Basel III Capital Rules

Securities Financing Transactions

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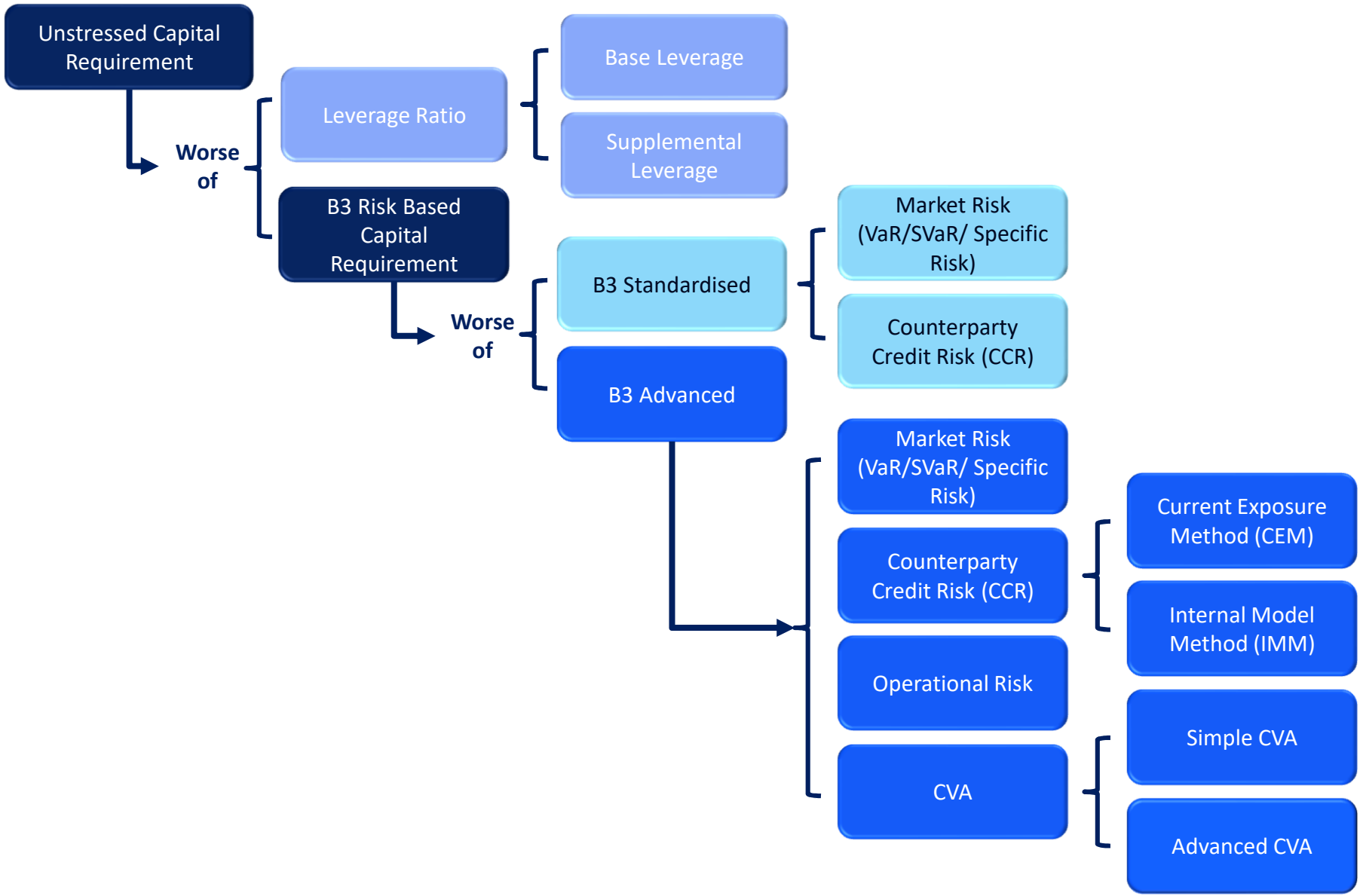
Basel RWA Calculation Basics

Securities Financing Transactions: Repos

Leverage

Overview of the Capital Measures



The Basic of RWA Calculation

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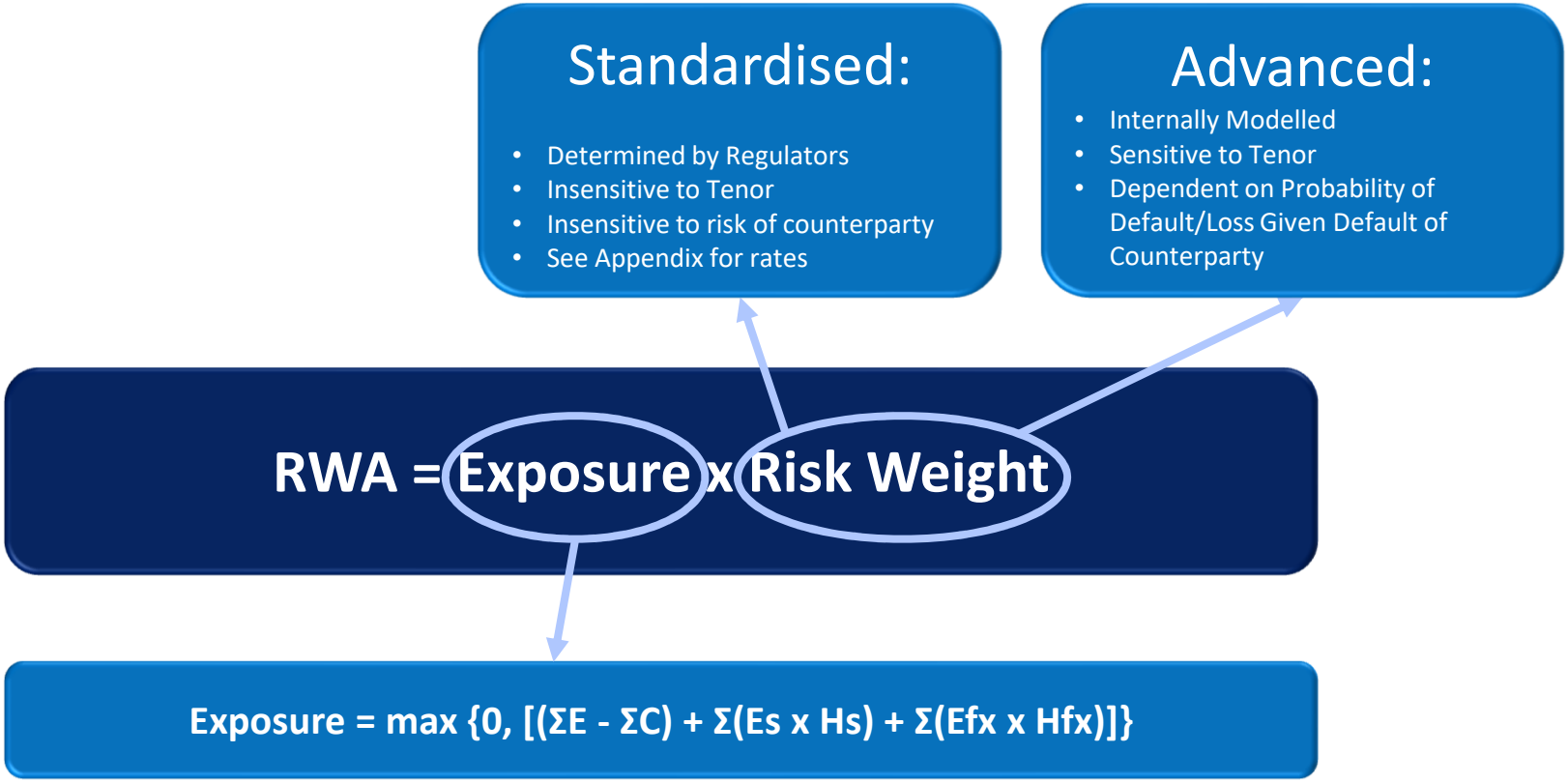

- ΣE = MV of all instruments the bank has lent, sold with a repurchase agreement or posted as collateral
- ΣC = MV of all instruments that the bank has borrowed, purchased subject to resale or took as collateral
- Ignore if collateral does not satisfy the definition of "financial collateral"
- ΣEs = Absolute value of the net position where the instrument is the same (MV of lent/sold/posted - MV of borrowed/ purchased /received)
- Ignore if collateral does not satisfy the definition of "financial collateral"
- Hs = Mkt price volatility haircut for the instrument (see Standard Supervisory Haircuts and Country Risk Classifications on the following pages)
- Adjusted for Holding Period
- ΣEfx = Absolute value of the net position of instruments and cash in a currency that is different than the settlement currency
- Hfx = Haircut if trade currency is different from "settlement currency"
- 8%, also adjusted for Holding Period

Exposure: Financial Collateral

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"Financial Collateral", is defined in the US Federal Register as:

- Cash
- Gold bullion
- Short and long-term debt securities **that are not re-securitisation exposures and that are investment grade**
- Publicly-traded equity securities
- Publicly-traded convertible bonds
- Money market fund shares and other mutual fund shares if a price for the shares is publicly quoted daily

Additional requirements for collateral:

- perfected, first priority security interest or, outside of the United States, the legal equivalent thereof, notwithstanding the prior security interest of any custodial agent
- Executed contract
- Wrong-way risk:
  - General Wrong-Way Risk: i.e. Turkish bank (non-sovereign owned) posts Turkish Govt debt security as collateral. Collateral is usually eligible
  - Specific Wrong-Way Risk: Highly correlated collateral (i.e. Turkish Govt posts Turkish Govt Debt security as collateral). Generally deemed ineligible (i.e. cannot reduce exposure). Additional capital measures apply to exposure and risk weight determination for IMM exposures

Exposure: Financial Collateral (cont)

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In the EU, Financial Collateral is governed by Article 197 & 207 of the CRR.

Typically, where the Credit Quality Step ("CQS") of the collateral is 4 or better (Sovereign collateral) or 3 or better (Institutions/Corporations), it is deemed eligible, unless the collateral and repo are both in the regulatory trading book (in which case, it is all eligible: Worst haircut applies to collateral that is otherwise ineligible)

A key difference between US & EU standardised: Margining. US requires daily margining. EU does not. A lack of daily margining excludes the transaction from repo-style treatment under US Rules

US Rules expressly prohibit the use of external ratings (S&P, Moodys, etc) in any aspect of collateral recognition or counterparty risk assessment. EU Rules rely on external ratings for CQS determination (which determines 'investment grade' under the standardised approach)

Exposure: Volatility Haircuts

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Residual maturity	Haircut (in percent) assigned based on:						
	Sovereign issuers risk weight under this section [1] (in percent)			Non-sovereign issuers risk weight under this section [1] (in percent)			Investment grade securitization exposures (in percent)
	Zero	20 or 50	100	20	50	100	
Less than or equal to 1 year	0.5	1.0	15.0	1.0	2.0	4.0	4.0
Greater than 1 year and less than or equal to 5 years	2.0	3.0	15.0	4.0	6.0	8.0	12.0
Greater than 5 years	4.0	6.0	15.0	8.0	12.0	16.0	24.0
Main index equities (including convertible bonds) and gold	15.0						
Other publicly traded equities (including convertible bonds)	25.0						
Mutual funds	Highest haircut applicable to any security in which the fund can invest.						
Cash collateral held	Zero						
Other exposure types	25.0						

(source: Federal Reserve Register, 12 CFR Parts 208, 217 and 225, Table 1 to § .132)

Based on 10-day holding period (for repos, that means the given haircuts must be multiplied by SQRT(0.5))

1. To determine which column to use for Sovereign and Non-sovereign issuers, refer to Country Risk Classifications (CRC) in the Appendix; Corporate exposures use 100% column, GSE exposures use 20% column, both under Non-sovereign issuers

EU Haircuts align to this and are governed by Article 224 (Corrigendum to Regulation (EU) No 575/2013 of the European Parliament)

Outlook: Basel IV implementation

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- At the end of 2017, the Basel Committee on Banking Supervision (BCBS) finalised a substantial revision of the Basel III framework, referred to as Basel IV
- With respect to securities financing transactions, several changes were introduced, in particular:
  - Introduction of haircut floors (see slide 24 in the Appendix)
  - Generally higher supervisory haircuts, in particular equities (goes from 15% to 20%)
  - More risk-sensitive collateral haircut formula for repo-style transactions which allows for some recognition of diversification benefits
  - Inclusion of fair valued repos in the CVA capital calculation
- Out of the four, the introduction of haircut floors is potentially the most impactful one:
  - Any securities financing transactions with non-regulated counterparties where the incoming collateral is not cash or government security is subject to a haircut floor. **If a particular transaction or netting set of transactions does not meet the prescribed haircut floor, the bank needs to treat the transaction / netting set of transactions as an unsecured loan for capital purposes**
  - Potential issues with this rule:
    - **Scope of counterparties is unclear:** It is clear that central banks, deposit taking commercial banks are out of scope. However, it is unclear whether broker-dealers, insurance groups, pension funds etc. are excluded.
    - **Scope of transactions:** For securities borrowing transactions, the borrower typically does not charge a haircut and therefore would fail any floor. Whilst some exemptions may exist, the conditions might be difficult to meet, in particular for agent lending transactions
    - **Cliff effect:** A de minimis shortfall in haircut could lead to a dramatically different capital outcome, i.e. secured versus completely unsecured
- **The industry is currently raising concerns at the Basel level - speak to your advisor**

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Defining a Repo-Style Transaction for Capital Purposes

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Repo-style transaction means a repurchase or reverse repurchase transaction, or a securities borrowing or securities lending transaction, provided that:

- the transaction is based solely on liquid and readily marketable securities;
- cash, or gold;
- the transaction is marked-to-fair value daily and subject to daily margin maintenance requirements;
- the transaction is a ‘‘securities contract’’ or ‘‘repurchase agreement’’ under the Bankruptcy Code, a qualified financial contract under the Federal Deposit Insurance Act, or a netting contract between or among financial institutions under the Federal Deposit Insurance Corporation Improvement Act or the Federal Reserve Board’s Regulation EE

Reverse Repo Example: Standardised Approach

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FACT PATTERN:

- Counterparty: Large Swiss Deposit-taking Bank (assets > $100bn)
- Cash Lent: USD $100m
- Collateral Received: EUR €100m 5Y German Corporate Bonds (16% reg haircut applies, plus 8% Fx haircut)
- Margining: Daily, cash
- Repo Tenor/Maturity: 30 days (0.0822yrs)
- EUR:USD rate assumed to be €1:$1.15 (equiv. collateral value = $115m)

Exposure Calculation:

Exposure at Default (EAD) = Cash lent less Collateral Received (net of regulatory haircuts)

EAD = $100m – ($115m x (1 – (16% + 8% x SQRT(0.5))))

EAD = $100m – ($115m x (1 – (24% x 0.71)

EAD = $100m - $95.48m

EAD = $4.52m

Risk Weight Calculation:

Switzerland is an unrated, high income OECD country according to the OECD ratings, so a **20%** B3S risk weight applies

Therefore, B3S RWA: $4.52m x 20% = **$0.90m**

Reverse Repo Example: Advanced Approach

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SAME FACT PATTERN ASSUMED

Exposure Calculation – Generally the same as B3S, unless in scope of IMM models*:

Exposure at Default (EAD) = Cash lent less Collateral Received (net of regulatory haircuts)

EAD = $4.52m

Risk Weight Calculation:

Large deposit-taking FI, domiciled in Switzerland

Probability of Default (PD) is an internally-modelled calculation and determination varies between banks significantly, so let's assume the bank is internally-rated to a PD of **0.5%**

Loss Given Default (LGD) is also internally-modelled and varies between banks. Since benefit for the collateral is taken through the exposure calc, let's assume an uncollateralised LGD of **50%**

Capital Requirement is calculated in accordance with the formula detailed in the Appendix:

$$\mathbf{K} = 0.50 \times N\left[\frac{(N^{-1}(0.005) + \sqrt{(1.25 \times (0.12+0.12 \times e^{-50 \times 0.005}))} \times N^{-1}(0.999)}{\sqrt{(1 - [1.25 \times (0.12+0.12 \times e^{-50 \times 0.005})])}}\right] - (0.50 \times 0.005) \times \left[\frac{1 + (0.822 - 2.5) \times (0.11852 - 0.05478 \times \ln(0.005))^2}{1 - 1.5 \times (0.11852 - 0.05478 \times \ln(0.005)}\right]$$

Where **N** = the cumulative distribution function for a standard normal random variable; $\mathbf{N^{-1}}$ is the inverse; **e** = the base of natural logarithms

Reverse Repo Example: Advanced Approach (cont)

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K = 4.8241%

Risk Weight = K x 12.5 x 1.06 = **63.92%**

RWA = EAD x Risk Weight

RWA = $4.52m x 63.92%

B3A RWA = **$2.89m**

* If repos are in-scope of Internal Model Methods under the Advanced Approaches, the Effective Expected Positive Exposure (or "EEPE": typically Monte-Carlo profiled exposure over a 1-year timeframe) is used as the basis for EAD and a modelled maturity value is applied in the risk weight calculation

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Basel RWA Calculation Basics

Securities Financing Transactions: Repos

Leverage

Leverage Overview

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Leverage Ratios

- Non-risk based measure to complement the risk-based capital requirements (B3S and B3A)
- Supplementary Leverage Ratio (SLR) applies to advanced approach banks
- For U.S. Global Systemically Important Banks (G-SIB), an additional buffer is required at the Bank Holding Company (BHC) level and Insured Depository Institutions (IDIs) are subject to the requirement

Leverage Ratio

$$\frac{\text{Tier 1 Capital}}{\text{Adjusted Quarterly Average Total on Balance Sheet Assets}} \geq 4\%$$

Supplemental Leverage Ratio

$$\frac{\text{Tier 1 Capital}}{\text{Adjusted Quarterly Average Total on Balance Sheet Assets} + \text{Significant Off Balance Sheet Assets}} \geq 5\% \text{ BHCs}, \geq 6\% \text{ IDIs}$$

Supplementary Leverage Ratio – Repo Style Transactions

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Exposure = Adjusted Secured Financing Transactions (SFT) Assets + Counterparty Credit Exposure

Adjusted Secured Financing Transaction (SFT) Assets = Gross assets recognised for accounting purposes (i.e. with no recognition of accounting netting), adjusted as follows:

- Exclude value of securities received if bank has recognised the securities as an asset on its balance sheet
- Cash payables and receivables with the same counterparty may be netted if the Netting Conditions are met

Assets = Gross Assets on B/S, Net if Netting Conditions are met

Netting Conditions

- Same counterparty, same explicit final settlement date
- Right to offset is legally enforceable in normal course of business and in the event of bankruptcy
- Under governing agreements, the counterparties intend to settle net, simultaneously or the functional equivalent; same settlement system and settlement arrangements

Counterparty Credit Exposure

- If a qualifying master netting agreement is in place, greater of 0 and $\Sigma E_i - \Sigma C_i$
- ΣE_i = total value lent to counterparty for all transactions included in netting agreement
- ΣC_i = total value received from counterparty for all transactions included in netting agreement

Counterparty Credit Exposure = max {0, ($\Sigma E_i - \Sigma C_i$)}

- If a qualifying master netting agreement is NOT in place, Counterparty Credit Exposure is calculated on a transaction by transaction basis, i.e. each transaction is treated as its own netting set

Leverage Ratio in the EU by Contrast: Repos

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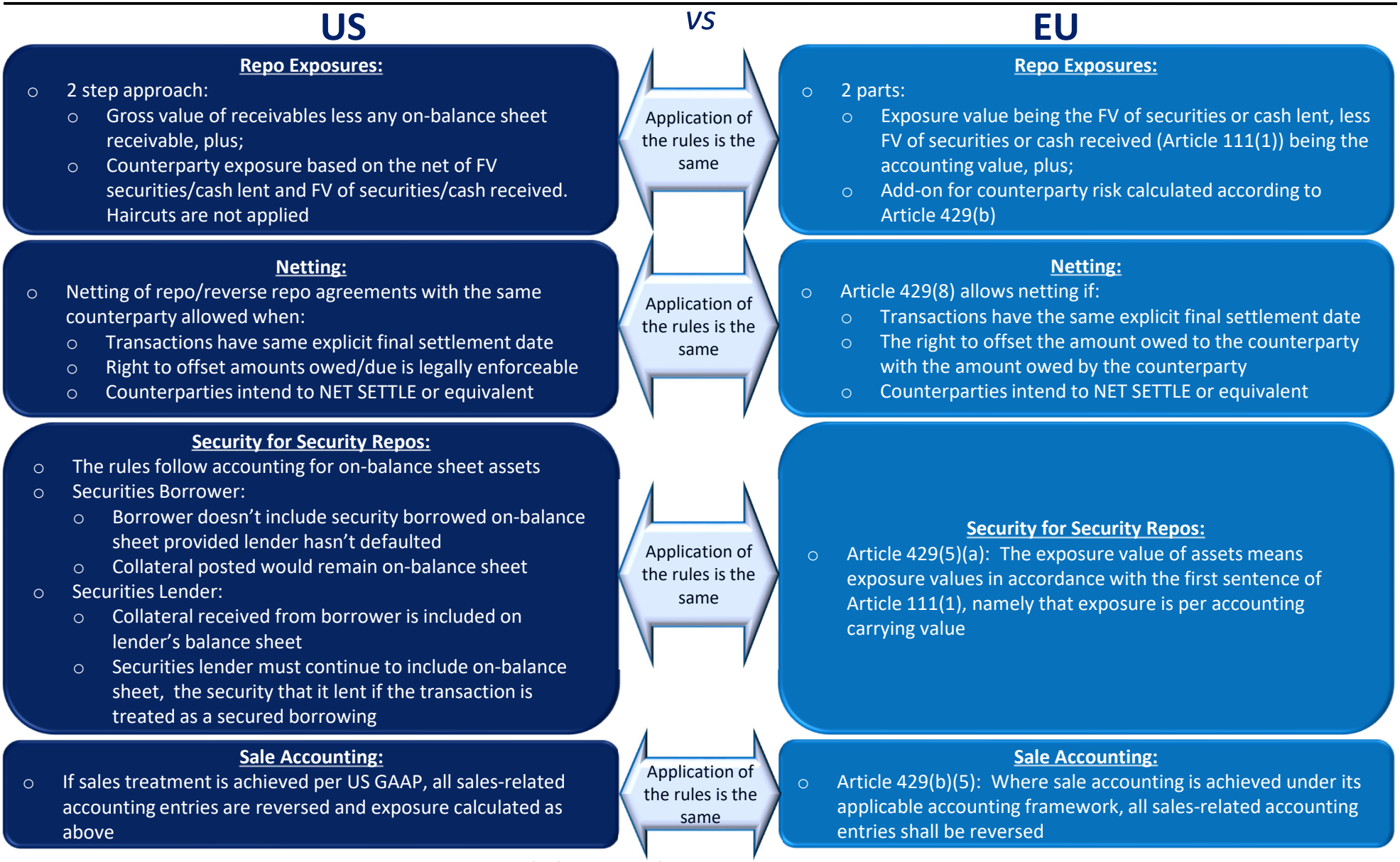

Note: Leverage ratio under CRR2 (EU) comes into force in 2021 and the exposure value will be based on SA-CCR

Conclusion: No significant differences between the two Rules

APPENDIX

Comparison of US vs EU Risk Weighting under Standardised

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RISK WEIGHTS :: STANDARDISED	CRR Article Ref	EU CRR (Article 111 – 134)	US Fed Rules (s.32; s.152 for equities)
Corporates	122	Ranges from 20% - 150% dependent on Credit Quality Step*	100%
Central Banks	114	Ranges from 0-150% dependent on the Credit Quality Step. We treat all central bank exposures @ 100%*. Member Central Banks funded in the domestic CCY of the member state receive 0% risk weight (i.e. BundesBank/Bank of France – unrated, but exposures denominated and funded in EUR). Similar treatment available for non-member state central banks	0 - 150% dependent on CRC of domicile. Central Banks, unconditionally backed by the full faith of the central government, are considered to be sovereigns under the US Rules
Sovereigns/Central Govts	114	Ranges from 0-150% dependent on the Credit Quality Step*	0 - 150% dependent on CRC of sovereign. Sovereign default is 150%
Public Sector Entities	116	Ranges from 20-150% dependent on the Credit Quality Step*	Split between general (relies on central government funds, i.e. tax dollars to function) and revenue (relies on own earnings, i.e. train fares) • General: 20-150% dependent on CRC domicile • Revenue: 50-150% dependent on CRC domicile
Regional Govts/Local Authorities	115	Treated as exposures to Institutions (see depository-taking institutions)	Split between general (relies on central government funds, i.e. tax dollars to function) and revenue (relies on own earnings, i.e. train fares) • General: 20-150% dependent on CRC domicile • Revenue: 50-150% dependent on CRC domicile
Depository-taking Institutions	119-121	• Rated Institutions: 20-150% dependent on Credit Quality Step* assigned to Institution • Unrated Institutions: 20-150% dependent on Credit Quality Step* assigned to sovereign in that jurisdiction • Where both the FI and Sovereign are unrated, 100% applies unless original maturity is <3mths (20%)	20 – 150% dependent on CRC of domicile
Institutions/Investment Firms	119-121	• Rated Institutions: 20-150% dependent on Credit Quality Step* assigned to Institution • Unrated Institutions: 20-150% dependent on Credit Quality Step* assigned to sovereign in that jurisdiction • Where both the FI and Sovereign are unrated, 100% applies unless original maturity is <3mths (20%)	100% corporate rate applies
Multilateral Development Banks	117	0% if included in the list contained in Art 117. 20% otherwise	0%

Comparison of US vs EU Risk Weighting under Standardised (cont)

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RISK WEIGHTS :: STANDARDISED	CRR Article Ref	EU CRR (Article 111 – 134)	US Fed Rules (s.32; s.152 for equities; s.53 exp to inv funds)
International Organisations	118	0% risk weight assigned to The Union, IMF, Bank for International Settlements, European Financial Stability Facility, European Stability Mechanism, or an international FI established by two or more member states which has the purpose to mobilise funding and provide financial assistance to the benefit of its members	0% assigned to Bank for International Settlements, European Central Bank, European Commission or IMF
Exposures secured by Mortgages	124-126	• Immovable property: 100% • Residential property: 35-150% (Art 125) • Commercial property: 50-150% (Art 126)	For residential mortgages that conform to prudent underwriting standards/<90days past due, 50% applies. Otherwise, 100%
Inventory & Receivables	134	100%	100%
Cash in the process of collection	134	20% (cash attracts 0%)	20% (cash attracts 0%)
High Risk Items	128	150%	NOT EXPLICITLY ADDRESSED
Exposures in default	127	150%	150%
Covered Bonds	129	10-100% dependent on Credit Quality Step* of covered bond. Where not rated, risk weight is 1 notch below the risk weight assigned to the institution that issues them (i.e. if the institution has a risk weight of 50%, the covered bond will be assigned a 20% risk weight; Institution is 100%, covered bond is 50%, etc)	NOT EXPLICITLY ADDRESSED
Units or shares in CIUs (collective investment undertaking, like ETFs)	132	100% unless a credit risk assessment method/look through/average risk weight approach is applied per para 2, 4 or 5. If a credit assessment method is applied, the risk weight ranges from 20-150%	Except for community development funds, three approaches are allowed for equity exposures to investment funds: 1) Full look-through based on product of RWA of fund exposures x bank's proportional share of fund 2) Simple modified look-through: Generally equates to the carrying value of the equity exposure x highest risk weight that applies to any exposure that can be held under the prospectus 3) Alternative modified look-through: Assignment of an adjusted carrying value pro-rata to different risk weight categories
Equity Exposures	133	100% unless they are to be deducted in accordance with Part 2, I which case they are: - 250% if in accordance with Art 48(4) - 1,250% if in accordance with Art 89(3), or; - Treated as high risk items in accordance with Art 128	100% if, on an aggregate basis, total equity exposures at the consolidated level are non-significant 20% if to a Federal Home Loan Bank (Fannie May/Freddie Mac) If significant in aggregate: - 250%: Investments in capital of unconsolidated FIs - 300%: Publicly traded equity - 400%: Not publicly traded equity - 600%: >immaterial leverage; or would meet the definition of a securitisation were it not for the Agency's application of para 8 in s.2

Country Risk Classifications (CRCs) – Risk Weights

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		Risk Weight			
	CRC	Sovereign Exposures	Banks Exposure	PSE General Obligations	PSE Revenue Obligations
Country Risk Classification (CRC)	0	0	20	20	50
	1	0	20	20	50
	2	20	50	50	100
	3	50	100	100	100
	4	100	150	150	150
	5	100	150	150	150
	6	100	150	150	150
	7	150	150	150	150
OECD Member with no CRC		0	20	20	50
Non-OECD Member with no CRC		100	100	100	100
Sovereign Defaulted *		150	150	150	150

* Sovereign defaulted in the past 5 years, regardless of the CRC

CRCs are determined by the OECD

Basel 3 Advanced – Risk Weight Calculation

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RWA is a function of EAD, the capital requirement (K), and 12.5 (inverse of 8%, the minimum amount of capital as a % of RWA)

CAPITAL (K) DRIVERS

Probability of Default (PD)	Bank's empirically based estimate of the long-run average of one-year default rates for the rating over a mix of economic conditions.	• Obligor risk rating • Scorecard Group • Default status	
Exposure at Default (EAD)	Estimate of the amount of exposure to a counterparty in the event of, and at the time of, that counterparty's default.	• Obligor risk rating • Instrument type • Age of exposure	• Utilization rate • Commitment type • Acceptance date
Loss Given Default (LGD)	Bank's empirically based estimate of the economic loss on an exposure per dollar of EAD, in the event of default within a one year horizon over a mix of economic conditions.	• Instrument type • Collateral type • Collateral value	• Line of business • Seniority • Country
Maturity (M)	Nominal remaining maturity of the expected contractual cash flows from the exposures, using the undiscounted amounts of the cash flows as weights. M has a 1yr floor and a 5yr cap.	• Remaining tenor	

Risk-Based Capital Formula

Wholesale	**Capital Requirement (K) Non-Defaulted Exposures**	$K = \left[LGD \times N\left(\frac{N^{-1}(PD) + \sqrt{R} \times N^{-1}(0.999)}{\sqrt{1-R}} \right) - (LGD \times PD) \right] \times \left(\frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b} \right)$
	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)	$b = (0.11852 - 0.05478 \times \ln(PD))^2$

RWA = Exposure x K x 12.5

Basel 3 multiplies the correlation factor for wholesale exposures other than HVCRE by 1.25 for exposures to regulated financial institutions (>$100bn) and all unregulated financial institutions.

B3A CEM/B3S Conversion Factors

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Remaining Maturity	Interest Rate	FX & Gold	Credit (IG)	Credit (Non-IG)	Equity	Precious Metals	Other
≤1 Y	0%	1%	5%	10%	6%	7%	10%
1 - 5Y	0.5%	5%	5%	10%	8%	7%	12%
≥5Y	1.5%	7.5%	5%	10%	10%	8%	15%

Basel IV Minimum Haircuts

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Residual maturity of collateral	Haircut level	
	Corporate and other issuers	Securitised products
≤ 1 year debt securities, and floating rate notes (FRNs)	0.5%	1%
> 1 year, ≤ 5 years debt securities	1.5%	4%
> 5 years, ≤ 10 years debt securities	3%	6%
> 10 years debt securities	4%	7%
Main index equities	6%	
Other assets within the scope of the framework	10%	

RWA Takeaways – to avoid penal Credit RWA

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Do's	Do Not's
▪ Minimise exposure on the **netting set-level** ▪ Enter contracts with **highly rated counterparties**	▪ Avoid **maturity peaks** ▪ Avoid counterparties with **wide credit spreads**

Do's	Do Not's
▪ Enter **short-dated** trades ▪ Ensure the counterparty can be **modelled internally** ▪ Use a regulatory-approved **netting agreement** ▪ Have **daily margin calls** ▪ Require **liquid** eligible financial collateral ▪ Trade **easy-to-replace** OTC derivatives* ▪ Trade **easy-to-value** derivative (no mark-to-model)*	▪ Enter **long-dated** trade ▪ Enter **carve-out** trades ▪ Allow **high margin thresholds** ▪ Accept **illiquid** collateral ▪ Enter transactions with **specific or general WW** risk ▪ Trade highly **complex / illiquid** OTC derivatives* ▪ Enter into **disputes on collateral**

Do's	Do Not's
▪ Consider **effective credit risk mitigation** in transactions ▪ Only accept collateral from counterparties which **are not legally connected** ▪ Analyse the **connectivity between parties** in the transaction ▪ Analyse the **correlation of the counterparty to general market factors**	▪ **Accept collateral** from parties **legally connected** to the obligor or the obligor itself ▪ **Trade** in credit derivatives where the **counterparty and the underlying reference entity are the same entity or connected entities***

* Predominantly applies to derivative transactions