

Revolution, Evolution or Intelligent Design – How Regulation shapes the Banking Industry

XXXIII Heidelberg Physics Graduate Days

Heidelberg, October 7th, 2014

Agenda

- » 1. Some basic Information about Banks 3
 - › Banking Products 7
 - › A Bank's Balance Sheet and Introduction to Risk 16
- » 2. Motivation for more Regulation 24
- » 3. Critical Thoughts on more Regulation 34
 - › Example 1: Risk Weights and Capital Requirements 36
 - › Example 2: European Stress Tests 40
- » 4. The Regulatory Tsunami - a Helicopter View 47
- » 5. Deep Dive into selected Regulatory Frameworks 50
 - › EMIR – Central Clearing of OTC-derivatives 51
 - › CRR – Capital Requirements for OTC-derivatives 60

The impact of banking regulation

- » By what follows always ask: What does it mean for the individual bank?
 - › What does it mean for a bank's business model? (How / where the bank makes money / profit?)
 - › How much does it change the organisation's structure?
 - › Will it change the way how a bank interacts with clients?
 - › Does it make changes to the existing IT-infrastructure likely?
 - › ...

May 21, 2010 3:00 am
Tsunami of regulation batters banks
By Brooke Masters in London

After the bank rescues in 2008 and 2009, bankers and traders braced themselves for a flood of new rules and regulations. They were pleasantly surprised when most governments shied away from swift action in favour of careful study and talk of global co-operation.

September 28, 2014 8:58 pm
Banks increase efforts to stay on right side of law
By Sam Fleming

If there was any doubt in bank executives' minds about the perils of falling foul of US sanctions, it was decisively scotched on Monday, June 30.

BNP Paribas's guilty plea to violations of sanctions against Sudan, Iran and Cuba was accompanied by a blockbuster fine of nearly \$9bn – plus a one-year ban on conducting certain transactions in dollars.

Euro Finance Week

Banker warnen vor „Regulierungs-Tsunami“

Es ist wieder Euro Finance Week. Die Spitzenbanker der Stadt sprechen viel vom verlorenen Vertrauen und wie man es zurückgewinnen kann. Aber sie warnen auch vor zu viel und vor allem zu ungleicher Regulierung.

19.11.2012, von TIM KANNING, FRAN

May 12, 2013 4:41 am

Regulatory tsunami floods business

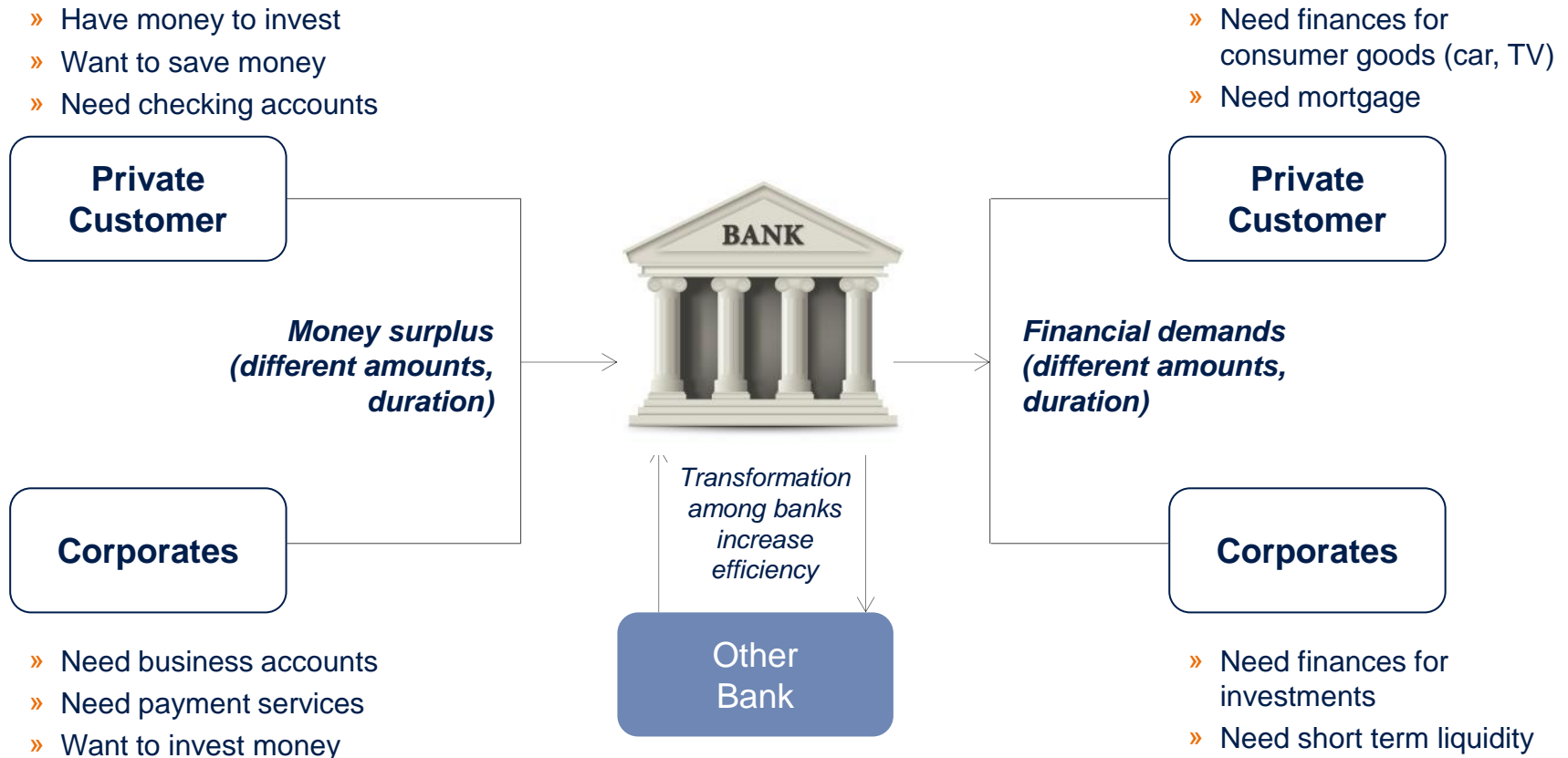
By David Ricketts



If there is one thing asset managers in Europe have had in abundance following the financial crisis, it is regulation.

1. Some basic Information about Banks

Banks offer three basic functions to the economy: they transform size, duration and risk of money being collected and lent



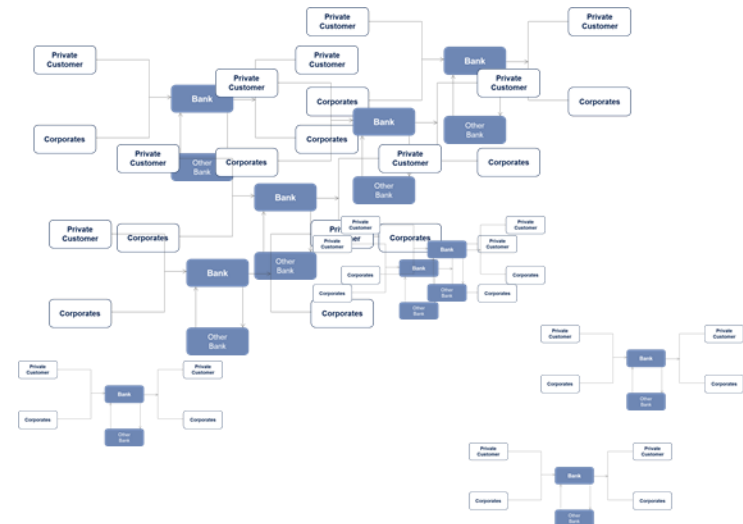
This transformation function is vital for the economy and justifies a more stringent and comprehensive regulation framework... or does it?

This seems simple enough, but the reality is much more complex...

Bank's intermediary function

- » Brings together those that have excess financial resources with those who have financial demand
- » The “price” of money borrowed is interest
- » In this sense interest is the “conversion factor” to move a cash flow along the timeline
- » To increase efficiency banks also borrow and lend money among each other

Complex system of interdependence



Banks need capital, but the real issue is the right management of risks

Real economy

What you can or can't do is determined by the amount of financial resources at your disposal

- » Capital (Equity, Debt) is the **main** scarce resource
- » Therefore the management (measurement, transparency, controlling) of these resources is essential:
- » Of course risk is also important

Banks

You can "buy" a financial instrument with 0 EUR (e.g. Swap), but you shouldn't have too much risk compared to ???

- » Risk is the main scarce resource of banks
- » How can risk be measured?
- » How can the attribution of risk to the different activities of a bank be made transparent?
- » How can risk be adequately managed?

It is essential that banks manage their risk adequately. This leads to the question how risk can be measured and what it can be compared to.



Banking Products

Banking products – overview

Loans	<ul style="list-style-type: none">» Banks lend money to private people, corporates and other banks» Different terms, different amounts, different riskiness
Deposits	<ul style="list-style-type: none">» Banks collect money from “the public”» Different terms, different amounts
Money Market Products	<ul style="list-style-type: none">» Transactions for providing liquidity for a bank’s business, maturity less than one year» Typical products: short term loans and deposits, commercial papers, call money, IAMs etc.
Securities Financing	<ul style="list-style-type: none">» Repos, Securities Lending
Issued Equity	<ul style="list-style-type: none">» Banks issue stock to raise their own funds (equity, sometimes just called capital)» Equity has best potential to absorb loss
Issued Debt	<ul style="list-style-type: none">» Usually banks also issue debt instruments (bonds, promissory loan, certificates)» Investors expect less interest on debt
Traded Securities	<ul style="list-style-type: none">» Banks buy and sell securities (bonds, stock, certificates, ...) that have been issued by other financial institutions, corporates or sovereigns (“secondary market”)
Derivatives	<ul style="list-style-type: none">» Derivatives are contracts whose value depends on the price of a different asset (“Underlying”)» There are derivatives for interest rates, credit, FX, equity and commodities
Guarantees	<ul style="list-style-type: none">» Example: a bank can guarantee the obligation of a different party to pay back a loan» Usually a bank receives a risk premium for this

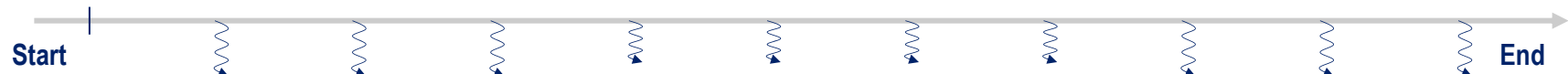
Typical example of a derivative – Interest Rate Swap

- » Most Interest Rate Swaps have two legs: one of them being fixed in advance (fixed leg) and the other one depending on a reference interest index (floating leg)
- » Determining parameters of an IRS: currency, notional, start, end/maturity, fixed rate, reference index for floating leg, payment frequency

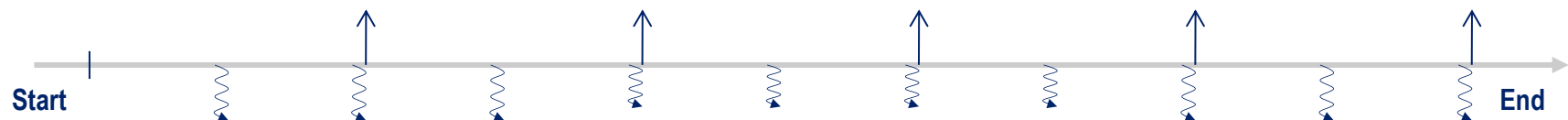
1st Leg (fixed)



2nd Leg (floating)



IRS (Plain Vanilla)



In a regulatory context derivatives are defined in the German Securities Trading Act (Wertpapierhandelsgesetz WpHG)



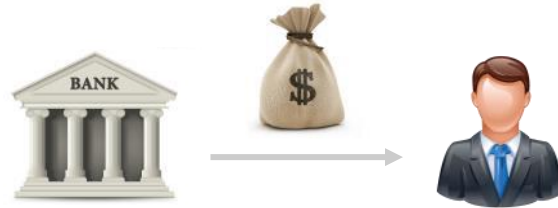
WpHG, Art. 2(2)

Derivatives within the meaning of this Act are

1. **firm contracts or option contracts** in the form of acquisitions, swaps or in other forms which are to be **settled at a future date** and whose **values are derived directly or indirectly from the price or value measure of an underlying instrument** (futures and forward transactions) relating to the following underlying instruments:
 - a) securities or money market instruments;
 - b) foreign exchange or units of account;
 - c) interest rates or other yields;
 - d) indices of the underlying instruments specified in (a), (b) or (c), other financial indices or financial measures; or
 - e) derivatives;
2. futures and forward transactions relating to commodities, freight rates, emission allowances, climatic or other physical variables, inflation rates or other economic variables or other assets, indices or measures as underlying instruments, provided
 - a) they are cash-settled or grant the party to a contract the right to demand cash settlement without this right being contingent on default or another termination event;
 - b) they are concluded on an organised market or a multilateral trading facility; or
 - c) in accordance with Article 38 (1) of Commission Regulation (EC) No. 1287/2006 of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards record-keeping obligations for investment firms, transaction reporting, market transparency, admission of financial instruments to trading, and defined terms for the purposes of that Directive (OJ EU no. L 241 p. 1), they have the characteristics of other derivatives and are not for commercial purposes and if the conditions set out in Article 38 (4) of this Regulation are not satisfied;and if they are not spot contracts within the meaning of Article 38 (2) of Regulation (EC) No. 1287/2006;
3. financial contracts for differences;
4. firm contracts or option contracts in the form of acquisitions, swaps or in other forms which are to be settled at a future date and are intended for the transfer of credit risk (credit derivatives);
5. futures and forward transactions relating to the underlying instruments set out in Article 39 of Regulation (EC) No. 1287/2006 if they satisfy the conditions of no. 2.

Derivatives carry a special kind of risk: counterparty credit risk

Loan



- » Bank lends money to private customer, corporation, other bank, financial institution etc.
- » Loan carries **credit risk**, i.e. that the debtor is unable to meet his obligation to pay interest or pay back the debt as a whole

Corporate Bond



- » Corporate issues bond
- » Buyer of that bond carries **issuer risk**, i.e. risk that the issuer of that security is unable to meet his obligation to pay interest or pay back the debt as a whole

Derivative



- » Two banks enter into a contract with settlement in the future (sometimes 20 years and longer)
- » In general payments are dependent on future events
- » Derivatives carry risk that **counterparty defaults**

Derivatives carry risk that counterparty defaults before settlement of that contract. The height of the exposure at risk depends on the underlying(s) of the derivative.

Types of derivatives

Interest Rate (incl. Cross-Currency-Swaps)

- » Plain Vanilla
- » Fix vs variable
- » Variable vs variable („Basis-Swap“)
- » Forward Rate Agreement
- » Swaption
- » Callable (puttable) Swap
- » Swaption
- » Cap, Floor, Collar
- » Exotic products

Credit

- » Single name
- » Index (e.g. iTraxx)
- » Basket (1st-to-default, nth-to-default)
- » CDX
- » Total Return Swap/
Equity Swap
- » Credit Spread Option
- » Credit Spread Forward

FX

- » Forward/Future
- » FX Swap
- » FX Option (Digital, Barrier, ...)
- » Exotic products

Equity and Security

- » Options
- » Futures
- » Forwards
- » Exotic products

Other Derivatives

- » Commodity Derivatives
 - › Metals
 - › Energy
 - › Agriculture
 - › Other
- » Rest (Weather Derivatives)

Warren Buffett, 2002: “Derivatives are financial weapons of mass destruction”



Warren Buffett, CEO of Berkshire Hathaway

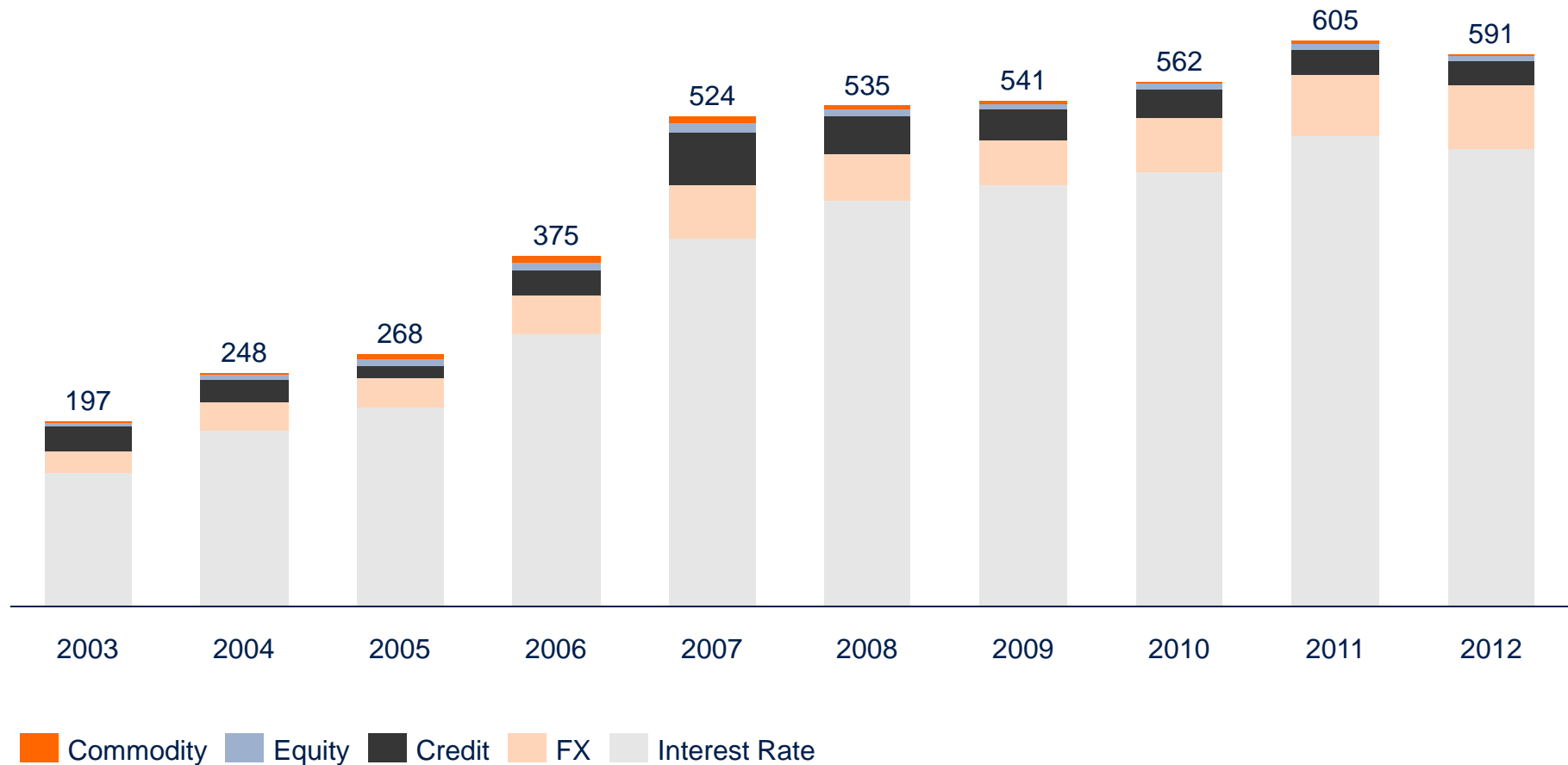
”“

Let's see if things look differently in 2014...

- » We view them [Derivatives] as **time bombs**, both for the parties that deal in them and the economic system.
- » Essentially, these instruments call for money to change hands at some future date, with the amount to be determined by one or more reference items, such as interest rates, stock prices or currency values. If, for example, you are either long or short an S&P 500 futures contract, you are a party to a very simple derivatives transaction – with your gain or loss derived from movements in the index.
- » Errors will usually be honest, reflecting only the human tendency to take an optimistic view of one's commitments. But the parties to derivatives also have enormous incentives to cheat in accounting for them. Those who trade derivatives are usually paid (in whole or part) on “earnings” calculated by mark-to-market accounting. But often there is no real market and “mark-to-model” is utilized. **This substitution can bring on large-scale mischief. In extreme cases, mark-to-model degenerates into what I would call mark-to-myth.**
- » I can assure you that the marking errors in the derivatives business have not been symmetrical. Almost invariably, they have favored either the trader who was eyeing a multi-million dollar bonus or the CEO who wanted to report impressive “earnings” (or both). The bonuses were paid, and the CEO profited from his options. Only much later did shareholders learn that the reported earnings were a sham.
- » The derivatives genie is now well out of the bottle, **and these instruments will almost certainly multiply in variety and number until some event makes their toxicity clear. Central banks and governments have so far found no effective way to control, or even monitor, the risks posed by these contracts.**
- » In our view, however, **derivatives are financial weapons of mass destruction**, carrying dangers that, while now latent, **are potentially lethal.**

And sure enough: derivatives exposures saw an exponential growth until the beginning of the financial crisis

Global outstanding notionals of derivatives [trillion USD]



Source: BIS

d-fine

What are derivatives used for?



Derivatives can be used to „trade“ risk so that in the end risk would be with those market participants that have offsetting risk or have better risk management procedures in place

Derivatives can be used to make bets on certain economical developments (crash of equity markets, economical crises, default of a sovereign state etc.)

Bank gives mortgage with fixed interest payment but rather needs variable interest because of re-financing that loan

Interest Rate Swap

Corporate needs to pay for goods received in one year and doesn't want the uncertainty of the exchange rate

FX Forward

Bank has too much credit risk of certain industries in its loan portfolio and wants to diversify (less idiosyncratic risk)

Credit Default Swap

IRS can lead to massive (and non-transparent) exposures among banks where certain drops of the interest rates could yield enormous losses and bring banks to the edge of bankruptcy

FX Derivatives can be used to enter into huge positions betting on further depreciation of distressed currencies and economies

The amount of CDS exposure in the market can lead to unpredictable results when an address actually defaults (like 50 fire insurances on the same house traded in the market)

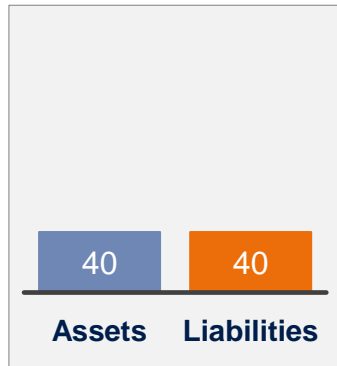
But each of these useful instruments can be used for evil, too...



A Bank's Balance Sheet and Introduction to Risk

Balance Sheets – let's start with a really simple example (1/2)

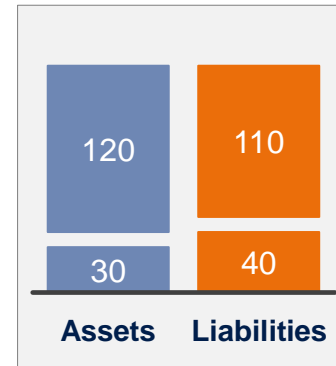
1st Example: Someone borrows money from a friend to buy a new TV



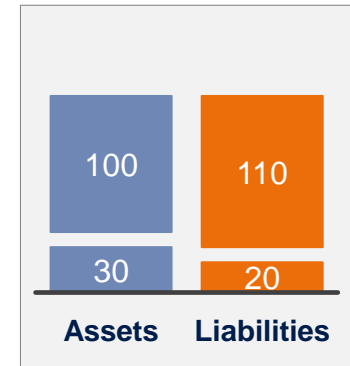
- » You own 40 EUR
- » You have 40 EUR as cash



- » You borrow another 110 EUR from a friend
- » You have 150 EUR as cash
- » **Raising money makes your BS longer**



- » You buy a TV for 120 EUR
- » You still owe your friend 110 EUR



- » After 1 year your TV isn't worth 120 EUR anymore
- » **This depreciation is counted as loss**
- » Loss is deducted from own funds (equity)

Accounting is the art of attaching values to assets and liabilities. Changes of values of assets or liabilities over time lead to profit or loss for this period.

Balance Sheets – let's start with a really simple Example (2/2)

2nd Example: Someone borrows money from a friend to invest in gold



- » You own 40 EUR and borrow another 110 EUR from a friend
- » You buy gold for 120 EUR
- » You still have 30 EUR left as cash



- » After 1 year your gold is worth 140 EUR
- » **This appreciation or write-up is counted as profit**
- » Profit is added to own funds (equity)



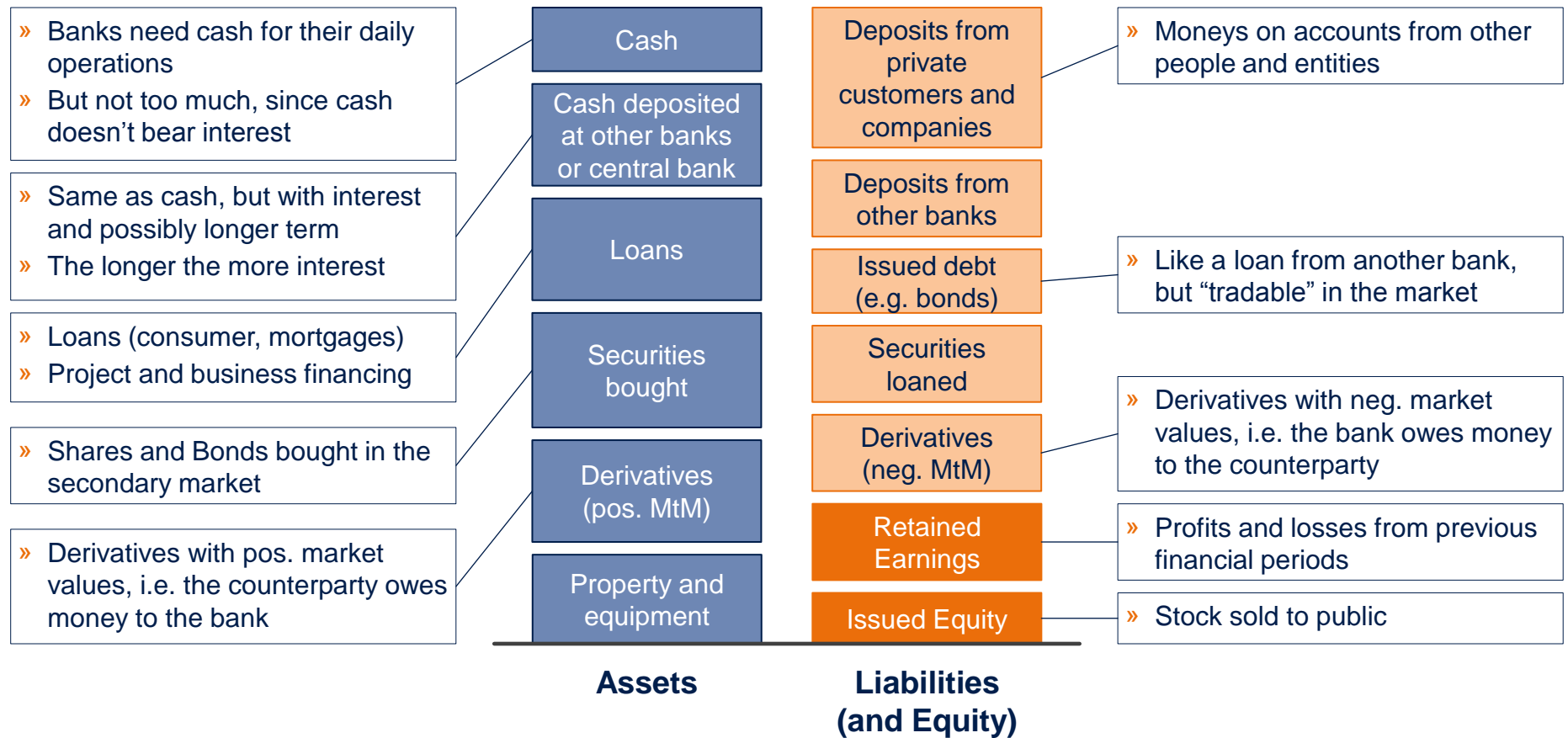
- » You decide to sell 50% of your gold for 70 EUR
- » Important question: when is the appreciation of the gold accounted for:
 - 1) When the gold price went up
 - 2) When the transaction took place



- » Finally you use some of your cash to pay back part of the debt (80 EUR)
- » Although gold went up only 16,6%, your equity went up 50%
- » **Paying back debt (and losses) make your BS shorter**

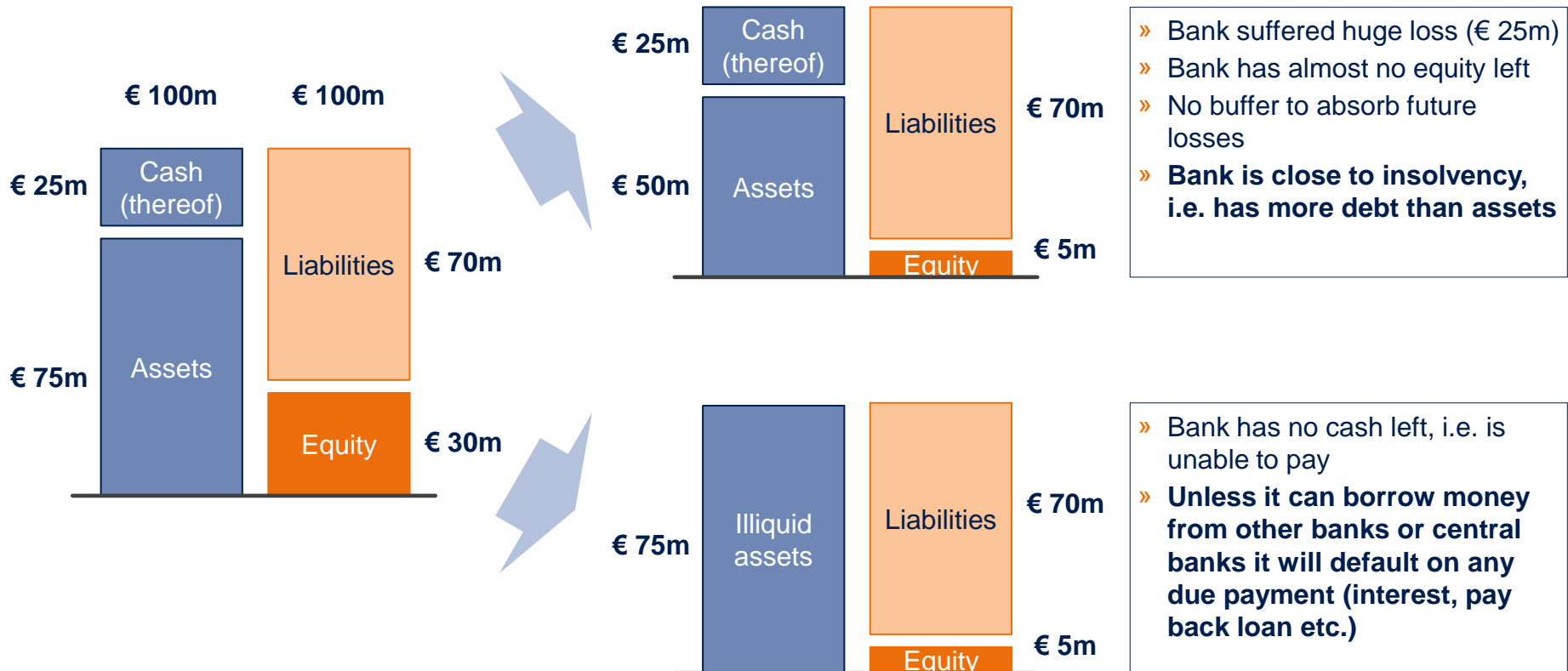
Equity is sum of own funds and accumulated profits (or losses). Because equity is a residual claim, relatively small price changes in assets can lead to relatively big changes in equity.

The goal of a bank's balance sheet is to give transparency about who the bank owes money and the bank's assets (who owes money to the bank?)



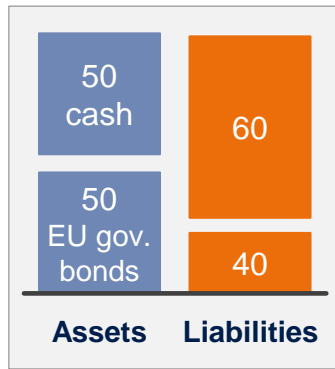
Balance sheet shows values of assets and liabilities at a certain time. P&L-Statement shows changes in values of assets and liabilities. $\Delta \text{Assets} + \Delta \text{Liabilities} = \Delta \text{Equity}$.

Risk (from a bank's point of view) is the uncertainty of what your balance sheet will look like in the future



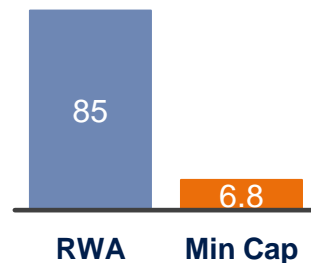
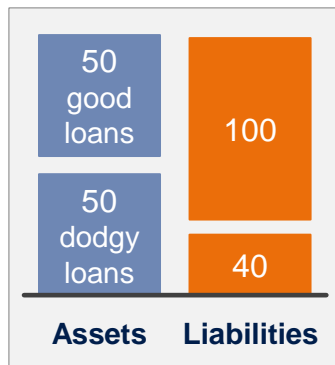
Capital must be at least 8% of the Risk Weighted Assets (RWA)

“Safe bank”



- » Risk weights (RW)*:
 - › RW for cash = 0%
 - › RW for EU-government bonds = 0% (i.e. they are treated as carrying no risk)
- » Risk weighted asset (RWA):
 - › $RWA = RW \times \text{exposure}$ (here: asset value)
 - › $RWA = 0 \times 50 + 0 \times 50 = 0$
- » Minimum capital requirement = $8\% \times 0 = 0$

“Risky bank”



- » Risk weights (RW):
 - › RW for good loans = 20%
 - › RW for dodgy loans = 150%
- » $RWA = 0.2 \times 50 + 1.5 \times 50 = 85$
- » Minimum capital requirement = $8\% \times 85 = 6.8$

*Outlook to
Basel3*

* Simplified example

Different kinds of risk

Market Risk	<ul style="list-style-type: none"> » Risk that market prices change » Interest rates, prices of equity or securities, real estate, commodities etc. » Changes in exchange rates between currencies » Also changes in volatilities 	<p>These risks can be mitigated by more equity</p>						
Credit Risk	<table border="0"> <tr> <td data-bbox="300 521 507 592"> Credit Risk </td> <td data-bbox="528 521 1636 592"> <ul style="list-style-type: none"> » Risk that the debtor of a loan is unable to pay back </td> </tr> <tr> <td data-bbox="300 606 507 678"> Issuer Risk </td> <td data-bbox="528 606 1636 678"> <ul style="list-style-type: none"> » Risk that the issuer of a bond is unable to pay back </td> </tr> <tr> <td data-bbox="300 692 507 806"> Couterparty Credit Risk </td> <td data-bbox="528 692 1636 806"> <ul style="list-style-type: none"> » Risk that the counterparty to a derivatives transaction is unable to pay all payments due (interest, premiums, notional amounts etc.) </td> </tr> </table>		Credit Risk	<ul style="list-style-type: none"> » Risk that the debtor of a loan is unable to pay back 	Issuer Risk	<ul style="list-style-type: none"> » Risk that the issuer of a bond is unable to pay back 	Couterparty Credit Risk	<ul style="list-style-type: none"> » Risk that the counterparty to a derivatives transaction is unable to pay all payments due (interest, premiums, notional amounts etc.)
Credit Risk	<ul style="list-style-type: none"> » Risk that the debtor of a loan is unable to pay back 							
Issuer Risk	<ul style="list-style-type: none"> » Risk that the issuer of a bond is unable to pay back 							
Couterparty Credit Risk	<ul style="list-style-type: none"> » Risk that the counterparty to a derivatives transaction is unable to pay all payments due (interest, premiums, notional amounts etc.) 							
Operational Risk	<ul style="list-style-type: none"> » Fraud » Events of damage – internal or external » Fines and compensations!!! 							
Liquidity Risk	<table border="0"> <tr> <td data-bbox="300 985 507 1085"> Unable to pay </td> <td data-bbox="528 985 1636 1085"> <ul style="list-style-type: none"> » Risk that bank is unable to make a payment when payment is due </td> </tr> <tr> <td data-bbox="300 1092 507 1213"> Higher financing cost </td> <td data-bbox="528 1092 1636 1213"> <ul style="list-style-type: none"> » Risk that the cost of raising cash increases </td> </tr> </table>	Unable to pay	<ul style="list-style-type: none"> » Risk that bank is unable to make a payment when payment is due 	Higher financing cost	<ul style="list-style-type: none"> » Risk that the cost of raising cash increases 	<p>These risks can be mitigated by more cash</p>		
Unable to pay	<ul style="list-style-type: none"> » Risk that bank is unable to make a payment when payment is due 							
Higher financing cost	<ul style="list-style-type: none"> » Risk that the cost of raising cash increases 							
Other	<ul style="list-style-type: none"> » Reputation risk, model risk, systemic risk, regulatory risk? 							

Some questions

Is there a good reason why banks should have more debt in comparison to equity (“Leverage Ratio”) than other companies?

What could be effective instruments of regulation?

How could banks be held more responsible?

What is the difference between “insolvent” and “unable to pay”?

Under which circumstance could a bank be unable to pay but not be insolvent?

2. Motivation for more Regulation

The regulatory tsunami addresses three fields

Systemic crisis

- » A crisis that ripples through the system and shakes the foundations
- » The system proves to be too interwoven, complex and/or non-transparent for regulators to make informed judgements.

Safeguard system as a whole

Individual wrongdoings

- » A bank breaks an existing regulation or rule
- » Bank has established insufficient rules, procedures and processes to ensure compliance

Deter banks from breaches; force better procedures and processes

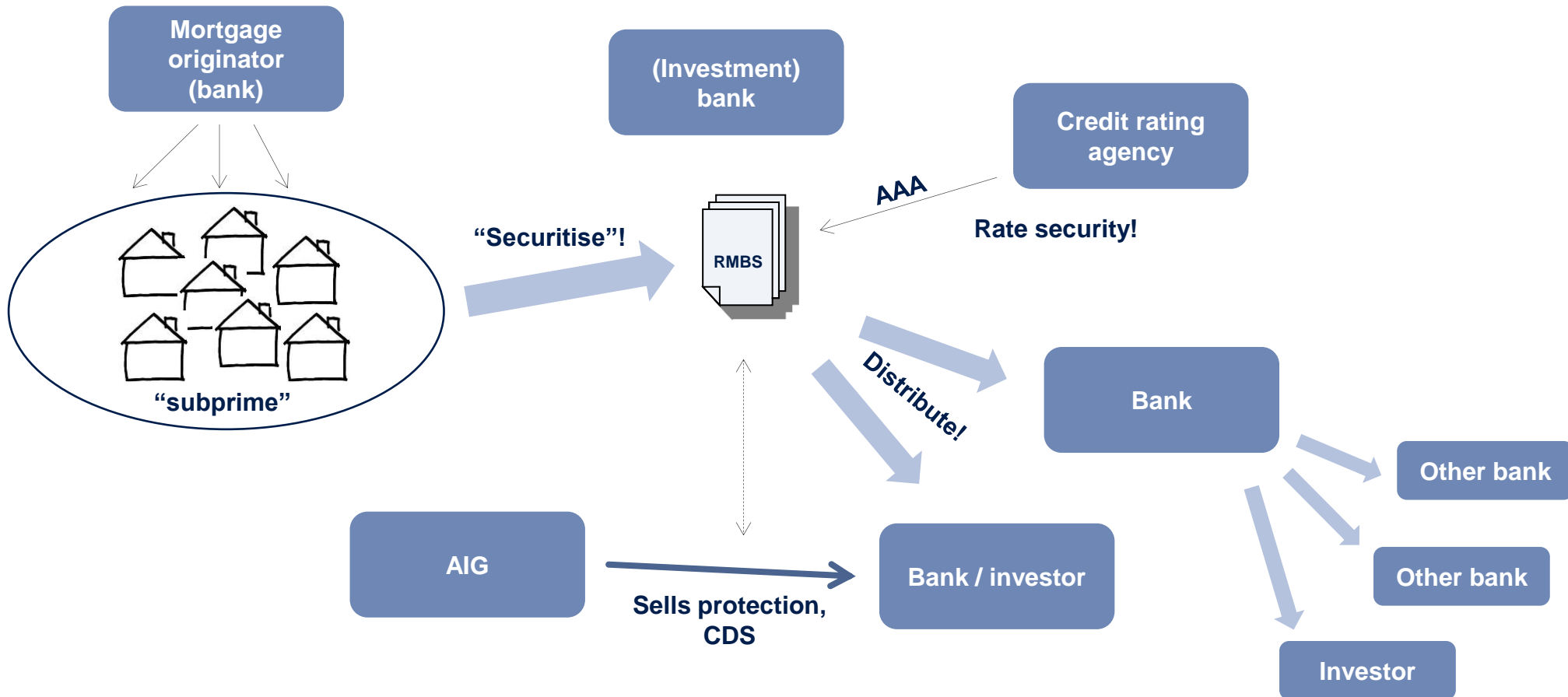
Individual misconduct

- » Bank does something that is not strictly against any law or regulation, but might not be in the client's interest
- » Banks seem not to serve the "real economy" (e.g. excessive speculation)

Establish clear rules; prevent misaligned incentives

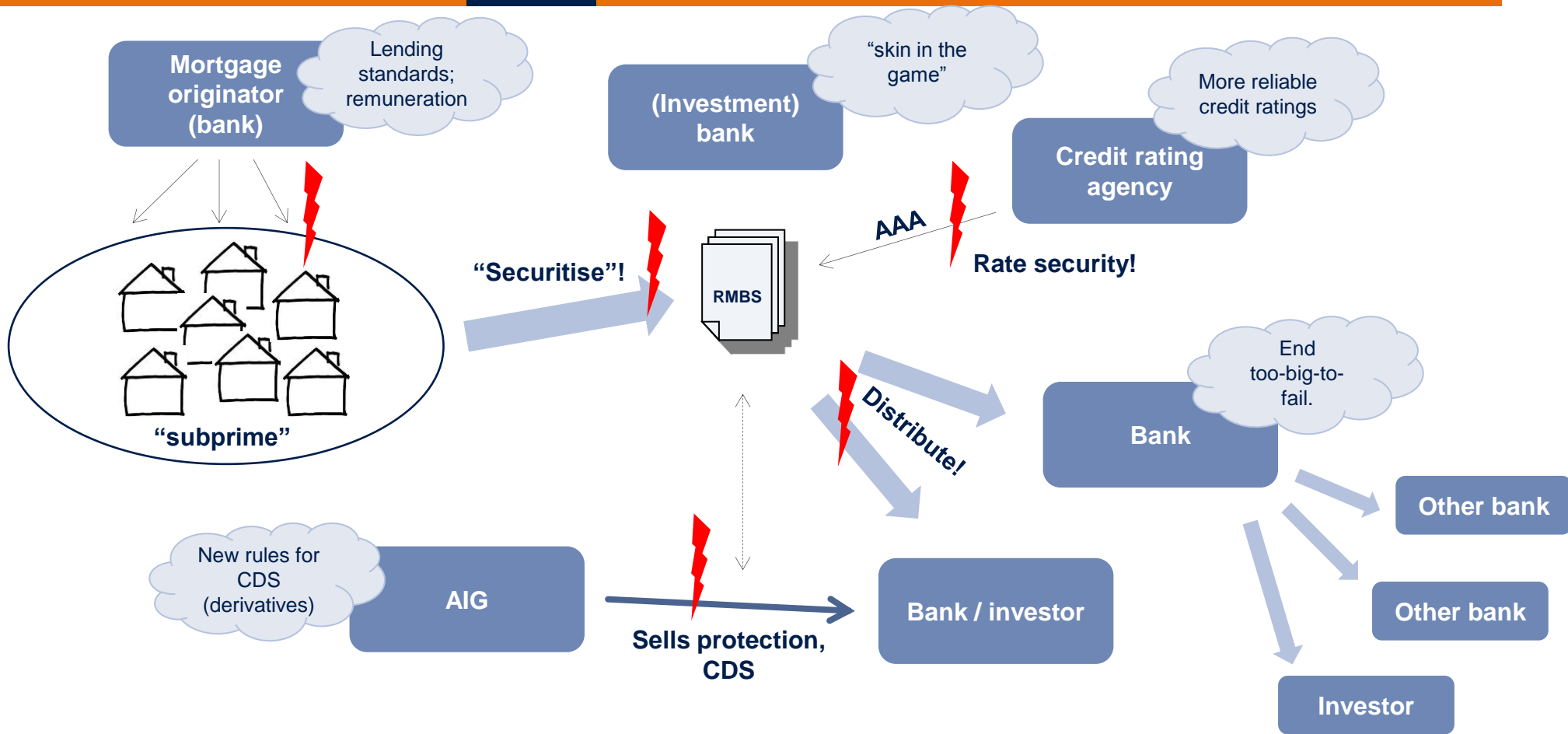
Regulators all over the world embark on mission to build a more resilient, transparent and fair banking system.

Systemic crisis I: The subprime crisis 2008 in a nutshell



» What could possibly go wrong?

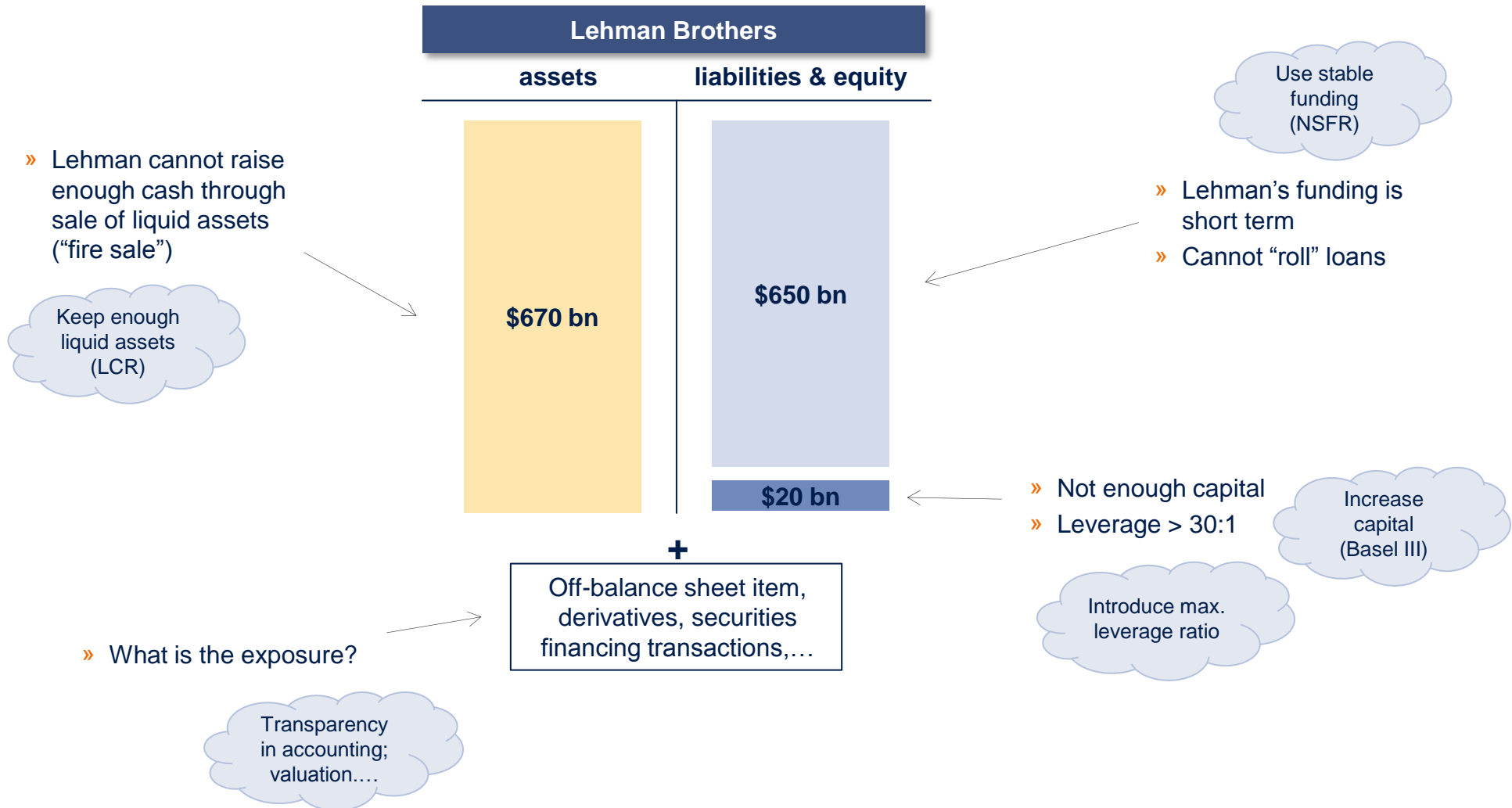
Systemic crisis II: The subprime crisis 2008 in a nutshell



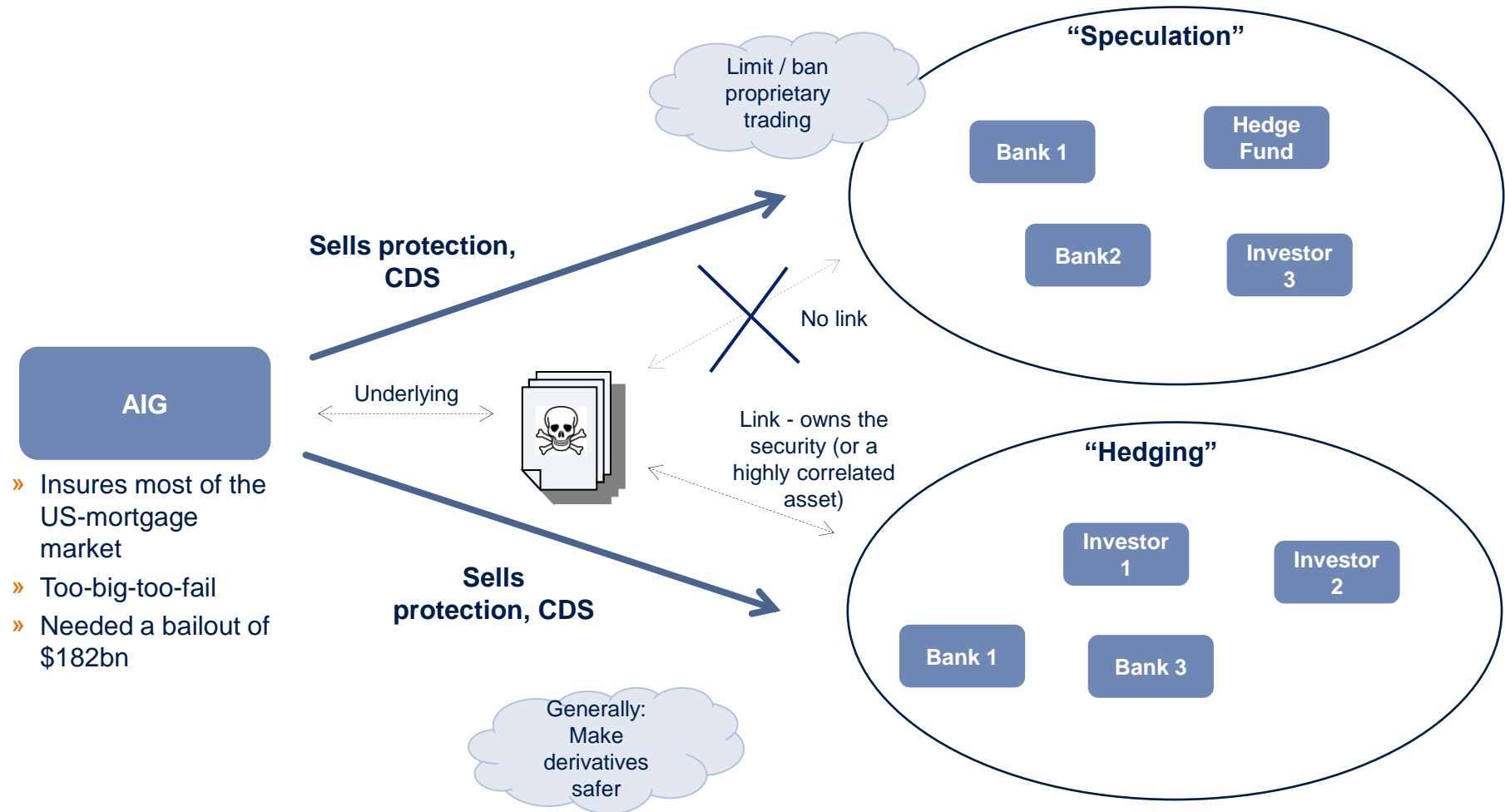
There is (at least) one new regulation for everything!

Systemic crisis III:

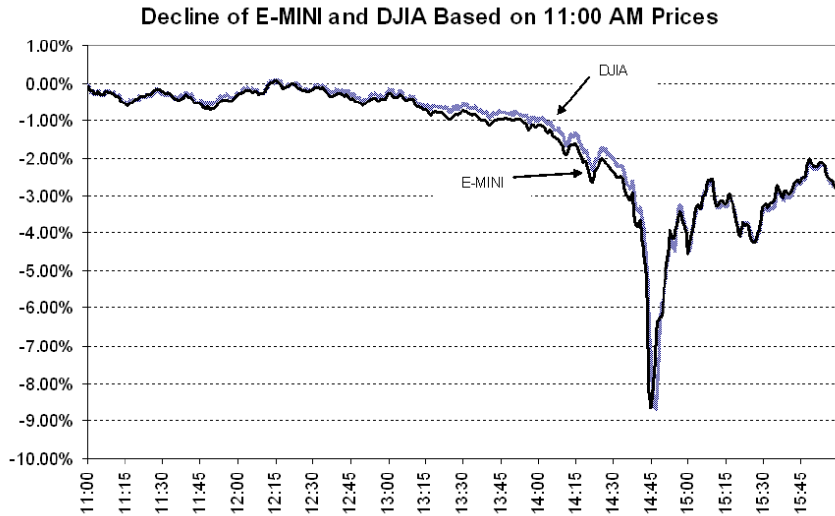
Lehman's bankruptcy showed various weaknesses on a balance sheet



Systemic crisis IV: AIG's collapse showed how derivatives can mask systemic risk



Systemic crisis V: Algorithms and flash crashes



» 6th May, 2010:

- » Algo sells quickly large quantity of E-mini futures
- » Dow Jones drops by 1000points within minutes

» 1st August 2012:

- » Knight Capital's new algo sends errand buy-and-sell orders
- » \$440m losses; Knights Capital goes bust; taken over by competitor

Error by Knight Capital rips through stock market

BY CAROLINE VALETKEVITCH AND CHUCK MIKOLAJCZAK
 NEW YORK | Wed Aug 1, 2012 6:31pm EDT
 9 COMMENTS | [Tweet](#) 40 | [Share](#) [Share this](#) [+1](#) 9 | [Email](#) [Print](#)

RELATED NEWS

[Knight Capital becomes hot options play after trading problems](#)

ANALYSIS & OPINION

[Facebook costs UBS some of its new friends](#)

[How the tech-stock](#)

(Reuters) - A technology breakdown at a major trading firm roiled the prices of 140 stocks listed on the New York Stock Exchange on Wednesday, undermining fragile investor confidence in the stability of U.S. stock markets.

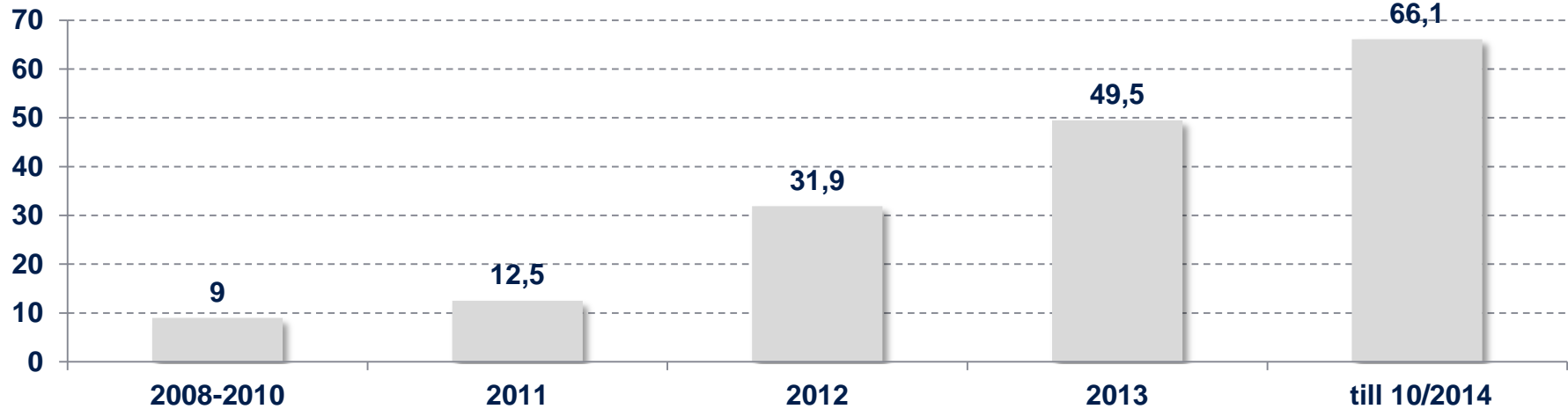
The problems at Knight Capital Group Inc ([KCG.N](#)), one of the largest firms that buys and sells stocks to provide liquidity to the markets, emerged at the beginning of trading.

Algorithmic trading and high frequency trading can be threat a to market stability.

Individual wrongdoing & misconduct – overview: Fines & settlement fees – now a high cost of doing business



Development of fines & settlement fees – billion USD



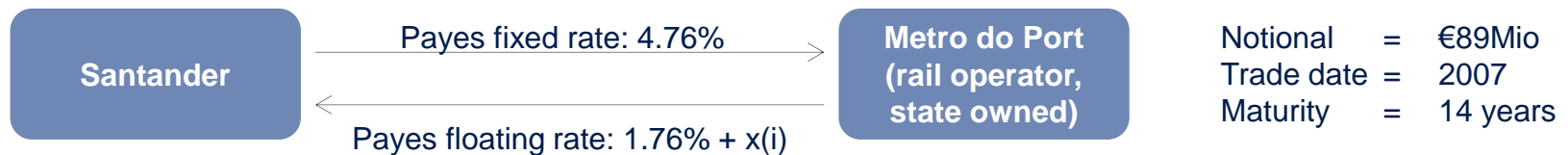
Selected highlights

- » \$8.4bn Countrywide (already BoA): predatory lending settlement
- » \$37m KPMG: Settlement over auditing at Wachovia
- » \$8.5bn Bank of America: fraudulent **mortgages** settlement
- » \$1.5bn UBS: **Libor rate rigging**
- » \$25bn BoA, Citi, Wells Fargo, JPM, Ally/GMAC: mortgage settlement (has its own homepage!)
- » \$100m JPM: “**London whale**”
- » \$10.3bn BoA: Fannie Mae settlement
- » \$13bn JPM (through Bear Sterns): mortgage lending practises
- » €1.7m SocGen, RBS, DB, Baclays: Euribor rigging settlement
- » \$2.6bn JPM: Settlement relating to Madoff Fraud
- » \$7bn Citi: mortgage settlement
- » \$2.6bn Credit Suisse: **tax evasion**, guilty
- » \$8.9bn BNP: sanctions violations; guilty
- » **\$17bn BoA**: mortgage settlement

Total: ~\$170bn; still to come: FX-rigging probe, further sanction violations,...

Individual misconduct – example: How much does the client need to be protected?

- » A more exotic swap – is this a good deal? (assume it is beginning 2007)



$$x_i = \max(x_{i-1} + 2 \times \max(0; 2\% - z_{3M}) + 2 \times \max(0; z_{3M} - 6\%) - d)$$

where: $d = 0.5$ for $2\% < z_{3M} < 6\%$; else 0%

z_{3M} : 3-month Euribor (rate, that banks say they pay for a three month Euro-loan)

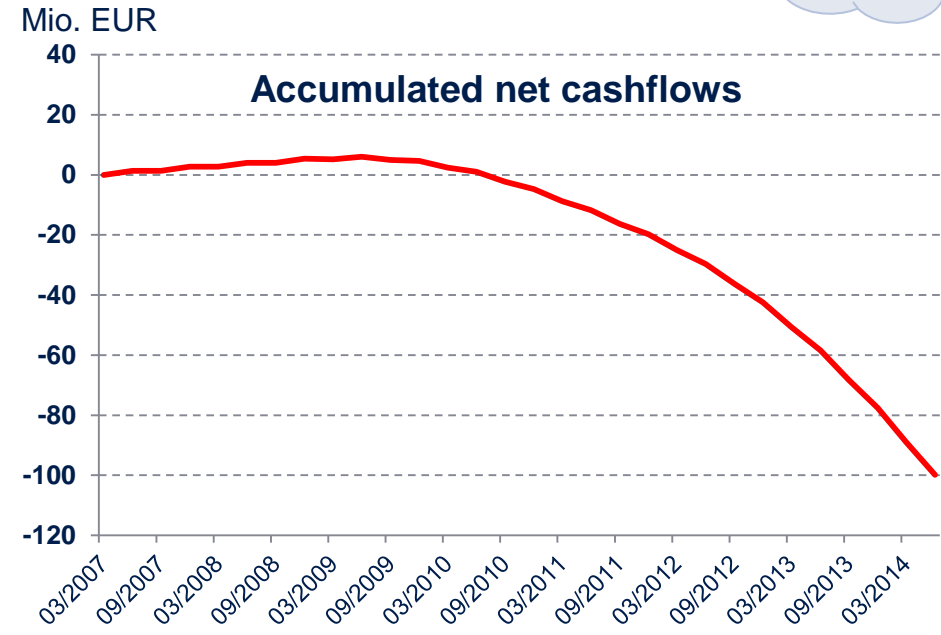
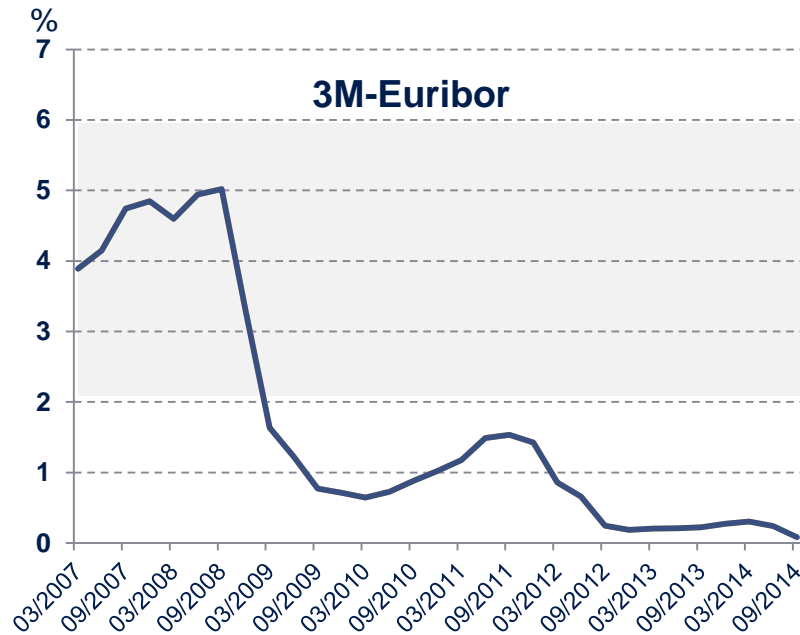
- » Which side of the trade looked more favourable in 2007?
- » And: how bad could it be anyway?... (What is the trade worth today?)

Individual misconduct – example: How much does the client need to be protected?

Protect
(retail)
clients

New rules
for
derivatives

» How bad it could be? Very bad!!!



- » Mark-to-market value today= - €500m ! Annualised coupon in 2013 > 40%!
- » Metro do Porto stops paying end of 2013; litigates Santander: “MdP lacked the capacity to enter the swap”; “an abnormal change of circumstances”; “Santander has duty to protect its customer”; court case ongoing...

Banks’ behaviour – even not plainly illegal – have been controversial and been a cause for litigation.

Source: Portuguese Media

3. Critical Thoughts on more Regulation

Why more regulation? Critical thoughts on more regulation

Fundamental question

Does complexity create risk?

or

Does complexity create uncertainty?

Further thoughts

- » (Unintended) consequences and (unforeseen) interaction of complex rules:
 - › Increase entry barriers to the system → increased concentration
 - › Increase potential for “regulatory arbitrage” (national and international) → no level playing field

- » Complex systems should be viewed holistically:
 - › System should be viewed as a whole - not collection of parts
 - › Heuristics better suited for complex system

- » Rules address past crisis - market participant adjust behaviour to rules:
 - › "When a measure becomes a target, it ceases to be a good measure.“*

The current regulatory approach is not free from controversy; is it a victory of hope over experience?

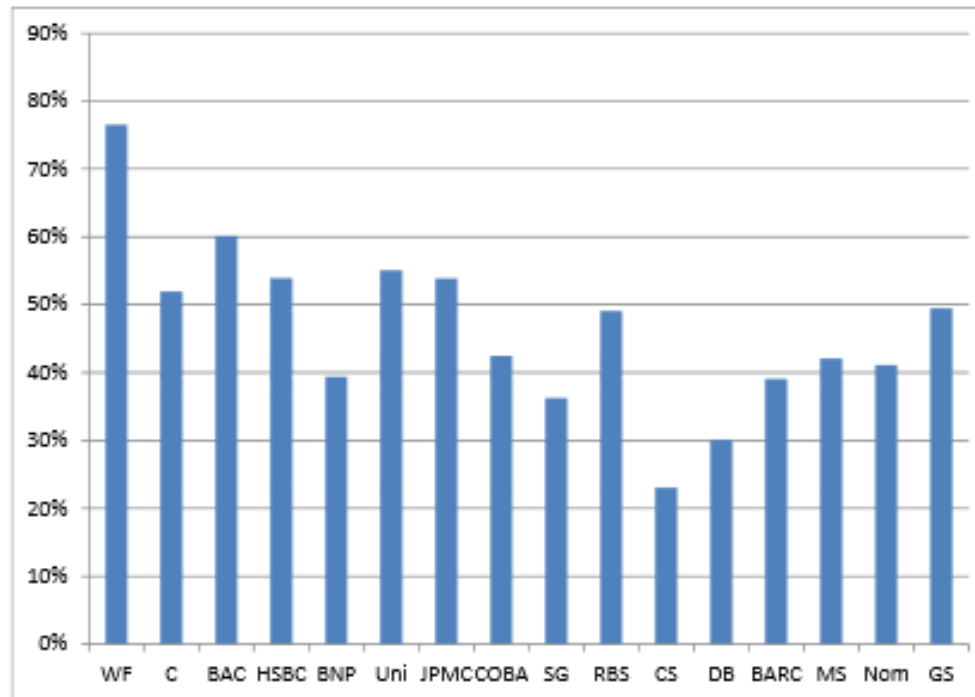


Example 1: Risk Weights and Capital Requirements

A case of an evolutionary approach

The ratio of RWA to total assets varies for large banks.

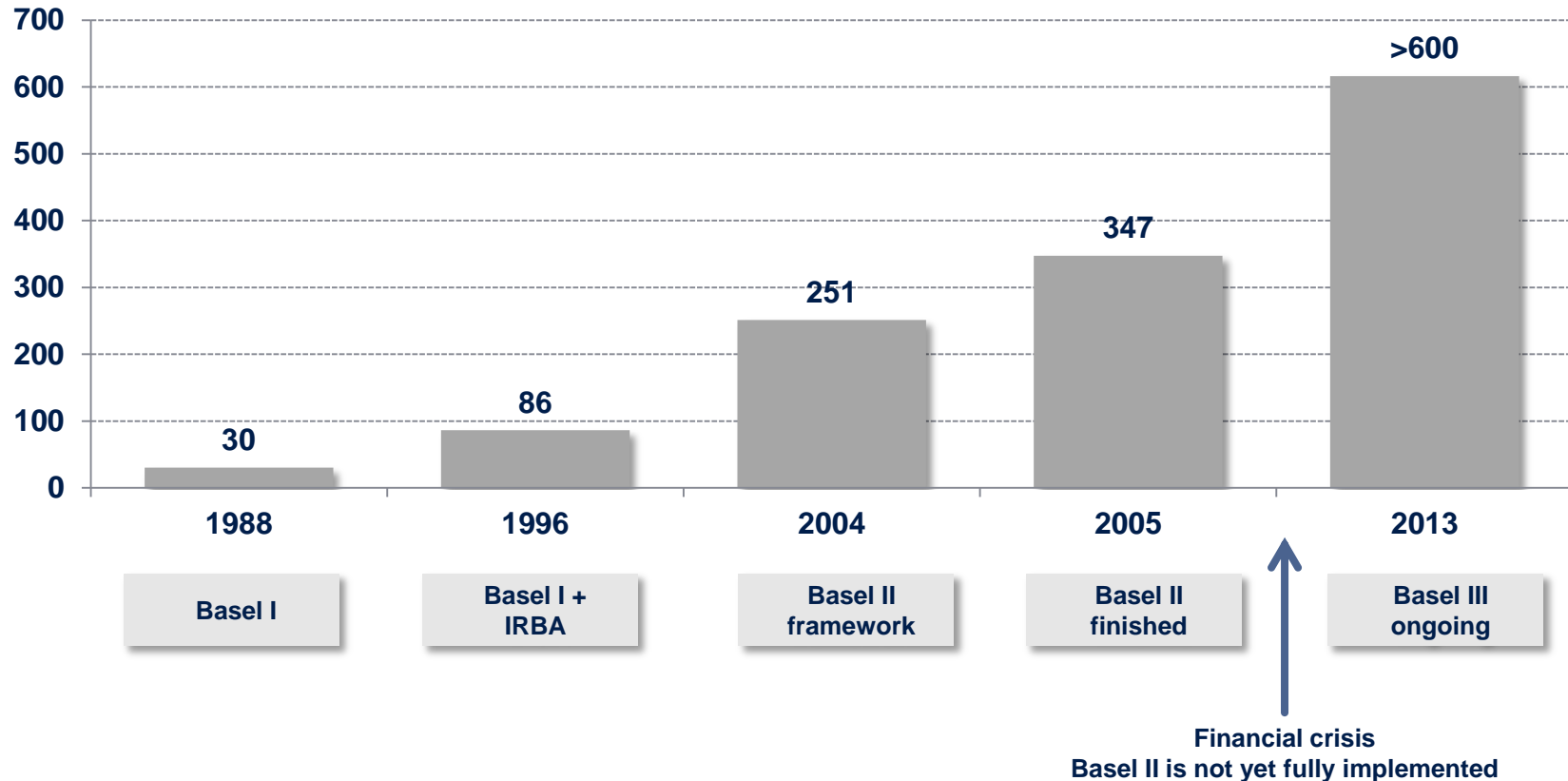
Figure 3: Total RWAs as a percentage of total assets (end-2011 data)



Differences arise from different business models, accounting standards and model approaches.

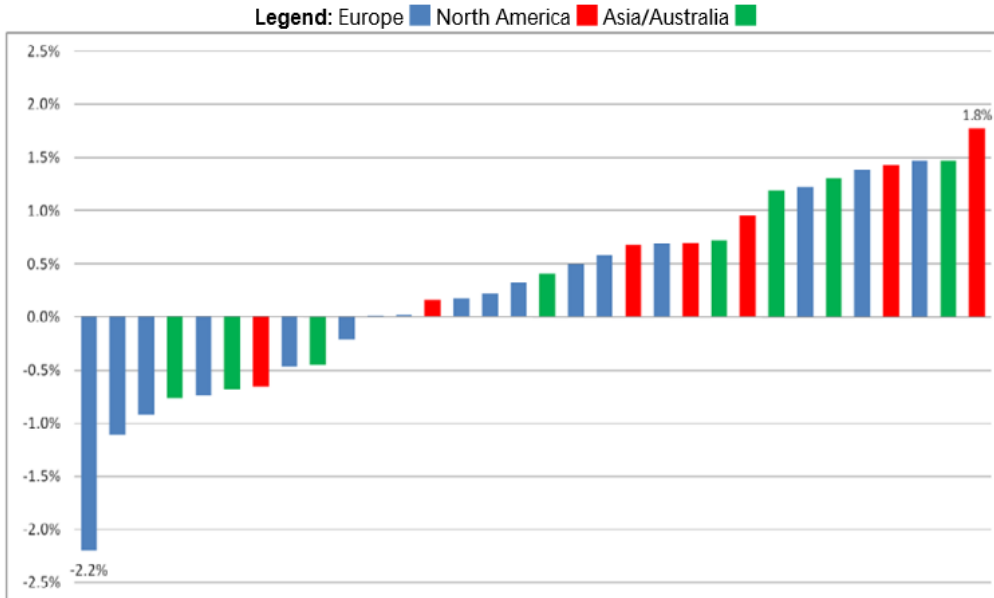
The ever growing amount of regulation – “the more is better”-approach

Development of the page count in the Basel Accord



Still needs to be translated into EU and national law! E.g. Basel III in EU already >500 and counting...

Does the effort pay off? The (dark) art of risk weighting



- » Investigation of the RWA in the banking book (July 2013): Looks at “practise-based” differences at 32 global banks via a “Hypothetical Portfolio Exercise”
 - » Capital ratios vary as much as +/- 1.5 to 2% (from Median of 10% from 32 banks)
 - » “notable dispersion (of PD and LGD)”
 - » “material amount of dispersion due to differences in practices”

Table 1: Implied capital requirement for the main diversified test portfolio (portfolio 25)

	Implied capital requirement for diversified portfolio (Euros)
Min	13,414,208
Max	34,165,014
Median	17,781,481
Mean	20,521,469
Stdev	6,344,392
Stdev/Mean	31%

- » Further investigation for trading book (January 2013 and December 2013)

There exists a material dispersion in calculating the risk weighted assets.



Example 2: European Stress Tests

Another case of an evolutionary approach

General challenges for stress tests

- » The difficulty to find the “right” balance:
 - › Too many failed banks – European banking systems in melt down
 - › No one fails – no credibility at all

- » The political conflicts:
 - › Germany: Do NOT stress shipping portfolios too much (HSH Nordbank, Commerzbank)
 - › France: Do NOT stress certain corporate loans too much
 - › ... and everyone: Do NOT stress anything related to sovereign debt too much!

- » The technical problem:
 - › Complexity immense; very resource intensive
 - › Never been really successful – see next slides

Stress tests are a fairly new tool; still a lot of “fine tuning” needed.

1st try CEBS: The (dark) art of stress testing

- » July 2010: CEBS (Committee of European Banking Supervisors) gets a go:
 - » 91 banks, 7 fail (of which you know none: Diada, Unnim,...)
 - » Hypo Reals Estate – already broke beforehand
 - » **Ireland:** Anglo Irish already bailed out – better be excluded; **other Irish banks look healthy**

- » Aggregated shortfall of only EUR 3.5bn

Template for bank specific publication of the stress test outputs

Name of bank: **ALLIED IRISH BANKS**

Actual results	
At December 31, 2009	m/n EUR
Total Tier 1 capital	8,542
Total regulatory capital	12,316
Total risk weighted assets	121,605
Pre-impairment income (including operating expenses)	2,294
Impairment losses on financial assets in the banking book	-5,380
1 yr Loss rate on Corporate exposures (%) ¹	4.6%
1 yr Loss rate on Retail exposures (%) ²	0.7%
Tier 1 ratio (%)	7.0 %
Outcomes of stress test scenarios	
The stress test was carried out under a number of key common simplifying assumptions (e.g. constant balance sheet, uniform treatment of securitisation exposures). Therefore, the information relative to the benchmark scenarios is provided only for comparison purposes and should in no way be construed as a forecast.	
Benchmark scenario at December 31, 2011 ²	
m/n EUR	
Total Tier 1 capital after the benchmark scenario	6,838
Total regulatory capital after the benchmark scenario	11,175
Total risk weighted assets after the benchmark scenario	72,313
Tier 1 ratio (%) after the benchmark scenario	9.5 %
Adverse scenario at December 31, 2011 ²	
m/n EUR	
Total Tier 1 capital after the adverse scenario	5,305
Total regulatory capital after the adverse scenario	9,642
Total risk weighted assets after the adverse scenario	73,771
2 yr cumulative pre-impairment income after the adverse scenario (including operating expenses) ²	901
2 yr cumulative impairment losses on financial assets in the banking book after the adverse scenario ²	-9,829
2 yr cumulative losses on the trading book after the adverse scenario ²	-20
2 yr Loss rate on Corporate exposures (%) after the adverse scenario ^{1, 2}	6.11%
2 yr Loss rate on Retail exposures (%) after the adverse scenario ^{1, 2}	4.31%
Tier 1 ratio (%) after the adverse scenario	7.2 %
Additional sovereign shock on the adverse scenario at December 31, 2011	
m/n EUR	
Additional impairment losses on the banking book after the sovereign shock ²	-606
Additional losses on sovereign exposures in the trading book after the sovereign shock ²	-36
2 yr Loss rate on Corporate exposures (%) after the adverse scenario and sovereign shock ^{1, 2, 3}	6.38%
2 yr Loss rate on Retail exposures (%) after the adverse scenario and sovereign shock ^{1, 2, 3}	4.94%
Tier 1 ratio (%) after the adverse scenario and sovereign shock	6.5 %
Additional capital needed to reach a b % Tier 1 ratio under the adverse scenario + additional sovereign shock, at the end of 2011	-

¹ Impairment losses as a % of corporate/retail exposures in APS, HTM, and loans and receivables portfolios

² Cumulative for 2010 and 2011

³ On the basis of losses estimated under both the adverse scenario and the additional sovereign shock

... 4 month later: Failing banks pull the whole of Ireland into the abyss

Ireland asks for €90bn EU bailout

Three-year loan, mainly earmarked to rescue the Republic's debt-ridden banks, will be handed over by the IMF and the EU

[Henry McDonald](#) in Dublin and [Jill Treanor](#)
The Guardian, Monday 22 November 2010



Brian Cowen and Brian Lenihan after confirming Ireland will seek a bailout loan from the IMF and EU. Photograph: Julien Behal/PA

British taxpayers face a multimillion pound bill to help bail out Ireland which last night asked for an international financial rescue package of as much as €90bn (£77.3bn), after seven days of denying it would need to succumb to the humiliation of a bailout for its crippled banking system.

Ireland Gets \$113 Billion Bailout as EU Ministers Seek to Halt Debt Crisis

By James G. Neuger and Simon Kennedy | Nov 29, 2010 1:58 PM GMT+0100 | [0 Comments](#) [Email](#) [Print](#)

European governments sought to quell the market turmoil menacing the euro, handing Ireland an 85 billion-euro (\$113 billion) aid package and diluting proposals to force bondholders to bear some cost of future bailouts.

European finance chiefs ended crisis talks in Brussels yesterday by endorsing a Franco-German compromise on post-2013 rescues that means investors won't automatically take losses to share the cost with taxpayers as German Chancellor **Angela Merkel** initially proposed to the consternation of bond traders.

The twin decisions were not enough to placate investors today that the crisis is now contained. Irish 10-year bonds erased an early advance, European stocks and the euro declined and the cost of insuring the debt of Spain and Portugal against default soared to record highs.

Related

- [Ireland's Bailout](#)
- [Wolf Interview on Ireland's Aid Package, Euro Outlook](#)
- [Nomura's Maloney on Irish Bailout](#)
- [Callow on Irish Bailout](#)

2nd try: EBA – „let’s be tougher“

- » EBA stress test, results from July 2011: only €2.5bn capital shortfall for all 90 banks.
 - › “The 2011 EU-wide stress test provides an **unprecedented level of transparency** on banks’ exposures and capital composition to allow investors, analysts and other market participants to develop an informed view on the resilience of the EU banking sector.”

- » Extract from the summary for the adverse scenario; **Dexia looks great!**

Results of the 2011 EU-wide Stress Test under the adverse scenario

Country	Bank	BANK Code	CT1 ratio Dec. 2010	CT1 ratio Dec. 2012 (Dec. 2010) (*)	CT1 ratio Dec. 2012 (April 2011) (**)
Austria	ERSTE BANK GROUP (EBG)	AT001	8.7%	8.1%	8.1%
	RAIFFEISEN BANK INTERNATIONAL (RBI)	AT002	8.1%	7.8%	7.8%
	OESTERREICHISCHE VOLKSBANK AG	AT003	6.4%	4.5%	4.5%
Belgium	DEXIA	BE004	12.1%	10.4%	10.4%
	KBC BANK	BE005	10.5%	10.0%	10.0%
Cyprus	MARFIN POPULAR BANK PUBLIC CO LTD	CY006	7.3%	3.6%	5.3%
	BANK OF CYPRUS PUBLIC CO LTD	CY007	8.1%	6.2%	6.2%
Denmark	DANSKE BANK	DK008	10.0%	11.1%	13.0%
	JYSKE BANK	DK009	12.1%	12.8%	12.8%
	SYDBANK	DK010	12.4%	13.6%	13.6%
	NYKREDIT	DK011	8.8%	9.4%	9.4%
Finland	OP-POHJOLA GROUP	FI012	12.2%	11.6%	11.6%
France	BNP PARIBAS	FR013	9.2%	7.9%	7.9%
	CREDIT AGRICOLE	FR014	8.2%	8.5%	8.5%
	BPCE	FR015	7.8%	6.7%	6.8%
	SOCIETE GENERALE	FR016	8.1%	6.6%	6.6%
Germany	DEUTSCHE BANK AG	DE017	9.8%	6.5%	6.5%

Source: EBA Report

d-fine

...3 months later: Dexia sinks and needs a bailout

- » 10th October 2011: Dexia is rescued by French & Belgian government

Dexia bank gets massive bailout

France, Belgium and Luxembourg are to bail out the troubled bank Dexia, following fears it could go bankrupt.

The Belgian government will buy the bank's division in Belgium for 4bn euros (\$5.4bn; £3.4bn).

And Luxembourg's finance minister said a Qatari investment group was ready to buy the bank's Luxembourg unit.



Trading has r
their value ha

How did Europe's bank stress tests give Dexia a clean bill of health?

Dexia, the deeply troubled Franco-Belgian bank, passed the European Banking Authority's stress tests just three months ago



Andrea Enria, chairman of the European Banking Authority, has admitted Dexia could infect other banks. Photograph: Brendan Smialowski/AFP/Getty Images

It may seem like a lifetime away, but it is only in July that the [European Banking Authority published the result of "stress tests"](#) on 90 banks across 21 countries in the EU, covering around 65% of the banking industry.

3rd try: ECB – “let’s be even tougher”

- » To be safe: exclude Dexia due to its “specific situation”
- » And a sigh of relieve from the ECB: collapse of Portuguese bank just **before** end of stress test

Portugal in 4.9 billion euro rescue of Banco Espirito Santo

BY SERGIO GONCALVES

LISBON | Mon Aug 4, 2014 9:26pm BST

0 COMMENTS | [Tweet](#) 13 | [Link this](#) | [Share this](#) | [Email](#) | [Print](#)



The logo of Portuguese bank Banco Espirito Santo (BES) is seen at their headquarters in downtown Lisbon August 3, 2014.

CREDIT: REUTERS/HUGO CORREIA

Banco Espirito Santo Junior Bonds Slide as Bailout Forces Losses

By Joao Lima and Alastair Marsh | Aug 4, 2014 12:21 PM GMT+0200 | [42 Comments](#) | [Email](#) | [Print](#)

Banco Espirito Santo SA's junior bonds tumbled to a record after the lender's 4.9 billion-euro (\$6.6 billion) bailout left holders facing losses they're struggling to quantify.

The Bank of **Portugal** will take control of Banco Espirito Santo's assets and deposit-taking operations by transferring them to a new company, Novo Banco, into which it will inject money from its **Resolution Fund (BRAEIA)**, the regulator said in a statement late yesterday. The fund will finance the rescue with a Treasury loan to be repaid by Novo Banco's eventual sale.

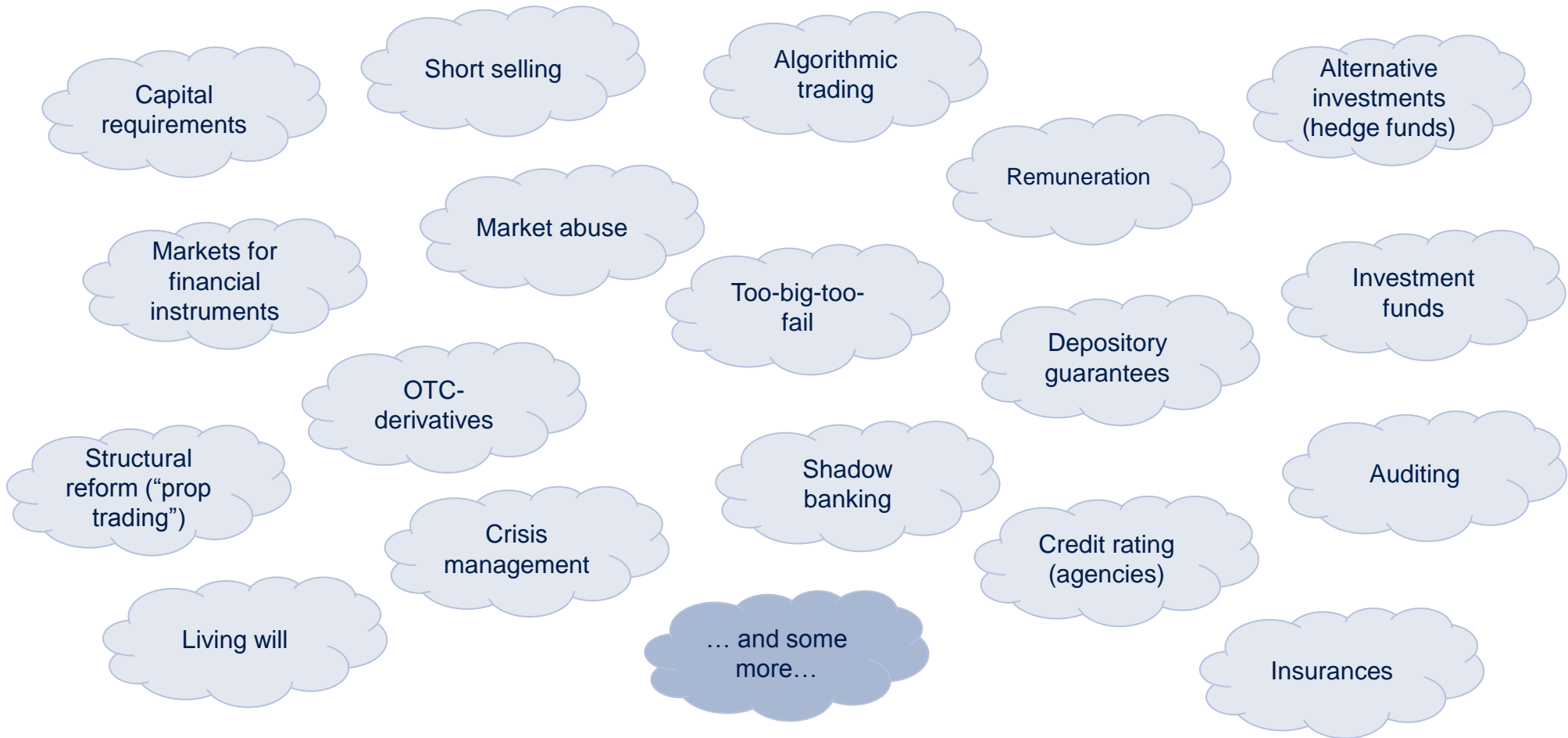


Aug. 4 (Bloomberg) — Bloomberg's Mark Barton breaks down the \$6.6 billion bailout of Banco Espirito Santo by Portugal's central bank and what it means to the firm, taxpayers and shareholders. He speaks on "The Pulse."

The ECB's stress is trying to strike the right balance between all the constraints.

4. The Regulatory Tsunami - a Helicopter View

A myriad of topics are on the legislator's agenda



EU: primary legislation ~**2000** pages; estimates for final page count: > **60 000!** (Level I, level II)

Focus on banking regulation for capital markets - an incomplete overview

EU Regulation	Aim / description
EMIR	<ul style="list-style-type: none">» Make the market for OTC-derivatives safer and more transparent» Mandates central clearing, introduces margin requirements and transactions reporting
CRD IV / CRR	<ul style="list-style-type: none">» Implements Basel III. Focuses on requirements for capital, liquidity, funding and leverage» Includes the net stable funding ratio (NTSF), liquid coverage ratio (LCR) and CVA-Charge
MiFID II/ MiFIR (incl. PRIIPS)	<ul style="list-style-type: none">» Improving the market for financial instruments. Vast scope; ranging from algorithmic trading, investor protection, and transaction reporting to changes in the market infrastructure
MAD II / MAR	<ul style="list-style-type: none">» New rules for prevention and sanctioning of market manipulation, market abuse and insider trading
BRRD & SRM	<ul style="list-style-type: none">» Bank Recovery and Resolution Directive & Single Resolution Mechanism» Prevention and the management of an orderly resolution of failing banks; living will
German Regulation	Aim / description
Trennbankengesetz	<ul style="list-style-type: none">» Prohibition of proprietary trading» (EU: Structural reform of the banking sector; probably 2017)
Finanztransaktionssteuer	<ul style="list-style-type: none">» Financial transaction tax on stocks, bonds and derivatives» (Discussions between 11 committed EU member states ongoing; no equivalent EU legislation.)

5. Deep Dive into selected Regulatory Frameworks

The changing environment for OTC-derivatives

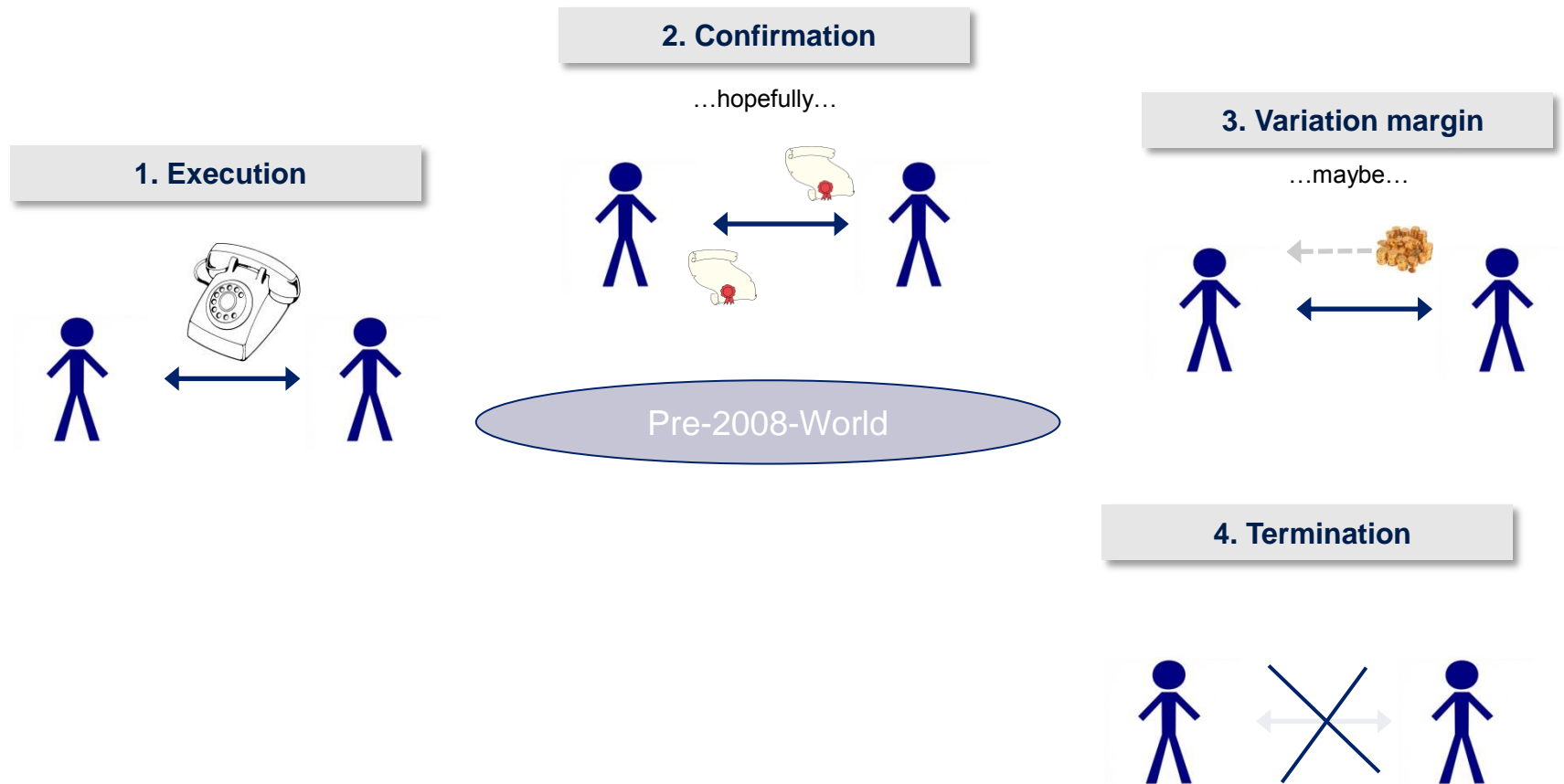


EMIR – Central Clearing of OTC-derivatives

A new design for the market infrastructure

OTC-derivatives I:

Before 2008 an OTC-derivative transaction was fairly unregulated



The G20 agreed in 2009 to globally increase financial stability – goal was by end-2012 at the latest...



“All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest.

OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements.

We ask the FSB and its relevant members to assess regularly implementation and whether it is sufficient to improve **transparency** in the derivatives markets, **mitigate systemic risk**, and **protect against market abuse.**”

Exchanges/Platforms

- » Europe: “Markets in Financial Instruments Regulation” (MiFIR/MiFID2)
- » USA: Dodd-Frank Act

Central Clearing

- » Europe: “European Market Infrastructure Regulation” (EMIR)
- » USA: Dodd-Frank Act

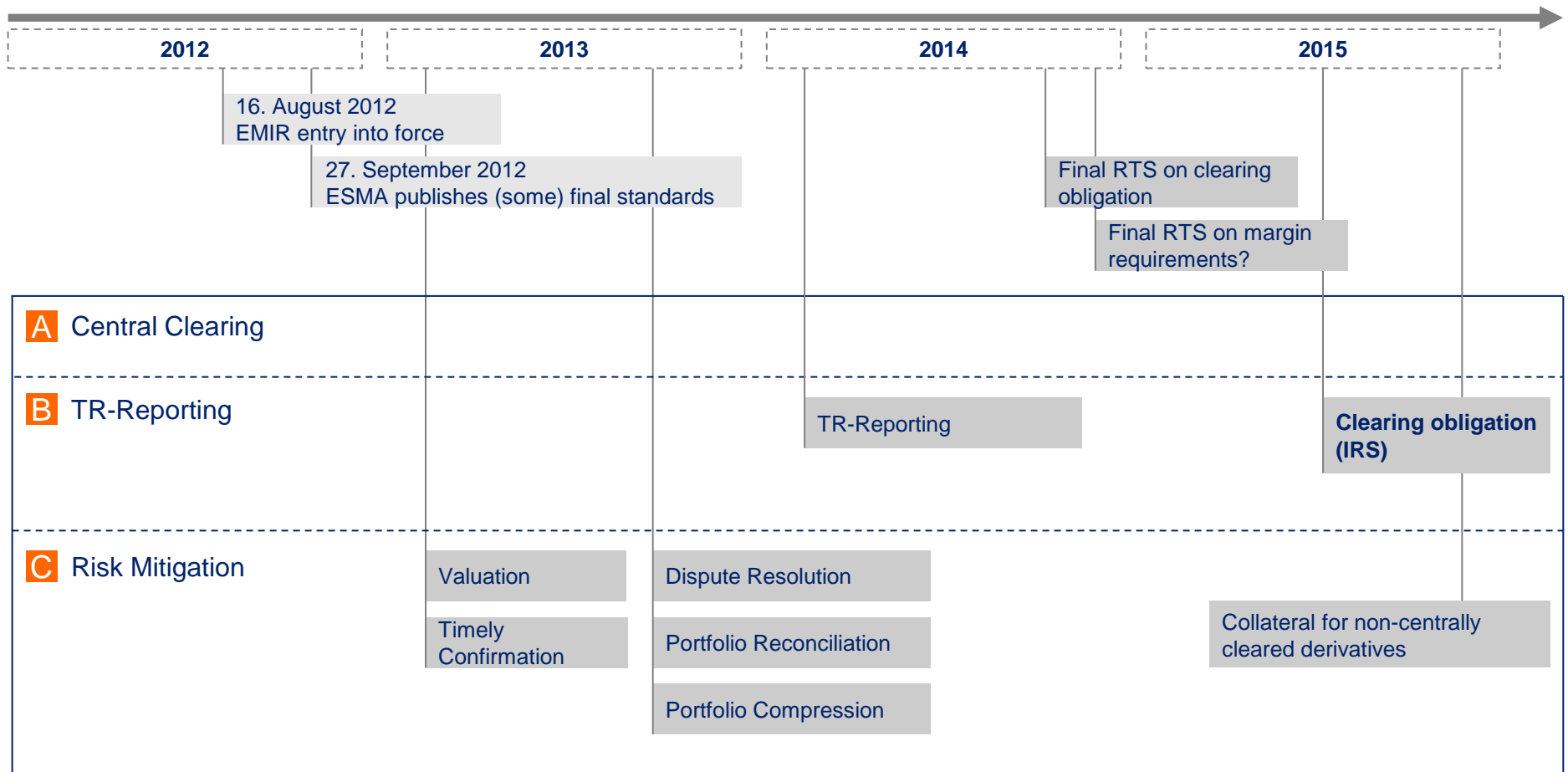
TR-Reporting

- » Europe: EMIR
- » USA: Dodd-Frank Act

Capital Charges and Risk Mitigation for non-centrally cleared Derivatives

- » Europe: “Capital Requirements Regulation” (CRR), EMIR
- » USA: Dodd-Frank Act

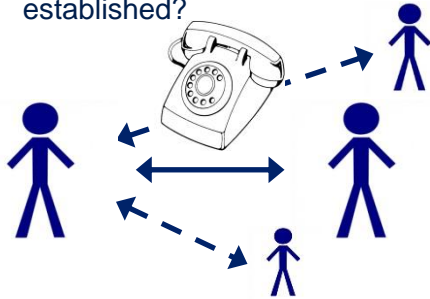
...now in 2014 in Europe we're still not quite there – clearing obligation in Europe expected for Summer 2015



OTC-derivatives II: The new regulation touches upon every step in the trade's lifecycle; new steps are introduced

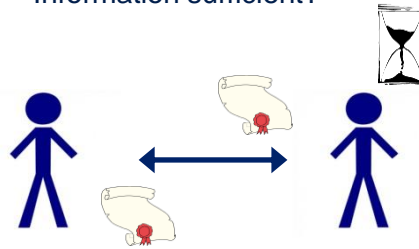
1. Execution

- » Electronic trading venue necessary?
- » Pre-trade transparency established?



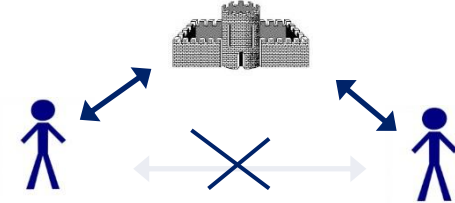
2. Confirmation

- » Met deadlines?
- » Information sufficient?



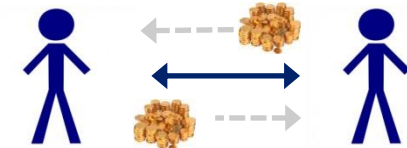
3. CCP Clearing

- » Clearing obligation?
- » Clearinghouse connection?



4. Margin

- » Variation margin;
- » Initial margin



Post-2015-world

6. Portfolio reconciliation

- » Compare valuations!
- » Resolve disputes!



5. Transaction reporting

- » Daily reporting to transaction repository

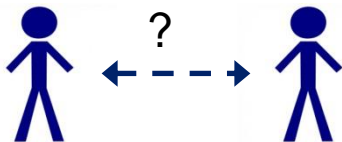


7. Termination



0. New pre-deal-checks

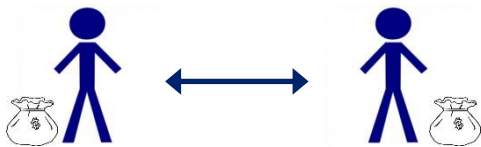
- » Documentation up-to-date?
- » Sufficient credit / limit?



Central clearing I:

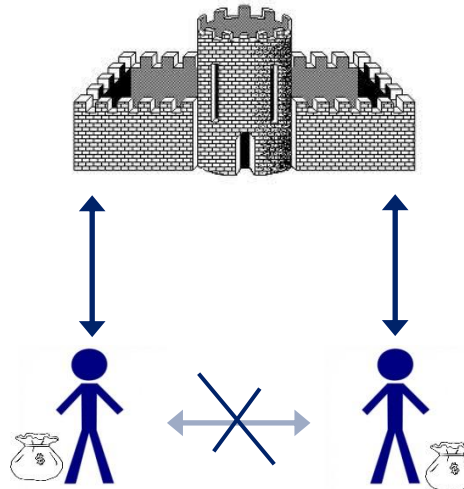
The CCP acts as a buyer to every seller and seller to every buyer

1. Conclude derivative deal



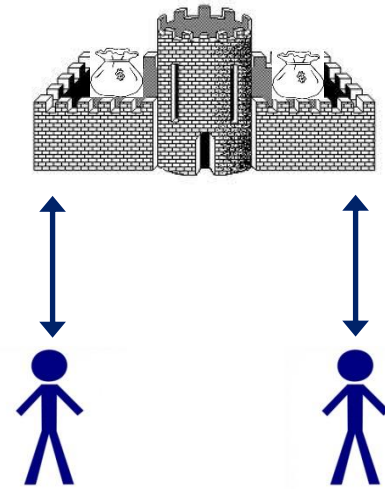
- » Derivative is a “standard” product; highly liquid

2. Novation to CCP



- » Replace original deal by two new deals
- » Clearing house acts as central counterparty (CCP): “buyer to every seller and seller to every buyer”
- » Examples: Eurex, LCH, ICE

3. Initial margin posting

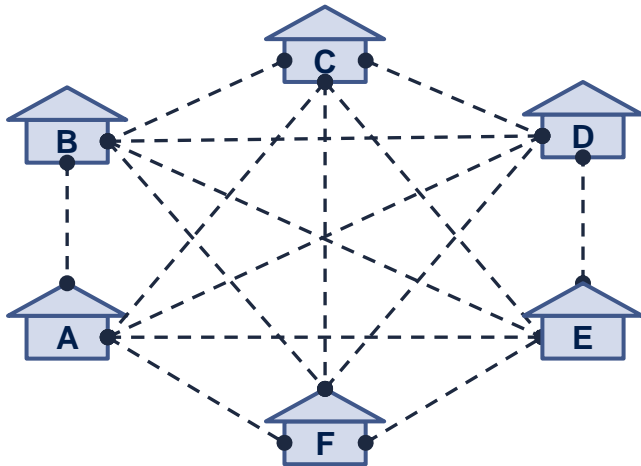


- » Post cash (or liquid securities) as initial margin to CCP
- » Initial margin requirements are lower than for bilateral trade, because:
 - › Lower regulatory requirements
 - › Multilateral netting

Central clearing II:

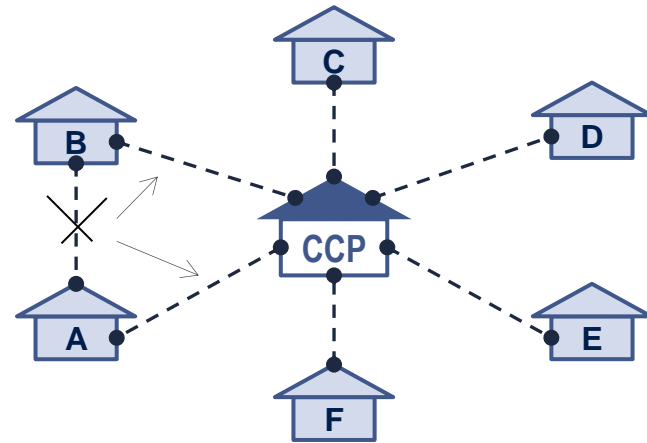
Central clearing reduces the number of links within the financial system

Bilateral trades



- » Every trade remains a bilateral contract till termination
- » Netting only possible with each bilateral relationship
- » High interconnectedness, little transparency (who owes what to whom?)

Transaction with a CCP



- » Every trade is replaced by two trades with the central counterparty (CCP)
- » Every market participant only faces the counterparty; high netting efficiency
- » But: CCPs can be very large (LCH ~ 70% of IRS market); new too-big-too-fail institutions?

Central clearing is one of the cornerstones envisaged to safeguard the financial systems.

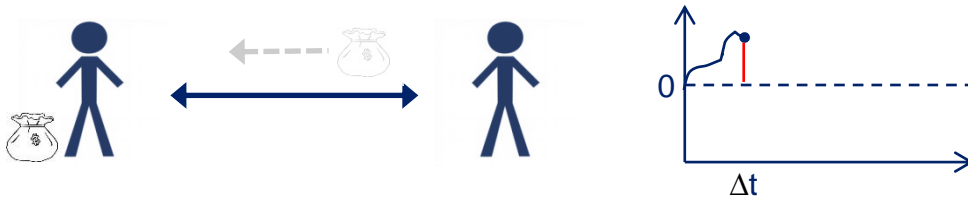
Initial margin I: In the event of the counterparty's default the surviving party must quickly close out, hedge or transfer the defaulter's portfolio

t = 0: conclude derivative deal



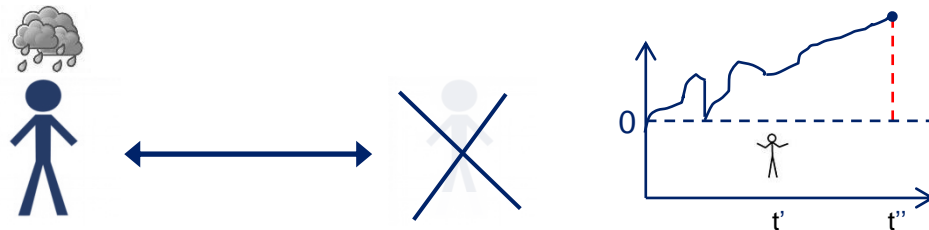
- » valuation ($t=0$) = 0
- » no exchange of initial margin

t = Δt : exchange of variation margin



- » variation margin = mark-to-market value; exposure resulting from actual changes in market prices

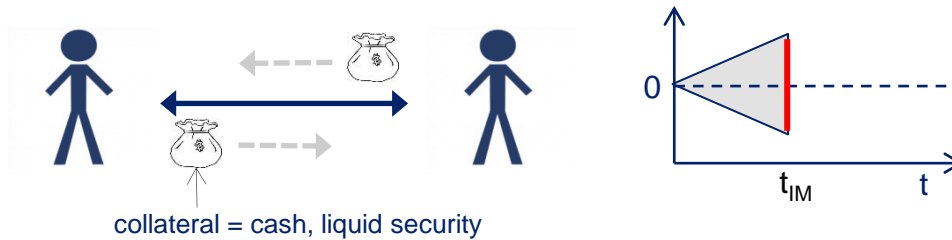
t = t': counterparty defaults



- » close-out risk: realised market risk hits the surviving counterparty
- » loss = change between default (at t') and close out of position (at t'')

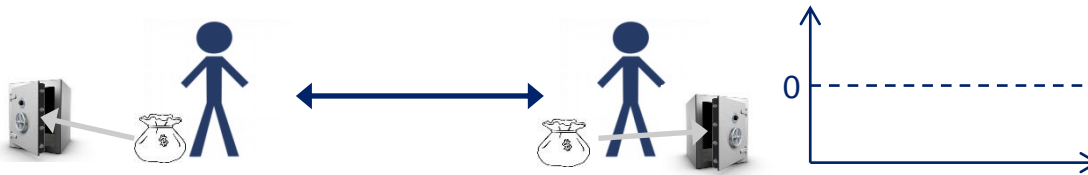
Initial margin II: The surviving party uses the initial margin to absorb the losses of the counterparty's default

t = 0: conclude derivate deal; exchange of initial margin



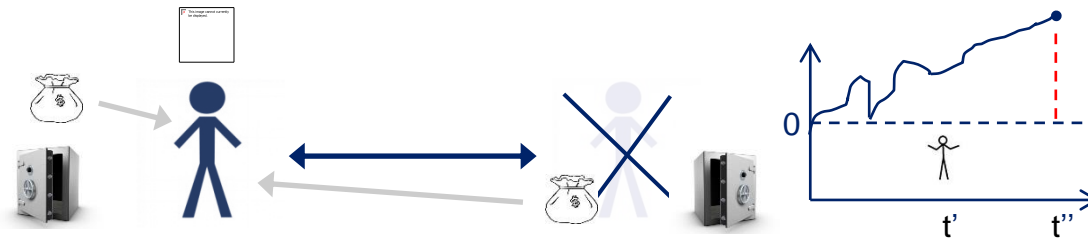
- » Valuation ($t=0$) = 0
- » Initial margin: “potential future exposure”; collateral collected to cover potential changes in the value over the appropriate close-out period in the event of default

t = 0: universal-two-way initial margin is segregated from own funds



- » Initial margin must be kept segregated

t = t': counterparty defaults; initial margin mitigates potential losses



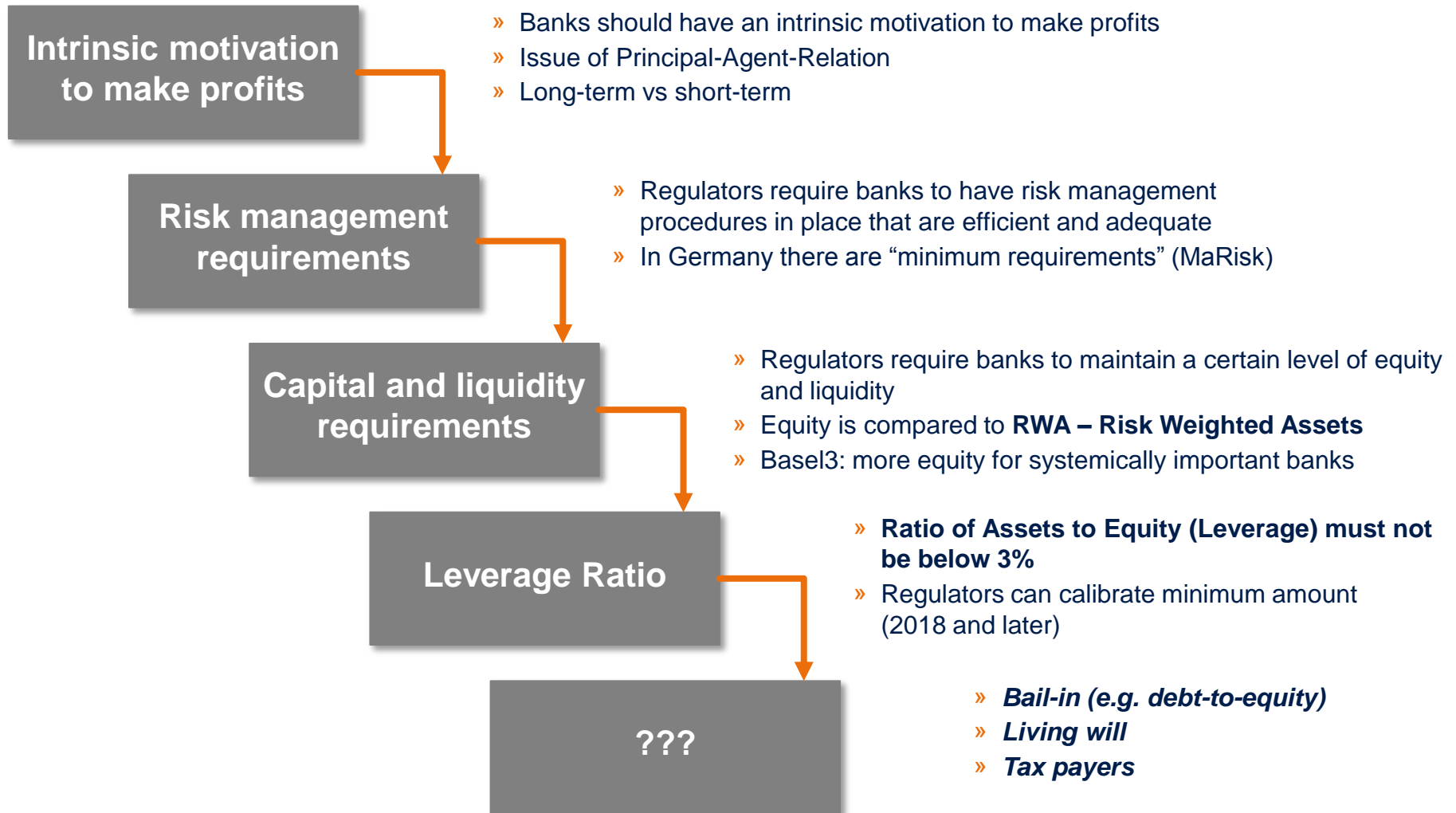
- » $t = t'$; counterparty defaults
- » Surviving party receives back posted collateral, uses collected IM to cover potential losses



CRR – Capital Requirements for OTC-derivatives

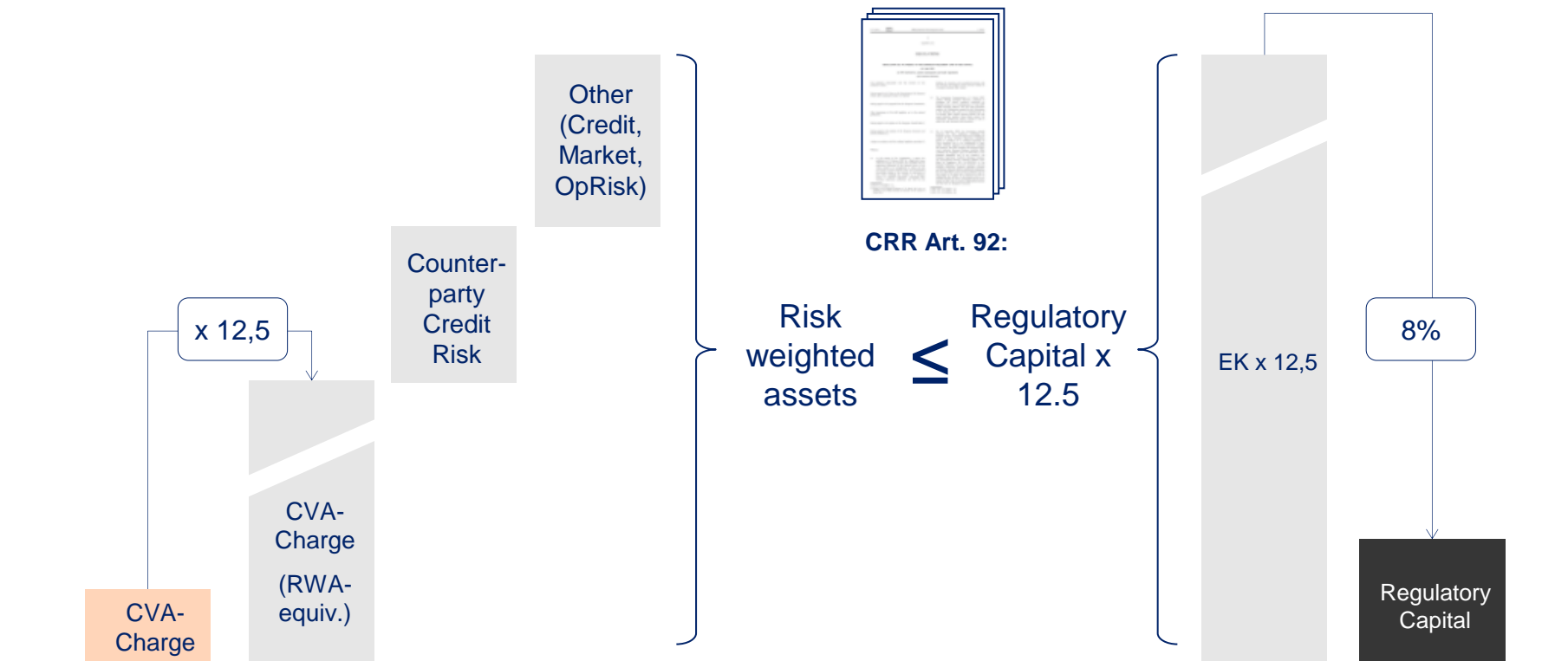
New rules should reflect the inherent risk in derivatives

When risk management fails, there are some backstop measures in place



Capital requirements – banks must have enough capital to absorb future unforeseen losses on a given level of confidence

Risk weighted assets and CVA-Charge for Derivatives Exposure



RWA formula for credit risk

$$\text{RWA} = \text{Risk Weight} \times \text{Exposure at Default}$$

Risk Weight

- » Standard Model: Depending on exposure class and external rating (CRR Art. 111 to 141)
- » Internal Model: EAD is modelled through “Probability of Default” and “Loss given Default”

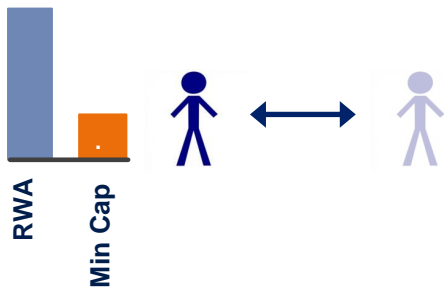
Exposure at Default

- » There are 4 different methods for obtaining EAD for a derivatives portfolio:
 1. **Current Exposure Method**
 2. Original Exposure Method
 3. Standardised Method
 4. Internal Model Method
- » A good exposure method needs to take into account:
 - › **Netting**
 - › **Portfolio diversification**
 - › **Collateral**

*Bear with me...
we need some
foundation first.*

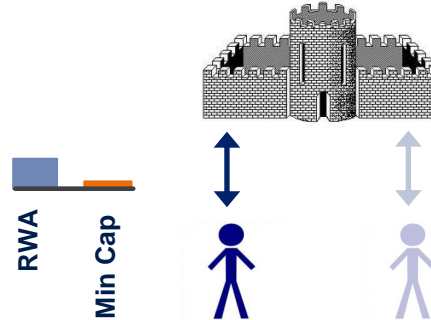
Capital Requirements for a CCP-cleared trade

Bilateral trade



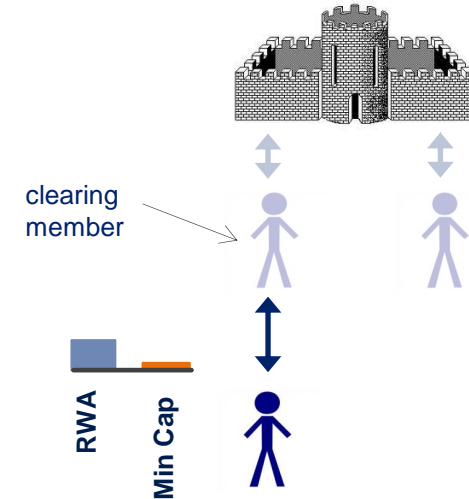
- » Risk weight according to standardised approach or IRBA
- » Example: risk weights of 20%, 50%, 100%, 150% (Standardised Approach)
- » RWA for Counterparty Credit Risk and CVA-Charge

Transaction with a CCP



- » Risk weight of 2% for direct clearing members
- » No CVA-Charge for centrally cleared trades

Client of a clearing member



- » More complicated; see next slide

Central clearing is incentivised under capital requirements regime

Capital treatment for centrally cleared portfolios

- » Main question: What **risk weight** (RW) applies for each exposure (trade, collateral (cash, securities), add-on)?
- » Legal basis: CRR article 305

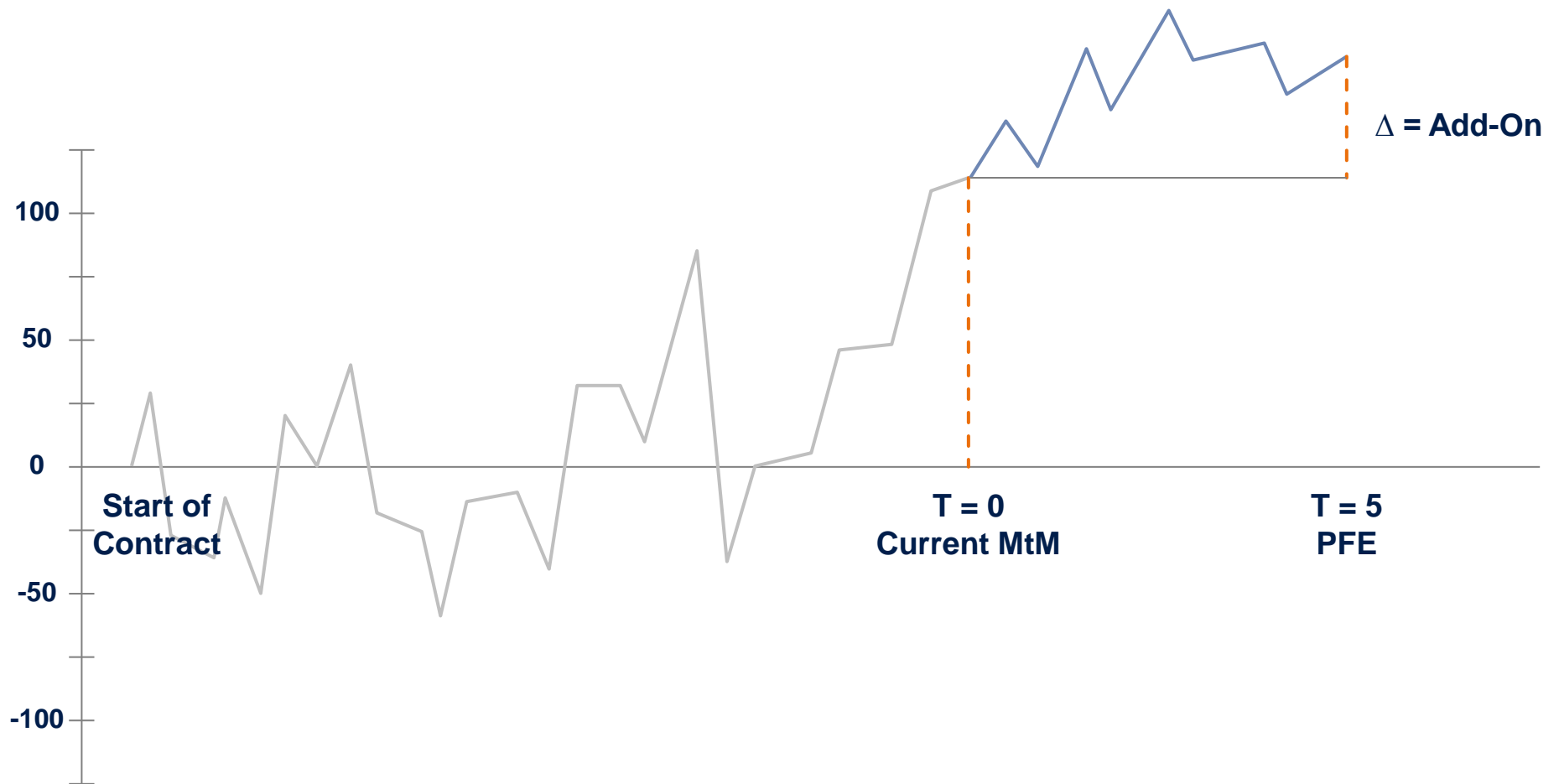
Necessary conditions for privileged RW

1. **Bankruptcy remote** – assets are protected from bankruptcy of clearing broker
2. **Portability** – portfolio can be transferred to auxiliary / back-up clearing broker
3. **Legal opinion** - lawyer agree that the assets are indeed bankruptcy remote
4. **qCCP** - CCP is registered as a „qualified CCP“

Choosing the correct risk weight

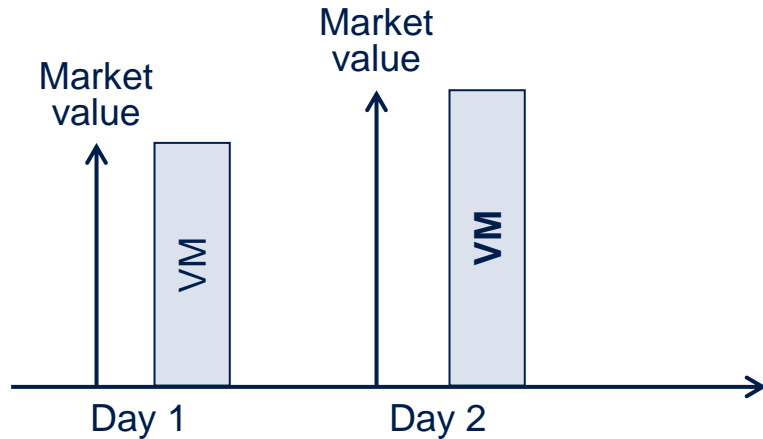
- » Bilateral RW for clearing broker
- » If criteria not met
- » 4% ...
- » If 4 criteria are fulfilled when clearing broker collapses
- » 2% ...
- » If 4 criteria are fulfilled when clearing broker and additional client collapse
- » 0% ...
- » For members of the same institutional protection scheme

A swap has a current market value (MtM) and a Potential Future Exposure (PFE, also called “Add-On”)



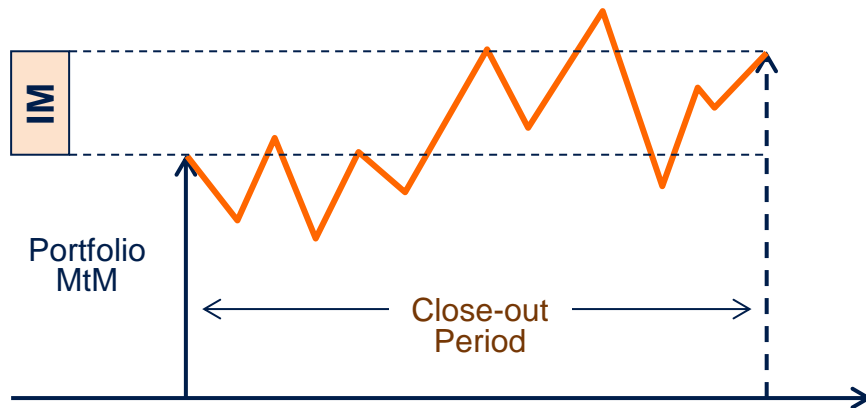
MtM is “backward looking”, PFE is “forward looking”. The Add-On (or PFE) gives rise to (possibly) more exposure.

CCPs: Variation Margin collateralises the current market value of a portfolio, Initial Margin covers the potential changes in value over a given period



Variation Margin

- » Example: Swap has a market value of € 3m on day 1, on day 2 a market value of € 5m
- » VM-amounts to € 3m (day 1) and € 5 m (day 2); the difference of € 2 m has to be settled on day 2
- » Central Counterparties also calculate VM intraday



Initial Margin

- » Initial Margin is calculated based on extreme market conditions
- » CCPs usually use both historical scenarios and non-historical (“extreme, yet plausible”) scenarios
- » Reference period for IRS is typically days (when centrally cleared)
- » Central Counterparties also calculate IM intraday

EAD according to Current Exposure Method for one swap



- » MtM: Current Market Value of Derivative – positive or negative
- » Long/short: Long: MtM goes up when underlying (e.g. interest rate) goes up
- » Risk: Sensitivity of MtM to changes in the market (e.g. $\Delta\text{MtM}/1\text{bp}$)

$$\text{EAD} = \text{RC} + \text{Add-On}$$

$$\text{RC} = \max(\text{MtM}; 0)$$

Add-On = function of underlying asset class, notional, maturity

For this example: Add-On = Risk x 10

Example 1

+10 Long 0.1

$$\text{EAD} = \text{RC} + \text{Add-On} = 10 + 1$$

Example 2

-10 Long 0.1

$$\text{EAD} = \text{RC} + \text{Add-On} = 0 + 1$$

Example 3

-20 Long 0.2

$$\text{EAD} = \text{RC} + \text{Add-On} = 0 + 2$$

Netting

Swap		
MtM	Long/ short	Risk

- » MtM: Current Market Value of Derivative – positive or negative
- » Long/short: Long: MtM goes up when underlying (e.g. interest rate) goes up
- » Risk: Sensitivity of MtM to changes in the market (e.g. $\Delta\text{MtM}/1\text{bp}$)

+10	Long	0.1
-20	Short	0.2
+10	Long	0.1
+5	Short	0.1

- » $\text{EAD} = \text{RC} + \text{Add-On}$
- » What is RC: sum first and then $\max()$ or other way round?
- » Answer: depends on **netting agreement**
- » With netting agreement: $\text{RC} = \max(5; 0) = 5$
- » Without netting agreement:
 $\text{RC} = \max(10; 0) + \max(-20; 0) + \max(10; 0) + \max(5; 0) = 25$
- » Add-On: see following slides!

Add-On according to Current Exposure Method for one swap

Excerpt from CRR Article 274 – Mark-to-market Method, aka Current Exposure Method

Mark – to – market Method

Article 274

Mark-to-market Method

1. In order to determine the current replacement cost of all contracts with positive values, institutions shall attach the current market values to the contracts.

2. In order to determine the potential future credit exposure, institutions shall multiply the notional amounts or underlying values, as applicable, by the percentages in Table 1 and in accordance with the following principles:

Table 1

Residual maturity	Interest-rate contracts	Contracts concerning foreign-exchange rates and gold	Contracts concerning equities	Contracts concerning precious metals except gold	Contracts concerning commodities other than precious metals
One year or less	0 %	1 %	6 %	7 %	10 %
Over one year, not exceeding five years	0,5 %	5 %	8 %	7 %	12 %
Over five years	1,5 %	7,5 %	10 %	8 %	15 %

Add-On for an Interest Rate Swap with € 100m notional and a residual maturity of 7 years equals 1.5m.

Add-On according to Current Exposure Method for one swap – Examples

Swap				
MtM	Asset class	Notional	Maturity	
				» MtM: Current Market Value of Derivative according to CRR Art. 274, Table 1
				» Asset class: Amount that is basis for calculating cash flows
				» Notional: End of contract
				» Maturity:
Example 1	Interest Rate	1m	10y	» Add-On = 15,000
Example 2	Interest Rate	5m	2y	» Add-On = 25,000
Example 3	Interest Rate	100m	0.5y	» Add-On = 0

MtM not relevant for Add-On calculation of a single contract...

Portfolio diversification when calculating Add-On

- » Having different swaps in one portfolio generally mitigates risk
- » Swaps generally have different sensitivities to price changes in the underlying
- » Offsetting positions – even two very risky trades might offset one another

CRR Art. 298:

$$PCE_{red} = 0.4 \cdot PCE_{gross} + 0.6 \cdot NGR \cdot PCE_{gross}$$

- » **PCE_{red}**: the reduced figure for potential future credit exposure for all contracts with a given counterparty included in a legally valid bilateral netting agreement
- » **PCE_{gross}**: the sum of the figures for potential future credit exposure for all contracts with a given counterparty which are included in a legally valid bilateral netting agreement and are calculated by multiplying their notional principal amounts by the percentages set out in Table 1
- » **NGR**: the net-to-gross ratio calculated as the quotient of the net replacement cost for all contracts included in a legally valid bilateral netting agreement with a given counterparty (numerator) and the gross replacement cost for all contracts included in a legally valid bilateral netting agreement with that counterparty (denominator)

30	Interest Rate	1m	10y
-10	Interest Rate	5m	2y
-5	Interest Rate	100m	0.5y

- » Add-Ons are 15k, 25k and 0
- » Add-On_{gross} = **40k**
- » NGR = Net MtM / Gross MtM

$$= (30 - 10 - 5) / (30 + 0 + 0) = 15 / 30 = 50\%$$
- » Add-On_{red} = 40% x 40k + 60% x NGR x 40k = 16k + 50% x 24k

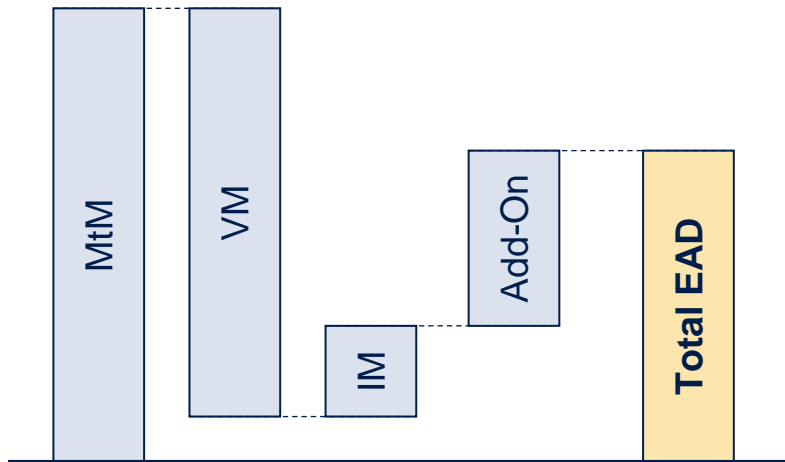
$$= \mathbf{28k}$$

Source: CRR

d-fine

EAD of a centrally cleared portfolio

Overview



- » Total EAD is composed of MtM, Add-On, Variation Margin and Initial Margin

Details

Market value

- » Daily validated market value of all contracts (net)
- » Can be slightly different than calculated market value of clearing member

VM

- » CCP calculates VM
- » Sometimes 20 times per day
- » Margin call when Delta is above a certain threshold

IM

- » CCP calculates IM according to an internal portfolio model (not anything like CEM!)
- » Confidence level > 99.9% and close-out period typically 5 days

Add-On

- » Most market participants calculate Add-On according to CEM (see previous slides)

CRR Article 384: CVA calculation (Standardised Method)

$$K = 2.33 \cdot \sqrt{h} \cdot \sqrt{\left(\sum_i 0.5 \cdot w_i \cdot \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right) - \sum_{ind} w_{ind} \cdot M_{ind} \cdot B_{ind} \right)^2 + \sum_i 0.75 \cdot w_i^2 \cdot \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right)^2}$$

Some assumptions



Simplify!

$$CVA = 2,33 \cdot \sqrt{\left(\sum_i 0,5 w_i EAD_i M_i \right)^2 + \sum_i 0,75 w_i^2 EAD_i^2 M_i^2}$$

- » EAD_i total Exposure to counterparty i
- » w_i Risk Weight for counterparty i depending on credit quality step:
{1: 0,7%; 2: 0,8%; 3: 1.0%; 4: 2.0%; 5: 3%; 6: 10%}
- » M_i (notional-weighted) remaining maturity of all contracts with counterparty
- » For aggregation to RWA CVA needs to be multiplied with 12,5!

Contacts

Moritz von Medem

Manager

Mobile +49 162-263-1300

E-Mail moritz.von.medem@d-fine.de

Dr. Marcus Gildemeister

Senior Consultant

Mobile +49 162-263-1419

E-Mail marcus.gildemeister@d-fine.de

d-fine GmbH

Frankfurt

München

London

Wien

Zürich

Zentrale

d-fine GmbH

Opernplatz 2

D-60313 Frankfurt/Main

T. +49 69-90737-0

F. +49 69-90737-200

www.d-fine.com

dfine