SCI Conference, NY, March 31st 2011

Risk Management Panel

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SCI – Risk Management Panel

- We are just coming out from an unprecedented event in history

  "The worst financial crisis in global history, including the Great Depression." *Federal Reserve Chairman, Ben Bernanke*

  - Over two trillion US dollars in write-downs from the crisis
  - Largest Bank bankruptcies in history

- This panel on the key practices and strategies for Identifying and managing risk in structured credit and ABS portfolios
  - Where was risk management throughout the crisis and what have we learned
  - How has the role and focus of risk management changed and what are the biggest challenges going forward
  - How can we do abetter job measuring, managing and communicating the risk of structured credit investments

From Lessons to Best Practices…

- In long periods of benign conditions:

  fading memory can lead to complacency and under-pricing of risk

- In periods of expansion:

  innovation and new products, rapid growth, limited/no loss data

Emerging Best Practices

1. **Independent Valuation, Internal Modelling and Risk Capabilities**
2. **Transparency**
3. **Good Models based on Fundamentals**
4. **Model Risk Framework**
5. **Risk Management Fundamentals**

Rosen D., 2010***, Rethinking Valuations***, in *Rethinking Risk Measurement* (Ed. K. Boecker), Riskbooks

Emerging Best Practices Beyond the Credit Crisis

Independent Valuation, Internal Modelling and Risk Capabilities

- *Even when an institution continues to rely largely on externally provided prices, it is important that it also develops internal analysis capabilities and that risk management is actively engaged in the valuation process*

Lessons from the Crisis…

*"… firms that performed better… had established, before the turmoil began, **rigorous internal processes**… and consequently had developed **in-house expertise to conduct independent assessments**… In contrast, firms that faced more significant challenges… generally **lacked relevant internal valuation models** and sometimes **relied too passively on external views of credit risk** from rating agencies and pricing services to determine values for their exposures."*

SENIOR SUPERVISORS GROUP, 2008
"Observations on Risk Management Practices during the Recent Market Turbulence"

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Emerging Best Practices Beyond the Credit Crisis

1. **Independent Valuation, Internal Modelling and Risk Capabilities**
2. **Transparency**

- *The recent events have highlighted the need for transparency on the contents and structure of complex securities as well as on the valuation and risk methodologies*
  - Example – structured credit products are complex: underlying collateral, structure, underlying risks (credit, prepayment, market, liquidity)
  - High-level, top-down models → misleading results, lack of ability to manage risk and invest

Industry Best Practices Beyond the Credit Crisis

1. **Independent Valuation, Internal Modeling and Risk Capabilities**
2. **Transparency**
3. **Good Models based on Fundamentals**

- Need for internal modelling infrastructure – check valuations and compare quotes
  - Dealer quotes have proven to be unreliable under stressed and illiquid markets
  - Models heavily depended on ratings have led to severe valuation issues
  - Importance of correlations and systematic risk
- Consistency across asset classes – capture all the risks and based on reliable data

Emerging Best Practices Beyond the Credit Crisis

1. **Independent Valuation, Internal Modelling and Risk Capabilities**
2. **Transparency**
3. **Good Models based on Fundamentals**
4. **Model Risk Framework**

- *Systematic approach for capturing and communicating model risk → limitations of our models and underlying data, and lack of illiquidity*
  - *Model application documentation, development process, independent review, testing and approval*
  - *Model risk methodology*
- Valuations should be challenged continuously – processes, knowledgeable resources, analytical tools and data (many price sources)
- Stress testing is fundamental – scenarios for default, recovery and prepayment; spreads; downgrades and defaults; correlations

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Industry Best Practices Beyond the Credit Crisis

1. **Independent Valuation, Internal Modelling and Risk Capabilities**
2. **Transparency**
3. **Good Models based on Fundamentals**
4. **Model Risk Framework**
5. **Risk Management Fundamentals**

- Over a decade of great performance, we abandoned risk management fundamentals
- Required effective tools:
  - Comprehensive stress testing
  - Risk metrics, concentration risk, risk contributions and performance attribution

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Stress Testing – Key Risk Management Tool

- A tool that supplements risk management approaches and measures
  - Providing forward-looking assessments of risk
  - Overcoming limitations of models and historical data
  - Supporting internal and external communication
  - Feeding into capital and liquidity planning procedures
  - Informing the setting of a banks' risk tolerance
  - Facilitating the development of risk mitigation or contingency plans across a range of stressed conditions

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Stress Testing – Key Risk Management Tool

Going back to some lessons …

- In long periods of benign conditions: fading memory can lead to complacency and under-pricing of risk
- In periods of expansion: innovation and new products, rapid growth, limited/no loss data

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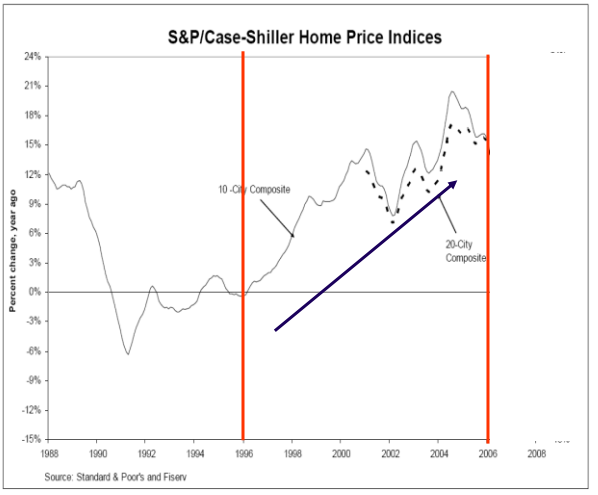
Example – Housing Market



In long periods of benign conditions: fading memory can lead to complacency and under-pricing of risk

In periods of expansion: innovation and new products, rapid growth, limited/no loss data

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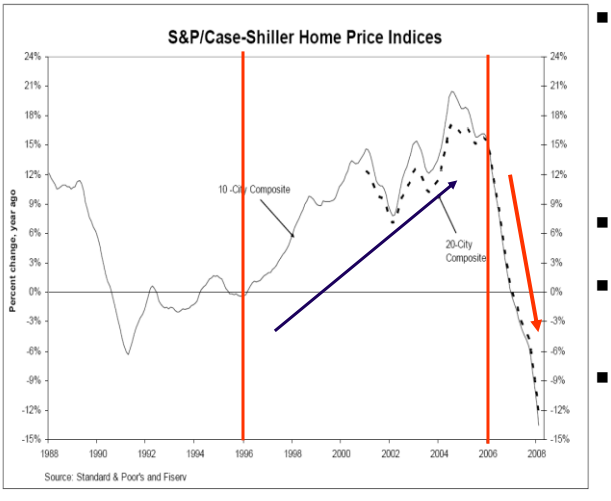
Systematic Risk and MBSs



- Strong conditional systematic factor → falling home prices
  - Default rates of subprime mortgages
  - Correlation of default of ABS tranches
- Prices continually rising in 1996-2006
- "Regime switch" – home prices in the US could not increase indefinitely
- Default rates and ABS tranche's correlations based on benign period not applicable in a falling price environment

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Concluding remarks

Some Concluding Remarks

When dealing with complex structures and instruments with limited liquidity, it is important to

- Understand the meaning and use of a “price”
- Understand all the underlying risks
- Limitation of the data and prices
  - Effectively incorporate fundamental credit information, historical data and expert judgment into the valuation process
- Acknowledge the sometimes “heroic” assumptions in our models and the limitation of the information which we can reasonably extract from the market
- Develop explicit model risk and stress testing approaches which can help us understand better
  - The behaviour of instruments and portfolios,
  - “Knightean” uncertainties we could be facing.

Final Remarks: *what is the value of a security?*

"Price is what you pay…

value is what you get."

Warren Buffet (1930 -)

"Nowadays people know

The price of everything

and the value of nothing."

Oscar Wilde (1854-1900)

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Final Remarks: *what is the value of a security?*

- *What is the price when there is no liquidity, or a market to sell to?*
- The crisis has further made evident the intrinsic limitation and ***subjectivity*** of our valuation models and pricing assumptions
  - When liquidity is thin, "market quotes" are unreliable and model parameters cannot be estimated based only on observed market prices
  - Sound risk management requires
    - Governance, processes and deep internal expertise around valuation
    - **Stress testing and model risk**

If Mr. Wilde was alive today….

"Before the crisis, people knew the price of everything and the value of nothing…

now we have no clue about either of them…"

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Selected Recent Publications

- Rosen D., 2010, Rethinking Valuations, in Rethinking Risk Measurement (Ed. K. Boecker), Riskbooks
- Nedeljkovic J., Rosen D., and Saunders D., 2011, Valuation of Structured Finance Products with Implied Factor Models, Chapter 9 in Credit Risk Frontiers: Subprime Crisis, Pricing and Hedging, CVA, MBS, Ratings, and Liquidity, T. Bielecki, D. Brigo, F. Patras (Editors), Wiley
- Nedeljkovic, J., Rosen D. and Saunders D. 2010, Pricing and Hedging CLOs with Implied Factor Models, Journal of Credit Risk, Fall issue
- Rosen D. and Saunders D. 2009, Valuing CDOs of Bespoke Portfolios with Implied Multi-Factor Models, Journal of Credit Risk, Fall Issue
- Rosen D. and Saunders D. 2011, Wrong-Way CVA and CVA VaR, research paper
- Pykhtin M., Rosen D. 2010, Pricing Counterparty Risk at the Trade Level and CVA Allocations, Federal Reserve Research Paper Series, Journal of Credit Risk, Winter Issue
- Rosen D. and Saunders D. 2010, Computing and Stress Testing Counterparty Credit Risk Capital, in Counterparty Credit Risk Modelling, (ed. E. Canabarro), Risk Books
- Garcia Cespedes J. C., de Juan Herrero J. A., Rosen D., Saunders D. 2010, Effective modelling of Counterparty Credit risk Capital and Alpha, Journal of Risk Model validation
- De Prisco B., Rosen D., 2005, Modelling Stochastic Counterparty Credit Exposures for Derivatives Portfolios, Counterparty Credit Risk (M. Pykhtin, Editor), Risk Books

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Selected Recent Publications

- Rosen D. and Saunders D. 2010, Economic Capital, in Encyclopedia of Quantitative Finance
- Rosen D. and Saunders D. 2010, Risk Contributions and Economic Credit Capital Allocation, in Advances in Credit Derivatives, Bloomberg Publications (forthcoming)
- Rosen D. and Saunders D. 2010, Measuring Capital Contributions of Systemic Factors in Credit Portfolios, Journal of Banking and Finance
- Rosen D. and Saunders D. 2009, Analytical Methods for Hedging Systematic Credit Risk with Linear Factor Portfolios, Journal of Economic Dynamics and Control
- Mausser H. and Rosen D. 2007, Economic Credit Capital Allocation and Risk Contributions, in Handbook of Financial Engineering (J. Birge and V. Linetsky Editors)
- Garcia Cespedes J. C., Keinin A., de Juan Herrero J. A. and Rosen D. 2006, A Simple Multi-Factor "Factor Adjustment" for Credit Capital Diversification, Special issue on Risk Concentrations in Credit Portofolios (M. gordy, editor) Journal of Credit Risk, Fall 2006
- Rosen D., 2004, Credit Risk Capital Calculation, in Professional Risk Manager (PRM) Handbook, Chapter III.B5, PRMIA Publications
- Aziz A., Rosen D., 2004, Capital Allocation and RAPM, in Professional Risk Manager (PRM) Handbook, Chapter III.0, PRMIA Publications

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Dan Rosen

Dr. Dan Rosen is the CEO and co-founder of ***R² Financial Technologies*** and acts as an advisor to institutions in Europe, North America, and Latin America on derivatives valuation, risk management, economic and regulatory capital. In addition, an adjunct professor of *Mathematical Finance* at the ***University of Toronto***.

Dr. Rosen lectures extensively around the world on financial engineering, enterprise risk and capital management, credit risk and market risk. He has authored several patents and numerous papers on quantitative methods in risk management, applied mathematics, operations research, and has coauthored two books and various chapters in risk management books (including two chapters of *PRMIA*'s Professional Risk Manger Handbook). In addition, Dr. Rosen is a member of the Industrial Advisory Boards of the *Fields Institute* and the *Center for Advanced Financial Studies* at the *University of Waterloo*, the Academic Advisory Board of *Fitch*, the Advisory Board, Educational and Credit Risk Steering Committees of the *IAFE* (International Association of Financial Engineers), the regional director in Toronto of *PRMIA* (Professional Risk Management International Association), and a member of the *Oliver Wyman Institute*. He is also one of the founders of *RiskLab*, an international network of research centers in Financial Engineering and Risk Management, initiated at the University of Toronto. Dr. Rosen was inducted in 2010 as a *fellow* of the ***Fields Institute*** *for Research in Mathematical Sciences,* for his *"outstanding contributions to the Fields Institute, its programs, and to the Canadian mathematical community"*.

Up to July 2005, Dr. Rosen had a successful ten-year career at *Algorithmics Inc*., where he held senior management roles in strategy and business development, research and financial engineering, and product marketing. In these roles, he was responsible for setting strategic direction, new initiatives and alliances; the design and positioning of credit risk and capital management solutions, market risk tools, operational risk, and advanced simulation and optimization, as well as their application to industrial settings.

He holds an M.A.Sc. and Ph.D. in Chemical Engineering from the University of Toronto.

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