

# IBM Risk Yönetimi Etkinliđi



## Gündem

- |               |  |
|---------------|--|
| 09:30 - 09:40 | Açılış Konuşması,<br>Gökhan Nalbantođlu, Yazılım Grubu Ülke Müdürü |
| 09:40 - 10:00 | CROs Perspective<br>Ebru Ogan Knottnerus, Garanti CRO              |
| 10:00 - 10:45 | Towards active management of counterparty credit risk with CVA     |
| 10:45 - 11:00 | Kahve Arası  |
| 11:00 - 12:00 | Exploring the Liquidity risk management under the Basel III accord |
| 12:00 - 12:15 | Challenges and Trends of implementing risk solutions               |

Theodoros Stampoulis  
WW Functional Leader – Sell Side Analytics, Business Analytics  
Date

# Active Management of Counterparty Credit Risk



## Safe Harbor Statement

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# Agenda

1. Introduction
2. Credit Valuation Adjustment (CVA)
3. CVA Capital Charges in Basel III

## Counterparty Risk is Changing

### Before the credit crisis

- Most counterparty risk situations were rather unilateral
  - The “too big too fail” concept obscured counterparty risk
  - Many institutions see their counterparty as being risk-free (at least from their point of view)
  - Credit spreads of banks just a few bps
  - Collateral agreements often one-sided or heavily skewed (independent amounts etc)
- Counterparty risk was the focus of mainly large global banks (1st tier)
- Wrong-way risk was a concept rather than a reality
- No-one had ever heard of DVA

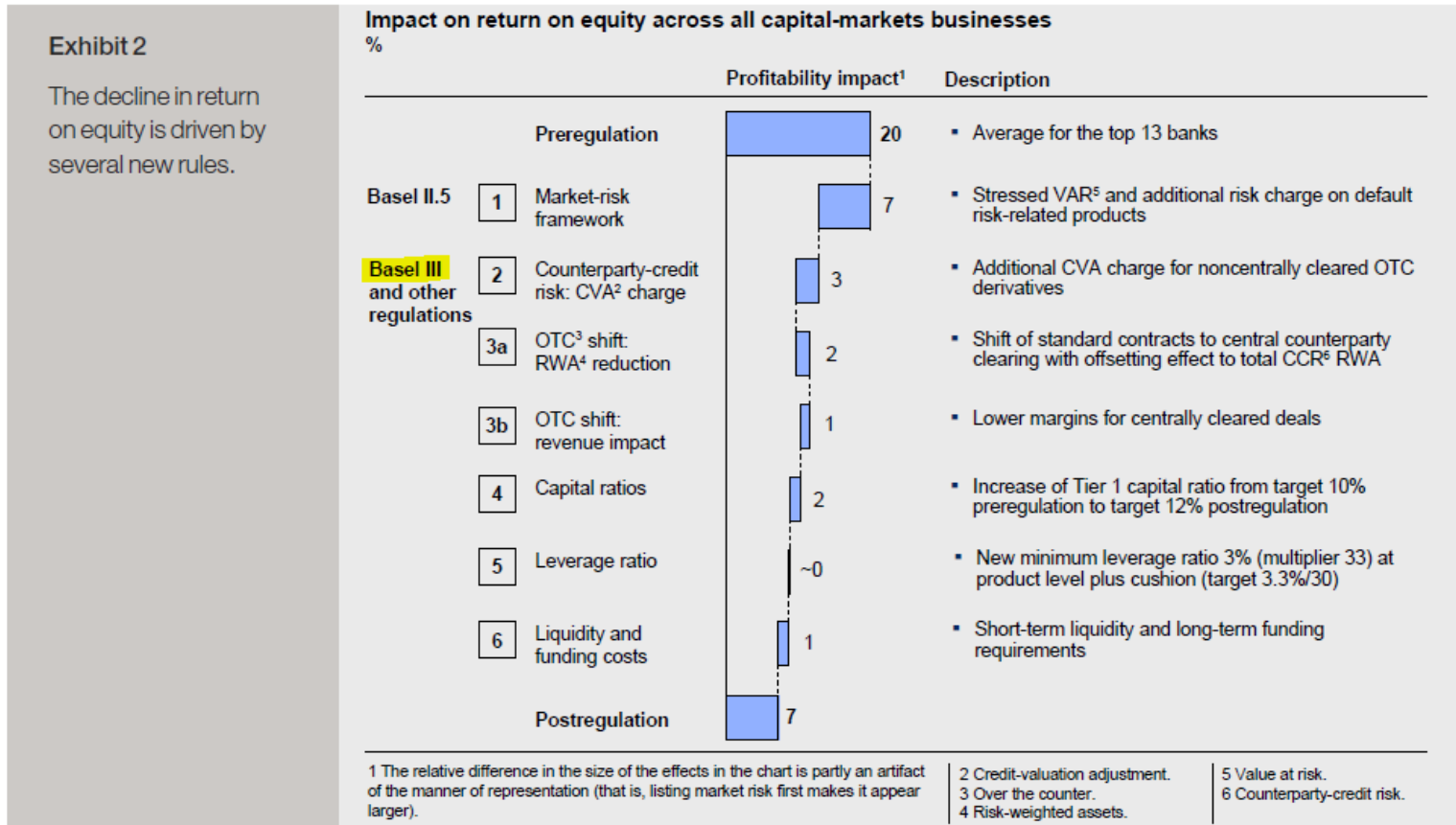
# Counterparty Risk is Changing

## After the credit crisis

- “Too big to fail” illusion is shattered
  - Lehman
  - Pseudo-bankruptcies (saved only by last-ditch rescues) during the credit crisis (Bear Stearns, AIG, Fannie Mae, Freddie Mac, Merrill Lynch, Royal Bank of Scotland)
- Every counterparty risk situation is bilateral
  - CVA and DVA
  - Collateral
  - Central counterparties
- Collateral Management
  - Moved from Back office to Front office process
- Wrong-way risk is suddenly everywhere
  - Massive problems arising from credit derivatives products

# Market Trends & Impacting Events

The pre-regulation ROE of top banks is 20%, and this is expected to drop down to 7% post-regulation with Basel III. With smarter risk management across six main categories, banks could return ROE to 14%<sup>1</sup>



## 1) Day of reckoning: New regulation and its impact on capital-markets businesses' McKinsey & Company

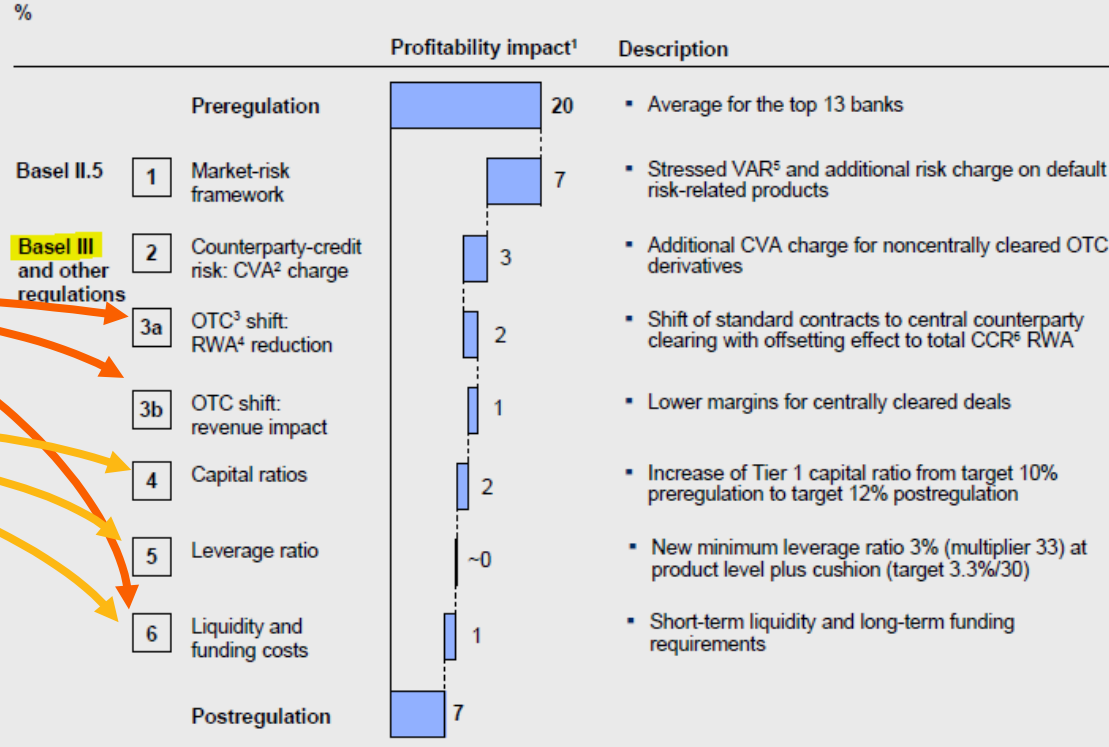
# Market Trends & Impacting Events

Through a coordinated approach to managing market, credit, and liquidity risk, firms can reduce the Basel III burden on profitability

Exhibit 2

The decline in return on equity is driven by several new rules.

## Impact on return on equity across all capital-markets businesses



1 The relative difference in the size of the effects in the chart is partly an artifact of the manner of representation (that is, listing market risk first makes it appear larger).  
 2 Credit-valuation adjustment.  
 3 Over the counter.  
 4 Risk-weighted assets.  
 5 Value at risk.  
 6 Counterparty-credit risk.

*Market Risk*  
*Counterparty credit Risk*  
*Liquidity Risk*  
*New Basel Regulatory Capital requirements*

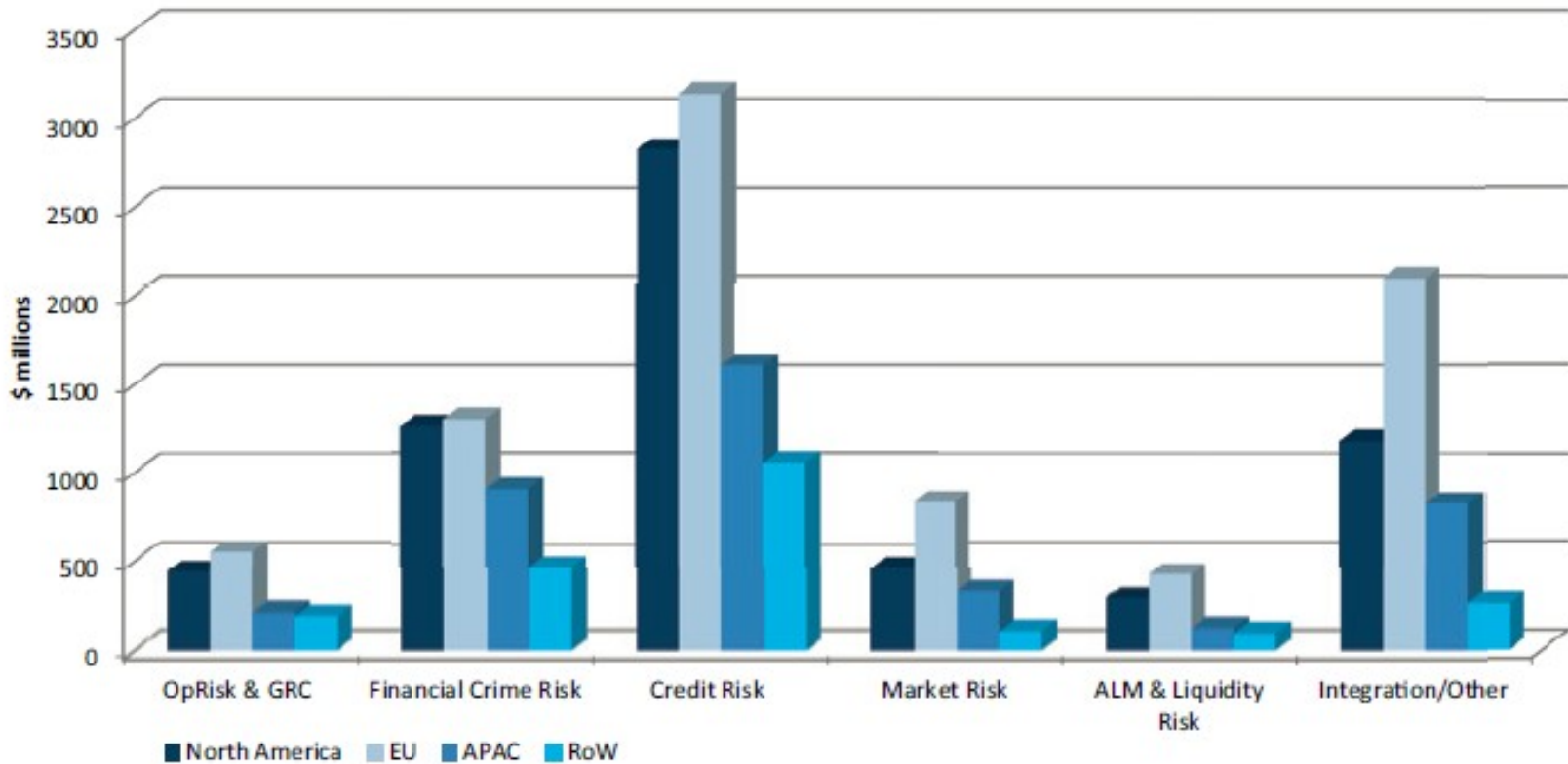
1) Day of reckoning: New regulation and its impact on capital-markets businesses' McKinsey & Company, Sep 2011



## Market Trends & Impacting Events

Expect that regional spend will follow 2012, for credit risk - over half of spend will be within the EU and North America

Figure 2: Risk IT Expenditure by Region 2012



Source: Chartis Global Risk IT Expenditure 2011  
<http://www.chartis-research.com/research/reports/global-risk-it-expenditure-2011>

## New Business Reality

### **Considerable long-term pressure on earnings potential**

- Higher risk based capital charges combined with higher quality standards for capital
- Significantly tightened operational constraints and strengthened qualitative criteria

**Therefore banks are focusing on the efficient use of capital and full risk based pricing**

*CVA is essential in evolving firms' risk and management culture, enabling strategic change*

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## Counterparty Credit Risk and CVA Pricing

CCR is the risk that the counterparty to a transaction could default before the final settlement of the transaction's cash flows. An economic loss would occur if the transactions or portfolio of transactions with the counterparty has a positive economic value at the time of default.

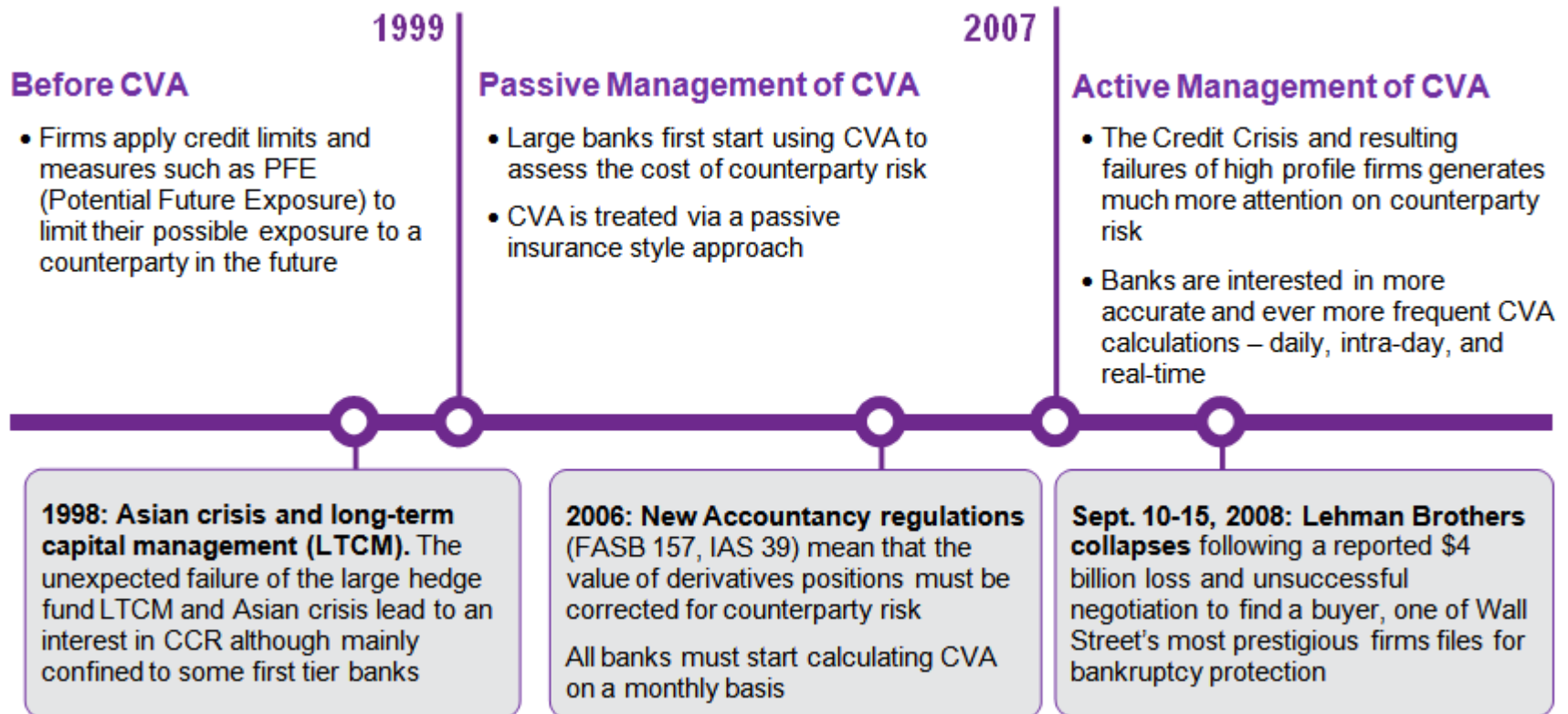
Definition from Basel II document, Annex 4, 2A, 2G.

### CVA: adjusting the market value of financial instruments for CCR

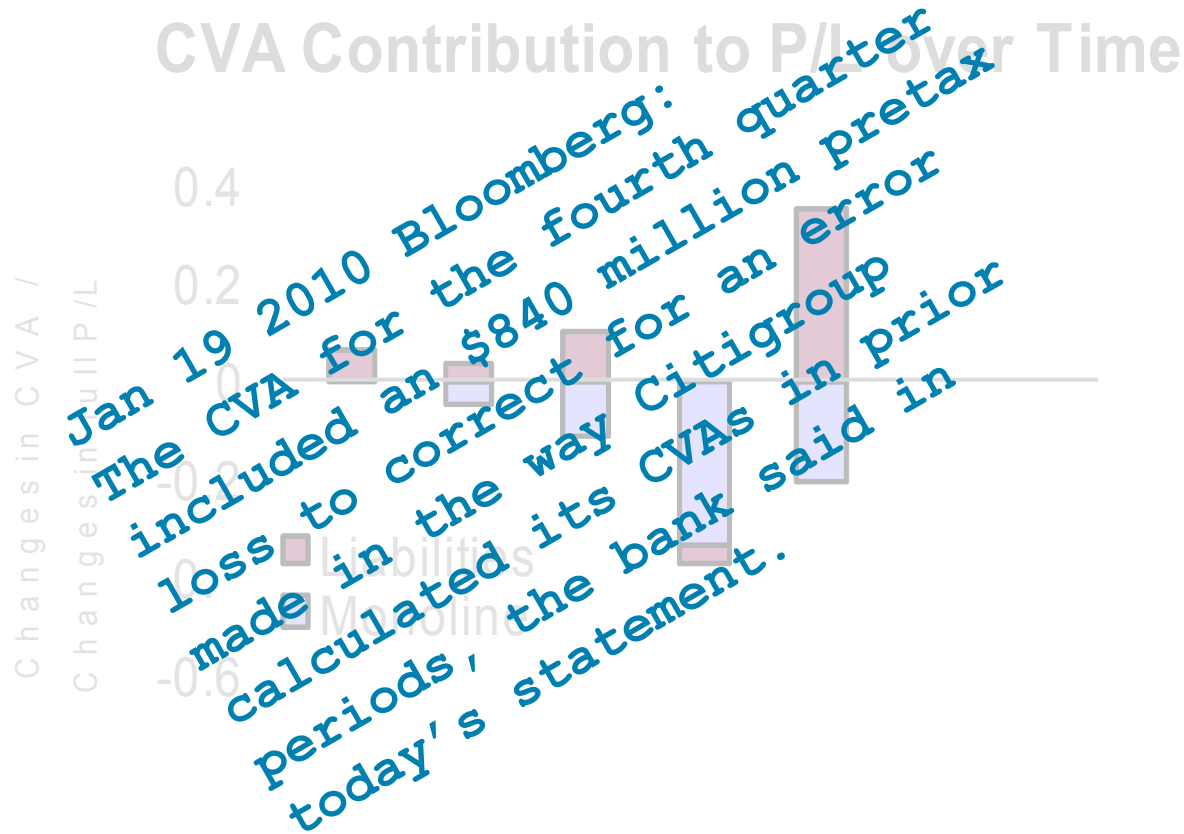
- Unilateral CVA considers defaults of the counterparty
- Bilateral CVA considers defaults of both the risk taker and the counterparty
- In theory, counterparties should agree on the value of a position adjusted with bilateral CVA

## History and current practice

- Rapid transition from passive to **active** management of CCR
- Usually implemented by setting up a CVA Desk
- Ever more accurate and frequent calculations: daily, intra-day, real-time



# Does CVA matter?



## CVA directly impacts profits

### Citigroup Q3 2011 results

**Securities and Banking revenues** grew 20% from the prior year period to \$6.7 billion due to the **\$1.9 billion of CVA recorded in the quarter.**

Excluding CVA, *Securities and Banking* revenues were down 12% to \$4.8 billion reflecting lower results in Fixed Income Markets, Equities and Investment Banking, partially offset by increased revenues in Lending.

**Fixed Income revenues** of \$3.8 billion in the third quarter 2011 **included \$1.5 billion of CVA.**

Excluding CVA, Fixed Income revenues were \$2.3 billion, 33% below the prior year period.

**Equity Markets revenues** of \$634 million in the third quarter **included \$345 million of CVA.**

Excluding CVA, Equity revenues fell 73% year-over-year to \$289 million.

**JPMorgan Chase Reports Third-Quarter 2011 Net Income of \$4.3 Billion, or \$1.02 Per Share, on Revenue of \$24.4 Billion**

### **Discussion of Results:**

Net revenue included a **\$1.9 billion gain from debit valuation adjustments (“DVA”)** on certain structured and derivative liabilities, resulting from the widening of the Firm’s credit spreads. **This was partially offset by a \$691 million net loss, including hedges, from credit valuation adjustments (“CVA”)** on derivative assets within Credit Portfolio, due to the widening of credit spreads for the Firm’s counterparties.

## Credit Value Adjustment (CVA)

- CVA is the price of counterparty risk (expected loss)
- We have to separate valuation of each derivative (instrument level) and CVA (netting set level)

Exposure with Credit Risk = Exposure without Credit Risk - CVA

$$CVA \approx \text{Spread} \times \text{EPE}$$

How much we expect to lose

Recovery in the  
event of default

$LGD$

Probability of  
Counterparty Default

$Q(T_{i-1} < \tau \leq T_i)$

Discount  
Factor

$D(t, T_i)$

Exposure  
Measure

$Exp(T_i)$

$$CVA = LGD \cdot \sum Q(T_{i-1} < \tau \leq T_i) \cdot E_t [D(t, T_i) Exp(T_i)]$$

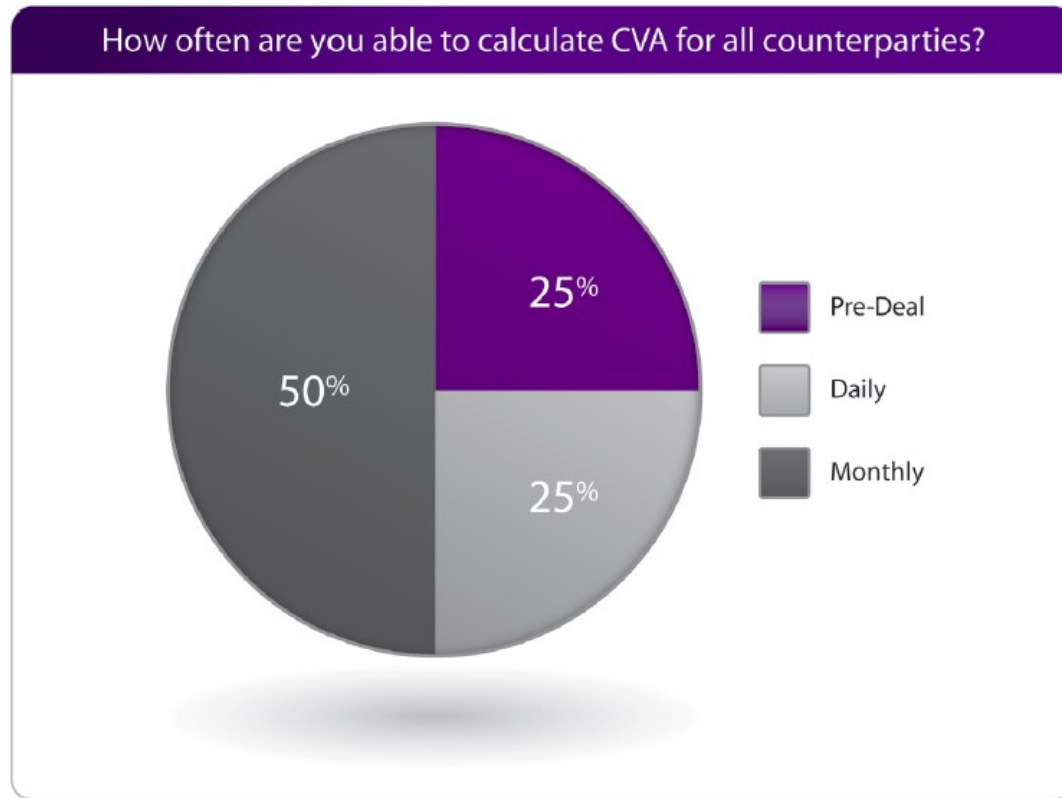


## Why is CVA so complex?

- Calculating the CVA of a derivative is always more complex than pricing the derivative itself
  - e.g. CVA of a swap involves volatility but pricing the swap itself doesn't
- Must account for
  - Complexities of the trade (cash flows, exercises, resets, ...) and market variables
  - Correlations between market variables
  - Default probability and recovery value (often more art than science)
  - Netting (causes exposure to be reduced)
  - Collateral agreements (as above)
  - Wrong-way risk (credit derivatives in particular)

## Current practice: in transition to active management

Of the firms surveyed, 50% calculate CVA monthly, 25% daily, and 25% in real time



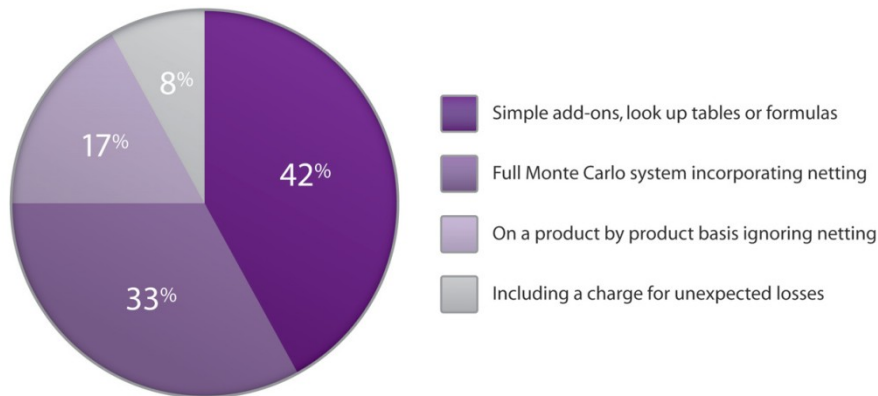
Source: Credit Value Adjustment: and the changing environment for pricing and managing counterparty risk, Algorithmics, December 2009

## Current practice: Incremental CVA at deal time

Pre Credit Crisis: Firms that charged CVA were often at a pricing disadvantage relative to firms that did not.

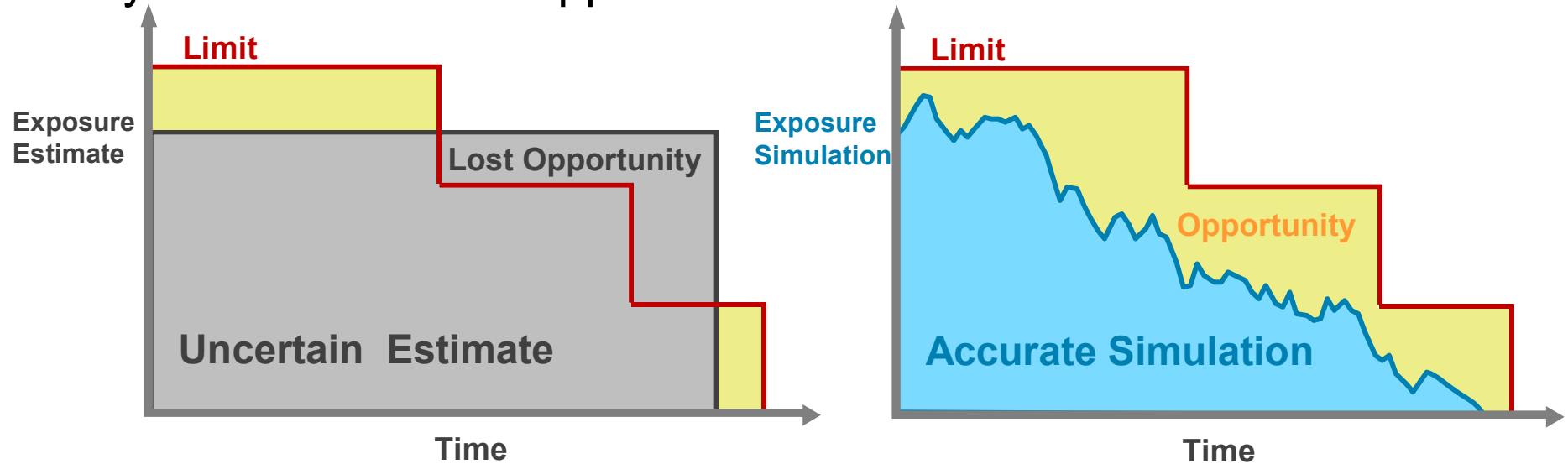
Post Credit Crisis: Firms that charge CVA on an incremental basis are a competitive advantage vs firms that cannot.

### How do you achieve intra-day calculation of pre-deal CVA?



Source: Credit Value Adjustment: and the changing environment for pricing and managing counterparty risk, Algorithmics, December 2009

## Why use a simulation approach?



### Why banks are looking for new risk management solutions

#### Need to keep ahead of regulators

- Seeking enterprise level analysis that can aggregate exposures across existing risk silos and calculate total risk, whereas legacy risk systems may calculate exposure within individual business lines
- Asking banks to handle increasing volumes or new exotic financial instruments (i.e. CDS/CDO)
- Banks want to qualify for incentives (e.g. Basel III trading book regulatory capital is expected to triple for many banks – and applying more accurate models and approaches within regulatory reporting can qualify a bank for reduced capital requirements)

#### Need to maintain a competitive edge in the market

- Want to improve pricing on trades with pre-deal analysis that includes CVA calculations. This requires systems that are capable of real-time results, where most legacy systems are designed for batch output,

## Why use a simulation approach?

The Market Risk impacts on pricing will impact Credit Risk exposures because valuations in some scenarios will increase the size of the exposure and the likelihood of counterparty default

Example risk factors

Interest Rates

Spreads

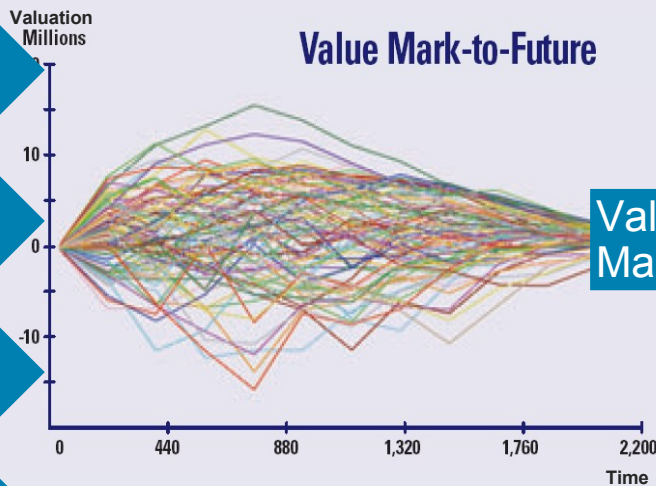
Equity values

Foreign exchange rates

Commodity prices

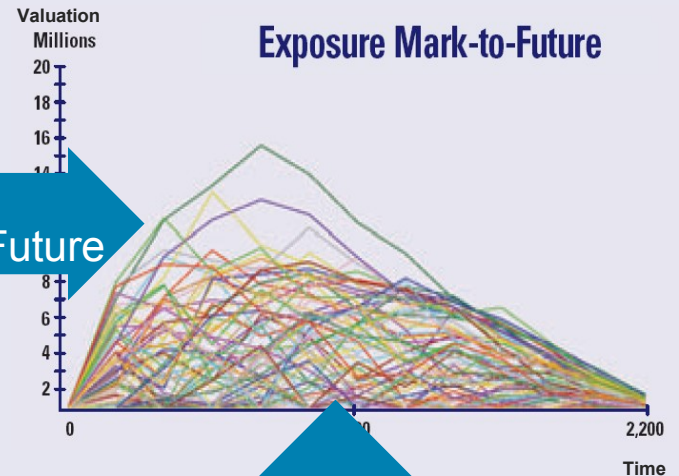
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### Market Risk simulation through time



Value Mark-to-Future

### Credit Risk simulation through time



Netting and collateral

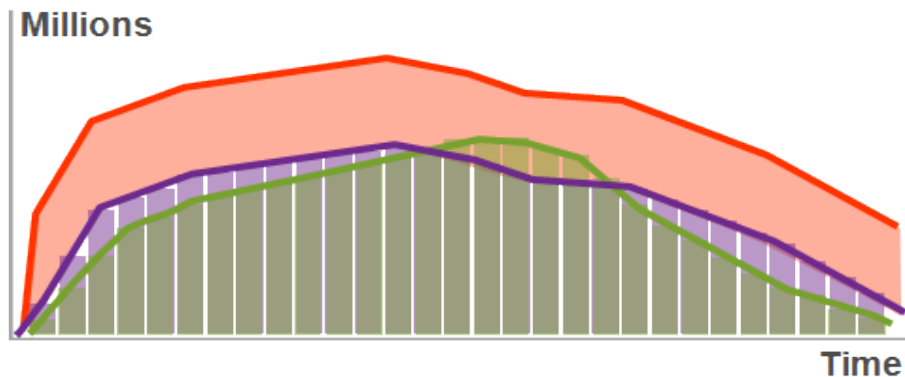
Market valuations impact Credit risks

Credit risks are mitigated by netting and collateral because both help to reduce the amount of money a bank can lose in the event of a counterparty default

## Pre-deal CVA: Why use a simulation approach?

Simulation approaches enable risk reducing trades to be priced more competitively than risk increasing trades.

	95% Peak Exposure	Unilateral CVA	
<b>End-of-Day</b>			
Counterparty Portfolio	\$50M	\$100K	
<b>Pre-deal</b>			
Add-on measure	\$2.5M	\$5K	Highly conservative additive estimate of exposure and CVA
Monte Carlo Simulation	\$1M	\$2K	Less conservative approach to measure exposure and CVA
Incremental Monte Carlo simulation	(\$2.5M)	(\$5K)	Most accurate measure capturing diversification, netting and collateral



“If we are able to measure our counterparty risk more accurately, we will be able to use our credit lines and capital more efficiently. This will allow us to do more business with the same or lower limits, as our current conservative methodologies constrain the business and may overstate exposure. **And because we can understand the CVA in advance of doing a trade, it lets us be sharper in our prices.**”<sup>1</sup>

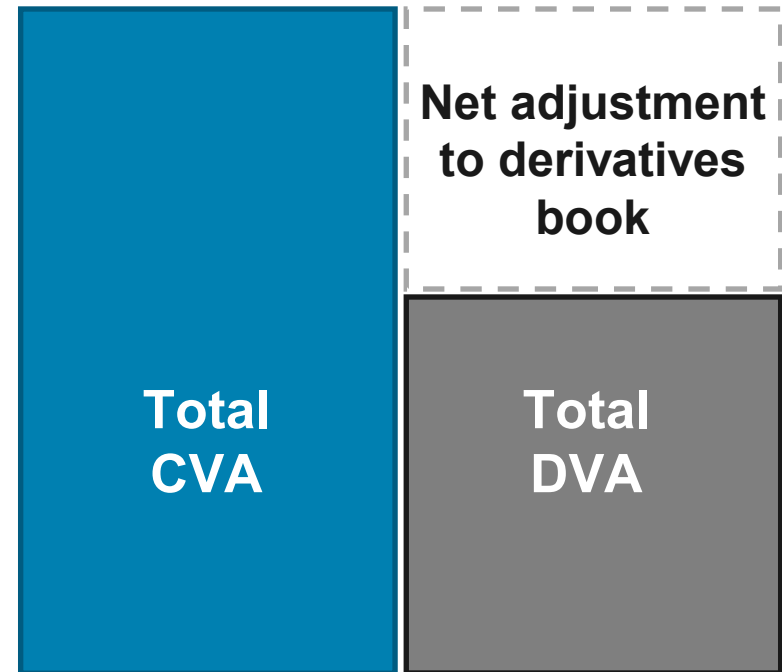
*Mark Engel, managing director and head of global analytics and financial engineering, global capital markets, Scotiabank*

Risk Magazine, “Exposing counterparty risk exposure”, March 2010  
<http://www.algorithmics.com/EN/media/pdfs/Algo-NF0310-RM-Exposure.pdf>

## Debt Value Adjustment (DVA)

In a world that includes DVA, there is symmetry with CCR adjusted prices being equal and opposite and therefore more risky parties pay less risky parties in order to trade with them.

- CVA
  - Expected positive exposure (EPE)
  - Counterparty default probability
  - Counterparty recovery rate
  - Represents a cost
- DVA
  - Expected negative exposure
  - Own default probability
  - Own recovery rate
  - Represents a gain



**BCVA= Counterparty Spread x EPE – Own Spread x ENE & if EPE = ENE**

**BCVA= EPE (Spread – Own spread)**

## Wrong-Way Risk

- It is typical to assume independence between
  - Default probability of counterparty
  - Exposure at default
- But in reality this is often wrong
  - Buying out of the money put options
  - Buying CDS protection
  - FX products with local currencies
- Wrong way risk challenges
  - Correlation and dependency are not the same thing
  - Wrong-way risk might be quite subtle / indirect
  - Wrong-way risk can be massive (mono-lines)



## A Realistic Example: Why wrong way risk matters

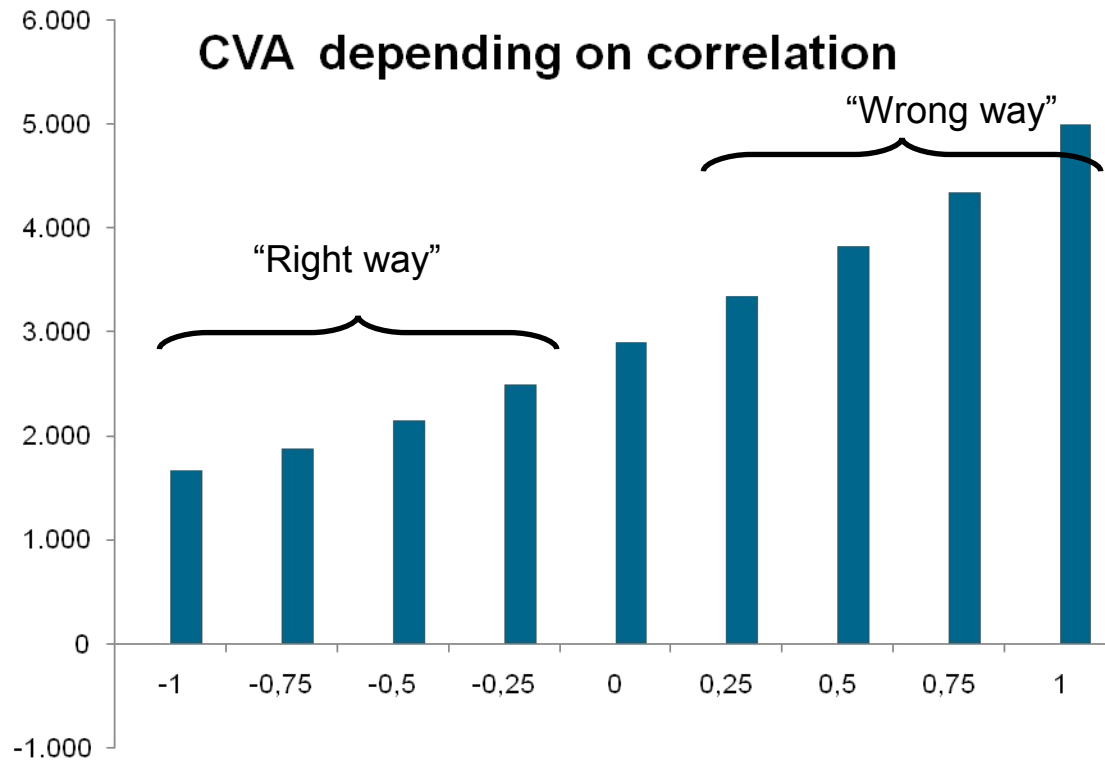
### Corporate Portfolio

- **150 Swaps:** one-directional (long fixed/short floating), all denominated in CAD
- **Maturities:** min = 2wks, max = 10yrs
- **Market factors:** Short-rate calibrated to swaption vols
- **Credit Modeling:** No netting, no collateral
- **Simulation time steps:** Quarterly to 10yrs (total of 40)

# A Realistic Example: Why wrong way risk matters

## Corporate Portfolio

CVA goes from \$1.7M - \$5M, depending on right or wrong way risk



## CVA Desk: Active Management of CVA

### Requirements to mark-to-market CVA in all derivatives positions

- CVA is not additive across positions (diversification effect due to netting)

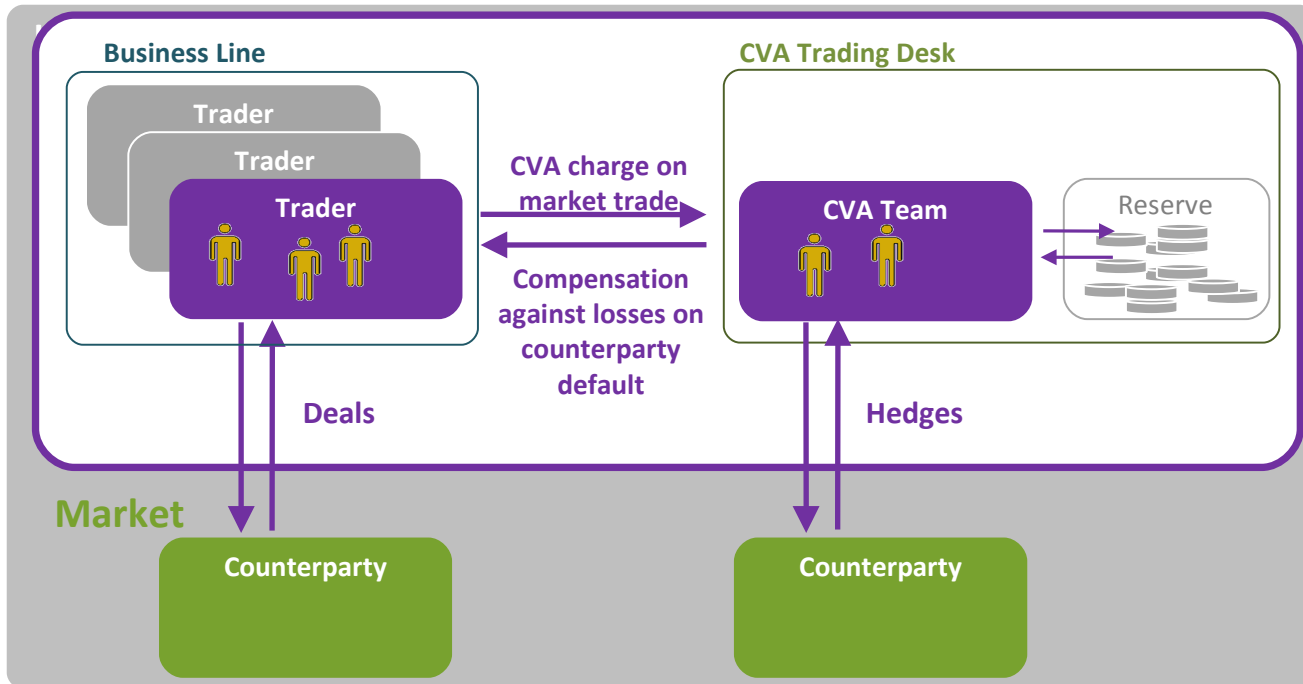
### This creates two key problems

- How to allocate and charge the CVA across businesses / trading desks
- How to reduce the volatility of CVA due to market movements (specifically credit spreads and volatility)

### Creates the need for a specialised group to tackle this coherently across all business groups

- Cross asset focus (centralised approach) trading desk
- Every derivative constitutes some sort of complex loan transaction
- Often tied into a central credit treasury to transfer price credit risk capital given CVA

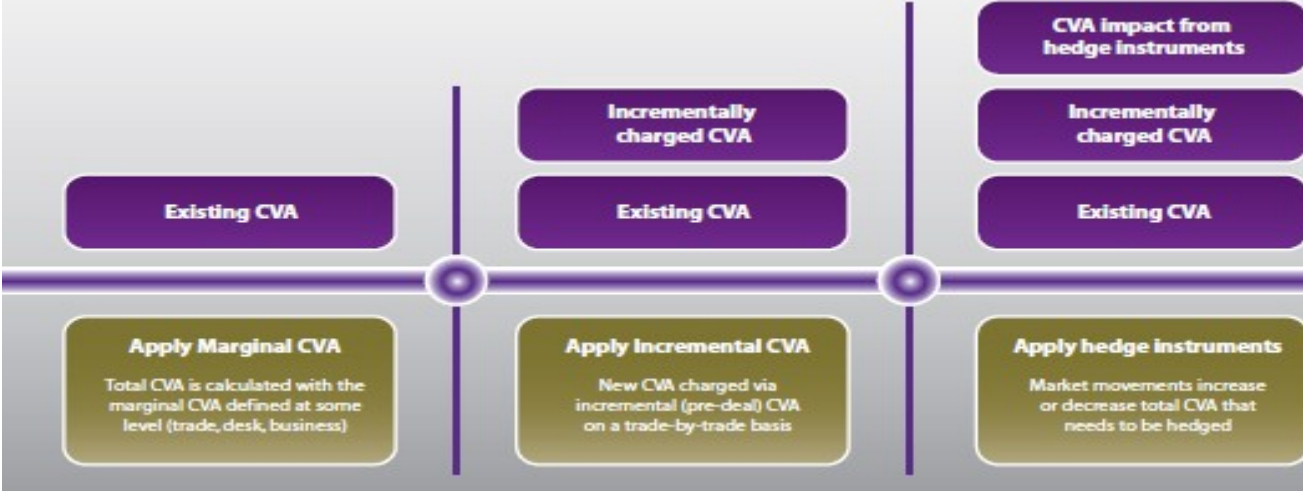
# Managing a CVA Desk



1) Distribute CVA charges on existing CCR

2) Charge CVA per each new trade

3) Hedge against market moves in total CVA



## CVA Desk: Key Challenges

### Positioning of CVA desk

- Centralised or decentralised
- Profit centre or utility
- Hedging policy
  - Basis, proxies, liquidity, market gaps
  - Overtrading due to unstable sensitivities
- Divergence between business practice and regulation (Basel III)

### DVA (Debt Value Adjustment)

- Should you monetise your own default?
- Link to funding

### Wrong way risk

- How to minimize wrong-way risk
- How to create “right way” exposures

Tight operational integration and fast analytics are both essential

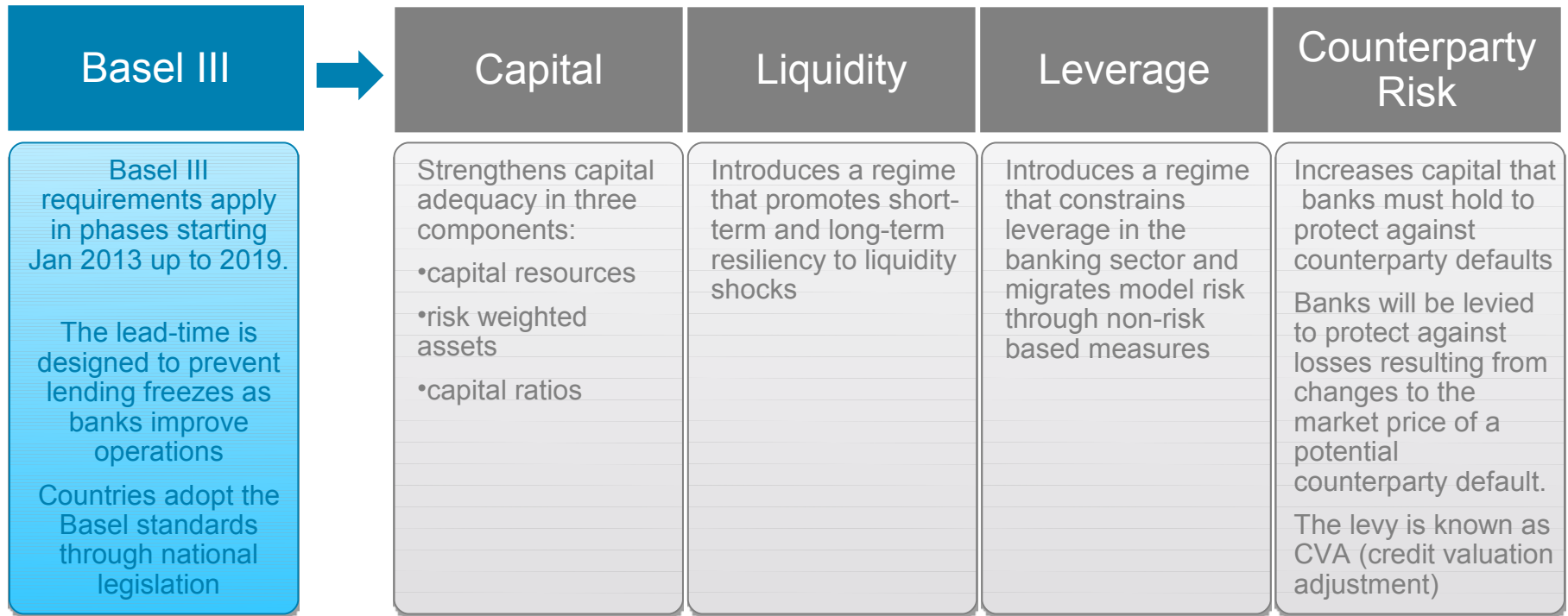
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1. Introduction
2. Credit Valuation Adjustment (CVA)
3. CVA Capital Charges in Basel III
4. Summary

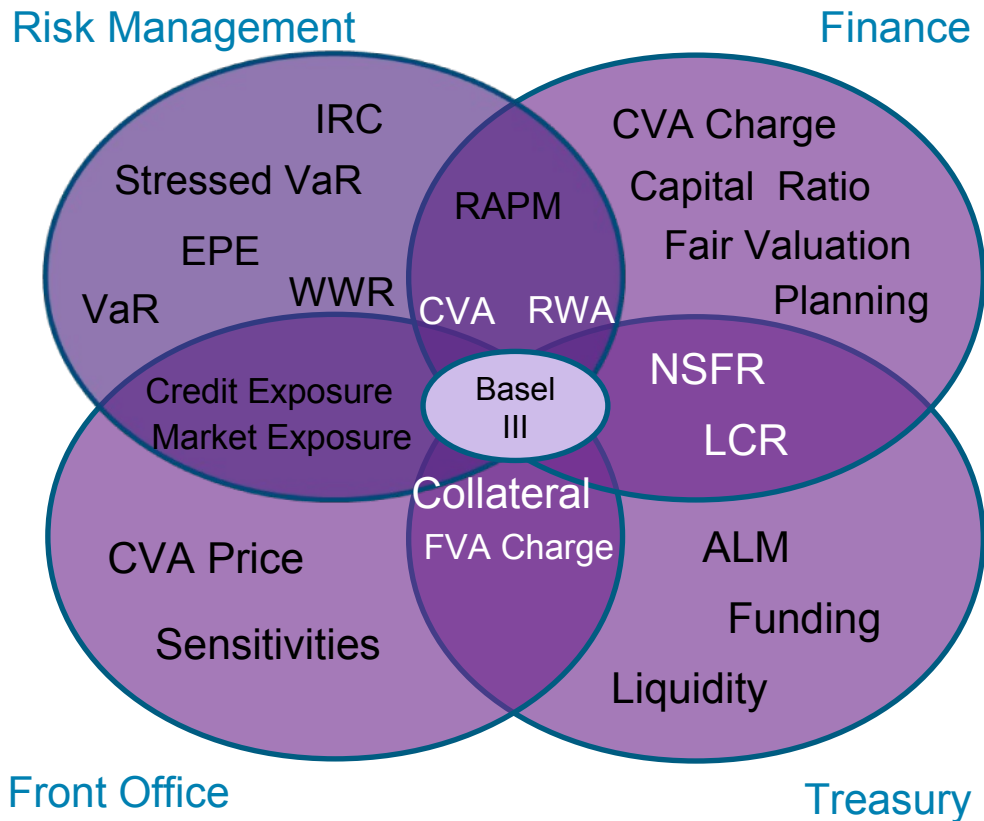
# Banks need risk systems that can keep pace with emerging regulation like Basel III, and regional acts Dodd-Frank or EMIR

These regulatory reforms are designed to prevent banks from taking on excessive risk and damaging global financial markets

Most banks are making reforms to Basel III standards, because Basel III is an international accord that is adopted through national legislation.



# Basel III impacts enterprise-wide

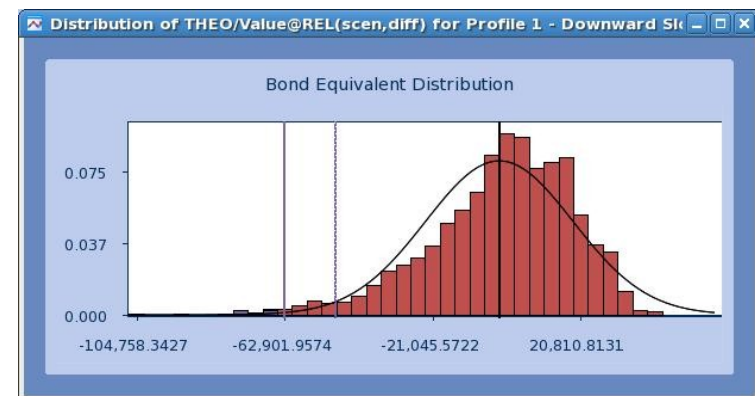
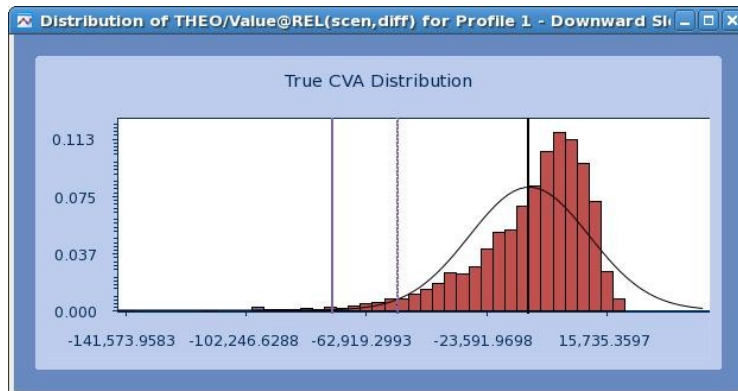


- **Stressed EPE.** Banks using the internal models method (IMM) must calculate exposures using data that includes a period of stressed market conditions .
- **Wrong way risk.** Banks must identify exposures that give rise to a greater degree of “general” wrong-way risk and must assume a higher exposure for transactions with “specific” wrong way risk.
- **Systemic risk.** Banks must apply a correlation multiplier of 1.25 to all exposures to regulated financial firms with assets of at least \$100 billion and to all exposures to unregulated financial firms.
- **Collateral.** For certain transactions, the “margin period of risk” will double to 20 days. No benefit can be achieved from downgrade triggers (e.g. receiving more collateral if the rating of a counterparty deteriorates). In addition, additional haircuts for certain securities and the liquidity coverage ratio will limit the reuse of collateral and encourage the use of cash collateral.
- **CVA VAR.** Banks must hold additional capital to capture the volatility of CVA. This is in addition to the current rules that capitalize default risk.
- **Central counterparties.** A risk weighting of 2% will be given to exposures to a CCP which meets various rigorous conditions . Whilst this represents an increase (from zero) in capitalisation of CCP exposures, it is intended to incentivising the clearing of OTC derivatives through CCPs.



## CVA capital charges in Basel III

- Captures CVA risk due to credit spread volatility
  - Volatility due to DVA or market risk factors not included
  - Does not account for wrong-way or right way risks
  - Only recognizes hedges that are managed as such and that are
    - Single name CDS and contingent CDS)
    - index hedges (if basis risk is captured in model)
- Initial proposal of “bond equivalent approach” was problematic



Bond equivalent method overstates parallel shifts, understates twists

## Basel III Proposal – CVA capital charge

- Revised proposal (Dec 2010): CVA “VaR”

- For IMM banks with approved internal model for specific interest rate risk

$$CVA = (LGD_{MKT}) \cdot \sum_{i=1}^T \text{Max} \left( 0 ; \exp \left( -\frac{s_{i-1} \cdot t_{i-1}}{LGD_{MKT}} \right) - \exp \left( -\frac{s_i \cdot t_i}{LGD_{MKT}} \right) \right) \cdot \left( \frac{EE_{i-1} \cdot D_{i-1} + EE_i \cdot D_i}{2} \right)$$

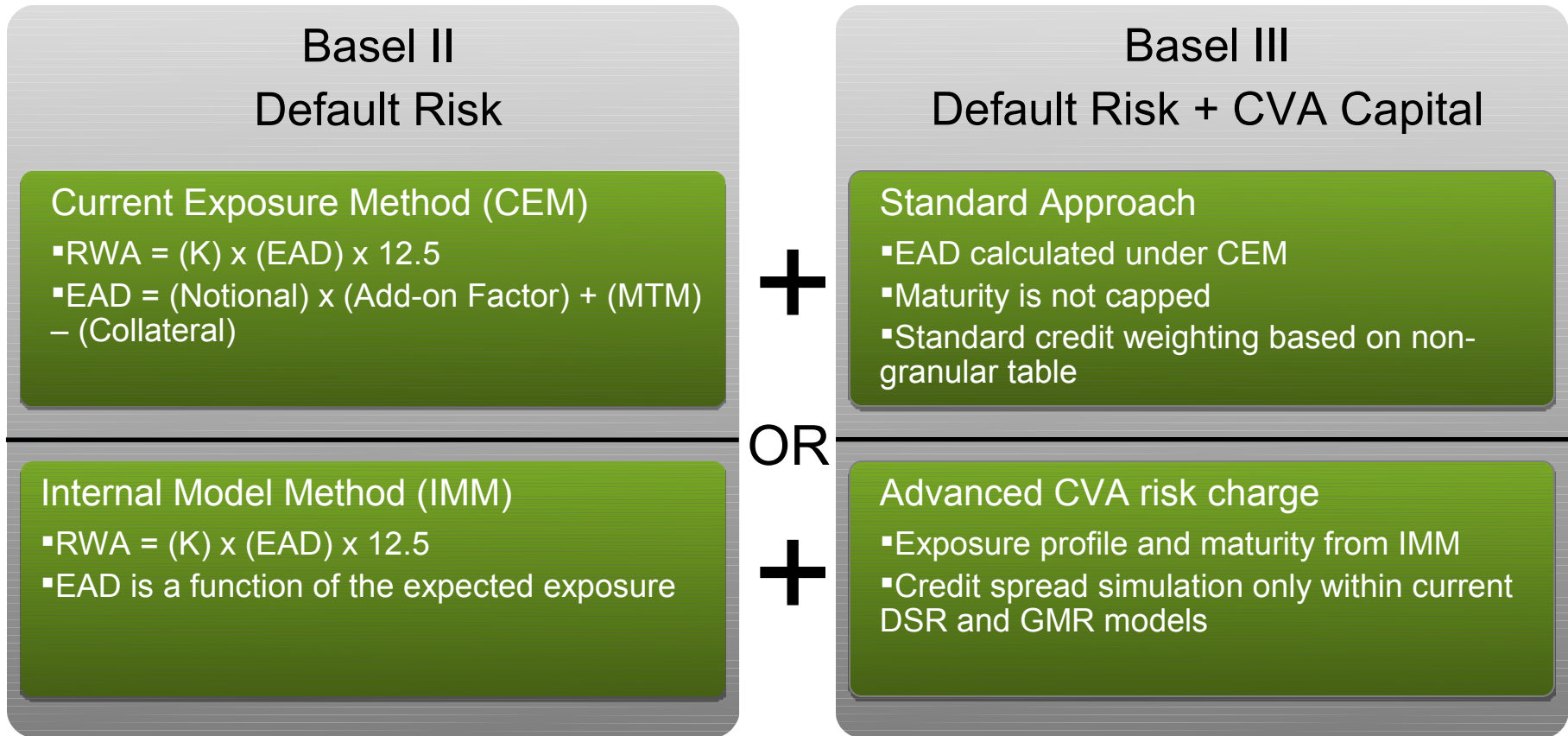
- First factor within sum approximates market implied marginal PD between  $t_{i-1}$  and  $t_i$
- Second factor captures regulatory expected exposure for same time interval

- This formula is then used directly in VaR model with full re-pricing
- Maturity adjustment related to effective EPE modified to avoid double-counting

- Challenges

- Calibration (e.g. market implied LGD)
- Divergence between business practice, accounting, and regulation
- Conceptual problems (see next slide)

# Banks can cushion BIS-3 capital increases via Internal Model Approval



Note: In order to apply Advanced CVA risk charge must have DSR and IMM approved by regulator

Basel III Capital charges are going up, if move to IMM, have potential to offset increased CVA Capital charges with Default Risk savings

## Overview of the IMM solution – What are the business benefits?

### Canadian Bank - Actual business outcomes to date

#### PFE

- *40%-60% reduction for the multiple phases of the project*
- *Reductions of 60% for Top 10 counterparty exposures*

#### Capital

- *IMM Default Charge – 43% reduction*
- *IMM CVA Charge – 22% reduction*

Questions?

