
Concentration Risk: Lessons Re-learned from the Current Crisis

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Moody's Analytics

Preambles

- *A crisis is a terrible thing to waste* (Stanford Economist Paul Romer):
 - The current financial crisis provides an unprecedented opportunity to learn and re-learn
- Easy to draw conclusions:
 - Correct but not useful, e.g., “Greed is bad”
 - Off the mark, e.g.: quants and models are to blame
 - Provide a long laundry list that lacks focus
- We can follow a comparative approach:
 - Look at how this crisis is similar to and different from previous crises and cycles
 - Look at those banks that have performed well during the crisis





The Lesson Re-learned

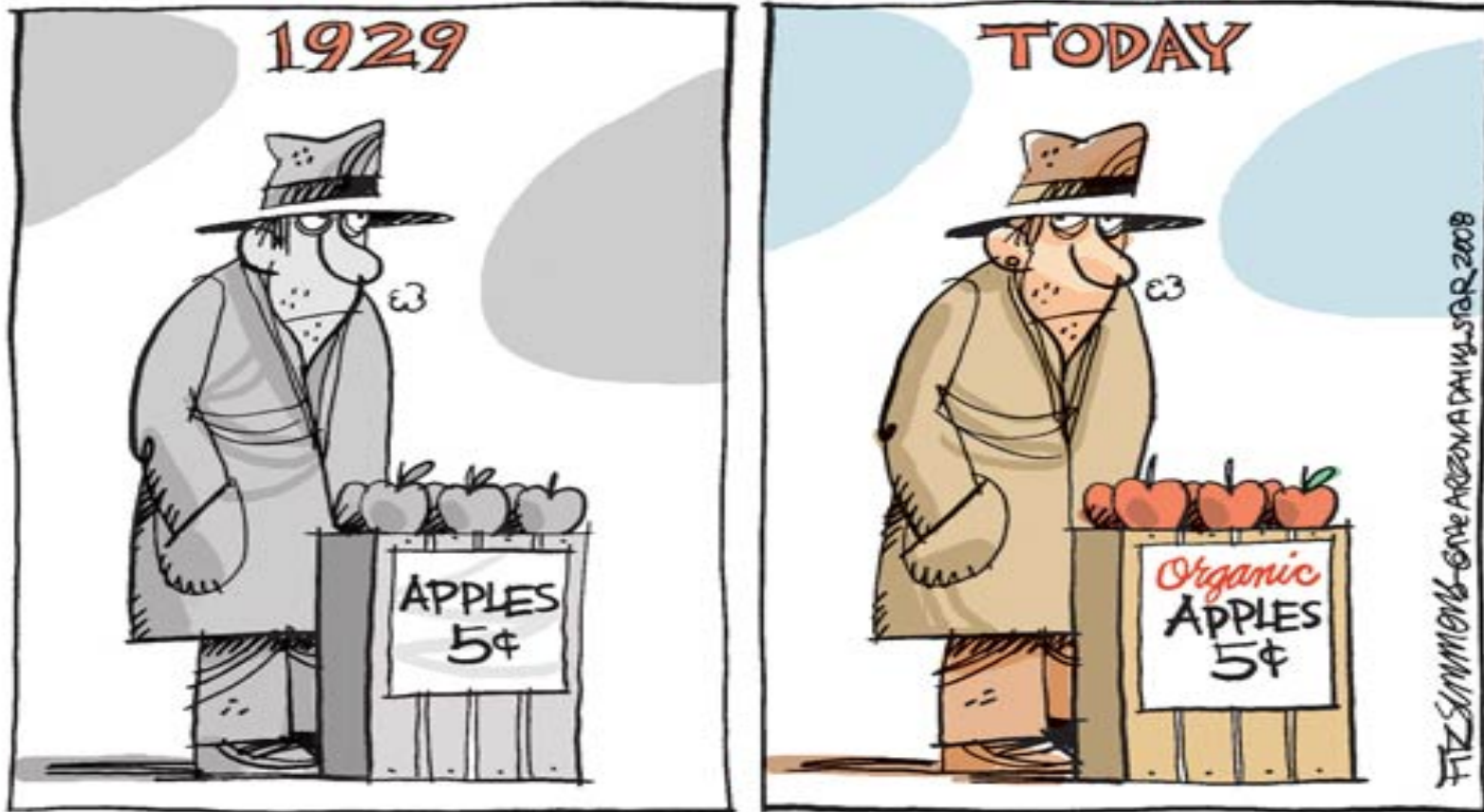


The Most Important Lesson: Manage Concentration Risk!

- Concentration and leverage are a deadly combination:
 - All banks are leveraged operations - 100% equity financed banks are not economical
 - Most bank failures are due to concentration of one form or another:
 - 1980's U.S. S&L crisis: real estate lending
 - 1980's Japanese banking crisis: real estates and equities
 - 1989-1991: A number of western banks with large exposures in Latin American debt crisis
 - 2008-present: concentration in residential real estate or other toxic assets
 - Integrity Bank (2008's 10th failed U.S. bank) loaned most of its capital to one real estate developer



History Repeats Itself (or It Rhymes)



Manifestation of Concentration Risk in Current Crisis

- Lehman
 - MBS and commercial real estate
- Northern Rock
 - Concentration in funding from the wholesale market
- Wachovia
 - Concentration in California real estate (acquisition of Golden West Bank)
- AIG
 - Concentrations in CDS
- HSBC
 - Diversified geographically and by product types
- Standard Charter
 - Diversified geographically and by product types
- Banco Itaú
 - Diversified revenue streams in Brazil and Latin America



What Does Basel II Say?

- ***Basel II 770 and 771: Risk concentrations are arguably the single most important cause of major problems in banks.***
 - ***credit risk concentrations are often the most material risk concentrations within a bank.***
- Alas, this is not explicitly addressed in Pillar 1.
- Basel II expects banks to deal with concentration risk in Pillar 2 and Pillar 3.



What Is Concentration Risk?

- According to Basel II (770)
 - A risk concentration is any single exposure or group of exposures with the potential to produce losses large enough (relative to a bank's capital, total assets, or overall risk level) to threaten a bank's health or ability to maintain its core operations. *"Concentrations are arguably the single most important cause of major problems in banks."*
- Need to define it in terms of risk, not in terms of notional amount





How Does Concentration Risk Arise in a Bank?



Banks Tend to Build Concentration Risk

- Banks tend to concentrate in certain regions, industry sectors, or asset classes:
 - Bank of San Francisco is naturally concentrated in loans to customers in San Francisco
 - Bank of Agriculture will have numerous exposures to agriculture business
- In pursuit of scale:
 - Wachovia brought Golden West to pursue their “coast to coast strategy”
 - Citibank had been on buying spree in pursuit of financial supermarket model



Concentration Is Usually Built During Asset Bubbles

- Banks in Texas built exposures to the oil and gas business during the 1970s when oil prices increased
 - Real estate was tied to the oil and gas business
- In the late 1990s, banks built their portfolios tied to telecom
- U.S. banks increased their concentrations in residential lending during the housing bubble



Dangerous to Chase Revenue without Respect to Risk

- At margin, the next new customer tends to be riskier than the existing ones
 - A strategy of seeking new customers/sources of revenue without respect to risk is a recipe for failure
 - Shareholder's Report on UBS's Write-Downs, p11:
 - *The consultant... recommended that UBS selectively invest in developing certain areas of its business to close key product gaps, including in Credit, Rates, MBS Subprime, and Adjustable Rate Mortgage products ... **The consultant's review did not consider the risk capacity (e.g. stress risk and market risk) associated with the recommended product expansion.***
- Make sure return is commensurate with the risk
 - Risk must be assessed at the portfolio level, which takes account of the concentration effect
 - The last dollar of \$40B in similar transactions is riskier than the first dollar



A Challenging Measurement Problem, Especially for Credit Risk

- Credit portfolio risk is the possibility of different credit portfolio values under different scenarios over some future time horizon
- Credit portfolio risk is a function of:
 - Portfolio weights/exposure sizes (larger exposures increase portfolio risk)
 - Standalone risks (higher PDs and LDGs and longer maturities increase portfolio risk)
 - Correlation among values of exposures (higher correlation increases portfolio risk)
 - Most challenging



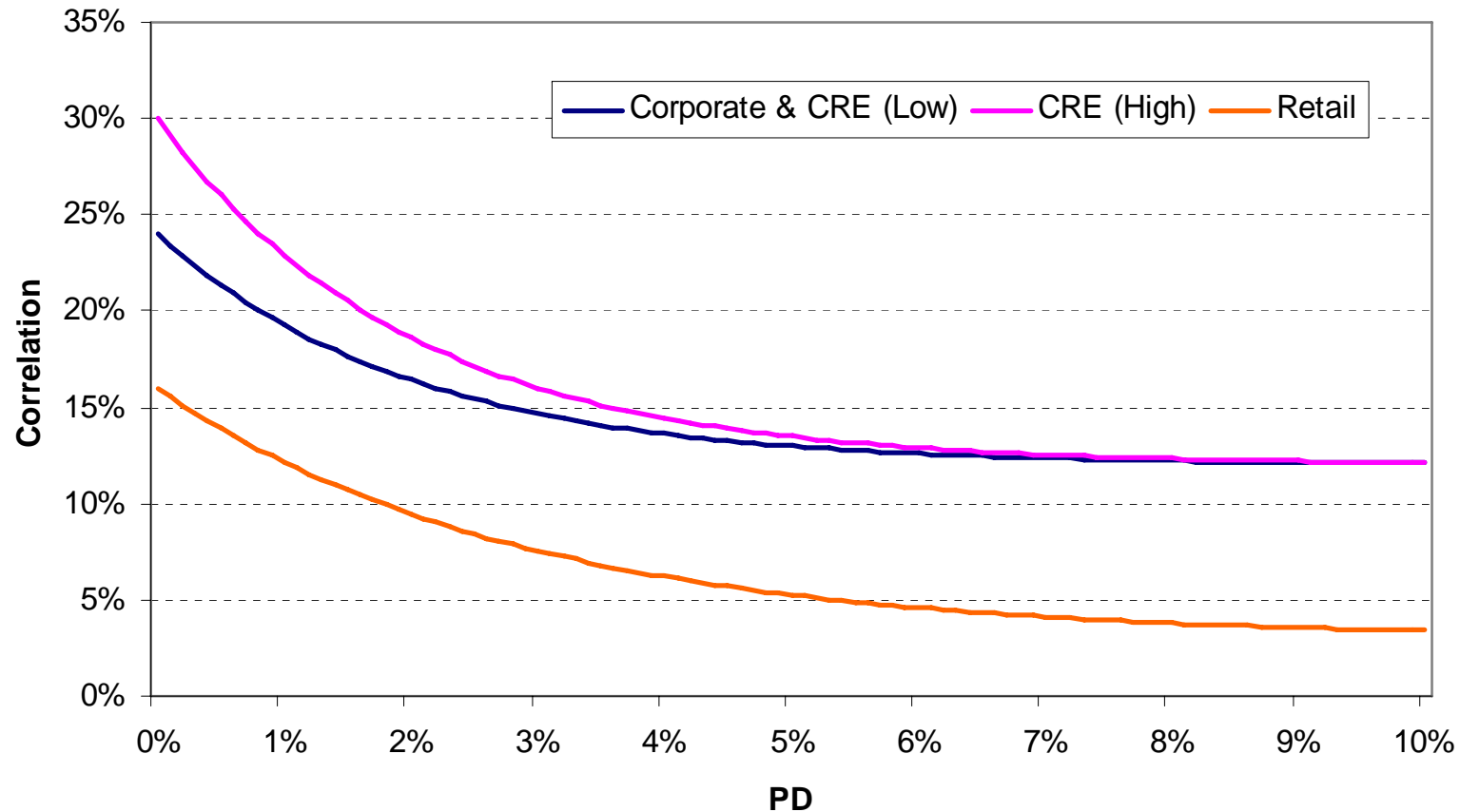
A Side Trip: Shortcoming of Basel II (Pillar I) on Concentration Risk

- While Pillar I recognizes the seriousness of issue, it fails to seriously address it:
 - The ASF framework doesn't account for concentration risk in a multi-factor sense
 - It doesn't account for correlation/concentration in specific asset classes, regions, industries, etc.
 - The R-squared function in Basel II is fundamentally flawed

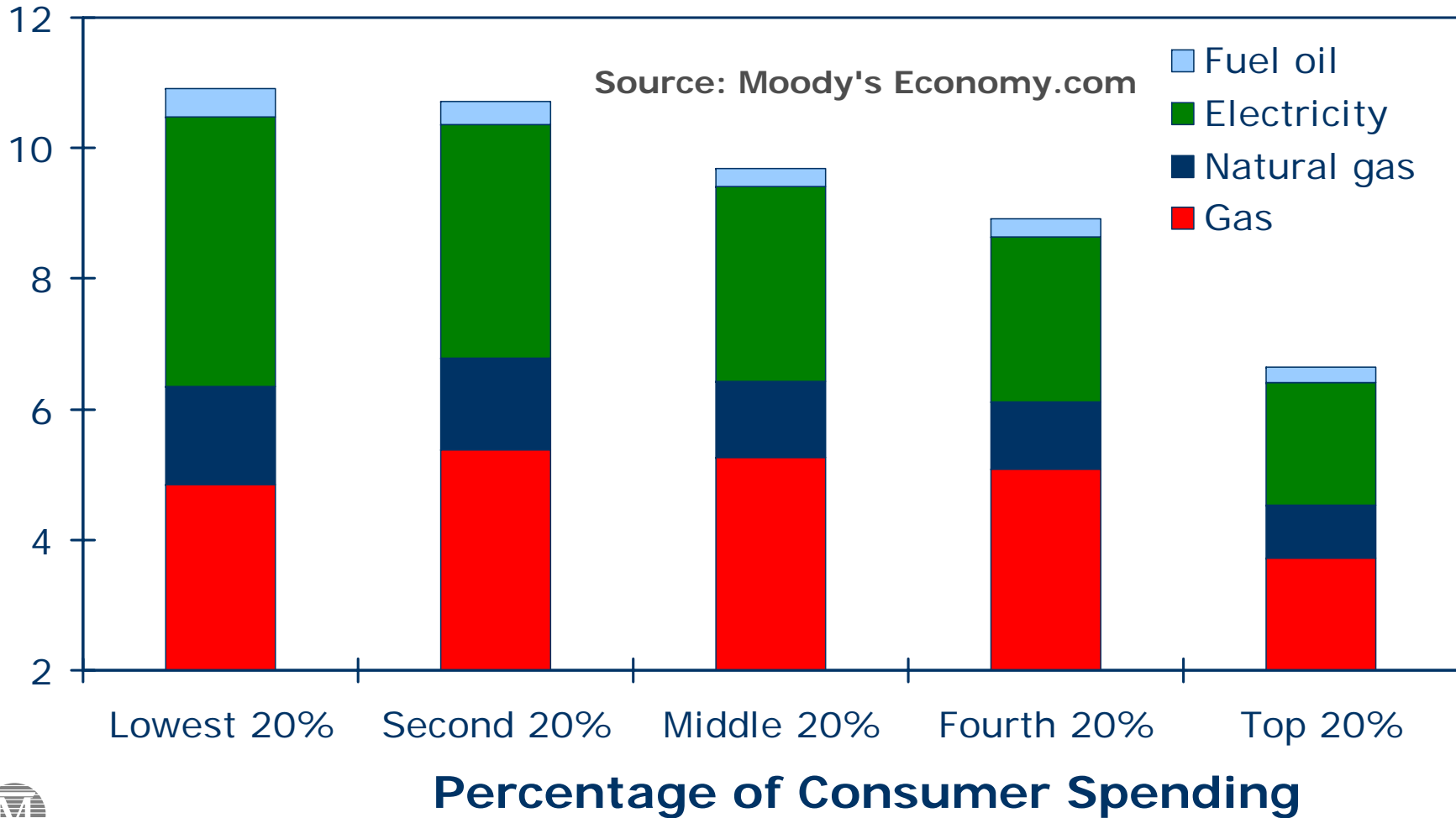


Asset Correlation Parameter in Basel II IRB Framework

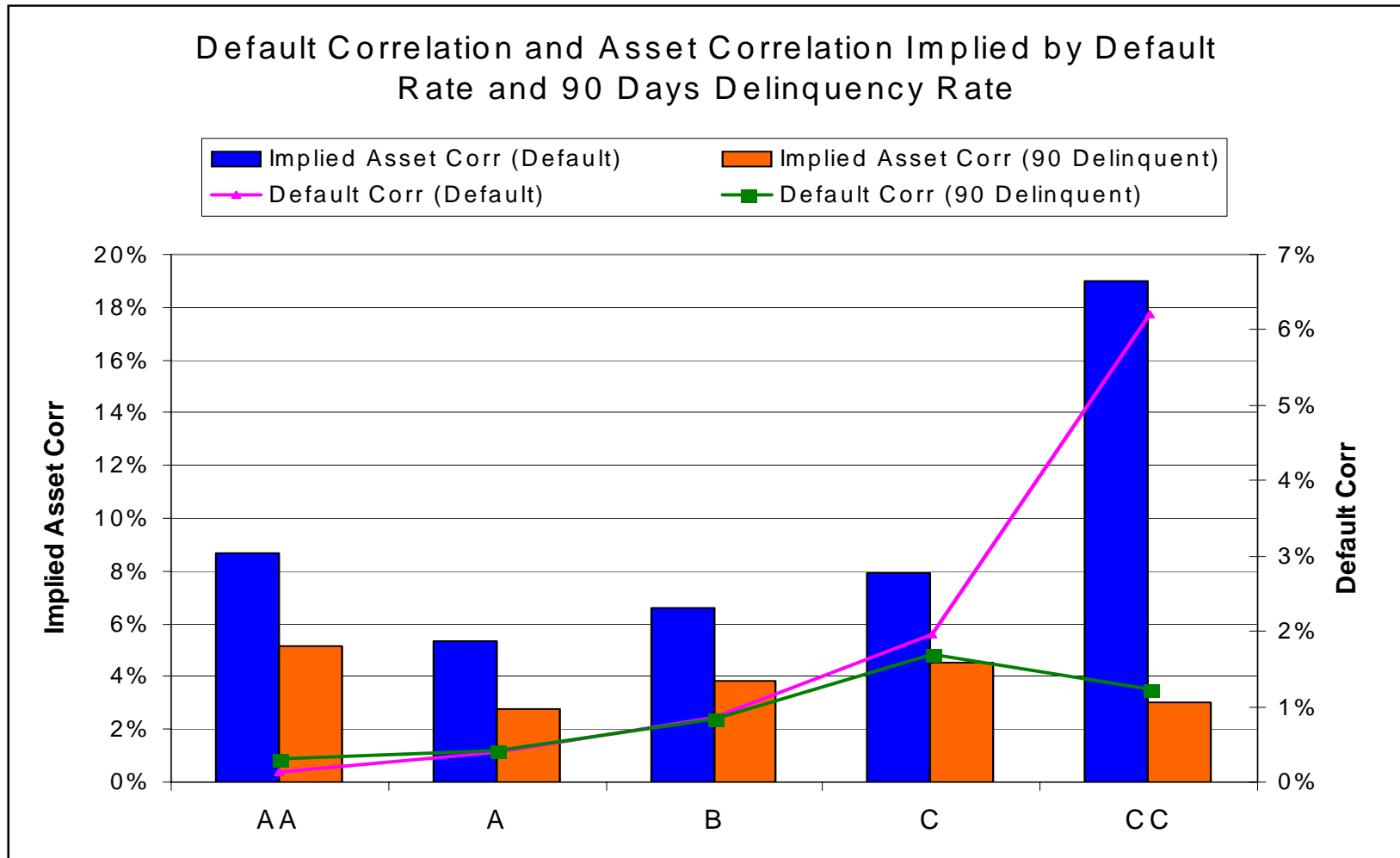
- A decreasing function of PD
- For all asset classes: Corporate, CRE, and Retail



Low Income Borrowers are More Sensitive to Economic Shock



Asset Correlations Increases with PDs



Capital Charge Under Basel II IRB

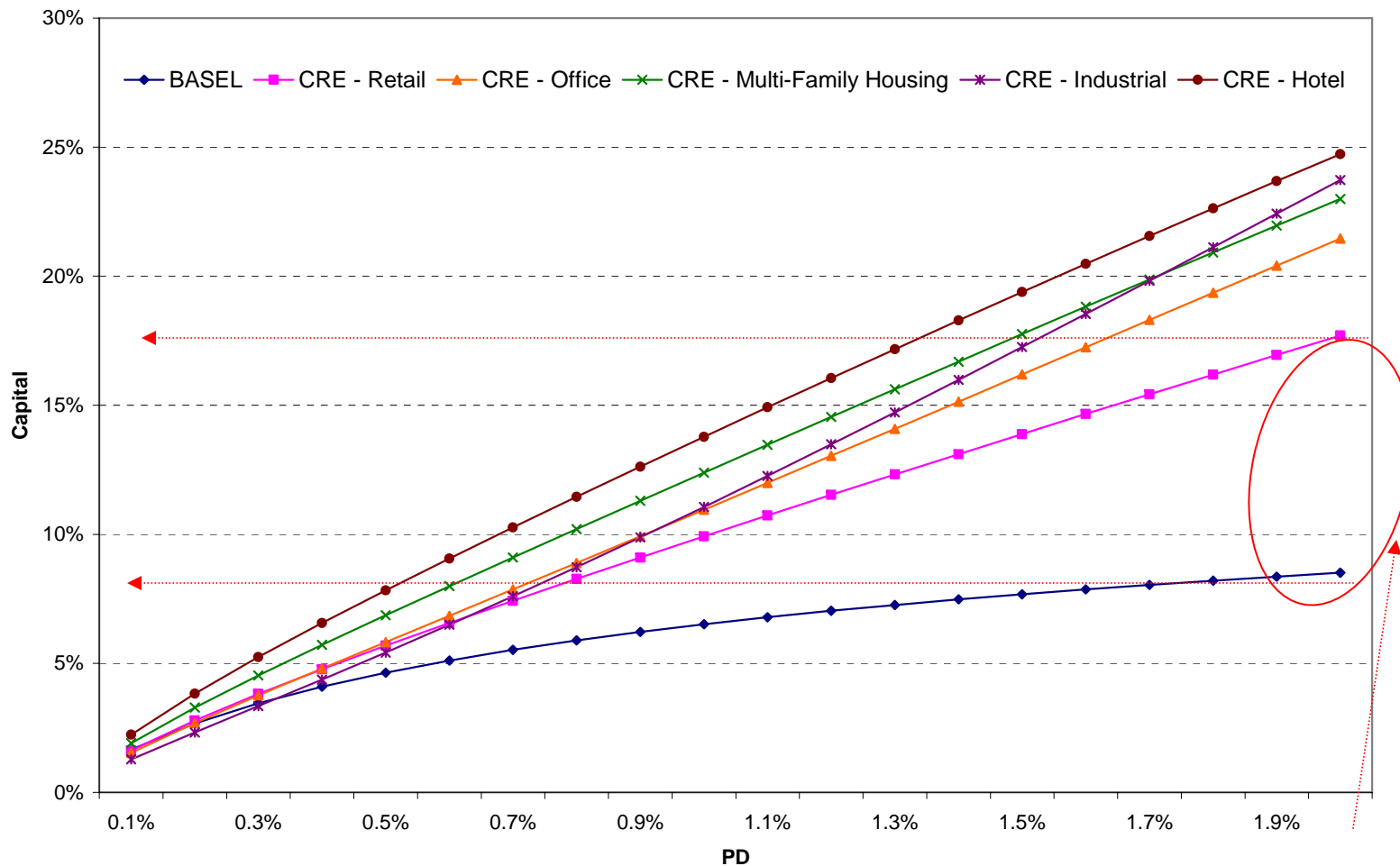
$$\text{capital} = LGD \cdot N\left(N^{-1}(PD) \cdot \sqrt{\frac{1}{1-R}} + N^{-1}(0.999) \cdot \sqrt{\frac{R}{1-R}}\right) - PD \cdot LGD$$

where R is the asset correlation, or Rsquare in a one-factor framework

- Capital is increasing function in PD. However, marginal increase diminishes since correlation decreases as PD increases.
- Empirical evidence implies a positive relationship between PD and R-squared for CRE and retail exposures. We plot capital charge based on actual CRE estimates together with Basel's function.



Capital Charge Based on Empirical Estimates and Basel's Function



Underestimate the risk



On the Relationship Between Asset Correlation and Default Probability (Summary) *

- After controlling for firm size, there is no strong negative relationship between asset correlation and default probability for corporate exposures.
- Our estimates suggest an increasing relationship between asset correlation and default probability for CRE and Retail exposures.
- The stylized decreasing relationship in Basel II doesn't have real theoretical or empirical support and underestimates capital for:
 - Risky exposures (such as subprime exposures)
 - When exposure's default risk increases

*Joseph Lee, Joy Wang, and Jing Zhang "The Relationship Between Average Asset Correlation and Default Probability" Moody's | KMV white paper, 2009.





Managing Concentration Risk



Concentration Risk Needs to Be Debated At the Highest Level

- Bank's CEO and the Board should ask:
 - What are the largest exposures?
 - By counterparty, asset classes, geographical regions, etc.
 - Will any of these concentrations have the potential to produce losses large enough to threaten the survival of the bank?
 - How is the bank managing the concentration risk?
- **The crisis has taught us: This is a life or death issue!**



You Can't Manage What You Don't Measure

- How do you measure concentration risk?
 - Start with the data infrastructure
 - A data warehouse that captures all the relevant data
 - Accurate and forward-looking, stand-alone risk assessment
 - Capture the portfolio effects
 - Measure correlation and diversification
 - An economic capital model
- Beware of silo risk
 - Credit risk showed in trading book (which supposed to only have market risk)



Managing Concentration Risk

- Through risk-based limit setting
- Make sure to examine both risk and return
 - Risk-based pricing
 - Risk-based compensation/incentive structure
- Best approach: a portfolio-based framework
- Need a market for banks to transfer risk





Summary



Summary

- The Lesson Re-learned
 - Risk concentrations are arguably the single most important cause of major problems in banks
- Measuring concentration risk
 - Sound assessment of individual risk components
 - Measuring correlation is key
- Managing concentration risk
 - Through risk-based limit setting
 - Making sure to examine both risk and return
 - Best approach: a portfolio-based approach
 - Need a market for banks to transfer risk



Concentration Risk In a Wider Context

- TBTF financial intuitions:
 - Do they present concentration risk to the society?
- Governments (worldwide) are playing a bigger role in all aspects of economy:
 - Is this a concentration risk?
 - How to mitigate and transfer the risk?
- When a big chunk of the portfolio holdings is in “cash” (government securities):
 - Is there a concentration risk here?

