INTRODUCTORY BANKING

Lecture and Tutorial 11 – Bank regulation and capital

Jana Juhászová

Institute of Economic Studies, Faculty of Social Sciences,
Charles University in Prague, Czech Republic

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Content

Global and local regulators

BASEL Committee on Banking Supervision

BANK FOR INTERNATIONAL SETTLEMENTS

WORLD BANK GROUP

OICV-IOSCO
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS

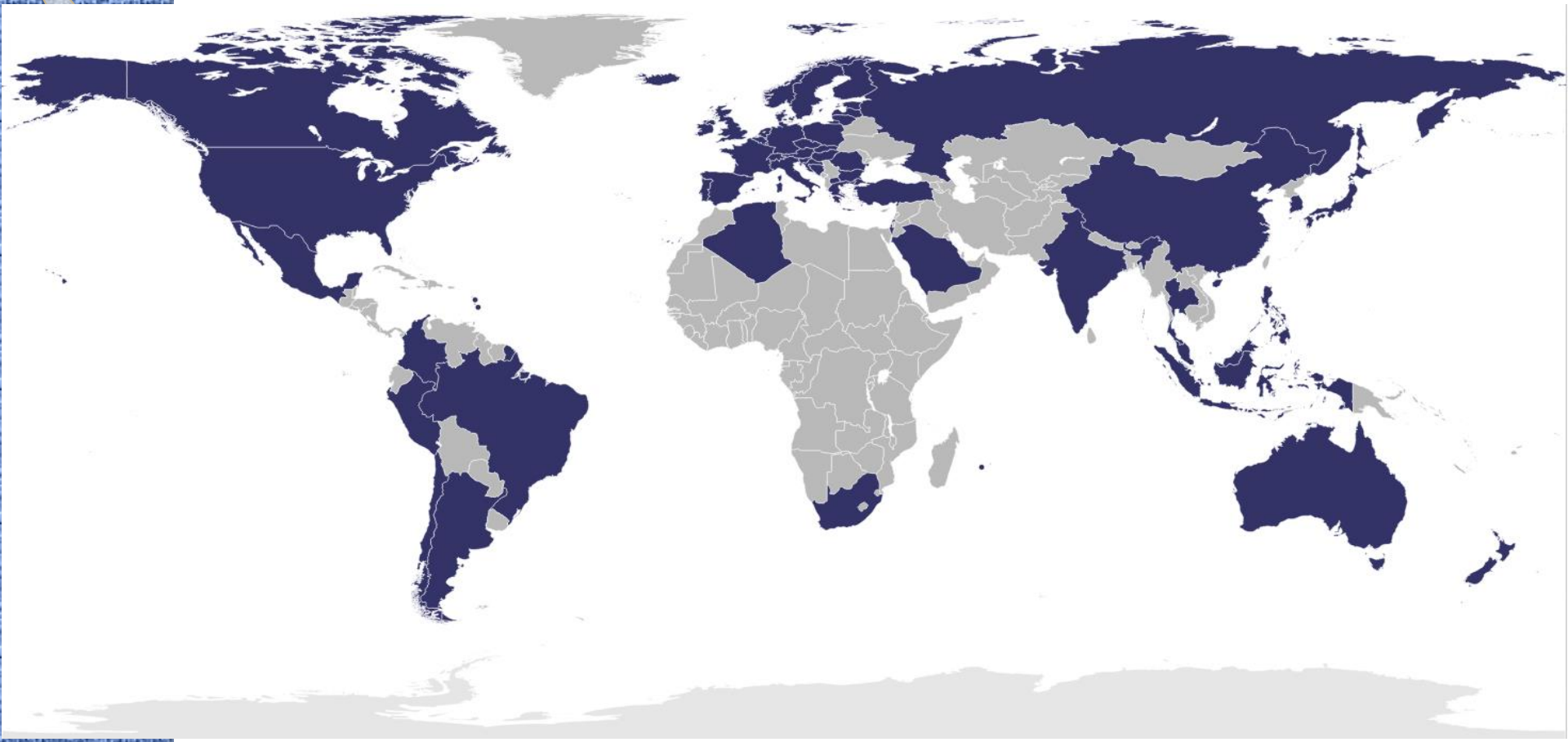
UNITED STATES FEDERAL RESERVE SYSTEM

ČNB ČESKÁ NÁRODNÍ BANKA

INTERNATIONAL MONETARY FUND

EUROPEAN CENTRAL BANK

BCBS banking regulation acceptance



Quiz: Is bank regulation good or bad?

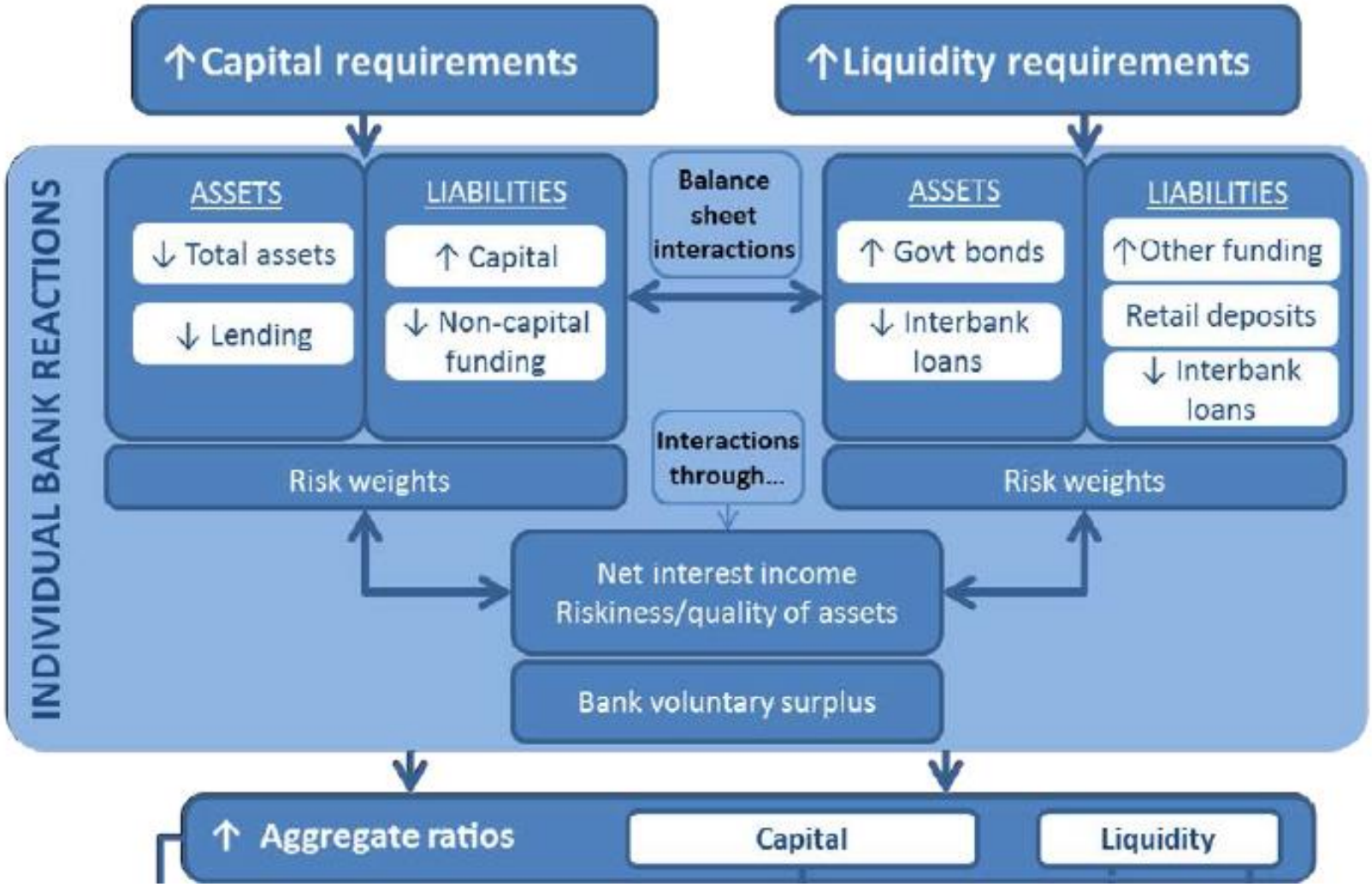
- In answering this question we must assess the long-term economic impact (LEI) – what are the long term expected benefits vs. long-term economic costs (lost output of an economy) should a systemic banking crisis occur.

- **In considering this we must perform a sort of stress-testing and assume worst outcomes – overestimate costs and underestimate benefits. Then we calculate the difference.**

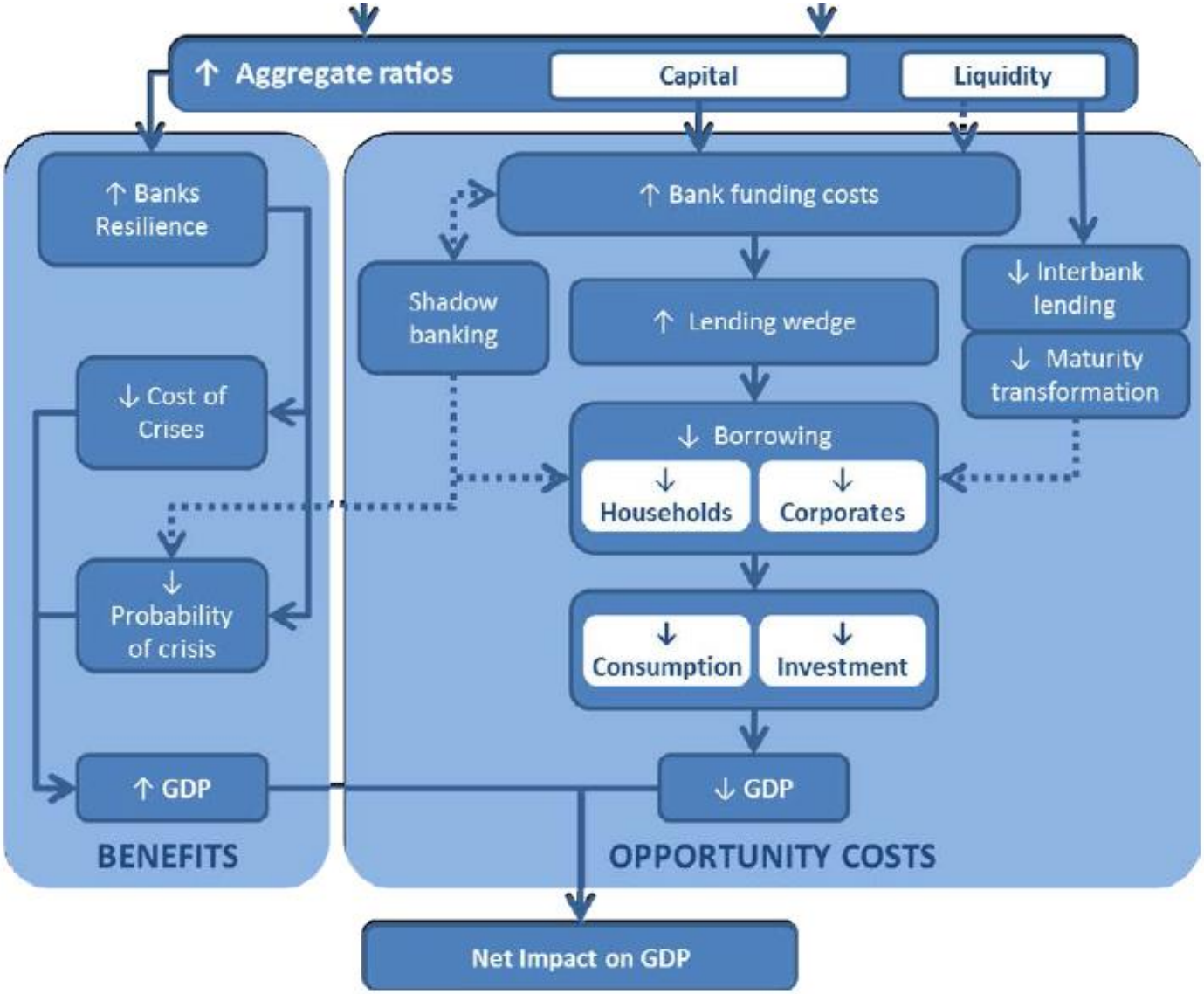
European system of regulators

Source: Annual Report 2011, European Systemic Risk Board

Capital requirements and economic activity



Capital requirements and economic activity (2)

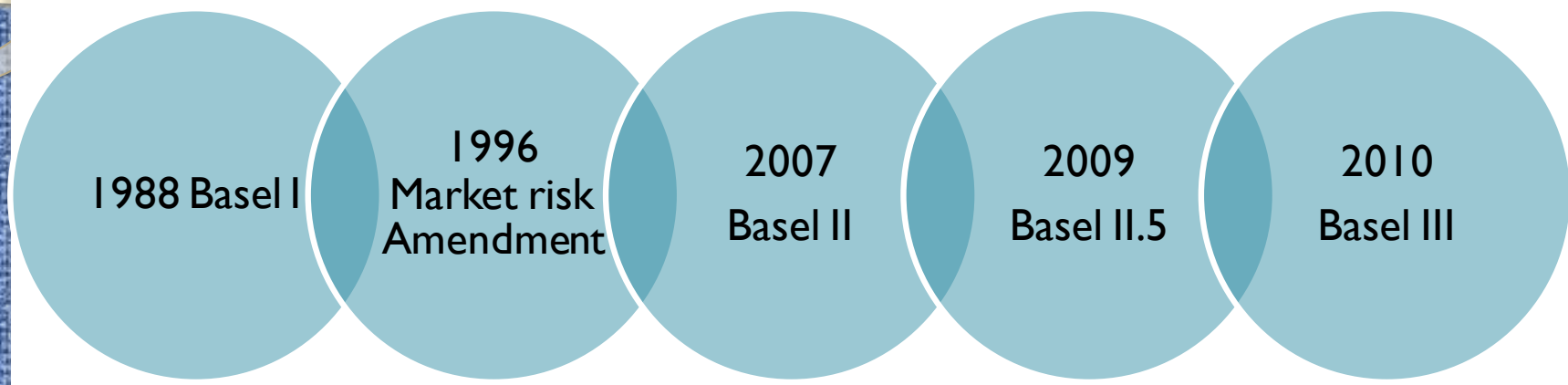


Basel Implementation

- Basel Accords are only recommendations (global standards), but today they are widely accepted by more than 100 countries.
- The EU transforms the Basel rules through directives and regulations that are being adopted by EU member countries, including the Czech Republic.
- In the EU Basel III has been implemented through
  a) in 2013: Capital Requirements Regulation*,
     Capital Requirements Directive**,
     commonly known as Capital Requirements Directive IV (CRD IV)
  a) in 2019: CRR II and CRD V (the European banking package of June 2019)

*Regulation (EU) No 575/2013 of the European Parliament and of the Council (2013)
** Directive 2013/16/EU of the European Parliament and of the European Council (2013)

Development of Basel Accords



Basel I included *Credit risk* later amended for *Market risk*

Basel II included Credit risk, market risk and *Operational risk*

Basel III included Credit risk, market risk, Operational risk and *Liquidity risk*

A set of currently valid standards available at the BIS website:
https://www.bis.org/basel_framework/

BANK FOR INTERNATIONAL SETTLEMENTS

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Basel I

- The basic framework of bank regulation is set by the Basel Committee on Banking Supervision (**BCBS**), a G-20+ committee and standard-setter, with its secretariat hosted by the Bank for International Settlements (**BIS**).
- The BIS is often known as "a bank of central banks", with a mission to serve central banks in their pursuit of monetary and financial stability, and to foster international cooperation in those areas.
- The BCBS is the primary global standard setter for the prudential regulation of banks and provides a forum for regular cooperation on banking supervisory matters. Its 45 members comprise central banks and bank supervisors from 28 jurisdictions.
- The BIS is located in Basel, Switzerland, therefore global banking standards are called "**Basel" Accords.**

Basel I – Key objectives

1. To assure the stability ("safety and soundness") of the international banking system with focus on Credit risk.
2. To safeguard a level-playing field for internationally active banks (the same capital requirements for all global banks).

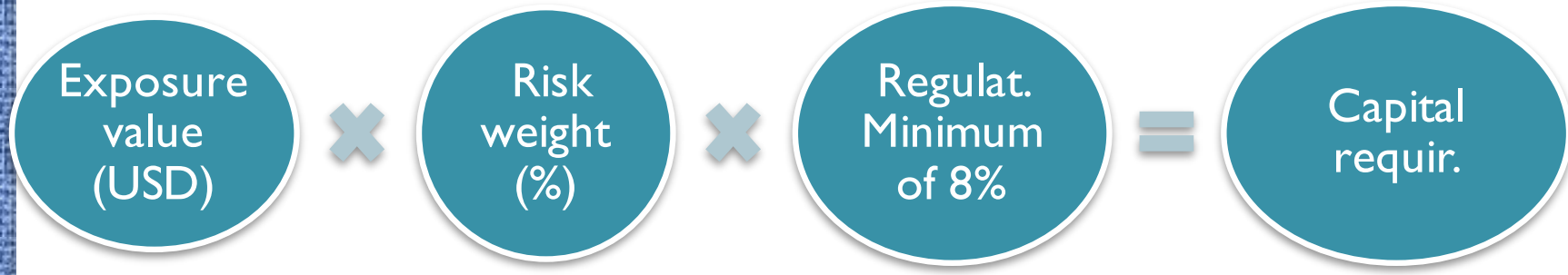
These objectives were reflected into the following requirements:

1. Classification of assets into risk-weight categories.
2. Minimal capital ratio against risk-weighted assets (RWA) of 8%.

$$\text{Capital Adequacy Ratio (CAR)} = \frac{\text{regulatory capital}}{\text{risk-weighted assets (RWA)}}$$

Basel I – Key objectives

0% Risk Category	10% Risk Category	20% Risk Category	50% Risk Category	100% Risk Category
• Cash, government debt, central bank debt, and the debt of governmental departments or organizations	• Central bank debt of countries with high inflation in the recent past	• Development bank debts, OECD bank debt, non-OECD bank debt under one year of maturity, and non-OECD public sector debt	• Residential mortgages	• Private sector debt, non-OECD bank debt with maturity over a year, real estate, plant and equipment, and capital instruments issued at other banks.



Basel I – Example (Credit risk)

A bank holds an asset in this case we assume a mortgage on residential property in the amount of $100,000.
The prescribed risk weight of 50% is applied to mortgages on residential property (under Basel I).

Step I: The risk-weighted asset (RWA): $50,000
Step II: Calculation of the capital requirement
8% of 50,000 USD = 4,000 USD

Capital requirements for **other risks were** added within the 1996 Market Risk Amendment (**Market risk**) and 2007 Basel II (**Operational risk**).

Task I – Basel I

Basel I			
Item	Amount	RW	RWA
Loan to a large corporate (A+)	50,000,000		
Ministry of Finance bonds (domestic)*	20,000,000		
Deposit in the central bank	15,000,000		
Russian railways bond (C+)	45,000,000		
Loan to Vodafone (unrated)	52,000,000		
Government T-bills	5,000,000		
Loan commitment (30% is drawn, A rating - CCF 20%)	40,000,000		
Eligible residential loan (secured)	10,000,000		
Counterparty for IRS hedging trade	100,000,000		
Loan to a regulated firm	3,000,000		
Loan to a bank (B+)	50,000,000		
Total	**390,000,000**	**0%**	**0**

Short revision (1)

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Hint: You can also use your phone, there is no need to switch between browser windows, but the choice is entirely yours.

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Basel II – Key objectives

Was an extension of the regulations for minimum capital requirements as defined under Basel I. The Basel II framework operates under three pillars:

Pillar 1

- **Minimum Capital requirement** - Calculation of minimum capital requirement for credit, market and operational risk.

Pillar 2

- **Supervisory review process** - On and Off sight supervision by Central Bank to encourage banks to use better risk management techniques.

Pillar 3

- **Market discipline** - Bolster Market discipline through enhanced disclosure by banks to complement the requirements under pillar 1 and 2.

Basel II – Key objectives recap

Pillar I Defines RWA (CR, MR, OpR) either via Standardized approach (SA) or Internal Ratings Based method (IRB).

Pillar II Ensures continual contact between regulators and banks and assessment of risks on an individual basis.

Pillar III Ensures more extensive and detailed information on banks' capital requirements as well as methods of risk assessment.

Another innovation of Basel II is also the division of capital of banks to so-called TIERs. This enables the regulators to set additional requirements on the quality of capital that banks use to fulfill capital requirements.

Basel II – Standardized Approach (STA)

Banks can choose between

- **standardized approach** (STA, similar to Basel I),
- **internal-rating based approach** (IRB, a new concept).

Compared to Basel I, STA better accounts for the risk by basing the risk weight for sovereign, banks and corporates on a **credit rating.**

Rating of Entity	Risk Weights		
	Sovereigns	Banks	Corporates
AAA to AA-	0%	20%	20%
A+ to A-	20%	50%	50%
BBB+ to BBB-	50%	50%	100%
BB+ to BB-	100%	100%	100%
B+ to B-	100%	100%	150%
Below B-	150%	150%	150%
Unrated	100%	50%	100%

Basel II – Examples

- **Sovereign exposures** get a risk weight (RW) = 0%
  Capital adequacy (CAD) = 8%
  Exposure (E) = EUR 1,000,000,000
  CaR = RW x 8% x E = 0% x 8% x 1,000,000,000 = EUR 0
  Eligible mortgage loan (collateralized) get a "preferential" 35% RW rather than the standard 50%
- **Consumer loans** (incl. credit cards etc.): 100% RW
- Inclusion of **off-balance sheet items** with a "credit conversion factor" (CCF). For example, an undrawn commitment with original maturity of 6 months, has a 20% CCF
- An increased risk weight for residual (net) value of **non-performing (defaulted) loans** of 150% rather than 100% if not sufficiently provisioned for (less than 20%)
- SMEs get a preferential risk weight of 75%

Basel II – Examples (2)

	Basel I				Basel II (Standardized approach)			
	Nominal value (A)	Exposure value (B)	Risk weight (C)	RWA (D)=(B)*(C)	Nominal value (A)	Exposure value (B)	Risk weight (C)	RWA (D)=(B)*(C)
1. Sovereign bond with an A rating	1000	1000	0%	0	1000	1000	20%	200
2. Loan to a corporate, B rated, no collateral or guarantee	1000	1000	100%	1000	1000	1000	150%	1500
3. Loan to a corporate, BBB rated, no collateral or guarantee	1000	1000	100%	1000	1000	1000	100%	1000
4. Undrawn commitment, original maturity of 6 months, counterparty has an A rating	1000	0	100%	0	1000	200	50%	100
5. Loan to a corporate, B rated, past due 100 days, with specific provision of 10%	1000	900	100%	900	1000	900	150%	1350
6. Eligible residential mortgage loan	1000	1000	50%	500	1000	1000	35%	350
7. Term loan to a small company	1000	1000	100%	1000	1000	1000	75%	750
Total	7000	5900		4400	7000	6100		5250

Task II – Basel II Standardized Approach

Basel II / III STA			
Item	Amount	RW	RWA
Loan to a large corporate (A+)	50,000,000		
Ministry of Finance bonds (domestic)*	20,000,000		
Deposit in the central bank	15,000,000		
Russian railways bond (C+)	45,000,000		
Loan to Vodafone (unrated)	52,000,000		
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Loan commitment (30% is drawn, A rating - CCF 20%)	40,000,000		
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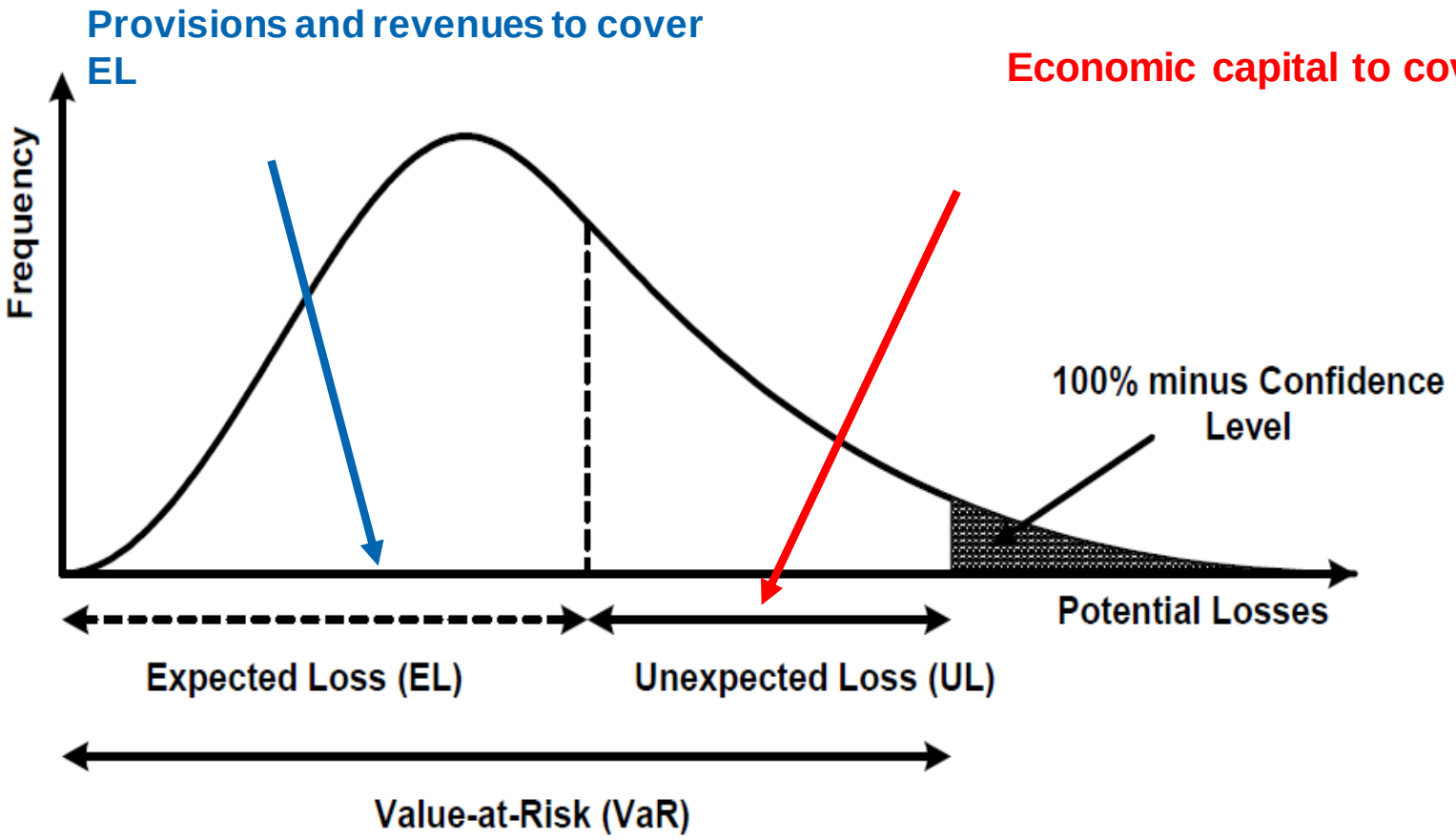
Total	**390,000,000**		

Basel II – IRB Approach

- IRB was introduced to bring capital regulation in line with prevailing credit risk management practices at banks.
- Banks were allowed to use their **risk management models** (after validation) to calculate capital requirements.
- IRB capital requirement based on an economic capital concept, using a portfolio approach to credit risk based on a model.

- **Capital requirement = Credit VaR – Expected Loss (EL),** where Credit VaR is the maximum loss experienced at a 99.9% confidence level.

Basel II – IRB Approach (2)



Basel II – Definition of Expected Loss (EL)

Expected (credit) loss (in units of currency) of a particular exposure:

$$EL = PD \times LGD \times EAD$$

PD	(probability of default)
LGD	(loss given default)
EAD	(exposure at default)

In a portfolio context, the expected loss of the portfolio equals

the sum of expected losses, or

a weighted average (by EAD) of the EL (in % of EAD) of the individual exposures, **even if the exposures are not independent.**

Basel II – Definition of key IRB model variables

- **Probability of default (PD)** which gives the average percentage of obligors that default in a rating grade in the course of one year.
- **Exposure at default (EAD)** which gives an estimate of the outstanding amount (drawn amounts plus likely future draw-downs of yet unused lines) in case the borrower defaults.
- **Loss given default (LGD)** which gives the percentage of exposure the bank might lose if the borrower defaults.

Source: https://www.bis.org/fsi/awp2010.pdf

Basel II – IRB Capital requirement

Credit VaR

Expected loss

$$CR = [LGD * PD_{stressed} - PD * LGD] * MA$$

MA: Maturity adjustment (ASRF model based on 1Y)

Capital requirements in % of EAD

Inverse of standard normal distribution applied to high confidence level (to arrive at 0.1% VaR)

$$PD_{stressed} = N\left(\frac{N^{-1}(PD) + N^{-1}(0.999)R^{\frac{1}{2}}}{(1-R)^{\frac{1}{2}}}\right)$$

Correlation (set by BCBS for different asset classes)

Inverse of standard normal distribution applied to PD to derive "average" default threshold

Basel II – Illustration of IRB model

Table C – IRB risk-based capital formulas for wholesale exposures to non-defaulted obligors and segments of non-defaulted retail exposures

Retail	**Capital Requirement (K) Non-Defaulted Exposures**	$K = \left[LGD \times N\left(\frac{N^{-1}(PD) + \sqrt{R} \times N^{-1}(0.999)}{\sqrt{1-R}} \right) - (ELGD \times PD) \right]$
	Correlation Factor (R)	For residential mortgage exposures: $R = 0.15$
		For qualifying revolving exposures: $R = 0.04$
		For other retail exposures: $R = 0.03 + 0.13 \times e^{-35 \times PD}$
Wholesale	**Capital Requirement (K) Non-Defaulted Exposures**	$K = \left[LGD \times N\left(\frac{N^{-1}(PD) + \sqrt{R} \times N^{-1}(0.999)}{\sqrt{1-R}} \right) - (ELGD \times PD) \right] \times \left(\frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b} \right)$
	Correlation Factor (R)	For HVCRE exposures: $R = 0.12 + 0.18 \times e^{-50 \times PD}$
		For wholesale exposures other than HVCRE exposures: $R = 0.12 + 0.12 \times e^{-50 \times PD}$
	Maturity Adjustment (b)	$b = (0.11852 - 0.05478 \times \ln(PD))^2$

Basel II – Capital TIERs

Tier I consists of shareholders' equity and retained earnings disclosed on their financial statements and is a primary indicator to measure a bank's financial health. It is the primary funding source and it typically holds nearly all of the bank's accumulated funds.

Tier 2 includes undisclosed funds that do not appear on a bank's financial statements, revaluation reserves, hybrid capital instruments, subordinated term debt - also known as junior debt securities and general loan-loss, or uncollected, reserves. Tier 2 capital is supplementary capital because it is less reliable than Tier I capital. It is more difficult to accurately measure due to its composition of assets that are difficult to liquidate (determine market price).

Basel II – Capital TIERs (2)

Tier III is tertiary capital, which many banks hold to support their market risk, commodities risk, and foreign currency risk, derived from trading activities. Tier 3 capital includes a greater variety of debt than Tier 1 and Tier 2 capital but is of a much lower quality than either of the two.

Under the Basel III accords, Tier 3 capital was completely abolished.

Basel II – Deficiencies

In general Basel II regulation was considered as a failure.

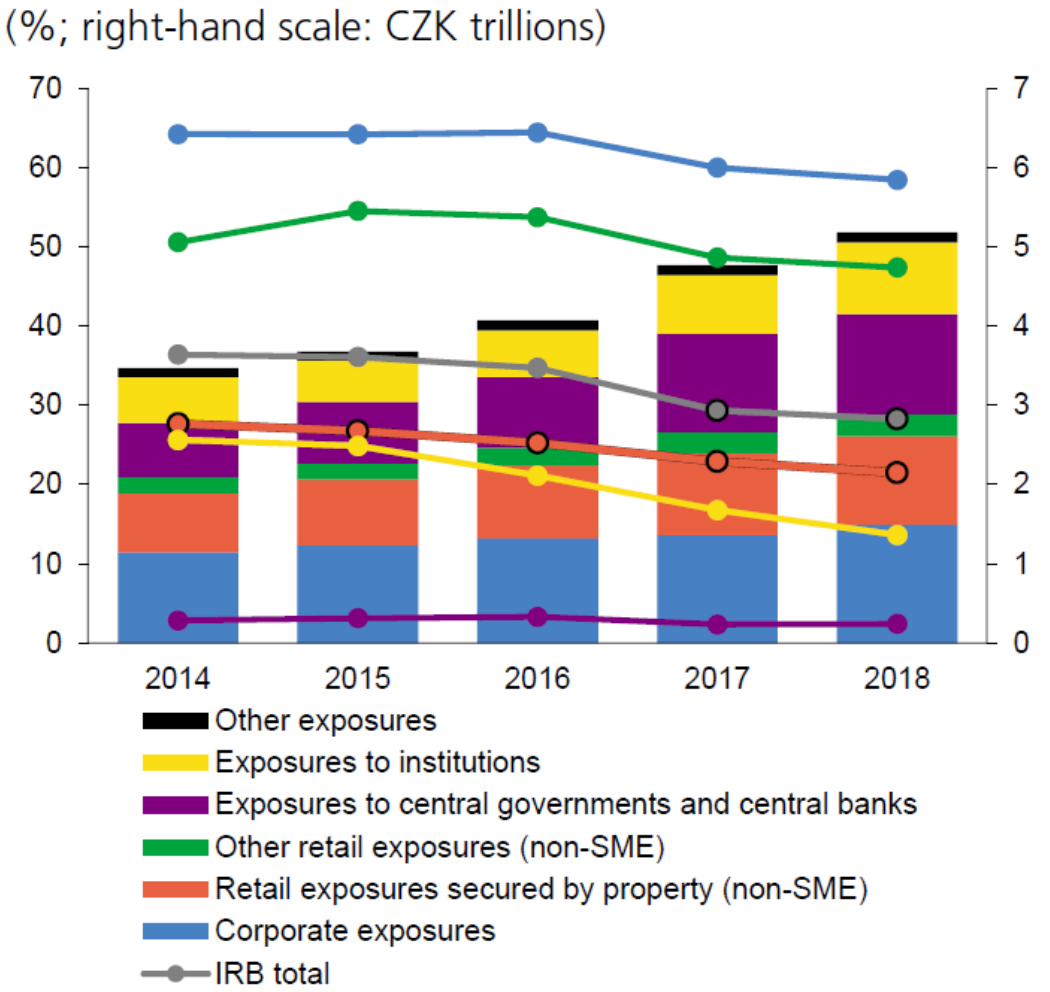
1) **Procyclicality** of capital requirements, especially in IRB, fuelling the (credit) booms and leading to accumulation of systemic risk,
2) Excessive use of external ratings, applied also on innovative instruments (CDOs),
3) Insufficient capital for market risk and securitization,
4) Overall relatively low CET1 capital requirements (2%)
5) Missing liquidity regulation, underestimating a possibility of systemic liquidity squeeze/crisis,
6) The 0% sovereign RW also amplified the 2010-2013 Eurozone sovereign crisis.

Basel II – Impact

Average RWs were decreasing in 2015 – 2018.

The aim was to better estimate risk, but the outcome was systematic underestimating.

The impact was also asymmetrical – big banks vs. small banks.



Source: CNB
Note: The points connected by lines denote the level of the risk weights for individual categories of exposures (left-hand scale). The height of the columns denotes the size of the exposure (right-hand scale). The colour coding of the points corresponds to the colour coding of the columns.

Content

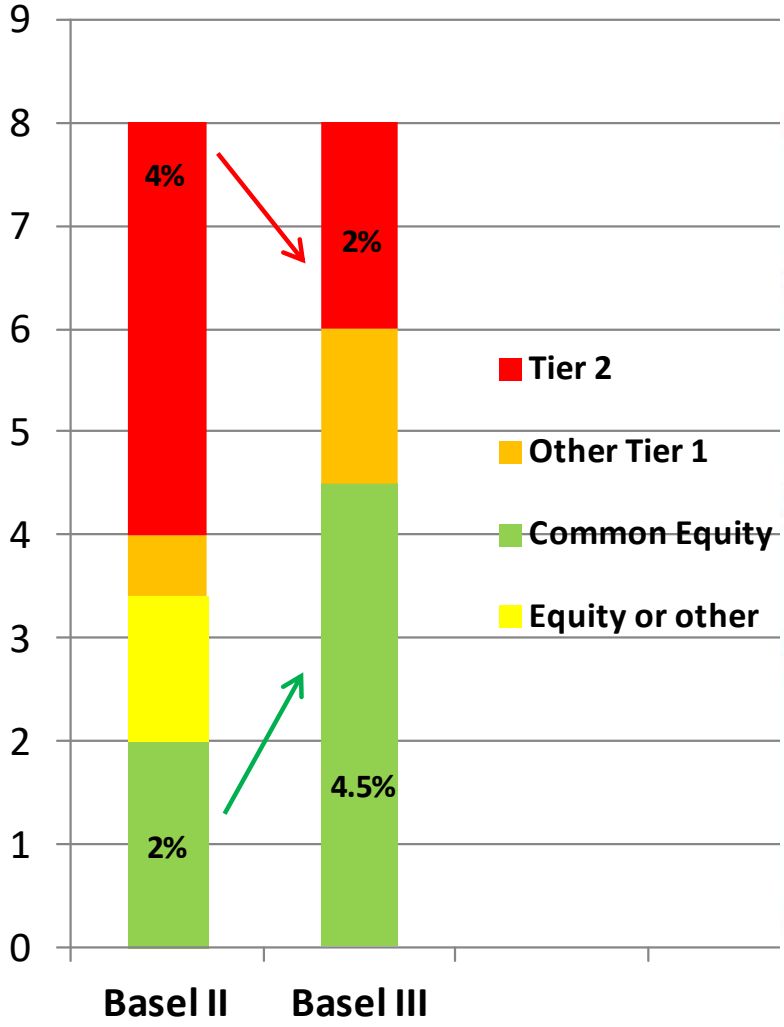
Basel III – Objective

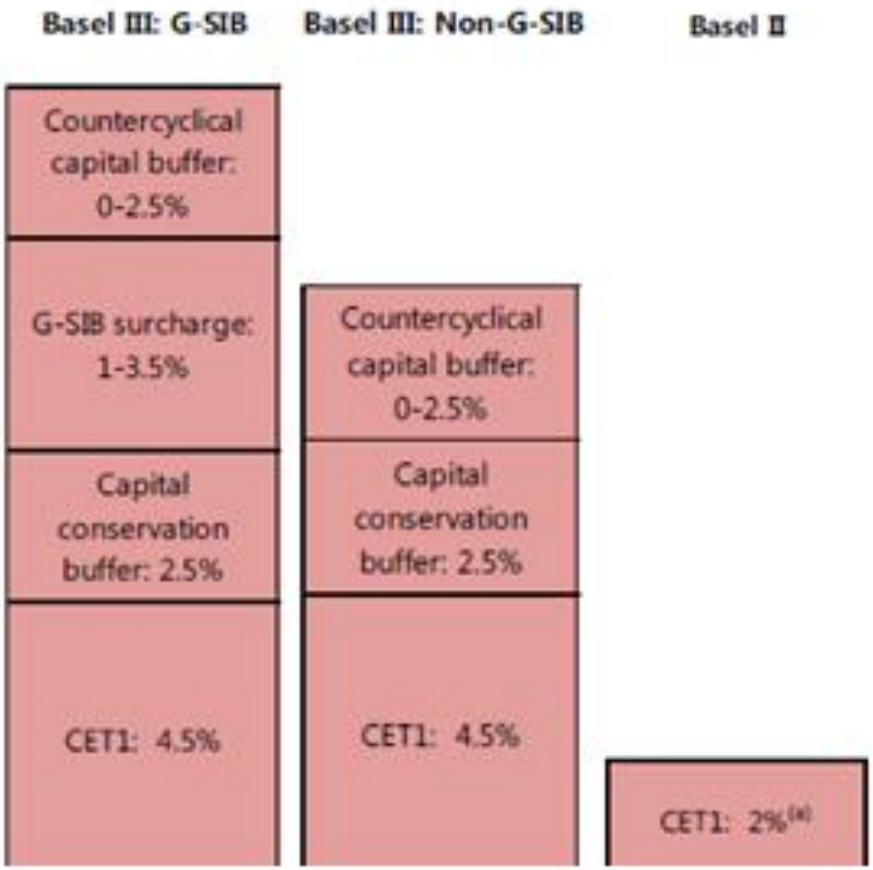
- The Basel III framework is a central element of the Basel Committee's response to the global financial crisis, financial innovation and massive growth in lending.
- It addresses a number of shortcomings in the pre-crisis regulatory framework and provides a foundation for a resilient banking system that will help avoid the build-up of systemic vulnerabilities.
- The framework will allow the banking system to support the real economy through the economic cycle.
- The first draft published in 2010, the finalization in 2017.

Basel III – Changes

1) Increasing the quantity and improving the quality of **bank capital**,
2) Introduction of **new liquidity standards** for internationally active banks (LCR, NSFR),
3) Addressing the **systemic risk** and interconnectedness via raising the trading book capital requirement, motivating banks to use central counterparties, and creating additional capital buffers,
4) Imposing gross **leverage ratio** as backstop - add a surcharge for the largest banks in line with G-SIB buffer,
5) Risk-sensitive output floor. It means that RWAs calculated by internal models cannot be lower than 72.5% of the risk weighted assets computed by the Standardized Approach.

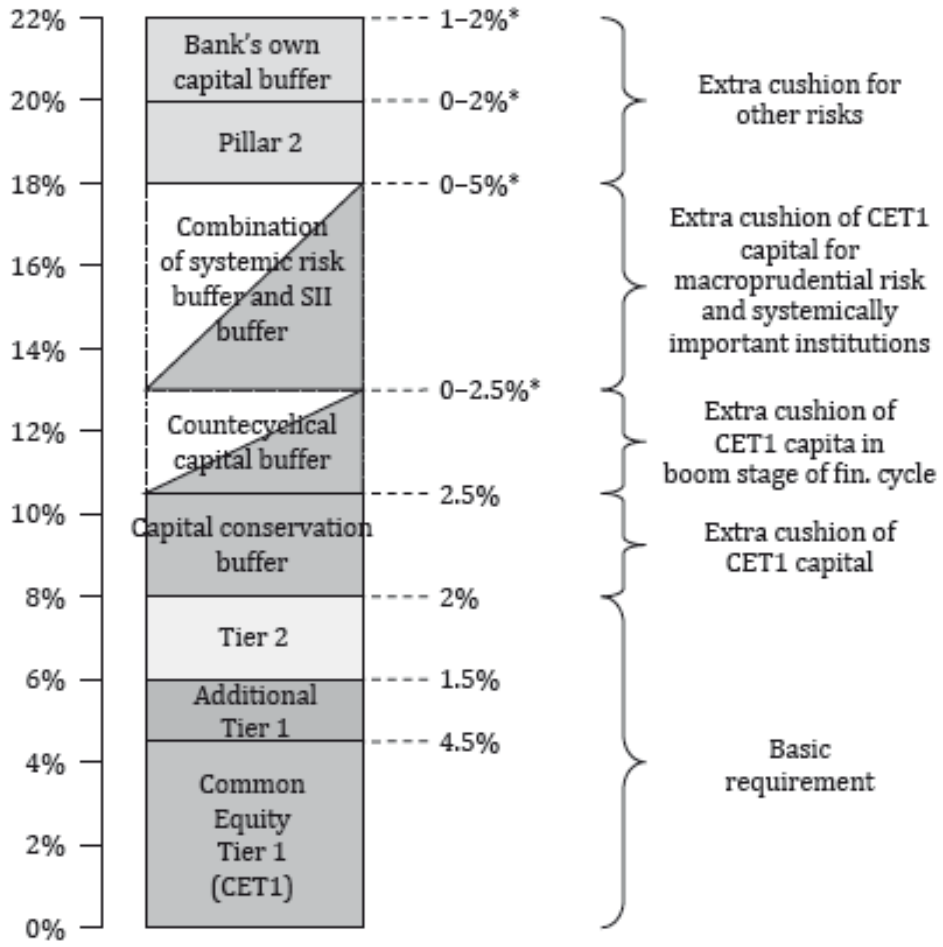
Basel III – Changes (2)





Basel III – Structure of CaR in the EU

Figure VI-17: Capital requirements stipulated by CRD IV (in % of risk weighted assets)



Basel III – Capital TIERs update

Tier I capital refined division

A. Common Equity Tier I (CET1) *– going concern basis*

- It is the highest quality of regulatory capital, as it absorbs losses immediately when they occur. It encompasses ordinary shares and retained earnings.
- The implementation started in 2014 as part of Basel III regulations relating to cushioning a local economy from a financial crisis. The Basel III accord introduced regulation that requires commercial banks to maintain a minimum capital ratio should comprise at least 4.5% CET I capital.
- The Basel III accord was introduced in 2009 as a response to the 2008 Global Financial Crisis and as part of continuous efforts to improve the banking regulatory framework.

Basel III – Capital TIERs update (2)

B. Additional Tier 1 capital (AT1) *– going concern basis*

- also provides loss absorption on a going-concern basis, although AT1 instruments do not meet all the criteria for CET1. For example, some debt instruments, such as perpetual contingent convertible capital instruments, may be included in AT1 but not in CET1.

Tier II capital (T2) – gone concern basis

The criteria for Tier 2 inclusion are less strict than for AT1, allowing instruments with a maturity date to be eligible for Tier 2, while only perpetual instruments are eligible for AT1.

Basel III – Capital TIERs

Tier 1 (going concern)	Common Equity Tier 1 (CET1)	Sum of common shares (equivalent for non-joint stock companies*) and stock surplus, retained earnings, other comprehensive income, qualifying minority interest and regulatory adjustments	CET1 >4.5%
	Additional Tier 1 (AT1)	Sum of capital instruments meeting the criteria for AT1 and related surplus, additional qualifying minority interest and regulatory adjustments	CET1 + AT1 >6%
Tier 2 (gone concern)		Sum of capital instruments meeting the criteria for Tier 2 and related surplus, additional qualifying minority interest, qualifying loan loss provisions and regulatory adjustments	CET1 + AT1 + Tier 2 >8%

* The standard requires instruments issued by non-joint stock companies to meet a set of criteria to be deemed equivalent to common shares and included in CET1.

Task III – Capital TIERs

Decide, whether following items are part of bank's capital and if so, assign the correct category of capital.	
Category	**Item description**
	Pension fund investments
	Preference shares
	Defferred tax assets
	Mortgage portfolio
	Subordinated bond
	Contingent convertible bonds (CoCos)
	Banks shares (own emission)
	Other Comprehensive Income
	Intangible assets
	Corporate loan
	Share premium (CZ: emisné ážio)
	Reserves - reserve funds for risk
	Retained earnings from previous years (from audited profits, not distributed per decision by shareholders)
	(Positive) Earnings from current year, not audited
	(Negative) Earnings (loss) from current year, not audited
	Deferred tax liabilities
	Goodwill
	Revaluation reserves
	Treasury shares (own shares buybacks)
	General provisions (if they exist in the jurisdiction; in the EU, they are not used anymore)
	Client deposits - term

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Basel IV – Objectives

Credit risk

- Standardised approach more granular and risk sensitive
- Removing the option to use advanced IRB for institutions and large corporates, and any IRB approach for equity
- Restrictions on model parameters (input floors)

Implementation date : 1/1/2022

Market risk

- Stricter border between Trading and Banking books
- More risk-sensitive Standardised Approach (SA)
- Revised Internal/Advanced Model Approach (IMA)
- Replacement in IMA of VaR

Basel IV - Outlook

Focus of Basel III

Capital definitions, buffers and liquidity requirements

Focus of Basel IV

Capital requirements	**Credit Risk**	**Securiti-sation**	**Counter-party Credit Risk**	**Market Risk**	**Opera-tional Risk**	**CVA Risk**	**Step-in Risk**
Capital floors (BCBS 306)	Interest rate risk in the banking book (BCBS 368) 2018	SA for credit risk (BCBS 347) IRB approach (BCBS 362)	Revi-sions to the secu-ritisation frame-work (BCBS 374) 2018	SA counter-party credit risk (BCBS 279) 2017	Funda-mental review of the trading book (BCBS 352) 2019	Revi-sions to opera-tional risk (BCBS 355)	Review of the CVA risk frame-work (BCBS 325)	Step-in Risk (BCBS 349)

Final document with expected implementation dates

Consultation paper

Implementation dates are based on information provided by BCBS Committee, but dates may be extended by local regulators.

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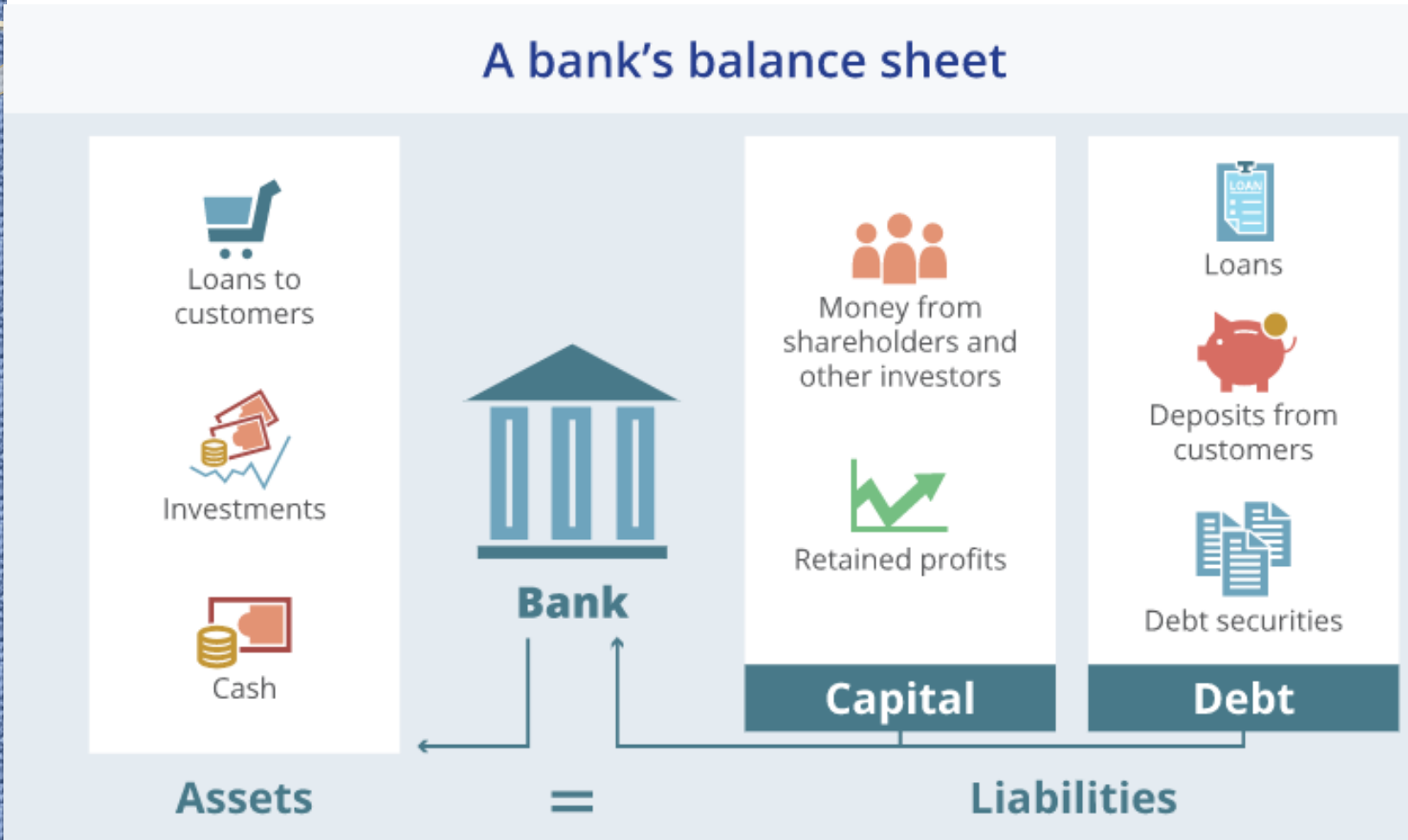
Bank capital



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