

**2012 ERM Symposium  
April 19 2012**

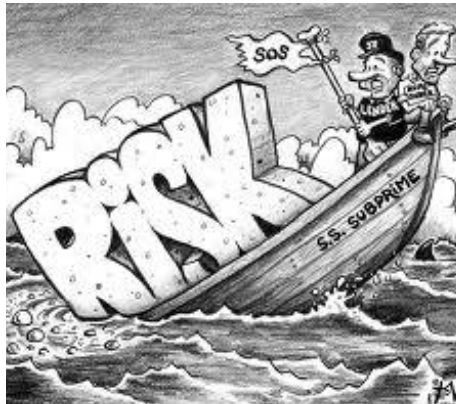
**Washington Marriott Wardman Park  
Washington, D.C.**

**Aligning Proper Incentives  
with Risk/Reward Decision Making**

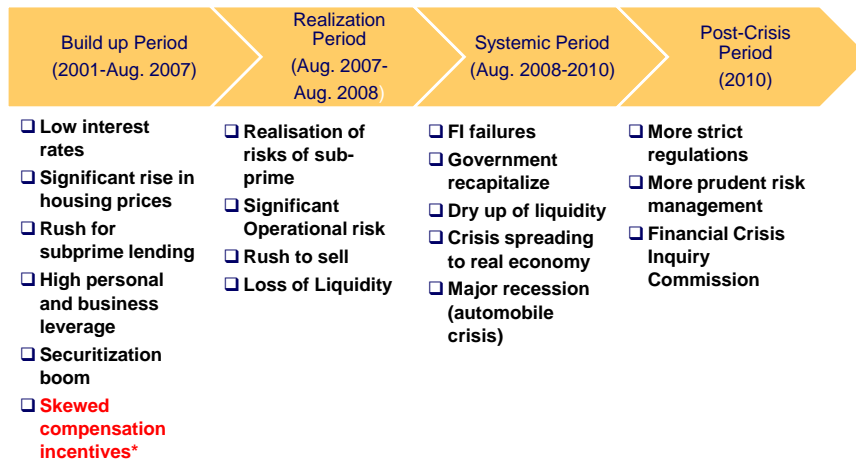
**Dr Bob Mark  
Managing Partner and CEO  
Black Diamond Risk Enterprise**

## The Subprime Crisis

**It Was An Accident Waiting To Happen**



## Subprime Crisis Process



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## Many contributed to the cause of the Subprime Crisis

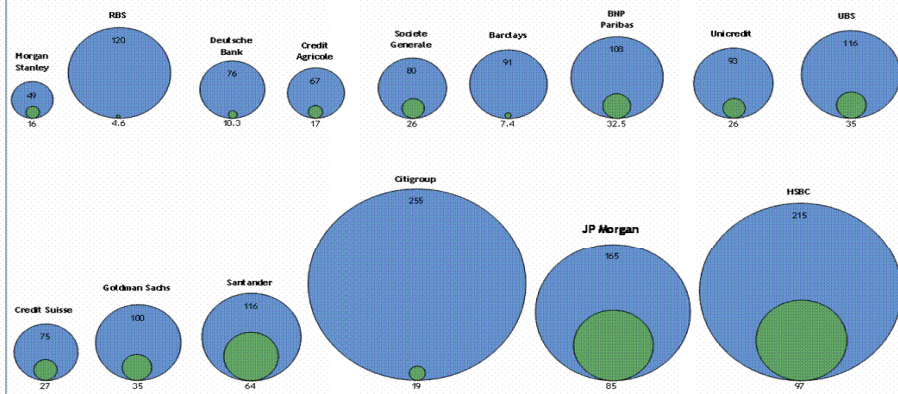


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## Price paid for not properly managing risk

### Banks: Market Cap

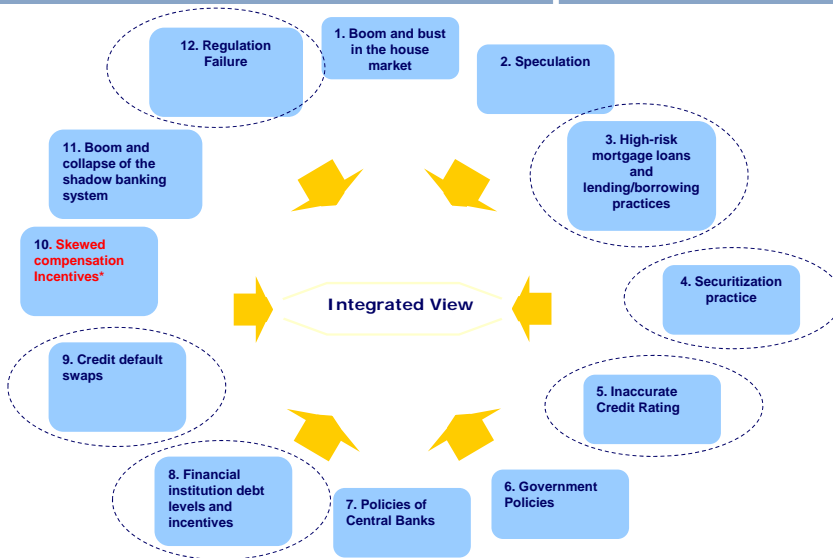
- Market Value as of January 20<sup>th</sup> 2009, \$Bn
- Market Value as of Q2 2007, \$Bn



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## Integrated view : Causes of the Subprime crisis

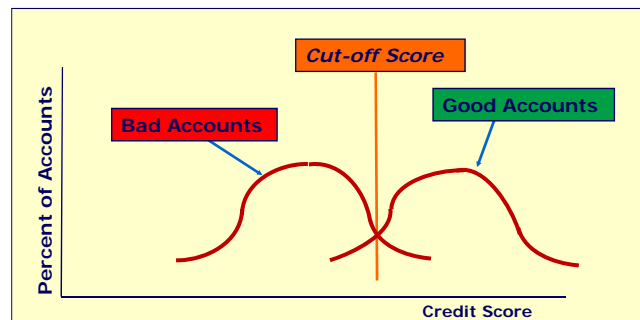


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1. No Longer Equate Ratings On Complex Assets e.g. CDO Tranches) With Ratings On Corporate Bonds
2. Paying more attention to the potential for unprecedented price moves and significant tail risk
3. Raised the quality of back testing pricing models
4. Clearly defining the roles and responsibilities for risk management
5. Increased Scrutiny On The Quality Of The Data About The Underlying Assets And Make Sure It Is Complete And Timely

Are you able to set cut off scores to minimize type 1 and type 2 errors related to the distribution of "Good" and "Bad" Accounts?

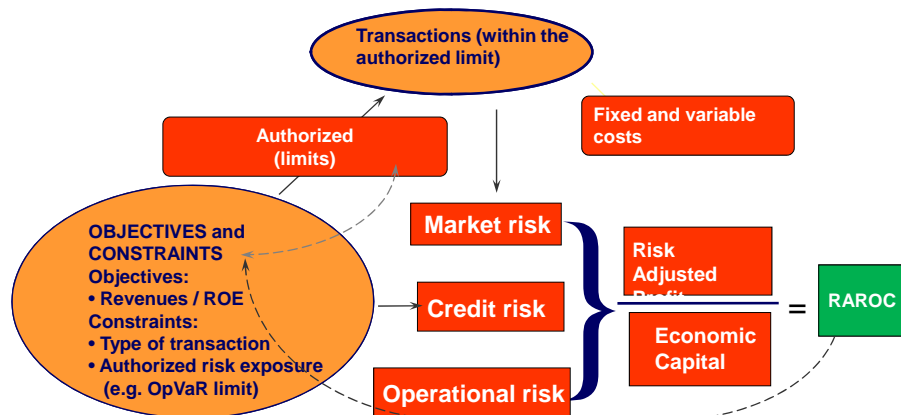
- Example: Are you able to integrate credit scoring data with Economic Capital data to perform sophisticated economic analysis?



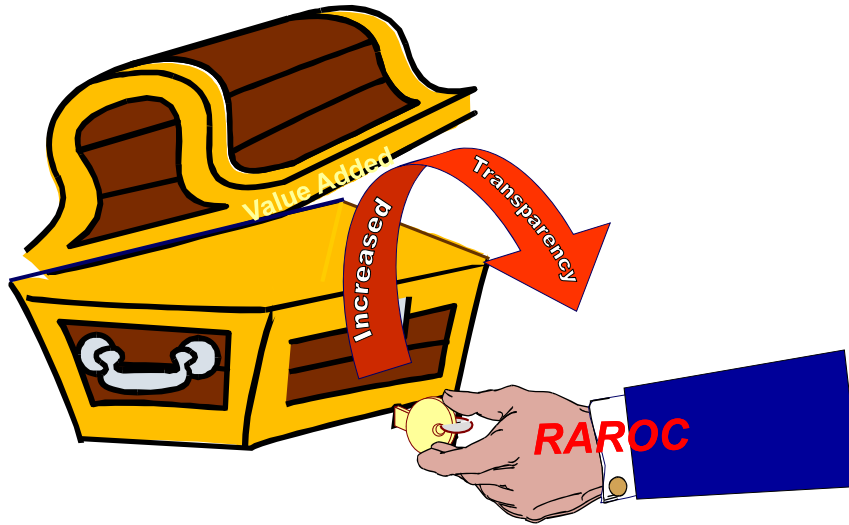
The presumption underlying credit scoring models is that the data has sufficient *accuracy* to be used to divide good credits and bad credits into distinct distributions.

6. Moving toward a second generation” of pricing models (e.g. for credit derivatives)
7. Many Risk Measurement models totally underestimated the risks plus Many Risk Managers didn't see it coming.
8. Paying significantly more attention to Information risk and Funding Liquidity risk
9. Working to reduce leveraged bets
10. Spending more time on aligning compensation incentives with risk adjusted performance over the lifetime of the deal\*

Need a process to establish coherence between multiple business objectives, the constraints assigned to each business and RAPM

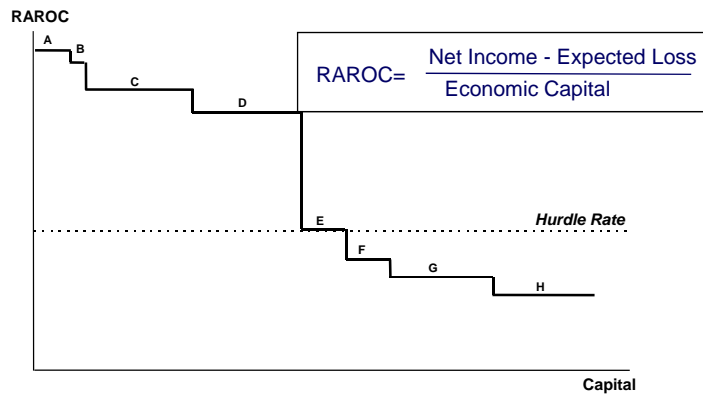


Key :Align Compensation Incentives over the life of the deal through RAROC and SVA measures



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Challenge: Assigning the right hurdle rate .



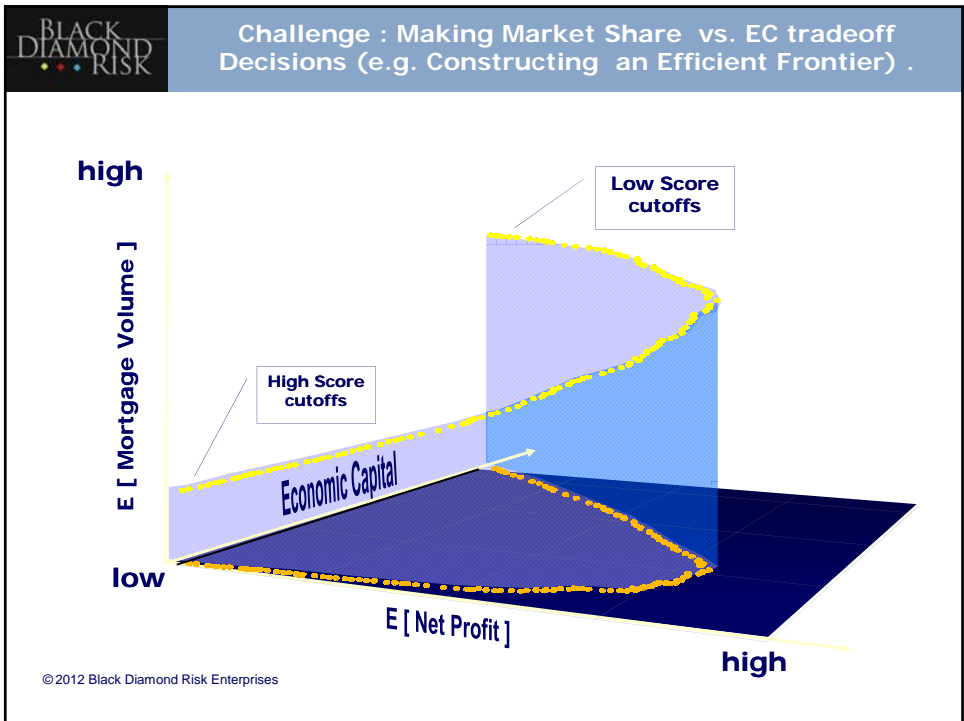
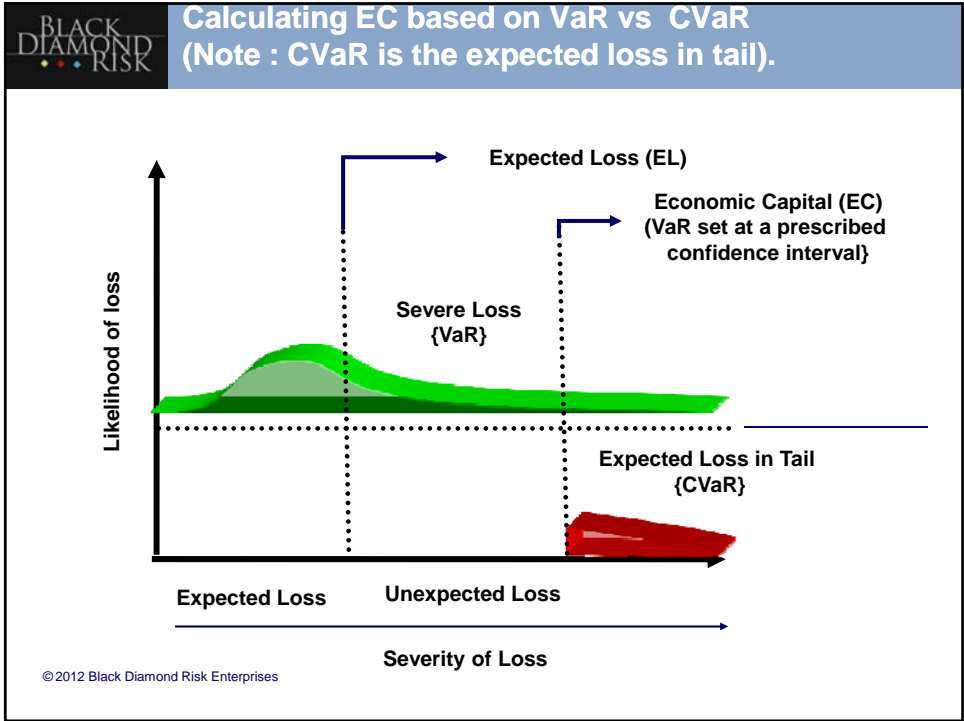
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**Challenge :**  
**Selecting the right set of capital measures**

- Economic Capital – Capital needed to sustain actual risk
  - Stand Alone Capital
  - Incremental Capital
  - Fully diversified Capital
- Regulatory Capital – Capital that the regulators want to make sure is set aside to cover contingencies
- Accounting (e.g. GAAP) Capital

**Challenge : Selecting the right set of capital measures (continued). Examples include:**

- VaR based Capital
- Dynamic VaR based Capital
- CVaR based Capital
- Dynamic CVaR based Capital
- Stress Test based Capital





**\*RAROC** = Risk Adjusted Return (RAR)  
On Capital (OC)

$EC = MRC + CRC + ORC + BRC + RRC + SRC + HRC - PE$  (Portfolio Effect)

After tax RAROC = N/D

$RAROC = (ER - C - EL + RORC - T) \times (1 - TR) / (EC)$

We want:

$RAROC > \text{Hurdle Rate}$

Shareholder Value Added (SVA) =  $N - \text{Hurdle Rate} \times EC > 0$

## Examples of a RAROC calculation



## Components of RAROC for a Loan

- ER="Expected revenues" are the revenues the activity is expected to generate (assuming no losses);
- C="Costs" are the direct expenses associated with running the activity (e.g., salaries, bonuses, infrastructure expenses, etc.);
- EL="Expected losses" are primarily the expected losses from default and correspond to the loan loss reserve. Because this cost, like other business costs, is priced into the transaction in the form of a spread over funding cost, there is no need for risk capital as a buffer to absorb this risk.
- RORC= "Return on risk capital" is the return on the risk capital allocated to the activity. It is generally assumed that this risk capital is invested in risk-free securities such as government bonds;
- T="Transfers" corresponds to transfer pricing mechanisms, primarily between the business unit and the Treasury group, such as charging the business unit for any funding cost incurred by its activities .It also includes overhead cost allocation from the head office.
- TR=Tax rate is the expected tax rate imputed to the activity using the effective tax rate of the company;
- EC="Economic capital" is the sum of risk capital and strategic capital

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## Calculating RAROC for a loan

- A \$1 billion corporate asset offers a headline return of nine percent.
- The operating cost is \$9 million per annum
- The effective tax rate is 30 percent.
- The portfolio is funded by \$1 billion with an interest charge of six percent
- Risk analysis of the unexpected losses associated with the portfolio is \$75 million dollars (i.e., 7.5 percent of the asset amount).
- The risk-free interest rate on government securities is seven percent Note: Economic capital must be invested in risk-free securities rather than being used to fund risky activities
- The expected loss on the asset is one percent per annum (i.e., \$10 million).

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- The after-tax RAROC is N/D where:  $N = (\$90 - \$9 - \$60 - \$10 + \$5.25) \times (1 - .3)$  and  $D = \$75$
- \$90 million is the expected revenue
- \$9 million is the operating cost
- \$60 million is the interest expense (six percent of the \$1 billion borrowed fund)
- \$10 million is the expected loss
- \$5.25 million the return on economic capital.
- The RAROC for this loan portfolio is 15.2 percent. This number can be interpreted as the annual after-tax expected rate of return on equity needed to support this loan portfolio

- Most firms use a single hurdle rate, for all business activities, based on the after-tax weighted average cost of equity capital:
- $H = (CE \times Re + PE \times Rp) / (CE + PE)$
- CE and PE denote the market value of common equity and preferred equity, respectively
- $Re$  and  $Rp$  are the cost of common equity and preferred equity, respectively.
- The cost of preferred equity is simply the yield on the firm's preferred shares.
- The cost of common equity is determined via a model such as the Capital Asset Pricing Model (CAPM)
- CAPM :  $Re = Rf + Be (Rm - Rf)$  where  $Rf$  is the risk-free rate,  $Rm$  is expected return on the market portfolio and  $Be$  is the firm's common equity market beta.

## Calculating Capital for a Mortgage

If PD =1% & LGD = 25% for a \$200,000 mortgage then  
Capital for the mortgage is \$5,012

If PD rises to 5% & LGD =25% for the same mortgage  
then Capital for the mortgage rises to \$13,176.

If PD rises to 20% & LGD rises to 45% for the mortgage  
then Capital for the mortgage rises to \$40,499

## Calculating RAROC for a Mortgage

**RAROC calculation for a \$200,000 mortgage**

**Assume:**

-PD =5% & LGD= 25%

-Coupon =6% & Funding Cost= 2%

**RAROC =N/D where**

**N= (6%-2%) x \$200,000 – 5%x25%x\$200,000**

**D= Capital=\$13,176**

**RAROC=(\$8,000-\$2,500)/\$13,176=41.7%**

**{Note : Ignored (for illustrative purposes) operating cost,  
taxes , capital credit , etc . Also treated the mortgage as  
non amortizing}**

## Bio of Dr. Robert M. Mark

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Dr. Robert M. Mark is a Founding Partner of Black Diamond Risk which provides corporate governance, risk management consulting, risk software tools and transaction services. Dr. Mark is also the Founding Executive Director of the Masters of Financial Engineering Program at the UCLA Anderson School of Management. He serves on several boards as well as on Checkpoint's Investment Committee. He was awarded the Financial Risk Manager of the Year by the Global Association of Risk Professionals (GARP). He is on the Executive Committee and Treasurer of the Board for the Professional Risk Managers' International Association (PRMIA)

Prior to his current position, he was the Senior Executive Vice-President and Chief Risk Officer (CRO) at the Canadian Imperial Bank of Commerce (CIBC). Dr. Mark was a member of the Management Committee. His global responsibility covered all credit, market, and operating risks for all of CIBC as well as for its subsidiaries. Prior to his CRO position, Dr. Mark was the Corporate Treasurer at CIBC.

Prior to CIBC, he was the partner in charge of the Financial Risk Management Consulting practice at Coopers & Lybrand (C&L). The Risk Management Practice and C&L advised clients on risk management issues and were directed toward financial institutions and multi-national corporations. This specialty area also coordinated the delivery of the firm's accounting, tax, control, and litigation services to provide clients with integrated and comprehensive risk management solutions and opportunities.

Prior to his position at C&L, he was a managing director in the Asia, Europe, and Capital Markets Group (AECM) at Chemical Bank. His responsibilities within AECM encompassed risk management, asset/liability management, research (quantitative analysis), strategic planning and analytical systems. He served on the Senior Credit Committee of the Bank. Before he joined Chemical Bank, he was a senior officer at Marine Midland Bank/Hong Kong Shanghai Bank (HKSB) where he headed the technical analysis trading group within the Capital Markets Sector.

He earned his Ph.D., with a dissertation in options pricing, from New York University's Graduate School of Engineering and Science, graduating first in his class. Subsequently, he received an Advanced Professional Certificate (APC) in accounting from NYU's Stern Graduate School of Business, and is a graduate of the Harvard Business School Advanced Management Program. He is an Adjunct Professor and co-author of Risk Management (McGraw-Hill), published in 2001 as well as a co-author of The Essentials of Risk Management (McGraw Hill) published in 2006. Dr. Mark served on the board of ISDA as well as the Chairperson of the National Asset/Liability Management Association (NALMA).