The Arbitrage-Free Approach:
Shining a Light into the Black Box of the Basel Rules

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A technical representation of BCBS236

Existing formula: the SFA

BCBS128, Article 624:

$$h = \left(1 - \frac{K_{IRB}}{LGD}\right)^N$$

$$c = \frac{K_{IRB}}{(1-h)}$$

$$v = \frac{(LGD\ - K_{IRB})K_{IRB} + 0.25(1-LGD)K_{IRB}}{N}$$

$$f = \left(\frac{v + {K_{IRB}}^2}{1-h} - c^2\right) + \frac{(1-K_{IRB})K_{IRB} - v}{(1-h)\tau}$$

$$g = \frac{(1-c)c}{f} - 1$$

$$a = g \cdot c$$

$$b = g \cdot (1-c)$$

$$d = 1 - (1-h) \cdot (1 - Beta[K_{IRB}; a; b]$$

$$K[L] = (1-h) \cdot \big((1 - Beta[L; a, b])L + Beta[L; a+1, b]c\big)$$

$$S[L] = K_{IRB} + K[L] - K[K_{IRB}] + (d \cdot K_{IRB}/\omega)\big(1 - e^{\omega(K_{IRB}-L)/K_{IRB}}\big)$$

$$K_{Tranche} = \max(floor, S[D] - S[A])$$

Replaced by the MSFA

BCBS236, Pages 20-21 :

For each asset

$$s_i = \frac{N^{-1}[PD1_i] + 3.09\sqrt{AVC_i}}{\sqrt{1 - AVC_i}}$$

$$w_i = N\big[s_i + \big(0.56 + 0.074 s_i - 0.34 {AVC_i}^{0.3}\big) \cdot (M-1)^{0.7}\big]$$

$$c_i = LGD_i \cdot w_i$$

$$v_i = 0.09 \cdot {LGD_i}^2 \cdot M \cdot AVC_i \cdot w_i \cdot (1 - w_i)$$

For the pool

$$LGD = \frac{\sum_i EAD_i LGD_i}{EAD_i}$$

$$N = \frac{(\sum_i EAD_i)^2}{EAD_i}$$

$$N^* = \frac{N}{\big(1 + 0.0079M\sqrt{N}\big)^2}$$

$$h = \left(1 - \frac{\sum_i \theta_i c_i}{LGD}\right)^{N^*}$$

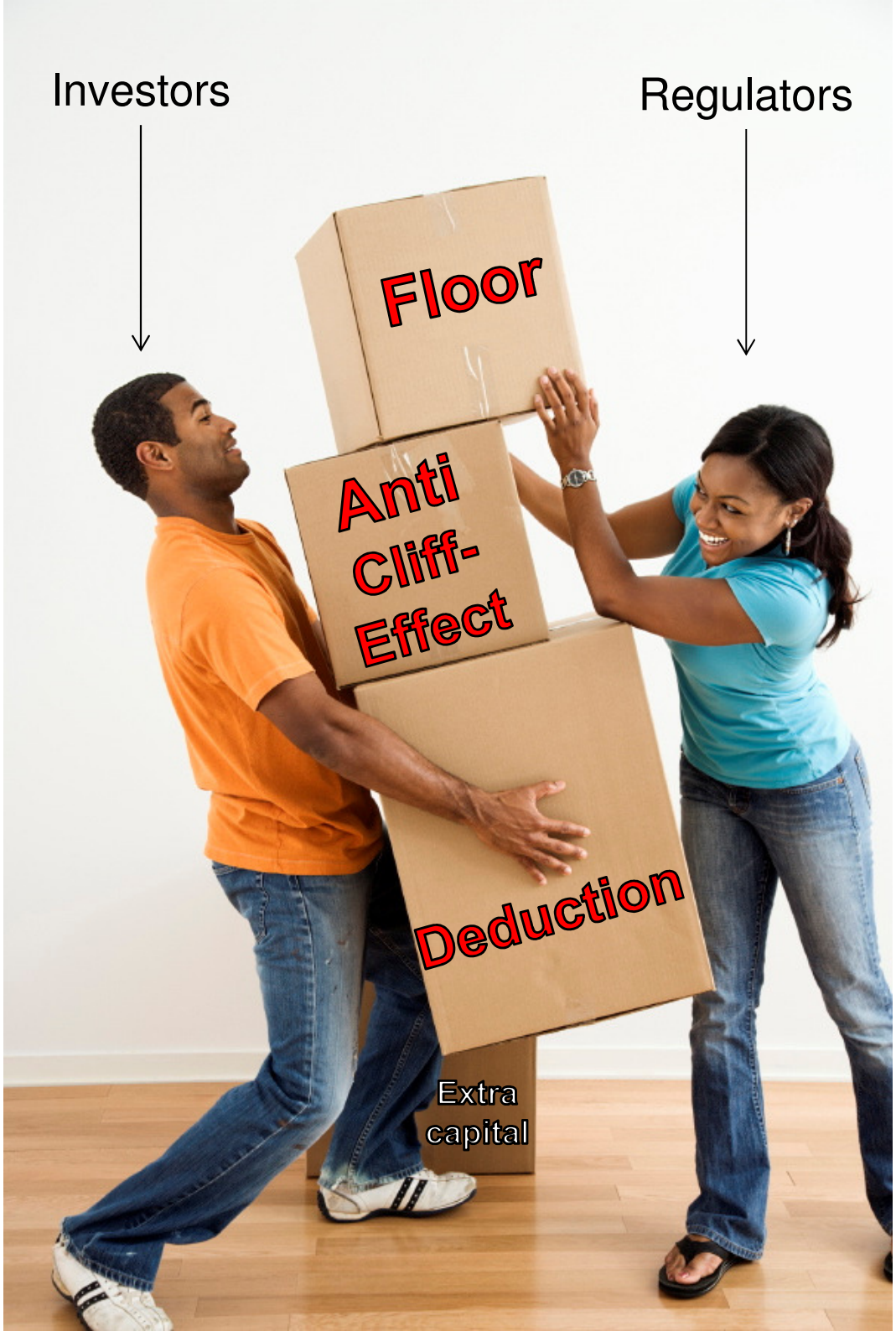
$$F = \left(\frac{V - C^2 h(1-h)}{1-h}\right) + \left(\frac{(1-h)C - (1-h)^2 C^2 - V}{(1-h)\tau}\right)$$

$$V = \left(\sum_i \theta_i \cdot \sqrt{v_i}\right)^2 +$$

$$+ \sum_i {\theta_i}^2 \cdot [w_i \cdot LGD_i \cdot (LGD_i - w_i \cdot LGD_i) + 0.25 \cdot w_i \cdot LGD_i \cdot (1 - LGD_i)]$$

$$C = \left(\frac{1}{1-h}\right) \cdot \sum_i \theta_i c_i, where\ \theta_i = \frac{EAD_i}{\sum_j EAD_j}$$

A non-technical representation of BCBS236



Agenda

(1) Industry Concerns on Basel Securitisation framework proposal

- Regulatory Overkill?
- Comments on BCBS236
- Stated Objectives

(2) The Arbitrage Free Approach

- BCBS 258 principles
- AFA Principles linking to BCBS 258
- AFA and ρ^*
- SAFA for originators & investors
- Comparison with BCBS 236

Securitisation: a regulatory overkill?

- The **European Commission Green paper on** the long term financing of the European economy indicates that “Reshaping the securitisation markets could help unlock additional sources of long term finance”, but also “can help financial institutions to free up capital” and enable deleveraging by reducing balance sheet usage.

- Indeed, Securitisation provides stable and non-recourse term funding, in complement to recourse funding raised through covered bonds: Securitisation is just a financing technique that simply distributes the risk of the assets comprising the securitised portfolio through tranching, but does not create additional credit risk.

- **European securitisations have performed well through the crisis** to deliver:
  - An efficient no recourse financing tool for issuers and their customers
  - A diverse, low risk, high quality investment for investors

Uninterrupted deluge of regulations for banks, insurance, funds

Senior tranches are key to the financing of the European economy across retail and corporates activities, yet an uninterrupted flux of current and forthcoming regulations has built up to deter European investors to invest in senior tranches across banks, insurance, pension funds and regulated funds:

- **BCBS236**: **Revisions to the Basel Securitisation Framework**
- Basel III: Liquidity Ratios (LCR and NSFR) / Leverage Ratio
- Basel 2.5 / CRD 3: Treatment of securitisation in the trading Book
- Solvency II: Punitive Capital Treatment of investment in (senior) ABS tranches
- European Money Market Reform: Article 7 prevents MMF to invest in some ABS

Summary Appraisal of BCBS CP 236: Industry Observations

Proposed BCBS framework eliminates securitisation as a viable tool for banks to provide financing:

- Regulatory weightings of securitised assets are multiples of same assets portfolio held directly
- Conservative structures and quality underlying assets most heavily penalized
- Security provided by credit enhancement widely ignored
- Economic incentives for securitisation removed

Proposed models fail to achieve their purpose:

- Multiple levels of regulatory add-ons lead to indiscriminate penalties
- Risk sensitivity removed
- Cliff effects not removed and wide differences between various proposed methods
- High penalties inflicted on external ratings also extend to banks' internal models (IAA)

Assumptions biased:

- Relative performances of securitisations and underlying assets ignored
- Recent enhancement measures ignored (alignment of interest, enhanced reporting, rating models

Likely consequences:

- Cliff effect or grandfathering on existing assets ?
- Full recourse secured debt increased (covered bonds): systemically preferable ?
- Assets back on bank balance sheet / loss of funding sources and/ asset diversification
- Unsecured or more primitive receivables funding for corporates

US Implementation of Basel III vs BCBS 236

- On July 2nd, the US published the US regulatory Capital rules for the implementation of Basel 3: the Risk-weighted Assets for Securitization Exposures set out in paragraph H highlights the different approaches retained to calculate the Risk-weighted Asset Amounts for Securitization Exposures
- The following table provides an indicative comparative summary of the charges for securitised exposures between the US regime finalised on July 2nd 2013 and the proposed Basel regime set out in the BCBS 236 consultation paper set out earlier on December 18th, 2012.

	BCBS 236 *[Dec 18, 2012]* (a)	US Basel 3 *[Jul 2, 2013]* (b)	Capital Charges BCBS vs US (a)/(b)
IRB banks	MFSA	SFA	approx 3 times
SSFA	p=1.5	p=0.5 (*)	3 times (*)
Floor	20% (with maturity adjustment for the RRBA eg 5 year RRBA @ 58%)	20% flat (**)	approx 3 times (**)

(*) specific regime for rmbs

(**) 3 times applies in the specific case of the RRBA versus US Basel 3, for other BCBS 236 formulas, such as MSFA and SSFA, the floor is also at 20%

Sources: US Department of Treasury, July 2nd Regulatory Capital rules & BCBS236 consultation paper published on December, 18th 2012

BCBS 236 Proposals affect high quality securitisation

The BCBS 236 proposals affect disproportionally high quality securitisation of assets held by banks:

- The MSFA boosts the capital for high quality assets by a much larger multiple than for low quality assets
- The RRBA which is calibrated on the MSFA deters bank investors by assigning higher Risk Weights to senior tranches than would apply if they hold the underlying portfolios under the Standardised Approach
- The SSFA sets post securitisation multiple at 2.5 times the standardised pool risk weights, prior to adjustments for delinquency and floors

BCBS 236 does not take into account critical qualitative factors which explain the superior performance of European securitised assets during the crisis. These are:

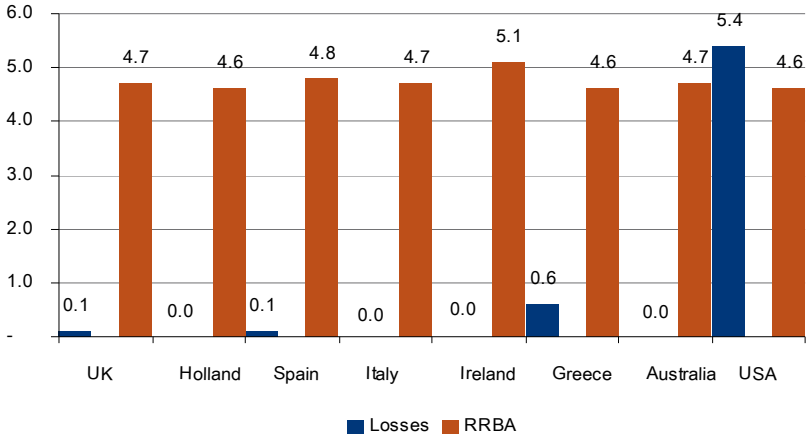
- High quality origination mostly by banks which historically retain skin in the game as they securitised only part of their portfolios,
- Key features of the European mortgage market that are conducive to financial stability and good pool performance:
  - **Full recourse to borrowers, and**
  - **High level of legal consumer protection, including strict laws protecting consumers from over-indebtedness.**

Higher rating-based RW for senior securitisation tranches than for whole loan portfolios

	RRBA		SA
▪ 1yr 1st pay AA+ RMBS	32%	▪ Residential mortgage loans	35%
▪ 5yr 1st pay AA+ credit card ABS	75%	▪ Retail portfolios	75%
▪ 5yr 1st pay AA Italian lease ABS	97%	▪ Commercial RE loans	100%
▪ 5yr 1st pay AA Dutch RMBS	97%	▪ Specialised lending (PF, IF)	100%
▪ 1yr 1st pay A Spanish SME ABS	81%	▪ SME loans	75%
▪ 5yr 1st pay A Spanish RMBS	141%	▪ Venture Capital/ Private Equity	150%

Source: BCBS / BofA Merrill Lynch global research

Senior tranches charges are multiples of actual and expected losses



Source: Fitch Ratings; Note: Realised plus expected losses, senior tranches only

The Floor: Existing Proposal

The BCBS 236 proposal is to set a fixed floor at **20% RW**
One may ask:

1. How should a fixed floor be calibrated?
2. As a matter of principle, is a fixed floor justified?

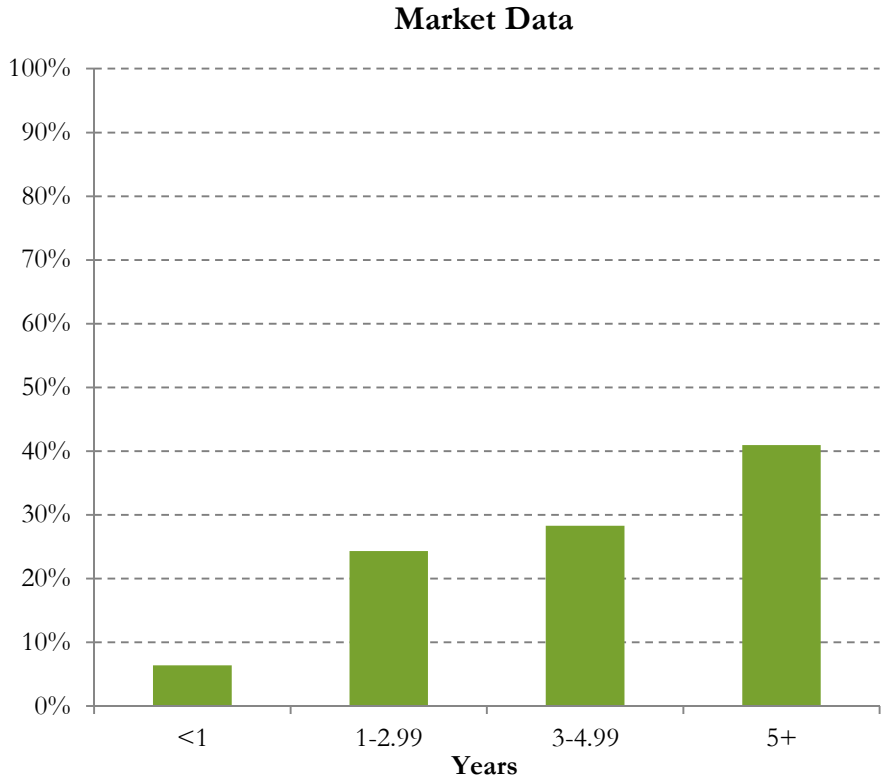
- **When the floor is a fixed value, it is not risk-sensitive** and it provides a perverse incentive to securitise low quality assets (eg. weak commercial real estate, even US subprime) but not high quality assets.
- With a fixed floor, the proportion of risk that this floor is covering reduces as the underlying risk increases.
- It provides an arbitrage opportunity for banks to move into senior tranches with riskier underlyings, in exchange for higher yield.
- If this becomes the strategy of a regulated bank (with risk management failings), it will actually increase systemic risk in the banking sector.

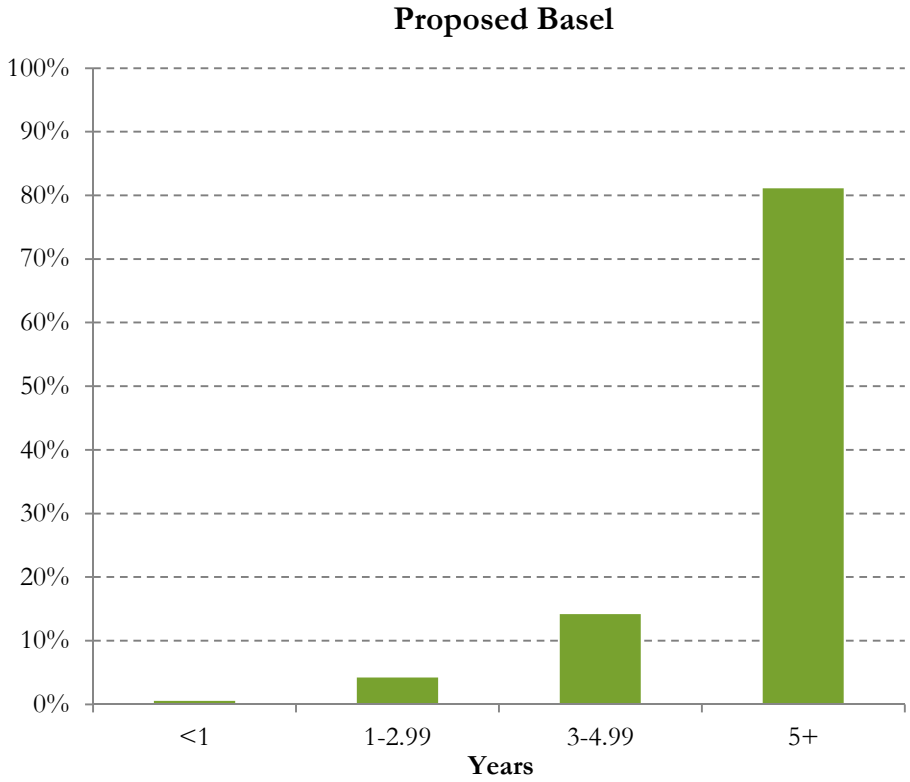
Asset Class	SA Risk Weight	Fixed Floor	Proportion of Floor compared to Underlying Risk
AAA to AA Corporate Loans	20%	20%	100%
Prime Residential Mortgages	35%	20%	57%
A+ to A- Corporate Loans	50%	20%	40%
Retail Portfolios	75%	20%	27%
BBB+ to BB- Corporate Loans	100%	20%	20%
B+ to B- Corporate Loans	150%	20%	13%
SA (Weak) Real Estate	250%	20%	8%

Maturity Definition Does Not Correspond to Market Reality

- Sample data from a major bank portfolio (most assets were purchased before 2007).
- The gap between Market based *(WAL)* and Basel format maturities (*Final Maturity*) will be greater for New Issue Transactions

Maturity in a Blackbox





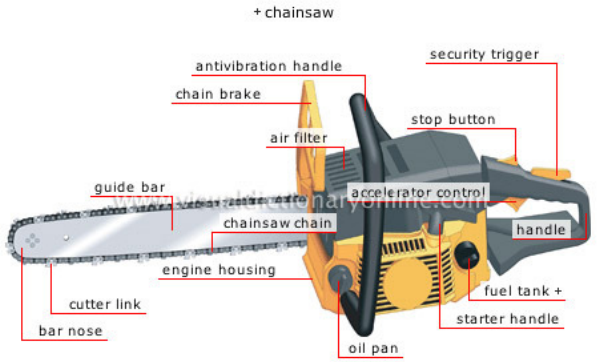
Source: AFME

More Technical Industry Concerns

Concerns about simplicity, continuity, applicability and risk-sensitivity of the recently BCBS proposed securitisation framework:

- 20% RW floor Disconnected from Asset Risk
- Discontinuity between treatment of underlying loans and their securitisations
- Multiple layers of conservatism built into MSFA
- Difficulties in calculation MSFA on an asset-by-asset basis
- MSFA tranche level maturity adjustment
- Disregard for first priority claim of first pay tranches on pool cash flow
- Mismatch between proposed and actual maturity of tranches
- Highly conservative calibration of RRBA
- The mis-sized caps
- Floor level disconnected from underlying asset pool
- Overly broad re-securitisation definition
- Are BCBS stated objectives achieved?

A simple and transparent design:



An over-engineered answer

Does BCBS Proposed Framework Achieve its Stated Goals?

ALTERNATIVES		PRIORITIES			
		Make capital requirements more prudent	**Make capital requirements more risk sensitive**	**Mitigate mechanistic reliance on external ratings**	**Reduce cliff effects**
A	MSFA	Does not allocate capital in line with economic risk	No / constrained by Floor & Cap	Yes	No Reduction
	RRBA	Does not allocate capital in line with economic risk: penalising high quality portfolio and possibly favouring low quality portfolios	No	No	Marginal Reduction *(cliff effect of rating agency first dollar loss methodology remains)*
	SSFA		No	Yes	Partially
B	Senior high quality tranche RRBA or MSFA/ SSFA concentration ratio Backsktop approach	Does not allocate capital in line with economic risk	No	Yes	Material cliff effect between SHQ and non SHQ tranches due to model discontinuity

Source: BNP Paribas response to BCBS Consultative Paper 236

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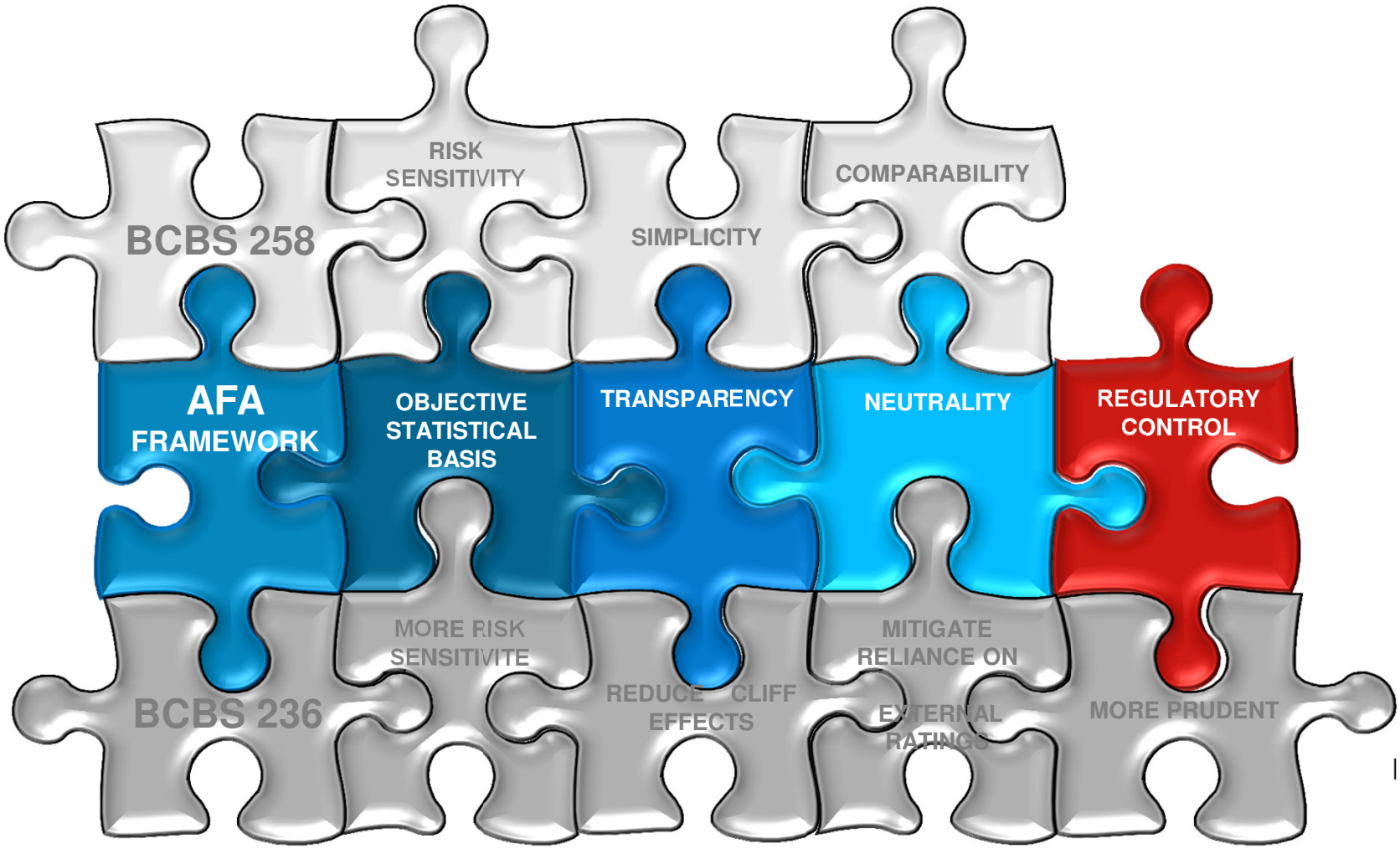
AFA meets BCBS 258:
Balancing Risk Sensitivity, Simplicity & Comparability

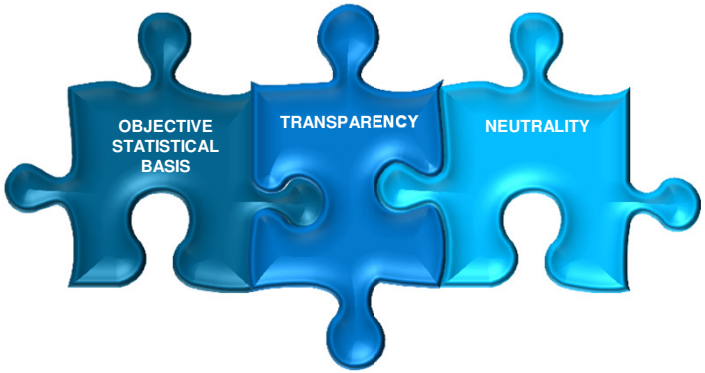
- BCBS 258 sets out key principles that regulation should follow:
  Risk Sensitivity, Simplicity and Comparability
- These match closely to the principles to which we have adhered in developing the Arbitrage Free Approach to meet BCBS 236 objectives.



Balancing Risk Sensitivity, Simplicity and Comparability -1-

BCBS 258: Risk Sensitivity

- *"Ex-ante risk sensitivity:* a risk-sensitive standard draws fine distinctions based on the characteristics of individual exposures or transactions. In the capital adequacy framework, this is primarily reflected in the granularity of the risk weights."
- *"Ex-post risk sensitivity:* a standard is risk-sensitive if, other things being equal, it can accurately differentiate in advance between different risk profiles. For a capital framework, this implies that it can distinguish with reasonable accuracy between sound banks and those that are likely to fail. Risk is, of course, unobservable; hence, this type of risk sensitivity can only be accurately assessed ex-post."



How the AFA measures up:

- UL based: like IRBA
- Starting point – risk sensitivity of individual underlying exposures
- Ability to adjust capital requirements according to performance of underlying exposures and to adjust ρ^*

How the MSFA/SSFA measure up:

- MSFA based on ES and very conservative EL
- Conservatism of MSFA, especially for long maturity deals, means most deals are handled by caps and floors

Balancing Risk Sensitivity, Simplicity and Comparability -2-

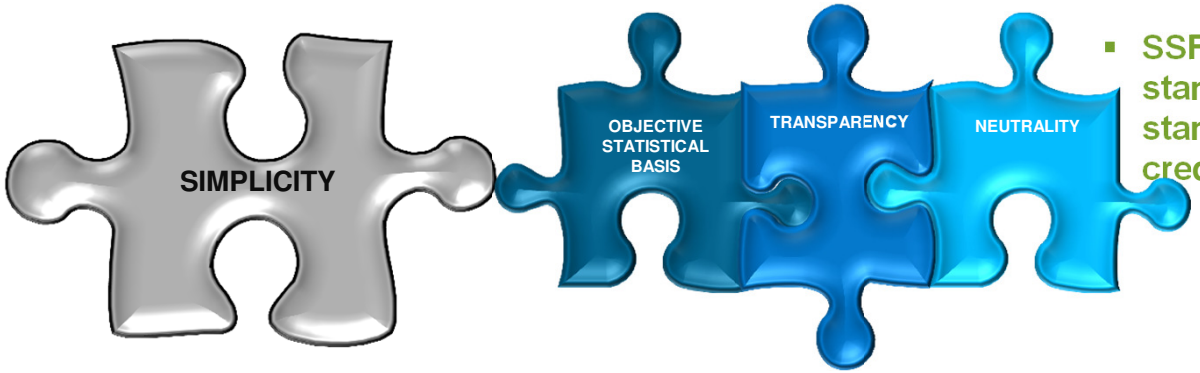
BCBS 258: Simplicity

"A capital standard is simple if it is clear and can be understood with reasonable effort. This requires:

- ***Simple exposition:*** a simple standard is clearly expressed in straightforward language. It is easily explained to banks to which it is meant to apply, as well as to other groups with a legitimate interest, such as market analysts.
- ***Simple interpretation:*** a simple standard is precise and unambiguous: it avoids imprecise terms that are capable of widely divergent interpretations.

A capital calculation process is simple if it requires:

- ***Simple inputs:*** a simple standard does not require a large number of inputs and avoids reliance on inputs not captured within the normal accounting or risk management systems of banks (ie, the inputs are subject to internal or external validation so the data called for is more readily accessible, better understood, and more reliable).
- ***Simple calculations:*** a simple standard can be calculated without the need for the use of highly advanced mathematical and statistical concepts, avoids iterative calculations, and can be easily verified by external parties such as supervisors or auditors."



How the AFA measures up:

- **Makes a single transparent modification to existing models: adding ρ^* to reflect higher correlation in the securitisation pool relative to bank balance sheet**
- **Several transparent adjustments for maturity, granularity and model risk**
- **Supervisory verification and control over new input**

How the MSFA/SSFA measure up:

- **MSFA complex approach with multiple levels of approximation**
- **SSFA super-simple formula but ad hoc stand alone approach unrelated to standard Basel tools for understanding credit risk**

Balancing Risk Sensitivity, Simplicity and Comparability -3-

BCBS 258: Comparability

A capital framework achieves perfect comparability if it delivers:

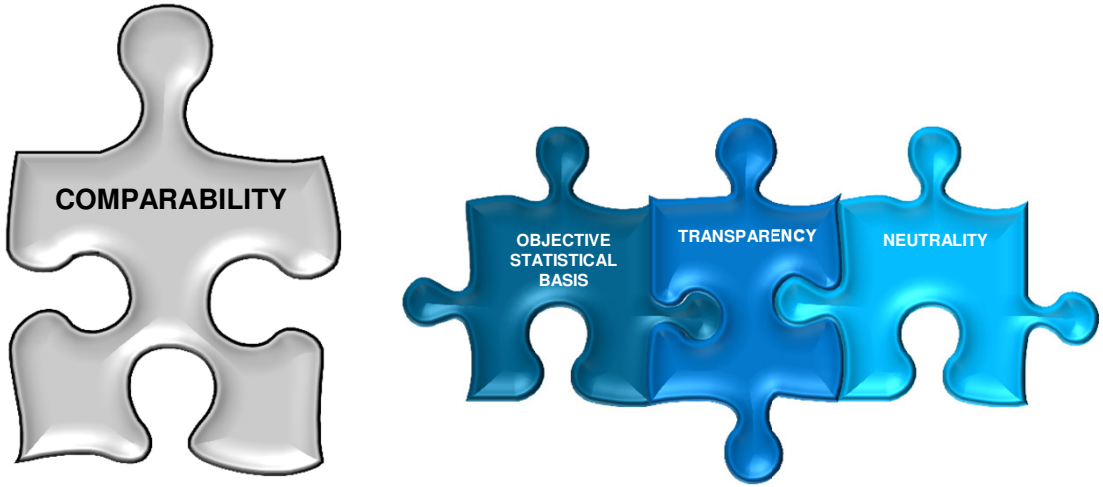
- ***Comparability between banks:*** two banks with portfolios having identical risk profiles apply the framework's rules and arrive at the same amount of risk-weighted assets and two banks with different risk profiles should produce risk numbers that are different proportionally to the differences in risk.
- ***Comparability over time:*** a bank's risk-weighted assets do not change over time if the underlying risks remain unchanged, and change proportionally when risks do change.
- ***Comparable information:*** any differences in risk-weighted assets across banks, jurisdictions and over time can be understood and explained.

How the AFA measures up:

- **Neutrality means that banks holding essentially similar on and off-balance sheet risks will have similar capital.**
- **Unified framework of AFA and SAFA permits consistency across banks with different information (originators or investors).**

How the MSFA/SSFA measure up:

- **Highly non-neutral approach means banks with underlying pool will hold much less capital than a bank holding securitisation tranche.**



Key AFA Principles: 4 Common Sense Requirements

OBJECTIVE STATISTICAL BASIS	Capital for securitisation exposures should be based on their marginal contribution to a single, widely accepted statistical measure of the bank's total portfolio risk.
NEUTRALITY	Apart from model risk charges, the capital a Bank must hold against a set of assets should be unaffected by packaging these assets into securities.
REGULATORY CONTROL	Control parameters should be available that permit regulators and supervisors to achieve their objectives and exercise judgments in the allocation of capital across different types of exposure. Such parameters should reflect the economic reality of transactions so that they could in principle be calibrated from empirical data.
TRANSPARENCY	Capital formulae should reflect in a simple way the nature of risk and be consistent with other regulatory capital approaches to facilitate comparisons and to promote transparency.

Application of Principle 1: Objective Statistical Basis

IRBA Capital for an loan asset:

$$Loan\ Capital = \underbrace{Stressed\ EL_{Loan} - EL_{Loan}}_{UL_{Loan}} + MRC_{Loan}$$

$$RW_{Loan} * 8\%$$

Expected Loss: $EL_{Loan} = PD_{Loan} \cdot LGD_{Loan}$

When the bank is under stress at 99.9%:
$Stressed\ EL_{Loan} = Stressed\ PD_{Loan} \cdot LGD_{Loan} = MVaR_{Loan}$

Unexpected Loss: $UL_{Loan} = Stressed\ EL_{Loan} - EL_{Loan}$

Model Risk Charge = $MRC_{Loan} = 6\% \cdot UL_{Loan}$

$$UL_{Pool} = \sum_{n\ loans} UL_{Loan}$$

AFA Capital for a tranche asset:

$$Tranche\ Capital = \underbrace{Stressed\ EL_{Tranche} - EL_{Tranche}}_{UL_{Tranche}} + MRC_{Tranche}$$

$$RW_{Tranche} * 8\%$$

Expected Loss: $EL_{Tranche} = PD_{Tranche} \cdot LGD_{Tranche}$

When the bank is under stress at 99.9%:
$Stressed\ EL_{Tranche} = Stressed\ PD_{Tranche} \cdot LGD_{Tranche} = MVaR_{Tranche}$

Unexpected Loss: $UL_{Tranche} = Stressed\ EL_{Tranche} - EL_{Tranche}$

Model Risk Charge = $MRC_{Tranche} = 6\% \cdot UL_{Pool}$

$$UL_{Pool} = \sum_{N\ tranches} UL_{Tranche}$$

Application of Principle 2: Neutrality

The AFA is based on a simple extension of the assumption of the original Asymptotic Single Risk Factor model employed in Basel II:

(1) $$Z_i = \sqrt{\rho_i}\, Y_{Bank} + \sqrt{1-\rho_i}\, Z_{F_i}$$ ⟸ ASRF (with Vasicek distribution)

Y_{Bank} is the Basel asymptotic single risk factor, and Z_i the factor of a loan

(2) $$Z_{F_i} = \sqrt{\rho^*}\, X_{SPV} + \sqrt{1-\rho^*}\, \varepsilon_i$$ ⟸ AFA Concentration Factor

X_{SPV} is an uncorrelated additional common factor and the ε_i's are idiosyncratic shocks.

Choosing the correlation parameters, ρ_i, to take the Basel II values, ensures that the MVaR of a pool of such assets will equal the Basel II levels and so capital for all the tranches of a securitisation equals the Basel II levels for on balance sheet assets.

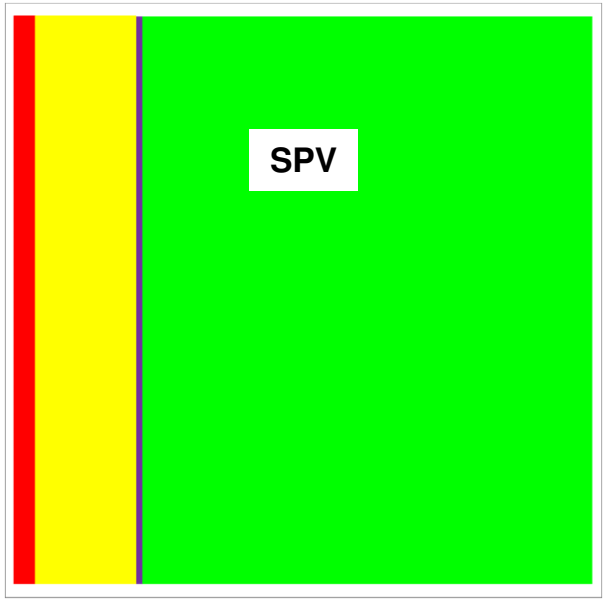
The additional common risk factor X_{SPV} spreads risk and capital across tranches in the structure in a smooth and economically well-motivated way, via the concentration correlation ρ^*

Graphical Representation of a SPV's Balance Sheet

Securitisation =
***Concentrated** Assets*

Expected Loss
Unexpected Loss
Model Risk Charge
No (regulatory) Loss

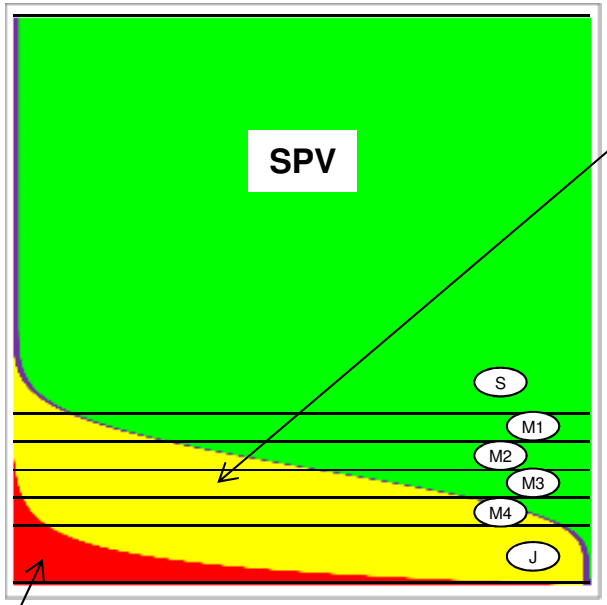
S Senior
M1 Mezzanine 1
M2 Mezzanine 2
M3 Mezzanine 3
M4 Mezzanine 4
J Junior



SPV Assets

Marginal Contribution to the Expected Loss of the **Bank**

Marginal Contribution to the Value at Risk of the **Bank**



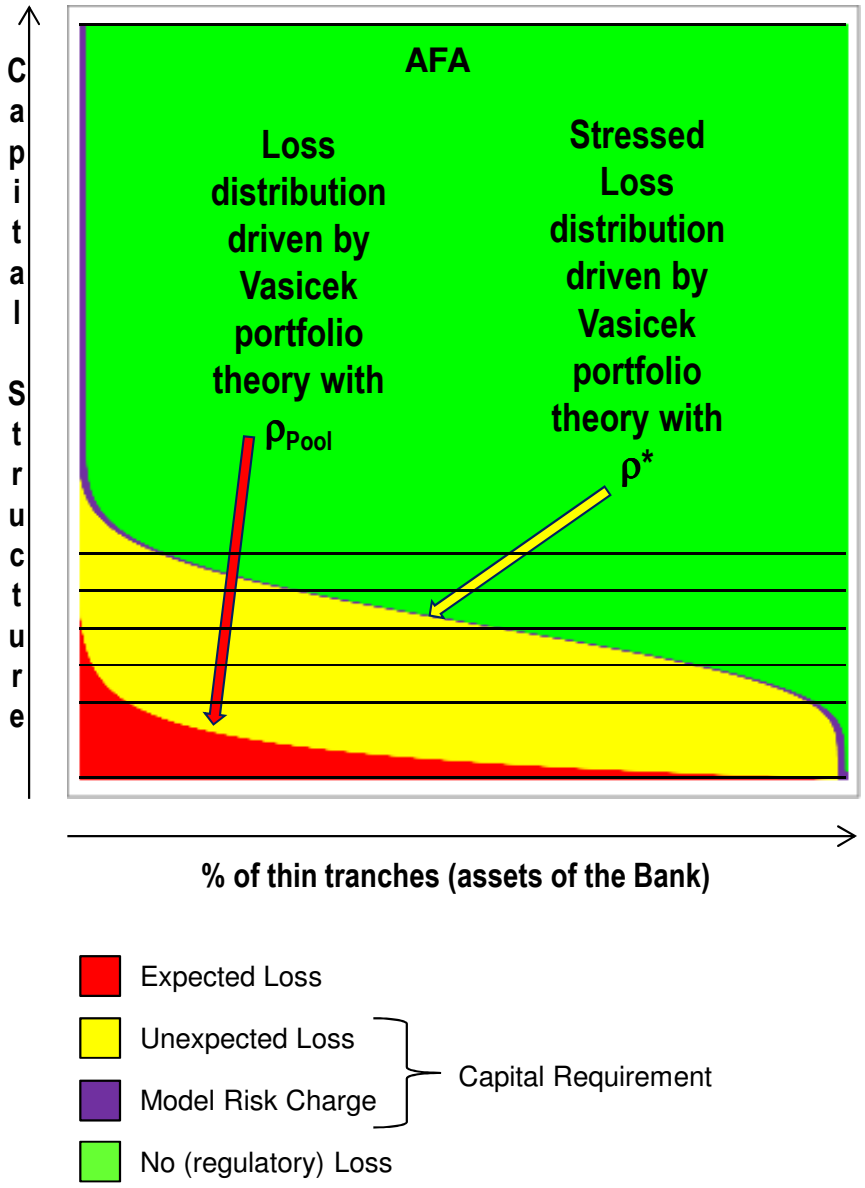
SPV Liabilities

Marginal Contribution to the Value at Risk of the **Bank**

Marginal Contribution to the Expected Loss of the **Bank**

The additional common risk factor spreads risk and capital across tranches in the structure in a smooth and economically well-motivated way

IRBA distribution (Vasicek) drives the AFA



Key input assumption: **pool is concentrated**

- **ρ is the current Basel 2 systemic correlation**
- **ρ^* is an asset class specific additional correlation to represent the fact that the pool is concentrated**

The implied pool correlation of the pool is:

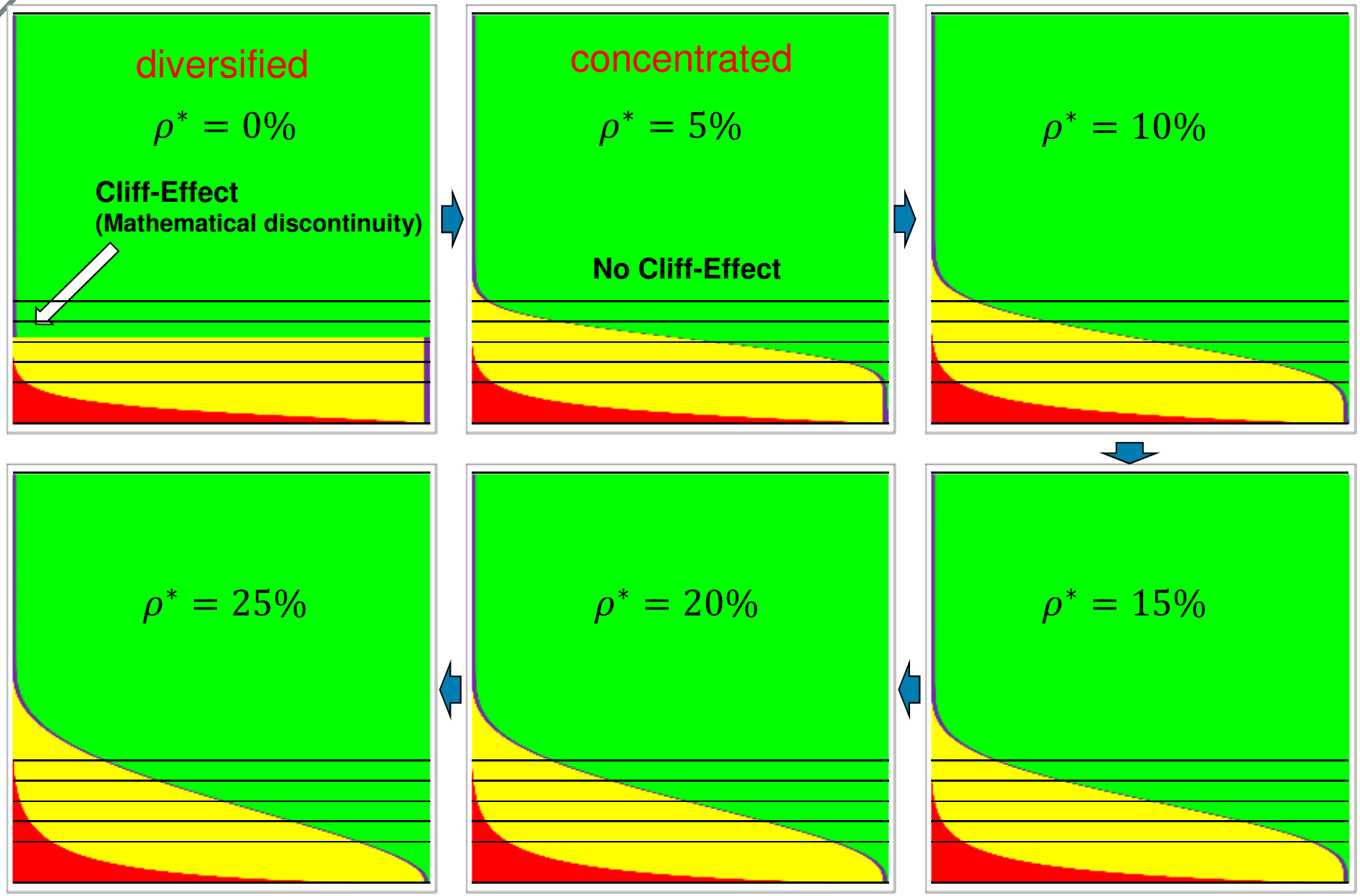
$$\rho_{Pool} = \rho + (1 - \rho) \cdot \rho^*$$

The Vasicek loss distribution is used in IRBA

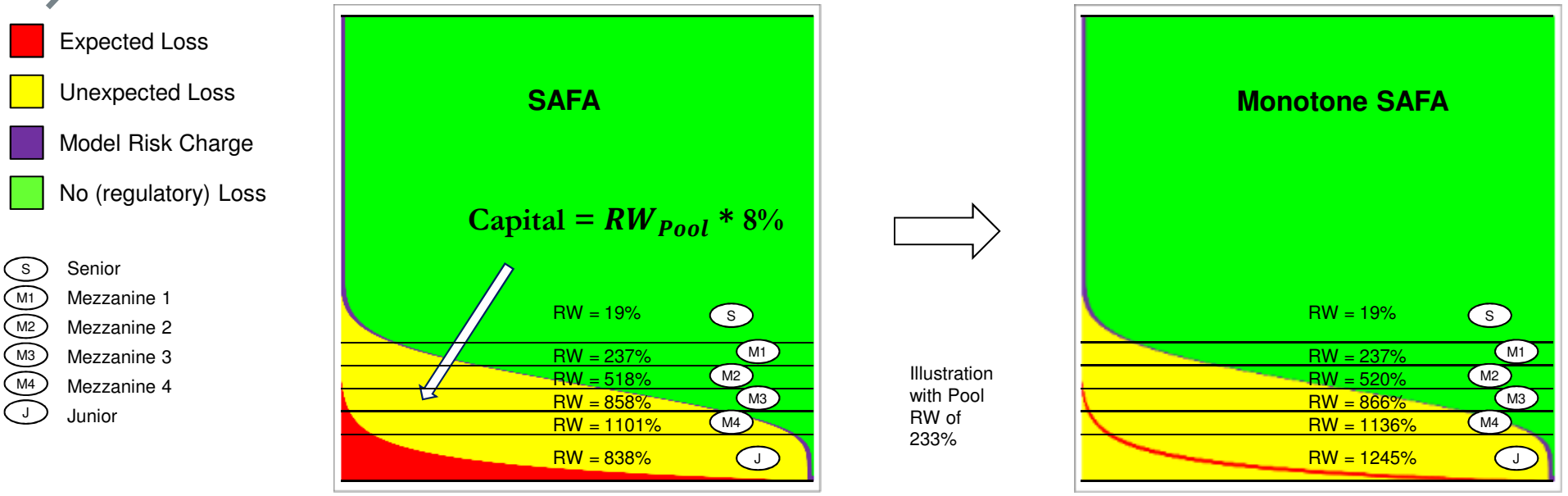
This Unexpected Loss (yellow surface) is the surface between the Vasicek stressed loss distribution (with Stressed PD and ρ^*) and the Vasicek loss distribution (PD and ρ_{Pool})

If $\rho^* = 0$, then a cliff-effect appears. To avoid the cliff-effect, the pool of assets that is securitised needs to be considered as more concentrated than the diversified bank wide asset base

Application of Principle 3: Regulatory Control with ρ^*



SAFA (Simplified AFA): a Solution for RW input



Key input assumption: pool is concentrated, risk weight of pool (RW) only is known

UL (yellow surface) = RW_{Pool} * 8%

The capital distribution is boosted by a proxy for regulatory expected loss.

If the regulatory expected loss is included in the SAFA ("red becomes yellow"), the capital distribution becomes Monotonic

The SAFA capital is distributed like in the AFA with ρ^*

The Simplified AFA (SAFA) can be used for those situations where PD or LGD of the underlyings are not known, eg. Standardised Approach or when RW only is known such as with the Slotting criteria approach in IRBA.

Calibrating ρ^*

- The ρ^* parameter may be set based on regulatory judgement.
- This could be done by asset class or on some other basis.
- Importantly, because it has economic interpretation, it may also be benchmarked against data.
- If it is believed that the allocation of capital should be done differently for short versus long maturity deals, ρ^*, could be given a maturity dimension.

Maximum Likelihood based estimates					
	ρ	ρ*	ρ*	ρ*	ρ*
Sector	Assumed Basel value	All regions 2000-2012	All regions 2005-2012	North America 2000-2012	North America 2005-2012
1. RMBS	15%	3%	6%	3%	6%
2. ABS	10%	11%	11%	12%	11%
3. Other	10%	3%	3%	2%	2%
4. PF	20%	26%	34%	26%	34%
5. CDO	20%	11%	7%	8%	4%
6. CMBS	9%	4%	4%	4%	3%
7. Structured Products	16%	10%	10%	4%	6%

Capital Calculations for a CLO Using Different Formulae

CORPORATE POOL (such as SME, Leveraged Loan)

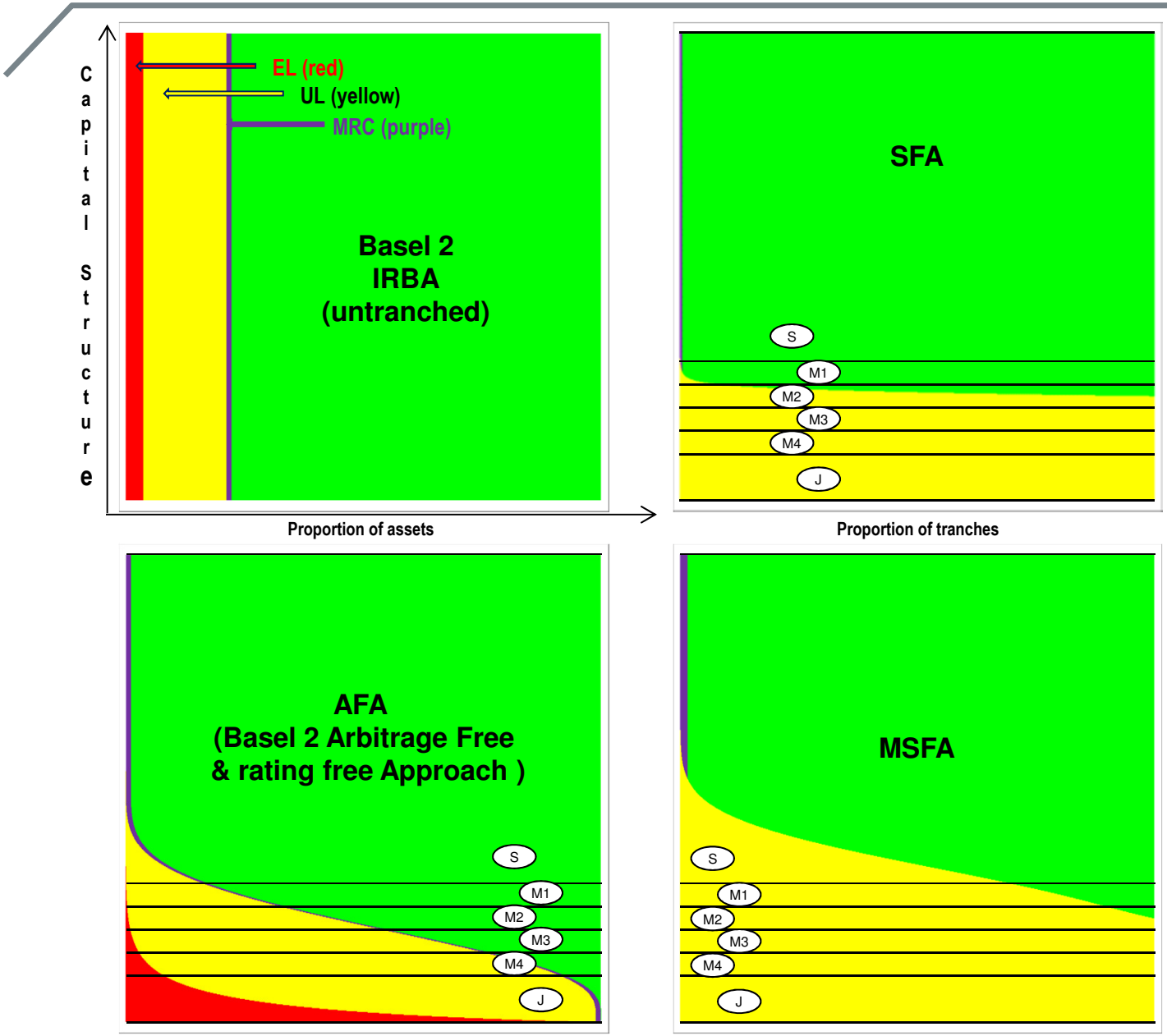
	Approach:	SFA	AFA	AFA	AFA	MSFA
	rho star ('stressed correlation')	0%	5%	10%	15%	0%
	Model Risk Charge (Floor) (RW%)	7.0%	13.2%	13.2%	13.2%	20.0%
Thickness	Tranche	nche Notional (prior to Adjustments)				
70.0%	Senior	7%	15%	20%	26%	114%
5.0%	Mezzanine 1	19%	151%	248%	303%	987%
5.0%	Mezzanine 2	851%	509%	532%	539%	1191%
5.0%	Mezzanine 3	1250%	973%	867%	804%	1250%
5.0%	Mezzanine 4	1250%	1189%	1093%	1010%	1250%
10.0%	Junior	1250%	817%	822%	820%	1250%
100.0%	*Total Tranches After Securitisation*	*298%*	*233%*	*233%*	*233%*	*439%*
100.0%	*Total Pool Before Securitisation*	*233%*	*233%*	*233%*	*233%*	*233%*
	Ratio After / Before	1.28	1.00	1.00	1.00	1.88

RW Stability Analysis

Approach:	SFA	AFA	AFA	AFA	MSFA
RW Instability Ratio Mezzanine 2 / Mezzanine 1	*44.65*	*3.37*	*2.15*	*1.78*	*1.21*
RW Instability Ratio Mezzanine 3 / Mezzanine 2	*1.47*	*1.91*	*1.63*	*1.49*	*1.05*
RW Instability Ratio Mezzanine 4 / Mezzanine 3	*1.00*	*1.22*	*1.26*	*1.26*	*1.00*
RW Instability Ratio Junior / Mezzanine 4	*1.00*	*0.69*	*0.75*	*0.81*	*1.00*

- The underlying pool is typical of a European corporate transaction (SME or Leveraged Loans)
- Pool IRBA RW: 233%
- IRBA Model Risk Charge (6% of RW): 13.2%

Comparative Review IRBA – SFA – MSFA - AFA (European Real Economy Corporates)



Expected Loss (EL)
covered by FMI -Future Margin Interest-
- IRBA: Yes
- AFA: Yes
- SFA: No
- MSFA: No

Unexpected Loss (UL)
- IRBA: UL definition
- AFA: UL conservation
- SFA: UL creation
- MSFA: massive UL creation

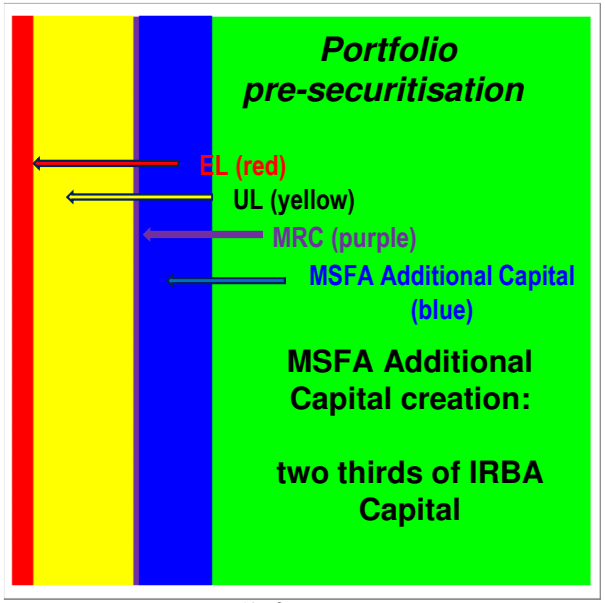
Model Risk Charge (MRC)
- IRBA: 6% * K_{IRB} (105 bps)
- AFA: 6% * K_{IRB}
- SFA: 56 bps
- MSFA: 160 bps

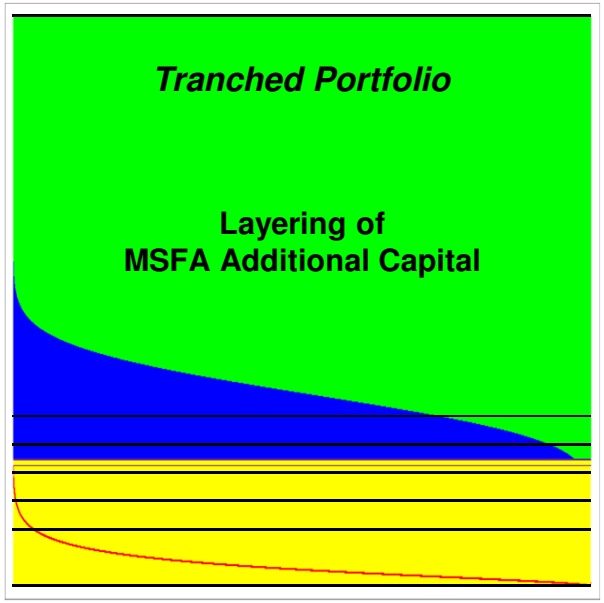
RW STABILITY for mezzanine tranches
- IRBA: n/a
- AFA: stable
- SFA: unstable
- MSFA: stable

ARBITRAGEABLE
- IRBA: n/a
- AFA: No (additive)
- SFA: Yes
- MSFA: Yes

MSFA Capital Creation: Impact on Corporate & Mortgage Assets

CORPORATES





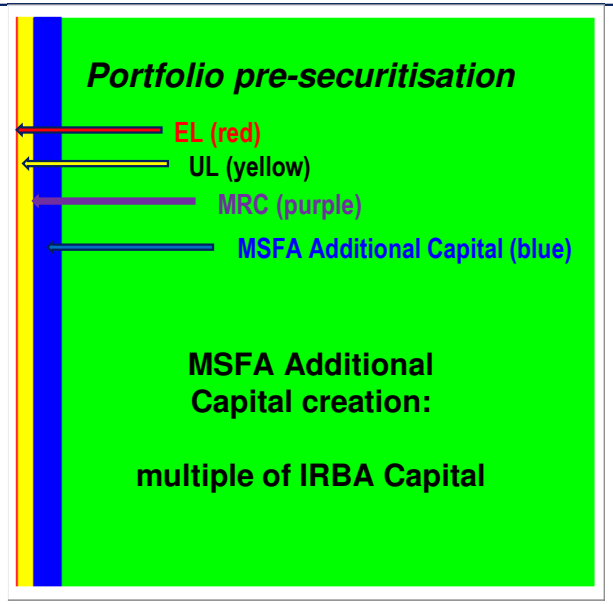
- PD = 5%
- LGD = 55%
- M = 5 years
- K_{IRB} = 17.58%
- MRC = 1.05%
- **CR_{IRB} = 18.63%**

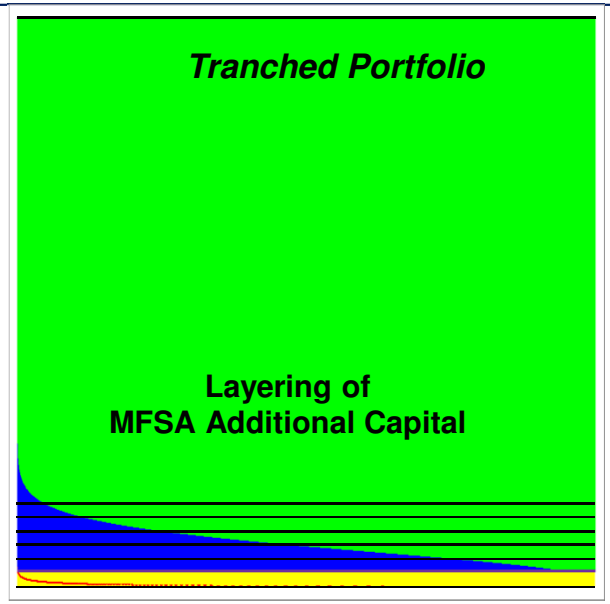
- **MSFA Capital Creation = 11.98%**

- MFSA Creation Ratio = 0.64

- **After/Before Ratio = 1.89**

MORTGAGES





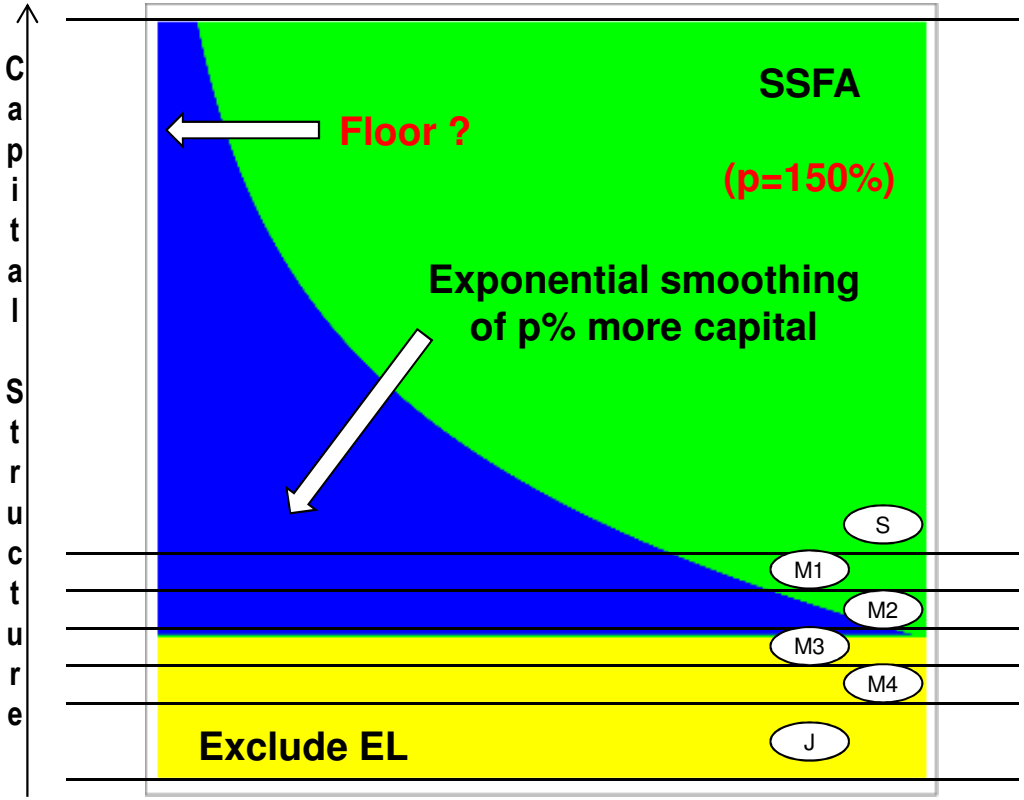
- PD = 1.5%
- LGD = 20%
- M = 5 years
- K_{IRB} = 2.60%
- MRC = 0.16%
- **CR_{IRB} = 2.76%**

- **MSFA Capital Creation = 4.67%**

- MSFA Creation Ratio = 1.69

- **After/Before Ratio = 3.28**

SSFA in BCBS236 (Post Securitisation)



Expected Loss

Unexpected Loss

Model Risk Charge

No (regulatory) Loss

and

Additional SSFA Capital

SSFA explained:

1. **Define capital**
   Replace K_{IRB} (including EL) by K_{SA} (excluding EL)
   Add a delinquency add-on 'w'

2. **Consider (erroneously) capital as a 'first loss'**

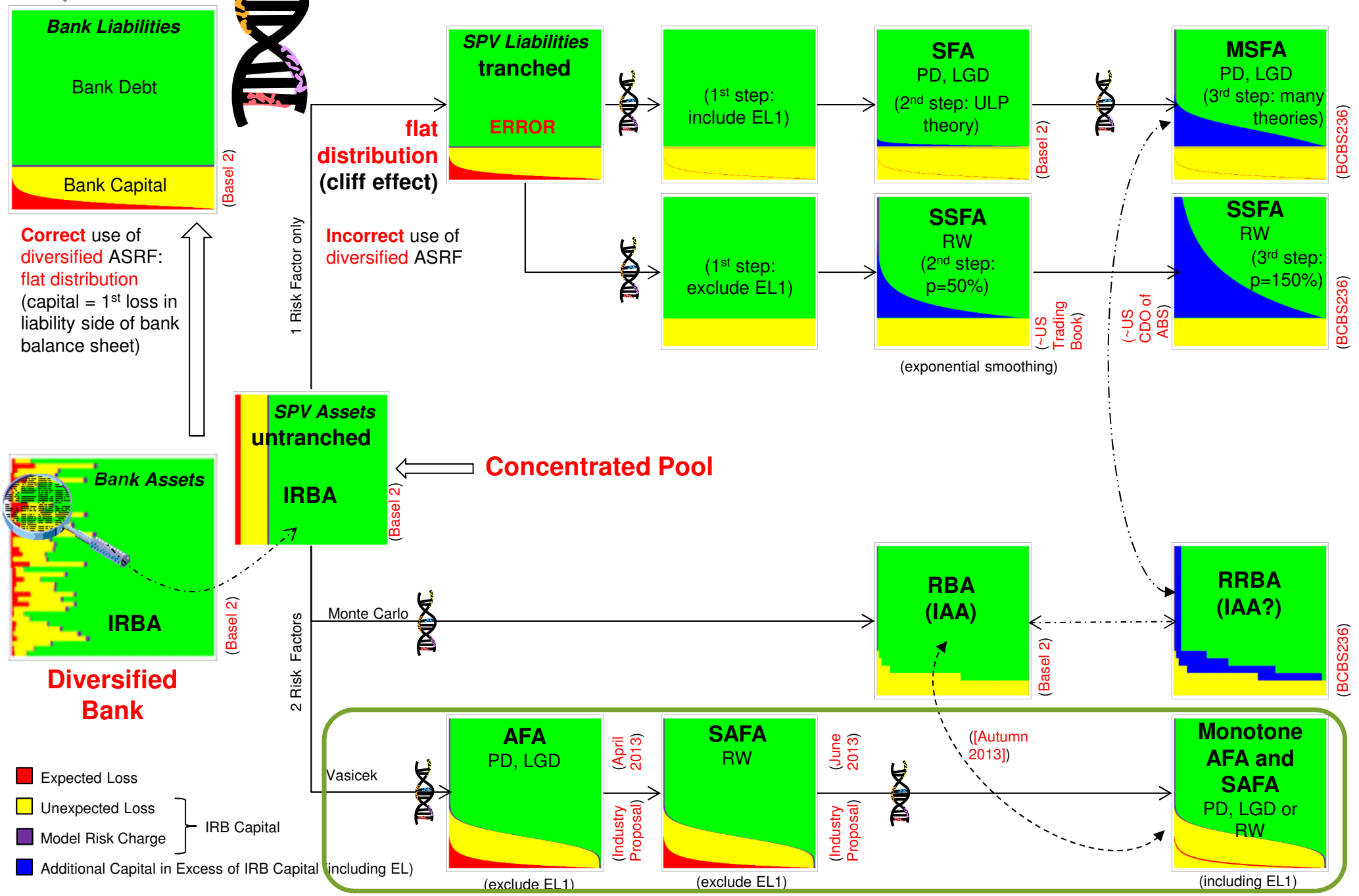
3. **Add p% more capital (p=1.5 in BCBS236)**

4. **Smooth exponentially the additional capital**

5. **Add a floor** (sometimes the capital charge is so high that the floor is never reached!)

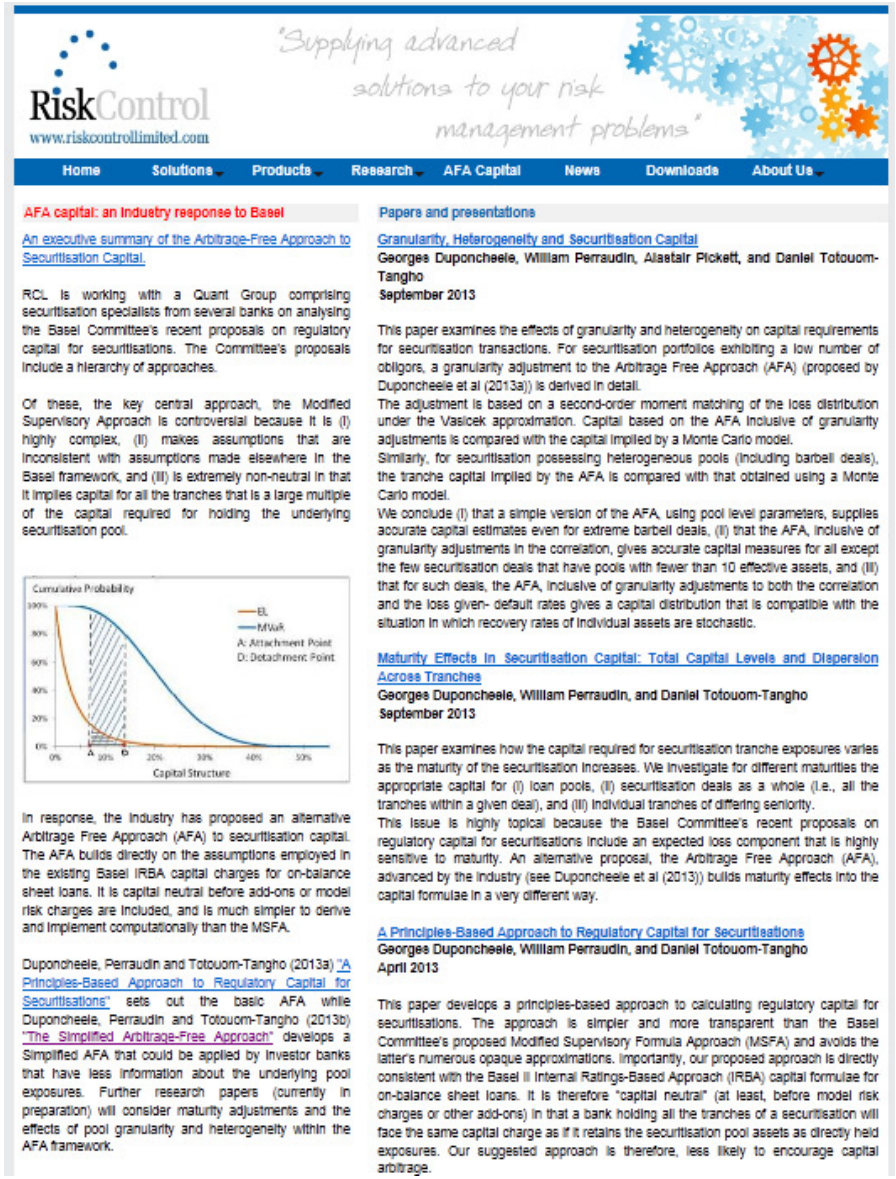
How it should be:

The DNA of Securitisation Capital Approaches



To get more information on the AFA…

http://www.riskcontrollimited.com/afa_capital.html



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AFA capital: an industry response to Basel

An executive summary of the Arbitrage-Free Approach to Securitisation Capital.

RCL is working with a Quant Group comprising securitisation specialists from several banks on analysing the Basel Committee's recent proposals on regulatory capital for securitisations. The Committee's proposals include a hierarchy of approaches.

Of these, the key central approach, the Modified Supervisory Approach is controversial because it is (I) highly complex, (II) makes assumptions that are inconsistent with assumptions made elsewhere in the Basel framework, and (III) is extremely non-neutral in that it implies capital for all the tranches that is a large multiple of the capital required for holding the underlying securitisation pool.

In response, the industry has proposed an alternative Arbitrage Free Approach (AFA) to securitisation capital. The AFA builds directly on the assumptions employed in the existing Basel IRBA capital charges for on-balance sheet loans. It is capital neutral before add-ons or model risk charges are included, and is much simpler to derive and implement computationally than the MSFA.

Duponcheele, Perraudin and Totouom-Tangho (2013a) "A Principles-Based Approach to Regulatory Capital for Securitisations" sets out the basic AFA while Duponcheele, Perraudin and Totouom-Tangho (2013b) "The Simplified Arbitrage-Free Approach" develops a Simplified AFA that could be applied by investor banks that have less information about the underlying pool exposures. Further research papers (currently in preparation) will consider maturity adjustments and the effects of pool granularity and heterogeneity within the AFA framework.

Papers and presentations

Granularity, Heterogeneity and Securitisation Capital
Georges Duponcheele, William Perraudin, Alastair Pickett, and Daniel Totouom-Tangho
September 2013

This paper examines the effects of granularity and heterogeneity on capital requirements for securitisation transactions. For securitisation portfolios exhibiting a low number of obligors, a granularity adjustment to the Arbitrage Free Approach (AFA) (proposed by Duponcheele et al (2013a)) is derived in detail.
The adjustment is based on a second-order moment matching of the loss distribution under the Vasicek approximation. Capital based on the AFA inclusive of granularity adjustments is compared with the capital implied by a Monte Carlo model.
Similarly, for securitisation possessing heterogeneous pools (including barbell deals), the tranche capital implied by the AFA is compared with that obtained using a Monte Carlo model.
We conclude (I) that a simple version of the AFA, using pool level parameters, supplies accurate capital estimates even for extreme barbell deals, (II) that the AFA, inclusive of granularity adjustments in the correlation, gives accurate capital measures for all except the few securitisation deals that have pools with fewer than 10 effective assets, and (III) that for such deals, the AFA, inclusive of granularity adjustments to both the correlation and the loss given- default rates gives a capital distribution that is compatible with the situation in which recovery rates of individual assets are stochastic.

Maturity Effects in Securitisation Capital: Total Capital Levels and Dispersion Across Tranches
Georges Duponcheele, William Perraudin, and Daniel Totouom-Tangho
September 2013

This paper examines how the capital required for securitisation tranche exposures varies as the maturity of the securitisation increases. We investigate for different maturities the appropriate capital for (I) loan pools, (II) securitisation deals as a whole (i.e., all the tranches within a given deal), and (III) individual tranches of differing seniority.
This issue is highly topical because the Basel Committee's recent proposals on regulatory capital for securitisations include an expected loss component that is highly sensitive to maturity. An alternative proposal, the Arbitrage Free Approach (AFA), advanced by the industry (see Duponcheele et al (2013)) builds maturity effects into the capital formulae in a very different way.

A Principles-Based Approach to Regulatory Capital for Securitisations
Georges Duponcheele, William Perraudin, and Daniel Totouom-Tangho
April 2013

This paper develops a principles-based approach to calculating regulatory capital for securitisations. The approach is simpler and more transparent than the Basel Committee's proposed Modified Supervisory Formula Approach (MSFA) and avoids the latter's numerous opaque approximations. Importantly, our proposed approach is directly consistent with the Basel II Internal Ratings-Based Approach (IRBA) capital formulae for on-balance sheet loans. It is therefore "capital neutral" (at least, before model risk charges or other add-ons) in that a bank holding all the tranches of a securitisation will face the same capital charge as if it retains the securitisation pool assets as directly held exposures. Our suggested approach is therefore, less likely to encourage capital arbitrage.

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