Bank Capital and Risk Management:
Operational risks in context

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Financial Firms Functionally

• Warehousing
  – Intermediate in illiquid exposures
  – Reduce illiquidity in their function as conduit
  – Add illiquidity as opaque corporate entities
  – Operational risks cut across both
• Is this
  – Efficient warehousing?
    • Deposit insurance
    • Payments and transactions processing
    • Monitoring of credits, claims, etc.
  – Inefficient warehousing?
    • Additional layer of taxation
    • Managerial discretion
    • Lack of transparency about assets
Financial Firms Functionally

• Distribution and origination
  – Services
  – Big balance sheet not required
  – Operational risks here too

• Financial firms are moving toward D&O and away from warehousing.

• How do we think about capital requirements and risk management in this context?
  – Many competing financial firms in service businesses have substantial ooprisk, yet no capital requirements
  – Service risks (oprisk is one) can trigger illiquidity and systemic problems
Definition of Capital

• Market value of the assets (tangible and intangible)

• Value of customer liabilities contingent on repayment

• Market value of investor liabilities
  – Role of subordinated debt
Definition of Capital

• This calculation makes more sense for warehouse firm than for D&O firm

• Capital as ‘Collateral on Call’
How much Collateral on Call?

- Liquidity and deadweight costs reduce collateralizability
  - Fee businesses contribute expected profits as well as risk
  - Expected service profits collateralizable only when received
  - Expected profits accrue over time
  - This makes horizon critical
VaR and Horizon

- Standard VaR – measurement of instantaneous $\sigma$

- Risk is capital falling below $f(\sigma)$ at end of period

- What we care about is risk of falling below at any time during period

- Translates fairly directly from standard VaR
  - 5% first stopping time VaR / standard Var = 1.2
Adding expected profits to VaR

- Horizon matters

<table>
<thead>
<tr>
<th>Expected return</th>
<th>Horizon</th>
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<tbody>
<tr>
<td></td>
<td>1 day</td>
</tr>
<tr>
<td>Expected return = 0</td>
<td>19%</td>
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<tr>
<td>Expected return = 20%</td>
<td>20%</td>
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How much Collateral on Call?

• For oprisks, data are limited and of questionable value
• Concern: big operational loss with externalities (e.g., 9/11 and the payment system, Enron and the energy market)
• Models of risk don’t provide full answer
  • Confidence, not just collateral, is the driver
  • Capital often far in excess of reasonable risk models
  • Risk measurement and risk charges are less useful for setting capital than they are for encouraging mitigation and hedging.
Insuring and Securitizing Oprisk

- Currently, we lack readily verifiable markers for oprisk severity and frequency
  - This is a problem for self-insuring, as well as for ceding risk
  - Ceding risk has additional problem of adverse selection / moral hazard
- Makes it hard and expensive to write contracts
- On the other hand, oprisks are highly diversifiable, so there is a strong argument for pooling
Allocation of Capital and Risk

• Internal systems needed
  - Charges for:
    • systematic risk exposures
    • corporate deadweight costs of financing
    • Externalities

• Helps create incentives to mitigate and clarify risk
• Helps to understand benefits of insurance

\[ k_i = r_f + \beta_{i,m} (k_m - r_f) + \beta_{i,b} Z_b + \beta_{i,l} Z_l \]
Insuring and securitizing oprisk: Lessons from the past

Figure 4b: Price of Reinsurance Relative to Actuarial Value, 1989-2000
Supply shock dominant?

[Diagram showing a demand and supply curve with the question: Supply shock dominant?]
Yes

- Price moves by more than ROL (retentions rise)
- Prices of hurricane risk rise after an earthquake
- Post Sept-11 price of outstanding cat bonds increased by 200 basis points (450 to 650).
Cobwebs are inefficient
(so they go away)

Figure 4d: Marginal Percent Reinsured 1970-2000
Capital market response to 9/11

- $8 billion + of capital moved into new/enhanced entities in first 6 weeks
- Lots of innovation in vehicles and instruments
Conclusions

• In the past market was pretty efficient over ‘medium’ term
• Good reasons to think ‘medium’ term is much shorter now
• Tremendous leverage from building hardware and software around insurance markets and risk measurement
• Hopefully, we don’t need need a large oprisk event as a wakeup call.