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Counterparty Credit Risk and CVA

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BankersAccuity, incorporating Bankers Almanac and Accuity, provides data solutions to banks and businesses worldwide, to facilitate compliance of transactions, AML screening and bank counterparty assessment.

BankersAccuity's Credit Risk is an online solution offering timely, quantitative and qualitative data on global banks. Providing comprehensive financial spreads, credit ratings and original financial statements, Credit Risk enables you to effectively assess and monitor counterparty performance.

Identify non-obvious risks by accessing contextual data including ownership information, board and key personnel, foreign branch network, proof of regulator and auditor.

Credit Risk ensures you to make a thorough and holistic risk-based decision when reviewing financial stability and overall lending risk.

Quick Poll Question

1. What is your experience around Counterparty Credit Risk and CVA?

    a. Novice
    b. Intermediate
    c. Advanced

Why CVA?

The Complexity of CVA

CVA VAR

Final Thoughts

Accounting Rules

- IFRS 13 (1st January 2013)
- CVA
  - "The entity shall include the effect of the entity's net exposure to the credit risk of that counterparty or the counterparty's net exposure to the credit risk of the entity in the fair value measurement when market participants would take into account any existing arrangements that mitigate credit risk exposure in the event of default"
- DVA
  - Non-performance risk "includes, but may not be limited to, an entity's own credit risk"
  - IFRS 13 requires DVA through the concept of exit price

Basel III Capital Requirements

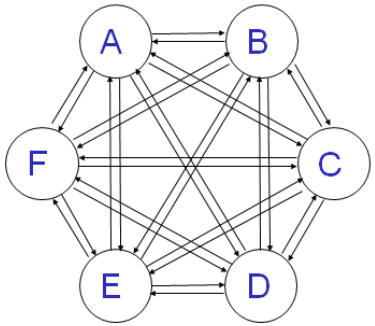
- BCBS Consultative document (December 2009)
  - "Roughly two-thirds of CCR losses were due to CVA losses and only about one-third were due to actual defaults. The current framework addresses CCR as a default and credit migration risk, but does not fully account for market value losses short of default."
- BCBS Basel III text
  - "Banks will be subject to a capital charge for potential mark-to-market losses (ie credit valuation adjustment – CVA – risk) associated with a deterioration in the credit worthiness of a counterparty."
- BCBS "Application of own credit risk adjustments to derivatives"
  - "the Basel Committee is of the view that all DVAs for derivatives should be fully deducted….."

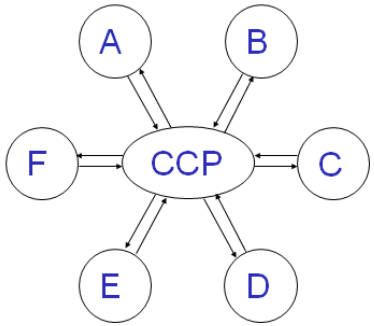
Different Versions of CVA

- A further problem in managing CVA is that there are three (at least) different CVA (and DVA) numbers
  - Accounting CVA - the official CVA for books and records
  - Trading desk CVA - the economic CVA as seen by the CVA trading desk
  - Regulatory CVA - the CVA as defined by regulatory capital requirements (Basel III)
- It is difficult (impossible) to align the three
  - In particular, aspects such as historical vs. risk-neutral calibrations, requirements to use stressed data, the alpha multiplier and historically calibrated IMM models drive regulatory CVA away

Impact of Regulation

- Basel II
  - A number of changes that will make quantification more complex and increase capital (stressed data, increased margin period of risk, wrong-way risk)
  - IMM approval more important due to expensive capital and misalignment of incentives
- CVA VAR
  - Basel 3 document (Dec 2009) recognises that two thirds of CCR losses may be mark-to-market (not default) related **– uncertainty of CVA is twice as important as CVA!**
  - Capital relief from hedging (only partial relief from indices) but no DVA
- Central counterparties
  - CVA disappears!
  - Relatively small capital charges to incentivise move to central clearing
  - What about CCP risks?





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CVA Computation

- Assumptions
  - No wrong way risk
  - No "self default"

$$CVA(t) = (1-R)\int_t^T EE(u)\,dPD_C(u)$$

Percentage recovery value if counterparty defaults

Expected exposure including discounting (how much we expect to lose) including discounting

Default probability (how likely is counterparty to default at this time)

CVA and Credit Exposure

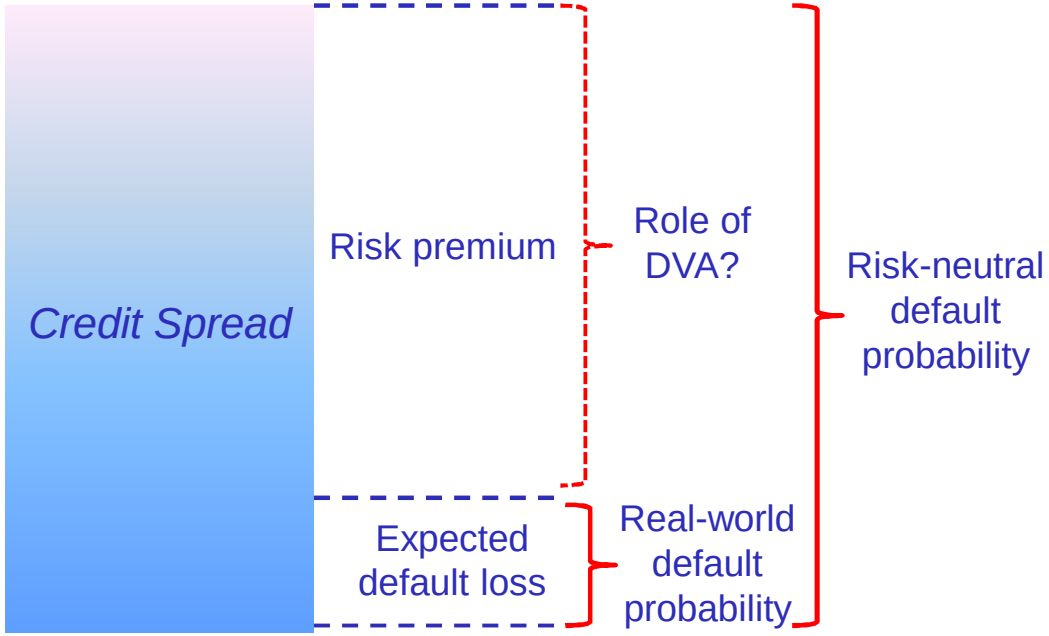
$$Exposure = \max(future\ value, 0)$$

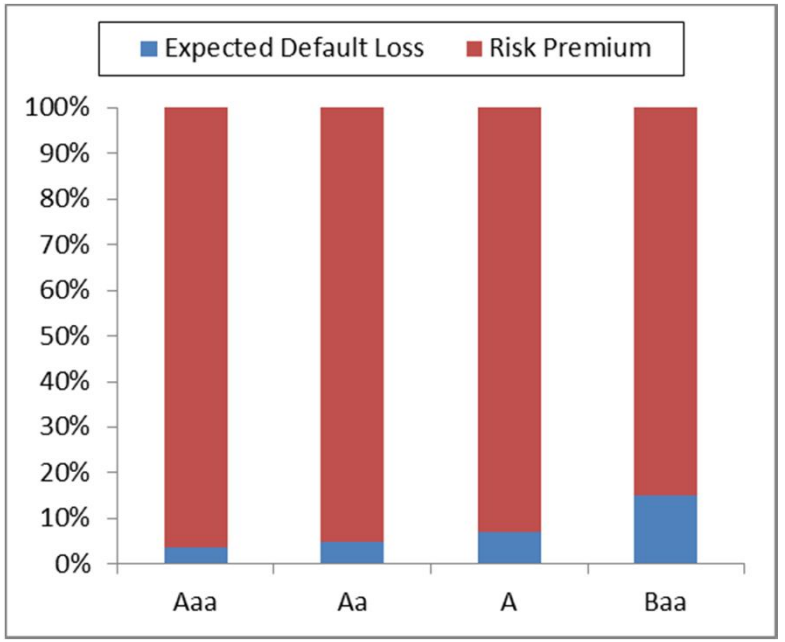
- Optionality
  - Exposure represents an option on the underlying future value
- Netting
  - Future value must be calculated at the portfolio level (dimensionality may be large)
  - Correlations are important
- Collateral
  - Impact of collateral on future value is quite subjective (e.g. margin period of risk)

- Quantifying exposure more complex than computing VAR (due to the longer time horizons involved)

CVA and Default Probability

- Using credit spreads (compared to historical default probabilities)
  - Resulting CVA will be many times higher (although DVA reduces this)
- But most credit spreads cannot be easily obtained
  - Mapping rules required and hedging not obvious





Quick Poll Question

2. Which of these most accurately describes DVA?

a. A completely normal and economic price adjustment, just like CVA
b. The single worst accounting standard ever
c. An slightly strange adjustment but one that a bank cannot avoid using
d. None of the above

Bilateral CVA Formula

- Considering an institutions own default (this formula assumes independent of defaults)

$$BCVA = (1-R_C)\int_0^T \underbrace{EE(u)}_{\text{Expected exposure}}\underbrace{\left[1-PD_I(u)\right]}_{\text{Probability we haven't yet defaulted}}\underbrace{dPD_C(u)}_{\text{Probability counterparty defaults}} \quad \text{CVA}$$

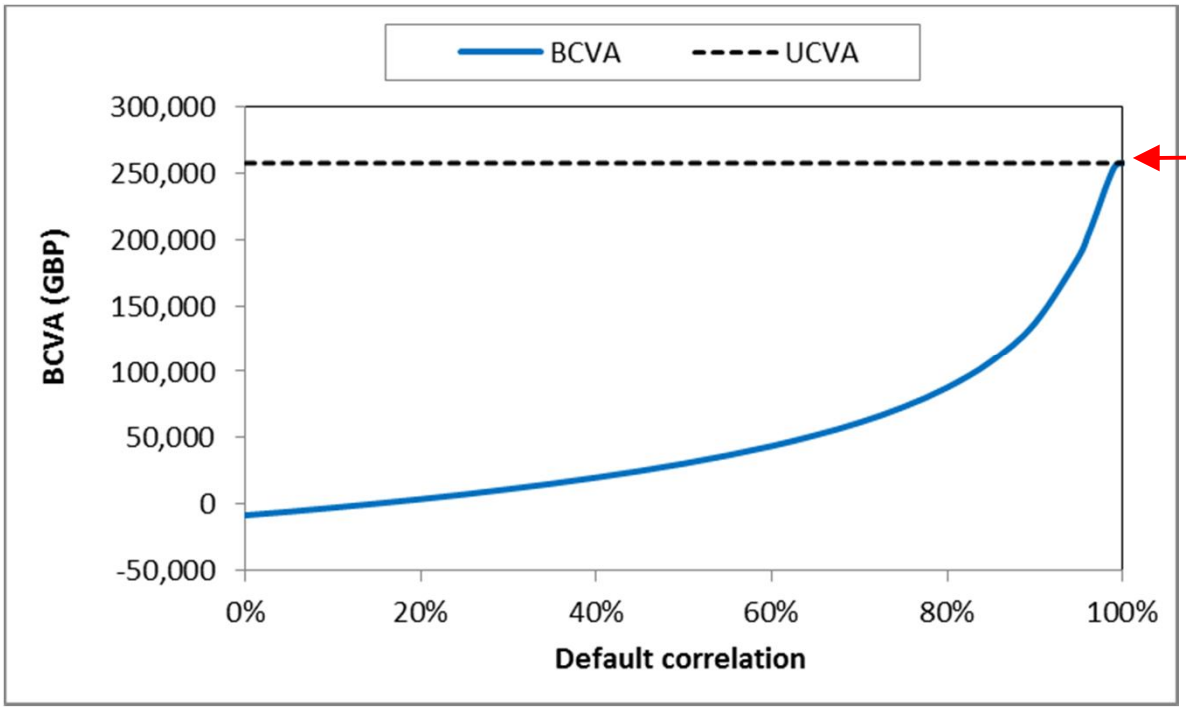
$$-(1-R_I)\int_0^T \underbrace{NEE(u)}_{\text{Negative expected exposure}}\underbrace{\left[1-PD_C(u)\right]}_{\text{Probability \textbf{counterparty} hasn't yet defaulted}}\underbrace{dPD_I(u)}_{\text{Probability \textbf{we} default}} \quad \text{DVA}$$

Bilateral CVA

- DVA has the impact of reducing BCVA

  CVA = 237,077, DVA = -245,077, BCVA = -8,791

- However, default correlation is also important



No DVA as we default second

Counterparty CDS = 500 bps

Own CDS = 250 bps

EE < NEE

Quick Poll Question

3. It is reasonable that BCVA should be strongly sensitive to default correlation ("First to default" effect)?

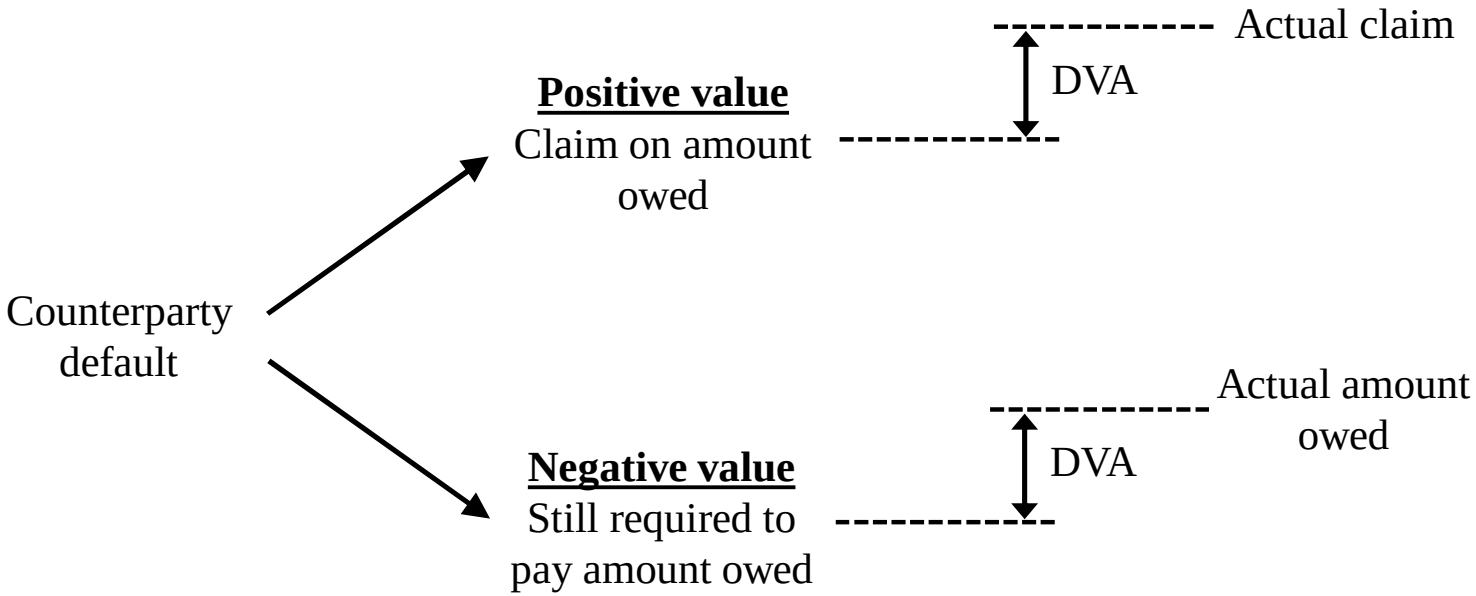
a. Yes
b. No

Closeout

- Closeout

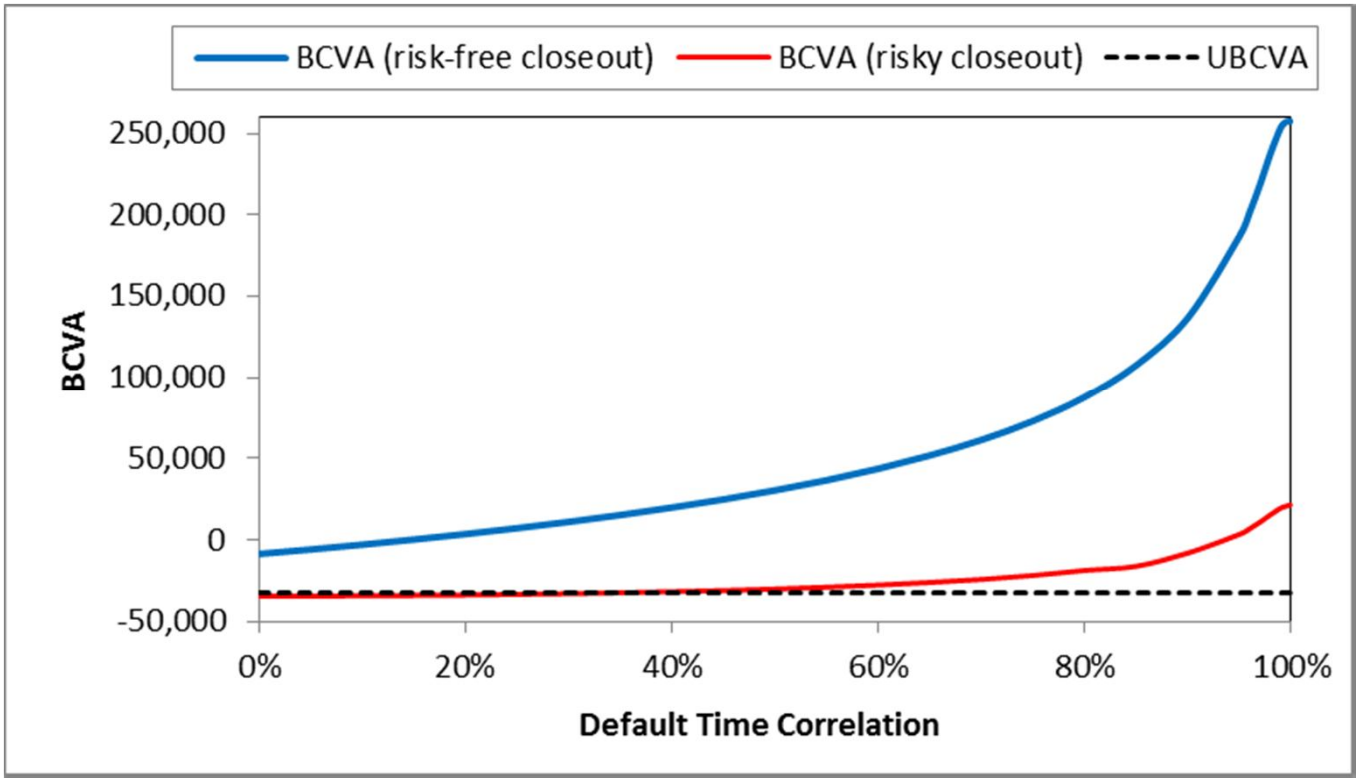
$$Exposure = \max(future\ value, 0)$$

  - Risk-free valuation is often used to define exposure
  - The reality is more complex (e.g. replacement costs)
  - ISDA supports a risky closeout (e.g. including CVA costs for replacement trade)
  - Even defining the payoff of CVA is difficult (self-referencing problem)



Impact of Risky Closeout Assumptions

- Sensitivity to default correlation is reduced
  - UBCVA gives good agreement with the accurate (and much more complex) result

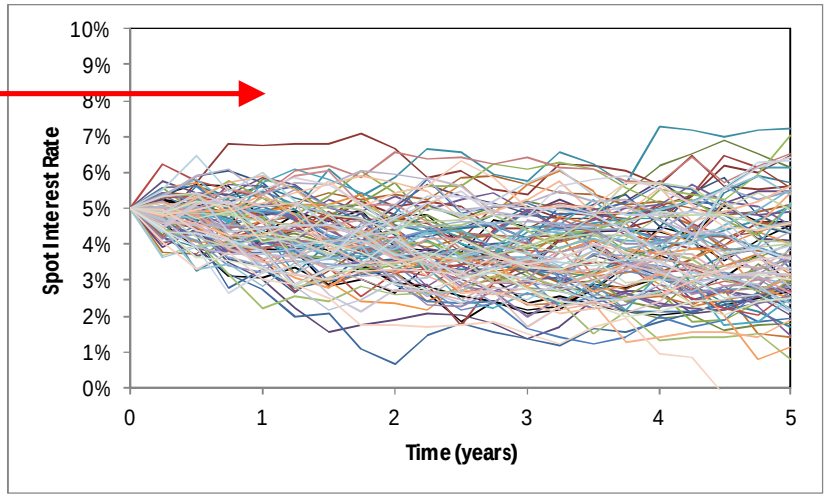


Wrong-Way Risk

- CVA computation typically assumes independence between default probability and exposure
  - But in reality this is often wrong (e.g. buying CDS protection)
- Empirical evidence of wrong-way risk
  - Duffee [1996] shows a clustering of corporate defaults during periods of falling interest rates (but institutions may be more likely to default when interest rates increase)
  - Levy and Levin [1999] show a devaluation of currencies linked to sovereign default
  - Credit derivatives – very clear relationship in crisis (e.g. monolines)
- Wrong way risk challenges
  - Correlation and dependency are not the same thing
  - Wrong-way risk might be quite subtle but very significant (e.g. monolines)
  - Wrong-way risk creates cross gamma problems when hedging

Dealing With Wrong-Way Risk

- General wrong way risk
  - Based on macroeconomic behaviour and unavoidable
  - Ideally needs to be incorporated into models tractably



- Specific wrong way risk
  - Based on extreme macroeconomic and also structural relationships
  - Sometimes dangerous to use naïve correlations
  - Often should be avoided (e.g. speculators)

Italy CDS Market, May 2011

Maturity	USD	EUR
1Y	50	35
2Y	73	57
3Y	96	63
4Y	118	78
5Y	131	91
7Y	137	97
10Y	146	103

Pricing CVA into Trades

- Banks have for some time priced CVA into trades
- How to stay competitive?
  - Use of historical (or blended) default probabilities
  - Include DVA (or some portion of DVA) in pricing to reduce charges
  - Ignore CVA for collateralized positions (avoid interbank CVA charges)
  - Ignore CVA for high quality counterparties
  - Ignore wrong-way risk (in all except the most toxic trades)
- Basel III will change this

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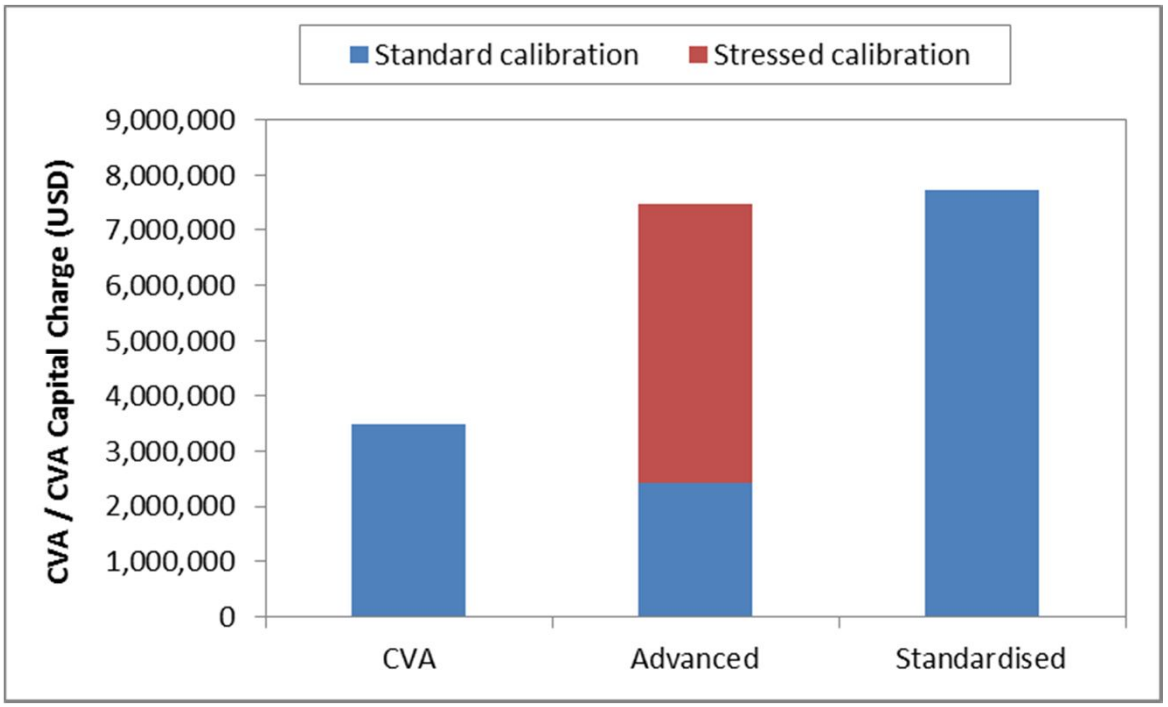
CVA VAR - Example*

- Size of CVA VAR (in this example)
  - Advanced CVA VAR (including stressed component) is larger than CVA
  - Can reduce CVA by using DVA but cannot apply DVA to CVA VAR



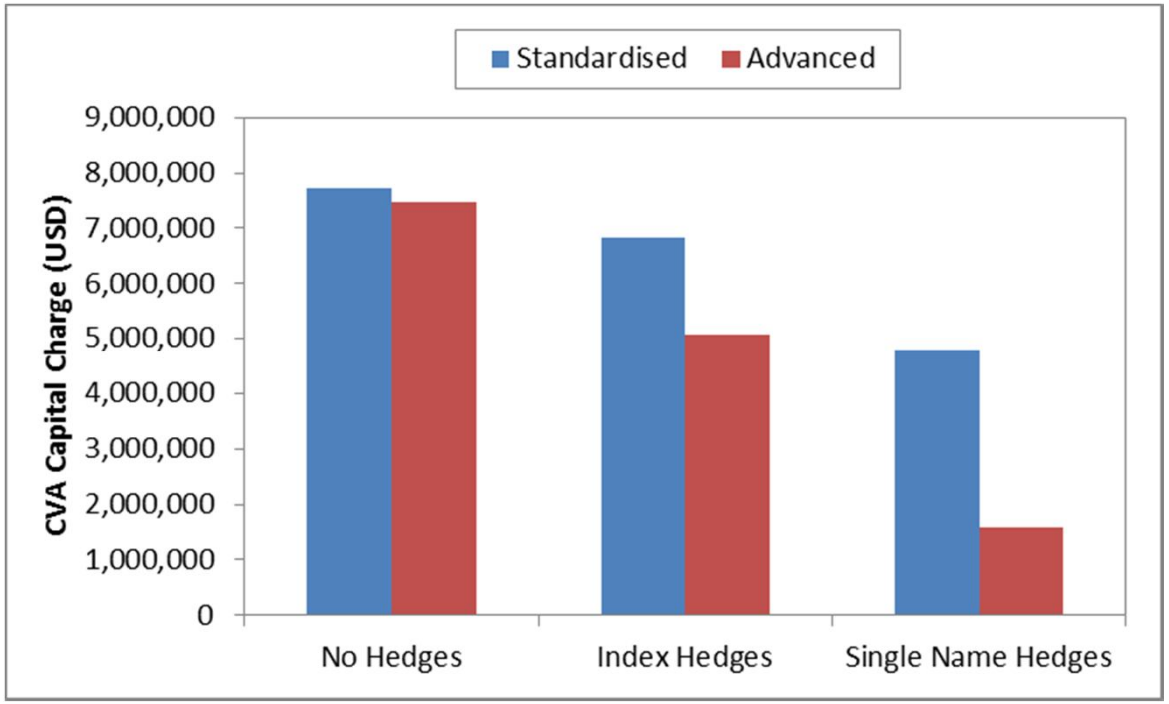
* 156 interest rate and FX trades with an average lifetime of 8-years with two different counterparties with credit spreads (and ratings) of 384 bps (double-B) and 56 bps (double A) provided by Quantifi (www.quantifisolutions.com)

CVA Capital Charge and Hedging

- Single name CDS
  - Full benefit in terms of CDS notional (not delta neutral hedge)
- Index CDS
  - Link to mapping used to determine credit spread
  - Basis must be accounted for in an index hedge, however *"If the basis is not reflected to the satisfaction of the supervisor, then the bank must reflect only 50% of the notional amount of index hedges in the VaR"*
  - Standardised approach gives 50% relief for index hedges implicitly (note this is potentially quite aggressive) $\sqrt{\sigma_i^2 + \sigma_s^2 - 2\rho\sigma_i\sigma_s} \approx \sigma\sqrt{2(1-\rho)}$
- Market risk hedges
  - Cannot be given relief as they are not modelled
  - Split hedge issue - must be included in standard VAR calculation (unlike eligible hedges) and therefore will increase capital!

CVA VAR and Hedging - Example

- Advanced approach allows significant capital relief
  - However, this is not perfect especially when using index hedges (most common)
- Standardized approach allows only moderate relief



Pricing Impact of CVA Capital Charges

- Magnitude of CVA VAR
  - Comparable to CVA itself (even when hedges are accounted for)
  - No DVA benefit
  - Collateralized counterparties cannot be ignored (and 20-day period in some cases)
  - General and specific wrong-way risk must be accounted for
- Implications*
  - Charges become prohibitive
  - Push towards central clearing
  - End-users find hedging very costly
  - Some banks reduce their derivatives businesses?

"The only thing more dangerous than having too many derivatives floating around the financial system, it seems, is having too few of them."

"The perils of prudence", Economist, June 20th 2009.

* Although possible Sovereign and non-financial exemptions may help

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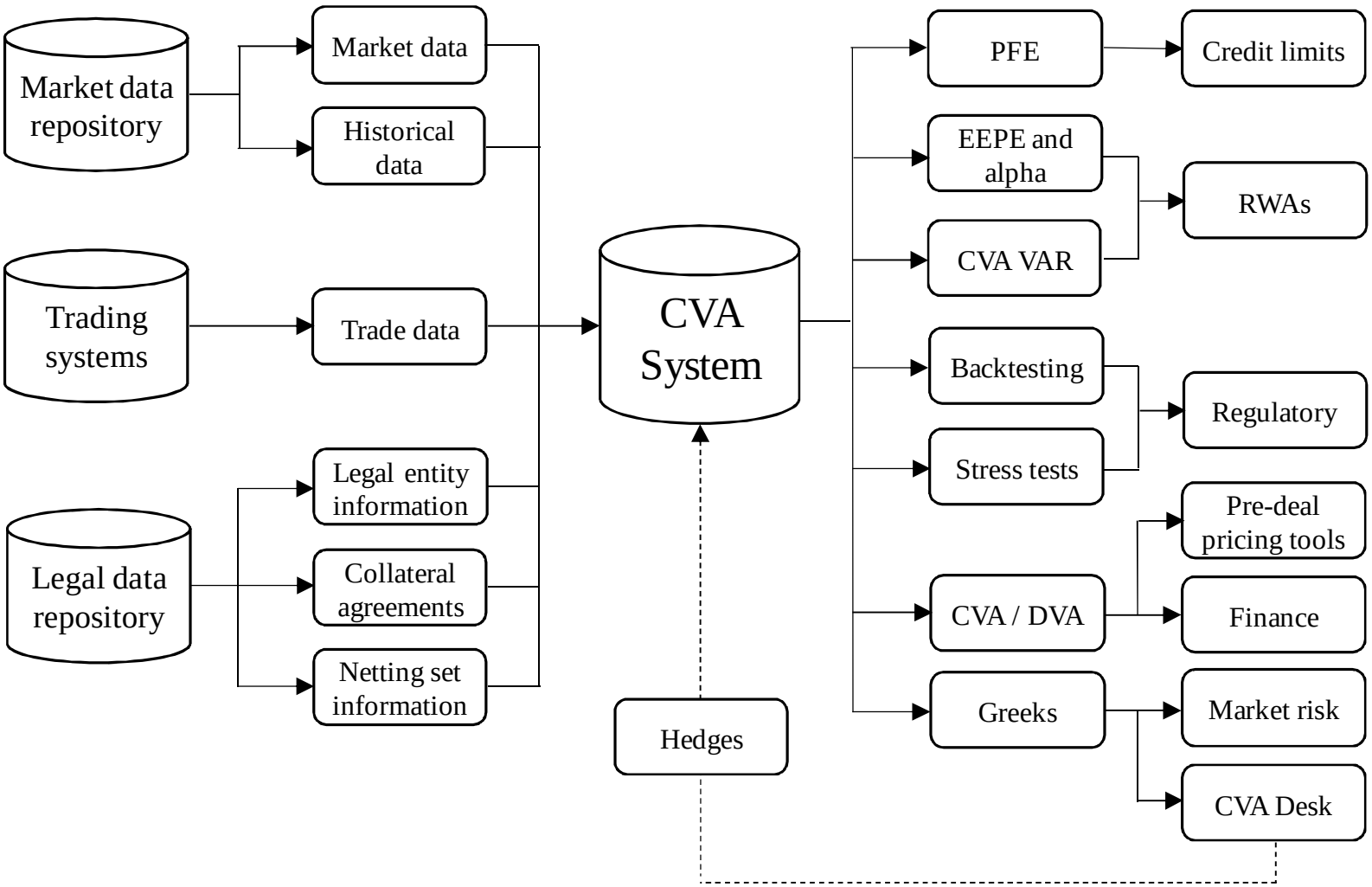
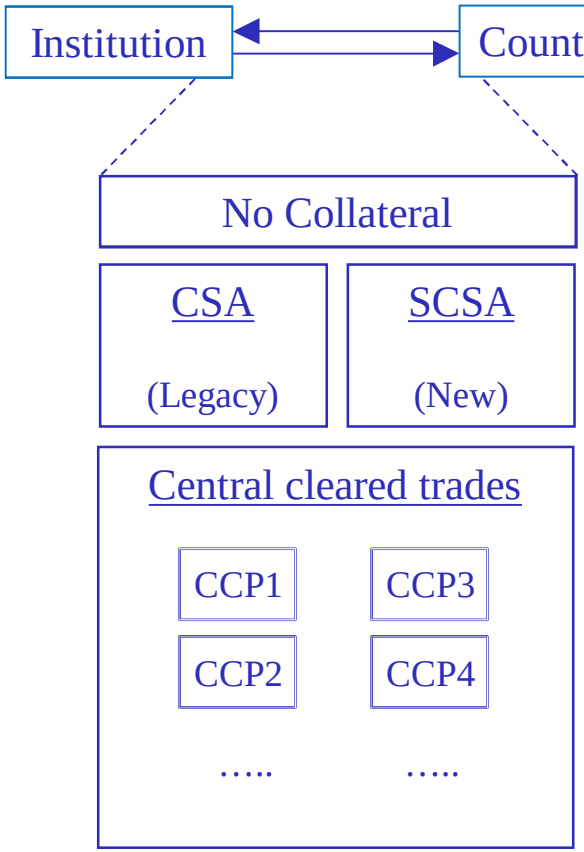
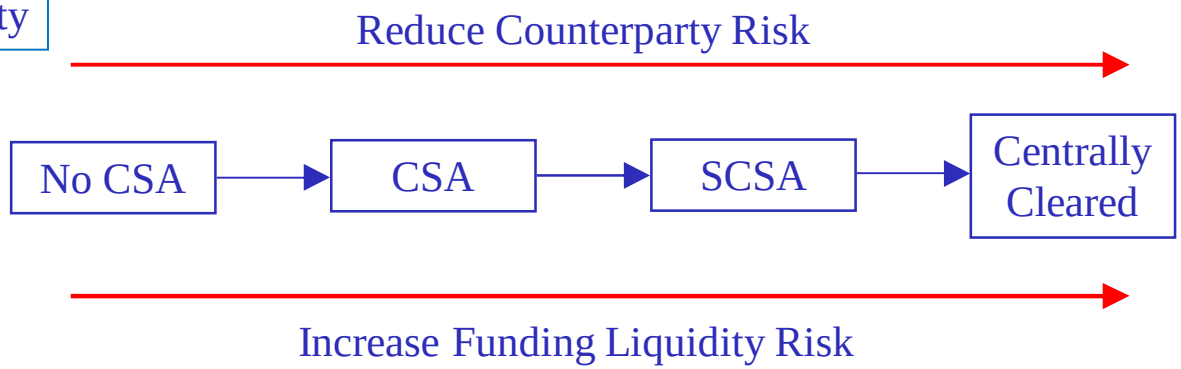
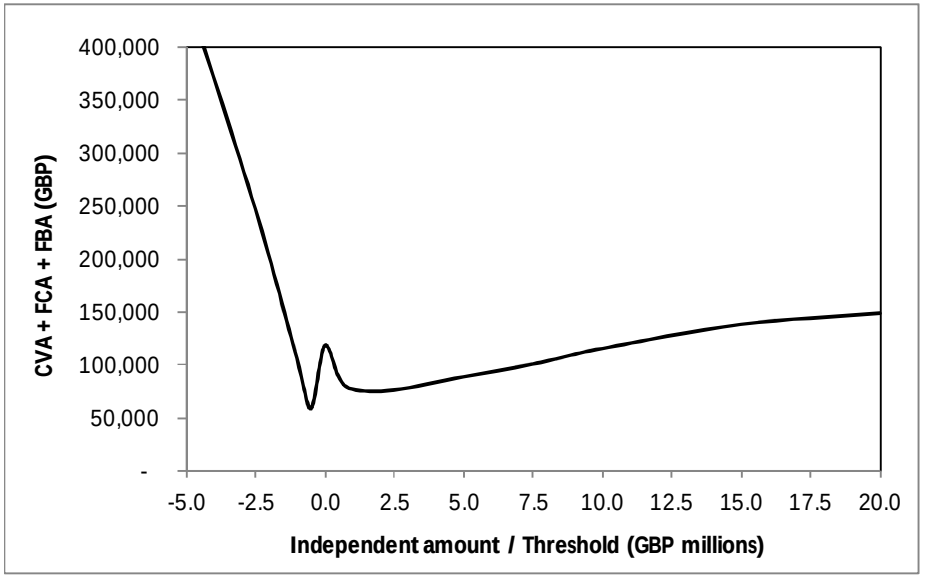
Technology is Key



Risk Mitigation is a Double-Edged Sword



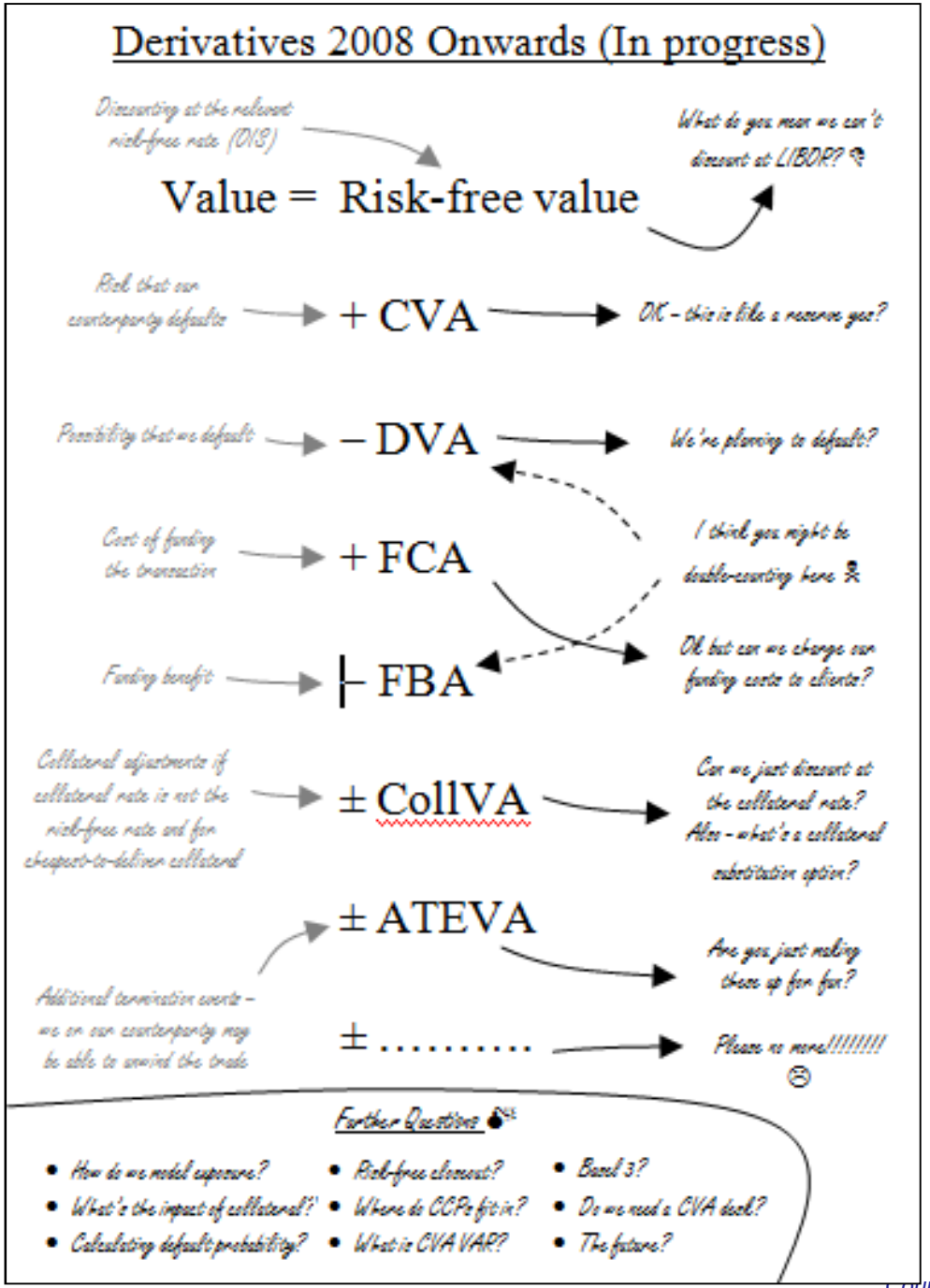




Derivatives Pre-2007

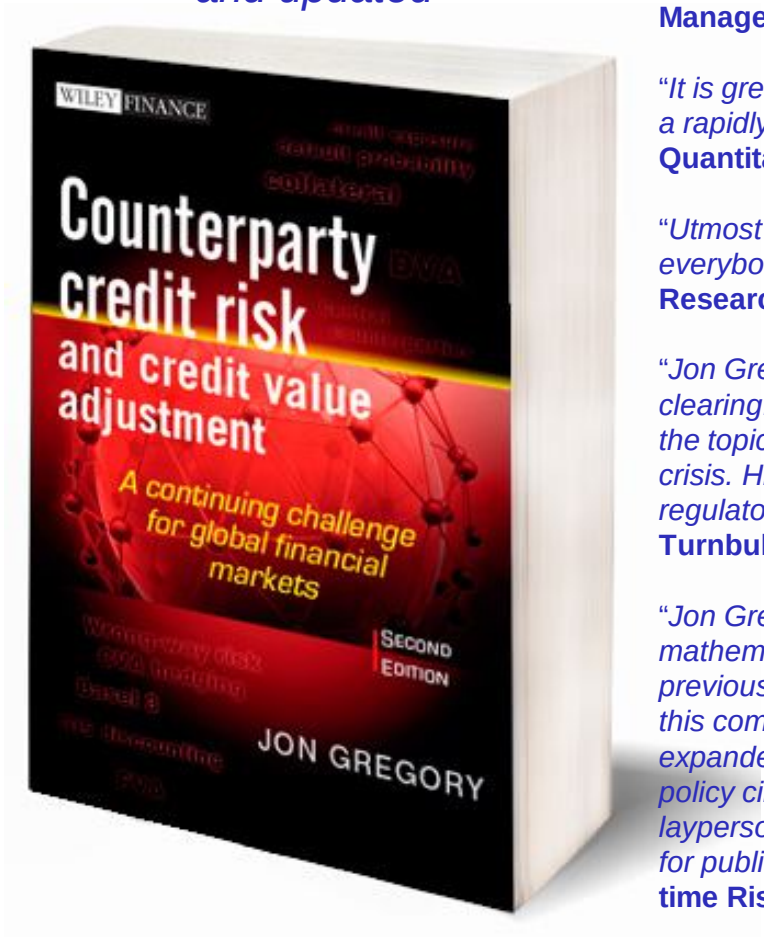
Value = Risk-free value

Exotics clearly more of a challenge
But we have some good models (especially for CDOs)



We will draw and announce the three winners of Jon's new book now.

Thoroughly expanded and updated



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