

Regulation

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Why do we regulate?

- In a frictionless world, there is no need for regulation. Bad banks disappear and become insolvent.
- The existence of deposit insurance and the existence of the lender of last resort implies that bank managers may take too many risks.
- Why do we regulate
 - Protect the depositors
 - Limit systemic risk
- Systemic risk : Systemic risk refers to **the risk of a breakdown of an entire system rather than simply the failure of individual parts**. In a financial context, it denotes the risk of a cascading failure in the financial sector, caused by linkages within the financial system, resulting in a severe economic downturn.

- Before 1980 bank failures were rare
- Between 1984 and 1991, 1300 banks in the US failed.
- After WWII, a ratio of solvency was required for banks in the US.
- Capital ratios were comprised of primary capital and secondary capital.
- Capital ratios do not take into account that different assets have different risks and became quickly obsolete.
- Starting in 1987, the G10 defined a capital ratio (Cooke ratio) to be used to regulate banks.

$$\text{BCR} = \frac{\text{Tier 1 Capital} + \text{Tier 2 Capital}}{\text{Risk Weighted Assets}}$$

Numerator - Tier 1 Capital

- Tier 1 capital refers to the core capital held in a bank's reserves and is used to fund business activities for the bank's clients.
- It includes common stock, as well as disclosed reserves and certain other assets.
- Tier 1 capital has two components: Common Equity Tier 1 (CET1) and Additional Tier 1.
- The Basel III Accord is the primary banking regulation that sets the minimum tier 1 capital ratio requirement for financial institutions
- The Tier 1 capital ratio compares a bank's equity capital with its total risk weight assets (RWAs). These are a compilation of assets the bank holds which are weighted by credit risk.
- Under the Basel III accords, the value of a bank's Tier 1 capital must be larger than 6% of its risk weighted assets.

Numerator - Tier 2 Capital

- Tier 2 is designated as the second or supplementary layer of a bank's capital and is composed of items such as revaluation reserves, hybrid instruments, and subordinated term debt.
- It is considered less secure than Tier 1 capital because it is more difficult to liquidate.
- Under Basel III, no more than 25% of a bank's capital requirements can be comprised of Tier 2 capital

What is in Tier 2?

- Revaluation reserves: These are reserves created by the revaluation of an asset. A typical revaluation reserve is a building owned by a bank. Over time, the value of the real estate asset tends to increase and can thus be revalued.
- General provisions: This category consists of losses that a bank may have of an as yet undetermined amount including from loans. The total general provision amount allowed is 1.25% of the bank's risk weighted assets (RWA).
- Hybrid capital instruments: This type of capital is a mixture of both debt and equity instruments. Preferred stock is an example of a hybrid instrument. A bank may include hybrid instruments in its Tier 2 capital as long as the assets are sufficiently similar to equity so losses can be taken on the face value of the instrument without triggering the liquidation of the bank
- Subordinated debt: Debt is subordinated in regard to ordinary bank depositors and other loans and securities that constitute higher ranking senior debt. The minimum original term of this debt is over five years.

Key Concepts

- Tier 2 capital is the second layer of capital that a bank must keep as part of its required reserves.
- This tier is comprised of revaluation reserves, general provisions, subordinated term debt, and hybrid capital instruments.
- There are two levels of Tier 2 capital upper level and lower level capital.
- Upper level Tier 2 capital consists of securities that are perpetual meaning they have no maturity date revaluation reserves, and fixed asset investments. Lower level Tier 2 capital consists of subordinated debt and is generally inexpensive for a bank to issue
- Tier 2 capital is subordinate to Tier 1 capital and is considered riskier as it is more difficult to calculate if a bank needs to liquidate it.

Risk Weighted Assets

- Risk weighted assets are used to determine the minimum amount of capital that must be held by banks and other financial institutions in order to reduce the risk of insolvency.
- The financial crisis of 2007 and 2008 was driven by financial institutions investing in subprime home mortgage loans that had a far higher risk of default than bank managers and regulators believed to be possible.
- When consumers started to default on their mortgages, many financial institutions lost large amounts of capital, and some became insolvent.
- Regulators consider several tools to assess the risk of a particular asset category. Since a large percentage of bank assets are loans, regulators consider both the source of loan repayment and the underlying value of the collateral.
- Risk weights are essentially percentage factors that adjust for the credit risk of different types of assets.

Example

What is the Minimum Capital Adequacy Ratio under Basel III?

Assume Bank A has \$5 million in tier 1 capital and \$3 million in tier 2 capital. Bank A loaned \$5 million to ABC Corporation, which has 25% riskiness, and \$50 million to XYZ Corporation, which has 55% riskiness.

$$RWA = 5 \times 0.25 + 50 \times 0.55 = 28.75$$

$$K_A = 5 + 3 = 8$$

$$\text{Capital Adequacy Ratio} = \frac{8}{28.75} \times 100 = 27.83 > 8$$

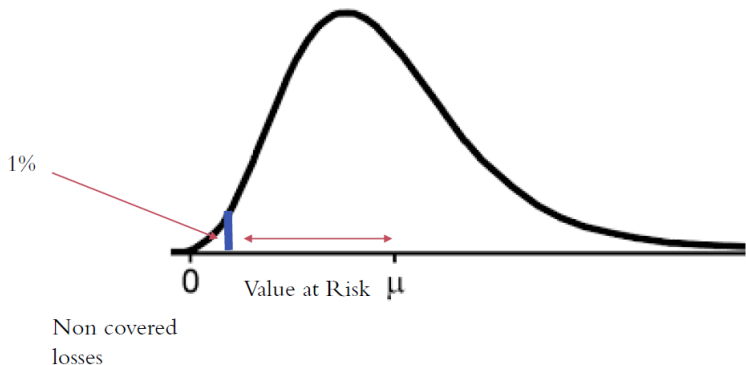
$$\text{Tier 1 Ratio} = \frac{5}{28.75} \times 100 = 17.39 > 6$$

Capital Requirements for Market Risk

- Every market position held by a bank has a capital requirement.
- This capital requirement is computed using the Value at Risk (VaR)
- It computes the potential loss that can be incurred in n days with a certain probability.
- The VaR methodology implies making assumptions about the probability distribution of the banks' assets.
- Under Basel III banks are required to cover 10 days of losses up to a probability of 1%.

Value at Risk

Bank A invests μ in an asset whose price in n days follows some probability distribution. The Value at Risk tells the maximum amount lost in the portfolio with certain probability (e.g. 99%).



Example

- A portfolio of 30 million euros has in 10 days a return that follows a normal distribution with mean 0 and standard deviation of 5%. Compute the maximum amount lost with a 99% probability.
- Standardize the return $r = \mu + \sigma z$
- The bank is required to hold in capital 3.54 million euros

$$\begin{aligned}\text{Potential Loss} &= 30 \times (r_{1\%prob}) = 30 \times (5\%z_{1\%}) \\ &= 30 \times 5\% \times \Phi(0.01) = 30 \times 0.05 \times (-2.36) = -3.54\end{aligned}$$

Alternative Methods and Limitations

- Simulations Consider other distributions
- Historical vs Forward-looking measures
- Recover probabilities from option's data

Basel II (2005-2009) - 3 Pilars

- Capital Requirements - Credit, Market, and Operational.
- Macroprudential Regulation.
- Market Discipline

- Credit Risk: Standard (External Ratings) + Internal Ratings Based (IRB). Under the Basel II guidelines, banks are allowed to use their own estimated risk parameters for the purpose of calculating regulatory capital.
- Market Risk: Standard (VaR or CAPM “Betas”) + Internal Models (Specially for illiquid assets)
- Operational Risk: AMA (Advanced Measurement Approach Internal Model), BIA (Basic Indicator Approach Capital based on past operational needs) and Standardized Approach (Capital depends on the type of financial intermediary).

Supervision

- Ensure that banks meet capital requirements.
- Incentivize the banking sector to use better risk management tools.
- Rely both on internal and external control. (E.g. Role of internal and external auditors)

Market Discipline

- Mandatory disclosure
- Under transparency bad practices or “risk” is penalized by investors.

- The Basel III accord is a set of financial reforms that was developed by the Basel Committee on Banking Supervision (BCBS), with the aim of strengthening regulation, supervision, and risk management within the banking industry.
- Due to the impact of the 2008 Global Financial Crisis on banks, Basel III was introduced to improve the banks' ability to handle shocks from financial stress and to strengthen their transparency and disclosure.
- The BCBS was established in 1974 by the central bank governors of the Group of Ten (G10) countries, as a response to disruptions in financial
- The committee was expanded in 2009 to 27 jurisdictions , including Brazil, Canada, Germany, Australia , Argentina, China, France, India , Saudi Arabia, the Netherlands , Russia , Hong Kong, Japan, Italy , Korea , Mexico, Singapore, Spain, Luxembourg, Turkey , Switzerland , Sweden , South Africa , the United Kingdom , the United States, Indonesia , and Belgium

Key Principles of Basel III

- Minimum Capital Requirements
- Leverage Ratio
- Liquidity Requirements

Leverage Ratio

- Basel III introduced a non risk based leverage ratio to serve as a backstop to the risk based capital requirements. Banks are required to hold a leverage ratio in excess of 3%. The non risk based leverage ratio is calculated by dividing Tier 1 capital by the average total consolidated assets of a bank.
- To conform to the requirement, the Federal Reserve Bank of the United States fixed the leverage ratio at 5% for insured bank holding companies, and at 6% for Systematically Important Financial Institutions (SIFI).

Liquidity Requirements

- Basel III introduced the usage of two liquidity ratios the Liquidity Coverage Ratio and the Net Stable Funding Ratio.
- The Liquidity Coverage Ratio requires banks to hold sufficient highly liquid assets that can withstand a 30 day stressed funding scenario as specified by the supervisors.
- The Net Stable Funding Ratio (NSFR) requires banks to maintain stable funding above the required amount of stable funding for a period of one year of extended stress (maturity

Liquidity Coverage Ratio

$$LCR = \frac{\text{High Quality Liquid Assets}}{\text{total Net Cash Flow Amount}}$$

- The LCR is calculated by dividing a bank's high-quality liquid assets by its total net cash flows, over a 30-day stress period.
- The high-quality liquid assets include only those with a high potential to be converted easily and quickly into cash.
- The three categories of liquid assets with decreasing levels of quality are level 1, level 2a and level 2b.
- For example, bank ABC has high quality liquid assets worth 44 million and 35 million in anticipated net cash flows over a 30-day stress period. The LCR is 1.57