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Diversité et comparabilité de la mesure des risques : comment arbitrer sans tomber dans le « simplisme »

Les modèles internes sont-ils bons ou mauvais ?

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Agenda

Origine de la controverse

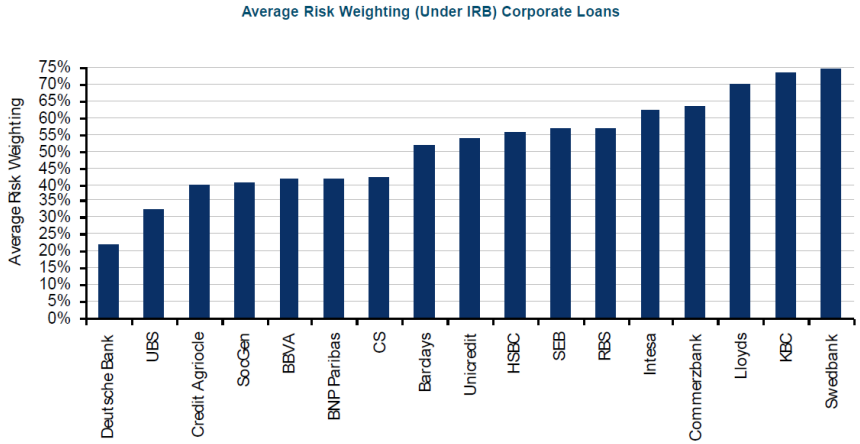
Quelle cible pour les modèles internes ?

Un peu de forward looking

Les modèles internes sont-ils bons ou mauvais ?

Origine de la controverse
Les modèles internes à l'origine de la crise de 2007 ?

- Certains modèles ont été contribué à la crise de 2007 (titrisation des supbrimes)
- En 2011, Barclays Equity research a publié une première étude qui mettait en avant une **suspicion sur les modèles internes**, suivie par d'autres études recommandant leur **abandon**
- D'autres études ont suivi notamment du FMI qui utilisent la **densité des RWA** pour illustres l'impact de modèles internes.
- En 2012, Andy Haldane, directeur exécutif de la BOE appelle a **revoir l'architecture de Bâle** qui repose trop sur de modèle internes opaques et peu fiables, un message qui est relayé par d'autres régulateurs.
- Ce qui est remis en cause, c'est **la fiabilité,** et la **comparabilité** des modèles internes.

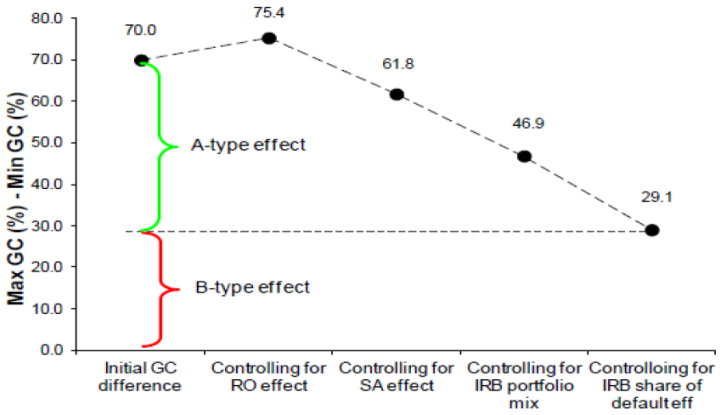


Origine de la controverse
Les analyses du comité de Bâle et de l'EBA

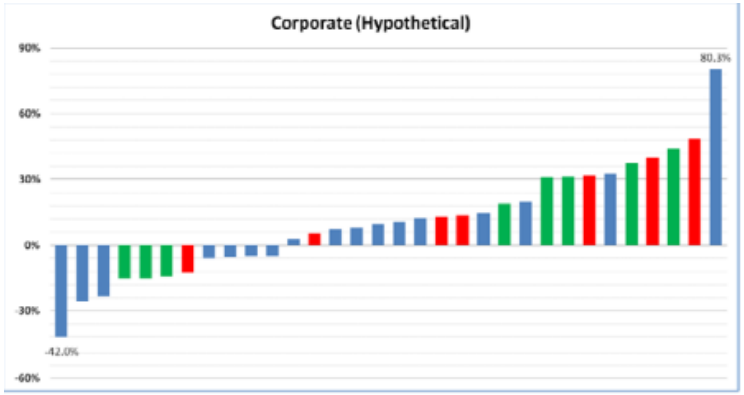
- A partir de 2012 , l'EBA et le Comité de Bâle lancent des benchmarks, sur la base de questionnaires qualitatifs et de portefeuilles hypothétiques, afin **d'analyser la variabilité** des RWA.

- Elles ont montré qu'une grande partie des facteurs explicatifs sont soit **structurels** (compositions de portefeuilles, roll out IRB …) soit liés à **des degrés de libertés laissés** par la réglementation aux **établissements et superviseurs** (définition du défaut, marges de conservatisme …)

- Seules des analyses très **granulaires** sont pertinentes pour comprendre les variations de RWA. Même sur les **mêmes expositions**, il est sain d'avoir une certaine variabilité dans l'estimation des risques.



Source: EBA's Impact Study Group (ISG) dataset (reference date December 2011), EBA calculation



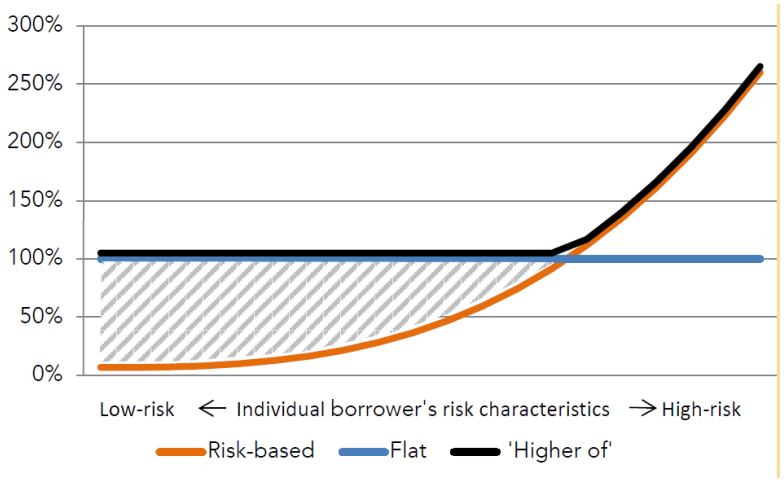
Quelle cible pour les modèles internes ?

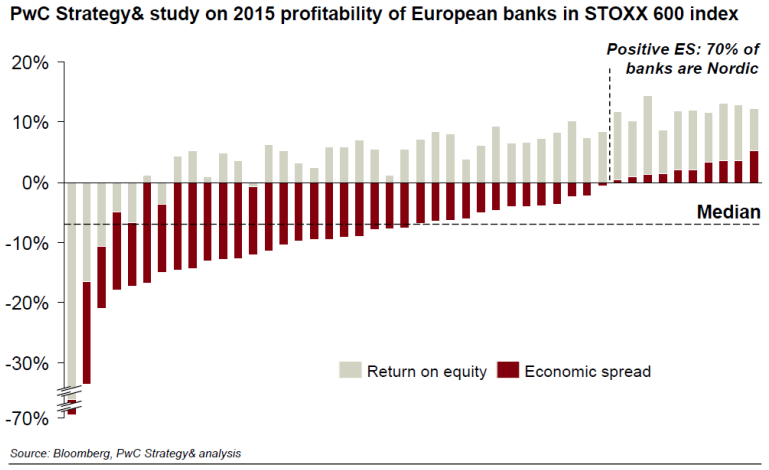
Peut on se passer de modèles internes pour le capital réglementaire?

- Si les modèles internes sont **trop complexes** pourquoi ne pas garder des mesures standards ou un leverage ratio pour le capital réglementaire et libérer les mesures internes des contraintes réglementaires ?

- Les contraintes de capital réglementaire CET1 ont à peu près triplé depuis la crise et les **fonds propres détenus par les banques ont plus que doublé**. Avec des ROE significativement inférieurs au cout du capital, le capital réglementaire est la **ressource rare principale**, qui détermine les choix de développement dans les activités, le pricing des produits et finalement les comportements du marché …

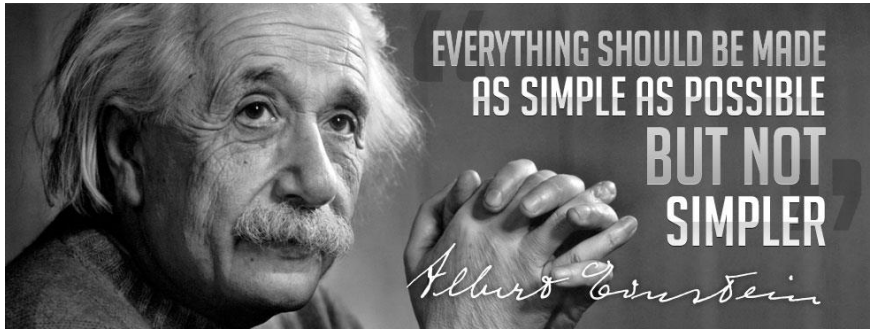
- Indépendamment de la perte des effets vertueux sur les pratiques de mesure des risques et des investissement effectués, **abandonner les modèles internes accroît le risque systémique**.



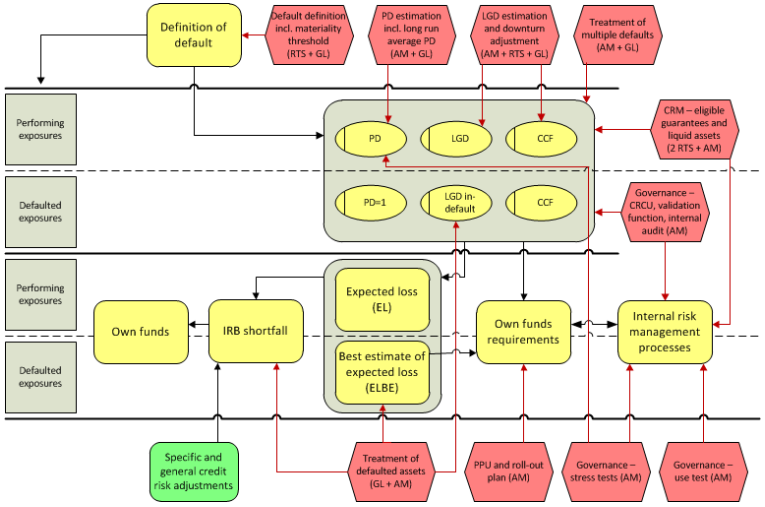


Quelle cible pour les modèles internes ?
Les attributs d'un bon modèle interne – principe de frugalité

- Un modèle est un compromis entre la complexité de la réalité et sa représentation en facteurs de risque.
- Identifier et limiter la modélisation aux **facteurs de risque pertinents** est une condition à la **pertinence** et la **maitrise** des modèles. C'est aussi dans le cas des modèles internes une condition de leur **comparabilité**.
- Il faut éviter l**es modèles sur paramétrés**, avec des degrés de liberté importants qui pose inéluctablement des problèmes de robustesse et de comparabilité, et éviter **les modèles simplistes**
- Les modèles **IRB sont des modèles contraints** mais pour lesquels les degrés de liberté étaient encore trop importants, et c'est bien le sens du travail de l'EBA.



The IRB model and EBA work



Quelle cible pour les modèles internes ?

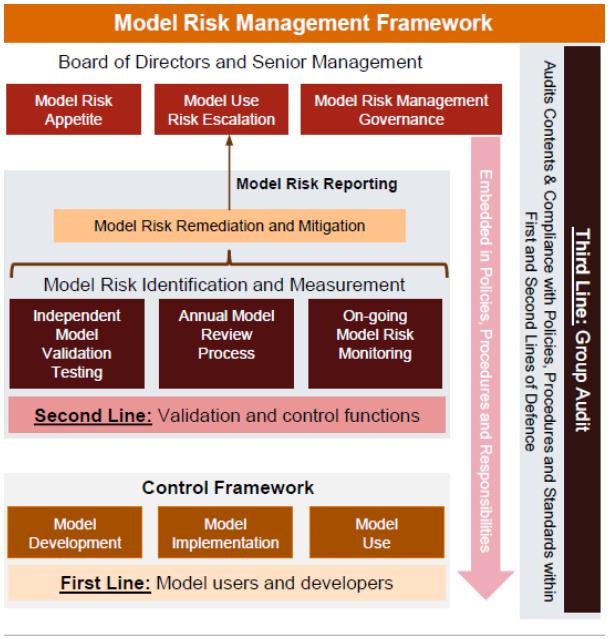
Les attributs d'un bon modèle interne – principe de responsabilité

- Par construction un modèle présente des limites, des lors pour pouvoir être utilisés **ils engagent la responsabilité** de l'ensemble des parties prenantes

- Pour les superviseurs, l'homologation des modèles internes requiert **des moyens importants**, le développement d'une expertise spécifique et in fine **exercer et assumer un jugement** sur la pertinence du modèle. On ne peut pas appliquer sur les modèles un appétit au risque à zéro.

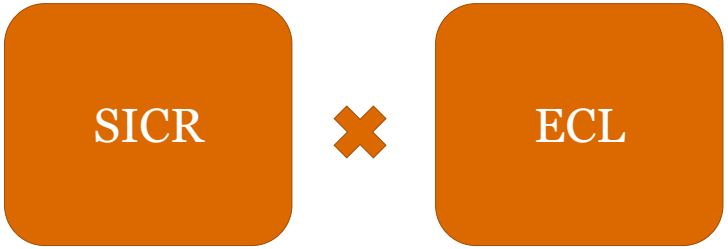
- Pour les établissements, au-delà du **rôle accru** des trois lignes de défense, il existe une exigence de **complétude** des dimensions de validation de modèle, et de **maintenance** des modèles dans le temps.

- Le développement des **dispositifs de Model Risk Management** sont essentiels dans cette perspective.



Un peu de forward looking
Que fait on sur d'autres modèles ?

- IFRS9 **est il un modèle frugal** ?
- IFRS9 a été conçu pour résoudre le problème du « too little too late » du provisionnement. Le principe est de provisionner à maturité quand le crédit se détériore de manière significative.



- IFRS9 doit **en particulier être forward looking**, et quand c'est pertinent prendre en compte plusieurs scénarios
- Les **degrés de libertés sont pratiquement sans limites**
- Sommes nous en train de créer un nouveau candidat forward au model bashing ?

- Approach 1: two-step approach

Scenario	Unemployment rate	Scenario probability	12-m PD	Lifetime PD	LGD	EAD	12-m ECL	Life ECL
Upside	4%	**30%**	0.04	**0.07**	55%	CU1,000	**CU22**	CU39
Base Case	5%	**55%**	0.08	**0.11**	65%	CU1,000	**CU52**	CU72
Downside	6%	**15%**	0.16	**0.20**	85%	CU1,000	**CU136**	CU170

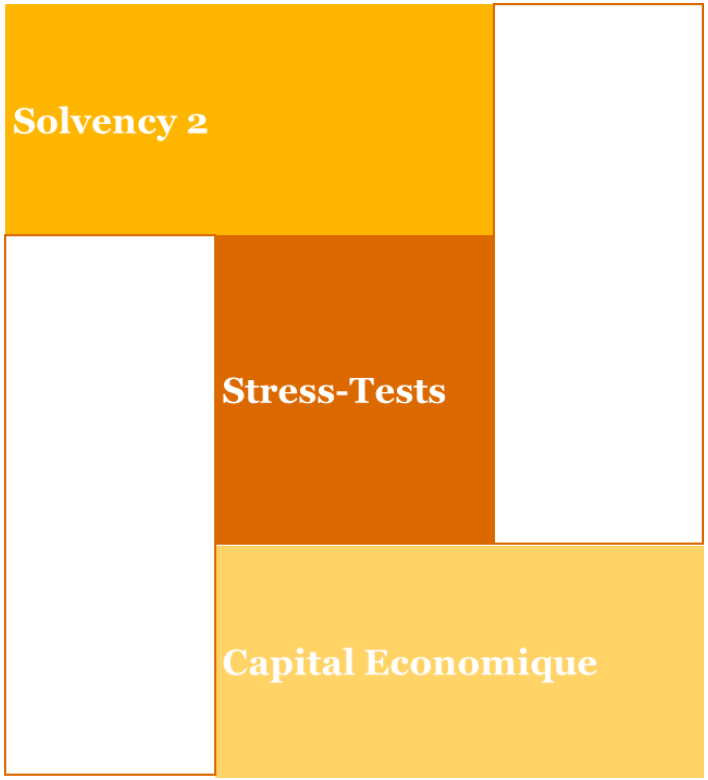
- Step one: The probability-weighted PD is 0.1115 (30% x 0.07 + 55% x 0.11 + 15% x 0.20). The entity then determines, based on the PD at initial recognition and this current probability-weighted PD, that no SICR has occurred.
- Step two: 12-month ECL is recognised, CU56 (30% x CU22 + 55% x CU52 + 15% x CU136).

IFRS

Les modèles internes sont-ils bons ou mauvais ?
D'autres modèles ?

- Les modèles internes dont on ne veut plus pour le capital réglementaire bancaire sont encouragés pour le capital réglementaire dans l'assurance, ou le pilier 2. Il s'agit pour certains **des mêmes modèles.**
- L'incohérence des traitements entre les différents modèles montrent que **le cœur du problème n'est pas technique et que le débat est mal posé.**
- Les modèles sont indispensables et sont appelés à être de plus en plus utilisés au-delà des modèles de capital et de PnL.
- Ils doivent être **bien conçus et maitrisés**, **la mise en place des dispositifs de model risk management semble essentielle.**

D'autres modèles…



Merci !

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EBA's REVIEW OF THE IRB APPROACH

EIFR seminar on internal models

Paris, 15 December 2016

Dorota Siwek

Why does the IRB Approach have to be reviewed?

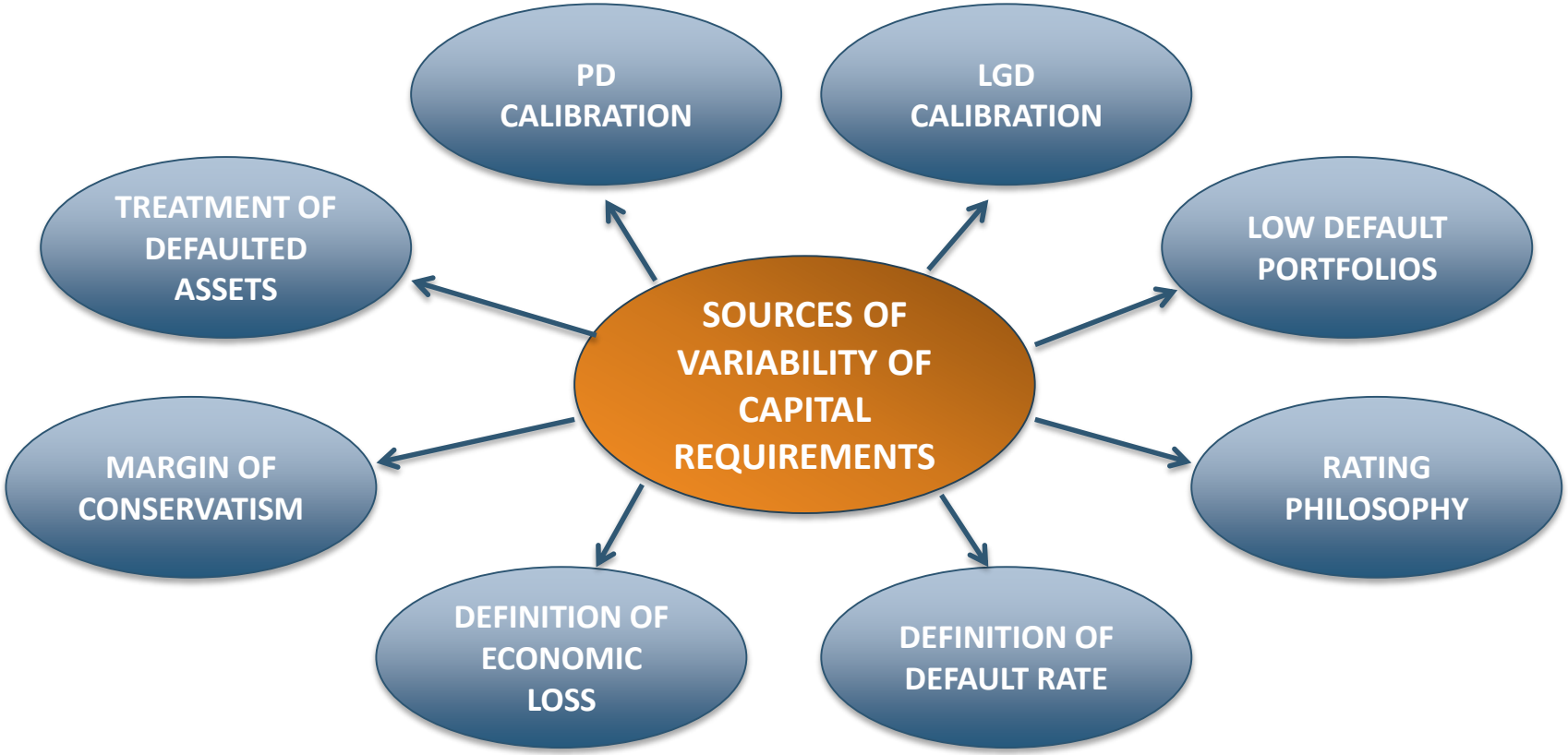
- Lack of trust regarding the use of internal models:
  - Concern that models are used to ensure low capital requirements, i.e. regulatory arbitrage, by some institutions
  - Technical model choices lead to substantial different outcomes, which indicate that capital requirements depend on non-risk based drivers
  - Supervisory practices are divergent
- **Report on the comparability and pro-cyclicality of capital requirements** published in December 2013 confirmed the existence of non-risk based variance in particular in the scope of application of the IRB Approach, PD & LGD calibration and in the treatment of defaulted assets.
- The concerns raised are general for all internal models. However, given that around 80% of capital requirements on average stem from credit risk, a revision of IRB models is the natural starting point.

Discussion Paper on the Future of the IRB Approach

- The EBA has published a Discussion Paper on the Future of the IRB Approach (EBA/DP/2015/01) in March 2015.
- EBA believes that the solution must be based on three strains of work:
  - **Regulatory review of the framework** (the topic of this presentation)
  - **Ensuring supervisory consistency** (benchmarking, home-host issues)
  - **Increased transparency** (harmonised disclosures)
- The EBA's review of the IRB Approach must be done within the legal framework of the CRR:
  - CRR requirements cannot be overruled by EBA's technical standards and guidelines
  - The review has to be carried out within the EBA's mandates
- The feedback from industry to the discussion paper is summarized in the EBAs Report on the regulatory review of the IRB Approach. (http://www.eba.europa.eu/regulation-and-policy/credit-risk/discussion-paper-on-the-future-of-the-irb-approach)

Sources of unjustified variability

The EBA's review of the IRB Approach is focused on the main sourced of unjustified variability of capital requirements identified in the studies on comparability of RWAs



The regulatory response

The EBA has undertaken a bottom-up approach to repairing the drawbacks of internal modelling: excessive RWA variability and lack of comparability across modelling outcomes

Prioritisation	Regulatory products	Current status
Phase 1: Assessment methodology	RTS on IRB assessment methodology	Finalised ✓
Phase 2: Definition of default	RTS on materiality threshold GL on default of an obligor	Finalised ✓
Phase 3: Risk parameters	GL on PD estimation, LGD estimation And the treatment of defaulted assets RTS on economic downturn	Consultation stage
Phase 4: Credit risk mitigation	RTS on conditional guarantees RTS on liquid assets RTS on master netting agreements	Planning stage

Phase 1: Assessment methodology

- Final draft RTS was published on 21 July 2016 and awaits endorsement by the Commission
- Addressed to competent authorities but applies also to institutions
- Covers all aspects of the IRB Approach, not only internal models
- Defines both criteria and methods
- Assessment and applies to all types of supervisory assessment in relevant scope, including:
  - Initial application for the IRB Approach
  - Subsequent applications based on the roll-out plan
  - Changes to the rating systems
  - Ongoing review of the IRB Approach

Phase 1: Assessment methodology – main policy decisions

1) General rules – scope of application of the RTS

2) Roll-out plans and permanent partial use of the Standardised Approach

   → No minimum coverage ratio specified, qualitative criteria for exclusion of portfolios

3) Validation of internal estimates, internal governance and oversight

   → Independence of the validation function based on staff separation, reporting lines or organisational structure

4) Use test and experience test

   → Specification of obligatory and additional areas of use test

5) Assignment of exposures to grades or pools

6) Definition of default

Phase 1: Assessment methodology – main policy decisions

7) Rating systems design, operational details and documentation

8) Risk quantification

- Specification of long-run average default rate
- Number of defaults weighted LGD

9) Assignment of exposures to exposure classes

10) Stress test used in assessment of capital adequacy

11) Own funds requirements calculation

12) Data maintenance

- Data quality management process and IT infrastructure

13) Internal models for equity exposures

14) Management of changes to rating systems

Phase 2: Definition of default

- The final package on the definition of default that was published on 28 September 2016 contains the following documents:
  - final draft RTS on materiality threshold for credit obligations past due (EBA/RTS/2016/06) – awaits endorsement by the Commission
  - final Guidelines on the application of the definition of default (EBA/GL/2016/07) – will enter into force after translation to all European languages
  - report with the results from the QIS on the proposed regulatory changes for a common EU approach to the definition of default
- Changes in the definition of default will apply both to IRB and the Standardised Approach.

Phase 2: RTS on materiality threshold – main policy decisions

- **Level of application of the threshold** – the threshold is applied at obligor level (exception for retail-exposures where facility level may be applied)
- **Reference amount for the threshold** – credit obligation past due is defined as the sum of all amounts past due
- **Absolute threshold** – cannot be higher than EUR 100 for retail exposures or EUR 500 for non-retail exposures
- **Relative threshold** – should be set at the level of 1% for both retail and non-retail exposures (in any case lower than 2,5%)
- **Application of the threshold in default detection process** – breach of the threshold means the start of the counting of the 90 (or where applicable 180) days; in the case both of those limits are breached for 90 (or 180) consecutive days a default has occurred

Phase 2: GL on the definition of default – main policy decisions

1) Days past due criterion

   → Definition of technical default – errors in data, IT systems and processes or lengthy payment allocation processes

2) Indications of unlikeliness to pay

3) Default definition in external data – only for IRB Approach

4) Criteria to return to non-defaulted status

   → Specification of probation periods – at least 3 months, 1 year for distressed restructuring

5) Consistency of default definition

6) Retail exposures

7) Documentation and governance – governance only for IRB Approach

Phase 3: Risk estimation

- Phase 3 will be based mostly on the comprehensive EBA guidelines on PD estimation, LGD estimation and the treatment of defaulted assets
  - Consultation Paper published on 14 November, consultation open until 10 February 2017
  - Public hearing / workshop planned for 19 January 2017
- RTS on the nature, severity and duration of economic downturn – consultation paper planned to be published in December 2016
- Objective: address non-risk based variability of risk estimates and capital requirements while preserving risk sensitivity of internal models
- The final GL and RTS will take into account the results of the qualitative survey launched across the banks
  - participation in the survey voluntary and open to all banks

Phase 3: Draft Guidelines on PD & LGD estimation and the treatment of defaulted assets – main policy decisions

1) General requirements

→ Margin of conservatism – categorisation and quantification

2) PD estimation

→ Data requirements – development sample vs calibration sample

Long-run average default rate:

- Based on likely range of variability of 1-year default rates
- historical observation period has to include downturn
- benchmark based on the most recent 5 years and all data

3) LGD estimation

→ Definition of economic loss and realised LGD:

- Discounting rate = 1Y EURIBOR + 5%
- Include additional drawings, fees and interest after default

Long-run average LGD:

- Historical observation period based on all observed data
- Include estimated recoveries on incomplete processes

Phase 3: Draft Guidelines on PD & LGD estimation and the treatment of defaulted assets – main policy decisions

4) Estimation of EL_{BE} & LGD in-default

EL_{BE} and LGD in-default within the definition of LGD model and based on the same methodology (only for a given reference date instead of the moment of default)

Calibration – consideration of economic conditions:

- ELBE – current economic circumstances
- LGD in-default – economic downturn

Individually assessed provisions may lead to override

5) Application of risk parameters (conservatism, human judgement)

6) Re-development, re-estimation and re-calibration of internal models

7) Calculation of IRB shortfall or excess

Phase 4: Credit Risk Mitigation

- Limited scope of the mandates included in the CRR to develop technical standards:
  - RTS on conditional guarantees under Article 183(6) CRR
  - RTS on what constitutes sufficiently liquid assets under Article 194(10) CRR
  - RTS on the use of internal models for master netting agreements under Article 221(9) CRR
- Possible necessity for broader review of the CRM framework especially in terms of: simplicity of the framework, eligibility of CRM techniques and consistency between approaches.
- EBA's work plan may depend on the international regulatory developments at the Basel level.

Implementation of the changes

- Many of the changes in rating systems resulting from the regulatory review will be classified as material.
- **EBA's opinion on the implementation of regulatory review of the IRB Approach** was published in February 2016 and applies to all changes resulting from the regulatory review of the IRB Approach (http://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-01+Opinion+on+IRB+implementation.pdf)
- Timelines to be agreed individually between competent authorities and institutions:
  - taking into account the approach to recalibrate risk parameters
  - including time required for supervisory assessment
  - avoiding multiple sequential changes in the models
- Final implementation deadline of all changes – by end 2020 at the latest

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Réflexion en cours sur risques et modèles

EIFR, 15 décembre 2016

Sommaire

1. La finalisation de Bâle 3
2. La variabilité des RWAs
3. L'usage des modèles internes en Pilier 1
4. Les pistes pour réduire la variabilité des RWAs

L’enjeu est de finaliser Bâle 3

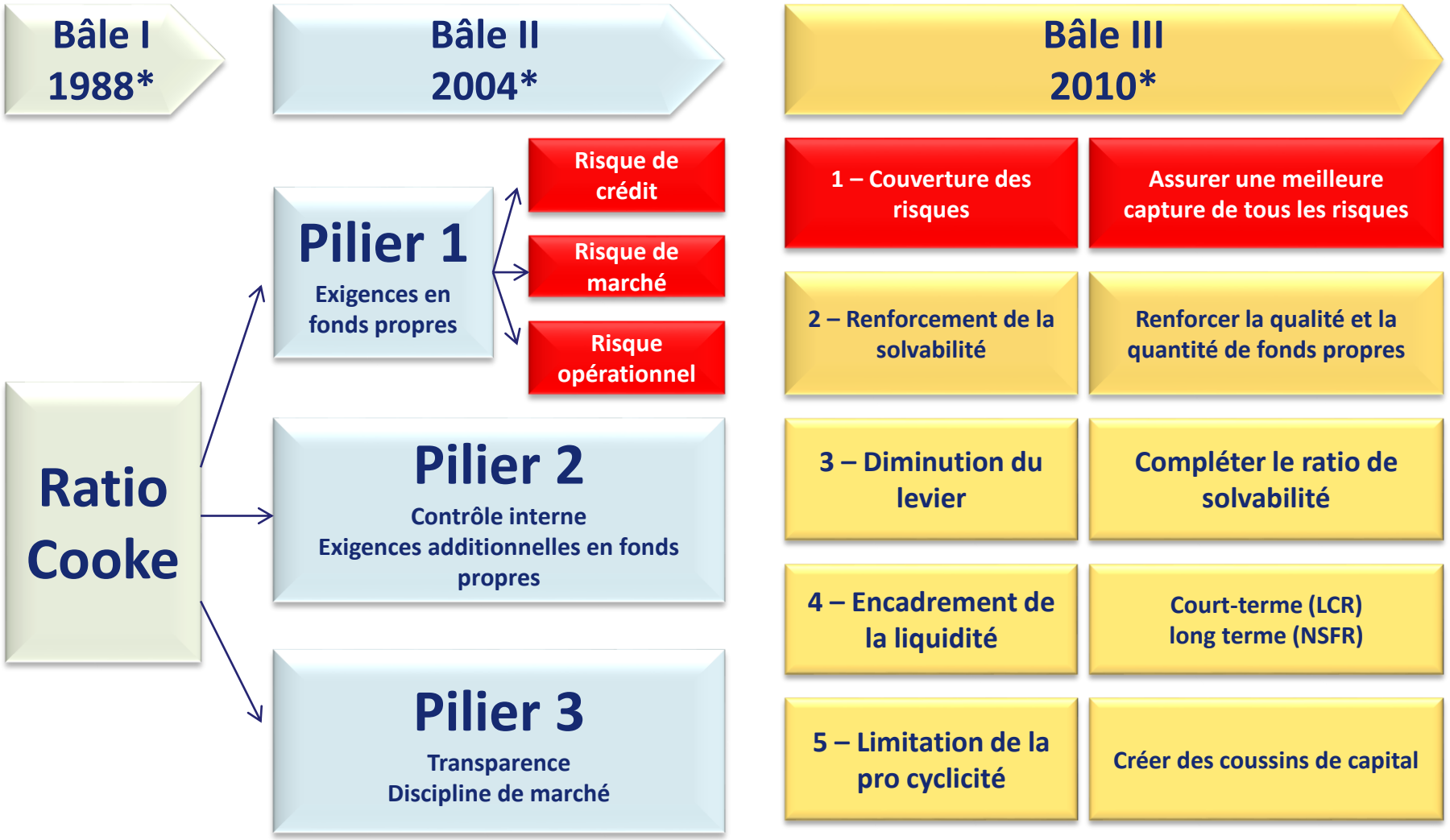
- La réforme de **Bâle 3** est venue renforcer de manière significative le dispositif prudentiel :

  - **Renforcement du niveau et de la qualité des fonds propres** requis au titre des exigences de solvabilité. Une capacité d’absorption des chocs de toutes natures plus importante.

  - **Enrichissement de la réglementation**, avec l’introduction de nouveaux ratios de liquidité (LCR et NSFR) et d’un ratio de levier. Une réglementation plus complète, sans doute mieux adaptée à la complexité de l’environnement des banques.

  - Une **prise en compte des problématiques macroprudentielles** dans la réglementation bancaire (e.g. coussins de fonds propres, risques systémiques), gage d’une meilleure prise en compte des questions de stabilité financière.

L'enjeu est de finaliser Bâle 3



*Repris au niveau européen par **CRD IV/CRR***

** dates d'adoption des mesures*

Les derniers points en discussion

- Les travaux de finalisation de Bâle 3 portent en pratique sur :
  - **Mesure du risque de crédit** : révision en profondeur de l'approche standard et encadrement accru de l'approche notations internes (IRB)
  - **Mesure du risque opérationnel**: refonte du dispositif existant envisagée (nouvelle approche et fin de l'utilisation des modèles internes)
  - Débat sur l'introduction d'un **plancher en capital** (*capital output floor*)
  - Introduction d'une **exigence de levier spécifique pour les G-SIBs**, au-delà de l'exigence de 3% de Tier 1.
- Pour mémoire, la mesure des risques de marché a déjà été mise à jour avec l'adoption de la revue fondamentale du portefeuille de négociation au début de l'année.
- NB : travaux en cours sur le risque souverain indépendants et dans une logique de moyen terme.

Le mandat confié au BCBS

- Un **mandat clair**, y compris du G20: *« Pas d'augmentation significative des exigences de fonds propres »*

> ***"We reiterate our support for the work by the Basel Committee on Banking Supervision (BCBS) to finalize the Basel III framework by the end of 2016, without further significantly increasing overall capital requirements across the banking sector, while promoting a level playing field."***
>
> (G20 Leaders' Communique, Hangzhou Summit, 4-5 September 2016)

=> Impact global vs impact local?

La variabilité des RWAs

- Les travaux en cours visent à **réduire la variabilité** des actifs pondérés (*risk-weighted assets* - RWA), afin de restaurer la confiance dans l'indicateur clé qu'est le ratio de solvabilité.

- Travaux influencés et justifiés par :
  - La nécessité de mettre à jour certaines règles de calcul des RWA introduites au moment du passage à Bâle 2.
  - Diverses études qui ont constaté des écarts parfois importants entre banques et pays, même si les écarts s'expliquent en partie par des différences comptables et une structure différente du financement de l'immobilier.
  - Une réflexion plus générale au sein du Comité de Bâle sur l'adéquation du dispositif prudentiel au regard de ses objectifs en termes de **simplicité, comparabilité et sensibilité aux risques**.

- Question centrale : **quelle place et quel rôle pour les modèles internes** dans le dispositif réglementaire?

Les travaux des superviseurs sur la variabilité des RWAs (1/2)

Septembre 2011 : le Comité de Bâle lance un Programme d'évaluation de la mise en œuvre de Bâle III. Ce programme (RCAP – *Regulatory Consistency Assessment Program*) comporte trois niveaux :

Niveau 1 : s'assurer de l'adoption de Bâle III dans les délais
Niveau 2 : s'assurer de la concordance des réglementations avec Bâle III
Niveau 3 : **s'assurer de la concordance des mesures produites**

Risque de marché	Janv. et déc. 2013	Rapport sur les RWA dans le *trading book*
Risque de crédit	Juillet 2013 et avril 2016	Rapport sur les RWA dans le *banking book*
Rapport au G20	Novembre 2014	Réduire la variabilité excessive

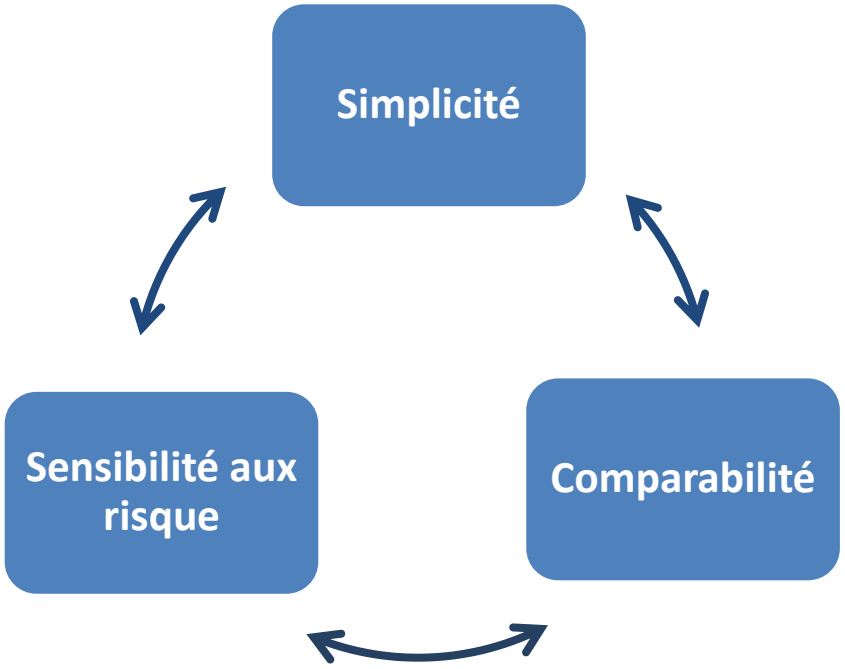
Travaux de benchmarking des modèles internes conduits par l'Autorité bancaire européenne

Les travaux des superviseurs sur la variabilité des RWAs (2/2)

- **De nombreux facteurs à prendre en compte**
  - Nature des expositions sous-jacentes
  - Pratiques de gestion et sélection des risques
  - Choix de modélisation
  - Données insuffisantes
  - Options et discrétions nationales
  - Ambiguïté, marges d'interprétation des textes
  - Processus de validation
  - Règles comptables
  - (…)
- **Essentiel de réduire la variabilité non justifiée, source potentielle d'arbitrage, mais toute la variabilité n'est pas à supprimer.**

Les objectifs du BCBS

- **Revue stratégique du dispositif international: un équilibre à trouver entre plusieurs objectifs**



The regulatory framework: balancing risk sensitivity, simplicity and comparability - discussion paper, BCBS, Juillet 2013

L'usage des modèles internes

- **Réflexions en cours centrés sur l'usage des modèles en Pilier 1**

Risque	Approche
Risque de crédit	Notations internes fondation (F-IRB) Notations internes avancée (A-IRB)
Risque opérationnel	Advanced Measurement Approaches (AMA)
Risque de marché	Internal models Approach (IMA)
Risque de contrepartie	Internal Models Method (IMM)

- **Pas de débat sur l'usage des modèles internes en Pilier 2**

Les modèles internes en Pilier 1?

- **Une utilisation réussie des modèles internes en Pilier 1 suppose de la part de superviseurs:**
  - Une supervision intrusive
  - Des ressources importantes et spécialisées

  => un choix de supervision

- **Débat entre modèles et standard en Pilier 1 renvoie à des visions et priorités de supervision différentes**

Les modèles internes en Pilier 1

- **Quelques raisons de reconnaître les modèles internes dans la réglementation :**
  - Meilleure adéquation des exigences au profil de risque des établissements
  - Adoption de meilleurs outils et indicateurs (logique incitative du dispositif)
  - Intégration des contraintes de supervision à la gestion interne (« Use test »)
  - Dialogue accru et connaissance renforcée des risques et de la gestion interne des banques

Où réduire la variabilité?

- **Quels risques, quelles expositions sont modélisables de manière fiable?**
- **Un enjeu particulier: les portefeuilles avec peu de données de défaut (« low default portfolios »)**
  - Souverains
  - Banques et institutions financières
  - Grandes entreprises
- **Un point d'attention pour les superviseurs**
  - Présence de suffisamment de données pour une approche statistiquement valide ?
    - Totalement ou partiellement: segmentation/notation? Quantification des paramètres de risque?
  - Expositions souvent comparables entres banques et pays

Comment réduire la variabilité?

- **Un préalable nécessaire à l'encadrement des modèles internes ou une alternative ?**
  - Des nouvelles approches standard plus sensibles aux risques
- **Travaux du BCBS en cours (crédit, opérationnel)**
- **Limites/défis des approches standard**
  - Approches applicables par défaut, par toutes les banques
  - Simplicité indispensable
  - Pas d'autorisation nécessaire
  - Comment bien prendre en compte les différences entres banques, *business models*, marchés nationaux…

Comment réduire la variabilité?

❑ Un ensemble de mesures envisageables

BCBS	Interdiction de la modélisation • Recours aux approches standard • Recours au ratio de levier
	Interdiction partielle de la modélisation (F-IRB vs A-IRB)
	Mise en place d'un « output floor »
	Mise en place d' « input floors »
EBA	Harmonisation des règles
	Clarification des règles
	Renforcement des processus de validation et de suivi (supervision)
	Benchmarking

Comment réduire la variabilité?

- **Au-delà des règles, l'examen individuel des modèles**

=> Projet TRIM (*Targeted Review of Internal Models*) du SSM

"The review started by the ECB aims at identifying, and ultimately at removing, these sources of non-risk-based variability and possible bias in the risk weights"

(I. Angeloni, SSM)

- **Phase préparatoire en 2016**
  - Choix des modèles
  - Méthodologie
  - Etat des pratiques

- **Démarrage en 2017…**

Le calendrier de finalisation de Bâle 3

- **Consultations en 2016 sur les différentes briques de la réforme**
  - Approche standard (déc. 2015- mars 2016)
  - Révision IRB (mars – juin 2016)
  - Levier (avril – juillet 2016)
  - Risque opérationnel (mars – juin 2016)
  - Floor (fin 2014)
- **Etude d'impact globale réalisée courant 2016, sur la base des données au 31/12/2015**
- **Travaux appelés à s'achever fin 2016 : environnement réglementaire international (enfin?) stabilisé**
- **Une mise en œuvre en Europe qui nécessitera une nouvelle révision du cadre réglementaire CRR (sans doute après la révision CRR2, qui vient d'être engagée)**

Merci pour votre attention

BÂLE 4 OU LES LEÇONS À TIRER DES MODÈLES INTERNES

CONFÉRENCE EIFR
PARIS – 15 DÉCEMBRE 2016

VÉRONIQUE ORMEZZANO
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BNP PARIBAS

The bank for a changing world

AGENDA

- La variabilité des Risk-Weighted Assets, souhaitable ou excessive ?
  - Les modèles internes doivent être harmonisés et non abandonnés
- L'approche Européenne
  - Revue ciblée des modèles internes *(Targeted Review of Internal Models*, TRIM)
- Calibrage des LGDs
  - Problèmes soulevés par les propositions de Bâle
  - Recommandations

Credit Risk : Internal Models should be harmonized, not discarded

- IRB-A models are viewed by some regulators as unreliable due to **excessive risk variability**

- Actually, EBA and BCBS own studies show that **75% of the RW variability is explained by different risk profiles**
  - *"Within the Banking Book, much of the variability **(up to three quarters)** in risk weights for credit risk is driven by **differences in underlying risk** arising from banks' asset composition, ie variation across banks in the relative share of different asset classes and differences in asset composition within asset classes. **RWA variation of this type is consistent with the greater risk sensitivity intended by the Basel framework."** **

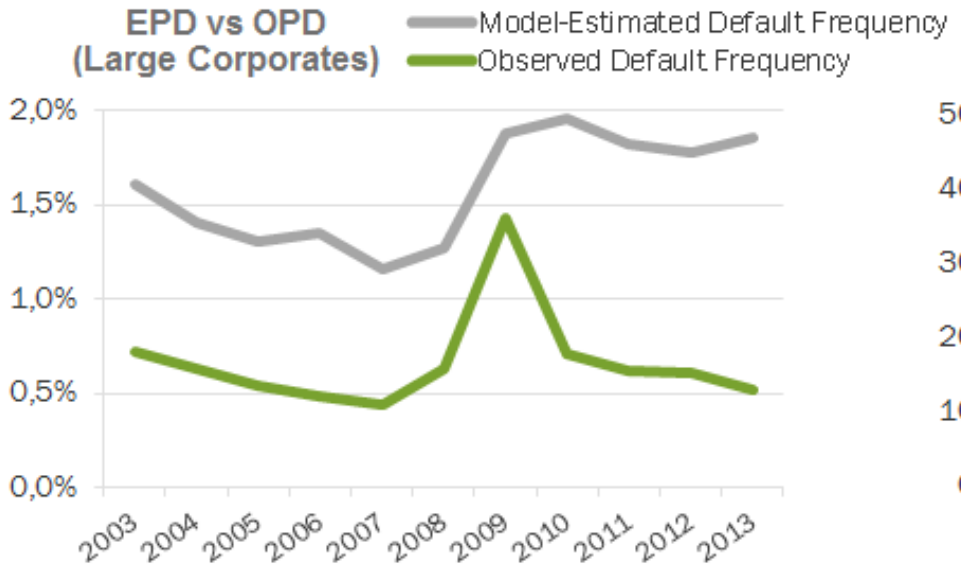
- As for the remaining 25% not explained, **harmonization of models** should be envisaged first before removing modelling possibilities
  - Capitalise on SSM, EBA's and other regulators' ongoing work (TRIM)
  - Interim adjustments, if needed, are a natural part of Pillar 2

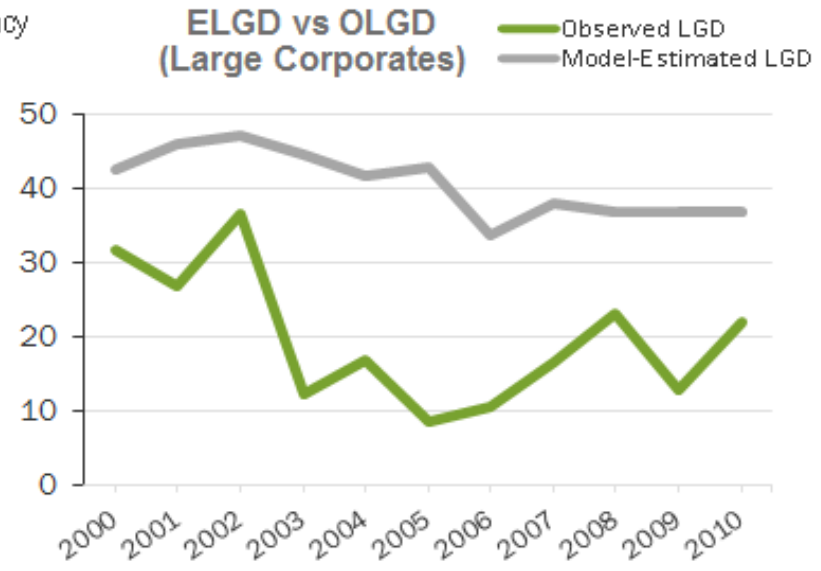
The variability of RWs is not *per se* an argument against the robustness of internal models

*BCBS - RCAP Analysis of risk-weighted assets for credit risk in the banking book, July 2013

“Good” or “bad” RWA variability ?

Are internal PDs and LGDs too optimistic ?





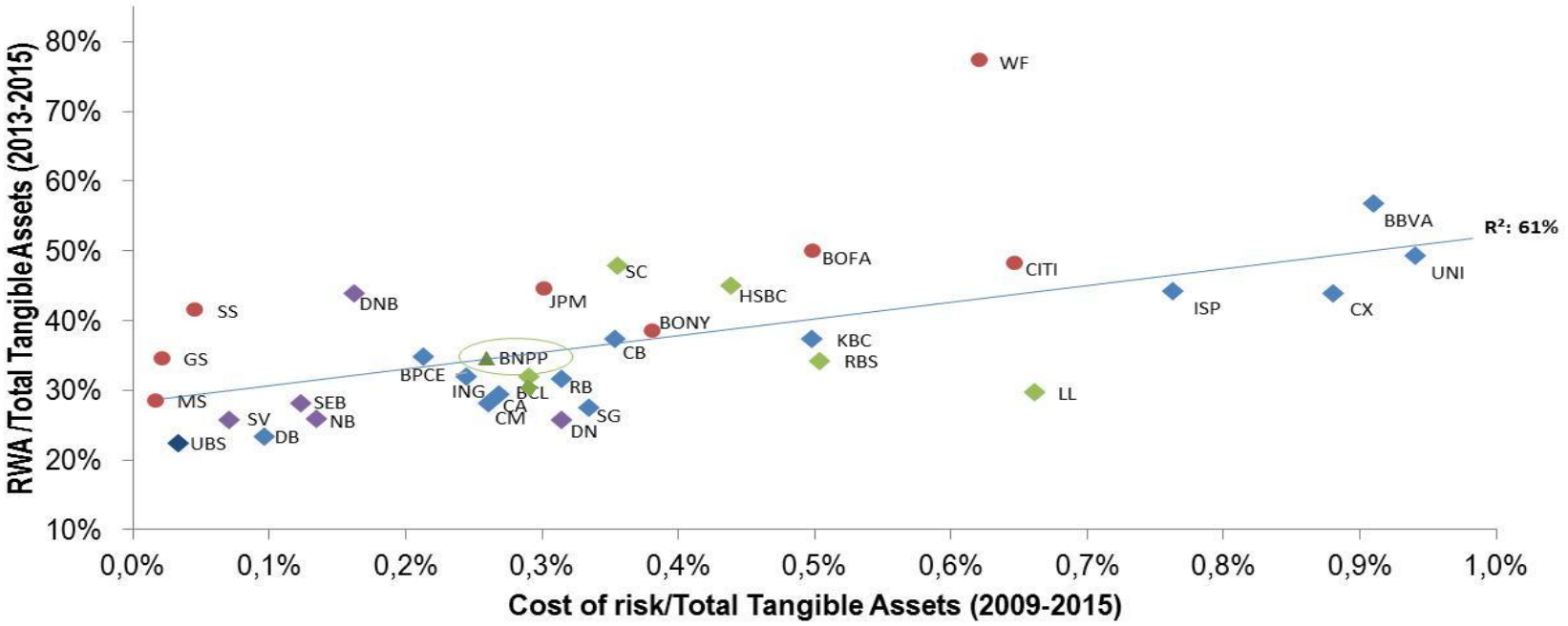
Source: Global Credit Data (GCD).
Scope : 14 large and internationally active banks, over 11 years (2003-2013).

Through the cycle, modelled PDs and LGDs are prudent compared with observed data

“Good” or “bad” RWA variability ?

Does Cost of Risk correlate with RW density ?

Chart 1: Major Banks - Cost of Risk (Average 2009-2015) and RWA (Average 2013-2015) / Total Tangible Assets (by bank) - IFRS



Source: Financial information from Bankscope; Annual Reports for *fully-loaded RWA (2013-2015)*; FDIC (Global Capital Index' by Thomas M. Hoenig, FDIC Vice Chairman) for IFRS estimation on US Banks - Total tangible assets. Calculations: BNP Paribas

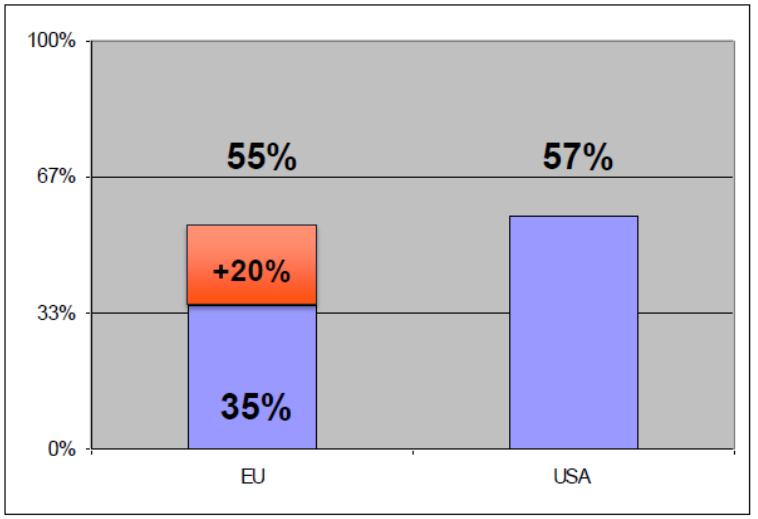
RWA fully-loaded according to Basel III rules from 2013 to 2015, except for certain banks for which fully-loaded RWAs were not published.
Total tangible assets are total assets disregarding goodwill, DTAs and other intangibles. Cost of risk is the amount of impairment charges on loans and securities.

Various RW densities correlate with actual losses
Actual losses suggest RW density could be more, not less, variable

“Good” or “bad” RWA variability ?

Comparing the RW density between US and EU banks is misleading

- Most of the gap between US and EU banks RW density is explained by :
  - Accounting standards (derivatives netting rules)
  - Transfer to GSEs of (generally) low risk mortgage loans (USD 8 trillion), whereas in the EU high quality mortgages remain on balance sheet and tend to reduce overall average RW
  - Operational risk (not counted in the RW density metric)
  - Software investment deduction (US: 100% ; EU: 0%)
- Those factors explain about 20pp difference



Source : European Banking Federation « What you need to know about Basel IV » report, 31 August 2016

Adjusted RWA density is almost equivalent between EU and the USA

“Good” or “bad” RWA variability ?

Case study : Comparing RW density of BNP Paribas and JP Morgan

Adjusting RWA/total assets ratio

	BNPP Total assets	BNPP RWA	BNPP RWA/total assets	JPM Total assets	JPM RWA	JPM RWA/total assets
Q4 2010 data	**1,998**	**601**	**30%**	**2,118**	**1,175**	**55%**
Remove derivatives netting (90%)	(312)					
Remove repos netting (4%)	(10)					
Remove pending settlements netting (20%)	(64)					
Remove life insurance assets	(148)					
Add loans sold to GSEs with repurchase liability				380	11	
Add loans securitised with repurchase liability: performing				69	2	
Add loans securitised with repurchase liability: >60 days past due				41	31	
Remove credit cards book				(128)	(163)	
Restated Q4 2010 data	**1,464**	**601**	**41%**	**2,480**	**1,057**	**43%**

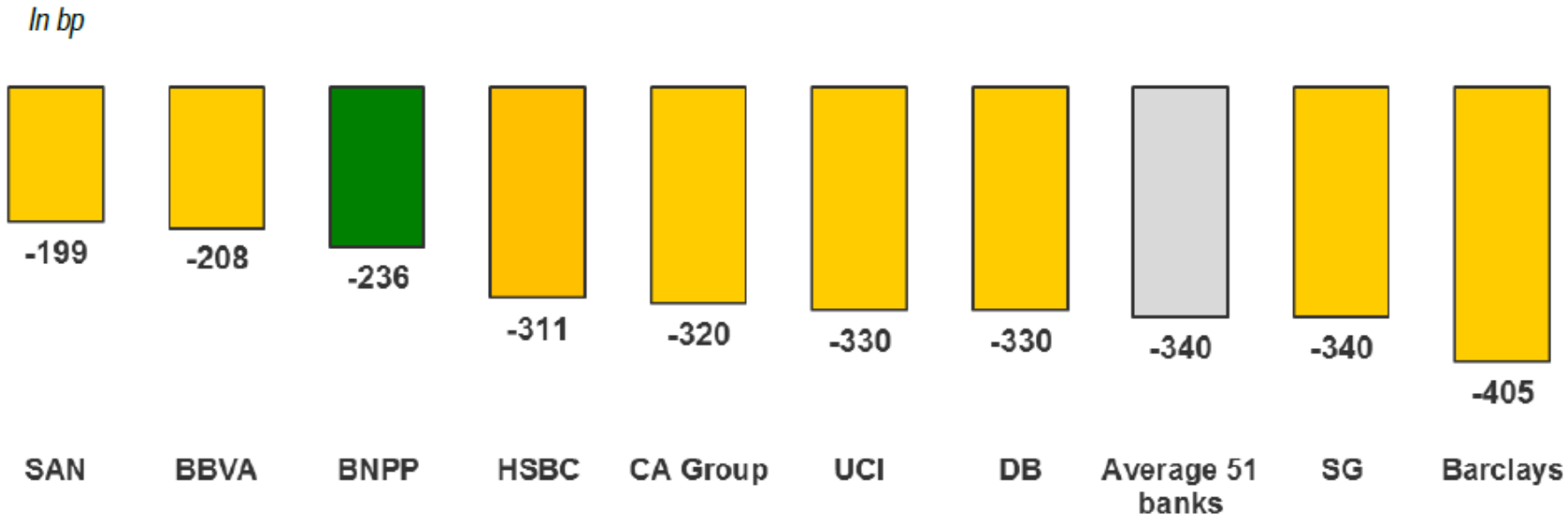
Source: JP Morgan, BNP Paribas, Exane BNP Paribas estimates

After adjustments, BNPP and JPM have comparable levels of RWA to total assets

“Good” or “bad” RWA variability ?

Are bank risk profiles similar ?

2016 European Stress Tests
Impact of Adverse scenario on CET1 ratio - peer group*

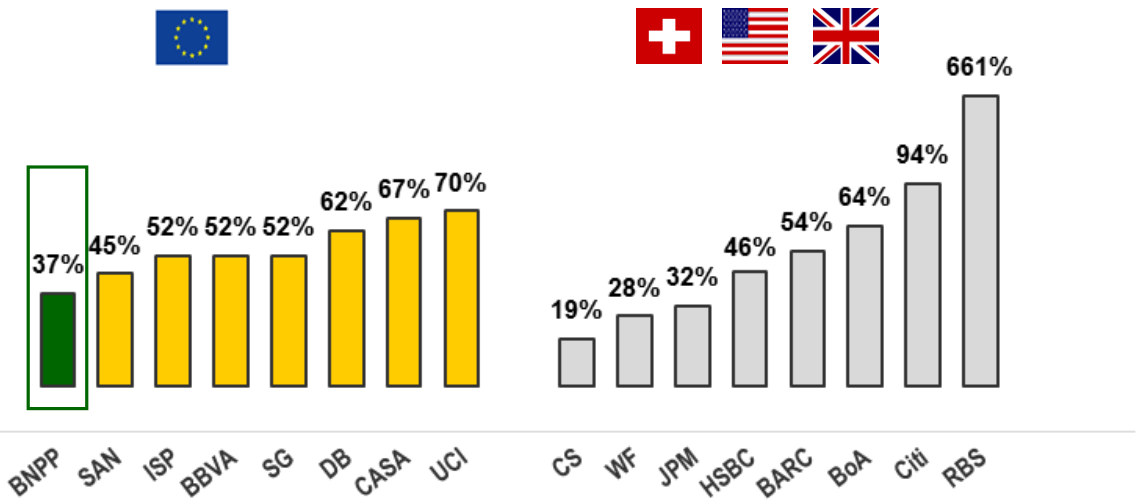


Different risk profiles justify different RW densities

“Good” or “bad” RWA variability ?

Are bank risk profiles similar ?

Cost of Risk/Gross Operating Income (2008-2015)



- Low risk appetite and strong diversification lead to low cost of risk
- CoR/GOI through the cycle measures the consistency between risk and return

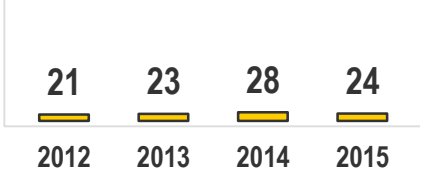
Different business models and risk appetites lead to different overall risk profiles, justifying different RW densities

“Good” or “bad” RWA variability ?

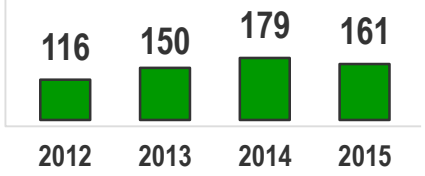
Are bank risk profiles similar : the case of BNP Paribas business lines

2015 data. Net provisions/Customer loans (in annualised bp)

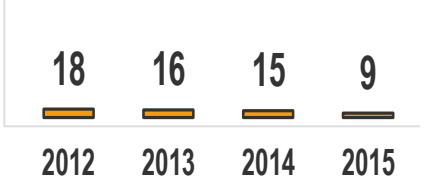
French Retail



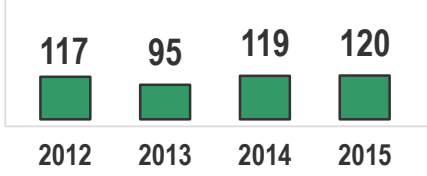
Italian Retail



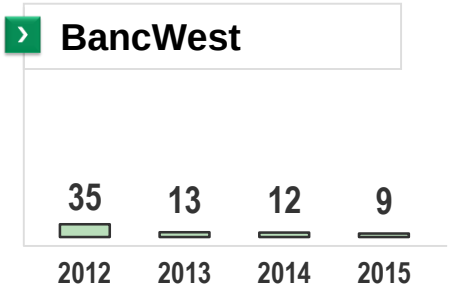
Belgium Retail



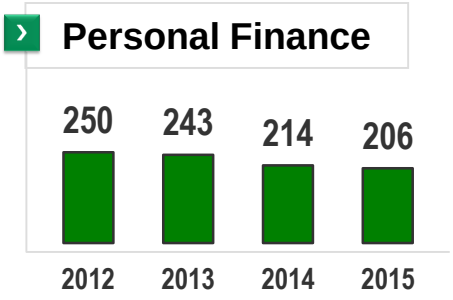
Europe-Mediterranean



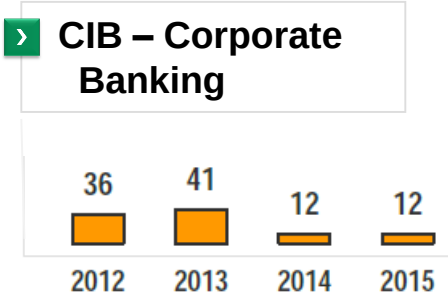
BancWest



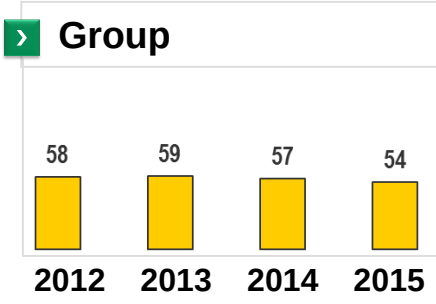
Personal Finance



CIB – Corporate Banking



Group



Should the new prudential framework make those businesses more “comparable” in RW density ?

Internal models should be harmonized, not discarded

An Overview of the Targeted Review of Internal Models (TRIM)

Objective

- To **restore credibility, adequacy and appropriateness** of approved Pillar 1 internal models used by SIs in the SSM, TRIM will:

Comply with regulatory standards

- Assess the reliability and comparability of internal rating systems and models permitted for capital requirements with a view to ensure compliance with regulatory requirements and harmonise supervisory practices, thus reducing non-risk-based variability of their outcomes and promoting level playing field within the SSM

Define supervisory guidelines

- Make recommendations to institutions and publish supervisory guidelines which ensure that internal models give consistent results across institutions

Improve internal models' supervision

- Contribute to improve the future supervisory work on internal models, enhancing the internal models expertise available within the SSM

Calculate adequately capital needs

- Verify whether risks are modelled correctly and hence capital needs are calculated adequately

Source : ECB, April 2016

Risk sensitivity also requires a better LGD calibration

Main issues with proposed revisions to IRB approaches

- **Applying a standard senior unsecured LGD (45%) across the whole corporate spectrum will unduly penalize the large corporates in high quality countries**
  - BNP Paribas back-testing data shows that recovery increases with the corporate turnover
  - Other major drivers of senior unsecured recovery include legal framework, and quality of assets
  - As a result, BNP Paribas internal LGD policy is based on a regularly back-tested matrix of LGDs ranking from ~30% to ~70%

- **Very limited recognition of collateral will give improper business incentives**
  - **Under F-IRB**, the eligibility criteria and haircuts are inherited form the Standardized approach
    - Many Credit Risk Mitigation techniques are no longer recognized.
    - Even when eligible, the combination of high haircuts (50%) and high levels of secured LGD floors (20 to 25%) results in an insufficient recognition of the value of collateral
  - **Under A-IRB**, strong limitations are introduced in the collateral effects
    - Application of a "one size fits all" 50% haircut to all the collaterals eligible
    - Only collateral which can be modeled is eligible . **The majority of secured exposures may therefore pass under F-IRB**. Indeed in practice the effect of collaterals often cannot be insulated from the other recovery flows in case of default of the customer because of:
    - Bargaining power: The pledge works as an incentive for the borrower to repay the bank's debt in priority
    - Efficiency: Banks will prefer to leave the borrower sell the assets (with the bank's consent and the proceeds being collected by the bank) rather than to repossess the asset and then to sell it.

Risk sensibility also requires a better LGD calibration
Options for recalibration of Foundation LGDs

Corporates and Specialized Lending

- Improve Senior unsecured LGD to recognize better recovery experience for loans vs bonds.
  - From 45% to 35% ? (CFO network proposal)
- Enlarge eligibility criteria of collateral to include more categories of physical collateral
- Reduce Haircuts on eligible collateral to workable levels

Banks

- Recalibrate LGD to reflect the new hierarchy of creditor: higher capital requirements and buffers, and TLAC/MREL bail-inable debt makes senior claims much less risky than before (including derivatives, repos, trade finance, interbank etc)

Insurance companies

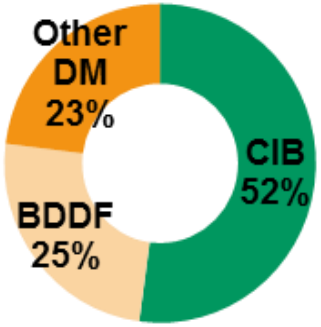
- LGD should take into account Solvency II implementation in Europe & differentiate between lender or policy holder status

Risk sensibility also requires a better LGD calibration

Can we really not model LGDs ?

Banks internal databases

For example, BNP Paribas' models are calibrated based on an internal default database composed of 946 defaults, of which half in the Corporate and Investment Banking Division.



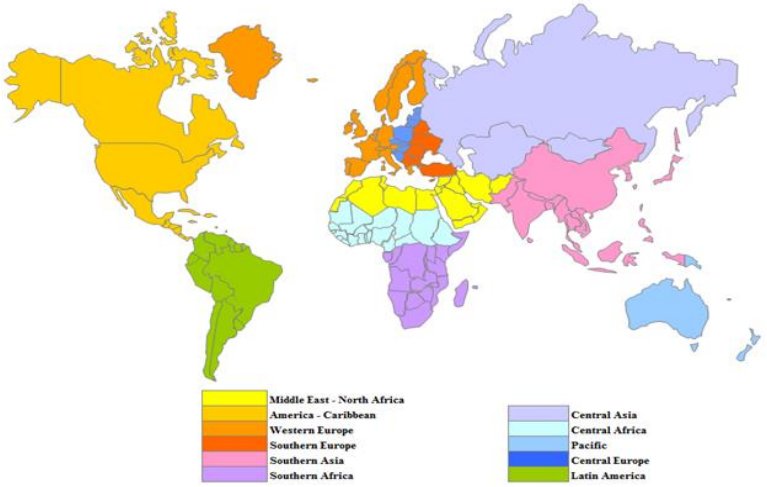
Industry pooling consortia allow efficient LGD calibration

Global Credit Data (GCD)

GCD contains default records from over 50 000 obligors across 120 different countries, over 20 years. Nearly 50 banks portfolios are represented in the LGD database. This represents a real alternative to the more general statistics published by rating agencies and conforms with Risk Management best practices and Basel regulation.

Global Emerging Markets Risk Database (GEMs)

GEMs data covers 12 regions *(see map).* In 2015, GEMs contained as many observations as 7,700 counterparts, 1,600 default events and 1,750 resolved contracts. It is the world's largest default and loss database for the emerging markets business of IFIs.



Sources : Global Credit Data & GEMs

CONCLUSION

- Les modèles internes doivent être harmonisés et non abandonnés
  - Y compris dans la dimension LGD
- L'accord de Bâle, tel qu'il se dessine, reflète une philosophie de régulation/supervision opposée à la pratique européenne, et française
- A ce stade
  - Quelles évolutions peuvent-elles encore être obtenues ?
  - Comment restaurer la confiance dans le système bancaire européen ?
  - Au-delà de Bâle 4 : le risque souverain…

EIFR
European Institute of Financial Regulation

MODEL RISK MANAGEMENT

15 Dec 2016

Internal model validation

Model Risk Management

SOCIETE GENERALE

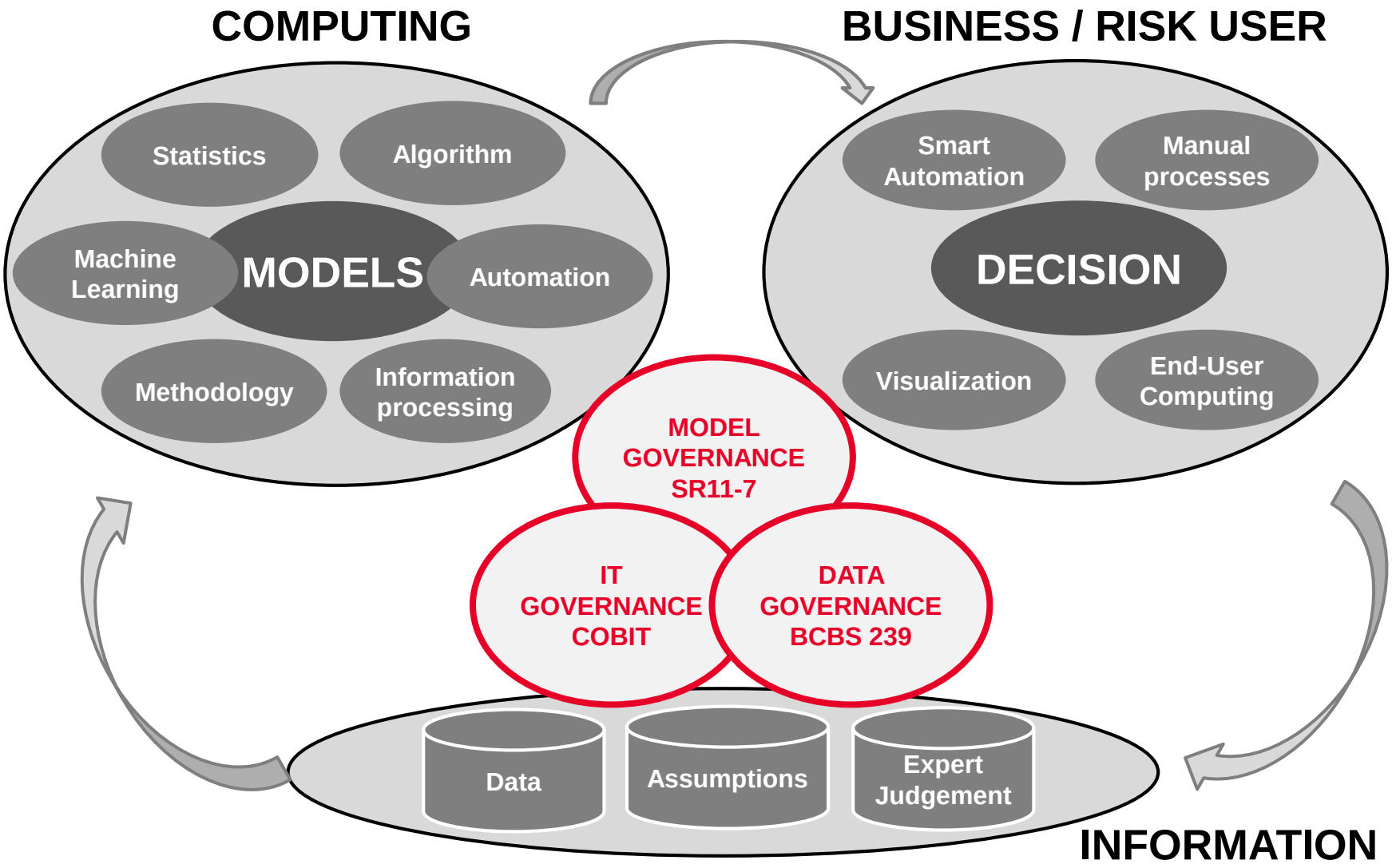
DEVELOPPONS ENSEMBLE
L'ESPRIT D'EQUIPE

WHAT IS A MODEL ?

Reality

One model

MODELS UNIVERSE – DATA SCIENCE



EMERGENCE OF A NEW FRAMEWORK FOR AN OLD RISK TYPE*

- Definition of model risk: “risk of adverse consequences (e.g., financial loss, poor business or strategic decisions, reputational damage) arising from decisions based on incorrect or misused model outputs”

- Management of model risk: “Model risk should be managed like other types of risk. Banks should identify the sources of risk and assess the magnitude.”

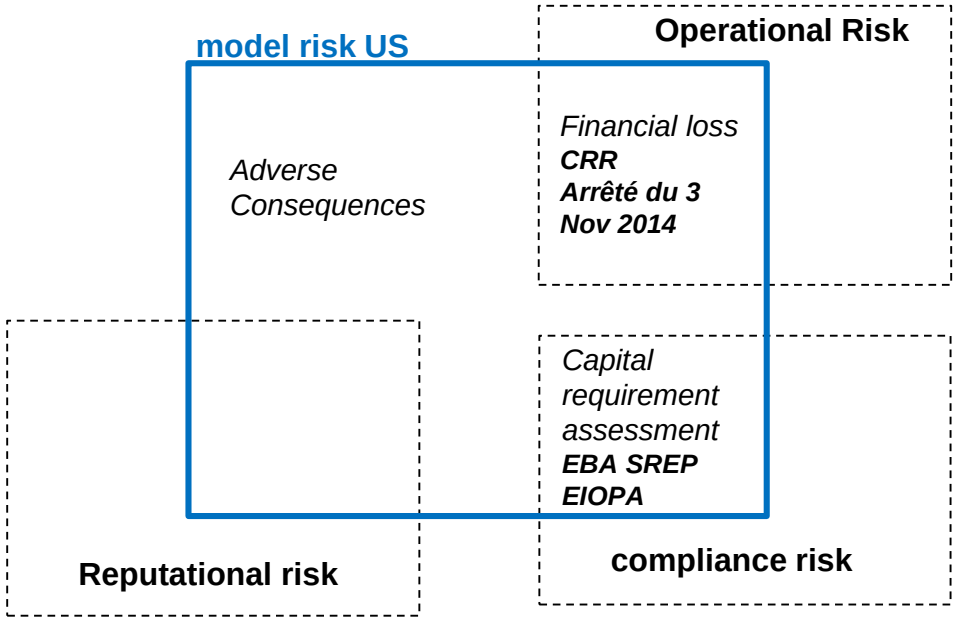
- Model risk components
  - Model risk management begins with robust model **development, implementation, and use.**
  - Another essential element is a sound model **validation process**.
  - A third element is **governance**, which sets an effective framework with defined roles and responsibilities for clear communication of model limitations and assumptions, as well as the authority to restrict model usage.

*** FED SR11-7 references**

REGULATORY TIMELINE

EU VS US COMPARISON OF APPROACHES

US approach contribution | **UE regulation**

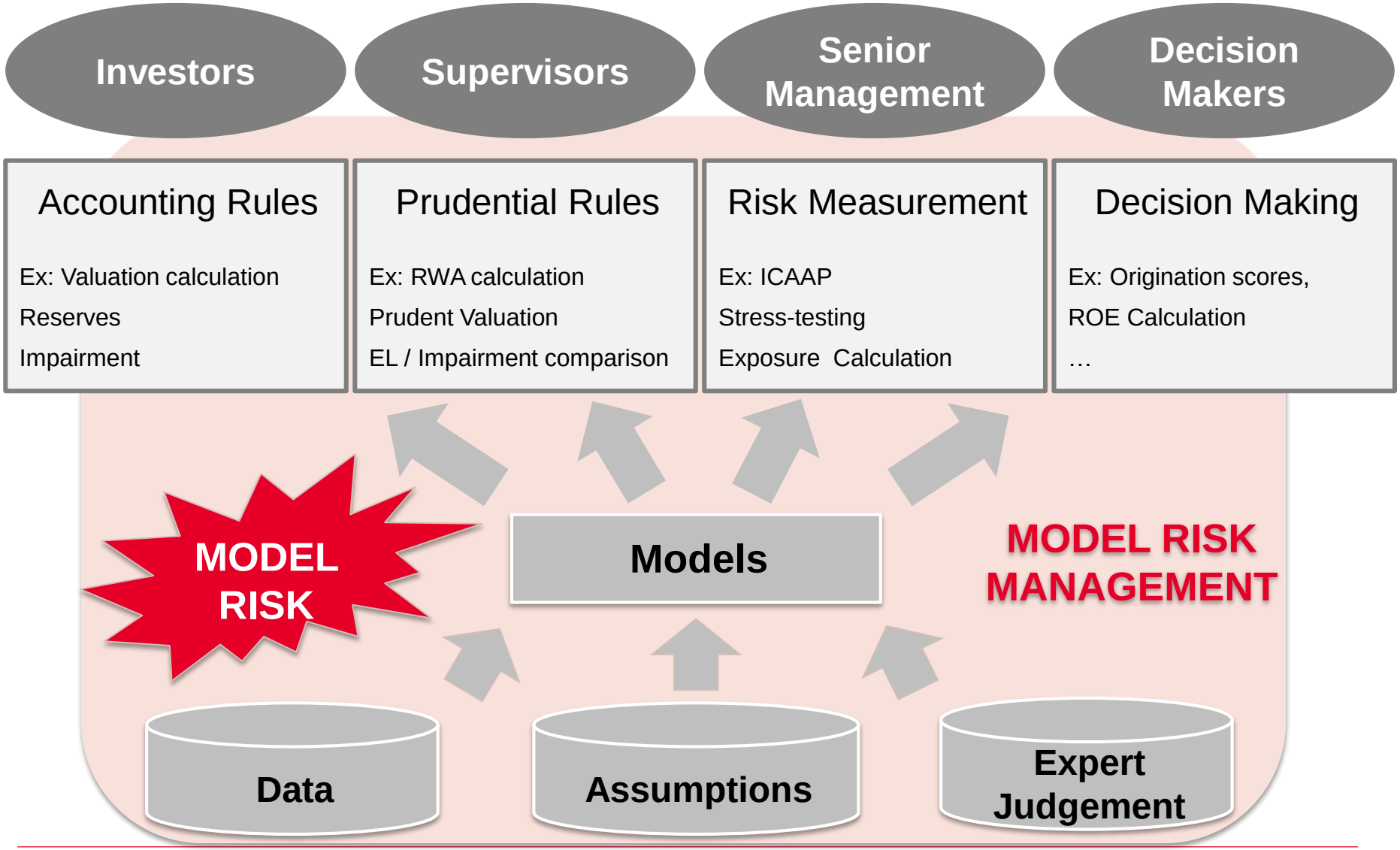


- **Definition of Model Risk by CRR – CRD IV (art 3.1.11)**
  - 'model risk' means the **potential loss an institution may incur**, as a consequence of **decisions** that could be principally based on the output of internal models, due to errors in the development, implementation or use of such models.

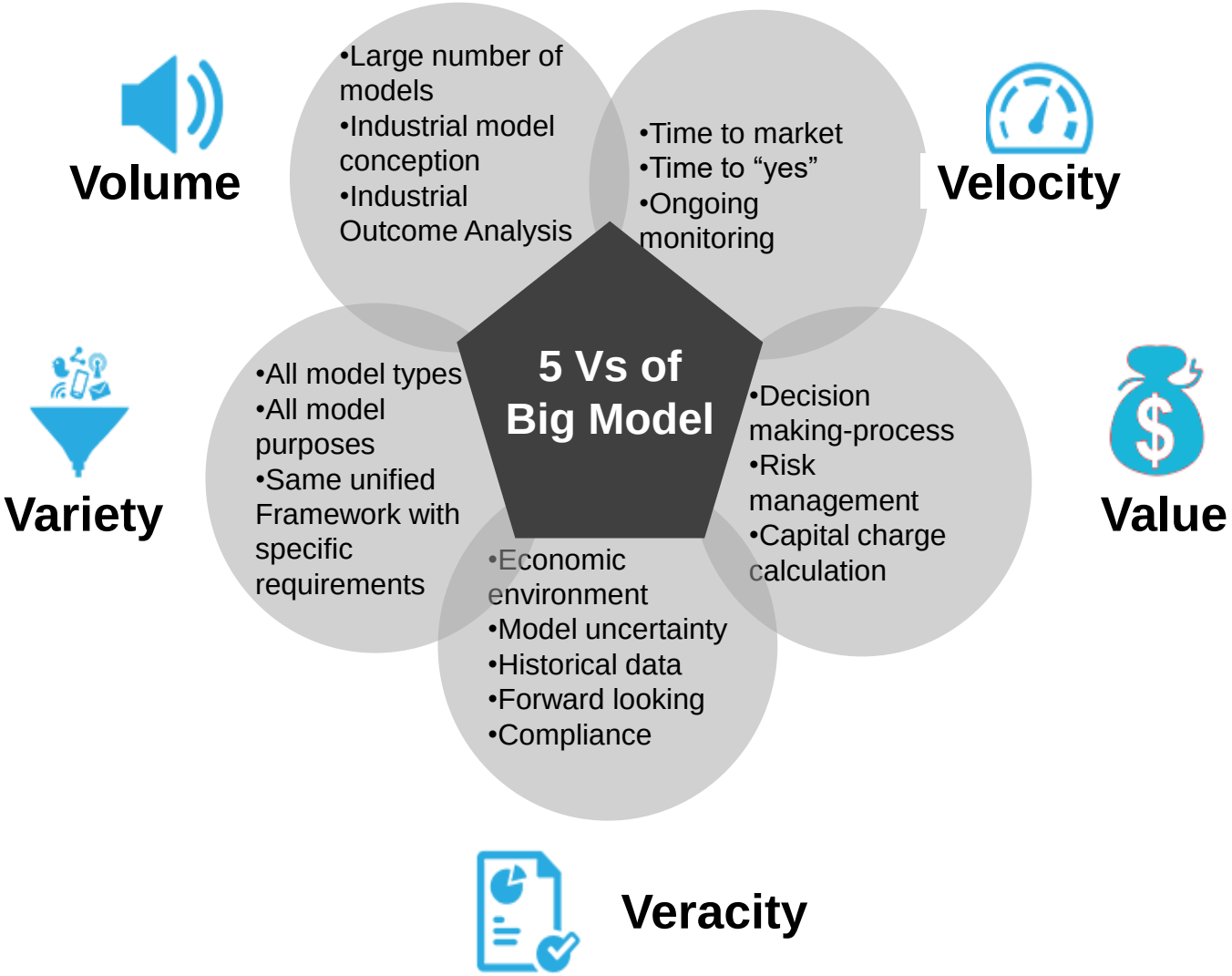
- **Definition of Model Risk by EBA (SREP CP/2014/14), two distinct forms**
  - Risk related to the underestimation of own funds requirements, related to model deficiencies and part of the specific risk capital

- **Definition of EIOPA**
  - All **errors** and **uncertainties** relating to modelling, data and parameters must be adequately addressed in the whole modelling process an the resulting SCR figures
  - This should be done **explicitly or at least implicitly** when setting the parameter values
  - The areas of interest are cash-flow models (e.g., technical provisions), market/underwriting/credit/operational risk models and aggregation models

MODEL RISK MANAGEMENT FRAMEWORK



MODELS MAJOR TRENDS



KEY ELEMENTS OF MRM FRAMEWORK

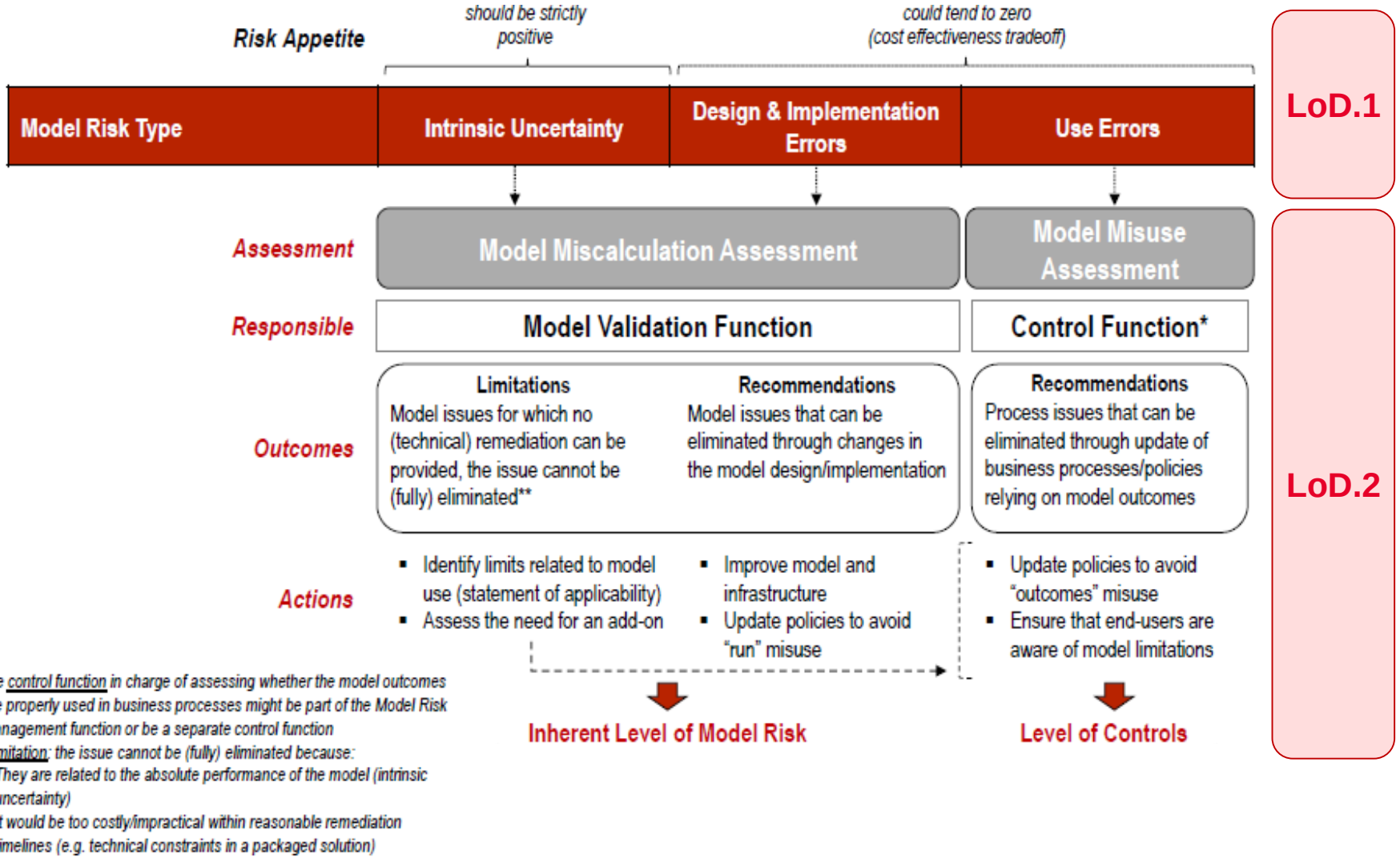
Policies, procedures, roles, responsibilities and templates are required in an SR 11-07 compliant operating framework:

Operating Model	MRM Policy	Model Inventory	Processes Procedures	Templates
• MRM Framework • Risk Tolerance	• Model Definition • Roles and Responsibilities • Validation Standards • Monitoring & Reporting • Exceptions • Risk Committees	• Tool Selection • Attributes • Information Compilation • Stakeholder Attestation • Risk Rating	• Model Development • Model Validation • Ongoing Monitoring Plan • Model Change • Periodic Reviews	• Model Development • Model Validation • Model Risk Reporting

MODEL RISK IS A KEY DRIVER TO ALLOCATE RESSOURCES

Component of model risk		Ressources	Value
Identify model risk	■ Model definition / MRM scope ■ Model risk definition ■ Models **Inventory** ■ **Documentation** ■ **Validations**		**Business Value** **RWA** **(…)**
Assess the level of risk	■ Model risk **rating** of each model ■ Model risk **scorecard**		
Mitigate model risk	■ Set up **governance** (1LoD, 2LoD, 3LoD roles and responsibilities ■ Set Models limitations ■ Correct/improve the models ■ Identify **prudence margins**		
Report and monitor	■ Models **monitoring** (performance and use) ■ Information towards users and top management ■ Periodic validations		

MODEL RISK APPETITE



* *The control function in charge of assessing whether the model outcomes are properly used in business processes might be part of the Model Risk Management function or be a separate control function*

** *Limitation: the issue cannot be (fully) eliminated because:*

- *They are related to the absolute performance of the model (intrinsic uncertainty)*
- *It would be too costly/impractical within reasonable remediation timelines (e.g. technical constraints in a packaged solution)*

VALIDATION PROCESS

- Validation process

Preparation phase

- Understanding the model, the modeling entity and the environment,
- Reception of the documentation of the models,
- Work program definition and validation.

Official, centralised, comprehensive and regularly updated documentation of the models

Validation phase

- Methodological review,
- Additional requests,
- Performance of substantive or sample testing,
- Performance of diligences.

Comité Modèles

- Discusses the modeling approach,
- Prepares the experts' decisions,
- Approves the validation report,
- Validates the proposed materiality of the change/extension under Delegated Regulation 529/2014.

Decision phase

- Handling of Comité Modèles' requests,
- Dealing with remediation if lack of prudence,
- Follow-up of previous recommendations and action plans.

Comité Experts

- Discusses and validates the Comité Modèles calibration proposals,
- Decides on the final model and materiality.

Information to the Supervisors :

Prior approval / Ex-ante notification / Ex-post notification

MODEL RISK RATING: WHY?

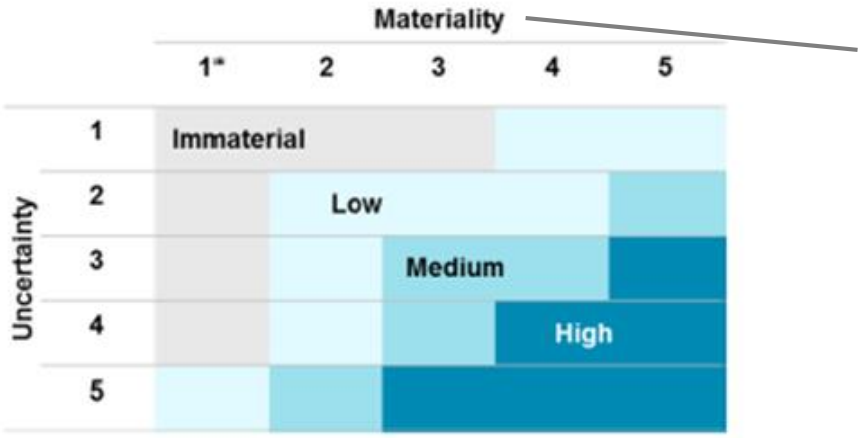
- Regulatory reasons: in the US, « All aspects of model risk management should be covered by suitable policies, including […] assessment of model risk »

- Source of added-value at bank's level: model risk rating may be useful to
  - **prioritize validation** activities,
  - **define** adapted **remediation** work, i.e. enhanced monitoring (frequency, number of checks performed) and / or recalibration
  - provide the necessary inputs to **give senior Risk staff a comprehensive view of model quality** across the risk landscape
  - **provide a useful "cross-check"** to ensure that all of the validation activities prescribed by regulation and internal standards have been correctly executed

MODEL RISK RATING: MULTIPLE POSSIBLE APPROACHES

Based on Materialy / uncertainty approach

Model Risk Rating matrix



Very dependent on :
-the indicator used
-the perimeter used to compare against (relative)

Based on model risk dimensions

Development (conceptual framework, input data calibration, output testing)

Implementation (input data, model code in system, performance execution, IT environment quality)

Usage (adequate usage and scope, Model output interpretation)

Risk mitigating environment (independent validation, monitoring, model risk assessment, governance set up, knowledge management, documentation)

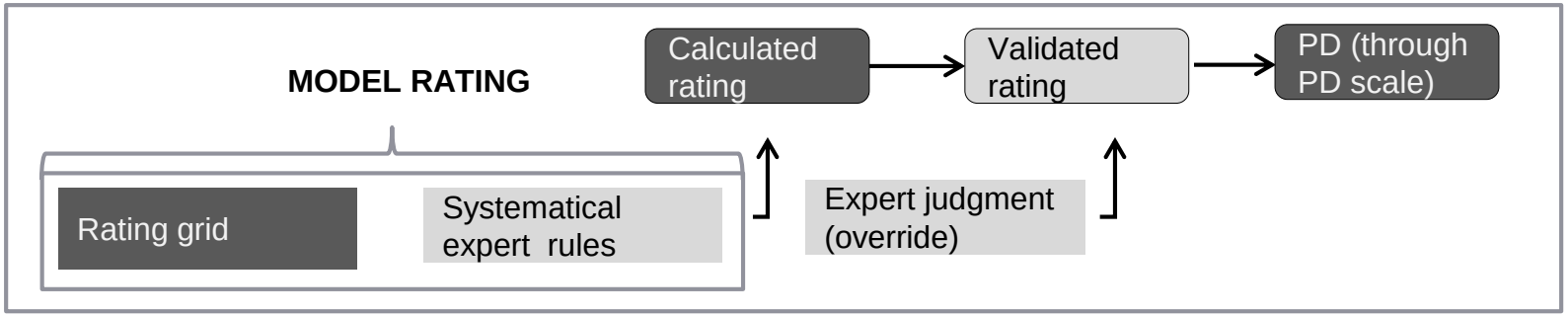
1 quantitative assessment accounting for the model materiality

4 qualitative assessments accounting for the potential sources of model risk / risk mitigants

The quantitative assessment is the anchorage point for the model risk assessment, the qualitative assessments being used to qualify it

WHAT LEVEL OF GRANULARITY ? BOTTOM-UP APPROACH

- Model risk is an aggregation of multiple processes



- How many models in that case ?

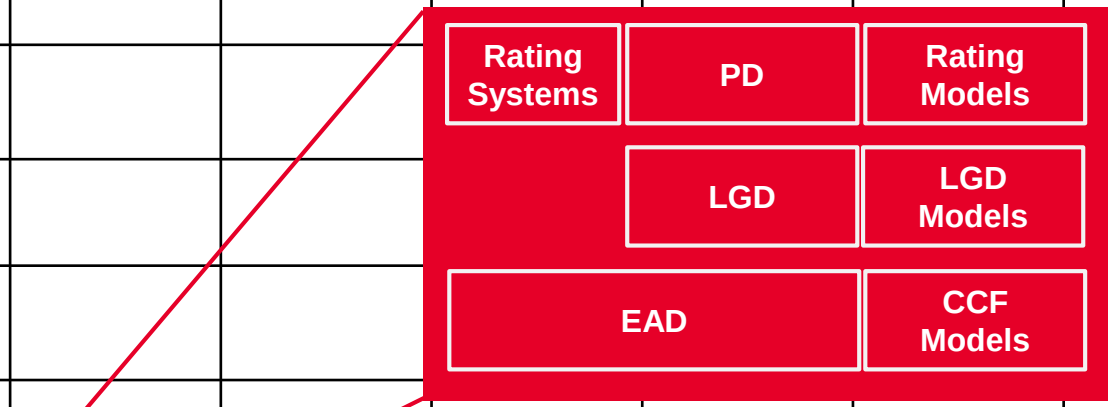
  Reminder Model Stocktake

  - Risk drivers/variables and/or their weights differ
  - A separate row is required for each:
    - Differing risk drivers and/or variable and for each;
    - Differing weighting per risk driver/variable.

- This definition can be very much granular and could lead to a model risk rating being applied to a too low level
- On the other hand, differences of use are not taken into account

WHAT LEVEL OF GRANULARITY ? TOP DOWN APPROACH

Model's usage	Modelized item: Credit risk	Operational risk	Counterparty Risk	Market risks factors	Structural risks	Others
Client advisory						
Pre-trade decision making						
Client pricing						
Books / Portfolio management						
Independant risk monitoring						
Regulatory own funds						
Financial Statement						
Reporting and Strategic steering						



Banks Internal Risk Measurement Models - The approach of the international banking prudential supervision (as represented by the Basel Committee - BCBS) to the banks first pillar risk measurement and capital adequacy is changing. Is it an evolution or a an involution?

Dr. Carlo Palego – Group Chief Risk Officer - Banco Popolare

Paris, 15 December 2016

•The use of banks internal risk measurement models in order to quantify the **pillar 1** capital absorption and related requirements to be reported to the Supervision Authorities seems to be on the verge of being significantly restricted by the Regulators.

•The Basel Committee (BCBS) is proposing to OECD Supervision Authorities and banking industries the prudential supervision approach that has already been adopted by U.S. Supervision Authorities for U.S. banks and that can be synthesised as **“back to the standardized risk computation methodologies”**

The rationale behind the BCBS new guidelines and approach to banks internal risk measurement models seems to be the intent of undertaking strong corrective actions to mitigate:

1. **excessive heterogeneity** of internal models hypothesises and methodologies across banking industry;
2. **high model risk**, especially for certain exposure classes (e.g.: lack of data, low default credit portfolios);
3. **high risk of model parameters downward manipulation** made by banks, especially by the weakest (in terms of capitalization level) banks (which have reasonably maximum incentive to keep their RWA as low as possible, in order to better fulfill the capital requirements fixed by the Supervision Authorities), or by banks subject to high competition pressure (in order to attract customers by means of excessively optimistic risk assessments).

The March 2016 two BCBS regulation proposals (both still in a consultation procedure) respectively focusing on the **operational risk measurement** model and on the banks **IRB credit risk measurement** models are fully consistent with the new direction the Regulators are going to go as far as the topics of banks internal risk measurement models are concerned.
In a nutshell:

1. as per the Op. Risk BCBS Proposal (**"Standardised Measurement Approach for Operational Risk"**), banks should be deprived – for pillar 1 purposes - of the possibility to fit a proper loss distribution to the empirical distributions of their observed operational losses and evaluate the operational risk in the different risk classes also through the judgements of business owners (Op. Risk AMA model). The Op. Risk RWA computation should be carried out by means of a standardized approach (so called **SMA approach**), somehow averaging between two different measures:
   a. the first measure (**BI component**) based upon a set of predefined weighting coefficients applied to a **business indicator (BI),** calculated on the basis of profit/loss items and divided into five different size-buckets;

b. the second measure (**Loss component**) based on the application of predefined multipliers to the **average operational loss** calculated in a ten year observation period (from current date and backwards in time) and under three different hypothesis, in such a way to penalise relatively big operational losses happened in the considered ten years.

N.B. The algorithm that aggregates the results of the BI component and of the Loss component and produces the final result (that is the Op. Risk capital requirement) is in general **conservative** (especially for banks of a certain size and with a relatively low operational risk profile) and has an implicit **floor embedded** (mathematically: the Internal Loss Multiplier is bounded below by (exp(1) – 1)). The SMA approach apparently awkward formulas produce an op.risk RWA (and a correspondent capital requirement) quite **downward inelastic** (i.e.: relatively sensitive to big operational losses as soon as they emerge, while requiring, to be materially reduced, a prolonged period of time during which just non-material loss events have happened);

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2. as per the Credit Risk IRB models BCBS Proposal (**"Reducing Variation in Credit Risk Weighted Assets – Constrains on the Use of Internal Model Approaches"**):

a. the IRB model use should be restricted to only few asset classes (totally excluding financial, equity and large corporate exposures, for which just the SA should be permitted, while to the mid-size exposures the FIRB approach should be applied as the only alternative to the SA):

b. as concerns the IRB credit RWA computation, a system of both final output and inputs **floors** is to be introduced**.** As far as the **IRB model final output floor** is concerned, that should be applied to the SA (Basel II instead of Basel I SA – topic currently under discussion) results;

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As regards the “corrective actions” to the potential weaknesses described in slide n. 2 presented by the Basel Committee with its March 2016 proposals:

1. they are **generally conservative** (that is they would generally imply an increase of the Pillar 1 RWA currently computed by banks using validated internal operational and / or credit risk measurement models and *coeteris paribus* a consequent decrease of their regulatory capitalization ratios). Nevertheless conservativeness doesn’t necessarily mean banks stronger capital positions (in the short term at least), provided that capital is a relatively scarce financial resource;
2. they generate risk measures with a **reduced risk sensitivity**. As per the proposed BCBS regulation aimed to ensure greater homogeneity and comparability of internal risk measurement models across the international banking industry, a greater standardization of the RWA computation is imposed on the banks. Standard models are - almost by definition - less risk sensitive than internal models. Moreover the risk measures proposed by the Basel Committee seem to be **downward inelastic** to the risk sources, especially because of the effect of the proposed floor systems.

Due to relative **“insensitive” risk measures**, several drawbacks may emerge. Most relevant are:

1. “internal models’” RWA would become less sensitive to risk factor dynamics and particularly to any factor, choice or dynamics, internal or external to a bank, which lowers the risk levels faced by that bank;

2. under the BCBS proposed prudential regulation, banks might have an incentive to increase their investments in riskier assets (or to diminish their investments in IT and control systems) and conversely decrease their investments in better quality assets (or to delay/avoid the costs of improving the reliability and safety of their business organization) **because of higher profitability (return-to-capital ratio) of the riskier strategies / policies**;
3. in other terms: potentially severe biases in banks key **capital allocation processes** might be caused by the wider resort to first pillar standardized scarcely risk sensitive risk measurement methods.

☞More generally: under the BCBS proposed regulation (pushing towards more standardized risk measurement models), **banks could have less incentive to develop and/or boost their risk management departments.** As a matter of fact one of the main ideas of model-based capital regulation was to incentivize banks to adopt stronger risk management systems and practices (BCBS, 2006). By limiting the use of internal model and the potential capital savings deriving from their use (by means of floor systems and imposed conservativeness), banks could be discouraged to invest in their risk management departments.

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•Even if perfect internal models homogeneity is not desirable, there is a broad consensus among industry and supervisors that current heterogeneity needs to be reduced.

•Nevertheless we believe this target may be pursued **without renouncing to adequately risk sensitive internal risk measurement models**.

•In 2016 EBA has started a comprehensive "IRB model repair" process, that aims to address all main issues (see *"The EBA's regulators view of the IRB approach"*, *"Opinion of the European Banking Authority on the implementation of the regulatory review of the IRB Approach"* and more recently (Nov. 2016) *"Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures"*.

•We believe EBA approach is the right way to address the IRB models heterogeneity issue and at the same time to preserve an adequate model discrimination capacity between differently risky exposures (e.g.: short and long term exposures, collateralized and non collateralized exposures, performing exposures to different - in terms of default probability - borrowers).

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As a matter of fact the main road to achieve the **"level the playing field"** goal and also possibly lower the **model risk** should be a supervisory regulation which tends:

1. **to reduce the range of possible hypothesis and methodology choices of banks** when constructing their own risk measurement models;

2. **to introduce adequate margins of conservatism** to be applied to the internal risk measures (also via appropriate floor systems that should be applied just to the **inputs of the models**, rather than to their final output), particularly for portfolios / loss event types characterised by scarcity of empirical evidence or data necessary to a fair risk computation, for quantifications of peculiar risks for which a bank shows poor experience (and so on).

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- As for the supposed risk of **undercapitalization** associated to banks (particularly weak banks) possible misconducts in internal models development / calibration, we believe the issue is as serious as not well supported by strong empirical evidence.
- Studies which have tried to demonstrate on an empirical basis the existence of a link between the probability of downward manipulation of risk measures and capital absorption computed by internal models and the average level of capitalisation of manipulating banks do exist - see for example Plosser and Santos (2014) - but they have not reached any definitive and clear conclusion.
- As for IRB models, it must be also considered their through-the-cycle nature and the probable results of backtesting analysis during adverse cycle periods (like the present one).
- Single cases of misconduct may indeed exist and it should be up to the Supervision Authorities intercepting and consistently removing those single situations in which capital savings have been realized due to an internal model "tweak" rather than to the "virtuous" features of the portfolio – or of the bank organisation, in the operational risk case - under risk measurement. **But these single cases cannot be transformed into a general rule.**

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•That's why the sound and prudent use of internal risk measurement models by banks require **strong and well qualified supervisors**. All the more so in the present very heterogeneous internal model context across Euro Area.

•Again: a **reduction of the range of methodological choices** available to banks when developing internal risk measurement models and the application of adequate **margins of conservatism** to crucial internal models' inputs (see the EBA Nov 2016 Consultation Paper on IRB models as a good example of the suggested approach) could well mitigate possible underestimation of risks and banks consequent undercapitalization.

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- At the moment the orientation of ECB – DG4 as for its final approach to the internal risk measurement models of banks has not been definitively cleared even if a general review of the topics (so called Targeted Review of Internal Models - TRIM) is on going.
- TRIM is a positive chance to preserve internal model in a more harmonized regulatory environment and industry practices.

- The actual risk is that EU Supervision Authorities (SSM) may consider the “american evolution” proposed by the Committee as a chance to take, in their apparent effort “to force” a general increase of capitalization ratios throughout the Euro area banking system.

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Conclusions

Conducting supervision to banks which diffusely utilize internal models to quantify first pillar capital requirements (in a differentiated context like the European banking industry) it's not an easy task.

More homogeneous than in the past supervisory practices in internal model validation procedures are highly desirable

Nevertheless preserving the internal models approach to the prudential supervision it's important, provided the may contribute to a sound and prudent bank management via a **fair and adequately risk sensitive capital absorption computation.**

These conditions require very skilled and independent supervisors.

The EU SSM is in the good position to reach these goals.

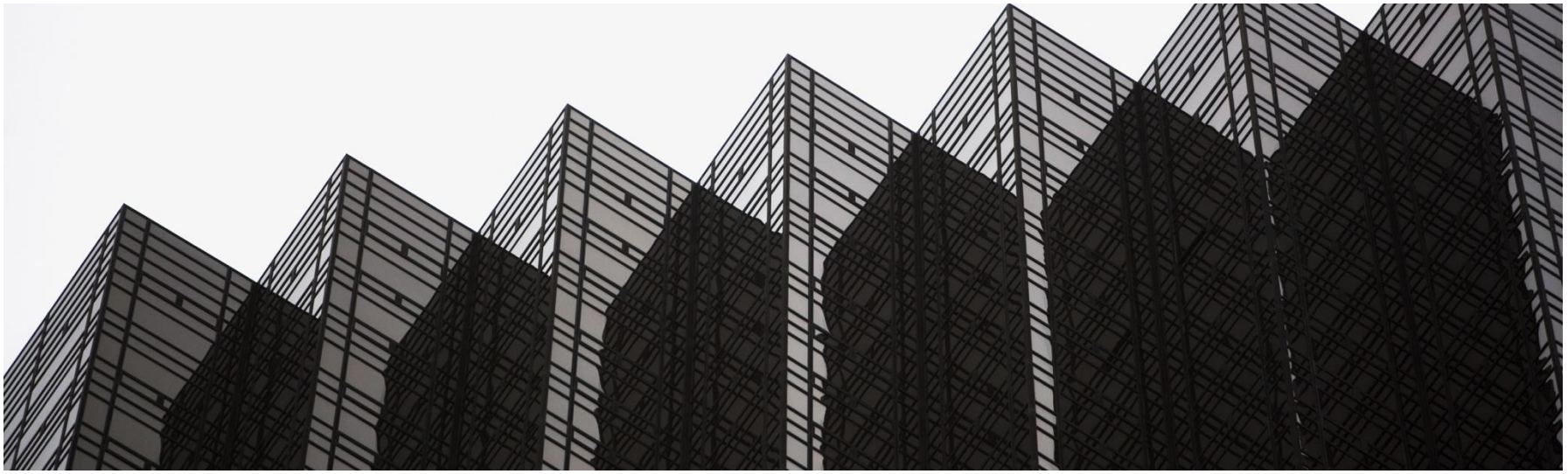
SP Global : Why Another Capital Ratio?

Date: 15 December 2016

Nicolas Malaterre
Senior Director

Mathieu Plait
Associate

EMEA Financial Services Ratings



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Agenda

- Why Another Capital Ratio?
- Risk-Adjusted Capital Framework (RACF) Overview
- Bank Ratings Framework– Where Does RACF Fit In?
- Outlook For European Banks
- Appendix 1: BICRA and S&P RWs curves
- Appendix 2: Regulatory RWs vs S&P RWs – Illustrative Example

Why Another Capital Ratio?

Why Yet Another Capital Ratio?

- **We first introduced our Risk-Adjusted Capital Framework (RACF) in April 2009 to address comparability issues with the regulatory ratios. We believe these issues will persist under Basel III and "Basel IV".**

- **Regulatory Tier 1, Core Tier 1, CET 1 ratio.**
  - **Key regulatory metrics, risk sensitive**
  - **Very complex under Basel II, Basel II.5 and Basel III**
  - **Comparability is blurred, within and across banking systems**
    - **National discretions (affect both the numerator and the denominator)**
    - **Methodological differences**
    - **Difference in banks' internal models/estimates**
      - While we think that internal model approaches are relevant and better capture the underlying risks in some instances we have concerns about the absence of global standardized validation framework among the national supervisors.
    - **Timing differences in the regulatory framework implementation**
  - **Transition to Basel III will last up to 2023**

Why Yet Another Capital Ratio?

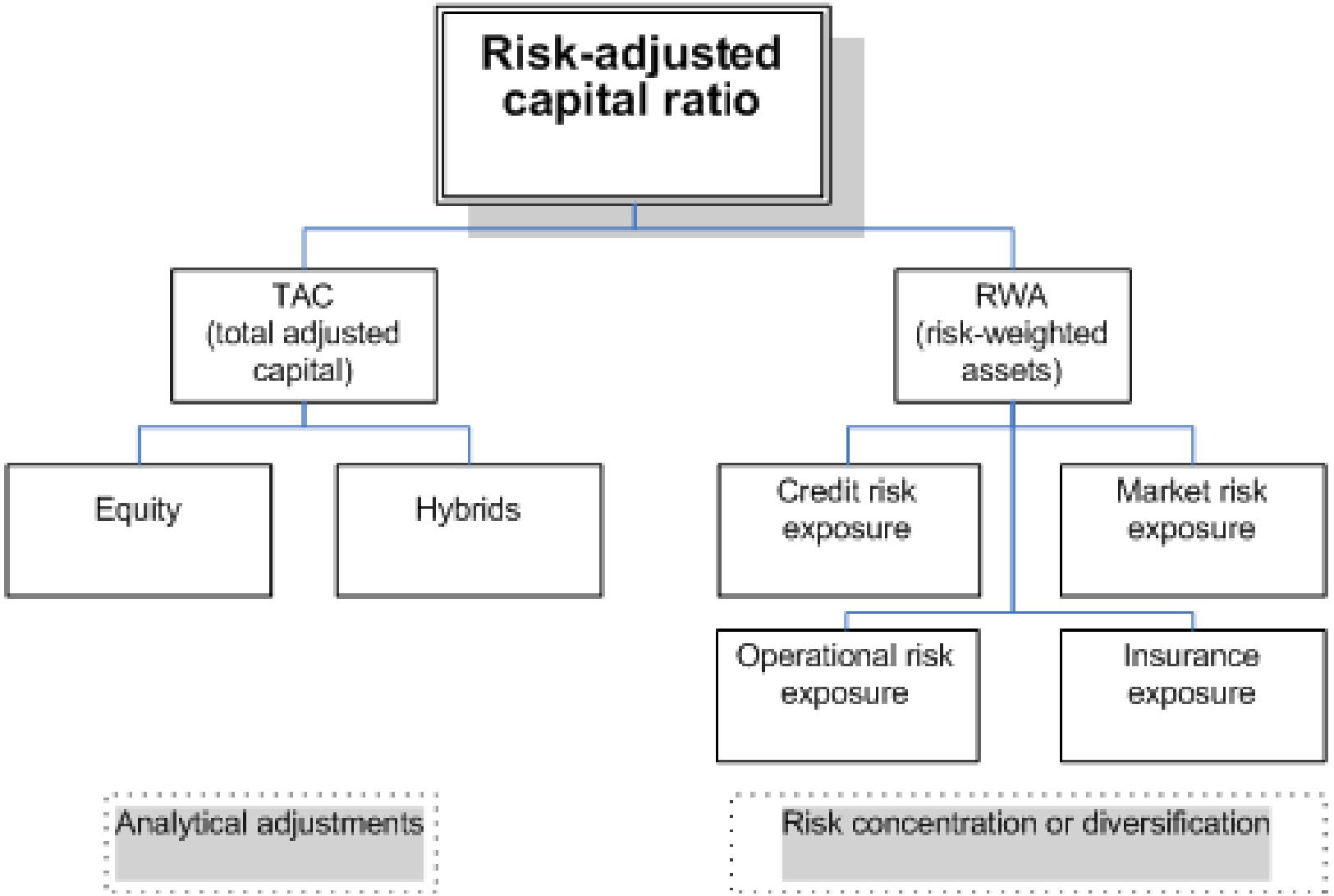
- **S&P also has different views on some risks and calibrations.** Appendix
  - **S&P Credit Risk RWs are calibrated to a 'A' stress scenario**
    - **In such scenario, the GDP could decline by as much as 6 % over 3 years, unemployment could reach up to 15% and the home price could decline by 30%. The stock market could drop up to 60 % (for a developed economy)**
  - **S&P Market RWAs are calculated over 1 year horizon with a 99.9% confidence level**

- **As we rate banks all over the globe it is critical for us to have to use capital ratios that are comparable. We also calculate RAC ratios for entities falling out of scope of the Basel Framework**

- **Therefore, while we monitor regulatory ratios, our capital assessment for banks is centred on RACF.**

Risk-Adjusted Capital Framework (RACF) Overview

Building Blocks For S&P's Risk-Adjusted Capital



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S&P Risk Weights Risk-Weighted Assets

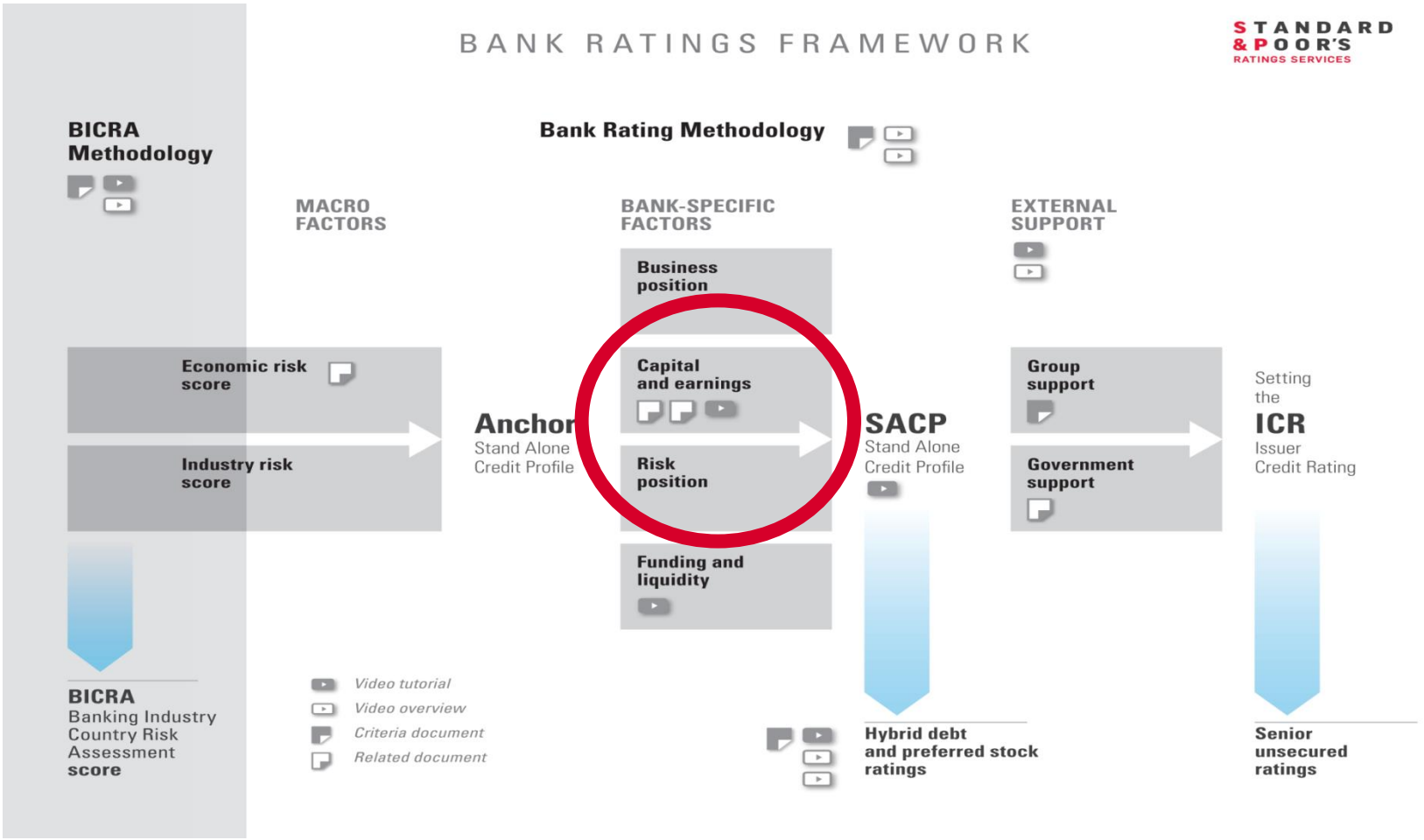
- **RWs for each credit exposure class reflect Standard & Poor's own qualitative risk assessment of what could be unexpected losses under a 'substantial' stress scenario**
  - **Losses are calibrated to a 'A' stress scenario**
    - **In such scenario, the GDP could decline by as much as 6 % over 3 years, unemployment could reach up to 15% and the home price could decline by 30%. The stock market could drop up to 60 % (for a developed economy)**
- **We derived from these stress losses a risk weight equivalent that we apply to banks' exposure at default**
  - **Ex: Retail mortgages in a low risk country could generate in our opinion 150 bps of unexpected losses**
  - **150bp / 8% = 150bp × 12.5 = 19% is our benchmark risk weight for retail mortgage portfolios in very low risk countries**
- **Risk Weighted Assets for Market risk are calculated over 1 year horizon with a 99.9% confidence level**
- **A RAC ratio of 8% indicates that a bank has just enough capital to absorb this 'substantial' (i.e. 'A' level) stress scenario**

Risk Weights Differentiation: S&P's Approach

- **The risk charges for corporate and retail exposure classes are differentiated based on the economic risk score.**
- **The risk charges for financial institutions are differentiated based on BICRA groups. BICRA is our methodology for assessing the risks relevant to national banking systems.**
- **The risk charges for sovereign exposures are differentiated based on Standard & Poor's sovereign ratings**
- **The risk charges for securitization exposures are differentiated based on assessments from rating agencies**
- **Risk charges are applied to Exposure At Default (EAD)**
  - **Adjustments to EAD for Credit Cards (10% of undrawn amounts taken as Credit Exposure) and Equity in the banking book**
  - **Where EAD is not available (e.g. in the U.S and some emerging countries.), S&P uses Basel Credit Conversion Factors assumptions**

Appendix

Bank Ratings Framework– Where Does RACF Fit In?



- **The projected RAC ratio is the key driver of "Capital and earnings"**
- **'Risk position' serves to refine the view of a bank's actual and specific risks, beyond the conclusion arising from the standard assumptions in the capital and earnings analysis (i.e. RAC ratio)**
- **A comparative assessment, in relation to peers operating in banking systems with similar economic risk. We also look whether material risks are not adequately captured by RACF**

From The Actual RAC Ratio To The SACP Impact

Actual RAC ratio
(based on actual data input)

Forecast RAC ratio
(based on bank's ability to grow or rebuild capital through internally generated retained earnings + external capital raising)

Table 9
Capital Assessment

Qualifier	Projected RAC ratio before concentration or diversification adjustments (%)
Very strong	More than 15%
Strong	More than 10% and up to 15%
Adequate	More than 7% and up to 10%
Moderate	More than 5% and up to 7%
Weak	3% up to 5%
Very weak	Less than 3%

Capital and Earning Score
(all else being equal)

Table 3
Using Bank-Specific Analysis To Determine The SACP

Capital and earnings* *Anchor*	*'bbb-' or better*	*'bb+' to 'bb-'*	*Below 'bb-'*
Very strong	+2 notches	+2 notches	+2 notches
Strong	+1 notch	+1 notch	+2 notches
Adequate	0 notches	0 notches	+1 notch
Moderate	-1 notch	0 notches	0 notches
Weak	-2 to -3 notches	-1 notch	0 notches
Very weak	-5 notches	-2 notches	-1 to -2 notches

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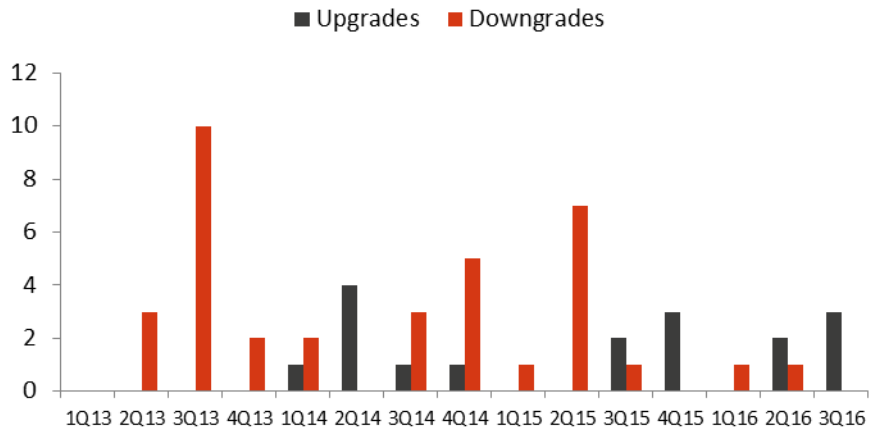
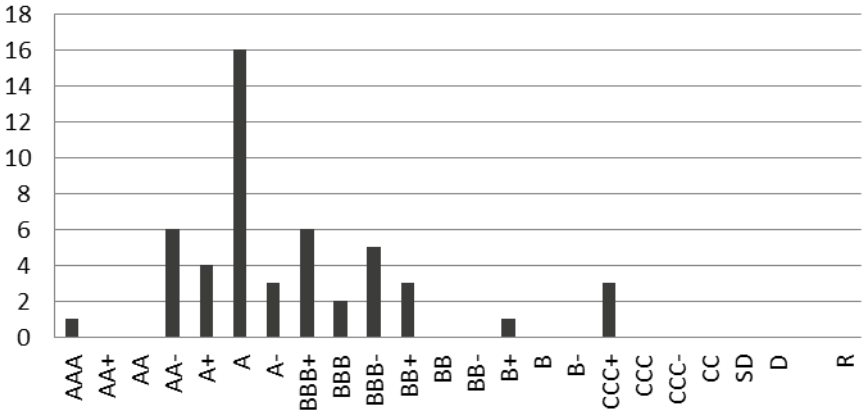
Outlook For European Banks

Top 50 Rated European Banks - Rating Trends

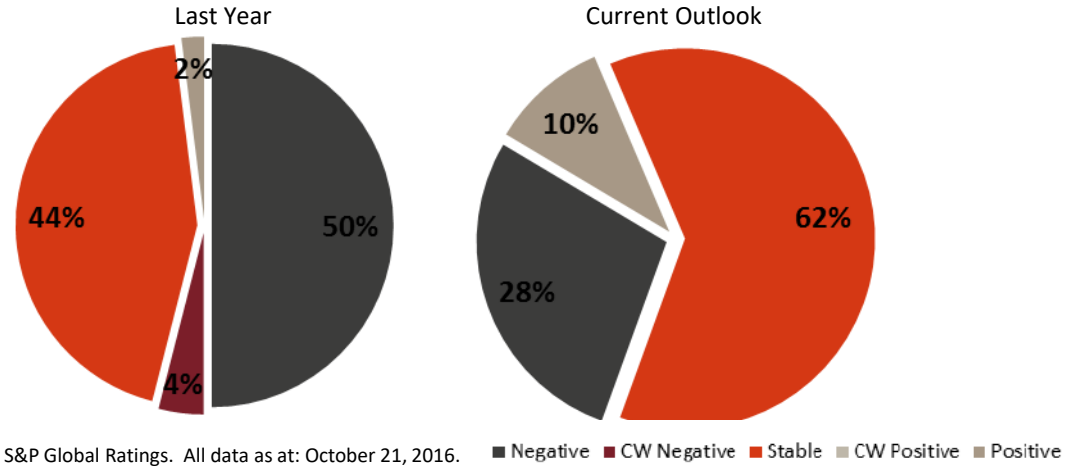
Historic Downgrades & Upgrades



Rating Distribution (ICR)



OL/CW Distribution



Source: S&P Global Ratings. All data as at: October 21, 2016.

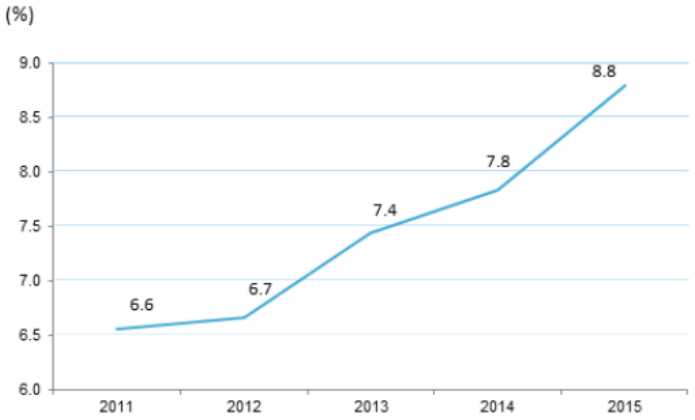
Takeaways:

1. Concentration at "A"
2. Since mid-2015, 8 upgrades vs. 2 downgrades
3. Shift from Neg to Stable outlooks, linked to removal of government support
4. But Europe is far from being an homogenous zone.

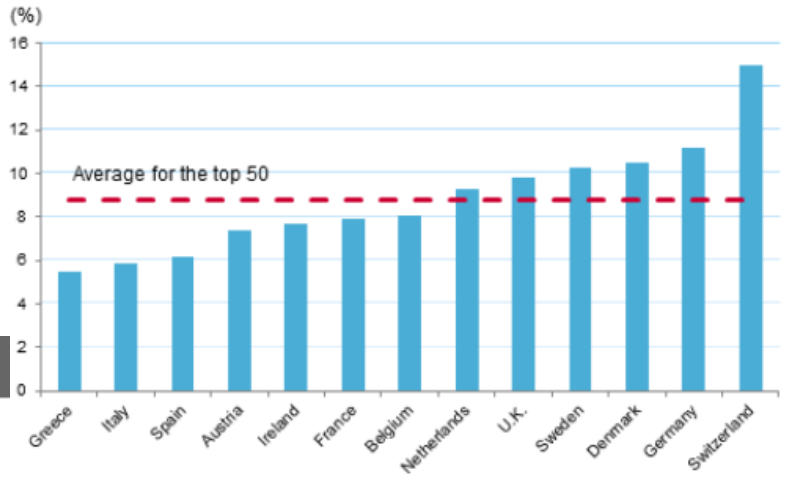
S&P Global Ratings

More Resilient Balance Sheets Support These Trends

Average RAC Ratio For The Top 50 Rated Western European Banks, 2011-2015

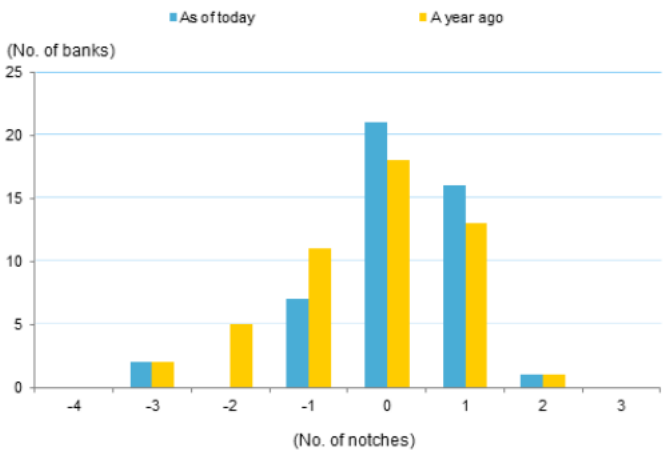


Average RAC Ratio For The Top 50 Rated Western European Banks, 2015, By Country



RAC--Risk-adjusted capital. Source: S&P Global Ratings.

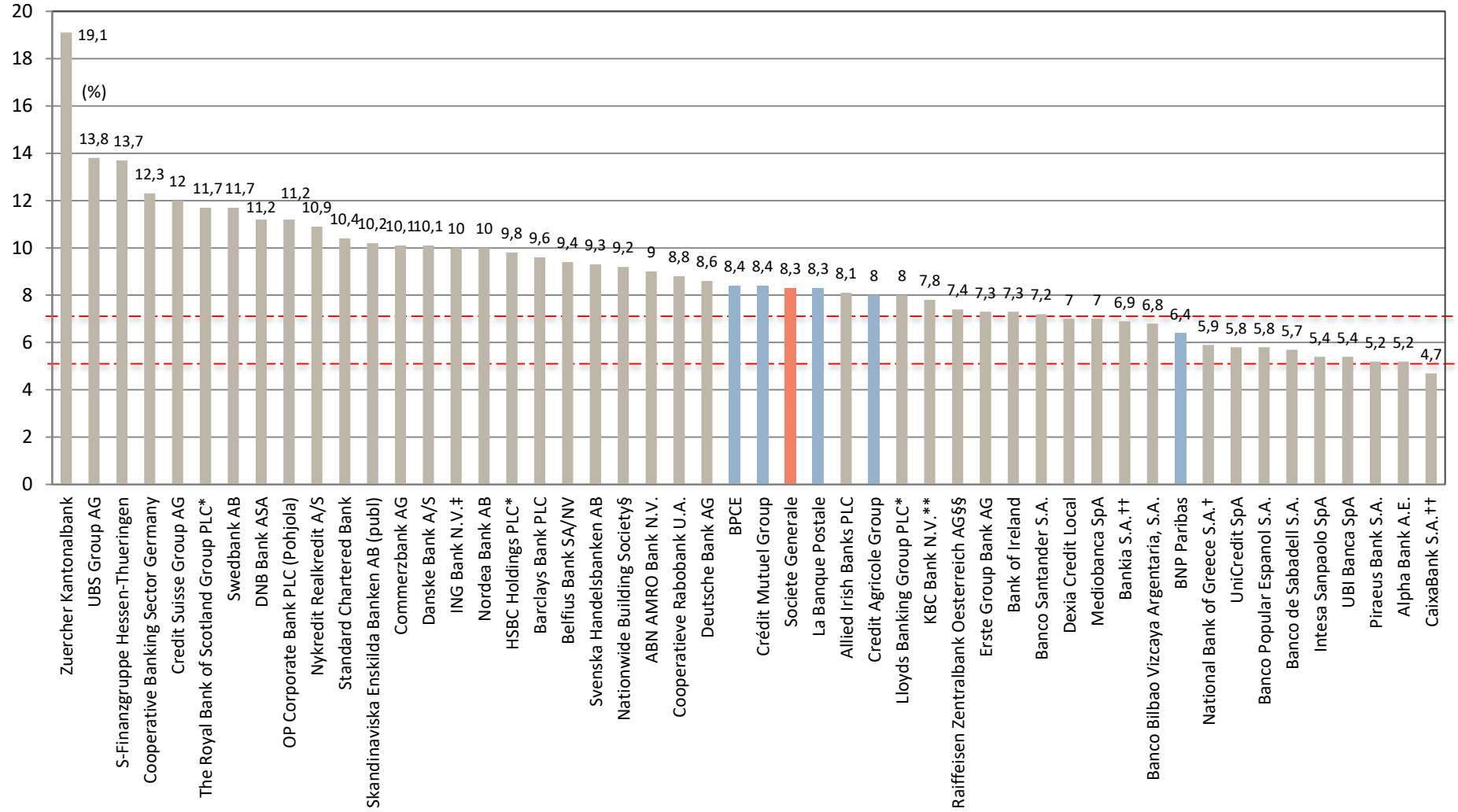
Combined Notching Impact Of Capital & Earnings And Risk Position For The Top 50 Rated Western European Banks



Source: S&P Global Ratings.

S&P Global Ratings

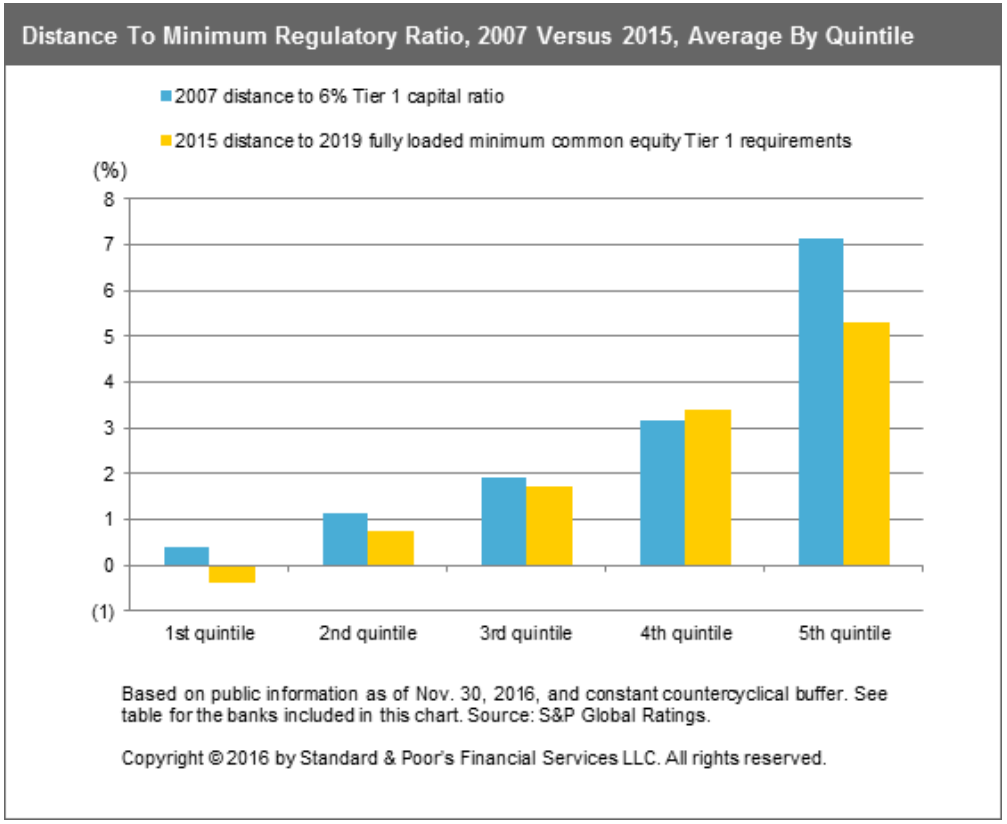
RAC Ratio / European Top 50 (Most Recent Historic Figures)



Note: The ranking is based on Tier 1 capital as published in The Banker in June 2016. All RAC ratios are calculated at the group level. *Holding company; the rating reflects that of the main operating company. § Nationwide Building Society (April 2015). †National Bank of Greece: Best estimate, ‡ING: The RAC ratio calculated at the operating bank level does not take into account part of the cash buffer managed at the holding company level (ING Groep) that we include in our forecast. **We calculate the RAC at the Group level. § § Referring to consolidated sector data ††RAC ratios are calculated at parent company level with group's consolidated financial statements.

Most Banks Don't Need More Capital, But The Flexibility To Use It In Times Of Stress

- **Banks' limited capacity to use their enhanced capital bases without breaching much stricter minimum regulatory requirements undermines the benefits of having a stronger capital base.**
- **As a result, we believe that banks' pro cyclical behaviors and exposure to confidence shocks might not have improved as significantly as could have been expected.**



Thank you

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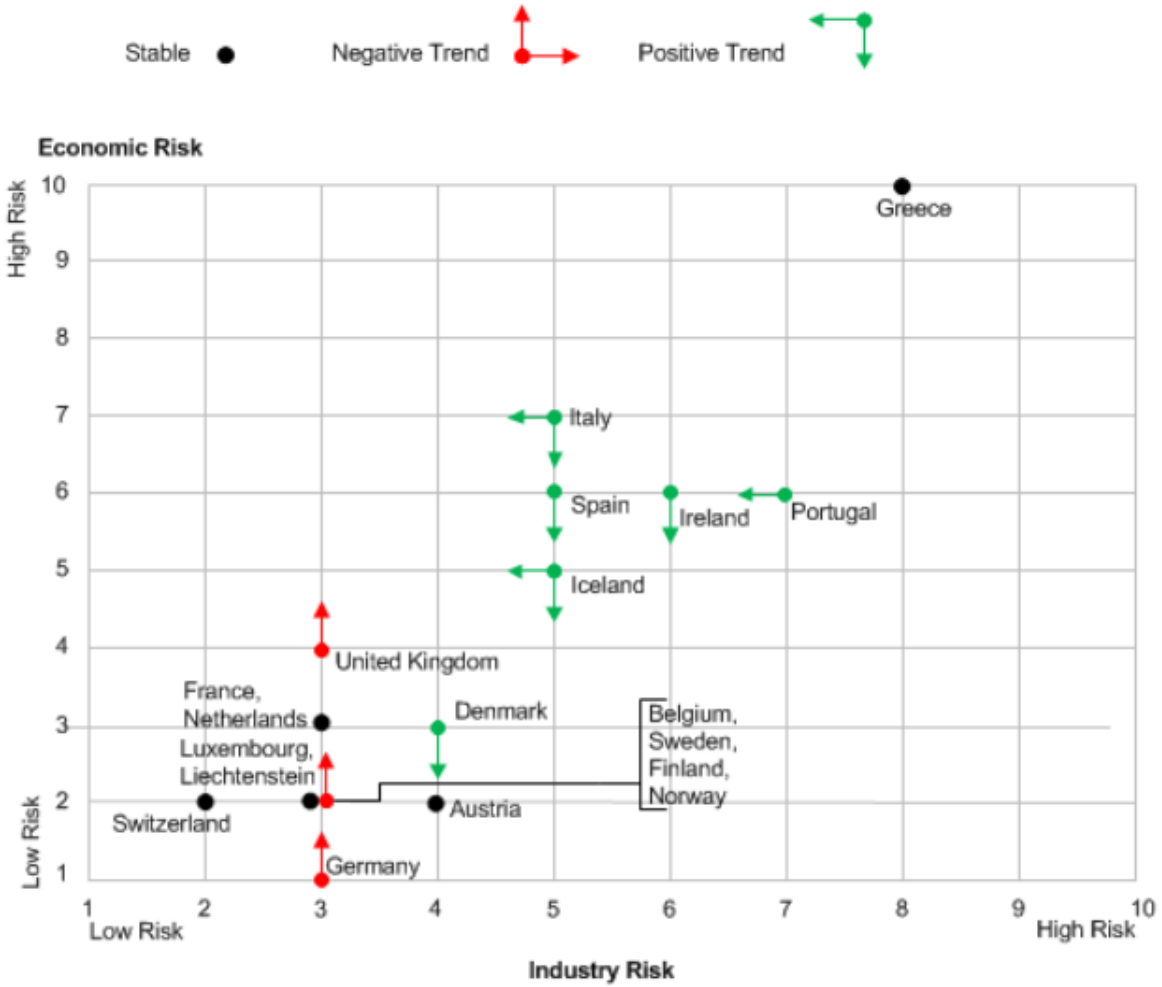
Appendix 1: BICRA and S&P RWs curves

BICRA Is Our Methodology For Assessing The Risks Relevant To National Banking Systems



Source: S&P Global Ratings. Data as of Nov. 4th, 2016

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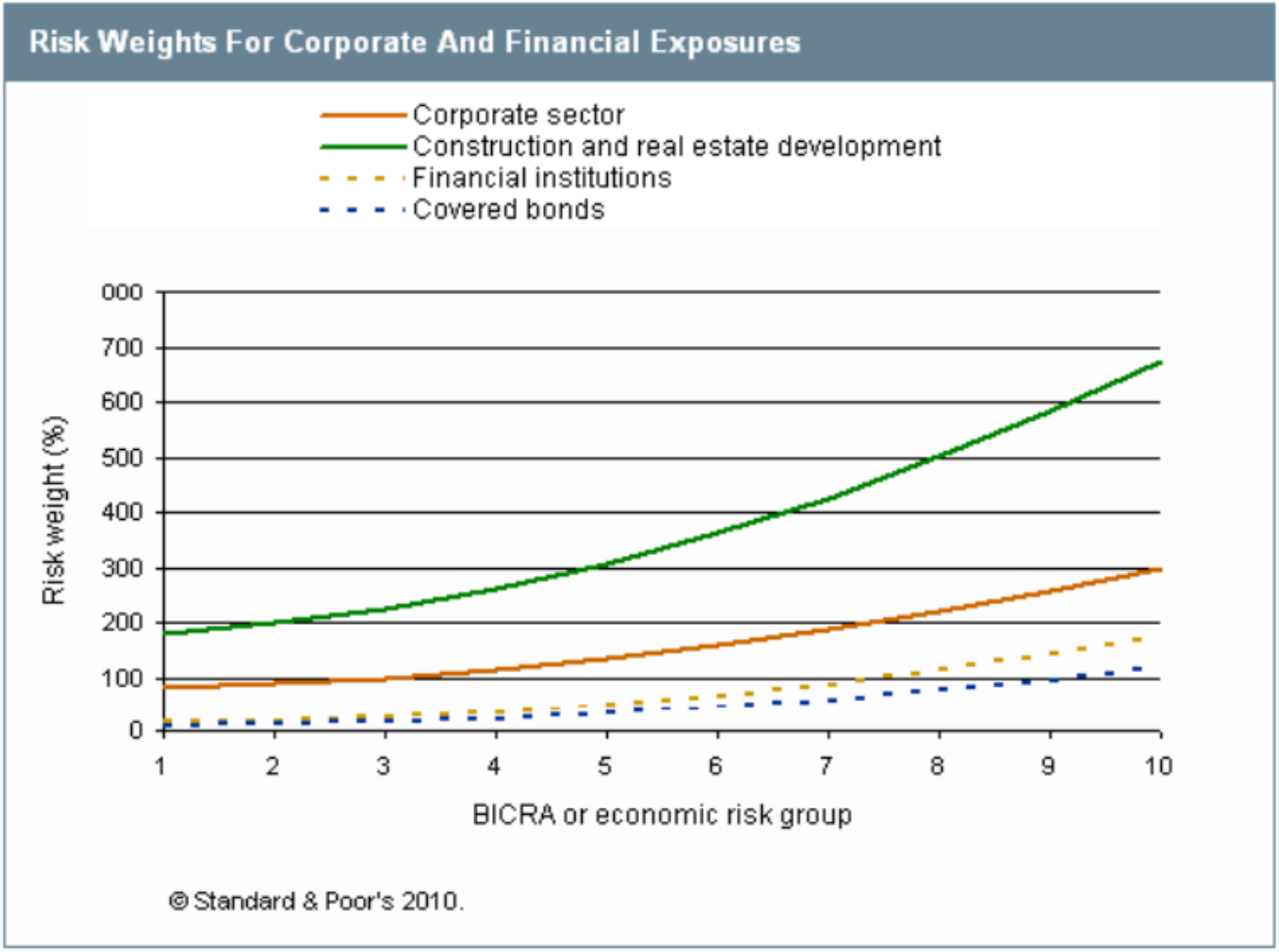
S&P Risk Weights For Corporate And FI Exposures



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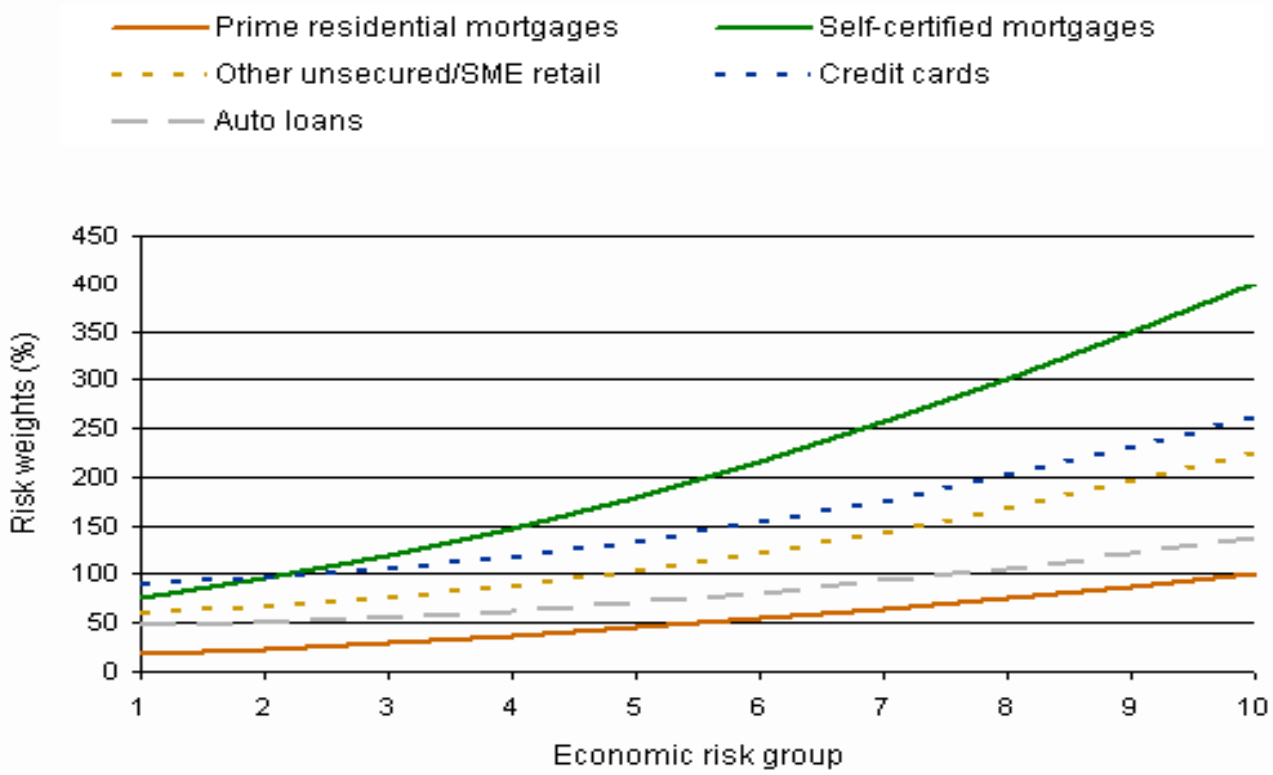
S&P Risk Weights For Retail Exposures

Risk Weights For Retail Exposures



SME--Small and midsize enterprises.

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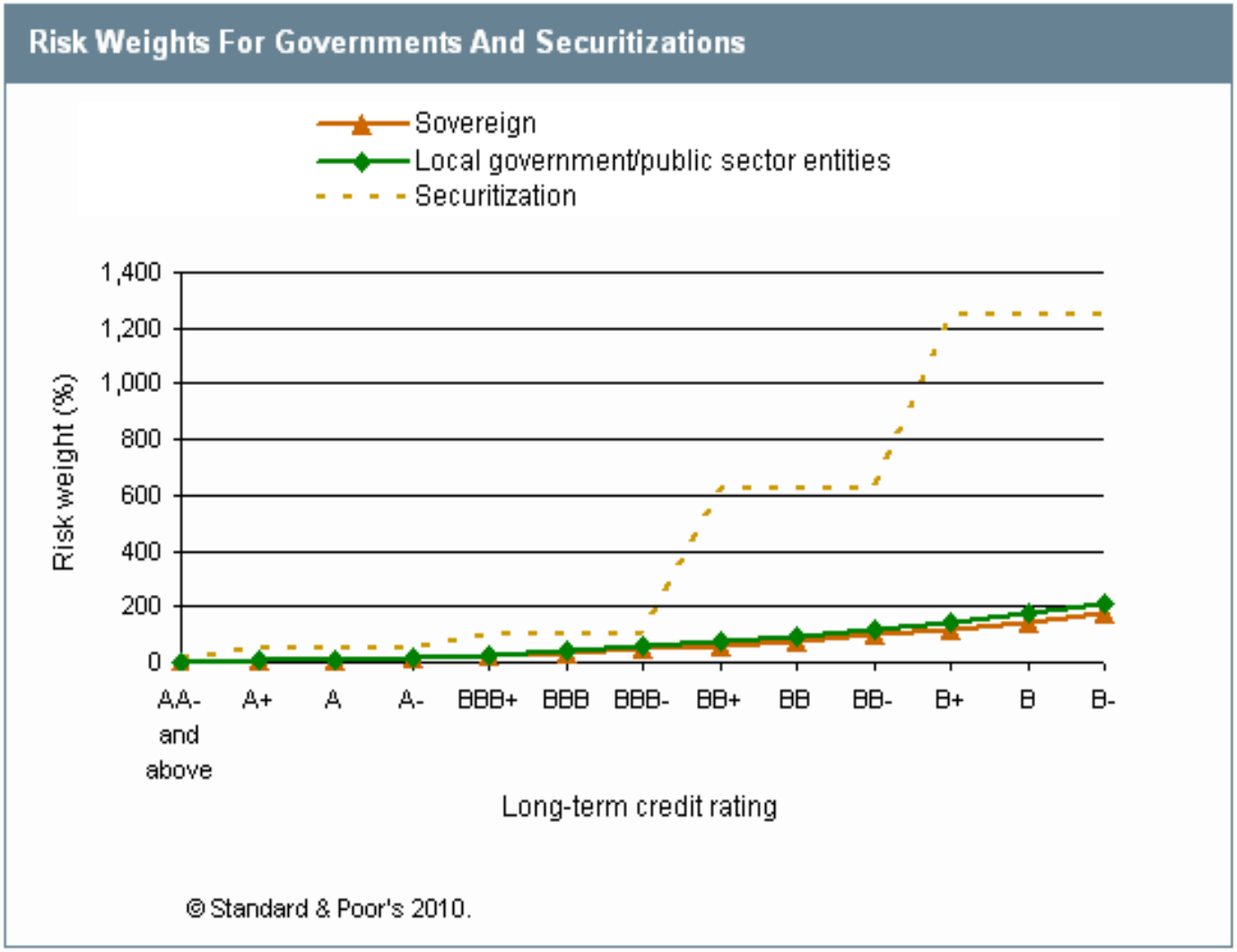
S&P Risk Weights For Sovereign And Securitizations

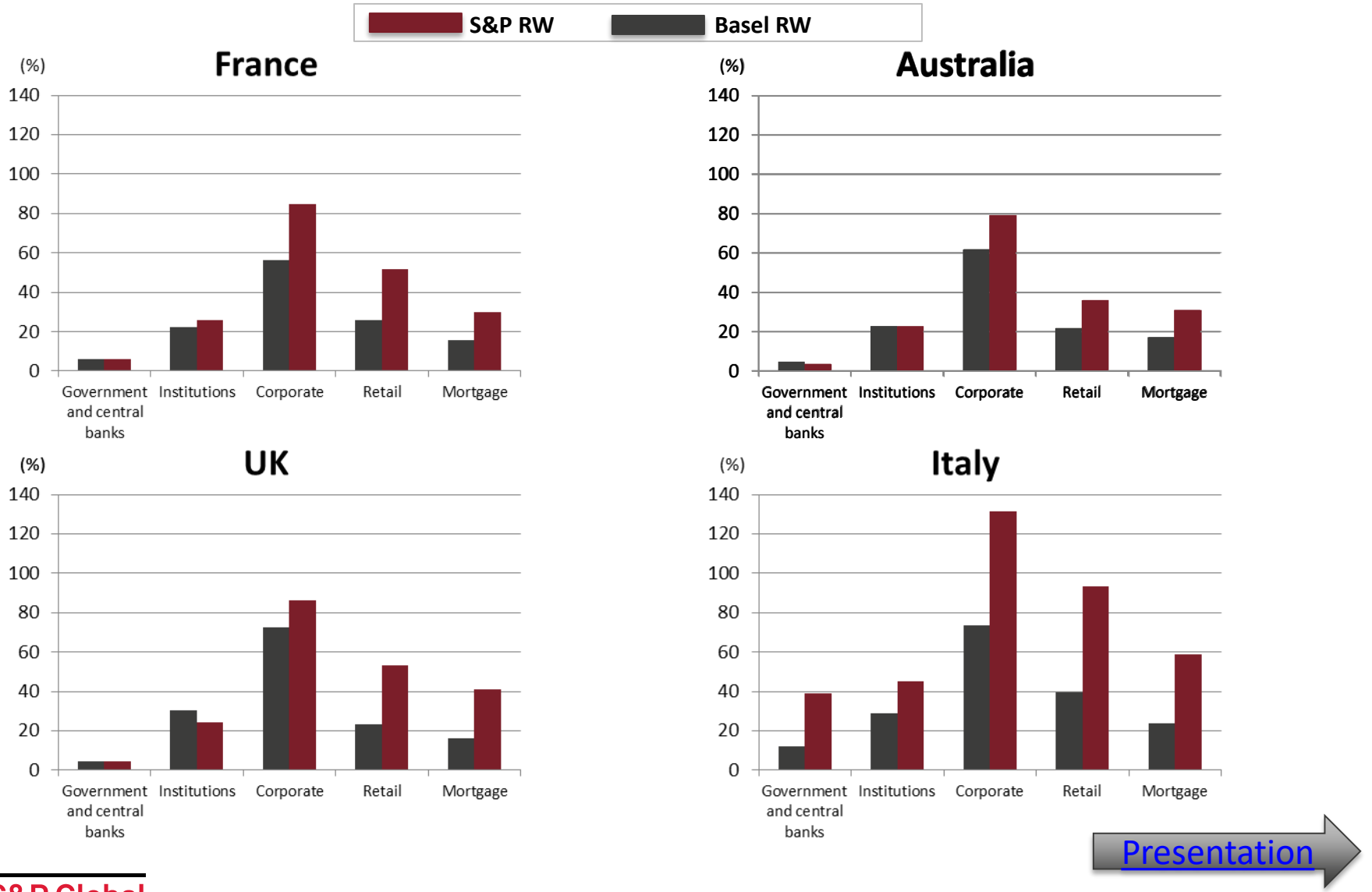


Presentation

S&P Global Ratings

Appendix 2: Regulatory RWs vs S&P RWs – Illustrative Example

Regulatory RWs vs S&P RWs – Illustrative Example



Presentation

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