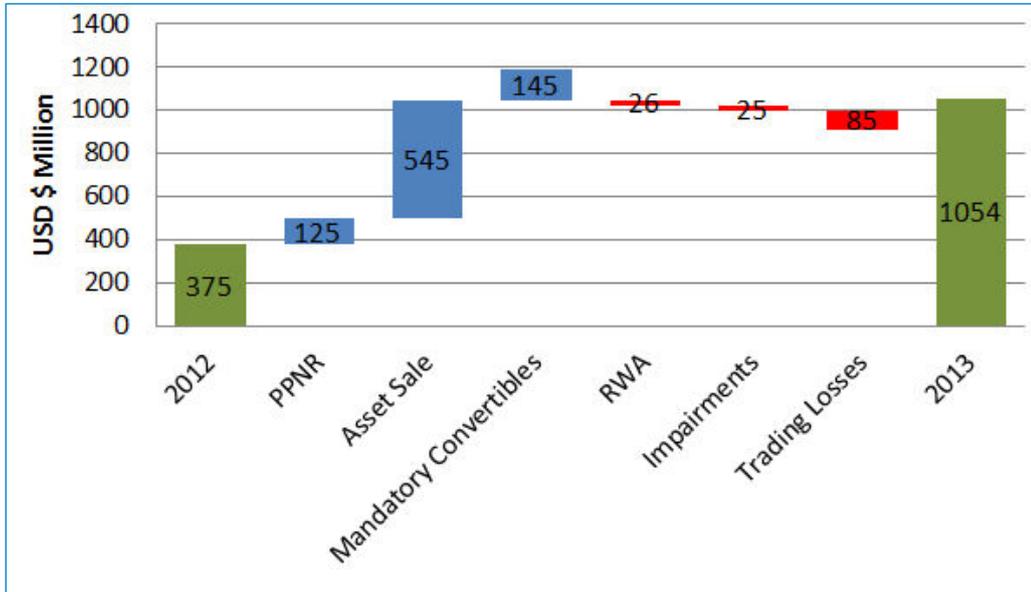


Figure 10: Strategic actions to manage the demand and supply of capital.

Capital Allocation and a Risk-Adjusted Performance Culture

The preceding sections described risk appetite as a key input to the capital management process. In fact, a quantified notion of risk appetite is paramount to containing risks within set tolerance levels. In that vein, capital allocation (ex ante) serves as the process to allocate the risk appetite down to various businesses. It enables banks to set risk levels top-down and to measure and monitor them bottom-up.

Capital allocation is done withstanding the diversification benefits that are already calculated in the risk aggregation process (risk contributions, or RC). An example shown in Figure 11 assumes that the bank has quantified its risk appetite and wants to allocate it fully to its business units. In reality, a bank may also want to maintain some cushion to decide the allocable capital. An allocable capital budget of \$4,725 million for 2013 creates a waterfall to the three main business units (i.e., corporate, retail and global markets, which get an allocation of \$1,639 million, \$1,627 million and \$1,459 million each). It is important to note that because this notion of capital is based on risk contributions, it ensures that capital allocation is additive.

The level of diversification that exists at the first layer allocation is 10 percent (diversification ratio = [total diversified economic capital]/[total undiversified economic capital]). Subsequently, each of the business units will allocate capital down to its respective lines of business (LoBs) in a similar fashion.

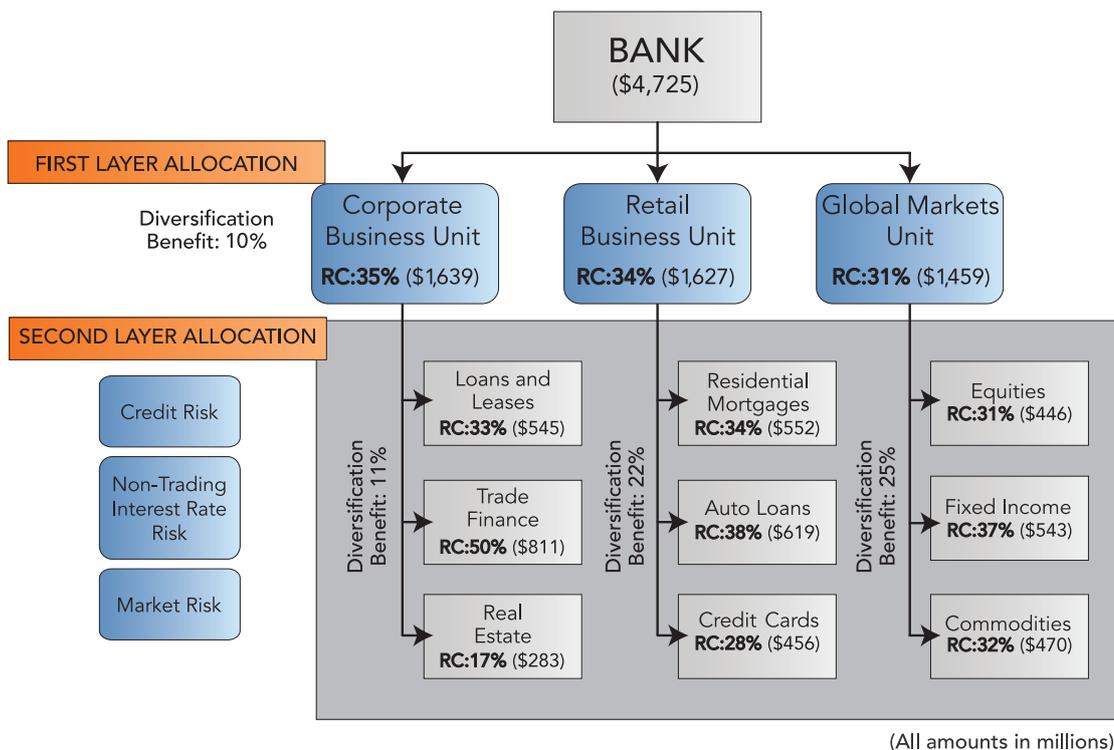


Figure 11: Top-down capital allocation.

By allocating capital down to the LoBs, banks can explore allocation scenarios based on different risk appetite levels.

Figure 12 shows the output from a capital allocation process where the risk appetite of the bank increases in 2013 and the bank accordingly allocates a greater amount of capital to its businesses that year.

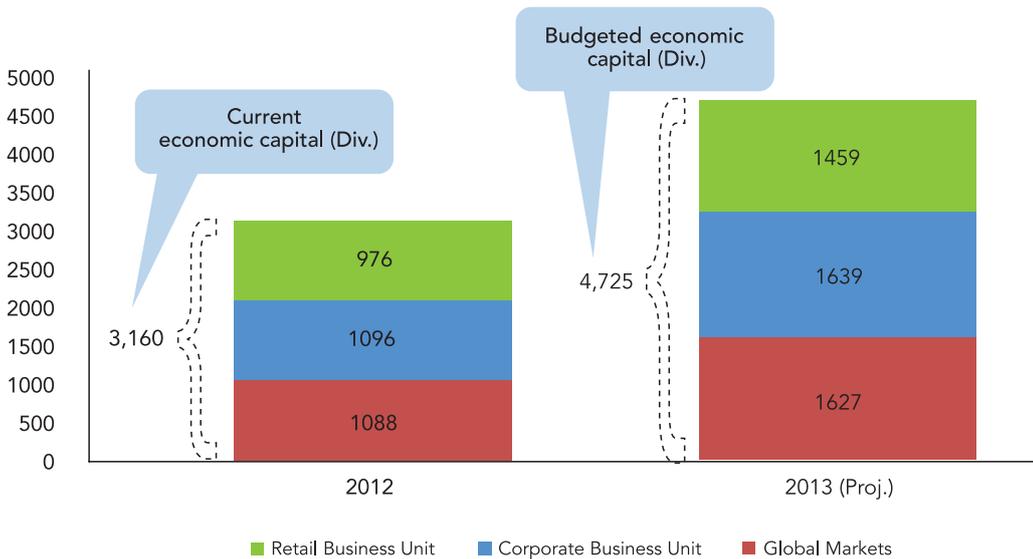


Figure 12: The evolution of capital from current to budgeted level.

Capital allocation must take into account the projections for businesses' risk-adjusted performance. To ensure using capital allocation most effectively, banks should allocate greater amounts of capital to businesses that promise a higher risk-adjusted profit. Usually a capital optimization process will address this complex problem to determine the correct allocation based on projected risk-adjusted profits.

Conclusion

Enterprisewide stress testing is becoming a popular method for regulators to ask banks to use as they determine the level of capital needed under adverse macroeconomic scenarios. Efficient management of capital, therefore, has assumed paramount significance in our regulatory environment. Banks will need to find ways to gain insights about their businesses so that they can effectively plan growth and manage risk profiles.

Basel III demands a more comprehensive approach to risk management. Banks need to simultaneously manage their capital, funding liquidity and leverage. They also need to evaluate their business activities more closely to judge the fit with the bank's long-term strategic goals as reflected in the bank's risk appetite. Then they must actively manage the portfolio dynamics – risk and return.

This paper offers banks a capital management approach that involves long-term capital planning and efficient capital allocation. The data demands of this process are very high – and they equally straddle the two domains of risk and finance that have traditionally worked independently of each other. To be successful, banks need both an infrastructure and a process for identifying businesses that create long-term value. The system must also be equipped to restructure businesses that are inefficiently managed but have growth potential. Such an infrastructure can provide tremendous insights, enabling users to do exploratory what-if analyses as they evaluate various options to decipher the best course of action for capital management.

Learn more

To learn more about this topic, visit:

sas.com/allocation

Appendix

This table provides a snapshot of recent capital stress testing regulations in different countries. It highlights their objectives, assumptions and methodological requirements.

Regulatory Body	Objectives	Assumptions and Requirements	Methodology	Results of the Exercise
European Banking Authority: 2011 EU-wide Stress Testing	<ul style="list-style-type: none"> • Microprudential stress testing with an objective to check individual institutions' solvency under macroeconomic shocks. • It entailed stress testing of the balance sheet under an adverse macroeconomic scenario to evaluate capitalization (Core Tier 1 capital) over the next two years. • Minimum required Core Tier 1 ratio of 5%. 	<ul style="list-style-type: none"> • Static balance sheet (balances do not grow) and the business mix remains current over the measurement horizon (two years). • Funding scenarios are stable (i.e., no loss of funding); banks have to factor in an increase in the cost of funds over the next two years. 	<ul style="list-style-type: none"> • Macroeconomic scenarios must drive the forecast of future income, expenses, loan losses and capital requirements. • Loan losses (or impairment flows) are based on calculation of defaulted flows and applying expected loss impairment rates to exposures. • Impact on net interest income to be calculated based on shocking the swap curves that changes yield on assets and liabilities and hence future interest income and expense – keeping the hedging strategy static. • Net trading income is a sum of average profitability of trading activities in the last five years and the losses/profits as a result of applying market risk shocks. 	<ul style="list-style-type: none"> • After taking into account capital-raising actions, the EBA's stress test exercise shows that eight banks (out of 90) fall below capital threshold of 5%. • There is a 14% decline in CT1 in an adverse scenario relative to the baseline scenario. • Evolution of P&Ls shows a steep decline of 28% over 2009 levels in profits.
The Federal Reserve USA: Capital Plans Rule (Dec. 30, 2011) and CCAR 2012 and 2013 exercise	<ul style="list-style-type: none"> • Submit comprehensive annual capital plans (under "Capital Plans" Regulation Y). • In order to assess the plans, the Federal Reserve collects data from banks (under Board's Regulation Y: Y-14Q (Position Data) and 14A (Projections) to do a projection of losses, revenues, expenses and capital ratios under adverse scenarios. • The objective is to achieve a minimum Core Tier 1 ratio of 5%, a 4% Tier 1 ratio, and a leverage ratio of not greater than 3%. 	<ul style="list-style-type: none"> • Banks need to provide to the regulators projection of capital measures (Tier 1 capital RWA, Tier 2 capital, total regulatory capital) based on business and an action plan to raise capital to the level needed for required capitalization under adverse scenario over the next nine quarters. • The final capital rule requires CCAR banks to submit input data (as per Reports FY 14A and FR Y-14Q). 	<ul style="list-style-type: none"> • The CCAR analytical system requires banks to project business volumes, business profitability, default rates, losses and capital action going forward for the next nine quarters. 	<ul style="list-style-type: none"> • CCAR 2012 estimates that the aggregate post-stress Core Tier 1 ratio (including capital actions like dividend distribution) for 19 banks falls from 10.1% in Q3 2011 to 6.3% Q4 2013.

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