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# **CAPITAL ADEQUACY: BASEL 2 and BASEL 3**

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FINANCIAL INSTITUTIONS MANAGEMENT  
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# AGENDA:

- Functions of bank capital;
  - Definitions of Bank Capital, leverage ratio;
  - Structure of BASEL 2
  - Bank capital and minimum ratios;
  - Risk-weighted assets for credit risk, market risk and operational risk
  - Basel 2 and Basel 3.
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# Importance of Bank Capital

- ❑ Absorb unanticipated losses and preserve confidence of the FI;
  - ❑ Protect uninsured depositors and other stakeholders;
  - ❑ Protect FI owners against increases in insurance premiums and liquidity premiums;
  - ❑ Acquire real investments in order to provide financial services.
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# Two DEFINITIONS of capital:

- Economic = difference in the market value of assets and liabilities.
- Regulatory = defined capital and ratios are based in whole or part on historical or book value with the exception of the investment banking industry.

The deviation of BV from its true MV depends on:

- Interest rate volatility.
  - Central banks' examination and enforcement.
  - $$\text{MV of Equity per share} = \frac{\text{MV of shares outstanding}}{\text{Number of shares}}$$
  - $$\text{BV of Equity per share} = \frac{(\text{Par Value of Equity} + \text{Surplus Value} + \text{Retained earnings} + \text{Loan Loss Reserves})}{\text{Number of shares}}$$
  - $\text{MV/BV}$  = the degree of discrepancy between the MV and BV of FI's equity.
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# Problem 1

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## Why do FI and Regulators are against market value accounting?

- Difficult to implement, especially for small commercial banks with large amounts of non-tradable assets as it is impossible to obtain accurate market prices;
  - An unnecessary degree of variability of earnings;
  - FIs will be less willing to have exposures in long-term assets such as mortgage loans, C&I loans because these assets will be continuously marked-to-market and they will reflect quality changes.
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# Leverage Ratio

- Banks are required to meet minimum capital standards on both a simple leverage basis and a risk-adjusted basis.

$$\text{Leverage ratio} = \frac{\text{Core Capital}}{\text{Total Assets}}$$

- Problems with leverage ratio:
  - Market value may not be adequately reflected
  - Fails to reflect differences in credit and interest rate risks
  - Off-balance-sheet activities escape capital requirements
  - Allows regulatory arbitrage
    - Banks are able to increase their asset risk without changes in the ratio

# OBJECTIVES of CAPITAL ADEQUACY:

- Development of more internationally uniform prudential standards for the capital required for banks' credit, market and operational risks : more capital for greater risk-taking.
  - Promote convergence of national capital standards , removing the competitive inequalities among internationally active banks;
  - Develop a more meaningful link between banks on- and off- balance sheet risk exposures and their capital support;
  - Enhance market discipline through better information about banks' risk profiles, risk measurement techniques and capital;
  - Develop a framework that was adaptive to rapid financial innovation.
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# History of Basel capital requirements:

- 1988 – Adoption of Basel I capital standards:
    - Covered only credit risk;
    - Risk depends on OECD/non-OECD
  - 1998 – Market risk coverage
  - 2006 – Operation risk coverage
  - 2007 – Basel II capital standards
  - 2009 – Basel II.5 improvement of market risk
  - 2013 – Basel III post-crisis capital regulation
    - Built upon Basel 2
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# BASEL 2 (adopted in 2004 by G20)

## The new accord is based on 3 pillars:

- Pillar 1: Minimum capital requirements for credit risk, market risk and operational risk.
  - Pillar 2: Supervisory review of capital adequacy.
  - Pillar 3: Market discipline.
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# STRUCTURE OF BANK CAPITAL:

**TIER 1 =** Issued and fully paid common stocks  
**(CORE CAPITAL)** + Non-cumulative perpetual preferred stocks  
+ Retained earnings  
+ Minority interest in equity accounts of  
consolidated subsidiaries  
+ Disclosed reserves

**Deductions:** – Goodwill  
– Increase in equity capital resulting from a  
securitization exposure

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# STRUCTURE OF BANK CAPITAL:

**TIER 2 (SUPPLEMENTARY CAPITAL) =**

- + Cumulative perpetual preferred stocks
- + Undisclosed Reserves
- + Asset Revaluation Reserves
- + General Loan Loss Reserves
- + Hybrid (Debt/Equity) Capital Instruments
- + Subordinated long-term debt

**Other Deductions: 50% from Tier 1 and 50% from Tier 2 capital:**

- Investments in unconsolidated subsidiaries engaged in banking and financial activities;

**TIER 3 (to cover market risk only) = subordinated short-term debt**

**TOTAL CAPITAL = TIER 1 + TIER 2 + Tier 3 - Deductions**

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# MINIMUM RATIOS:

## LIMITS AND RESTRICTIONS:

- Tier 2 capital cannot exceed Tier 1 capital (maximum split is 50/50);
- Tier 3 capital cannot exceed 250% of Tier 1 capital;
- Subordinated long-term debt is limited to 50% Tier 1 capital;
- Amount of loan loss reserves (Tier 2) is limited to 1.25% of risk adjusted assets;
- Asset revaluation reserves are subject to a discount of 55% to the difference between the historic book value and market value.

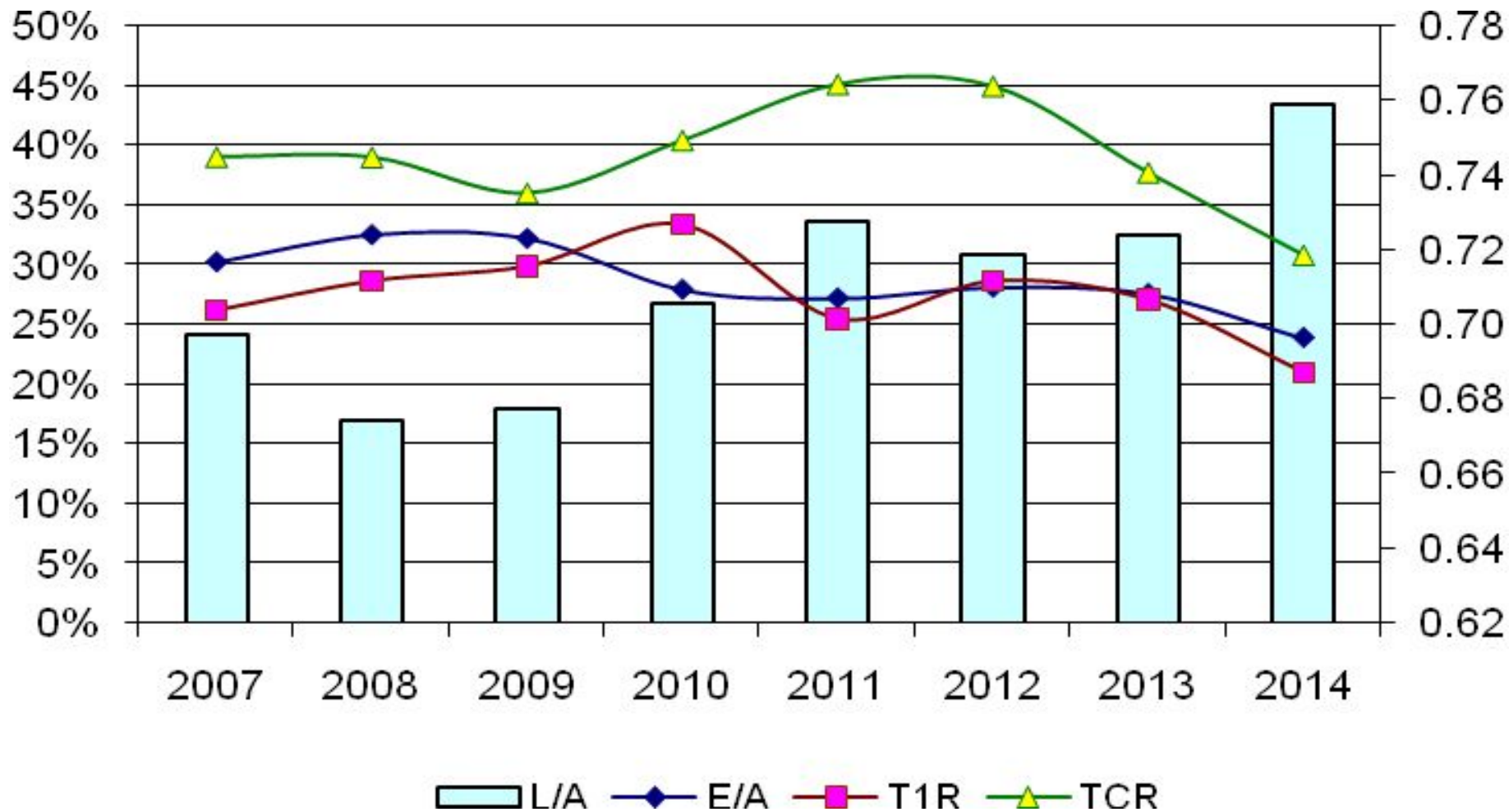
- **Tier 1 capital ratio** = 
$$\frac{\text{Tier 1 capital}}{\text{Total Risk – Weighted Assets}} \geq 4\%$$
  
(Credit risk + Market risk + Operational risk)
  - **Total capital ratio** = 
$$\frac{\text{Tier 1 + Tier 2 + Tier 3}}{\text{Total Risk – Weighted Assets}} \geq 8\%$$
  
(Credit risk + Market risk + Operational risk)
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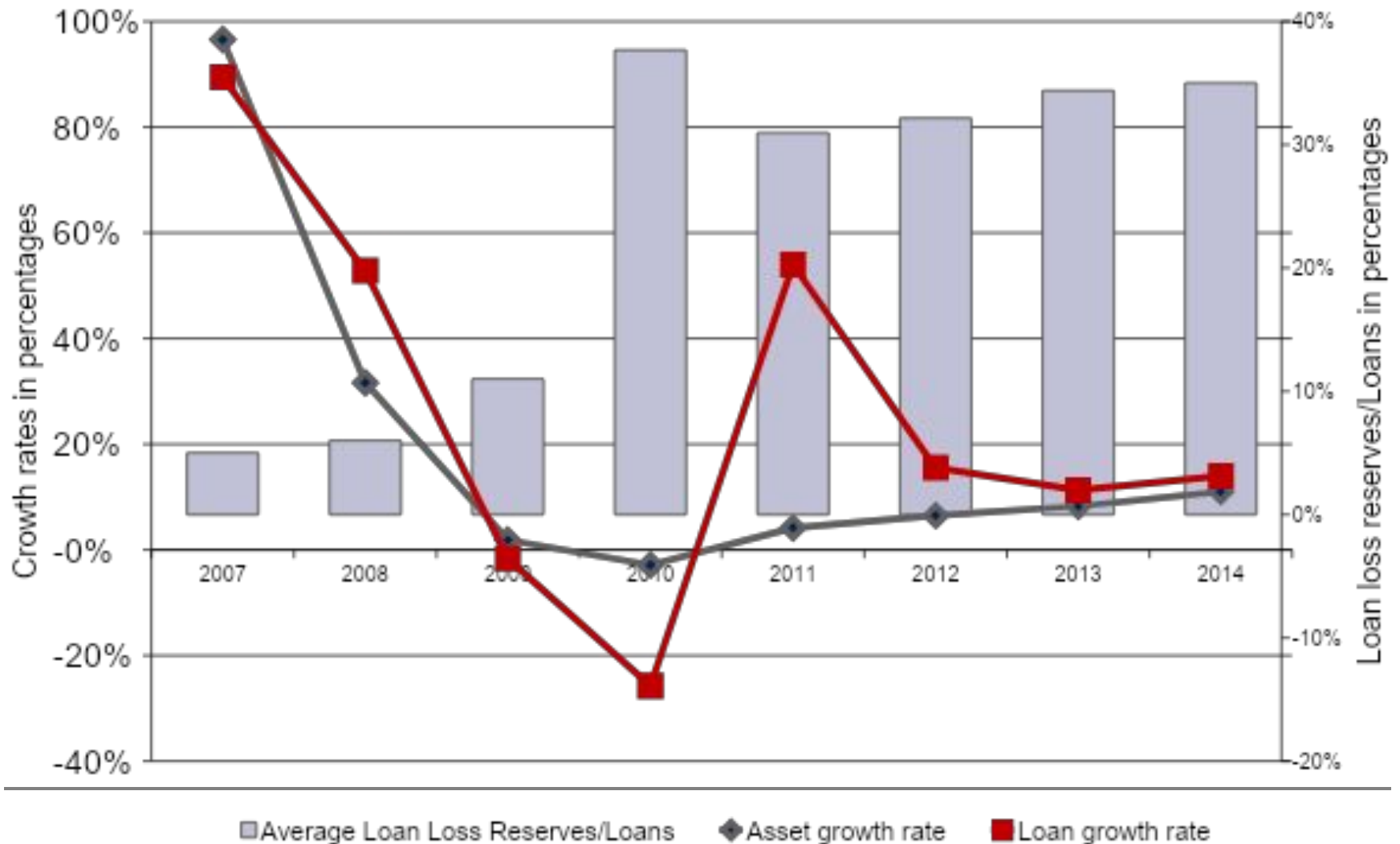
# Capital ratios of Kazakhstani banks

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# Average leverage ratios of Kazakhstani banks

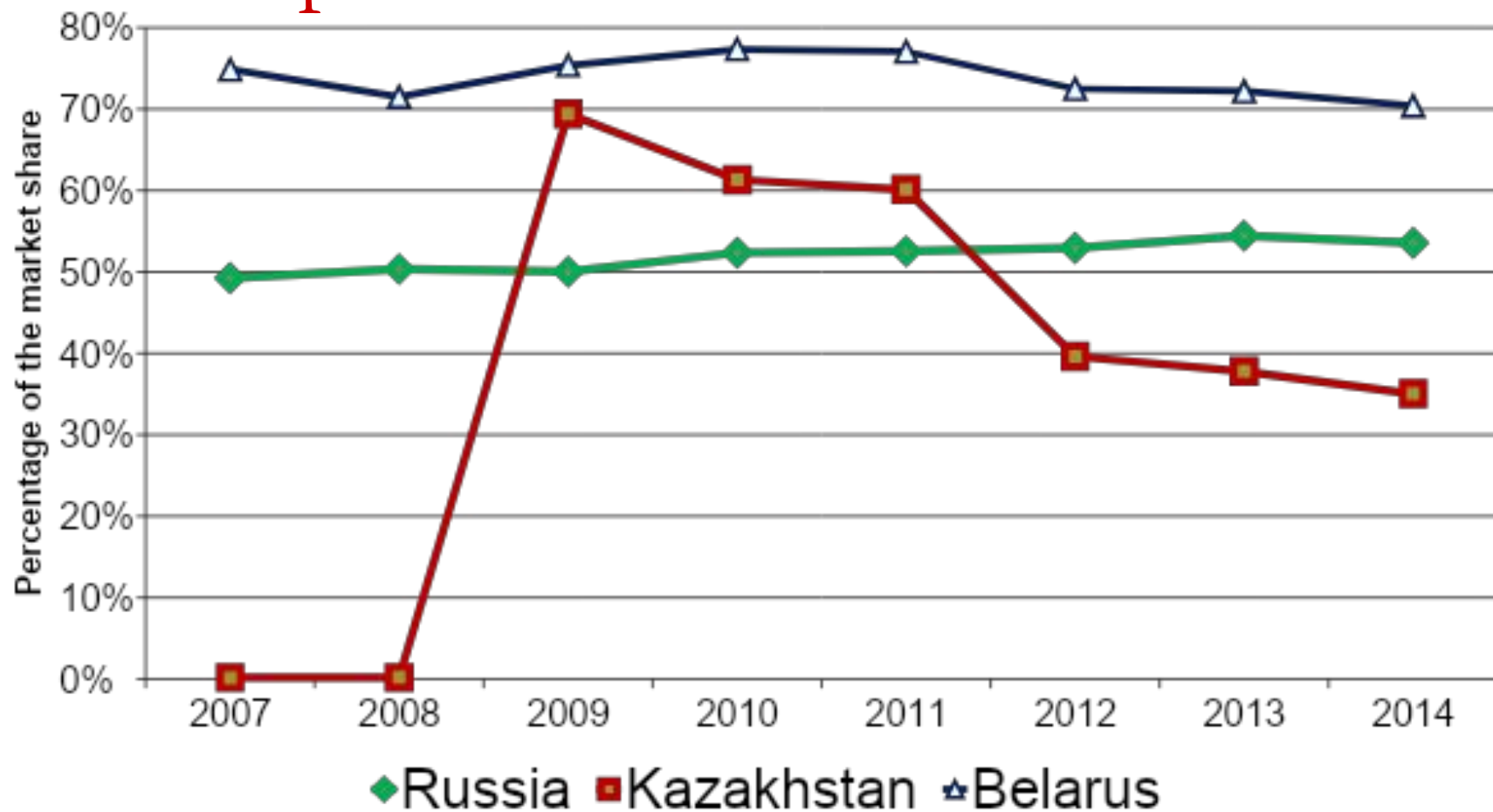


# Growth in assets, loans and Loan loss provisions of Kazakhstani banks





# Percentage of State in the ownership of bank capital



# RISK WEIGHTED ASSETS

- Total Risk-weighted Assets (TRWA) are determined by multiplying the capital requirements for market risk and operational risk by 12.5 (in Kazakhstan we apply 8.3 for banks and 10 for bank holding) and adding the resulting figures to the sum of risk-weighted assets for credit risk.
- Approaches to measure risks:

<b>Credit risk</b>	<b>Operational risk</b>
1. Standardized Approach	1. Basic Indicator Approach
2. Internal Rating Based Approach: a. Foundation IRB b. Advanced IRB	2. Standardized Approach 3. Advanced Measurement Approach

# ESTIMATION OF RISK WEIGHTED ASSETS FOR CREDIT RISK: Standardized approach

$$\mathbf{R.W. ASSETS} = \mathbf{R.A.B/S ASSETS} + \mathbf{R.A. Off B/S ASSETS}$$

$$\mathbf{R.W. B/S ASSETS} = \sum_{i=1}^n \mathbf{Risk Weight}_i \times \mathbf{Asset amount}_i$$

**R.W.Off B/S ASSETS:**

1)  $\mathbf{Amount}_j \times \mathbf{Convergent factor}_j = \mathbf{Credit Equivalent Amount}_j \text{ (CEA}_j\text{)}$

2)  $\mathbf{R.A.Off B/S ASSETS} = \sum_{j=1}^m \mathbf{CEA}_j \times \mathbf{Risk Weight for B/S Assets}$

$$\mathbf{R.W. ASSETS} = \sum_{i=1}^n \mathbf{RW}_i \times \mathbf{A}_i + \sum_{j=1}^m \mathbf{CEA}_j \times \mathbf{RW}_j$$

# Standardised approach (use outside credit rating)

- On Balance sheet assets are allocated into weighting bands according to ratings of rating agencies separately for sovereign, interbank and corporate exposures.
- For sovereigns and their central banks the following risk weights are proposed:

<b>Credit Assessment</b>	<b>AAA to AA-</b>	<b>A+ to A-</b>	<b>BBB+ to BBB-</b>	<b>BB+ to B-</b>	<b>Below B-</b>	<b>Unrated</b>
<b>Risk Weights</b>	0%	20%	50%	100%	150%	100%

- For corporate lending and claims on insurance companies:

<b>Credit Assessment</b>	<b>AAA to AA-</b>	<b>A+ to A-</b>	<b>BBB+ to BB-</b>	<b>Below BB-</b>	<b>Unrated</b>
<b>Risk Weights</b>	20%	50%	100%	150%	100%

## EXAMPLE: Step 1. Calculate Risk-Weighted on-Balance Sheet Assets

- Each bank assigns its assets to one of five categories of credit risk exposure:

<b>Asset category (%)</b>	<b>Balance sheet assets (\$ mill)</b>	<b>Risk Weighted assets (\$ mill)</b>
0	5	0
20	40	8
50	15	7.5
100	30	30
150	20	30
<b>Total</b>	<b>110</b>	<b>75.5</b>

Step 2. Calculate Credit Equivalents for Off-Balance sheet Items other than OTC Interest Rate and Foreign Exchange Contracts.

Off balance sheet assets	Nominal amount	Conversion factor	Credit equivalent	Risk weight for Assets	Risk Weighted off B/S assets
Direct credit substitute to "A-" corporation	30 x	1.00 =	30 x	50% =	15 \$mil
Commercial L/C to BBB corporation	40 x	0.20 =	8 x	100% =	8 \$mil
<b>Total</b>	<b>70</b>		<b>38 \$mil</b>		<b>23 \$mil</b>

## Step 3. Calculate Credit Equivalents for OTC Interest Rate and Foreign Exchange Contracts.

Interest rate contracts	Exchange rate contracts	Exclusion
Single currency interest rate swap Forward rate agreement Interest rate options purchased	Cross currency interest rate swap Forward foreign exchange contracts Foreign currency options purchased	Spot foreign exchange contract Futures and Options traded on organized exchanges and marked to market daily

- Credit conversion factors for Interest Rate and Foreign Exchange Contracts in calculating potential exposure

Remaining maturity	Interest rate contracts	Exchange rate contracts
1 year or less	0	1%
1 – 5 years	0.5%	5%
Over 5 years	1.5%	7.5%

Off balance sheet assets	Nominal amount \$mil x	Potential exposure Conversion factor =	Potential Exposure \$ mil +	Current Exposure \$ mil =	Credit Equivalent Amount x	Asset Category =	Weighted Assets \$ mill
4 year fixed/floating interest rate swap	100	0.005 =	0.5 +	3 =	3.5	100% = (accepted under Basel 2)	<b>3.5</b>
2 year forward foreign exchange	40	0.05 =	2 +	(-1) = We take it as 0	2	100% =	<b>2</b>
							<b>5.5</b>

## Step 4. Total Risk Weighted assets

Risk-Weighted assets for credit risk = 75.5 \$ mill + 23\$ mill + 5.5\$ mill = 104 \$ mill

Total Risk –weighted assets = 104 + 12.5 (capital required to cover market risk and operational risk)



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## Example continued:

Calculate the minimum capital ratios if:

Tier 1 = 9\$ mill , Tier 2 = 7\$ mill , Tier 3 = 16

Capital chargers for market risk is 8\$ mill and for operational risk is 6\$ mill.

$$\text{Step 4. TRWA} = 104 + 12.5(8+6) = 279$$

$$\text{Step 5. Tier 1 ratio} = 9/279 = 3.22\%$$

$$\text{Total ratio} = 32/279 = 11.47\%$$

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# Internal rating based approach (foundation and advanced)

- Banks will be allowed to use their internal estimates of borrower creditworthiness to assess credit risk in their portfolios.
  - Distinct analytical frameworks will be provided for different types of loan exposures.
  - The IRB approach relies on four quantitative inputs:
    - Probability of default (PD) = likelihood that a borrower will default over the given time horizon;
    - Loss Given Default (LGD) = the proportion of the exposure that will be lost if a default occurs;
    - Exposure at Default (EAD) = the amount of the loan that will be lost if a default occurs;
    - Maturity (M) = remaining economic maturity of the exposure.
  - Granularity scaling factor – higher capital will be required for more concentrated books than average.
  - For Retail loans there is only a single advanced IRB approach (no foundation alternative) and banks will set all inputs.
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**Foundation and advanced approaches differ primary in terms of inputs that are provided by banks or supervisors:**

<b>Data Input</b>	<b>Foundation IRB</b>	<b>Advanced IRB</b>
<b>PD</b>	Provided by bank based on own estimates	Provided by bank based on own estimates
<b>LGD</b>	Supervisory values set by the Committee	Provided by bank based on own estimates
<b>EAD</b>	Supervisory values set by the Committee	Provided by bank based on own estimates
<b>M</b>	Supervisory values set or At national level provided by banks	Provided by bank based on own estimates

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# MARKET RISK (adopted in 1998)

- April 1995, the Basel Committee announced amended proposals for the treatment of market risk. According to this the following rules for the market risk were accepted:
- Banks have choice in the computation of market risk: either they can employ the Basel building block method, or they can use their own models.
- The internal model is Value at Risk, the worst potential loss with 99% confidence level over a 10 day period.
- BIS requires banks to have additional capital beyond :

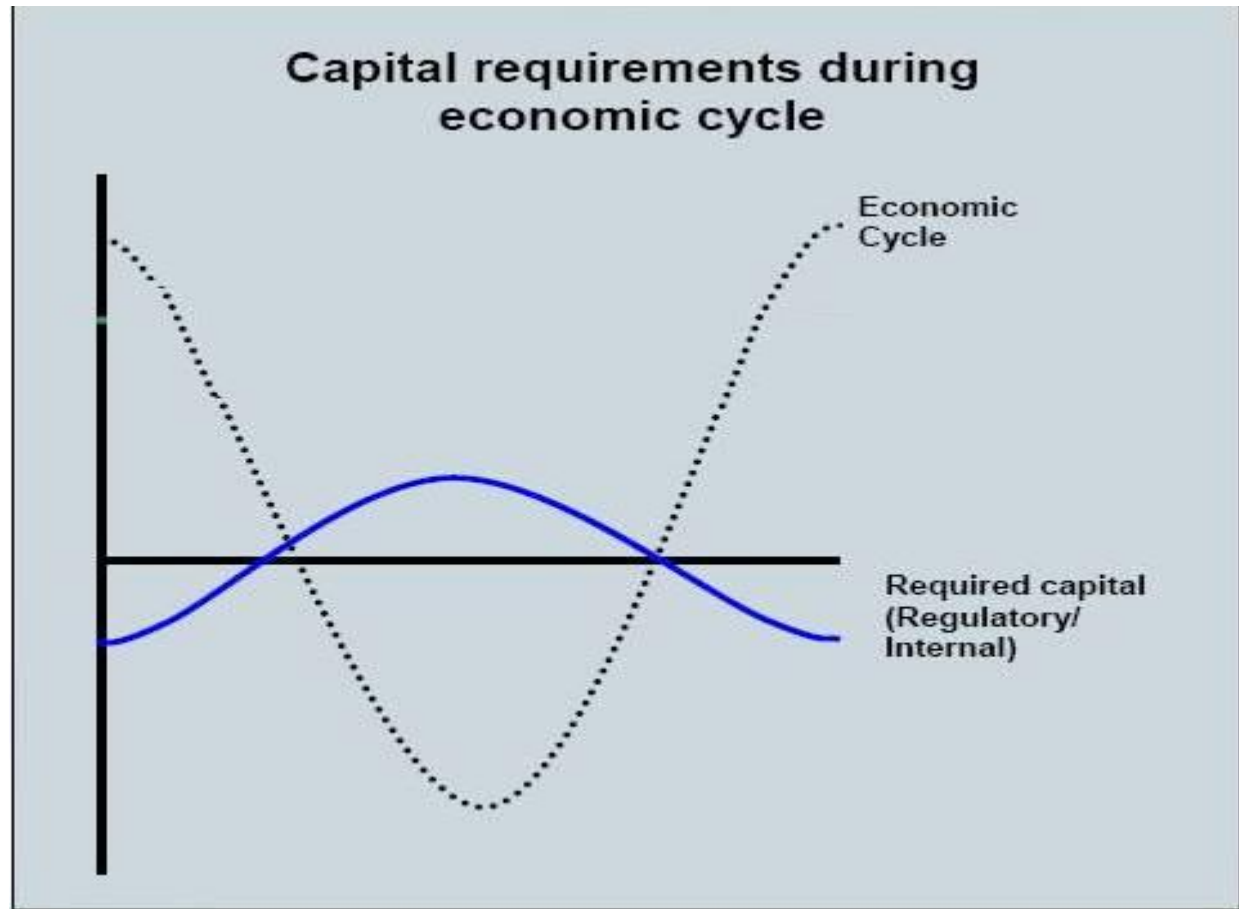
Previous day's VAR  $\times \sqrt{10}$

Average Daily VAR over previous 60 days  $\times$  a factor with min 3

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# The pro-cyclicality of the VaR requirements

VaR to “an airbag that works all the time, except when you have a car accident.”



# What is Stressed VaR?

- The new component of stressed VaR is defined by the highest:
  - Each latest available stressed VaR number ( $sVaR_{t-1}$ )
  - An average of the stressed VaR measures over the preceding sixty (60) days ( $sVaR_{avg}$ ) multiplied by a multiplication factor  $m_s$

$$C_{sVaR} = \max\{sVaR_{t-1}; m_s \cdot sVaR_{avg}\}$$

# Definition of Operational Risk

- Risk of loss resulting from:
  - inadequate or failed
    - **internal processes**
    - **people**
    - **systems**
  - or from **external events**
- includes legal risk
- excludes strategic and reputational risk

Includes, but not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements

# Basel II Pillar 1 – Operational Risk

## Basic Indicator Approach

- Capital = Bank's Total Gross Income \*  $\alpha$
- $\alpha = 15\%$

## Standardised Approach

- Break into business lines each with a  $\beta$  factor
- e.g. Corporate finance :  $\beta = 18\%$
- Retail banking :  $\beta = 12\%$

## Advanced Measurement Approach

- Internal Measurement Approach
- Loss Distribution Approach
- Scorecard Approach
- Scenario Analysis



# Basic Indicator Approach (BIA)

1. Banks using the BIA must hold capital for operational risk equal to the average over the previous three years of a fixed percentage (a factor  $\alpha = 0.15$  set by the Committee) of positive annual gross income.
2. Figures for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average.

$$K_{\text{BIA}} = [\sum (\text{GI}_{1-3} \times \alpha)] / 3$$

□ Gross Income (GI) = net interest income + net non-interest income

3. In Kazakhstan  $\alpha = 0.12$  (and  $\alpha = 0.1$  for a bank that is a subsidiary of the banking holding company)

# A Standardised Approach (SA)

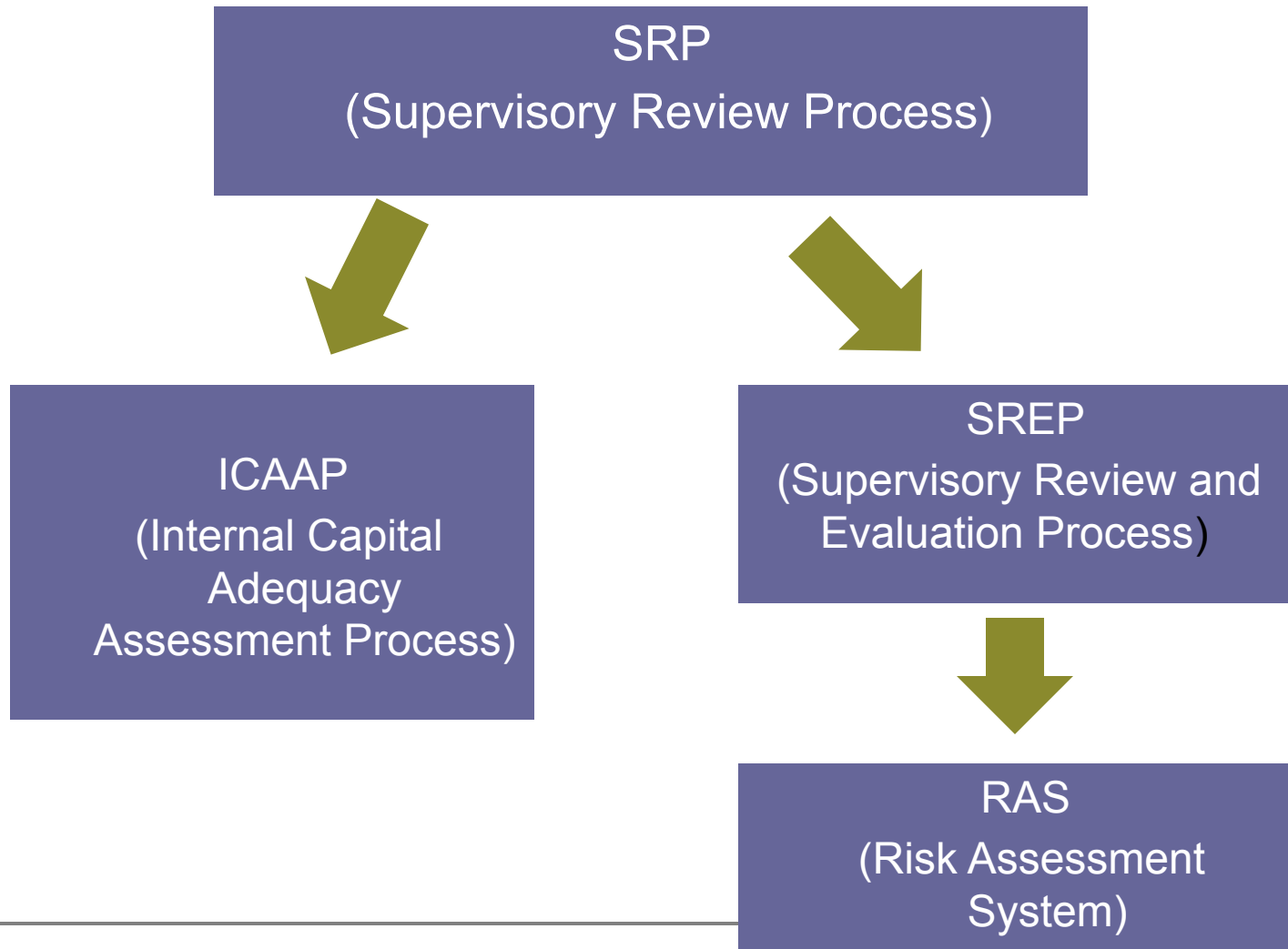
1. In the SA, banks' activities are divided into eight business lines and different risk indicators ( a factor  $\beta$  set by Committee for each line) are set for different lines of business.
2. Capital charge for each business line is computed by multiplying a factor  $\beta$  for each line by the gross income for that business line, then summing.
3. Total capital charge is calculated as the three year average of the capital charges across each business lines in each year.
4. Note that the negative capital charges (resulting from negative gross income) in any business line may offset positive capital charges in other business line without limit.

$$K_{SA} = \left\{ \sum_{\text{years } 1-3} \max[\sum (GI_{1-8} \times \beta_{1-8}), 0] \right\} / 3$$

The values of betas are detailed below:

- Corporate finance, trading and sales, payment and settlement – 18%;
- Commercial banking, agency services – 15%
- Retail banking, asset management, retail brokerage – 12%

# PILLAR 2: Supervisory Review



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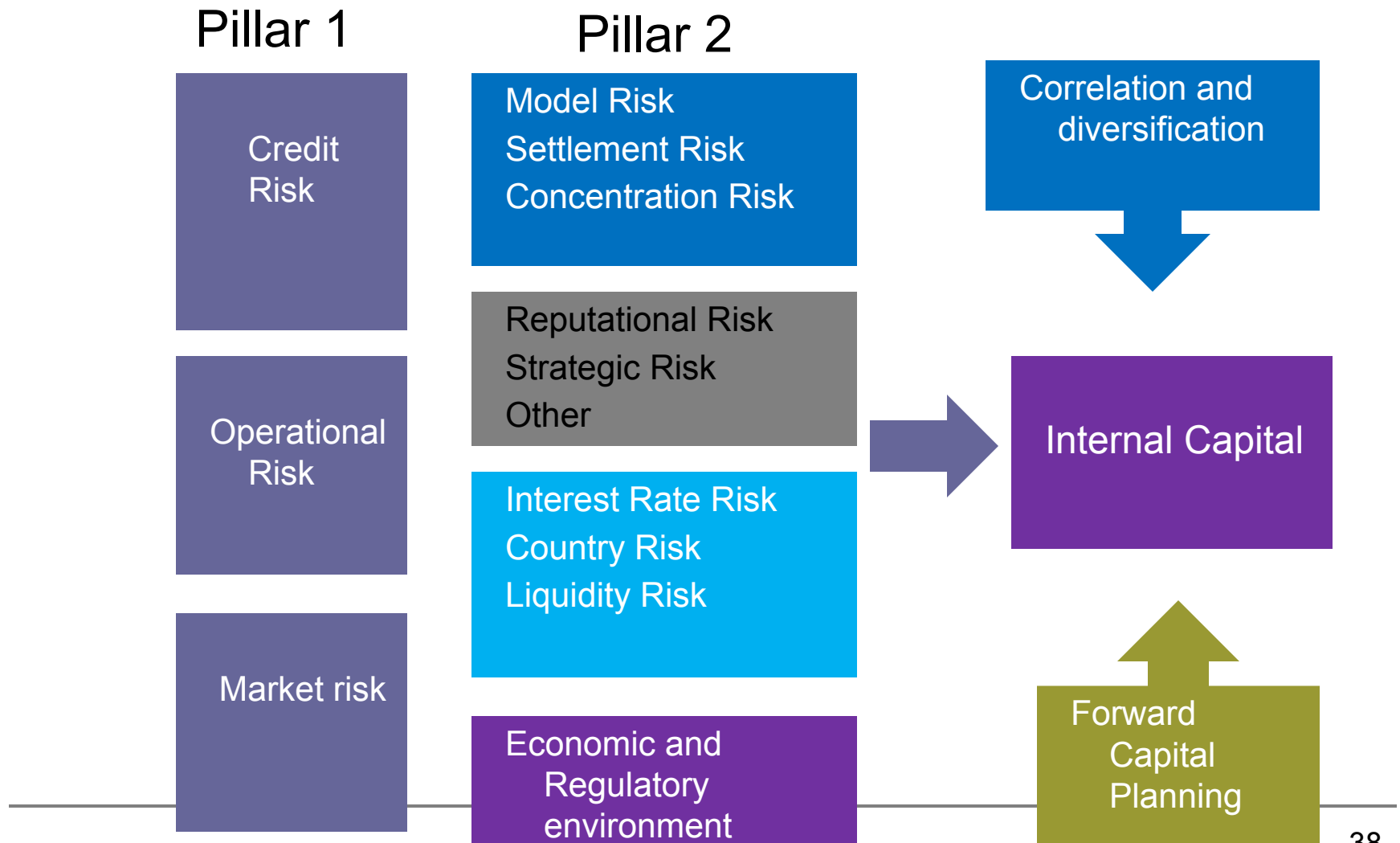
# PILLAR 2: Supervisory Review

## 4 Key Principals of Supervisory Review:

- Banks are required to have a process for assessing their capital adequacy based on a thorough evaluation of their risk profile.
  - Supervisors would be responsible for evaluating how well banks assess their capital adequacy needs relative to the risk.
  - Supervisors should expect banks to operate above the minimum regulatory capital ratios.
  - Supervisors should intervene at an early stage to prevent capital falling below the minimum level required.
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- The supervisory review process is intended not only to ensure that banks have adequate capital to support all the risks in their business, but also to encourage banks to develop and use better risk management techniques in monitoring and managing their risks.
  
  - Note that there are some areas of risks that are not covered by the Pillar 1. Supervisors and banks are required to focus on these risks as well.
  
  - Pillar 1 does not cover:
    - the credit concentration risk;
    - interest rate risk of banking book;
    - business and strategic risk;
    - the business cycle effect.
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# Internal Capital Adequacy Assessment Process



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## **PILLAR 3: Market discipline**

- The goal is to encourage market discipline through the enhanced disclosure by banks.
  - Effective disclosure (quantitative and qualitative) is essential to ensure that market participants can better understand bank's risk profiles and the adequacy of their capital positions.
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# Information to disclosure should include:

- Capital structure and bank's approach to assess the capital adequacy of capital, capital ratios;
  - Risk exposure and assessment:
    - Credit risk, credit risk mitigation, counterparty credit risk;
    - Securitization;
    - Market risk;
    - Operational risk
    - Equities: disclosure for the banking book positions;
    - Interest rate risk in the banking book.
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# Problems with Basel 2 revealed by the financial crisis 2007

- Supervisory capital ratios were *not sufficiently forward looking* and based on credit risk estimated from current bank accounts.
    - It led to the understatement of provisions for loan losses and to overstatement of bank asset values and bank capital (Furlong and Knight, May 24, 2010).
  - Capital regulation estimated the bank risks under the *normal economic* conditions and did not consider the cyclicity of the economy.
  - *Systemically important* financial institutions were exposed to greater risks due to the interconnectedness of their transactions.
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# BASEL III

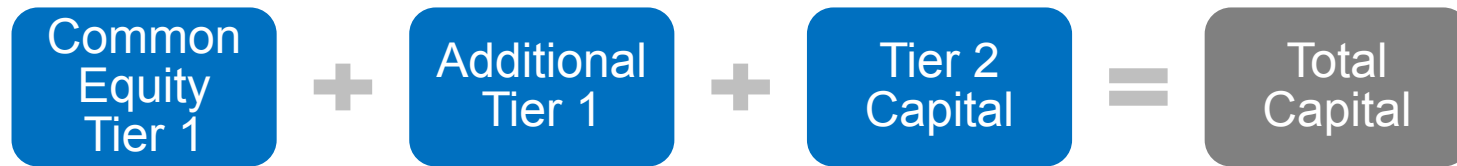
- On 12th of November 2010 the G20 leaders officially endorse the Basel III framework at the Seoul Summit:
    - Implementation deadline starts: January 1, 2013
    - Completion of the implementation: January 1, 2019
  - Basel 3 is the reaction to the Financial Crisis 2007
  - Basel 3 is based on Basel 2 regulation but has greater requirements for bank capital
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# A. Comparison of Basel 2 and Basel 3 capital definitions

BASEL 2	Basel 3
No common equity Tier 1 capital (CET)	Common equity Tier 1 capital = (common stocks + retained earnings)
No leverage ratio (LR)	LR = $\frac{\text{Core Tier 1 capital}}{\text{Risk adjusted assets}} > 4.5\%$
Tier 1 ratio > 4%	Tier 1 ratio > 6%
Tier 2 capital (T2)	Tier 2 capital
Tier 3 capital (T3)	No Tier 3 capital
TCR = $(T1+T2+T3) / RWA > 8\%$	TCR = $(T1+T2) / RWA > 8\%$

**Core Tier 1 Capital Ratio (Common Equity after deductions) :**  
**Before 2013 = 2% → 1st January 2013 = 3.5% → 1st January 2014 = 4%**  
 →  
**1st January 2015 = 4.5%**

# Basel III squeezes capital



- Predominant form of Tier 1 capital should be common equity
  - Common equity = common shares and retained earnings
- Tier 3 capital will be eliminated
- Capital requirements:
  - **Common Equity Tier 1 Capital Ratio = min 4.5%**
  - **Tier 1 Capital Ratio = min 6%**
  - **Total Capital ratio = min 8%**

## B. Capital Conservation buffer



- The purpose of the conservation buffer is to ensure that banks maintain a buffer of capital that can be used to absorb losses during periods of financial and economic stress.

Banks will be required to hold a capital conservation buffer as 2.5% from Common Equity Tier 1 capital

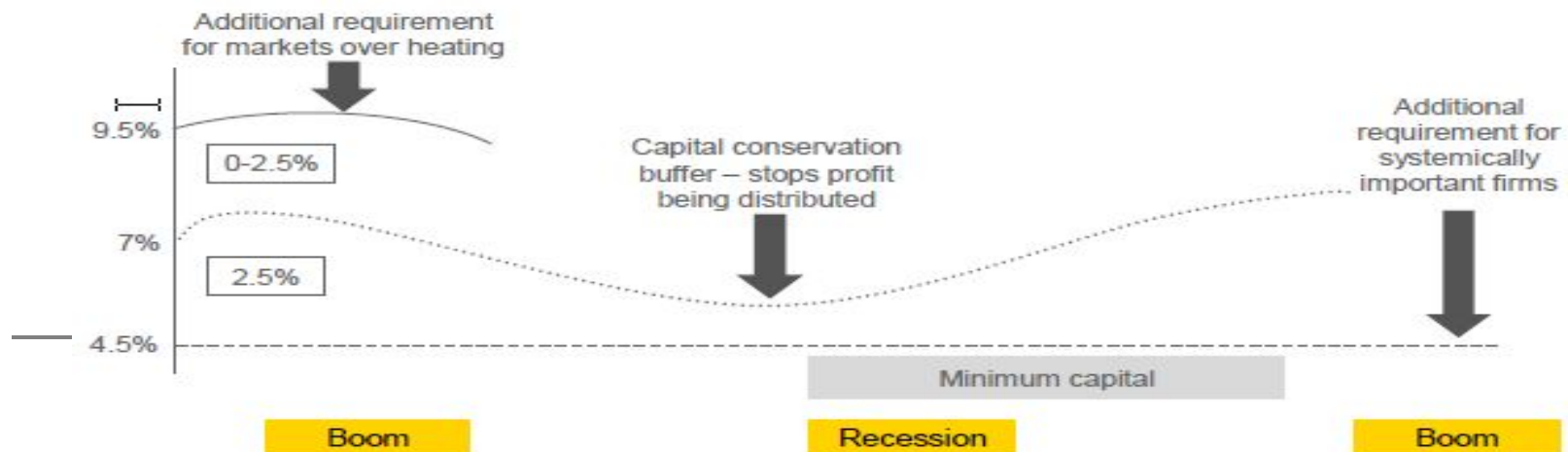
Capital Conservation Buffer before 2016 = 0%

1st January 2016 = 0.625%, 1st January 2017 = 1.25%,

1st January 2018 = 1.875%, 1st January 2019 = 2.5%

# C. Countercyclical capital buffer

- Countercyclical buffer
  - An extension of conservation buffer
  - Imposed by national authority to curb excessive credit growth
  - To ensure to cover also macro-economic environment
  - The buffer will range between 0 to 2.5 % of RWAs
  - Calculation and publically disclosed with same frequency as minimum capital requirement



# C. Countercyclical Capital Buffer

- **BASEL II:**

There is no Countercyclical Capital Buffer

- **BASEL III:**

A countercyclical buffer within a range of 0% – 2.5% of common equity or other fully loss absorbing capital will be implemented according to national circumstances.

- The buffer will be phased in from January 2016 and will be fully effective in January 2019.
- Countercyclical Capital Buffer before 2016 = 0%,  
1st January 2016 = 0.625%, 1st January 2017 = 1.25%,  
~~1st January 2018 = 1.875%, 1st January 2019 = 2.5%~~

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# Capital for Systemically Important Banks only

- **Systemically important banks should have loss absorbing capacity beyond the standards.**
  - Range from 1% to 2.5% of RWA
  - Implemented as an extension of the capital conservation buffer
  - Phased in from 2016 to 2018