What Is a Robust Level of Risk Capital?[1]

by Larry Rubin and Ziaokai (Victor) Shi

Market observers have never been as skeptical on financial service firms' capital standing as they are today. As The Hartford released its third quarter earnings on Oct. 30, 2008, its stock price fell almost 50 percent when it reported a $2.6 billion quarterly loss. Many believe this was driven by its failure to convince the market that it was sufficiently capitalized to survive the financial crisis. The conference call was dominated by questions on the company's capitalization level.

Their skepticism makes sense. As shown in the table below, some prominent firms have asset-to-equity ratios as high as or higher than 20, which means their $1 in capital could leverage more than $20 in assets. Wall Street firms and some other financial conglomerates were operating

LEVERAGE OF TOP 25 FINANCIAL SERVICE COMPANIES IN THE UNITED STATES ($ Billions, 03/31/2008)

Asset Rank	Company	Industry	Asset-to-Equity	Q1 2008 Assets	Q1 2008 Equity
10	Freddie Mac	Specialty Lender	**50**	803	16
16	Bear Stearns	Broker/Dealer	**34**	399	12
5	Morgan Stanley	Broker/Dealer	**33**	1,091	33
11	Lehman Brothers	Broker/Dealer	**32**	786	25
7	Merrill Lynch	Broker/Dealer	**29**	1,042	37
4	Goldman Sachs	Broker/Dealer	**28**	1,189	43
18	FHLB of San Francisco	FHLB	**23**	332	14
8	Fannie Mae	Specialty Lender	**22**	843	39
15	Prudential Financial	Insurance	**21**	478	23
17	The Hartford	Insurance	**19**	344	18
1	Citigroup	Bank	**17**	2,200	128
14	Metlife	Insurance	**17**	557	33
21	GMAC	Specialty Lender	**16**	243	15
24	Countrywide Financial	Thrift	**15**	199	13
19	WaMu	Thrift	**14**	320	22
6	AIG	Insurance	**13**	1,051	80
3	JPMorgan Chase	Bank	**13**	1,643	126
13	Wells Fargo	Bank	**12**	595	48
12	GE Capital	Specialty Lender	**12**	684	58
22	U.S. Bancorp	Bank	**11**	242	22
2	Bank of America	Bank	**11**	1,737	156
9	Wachovia	Bank	**10**	809	78
25	Farm Credit System	Specialty Lender	**7**	197	27
23	Bank of New York Mellon	Bank	**7**	205	28
20	Berkshire Hathaway	Insurance	**2**	281	119

Source: SNL

[1] The views in this article only represent the authors' personal opinions. This article does not represent any statements from the organization where the authors are currently employed.

with high leverage ratios while at the same time they assumed that they were holding enough capital based on measurement generated from their internal risk capital models. Would those internal model generated figures be sufficiently robust for financial firms to withstand unexpected losses such as the credit crisis happening today? Also what has really caused the financial crisis as well as the undercapitalization of financial firms?

What Has Caused the Problem?

In the middle of this "hurricane" of the financial crisis, insurance companies generally stand in slightly better positions than investment banks (with a few exceptions that mostly arise from businesses written by affiliates of U.S. insurers but were not regulated as insurance). The credit crisis has impacted the banking sector more than the insurance sector. One of the reasons might be because they are under different regulatory environments. The insurance industry differs from banking in terms of the regulatory requirements of capital required. In the United States, the regulators have enforced risk-based capital (RBC) law, which requires insurers to hold minimum capital requirements according to calculations using a series of factors provided by regulators. Companies need to have an RBC ratio (total capital after slight adjustments over minimum requirement) of greater than 150 percent to avoid any regulatory actions. Insurers are generally holding two to four times the minimum RBC requirements for a targeted rating. This regulation has helped the insurance industry by setting up one bottom line of capitalization level across the industry. While U.S. risk-based capital is a crude and one-size-fits-all solution, the fundamental premise is that capital should be sufficient to enable a company to mature its future obligations.

However, investment banks are not as regulated as insurance companies in the United States. The credit default swap (CDS) market was nearly unregulated before this crisis. Firms like Bear Sterns, Merrill Lynch, Lehman Brothers, Washington Mutual, Fannie Mae and Freddie Mac had to face the reality of either filing for bankruptcy or selling themselves (to the government or other companies). This is largely because of the difficulties in funding their capital gaps. Regulated insurance companies, although also lacking capital access under current market pressure, had better capital strength to begin with and so far have been able to survive based on private sector solutions rather than purely relying on government bailouts. This is because 1) the capital gap is smaller; and 2) their core insurance operations are healthy and therefore attractive to private investors.

Regulation, especially of minimum capital requirements, plays a key role in preventing the trains from moving off their tracks. However, is more regulation the answer, or is the current problem a result of flawed regulation? In the past, we occasionally heard complaints of the over-regulation of federal banking regulators on investment and non-investment banks. However could it be true that federal regulation enforced burdensome regulatory rules resulting in only increased workloads on financial reporting processes, while neglecting some basic principles of capital requirements?

It is the authors' contention that it was not greed that led to the financial crisis but inadequate capital that followed from a flawed risk management strategy. Without an industry-wide capital framework, financial firms have been overrelying on their internal economic capital (EC) models to make their capital funding/allocating decisions. But they made three faulty assumptions: 1) they are adequately capitalized if they hold capital at the level their EC model has calculated; 2) EC models, which rely on historical experience as input, are sufficient to enable them to survive unexpected losses; 3) EC is the capital needed for the company to survive until the company can recapitalize (one year). We believe if companies had adequately considered the market price of risk in determining their economic capital, the credit crisis might have been avoided.

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Market Price of Risks

Markets price risk even though risks may not be traded in a deep and liquid market. Investors require margins when they choose to lend or invest their money. This margin decreases or increases depending on investors' pessimism and optimism, as well as changes in their risk aversion. Over the longer term, this margin becomes the excess of the company cost of capital over risk-free rates. A company creates additional value for its investors if the return on economic capital exceeds the cost of capital.

Can we purely utilize an internal model (that relies on historical loss data) to establish economic capital? To what extent does the market-priced risk impact economic capital?

The "standard" or most popular definition of economic capital is defined as the amount that an insurance company needs so that it can absorb all losses within a one-year time horizon with 99.5 percent probability. This definition is currently contained in the CFO principles for MCEV and in Solvency II. We considered how this level compares to market price of risks. In other words, is economic capital under this definition truly economic (i.e., consistent with the market)?

We compared the standard definition of economic capital to the market price of risk by analyzing an A-rated bond. Using historical default rates and rating transition probabilities published in Moody's study,[2] we simulated the loss distribution of this bond. Capital was set equal to the 99.5 percentile of this distribution over average loss (i.e., the 50th percentile of credit losses) over a one-year period. We further ran the model using a five-year time horizon. We then compared this to economic capital as determined by the market price of risk (described above). Under this approach, the average excess historical spread over expected defaults was the market-consistent return on capital (for A-rated bond issuers). Using a cost of capital of 9 percent, we solved for the market implied economic capital. The results of the analysis are shown below.

	Basic Points of Notional Amount
Market price Economic Capital	265
99.5% Percentile over one year	65
99.5% Percentile over five years	122

The conclusion is clear. The economic capital defined under Solvency II is significantly lower than the market implied economic level of capital. Even under five years' loss (Solvency II defines one year) time horizon, the internal EC is still lower than the market priced number although it is closer. We believe there are a number of reasons for this difference:

1. The historical data represents only one sample of potential outcomes that could have happened and is not necessarily the mean.
2. The market is pricing risks that are currently unknown (such as black swans and paradigm shifts).
3. Economic capital modeling may have failed to adequately consider the level of liquidity risk that is priced for in the market.

Failure to reflect the market price of risk in economic capital calculations may have resulted in the undercapitalization of the banking industry. If the industry replaces RBC with the currently Solvency II defined risk capital, we may foresee an undercapitalization and increasing failures in the insurance sector in the future. While we do not conclude the 265 basis points is the correct level of economic capital, as this price can include other factors such as cost of funds for potential purchasers or the assets, frictional costs and tax liabilities, we do conclude that the large disconnect between the market price of risk and the

[2] "Corporate Default and Recovery Rates, 1920-2007," February 2008, Moody's.

Solvency II definition should lead to risk managers questioning whether their economic capital models are properly reflecting all the risks. We believe that for the regulatory framework to become more economic and thereby promote a healthier industry, the definition of economic capital under Solvency II needs to be an improvement over the one-size-fits-all definition contained in U.S. RBC. In order for it to be an improvement, it should be modified to reflect as a key input the market price of risk, and it should adopt the RBC definition that capital exists to mature an obligation.

Establish Robust Risk Capital Strategy

The authors agree with Greenspan's remarks recently made in the *New York Times*, "Bad data hurt Wall Street computer models," Greenspan said, "… whole intellectual edifice, however, collapsed in the summer of last year because the data inputted into the risk management models generally covered only the past two decades a period of euphoria… ."

Political figures and journalists have tended to blame deregulation and greed for the credit crisis. However, we would like to suggest that these were not the primary cause of the credit crisis. The real cause of the crisis was faulty regulation and arrogance. Flawed regulation in the over-reliance on complicated capital models and arrogance in believing that the complex mathematical formula in risk models overcame the limitations on input availability and enabled companies to capture returns that were greater than the cost of capital, have led Wall Street (by creating CDOs and similar instruments) to repackage risks and take out the systematic excess risk charges as profits, and have also allowed companies to run "prudently" on leverage ratios that were in hindsight over the limit. If some of the broker dealers that were running over 30-to-1 leverage ratios had reflected the market price of risk, they might still be around today. Establishing an "economic" solvency and performance framework based on the presumption that we are smarter than the market is not economic and is both fatally flawed and fundamentally unsound. The objective of performance reporting should be to judge whether we truly were smarter than the market and not to presume it up-front.

Almost every recently failed firm was perceived as a sophisticated risk manager. We wish those painful failure examples would evoke more consideration over a system that might be fundamentally flawed rather than blaming individuals who were unlucky in being the last executives of their fallen companies.

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