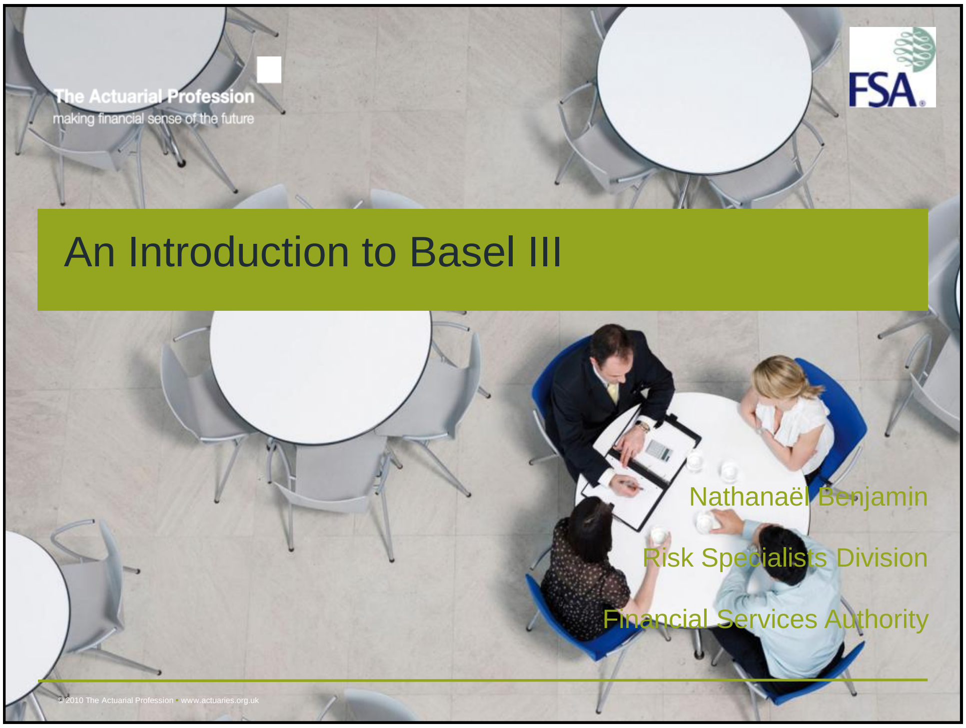


The Actuarial Profession
making financial sense of the future

FSA

An Introduction to Basel III

Nathanaël Benjamin

Risk Specialists Division

Financial Services Authority

Agenda

- Capital framework for banks
- Overview of Basel III measures
- Zoom-in on Basel III counterparty risk framework

Capital framework for banks

Pillar 1: minimum requirements

- Credit risk
- Market risk
- Operational risk

Pillar 2: supervisory review process

Pillar 3: market discipline

Unexpected losses to be covered by capital, expected losses by provisions

Key difference with insurance: focus on assets

Capital framework for banks: Credit risk

- Coverage: all sources of credit risk, e.g. retail and corporate loans, derivatives, securities financing
- Banks have internal risk measurement systems to evaluate different sources of credit losses: **probabilities of default** (PD), **loss given default** (LGD) and **exposure at default** (EAD)

- **Retail PD** models typically based on scorecards, also used for credit sanctioning, for example using logistic regression to link main drivers of creditworthiness (income multiple, loan-to-value ratio) to probability of default, at segment level
- **Retail mortgage LGD** models combine estimates of cure rates, time to repossession, house price index moves, forced sale discounts to project the portion of exposure that will not be recovered
- **Retail EAD** models for drawdown facilities (e.g. overdrafts and credit cards) estimate the portion of undrawn amount that will end up being drawn upon by the time of default

Capital framework for banks: Credit risk

- **Corporate PD** models usually distinct for different categories of obligors: banks, non-banks financial institutions, large corporates, mid-corporates, small-to-medium enterprises
- Unlike for retail, corporate credit exposures are managed on an obligor-by-obligor basis, not pools of obligors
- Corporate PD models usually start by assigning obligors to an **internal rating grade** in the corporate master scale, based on balance sheet characteristics such as leverage, profit before tax, earnings, and separate assessments of country and sector risks
- Final phase is to attribute PD estimates to internal rating grades, for example based on mapping to rating agency grades or relevant internal default history

Capital framework for banks:
Credit risk

- For trading products, e.g. OTC derivatives and repo-style transactions, major banks have developed internal models to evaluate counterparty exposures
- Projections of mark-to-market counterparty exposure into the future, and until the maturity of all products, typically up to 30-50 years
- This forms the basis for estimation of exposure at default for this type of credit risk
- More on this below

Capital framework for banks:
Credit risk

- Estimates of lifetime PD, LGD and EAD factor in expected loss **provisioning**
- Under Basel framework, minimum capital requirements for credit risk have advanced and standardised approaches
- **Advanced approach:** internal ratings based (IRB), takes banks' own estimates of PD, LGD and EAD and feeds them to the IRB formula:

Capital requirement (K) = EAD * [LGD * N [(1 - R)^-0.5 * G (PD) + (R / (1 - R))^0.5 * G (0.999)] - PD * LGD] * (1 - 1.5 x b(PD))^ -1 × (1 + (M - 2.5) * b (PD))

- Based on asymptotic single risk factor model, derived from Merton/Vasicek model
- Assumes infinitely granular portfolio, well diversified internationally. Under these assumptions, aimed to cover 99.9% worse-case loss over one year
- Standardised approach mandates fixed risk weights

Capital framework for banks: Market Risk

- Banks' internal market risk measurement systems are generally VaR-based, complemented by stress testing
- Value at Risk calculated at portfolio level, three main methods: historical simulation, Monte Carlo simulation and variance-covariance matrix
- Requires maintenance of **time series** of main market risk factors relevant for the portfolio, together with **valuation models** for all instruments in the portfolio
- Identification of all material market risk factors is essential, their absence is the main cause of VaR breakdown, e.g. basis not reflected, etc.
- Valuations subject to product control process
- VaR used to control and limit amount of trading by desk, expression of risk appetite
- Based on 10-day liquidation horizon

Capital framework for banks: Market Risk

- In addition to VaR-based capital requirements, incremental risk charge to cover jump-to-default and credit migration risk
- Concerns instruments with issuer risk: bonds, CDSs, equities, etc
- Capital horizon of 1 year, broken down into consecutive liquidity periods, under constant level of risk assumption
- Basel "2.5" adds requirements based on Stressed VaR to condition parameterisation on period of market stress
- Issuer risk of trading instruments: form of credit risk incorporated in market risk framework

Basel III: Background

- Crisis highlighted particular aspects not always appropriately addressed by the existing Basel II framework
- Basel Committee given by G20 mandate to revise capital framework
- Bulk of the work performed by the Policy Development Group of the Basel Committee, with sub-groups focussing on different measures
- Work started in January 2009
- Consultation and QIS process started in December 2009, subsequent changes
- Final package published in December 2010

10

Basel III Pillar 1 Measures: Capital

Quality and level of capital

- Greater focus on common equity. The minimum will be raised to 4.5% of risk-weighted assets, after deductions.

Capital loss absorption at the point of non-viability

- Contractual terms of capital instruments will include a clause that allows – at the discretion of the relevant authority – write-off or conversion to common shares if the bank is judged to be non-viable. This principle increases the contribution of the private sector to resolving future banking crises and thereby reduces moral hazard.

Capital conservation buffer

- Comprising common equity of 2.5% of risk-weighted assets, bringing the total common equity standard to 7%. Constraint on a bank's discretionary distributions will be imposed when banks fall into the buffer range.

Countercyclical buffer

- Imposed within a range of 0-2.5% comprising common equity, when authorities judge credit growth is resulting in an unacceptable build up of systematic risk.

Basel III Pillar 1 Measures:
Risk Coverage

Securitisations

- Strengthens the capital treatment for certain complex securitisations. Requires banks to conduct more rigorous credit analyses of externally rated securitisation exposures.

Trading book

- Significantly higher capital for trading and derivatives activities, as well as complex securitisations held in the trading book. Introduction of a stressed value-at-risk framework to help mitigate procyclicality. A capital charge for incremental risk that estimates the default and migration risks of unsecuritised credit products and takes liquidity into account.

Counterparty credit risk

- Substantial strengthening of the counterparty credit risk framework. Includes: more stringent requirements for measuring exposure; capital incentives for banks to use central counterparties for derivatives; and higher capital for inter-financial sector exposures.

Bank exposures to central counterparties (CCPs)

- The Committee has proposed that trade exposures to a qualifying CCP will receive a 2% risk weight and default fund exposures to a qualifying CCP will be capitalised according to a risk-based method that consistently and simply estimates risk arising from such default fund.

Basel III Pillar 1 Measures:
Containing Leverage

Leverage ratio

- A non-risk-based leverage ratio that includes off-balance sheet exposures will serve as a backstop to the risk-based capital requirement. Also helps contain system wide build up of leverage.

Basel III Pillar 2 Measures: Risk Management and Supervision

FSA

Supplemental Pillar 2 requirements

- Address firm-wide governance and risk management; capturing the risk of off-balance sheet exposures and securitisation activities; managing risk concentrations; providing incentives for banks to better manage risk and returns over the long term; sound compensation practices; valuation practices; stress testing; accounting standards for financial instruments; corporate governance; and supervisory colleges.

Basel III Pillar 3 Measures: Market Discipline

FSA

Revised Pillar 3 disclosures requirements

- The requirements introduced relate to securitisation exposures and sponsorship of off-balance sheet vehicles. Enhanced disclosures on the detail of the components of regulatory capital and their reconciliation to the reported accounts will be required, including a comprehensive explanation of how a bank calculates its regulatory capital ratios.

Basel III Liquidity Measures: Global Liquidity Standard and Supervisory Monitoring

Liquidity coverage ratio

- The liquidity coverage ratio (LCR) will require banks to have sufficient high-quality liquid assets to withstand a 30-day stressed funding scenario that is specified by supervisors.

Net stable funding ratio

- The net stable funding ratio (NSFR) is a longer-term structural ratio designed to address liquidity mismatches. It covers the entire balance sheet and provides incentives for banks to use stable sources of funding.

Principles for Sound Liquidity Risk Management and Supervision

- The Committee's 2008 guidance Principles for Sound Liquidity Risk Management and Supervision takes account of lessons learned during the crisis and is based on a fundamental review of sound practices for managing liquidity risk in banking organisations.

Supervisory monitoring

- The liquidity framework includes a common set of monitoring metrics to assist supervisors in identifying and analysing liquidity risk trends at both the bank and system-wide level.

Basel III Measures: Systemically Important Financial Institutions

- In addition to meeting the Basel III requirements, global systemically important financial institutions (SIFIs) must have higher loss absorbency capacity to reflect the greater risks that they pose to the financial system.
- The Committee has developed a methodology that includes both quantitative indicators and qualitative elements to identify global systemically important banks (SIBs).
- The additional loss absorbency requirements are to be met with a progressive Common Equity Tier 1 (CET1) capital requirement ranging from 1% to 2.5%, depending on a bank's systemic importance. For banks facing the highest SIB surcharge, an additional loss absorbency of 1% could be applied as a disincentive to increase materially their global systemic importance in the future.
- A consultative document was published in cooperation with the Financial Stability Board, which is coordinating the overall set of measures to reduce the moral hazard posed by global SIFIs.

Basel III on Counterparty Risk

- Areas where the Basel II treatment did not adequately capitalize for the risks during the crisis
- Provision of incentives to move bilateral OTC derivative contracts to multilateral clearing through central counterparties
- Provision of incentives to reduce operational risk arising from inadequate margining practices, back-testing and stress testing
- Whether the changes would contribute to reducing procyclicality.

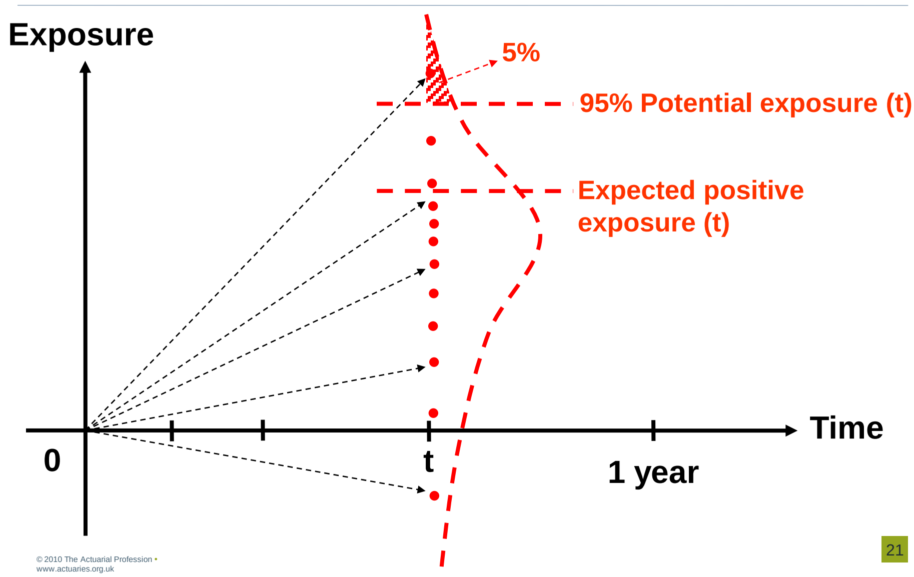
Background:
The Basel II framework for counterparty risk

- Calculation of minimum capital requirements for counterparty risk in the trading book
- Types of transactions through which banks are exposed to counterparty risk: OTC derivatives, securities financing, margin lending, long-settlement transactions
- Asset classes: interest rates, exchange rates, equities, credit, commodities
- Available methods to determine exposure at default (EAD) for OTC derivatives:
- Internal Models Method (subject to supervisory approval)
- Standardised Method
- Current Exposure Method
- Available methods to determine EAD for repo-style transactions:
- Internal Models Method (subject to supervisory approval)
- “Repo VaR” (subject to supervisory approval)
- Own-Estimates (subject to supervisory approval) or Supervisory Haircut Comprehensive Approach
- Simple Approach

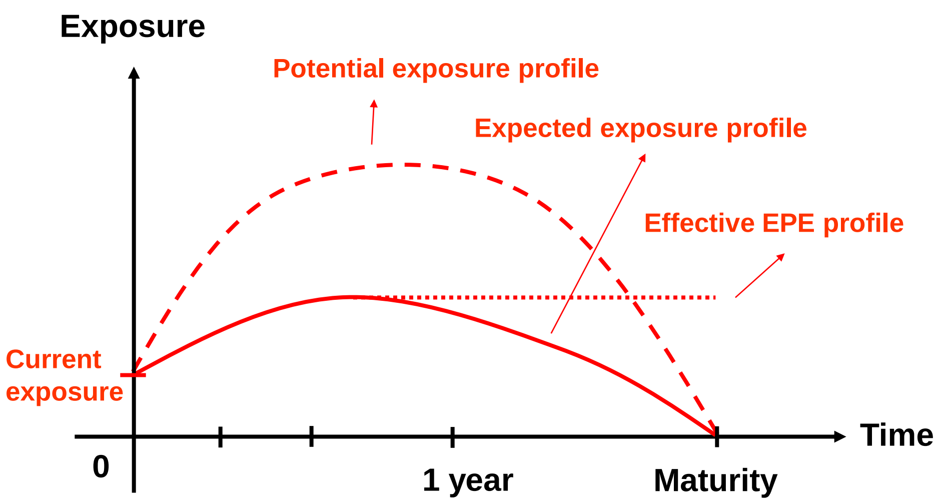
Background:
Basel II framework for counterparty risk

- Risk-weighted assets (RWAs) for a portfolio = sum of RWAs for all netting sets
- RWAs for a netting set = risk weight of the counterparty × EAD for the netting set
- Internal Model Method: EAD = Alpha × Effective EPE
  - Effective EPE: regulatory-defined measure of average future exposure to a netting set, based on term structure of expected future counterparty exposures estimated internally by the bank, reflecting netting rules and projected values of instruments in the netting sets.
  - Bank can choose to model only Effective EPE and use the fallback value of 1.4 for Alpha, or to model its own alpha subject to supervisory approval and a floor of 1.2
- Current Exposure Method: EAD = Current net MtM + PFE Add-on
  - Add-on = Add-onGross × (0.4 + 0.6 × NGR)
  - Add-onGross = Sum of Supervisory PFE Factors × Notionals across transactions in the netting set
  - NGR = net-to-gross ratio = Current net MtM / Current gross MtM

Determination of EAD: future exposure



Determination of EAD: metrics



Determination of exposure at default: issues

- Defaults and deteriorations in the creditworthiness of trading counterparties occurred precisely at the time when market volatilities and correlations, and therefore counterparty exposures, were higher than usual. Thus, observed generalized wrong-way risk was not adequately incorporated into the framework
- Need to strengthen the point-in-time estimate of average future exposure, such as Effective EPE, as the basis for determining EAD for trading counterparties.
- Poor back-testing of counterparty exposure models during the crisis
- Need for EAD estimates to be appropriate for a credit downturn, consistent across Basel framework

Determination of EAD: Basel III

- Condition parameters of counterparty exposure models on a period of credit stress
- In line with use of Stressed VaR for market risk
- Stressed estimates of parameters such as volatilities and correlations should be estimated historically from a 3-year period that includes the 1-year observation period used for Stressed VaR for credit assets
- Recognizes trading aspect of counterparty risk (partly driven by same risk factors as market risk)
- Capital requirements = maximum of requirements under current calibration and requirements under stressed calibration, at portfolio level

Correlation between financial counterparties

- During the crisis, large financial institutions proved to be more interconnected than reflected in the Basel II capital framework. As a result, when markets entered the downturn, banks' counterparty exposure to other financial firms also increased.
- Evidence suggests that the asset values of financial firms are, on a relative basis, more correlated than those of non-financial firms.
- Empirical work performed by the RMMG showed that in times of crises, the asset value correlation between financial firms were at least 25% higher than that between non-financial firms
- Basel III measure: multiply the AVC for financial counterparties by 1.25 in the IRB framework of the Basel formula.

Margin period of risk

- The close-out period for replacing trades with a counterparty with large netting sets or netting sets consisting of complex trades or illiquid collateral extended beyond the horizon required for the capital calculations under the model-based advanced approaches (10 days for OTC derivatives and 5 days for securities-financing transactions)
- Alternatively often short close-out were achieved, but at the cost of substantial forced-sale discounts
- In particular during the crisis very large margin call disputes were observed, which lasted for an excessively long time
- Basel III measure: increase the minimum margin periods of risk in model-based approaches for voluminous netting sets, netting sets containing illiquid trades, and netting sets where frequent disputes were incurred

Treatment of central clearing counterparties (CCPs)

- Before and during the crisis CCPs were not widely used to clear trades.
- Aim to encourage the use of CCPs whilst recognizing that they do not eliminate risks
- Dialogue with CPSS/IOSCO and collaboration in the development of one set of standards for the soundness of CCPs
- Distinction between sources of loss: direct vs. through the mutualisation of losses via the loss-sharing arrangements
- RMG working to develop capital treatment for potential losses on a bank’s exposure to CCPs

Other counterparty risk measures in Basel III

FSA

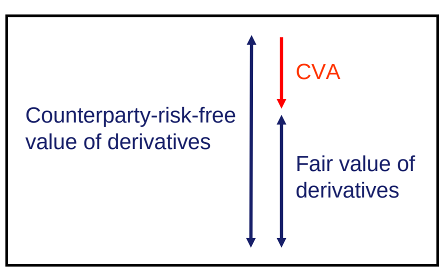
- Enhancement of standards for back-testing of counterparty exposures
- Penalization of extreme cases of wrong-way risk where there is a legal connection between the counterparty and the underlying transaction
- Enhanced qualitative requirements for the monitoring of wrong-way risk
- Qualitative standards established around collateral management, including staffing of collateral units, soundness of collateral systems, control on re-use of collateral (e.g. re-hypothecation and re-investment of collateral pledged or received)
- Enhanced stress testing requirements

28

Definition: credit valuation adjustment (CVA)

FSA

- **Downward adjustment to the valuation of OTC derivatives to reflect** counterparty **risk into their fair value.**



- **Calculated as price of counterparty risk, and hence the expected value of discounted future counterparty losses that the netting sets concerned could incur:**

$$CVA = E\left(\sum_{t=1}^{Maturity} Df_t \cdot L_t\right) \approx \sum_{t=1}^{Maturity} Df_t \cdot EL_t \approx \sum_{t=1}^{Maturity} Df_t \cdot PD_{[t;t+1]} \cdot LGD \cdot EE_t$$

29

Role of CVA

- CVA is key to value derivatives correctly and therefore risk-manage them properly
- CVA is key to recognise losses progressively without waiting for outright default and huge sudden associated loss, which could substantially damage the confidence of the market in the bank, and thereby impair its ability to obtain funding
- CVA is key to increase market transparency by making banks, many of which are also financial counterparties, disclose openly and consistently the true risk on their balance sheets

30

CVA: Did reflect increase in counterparty risk

- During the last crisis, counterparty losses were mostly incurred through CVA rather than actual defaults.
- Very substantial losses were incurred during the crisis through CVA, in particular in situations of wrong-way risk as in the case of exposures to financial guarantors (monolines). For some firms this constituted a major portion of overall trading losses.
- Materiality: up to several billions of losses, sometimes in short timeframes, especially for banks with monoline exposures
- CVA losses by themselves constituted a material portion of largest losses aggregated across the largest firms between January 2007 and March 2009.
- Without CVA, parts of the market could have been under the illusion of safety, which could have had much more dramatic consequences

© 2010 The Actuarial Profession • www.actuaries.org.uk

31

Capitalization of CVA losses: issues

- Mark-to-market losses due to credit valuation adjustments (CVA) were not directly capitalized for.
- The Basel II framework considers counterparty risk from the perspective of defaults and credit migrations over one year, for example via the Basel formula or the standardised credit risk weights, but does not fully reflect the potential for MtM losses short of outright default.

Capitalization of CVA losses: Basel III

- Introduces a capital charge to protect against unexpected losses due to adverse changes in CVA
- Difficulty: due to MtM nature of CVA risk, VaR of CVA models have conceptual appeal, but are often still largely insufficiently validated and have a “black box” aspect.
- Objective: need for a simple and transparent way of representing CVA risk, based on existing inputs already subject to regulatory controls, whilst recognizing its market risk nature
- Idea: leverage existing regime for MtM risk to provide capital for CVA. This recognizes the MtM nature of counterparty risk, and relies on existing framework.
- Capital charge constructed based on a simple bond analogy, determined as the applicable market risk charge for a replicating portfolio of CVA

Capitalization of CVA losses: Basel III

- Idea is that since CVA is the downward adjustment to reflect counterparty risk in the valuation of OTC derivatives, i.e. the loss of value incurred by having a given set of OTC derivatives with a given counterparty instead of a risk-free counterparty, it can be approximated as the loss of value from a risk-free to a risky bond.
- A long risk-free bond and a short risky bond can be viewed as a replicating portfolio of CVA, as a first-order approximation
- Term structure of expected exposures (already used for regulatory purposes) can be reflected as coupon payments under the bond analogy.
- Capital is determined by inserting this replicating portfolio in the existing market risk framework

34

Capitalization of CVA losses: specifications

- Use the following as the "pricer" giving the value of CVA, to be fed into the market risk VaR for spread sensitivities (exposures EE kept constant):

$$CVA = LGD \cdot \sum_{i=1}^{T} Max\left(0; exp\left(-\frac{s_{i-1} \cdot t_{i-1}}{LGD}\right) - exp\left(-\frac{s_i \cdot t_i}{LGD}\right)\right) \cdot \left(\frac{EE_{i-1} \cdot Df_{i-1} + EE_i \cdot Df_i}{2}\right)$$

- CVA sensitivities are derived by differentiating the above with respect to spreads, or formula above used directly in case of full revaluation
- The approved specific risk VaR model is used to calculate the VaR due to changes in spreads, with constant exposures, calculated over the following portfolio:
  - The set of all CVA pricers (as above) across counterparties
  - All single-name hedges referencing the counterparties directly
  - 100% of index CDS hedges if basis is reflected, otherwise 50% of their MtM

35

Capitalization of CVA losses: specifications

- Standardised CVA charge for all banks that do not have both IMM and specific risk VaR approvals:

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

- Outstanding EAD, reflecting incurred CVA: banks cannot lose again what they have already written down, so incurred CVA allowed to be subtracted from EAD (only for the “classic” counterparty default charge, not for CVA charge).

Capitalization of CVA losses

- Approach relies on inputs available to all firms: EAD, M, spreads, interest rates, and existing market risk approach as approved by supervisors.
- Sensitivity of CVA to the market risk drivers of exposure are not represented. Consequently hedges of the CVA sensitivity to the market risk drivers of the underlying transactions are not eligible.
- Next steps and longer term: work on the Current Exposure Method, and fundamental review of the trading book by the Trading Book Group (under the PDG), and consideration of the integration of counterparty and market risks.

Counterparty risk capital charge under Basel III

- Final full Basel III CCR charge is the sum of:
  - The "classic" CCR charge based on "outstanding EAD", i.e. EAD net of incurred CVA. If the firm is IMM, then this is the maximum of the portfolio-level charges based on current and stressed parameters. For advanced firms, effective maturities are capped at 1 year in the Basel formula if MtM effects of downgrades are already reflected in the VaR
  - The CVA charge. For firms with both IMM and specific risk VaR approval, this is 3 times the current VaR plus 3 times the stressed VaR (with consistent stress periods for spreads and exposures). For all other firms, this is the standardised CVA charge

Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

The views expressed in this presentation are those of the presenter.