



**EFFAS**

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**SUMMER SCHOOL**



# Fixed Income and Capital Ratios

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EFFAS THE EUROPEAN FEDERATION  
OF FINANCIAL ANALYSTS SOCIETIES

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- Accounting: Fixed Income Portfolios
- Capital Ratios
- Bonds in HTM or AFS Portfolios: RWA Calculation (Credit Risk)
- Bonds in Trading Portfolios: RWA Calculation (Market Risk)
- Credit Risk Mitigation Techniques: Capital implications of CDS
- Hedging
- Fixed Income and Capital Ratios: Conclusions

# Accounting: Fixed Income Portfolios

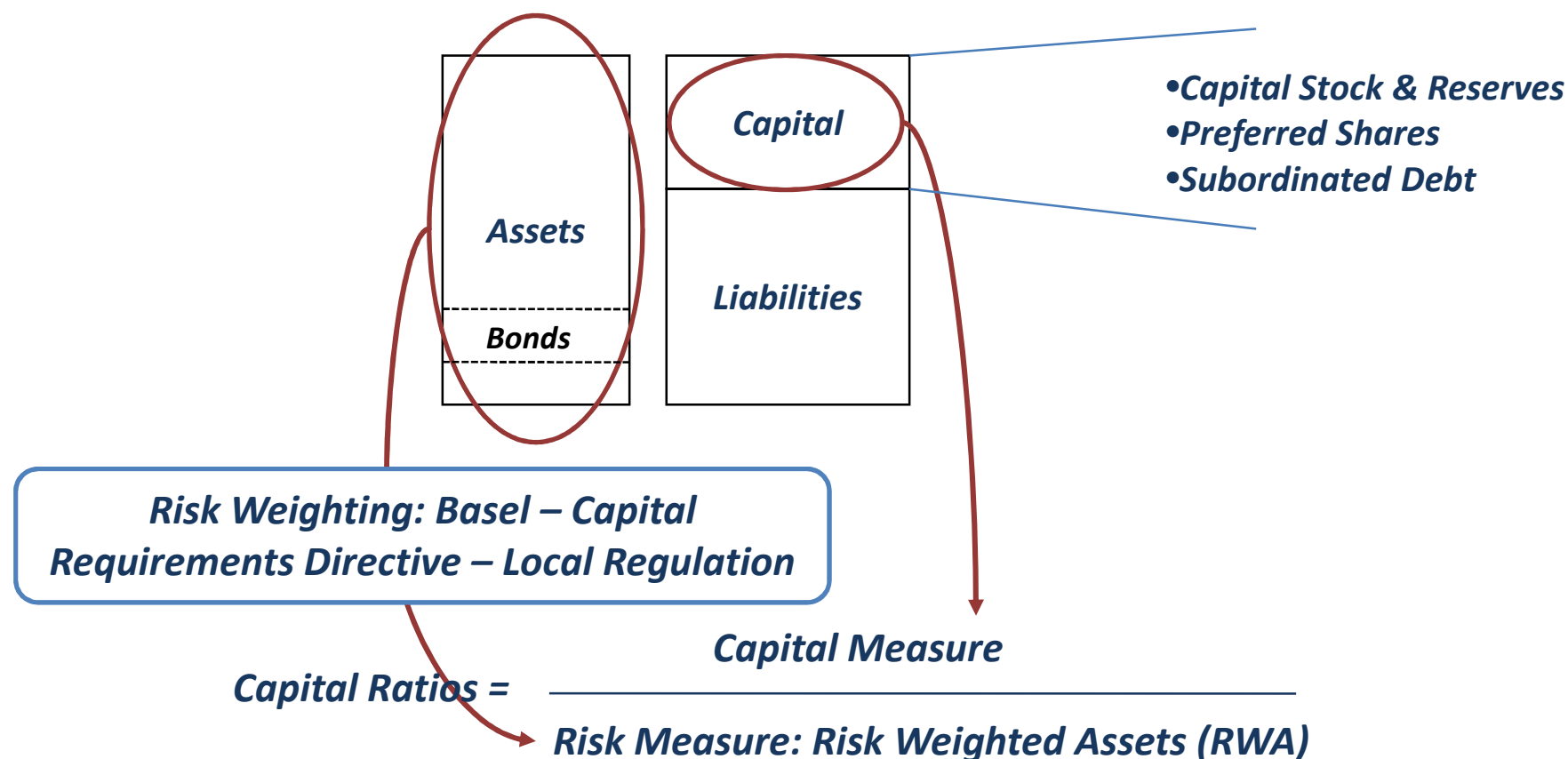
When investing in Bonds we have 3 different portfolios to book them:

	<b>Hold To Maturity (HTM)</b>	<b>Available For Sale (AFS)</b>	<b>Trading</b>
<b>Objective</b>	<i>Hold the bond until maturity → Carry trade</i>	<i>Not trading objective but available for sale</i>	<i>Trading</i>
<b>Accountancy</b>	<b>-Yield: Accrual accounting</b> <b>-Mark to Market: No</b>	<b>-Yield: Accrual accounting</b> <b>-Mark to Market impact: Shareholder's Equity</b>	<b>-Yield: Accrual accounting</b> <b>-Mark to Market: Daily MtM through P&amp;L</b>
<b>P&amp;L Impact</b>	<b>Net Interest Income = Yield daily accrual – Funding cost = Margin (credit spread) through P&amp;L</b>	<b>Net Interest Income = Yield daily accrual – Funding cost = Margin (credit spread) through P&amp;L</b>	<b>-Net Interest Income = Yield daily accrual – Funding cost = Margin (credit spread) through P&amp;L</b> <b>-Net gains on financial assets at fair value though P&amp;L: Mark to Market less Book Value</b>
<b>Shareholder's Equity Impact</b>	N/A	<b>Mark to Market Impact in Shareholder's Equity (unrealized profit and loss)</b>	N/A
<b>Book Value Impact</b>	<i>Bond premium (Buy Price - Par) daily accrual</i>	<i>Bond premium (Buy Price - Par) daily accrual</i>	<i>Bond premium (Buy Price - Par) daily accrual</i>

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## Capital Ratios (I)



## Capital Ratios (II)

$$\text{Capital Ratios} = \frac{\text{Capital Measure}}{\text{Risk Measure: Risk Weighted Assets (RWA)}}$$

$$\text{RWA} = \text{RWA (Credit)} + \text{RWA (Market)} + \text{RWA (Counterparty)} + \text{RWA (Operational)}$$

**Credit Risk:** Risk that a borrower will default on any type of debt by failing to make payments which it is obligated to do.

- **Banking Book**
- **Bonds in HTM or AFS portfolios are treated as Credit Risk**

**Market Risk:** Risk of losses in positions arising from movements in market prices (Interest rate risk, Equity risk, Currency risk, Commodity risk, **Credit spread risk**)

- **Derivatives**
- **Bonds in a Trading portfolio**

**Counterparty Credit Risk:** Risk that a counterparty in a derivative transaction will not face its contractual obligations: **Derivatives**

**Operational:** Risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events (Risk incurred by the Bank in its internal activities)



## Capital Ratios (III)

$$\text{Capital Ratios} = \frac{\text{Capital Measure}}{\text{Risk Measure: Risk Weighted Assets (RWA)}}$$

### **Total Capital**

- **Capital Stock & Reserves** → Core Capital
- **Preferred Shares** → Tier I
- **Subordinated Debt** → Tier II

$$\text{Core Capital Ratio} = \frac{\text{Core Capital}}{\text{Risk Weighted Assets (RWA)}}$$

$$\text{Tier I Ratio} = \frac{\text{Tier I Capital (Core Capital + Tier I Instruments)}}{\text{Risk Weighted Assets (RWA)}}$$

$$\text{Solvency Ratio or BIS Ratio} = \frac{\text{Total Capital (Tier I + Tier II)}}{\text{Risk Weighted Assets (RWA)}} \geq 8\%$$

$$\text{Leverage Ratio} = \frac{\text{Tier I Capital}}{\text{Total Assets}}$$

## Capital Ratios (IV)

What do we mean by an **asset capital consumption**?

As the main objective of Basel II was to preserve a minimum of 8% Solvency Ratio, a bank that introduce a new asset with a predetermined RWA, should increase its capital by  $RWA \times 8\%$ .

$$\text{Solvency Ratio} = \frac{\text{Total Capital}}{\text{RWA}} \geq 8\% \implies \text{Capital} = \text{RWA} \times 8\%$$

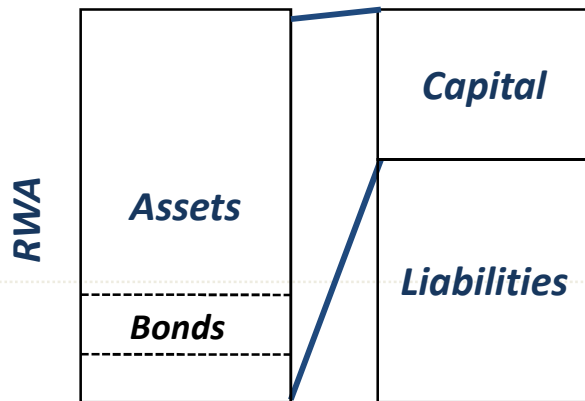
***Nowadays:***

- ***Core Capital is the most important Ratio***
- ***Core Capital requirements  $\geq 10\%$***





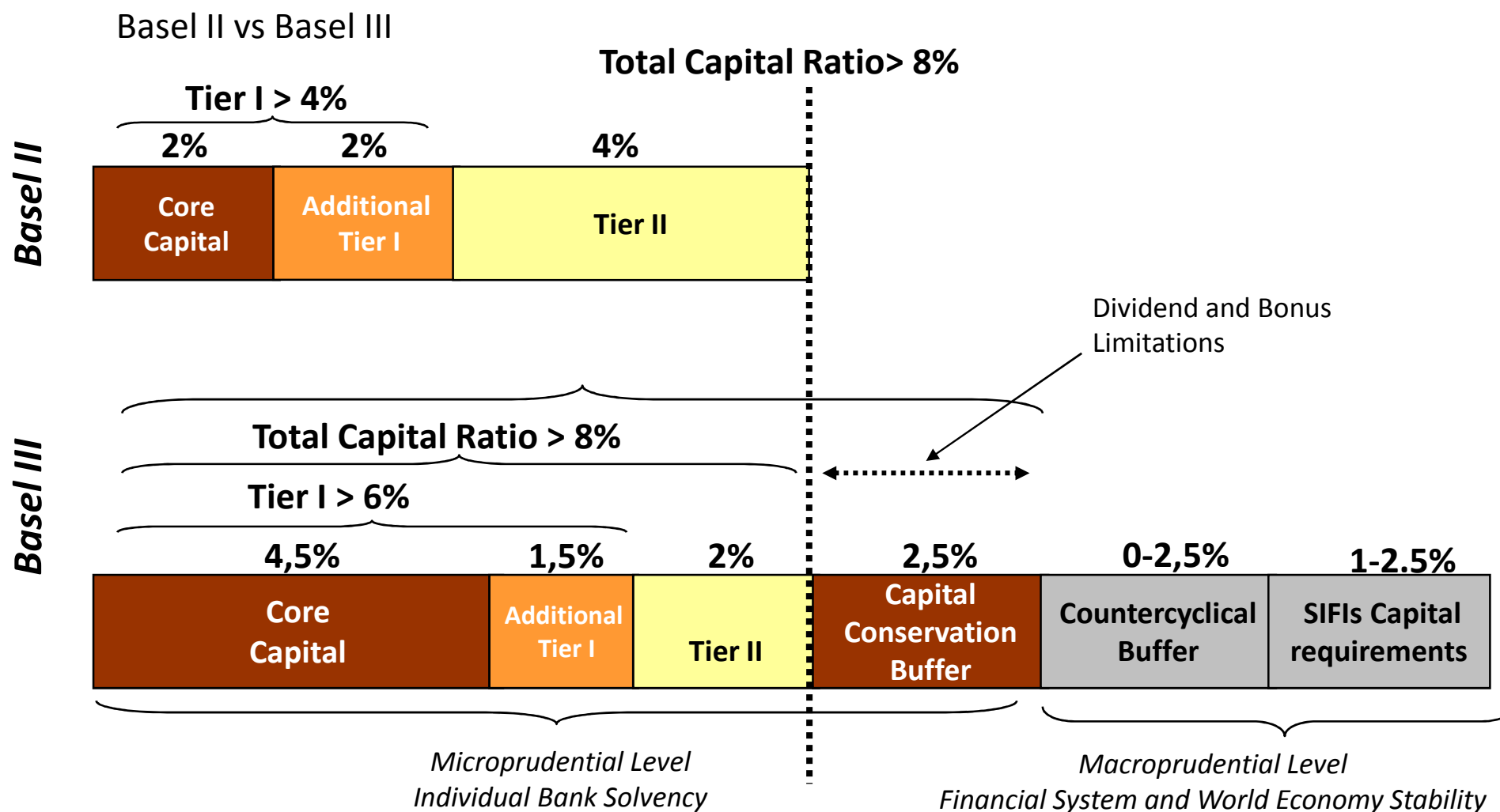
## Capital Ratios (V)



### Capital Ratios is a limit to Balance sheet growth

- **Two Banks with the same level of Capital:** Bank with better credit quality assets (lower RWA) could have a higher Balance Sheet
- If the Bank has a **Capital Ratio objective**, it will have a **limit on its Assets (size vs quality)** → Optimization of the **Return vs Risk trade-off**:
  - *Asset Management: Shorten maturities, sell high RWA consumers,...*
  - *Capital Management: Capital increase, capital management (exchange offers core capital vs Tier I or Tier II capital)*

## Capital Ratios (VI)



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# Capital Ratios. RWA Calculation (Credit) (I)

## *Standard Model*

RWA are based on External Credit Rating Agencies ratings

Bonds: HTM or AFS portfolios

Debtor	Rating	RWA
Central Banks. Sovereign	AAA - AA-	0%
	A+ - A-	20%
	BBB+ - BBB-	50%
	BB+ - B-	100%
	B - D	150%
	NR	100%
Corporates and Financials	AAA - AA-	20%
	A+ - A-	50%
	BBB+ - BBB-	100%
	BB+ - D	150%
	NR	100%
Mortgages		35%
Commercial Mortgages		50%
Consumer Loans		75%

$$RWA = RWA (\%) \times \text{Exposure At Default (EAD)}$$

$$\text{BIS Ratio} = \frac{\text{Total Capital}}{\text{RWA}}$$

*Standard do not discriminate between maturities*

## Capital Ratios. RWA Calculation (Credit) (II)

### *Advanced Model (IRB – Internal Rating Based)*

RWA are calculated with regulatory formulas fed with parameters estimated internally by the bank:

- **PD: Probability of default**
- **LGD: Loss Given Default**
- **M: Maturity**

**Bonds: HTM or AFS portfolios**

• **Foundation IRB:** Bank is only able to estimate PDs internally

• **Advanced IRB:** Bank is able to estimate all parameters

$$K = \left\{ LGD \times N \left[ \frac{N^{-1}(PD)}{(1-R)^{0.5}} + \left( \frac{R}{1-R} \right)^{0.5} N^{-1}(0,999) \right] - PD \times LGD \right\} \times \left[ \frac{1 + (M - 2,5)b}{1 - 1,5b} \right]$$

*Formula used to estimate Regulatory Capital for Corporates and Financial Entities*

$$b = (0,11852 - 0,05478 \ln(PD))^2$$

$$R = 0,12 \times \frac{1 - e^{-50PD}}{1 - e^{-50}} + 0,24 \times \left[ 1 - \frac{1 - e^{-50PD}}{1 - e^{-50}} \right]$$

$$K \text{ (eur)} = K(\%) \times \text{EAD}$$

$$K \text{ (Regulatory Capital)} = \text{RWA} \times 8\% \rightarrow \text{RWA} = K \times 12,5$$

$$\text{BIS Ratio} = \frac{\text{Total Capital}}{\text{RWA}}$$

## Capital Ratios. RWA Calculation (Credit) (III)

*We have bought 100 mn eur of Deutsche Telekom bond at par and want to calculate the RWA and capital consumption of the new asset that would be booked in the Hold To Maturity portfolio based on both Standard and Advanced IRB methodologies.*

DT 6 01/20/17 Corp		99) Feedback		Page 1/11		Description: Bond	
		99) Notes		95) Buy		96) Sell	
						97) Settings	
21) Bond Description		22) Issuer Description					
Pages		Issuer Information				Identifiers	
1) Bond Info		Name DEUTSCHE TELEKOM INT FIN				BB Number EH6872467	
2) Addtl Info		Industry Wireline Telecom Services				ISIN DE000A0T5X07	
3) Covenants		Security Information				BBGID BBG0000CH1P4	
4) Guarantors		Mkt of Issue Euro MTN				Bond Ratings	
5) Bond Ratings		Country NL		Currency EUR		Moody's Baa1	
6) Identifiers		Rank Sr Unsecured		Series EMTN		S&P BBB+	
7) Exchanges		Coupon 6		Type Fixed		Fitch BBB+	
8) Inv Parties		Cpn Freq Annual				Composite BBB+	
9) Fees, Restrict		Day Cnt ACT/ACT		Iss Price 99.80800		Issuance & Trading	
10) Schedules		Maturity 01/20/2017		Reoffer 99.808		Amt Issued/Outstanding	
11) Coupons		BULLET				EUR 2,000,000.00 (M) /	
Quick Links		Issue Spread +265bp vs Mid Swaps				EUR 2,000,000.00 (M)	
32) ALLQ Pricing		Calc Type (1)STREET CONVENTION				Min Piece/Increment	
33) QRD Quote Recla		Announcement Date		01/13/2009		1,000.00 / 1,000.00	
34) TDH Trade Hist		Interest Accrual Date		01/20/2009		Par Amount 1,000.00	
35) CACS Corp Action		1st Settle Date		01/20/2009		Book Runner BNPPAR,JPM,RBS	
36) CF Prospectus		1st Coupon Date		01/20/2010		Exchange Multiple	
37) CN Sec News							
38) HDS Holders							
39) VPR Underly Info							
66) Send Bond							
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000							
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2013 Bloomberg Finance L.P.							
SN 850066 6481-4729-2 03-Jun-13 19:45:30 CEST GMT+2:00							

## Capital Ratios. RWA Calculation (Credit) (IV)

### Standard Model

Rating (2nd best): BBB+

$RWA (\%) = 100\%$

$RWA = EAD \times 100\%$

$RWA = 100 \text{ mn} \times 100\% = 100 \text{ mn}$

$\text{Regulatory Capital} = RWA \times 8\%$

$\text{Regulatory Capital (K)} = 8 \text{ mn}$

Debtor	Rating	RWA
Central Banks. Sovereign	AAA - AA-	0%
	A+ - A-	20%
	BBB+ - BBB-	50%
	BB+ - B-	100%
	B- - D	150%
	NR	100%
Corporates and Financials	AAA - AA-	20%
	A+ - A-	50%
	BBB+ - BBB-	100%
	BB+ - D	150%
	NR	100%
Mortgages		35%
Commercial Mortgages		50%
Consumer Loans		75%

# Capital Ratios. RWA Calculation (Credit) (V)

## Advanced IRB Model

PD = Internal estimate. Proxy: Implicit PD 1y in CDS curve

Deutsche Telekom AG - DT CDS EUR SR												
	Tenor	Ticker	MSG Quotes			CMAL			My PCS (Pricing Sources)			
			Bid	Ask	Time	Bid	Ask	Time	Bid	Ask	Time	Source
1) Curve		DT CDS EUR SR CRV										
2) 6 Mo		DT CDS EUR SR 6M	N.A.	N.A.	N.A.	9.3	11.2	17:30:00	9.3	11.7	19:02:53	CBIT
3) 1 Yr		DT CDS EUR SR 1Y	11.0	21.0	06/03/13	12.2	14.4	17:30:00	11.0	21.0	06/03/13	MSG1
4) 2 Yr		DT CDS EUR SR 2Y	24.0	34.0	06/03/13	24.8	28.3	17:30:00	24.0	34.0	06/03/13	MSG1
5) 3 Yr		DT CDS EUR SR 3Y	41.0	51.0	06/03/13	35.9	39.9	17:30:00	41.0	51.0	06/03/13	MSG1
6) 4 Yr		DT CDS EUR SR 4Y	58.0	66.0	06/03/13	51.4	56.2	17:30:00	58.0	66.0	06/03/13	MSG1
7) 5 Yr		DT CDS EUR SR 5Y	74.0	79.0	18:16:43	72.7	78.7	17:30:00	74.0	79.0	18:16:43	MSG1
8) 7 Yr		DT CDS EUR SR 7Y	98.0	109.0	06/03/13	97.6	104.8	17:30:00	98.0	109.0	06/03/13	MSG1
9) 10 Yr		DT CDS EUR SR 10Y	112.0	132.0	06/03/13	115.3	123.6	17:30:00	112.0	132.0	06/03/13	MSG1

$$PD \approx \frac{\text{CDS Premium}}{(1 - \text{LGD})}$$

Using standard LGD = 40% and assuming CDS premium 1y Deutsche Telekom = 0,2%

$$PD \approx \frac{\text{CDS Premium}}{(1 - \text{LGD})} = \frac{0,2\%}{(100\% - 40\%)} = 0,33\%$$



## Capital Ratios. RWA Calculation (Credit) (VI)

**PD = 0,33%**

**LGD = 40%**

$$K = \left\{ LGD \times N \left[ \frac{N^{-1}(PD)}{(1-R)^{0.5}} + \left( \frac{R}{1-R} \right)^{0.5} N^{-1}(0,999) \right] - PD \times LGD \right\} \times \frac{1 + (M - 2,5)b}{1 - 1,5b}$$

**M = (Bond Maturity - Today()) = (20-jan-17 - 10-jul-13 )/365 = 3,5 y**

Parameter	Value
Prob.Default (PD)	<b>0,333%</b>
Loss Given Default (LGD)	<b>40,00%</b>
Exposure At Default (EAD)	<b>100.000.000</b>
Maturity (M)	<b>3,5</b>

Correlation (R)	0,22158
Total Loss	0,03076
Expected Loss (EL)	0,00133
b component	0,18574
Unexpected Loss (Total Loss - EL)	0,02942
Maturity Adjustment	1,65250

<b>Capital (K %)</b>	<b>4,86%</b>
<b>RWA (%)</b>	<b>60,77%</b>

<b>Capital (\$)</b>	<b>4.861.958,83</b>
<b>RWA</b>	<b>60.774.485,43</b>

**K (%) = 4,86% → Regulatory Capital (K) (mn) = EAD x K(%) = 4,86 mn**

**RWA (%) = K(%) x 12,5 = 60,77% → RWA (mn) = K x 12,5 = 60,77 mn**

## Capital Ratios. RWA Calculation (Credit) (VII)

*If the Core Capital Ratio of the Bank is 10% and the Core Capital amount is 1.000 mn eur, what will be the impact of buying the Deutsche Telekom bond, both in Standard and in Advanced IRB model?*

$$\text{Core Capital Ratio} = \frac{\text{Core Capital}}{\text{Risk Weighted Assets (RWA)}} \Rightarrow \text{RWA} = \frac{\text{Core Capital}}{\text{Core Capital Ratio}}$$

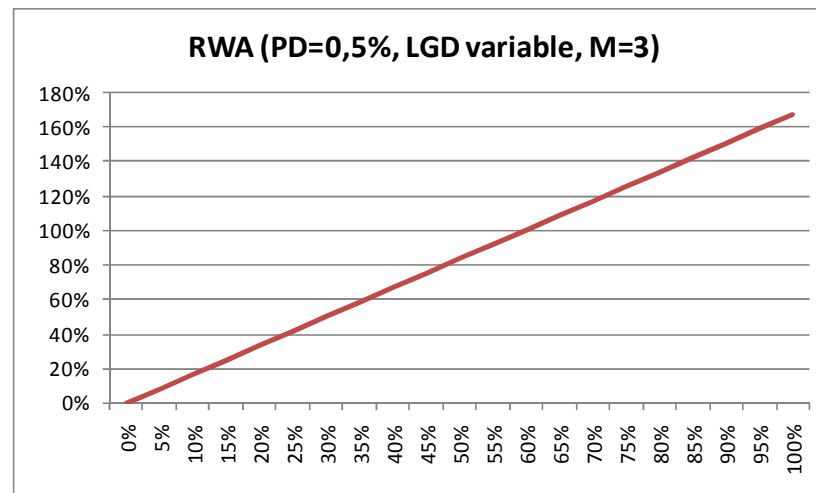
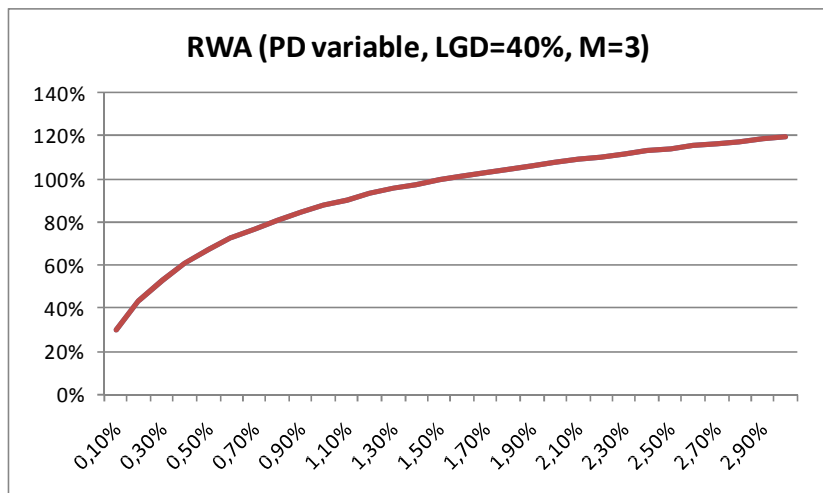
Current Total RWA =  $1.000 / 10\% = 10.000$  mn

**Standard:** New bond RWA = 100 mn      Core Capital Ratio =  $\frac{1.000}{10.000 + 100} = 9,90\%$

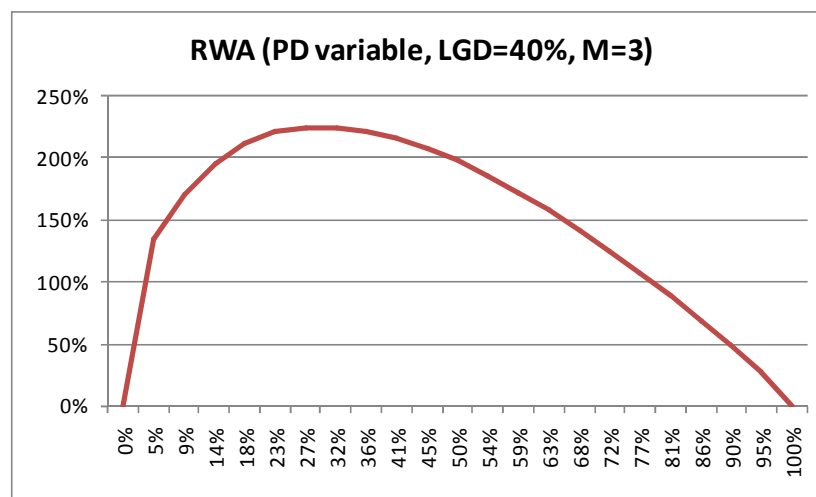
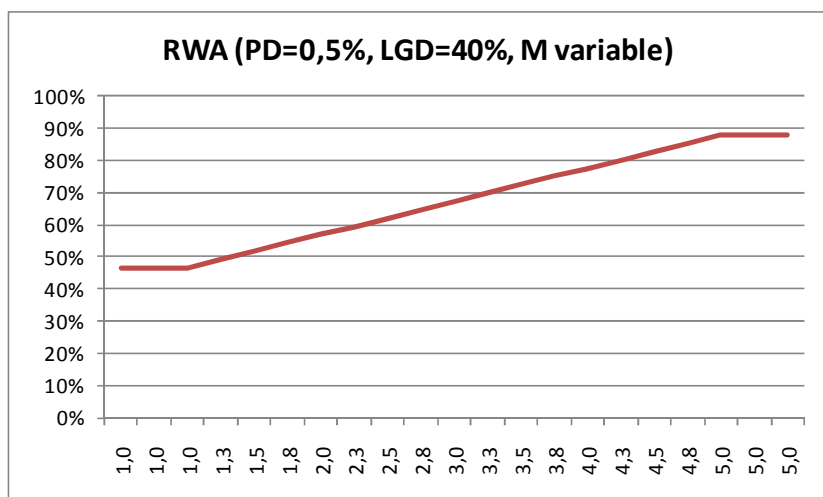
**Advanced IRB:** New bond RWA = 60,77 mn      Core Capital Ratio =  $\frac{1.000}{10.000 + 60,77} = 9,94\%$



## Capital Ratios. RWA Calculation (Credit) (VIII)



### Sensitivities to Input Parameters



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# VaR: Measure of Fixed Income Market Risk (I)

**Bond in a Trading Portfolio: Daily MtM → Daily Impact in P&L**

**Bonds: Trading Portfolios**

Main tool to measure and manage Market Risk in a trading portfolio: **Value at Risk (VaR)**

**VaR = Maximum loss over a predetermined time horizon at a given confidence level and considering normal market conditions**

VaR measures potential losses and takes into account leverage, correlation, different assets, different market risk (interest rate risk, credit risk, currency, ...)

*VaR example: Maximum loss over a 1 day horizon at a 99% confidence level = 1 mn eur → There is only a 1% probability of losing more than 1 mn eur in the market value portfolio in 1 day due to movements in market risk*

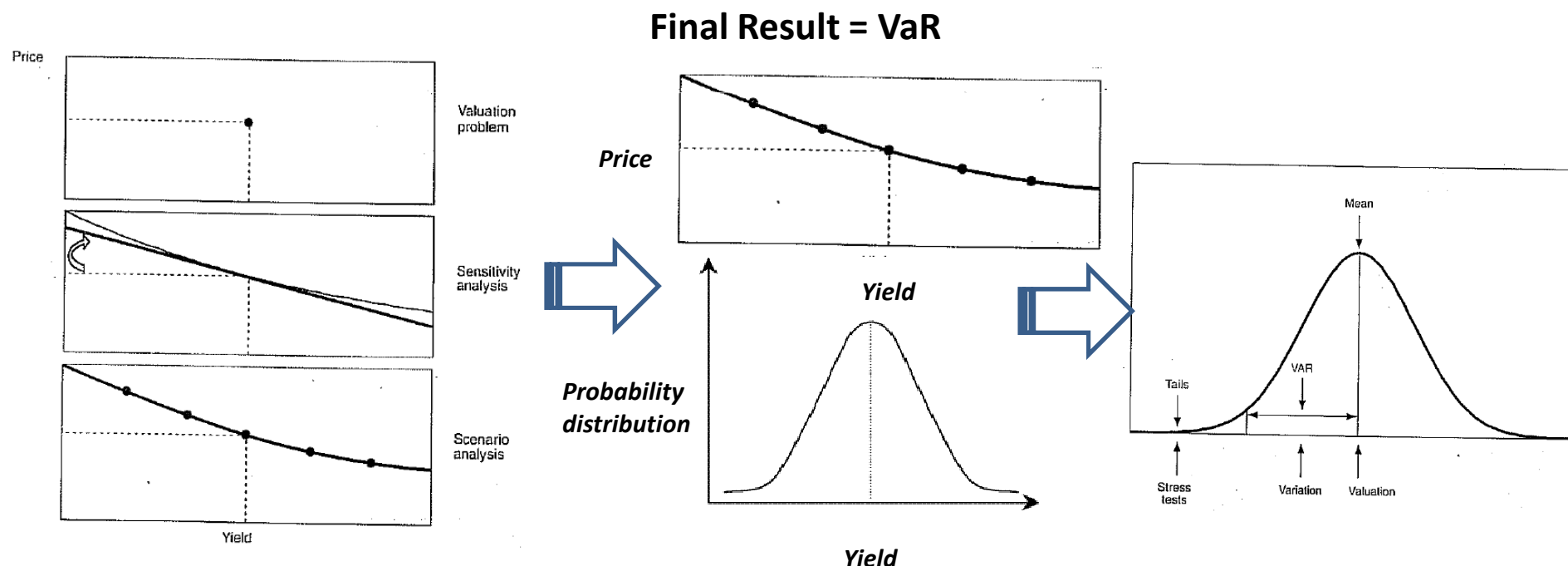
VaR can be parametric, Historical VaR or Montecarlo Simulation VaR

Usual way to measure VaR: Historic VaR → Simulate current portfolio with the last 2 year movements of market risks (interest rate risk, credit risk, currency, ...)

# VaR: Measure of Fixed Income Market Risk (II)

## Bonds: Trading Portfolios

From a Bond Valuation Problem (Cash Flow analysis) to Sensitivity analysis (duration + convexity) to Scenario analysis (Montecarlo simulation) + Probability distribution →



# Capital Ratios. RWA Calculation (Market) (I)

## Bonds: Trading Portfolios

**Capital Requirement = f (VaR, stressed VaR, Incremental Risk Charge (IRC))**

- ✓ **VaR:** 10-days Value at Risk measure at the 99% confidence interval of the trading portfolio
- ✓ **Stressed VaR (SVaR):** Calculated by combining current portfolio performance on the 10-day, 99% confidence interval with the historical data from the same portfolio in a significantly financial stressed period (12 months)
- ✓ **Incremental Risk Charge (IRC)** estimates the default and migration risks, over and above what is captured by VaR, of Fixed Income securities

Why using IRC: VaR does not estimate tail event losses, typically uses a 99% confidence interval and parameters are estimated using short time series data (normally 2 years)

IRC is measured at a 99,9% confidence level and 1 year time horizon

Montecarlo simulation (weekly calculation): migration of ratings from current rating to default → Contribution of very low probability but high impact events (Extreme events)

# Capital Ratios. RWA Calculation (Market) (II)

## Bonds: Trading Portfolios

**Market Risk Factors.** Any relevant market risk factor used for pricing should be included in the calculation of VaR and SVaR. Regulator's requirements:

- ✓ **Interest rates:** Banks must model yield curves (estimate forward rates from zero coupon yields or generate a separate yield curve from different instruments in order to capture differences between bonds and swaps)
- ✓ **Credit Risk (spread):** Market movements of credit spreads
- ✓ **FX Risk:** Must be considered if bank has exposure to currencies different to domestic currency
- ✓ **Equity:** Market-wide movements, price changes in industry sectors, volatility of equity
- ✓ **Commodity price risk:** A single risk factor is sufficient if the aggregate position is limited
- ✓ **Correlation risk and basis risk**
- ✓ **Nonlinearities for options embedded in bonds**



## Capital Ratios. RWA Calculation (Market) (III)

### Bonds: Trading Portfolios

#### Market Risk Capital Requirement

$$MRC = \max(VaR_{t-1}, K_{VaR} \times \frac{1}{60} \sum_{i=1}^{60} VaR_{t-1-i}) + \max(SVaR_{t-1}, K_{SVaR} \times \frac{1}{60} \sum_{i=1}^{60} SVaR_{t-1-i}) + IRC$$

*kVaR and KSVaR is set by the national authorities based on the bank's risk management system quality and subject to a minimum floor of 3*

$$kVaR = 3 + \text{backtesting adjustment VaR}$$

$$kSVaR = 3 + \text{backtesting adjustment SVaR}$$

*Backtesting adjustment (VaR or Stressed VaR): ex-post performance of the model ranging 0 to 1 based on the outcome of backtesting VaR. Backtesting could be performed on either hypothetical or actual trading outcomes, or both.*

*If backtesting results are satisfactory, and the banks meets all of the required qualitative standards, the plus factor could be zero.*

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## Hedging with a CDS. Capital Implications (I)

When **buying a Hedging CDS**, if it complies with certain **general and specific requirements** defined in regulation (Basel → Capital Requirements Directive → Local regulation), we can apply it as a **Credit Risk Mitigation Technique**

### Credit Risk Mitigation Technique Effects:

**Standard Model → Substitution of RWA(%)**. The risk weighting of the debtor will be substituted by the risk weighting of the protection provider counterparty (CDS Seller)

**Advanced IRB Model → Substitution of PD**. The PD of the debtor will be substituted by the PD of the protection provider counterparty (CDS Seller)

- **Counterparty Credit Risk of the CDS will not compute additional RWA** as it is implicit in the substitution methodology

- **Haircuts will be applied** to the notional of the CDS if there are: **maturity or currency mismatches** (allowed but haircuts applied) or **no restructuring credit event (HC = 40%)**

## Hedging with a CDS. Capital Implications (II)

### Standard Model

*We bought a CDS to a Bank (Rating = A-; PD 1y = 0,1%) to hedge the 100 mn eur Deutsche Telekom bond. What will be the new capital consumption?*

$$RWA_{\text{Bond}} = 100 \times 100\% = 100 \text{ mn}$$

$$\text{Capital}_{\text{Bond}} = 8 \text{ mn}$$

$$RWA_{\text{Bond+CDS}} = 100 \times 50\% = 50 \text{ mn}$$

$$\text{Capital}_{\text{Bond+CDS}} = 4 \text{ mn}$$

$$\text{Capital Savings} = 4 \text{ mn}$$

Debtor	Rating	RWA
Central Banks. Sovereign	AAA - AA-	0%
	A+ - A-	20%
	BBB+ - BBB-	50%
	BB+ - B-	100%
	B- - D	150%
	NR	100%
Corporates and Financials	AAA - AA-	20%
	A+ - A-	50%
	BBB+ - BBB-	100%
	BB+ - D	150%
	NR	100%
Mortgages		35%
Commercial Mortgages		50%
Consumer Loans		75%

## Hedging with a CDS. Capital Implications (III)

### Advanced IRB Model

**PD<sub>BOND</sub> = 0,33%**

**PD<sub>BOND+CDS</sub> = 0,1%**

**LGD = 40%**

**M = (Bond Maturity - Today()) = (20-jan-17 - 10-jul-13) / 365 = 3,5 y**

$$K = \left\{ LGD \times N \left[ \frac{N^{-1}(PD)}{(1-R)^{0.5}} + \left( \frac{R}{1-R} \right)^{0.5} N^{-1}(0,999) \right] - PD \times LGD \right\} \times \left[ \frac{1 + (M - 2,5)b}{1 - 1,5b} \right]$$

Parameter	Value
Prob.Default (PD)	0,100%
Loss Given Default (LGD)	40,00%
Exposure At Default (EAD)	100.000.000
Maturity (M)	3,5

Correlation (R)	0,23415
Total Loss	0,01368
Expected Loss (EL)	0,00040
b component	0,24694
Unexpected Loss (Total Loss - EL)	0,01328
Maturity Adjustment	1,99397

<b>Capital (K %)</b>	<b>2,65%</b>
<b>RWA (%)</b>	<b>33,09%</b>

<b>Capital (\$)</b>	<b>2.647.282,89</b>
<b>RWA</b>	<b>33.091.036,15</b>

**K<sub>BOND</sub>(%) = 4,86% → Capital<sub>BOND</sub> (mn) = 4,86 mn → RWA = K x 12,5 = 60,77 mn**

**K<sub>BOND+CDS</sub>(%) = 2,65% → Capital<sub>BOND+CDS</sub> (mn) = 2,65 mn → RWA = K x 12,5 = 33,09 mn**

**Capital Savings = 4,86 - 2,65 = 2,21 mn**

# Central Counterparties (CCPs) (I)

**Central Counterparties will be a key element in the financial system**

Financial Regulation incentivizes clearing in CCPs vs counterparty credit risk (OTC derivatives):

- **European Market Infrastructure Regulation (EMIR)**
- **Basel III**

Basel III (final wording of the Capital Requirements Directive IV):

*The financial crisis highlighted that credit institutions and investment firms massively underestimated the level of counterparty credit risk associated with over-the-counter (OTC) derivatives. This prompted the G20 Leaders, in September 2009, to call for more OTC derivatives to be cleared through a Central Counterparty (CCP). Furthermore, they asked to subject those OTC derivatives that could not be cleared centrally to higher own funds requirements in order to properly reflect the higher risks associated with them.*

Basel III includes specifically CCPs as protection providers (clearing through CCP Hedging CDS bought to a market dealer):

*Institutions may use the following parties as eligible providers of unfunded credit protection:*

....

***(h) central counterparties***

## Central Counterparties (CCPs) (II)

**CCPs Treatment is very generous:**

*Article 297 (Own funds requirements for trade exposures)*

*1. An institution shall apply the following treatment to its trade exposures with CCPs:*

*(a) it shall apply a risk weight of 2% to the exposure values of all its trade exposures with QCCPs;*

**So, a deal cleared through a CCP will bear a RWA of 2% → Capital Consumption of 0,16%**

***We have bought a CDS to hedge the 100 mn Deutsche Telekom Bond (BBB-). If the protection provider Bank is A- what will be the capital savings of buying the CDS?***

$$\text{RWA}_{\text{loan}} = 100 \text{ mn} \times 100\% = 100 \text{ mn} \rightarrow \text{Capital}_{\text{loan}} = 8 \text{ mn}$$

$$\text{RWA}_{\text{loan+cds}} = 100 \text{ mn} \times 50\% = 50 \text{ mn} \rightarrow \text{Capital}_{\text{loan+cds}} = 4 \text{ mn} \rightarrow \text{Savings} = 4 \text{ mn}$$

***And clearing the CDS through a CCP?***

$$\text{RWA}_{\text{loan+cds CCP}} = 100 \text{ mn} \times 2\% = 2 \text{ mn} \rightarrow \text{Capital}_{\text{loan+cds}} = 0,16 \text{ mn} \rightarrow \text{Savings} = 7,84 \text{ mn}$$

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- Bonds in HTM or AFS Portfolios: RWA Calculation (Credit Risk)
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## Hedging

- Fixed Income and Capital Ratios: Conclusions



# Fixed Income and Capital Ratios: Conclusions (I)

## Regulatory Capital Calculation

### 1. HTM or AFS portfolios (Credit Risk Model)

**Regulatory capital in Credit Risk Methodologies** (Standard or Advanced) is deterministic based on external rating (Standard) or Internal estimation of PD, LGD and M (IRB):

- **Standard:** RWA Table (external rating vs RWA (%))
- **Foundation IRB:** Closed-form formula (PD, LGD, M). Only internal PD estimate
- **Advanced IRB:** Closed-form formula (PD, LGD, M). Internal estimate of all parameters

### 2. Trading portfolios (Market Risk Model)

**Regulatory capital in Market Risk Methodology:** Need Montecarlo simulations and takes into account correlations in the portfolio → impact of adding the same bond in different portfolios could be different

## Fixed Income and Capital Ratios: Conclusions (II)

**Basell II.5 (currently) and Basel III (jan-14)** introduce new calculations that penalize trading portfolios (Market Risk Capital Calculation) vs HTM or AFS portfolios (Credit Risk Capital Calculation)  
→ 2007 crisis highlighted deficiencies measuring risk in trading portfolios. Basel II.5 tried to solve but nowadays there are **arbitrage opportunities booking in HTM or AFS (usually low capital consumption) vs trading portfolios (high impact of SVaR and IRC)**

### **Hedging with CDS: Credit Risk Mitigation Technique Effects:**

- **Standard Model → Substitution of RWA(%)**. The risk weighting of the debtor will be substituted by the risk weighting of the protection provider counterparty
- **Advanced IRB Model → Substitution of PD**. The PD of the debtor will be substituted by the PD of the protection provider counterparty

**CCP's will be a key element as regulation incentivizes clearing through CCPs (very low RWAs → 2%)**



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# Fixed Income and Capital Ratios

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