



# Risk Management in the Age of Turbulence - Failures and Challenges

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## ABSTRACT

Today's business, being affected by the continuous changes in economic environment, must reinvent the "prudent risk taking" concept to strike an appropriate balance between risk, return and growth, in order to create lasting value. This paper is focused on describing the nature of risk and the objectives of risk management. In the context of more attractive risk conceptual simplifications which often lead to significant errors, the paper explains the failures in risk management, the way of their occurrence and the methods of reducing their occurrence.

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## 1. Introduction

Risk is one of the companies' fundamental elements which influence financial behavior and generate complexity and efficiency in resources allocations. Much of the financial decisions making by households, business firms, governments, and especially financial institutions are focused on the management of risk. Measuring the influence of risk and analyzing ways of controlling and allocating, risk management requires a wide range of sophisticated mathematical and computational tools like probability, optimization, and estimation theories.

Also, academics and practitioners have paid a lot of attention in the recent years to the risk management concepts and this has led to a continued growth of number of academic articles indexed in the Journal of Economic Literature and to an extended membership of the Global Association of Risk Professionals.

Banks and companies noted that the type, number and extent of their exposure have increased significantly in the context of globalizations of trade and production which lead to a significant increase of financial and direct investment in volatile emerging markets. In addition, in both developed and emerging economies, capital markets have become more important as a means of allocating resources. Spates of volatile financial innovations are simultaneously a source of risk and a means to mitigate it.

But risk management has also attracted attention due to the repeated failures associated with its implementation, being tested by unprecedented turbulence in the financial markets, including depressed asset prices, reduced liquidity in many markets, and a contraction in the credit markets.

The changed marketplace has affected every segment of the financial services industry including banks, insurance companies, and asset management firms. While the confluence of these events has challenged risk management within financial firms, these events have also demonstrated the need for enhanced risk management capabilities. Risk and return are generally correlated and should be evaluated together [Deloitte, 2009].

## 2. Risk Management – Key Concepts

Considering the fact that companies invest a lot in research and product development, plant and equipment, inventory, and human capital without knowing whether the future cash flows from these investments will be sufficient to compensate debt and equity holders, the risk is to be defined as a key factor in economic life. If such real investments do not generate their required returns, then the financial claims on these returns will decline in value. This view moves risk management to the core of an organization's activities and makes it essential to the organization's strategy.

Above all, risk management is a dynamic process whereby intervening factors can cause outcomes to differ from those planned. Internal causes can be for the most part grouped under operational risks, which include fraud, system failure, and the disruption of production, human error and so forth [Ruth, 2005].

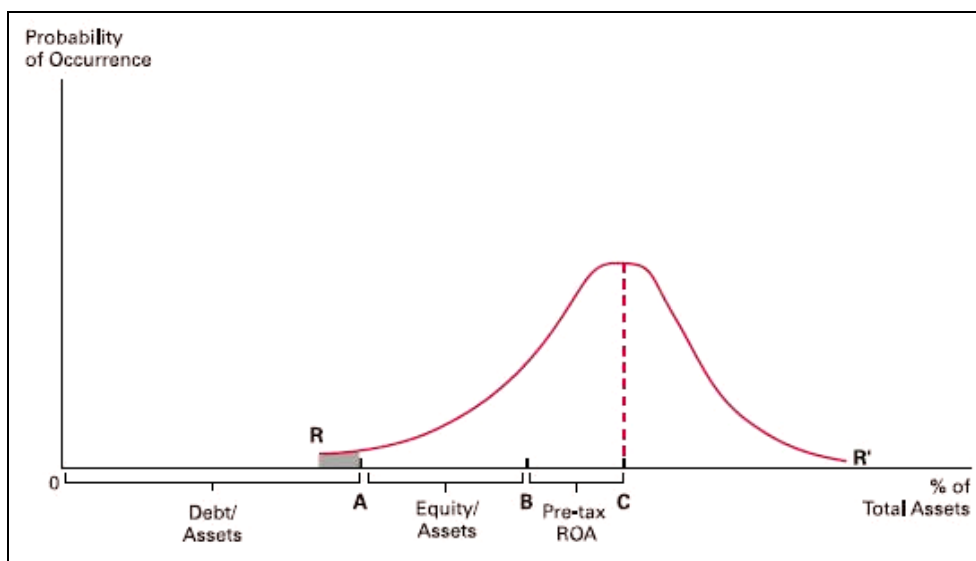
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An important issue in risk analysis occurred when analysts began to describe the risk of an investment as being equivalent to the distribution of potential outcomes, where the distribution consists of all possible outcomes weighted by their relative probability of occurrence. The more extreme is the distribution of outcomes, the riskier is the project. Two projects could have the same expected return (the weighted average of all possible outcomes) but differ in their risk, if one project had a broader range of outcomes or a higher probability of extreme outcomes than the other.

Another important issue was that while individual outcomes were not predictable, their distribution often was. That is, distributions often could be described by mathematical models that depended on a few key parameters, such as the mean and the standard deviation for the well-known normal distribution. If the appropriate type of distribution could be established, then an analyst could use relatively sparse historical data to forecast the key parameters and thus the future distribution of returns. This ability to predict the distribution of returns was critical both to the quantification of risk premiums and to the determination of the capital structure of the firm.

The relationship between capital structure, defined as the relative proportions of debt and equity in the firm's balance sheet, and the distribution of returns is shown in Figure 1.

**Figure 1. Capital Structure and Bankruptcy Risk**



Source: Ralph C. Kimball, *Failures in Risk Management*, *New England Economic Review*, January/February 2000

The horizontal axis is denominated in terms of percent of total assets. The distance OA represents the ratio of debt to assets, while the distance AB represents the ratio of equity to assets. Their sum, represented by the distance OB, equals 100 percent of assets. The distance BC represents the expected pretax return on assets, approximated by the historical mean of pretax return on assets (ROA). The curve RR' represents the potential variation in pretax ROA around the expected value.

Book insolvency occurs when operating losses exceed the firm's equity capital; it is represented by the shaded area under the curve to the left of A on the horizontal axis. This shaded area represents the risk borne by the debt holders and is equivalent to the probability of the firm's insolvency. The area under the curve to the right of A represents the risk borne by the equity holders.

Clearly, the division of risk between debt and equity holders will be determined by the position of point A relative to the distribution of outcomes. The risk borne by debt holders can be decreased if the proportion of equity capital is increased, shifting point A to the left, or increased if the proportion of equity is decreased, shifting point A to the right. Similarly, an increase in risk, signified by a flatter distribution, will require a higher proportion of equity to generate the same probability of insolvency [Ralph, 2000].

### 3. Companies and Management Risk Failures

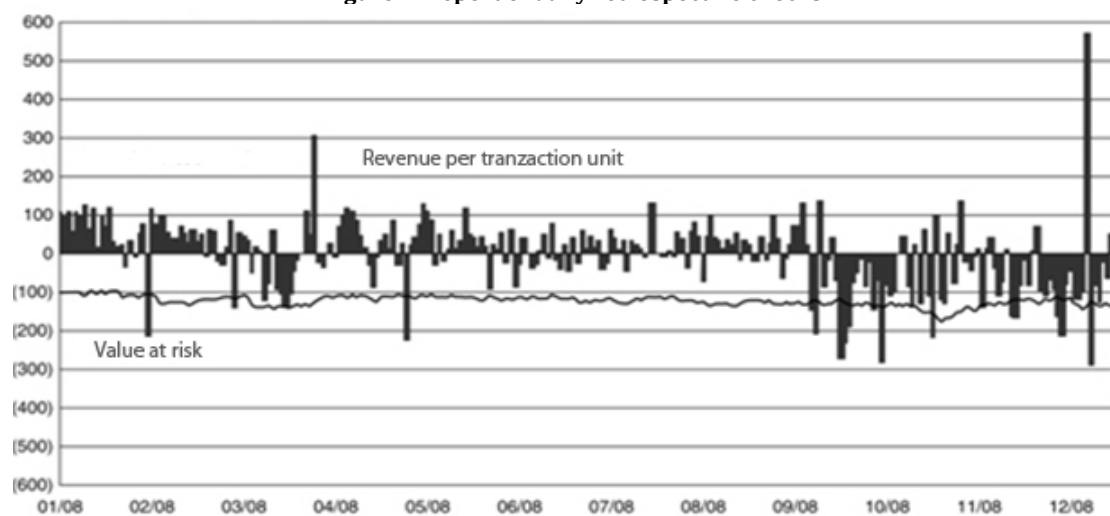
Companies fail due to unexpected losses generated by three categories of causes:

- *Insufficient capital* for the draw absorption from distribution due to the huge dimension of losses which exceed the "socially acceptable" hurdle for insolvency. The company fails even if its loss distribution was correctly estimated;
- *Model errors* - misestimating of outcomes distribution due to errors occurred in risk measurement. This type of error can also represent a form of management myopia when managers fail to recognize that an exposure exists. It is the most common way of failure recorded at companies' level;
- The latter might be termed as *risk ignorance*.

The companies' ability of managing their equity capital and measure their exposures is directly linked to their capacity of acting as buffers against errors in risk management.

Although difficult to quantify the risk as a simple model which can produce a poor representation of the future, it is possible to make some estimations of error parameters, that means, the possibility for the protocols, used for generating parameters, to inform that the model is wrong - see Figure 16.

**Figure 2. Report of daily retrospective checks**



Source: Black Diamond Risk Enterprises

If the risk assessment is a failure due to the fact that, initially, was not based on meaningful measures and the applied methods were addressing wrong problems, then, the risk management becomes a simply waste of time and money. In the worst case, the erroneous conclusions lead the organization down a more dangerous path that it would probably not have otherwise taken.

Stochastic methods, which are widely used in financial communities, require an assumption of system stability, this means that, despite the fact that there will always be random movements and even occasional shocks, will not be any event that is so unusual that the system can not survive and companies do not continue to make transactions in the future.

When the risk management has failed, this leads to the idea that one of the following general causes occurred [Hubbard, 2009]:

1. Confusion regarding the concept of risk. Among different specialties in risk management, analysts and managers are using the word risk to mean some very different things.
2. Completely avoidable human errors in subjective judgments of risk. Most of the methods of risk assessment must rely on at least some subjective inputs by human experts, but, without certain precautions, human experts make surprisingly consistent types of errors in judgment about uncertainty and risk. Although research shows that there are methods that can correct certain systemic errors that people make, very few do so and the net result is an almost universal understatement of risk.
3. Entirely ineffectual but popular subjective scoring methods. The numerous arbitrary rules and values created in scoring methods not only fail to consider the problems with subjective risks (see previous point), they introduce errors of their own and may actually make decisions worse. There is no large, important decision that would not be better served with some other analysis approach.
4. Misconceptions that block the use of better, existing methods. Even some experienced risk analysts defend the use of ineffectual methods by arguing that better, more sophisticated methods will not work. But each of these arguments is based on fundamental fallacies about the nature of quantitative risk analysis.
5. Recurring errors in even the most sophisticated models. Most users of the more quantitative approaches do not attempt to measure the reliability of their models by checking against historical data. Quality control is mostly nonexistent in users of popular quantitative modeling tools and the use of real-world observations is too rare. These are all avoidable problems and should not be considered obstacles to the use of better risk analysis. Some analysts assume that their models take on a level of authority and "truth" that is never justified. Half-understood models are misapplied in a variety of situations.
6. Institutional factors. Unnecessary isolation of risk analysts from each other—both within the same organization and among organizations - means that important shared risks and relationships will be ignored in overspecialized models.

7. Unproductive incentive structures. The methods will not matter much if the incentives to make better decisions and manage risks are not improved. Minimizing risk is not a factor in most executive bonus calculations. Human experts are not incentivized to give reliable forecasts and there is little incentive to verify old forecasts against observations. A key motivator is compliance and use of so-called best practices.
8. Except for certain quantitative methods in certain industries, the effectiveness of risk management is almost never measured. The biggest failure of risk management is that there is almost no experimentally verifiable evidence that the methods used improve on the assessment and mitigation of risks, especially for the softer (and much more popular) methods. If the only “evidence” is a subjective perception of success by the very managers who championed the method in the first place, then we have no reason to believe that the risk management method does not have a negative return. Part of the success of any initiative is the measurable evidence of its success. It is a failure of risk management to know nothing of its own risks. It is also an avoidable risk that risk management, contrary to its purpose, fails to avoid.
9. Some parts that have been measured do not work. The experimental evidence that does exist for some aspects of risk management indicates the existence of some serious errors and biases. Since many risk management methods rely on human judgment, we should consider the research that shows how humans misperceive and systematically underestimate risks. If these problems are not identified and corrected, then they will invalidate any risk management method based even in part on human assessments. Other methods add error through arbitrary scales or the use of historical data. Even some of the most quantitatively rigorous methods fail to produce results that compare well with historical observations.
10. Some parts that do work are not used. There are methods that are proven to work both in controlled laboratory settings and in the real world, but are not used in most risk management processes. These are methods that are entirely practical in the real world and, although they may be more elaborate, are easily justified for the magnitude of the decisions risk management will influence. Falling far short of what one could reasonably be expected to do is another form of failure.

As a conclusion to the above presented failures is the imperious necessity of a deeper analyze of risk taken into account when risk management has to be applied. Now it is time to measure risk management itself in a meaningful way so we can identify more precisely where risk management is broken and how to fix it.

#### 4. Challenges in Risk Management

There are two main directions used by major companies and especially by financial institutions as methods to capture and measure potential losses over some horizon of time generated by risks:

- Using probability-weighted approach in order to estimate potential losses (as in a value-at-risk or earnings-at-risk system, where the distribution of future earnings is calculated);
- Using point estimates of potential losses under certain extreme circumstances (as in a stress test or scenario analysis approach or in an ‘expected tail loss’ estimation);

In today’s businesses, the picture is considerably more complex and the focus is mainly on potential losses, either to earnings or economic value. An aggregate risk measure must incorporate different types of risk (market, credit, and operational) and must bring together risks across different business lines (banking, insurance, and securities).

The state of development of modeling technology and the assumptions and techniques used to estimate potential losses vary across the various risks. Some major reasons are the nature of the risk, the availability of data, and the frequency of measurable events [Cumming, 2009]:

- *Market risk* can be estimated using available series of daily data, price and portfolio changes and the one-day horizon for measuring potential losses.
- *Credit risk* tends to exhibit lower frequency variation as changes in credit status tend to evolve over weeks or months rather than on a day-to-day basis and as fewer historical data are available to aid in model calibration.
- *Operational risk* - the risk stemming from the failure of computer systems, control procedures, and human error –captures a mixture of events, some of which involve relatively frequent small losses (settlement errors in a trading operation, for instance) and others which involve infrequent but often large losses (widespread computer failure).

It is difficult to obtain consistent data on these losses. Legal, strategic and reputational risks are very difficult to be quantified, because theoretical techniques required for capturing all these risks are not discovered and developed.

One of the main challenges regarding the calculation of risk exposures is based on these differences. Should we choose a single horizon for all the risks and, if so, how can we determine this horizon? Can we explicitly take into consideration the time dimension into the risk assessment and what are the paths of risk over time? How can we measure the correlations between various risk exposures?

When defining a new risk, most organizations address this situation by adapting their vision or by designing new processes, starting from the idea that increased control leads to lower default risk. In reality, the situation is exactly reversed - the dynamics of change continue to grow, new risks and regulations are identified, and in most of the cases, those measures taken to manage newly identified risks, usually increase the vulnerability because of the increasing complexity.

Many organizations usually apply a costly band aid of control when external forces bring extra regulation and something goes wrong. Anyway, as in the case of ROI, the past cannot be a guarantee for the future. This way, all contemporary systems related to risk management that tries to change what yesterday went wrong, will not be able to manage what it might go wrong tomorrow. So, the resulting risk management systems are designed to eradicate what went wrong yesterday, not to manage what might go wrong tomorrow.

## 5. Main drivers of change in risk management priorities over the past three years

Increased focus on risk management on the part of senior management and board	-14%
Losses at our own institution	-6%
Regulatory pressure	-11%
Governance scandals affecting another financial institution or major corporate	-5%
Changes in reporting standards	-4%
Threat of terrorist activity	-2%
Focus on social responsibility programs	-1%
Increased levels of IT security risk	-1%
Increased levels of geopolitical risk	0%
Demands for corporate transparency and accountability	+3%
Increased focus on risks pertaining to people and behavior	+3%
Increased off shoring activities leading to greater emphasis on business continuity	+4%
Levels of customer satisfaction and/or churn	+4%
Macroeconomic volatility	+4%
Financial market volatility	+4%
Increased stakeholder focus on risk management practices	+4%
Securing competitive advantage over competitors	+4%
Focus on cost reduction and efficiency	+5%
Aim of increasing value of risk management to the business	+9%

*Source: PricewaterhouseCoopers EIU Survey, January 2008*

## 6. Conclusion

Nowadays, an optimum equilibrium between companies risk and companies analysis can only be achieved by reinventing the prudent risk approach. The company perspective in risks analyzes and regulation is very much depending on globalization, sourcing, supply chain, stakeholder requirements and macroeconomic considerations.

Many of the key research questions involve technical issues in risk measurement and risk modeling. In addition, future research into the main issues presented in this article could produce findings that would be of clear use to supervisors and financial institutions.

Although risk assessment methods are very useful in limiting risk and enhance business decision-making skills, even the best models can fail sometimes, and in this case, management must be prepared for these unforeseen elements. When this set up is clear, a company depends, on both ability to forecast and risk models, no matter how sophisticated they are.

Risk assessment failures can sometimes be specific to certain activities, asset categories, industry groups and counterparties. Therefore, best practices include imposing focus and deep analysis of limitations in the logic game. Such limitations recognize that an increase of diversification will tend to mitigate extreme losses when risk prevention fails [McNeil, 2005].

A best practice in risk management is more than a set of quantitative methods for models definition, risk measurement and risk management. Therefore, some methods of risk measurement like economic capital or Value at Risk create, within the company, a corporate culture that integrates risk-based thinking and

expertise at every level of business flow and this is the best protection of the company against catastrophic risk.

Although mathematical models and protocols used to measure the risk vary from one firm to another, the best practice in risk management remains constant. It is designed to optimize the tactical decisions and strategic ones at every level of the enterprise.

Best practices also include explicit risk model definition when possible. Financial engineering and risk models domain is very robust. New models and methods are developed and implemented very quickly, because any small advantage gain in this area can lead to substantial profits. It is almost impossible to follow all the details and to have a complete screening of them, since many models are protected like state secrets. However, there are two important developments in cutting-edge best practices in recent years. Both developments have recognized the dynamic character of market evolution over time and the effect of human activities as main drivers of change.

Financial institutions like Goldman Sachs, Morgan Stanley and JPMorgan Chase use sophisticated (and expensive) risk models. These models can be fully own and developed in-house, or use commercial software that is customized for use within the company and is updated with information by using internal protocols. Such models are able to manage each class of goods, each type of derivative security, and each exposure. The technology that supports this effort provides real-time reports on the risk of the individual agent to high management.

## References

- [1]. Cumming C. M., Hirtle B. J.: "The challenges of risk management in diversified financial companies, *Financial Capital*", New York, 2009;
- [2]. Deloitte Co.: "Global Risk Management Survey: Sixth Edition Risk management in the spotlight", 2009;
- [3]. Duncan, W., R.: *A Guide to the Project Management Body of Knowledge, Project Risk, Management, Project Risk Management*, Upper Darby, 1996;
- [4]. Froot, K. A., Stein J. C.: "Risk Management, Capital Budgeting, and Capital Structure Policy for Financial Institutions: An Integrated Approach", *Journal of Financial Economics* 47, no. 1 (January): 55-82, 1998;
- [5]. Haslett, W. V.: "Risk Management: Foundations For a Changing Financial World", Wiley, 2010
- [6]. Hubbard D.W.: "The Failure of Risk Management: Why It's Broken and How to Fix It", John Wiley & Sons, New Jersey, 2009;
- [7]. ISO/DIS 31000 – "Risk Management: Principles and Guidelines on Implementation", ISO 2008/9;
- [8]. Lam J.: "Enterprise - Wide Risk Management: Staying Ahead of the Convergence Curve", *Journal of Lending and Credit Risk Management*, 81, no. 10 (June): 16-9, 1999;
- [9]. Lam, J.: "Enterprise Risk Management": From Incentives to Controls. Wiley, Hoboken, NJ (2003);
- [10]. Matthew J., Stewart, D.: "Probability for risk management", *Library of Congress*, 2009;
- [11]. McNeil, A.J., Frey, R., Embrechts, P.: *Quantitative Risk Management: Concepts, Techniques and Tools*. Princeton University Press, Princeton, NJ (2005);
- [12]. Kimball R. K.: "Failures in Risk Management", *New England Economic Review*, January/February 2000;
- [13]. PricewaterhouseCoopers – DiPiazza S. A.: "Exploring emerging risks", *PWC 2008 Annual Global CEO Survey 2008*;
- [14]. Ralph C. Kimball: "Failures in Risk Management", *New England Economic Review*, January/February 2000
- [15]. Ruth T., Schymyck N.: "Risk Management and Innovation in Japan, Britain and the United States", *Routledge*, New York, 2005;
- [16]. Rowe, D., Jovic, D., Reeves, R.: "The continuing saga – Basel II developments: bank capital management in the light of Basel II – how to manage capital in financial institutions", *Balance Sheet Journal*, vol. 12, Issue 3, 2004;
- [17]. Samuelson, P.: "Foundations of Economic Analysis", Cambridge University, 1947;
- [18]. Staveren, M.: "Uncertainty and Ground Conditions: A Risk Management Approach", Elsevier 2006;
- [19]. Simons K.: "Model Error", *New England Economic Review*, November/December, 1997;
- [20]. Samuelson, P.: "Foundations of Economic Analysis", Cambridge University, 1947;
- [21]. Staveren, M.: "Uncertainty and Ground Conditions: A Risk Management Approach", Elsevier 2006;
- [22]. Stulz R.: "Rethinking Risk Management", *Journal of Applied Corporate Finance*, Fall, 1996;
- [23]. Toft, B.: "Behavioral aspects of risk management", *proceedings Annual Conference of Association of Risk Managers in Industry and Commerce*, 1–4 April, University of Warwick, Warwick, 1993;
- [24]. Tufano P.: "Who Manages Risk? An Empirical Examination of the Risk Management Practices of the Gold Mining Industry", *Journal of Finance*, September, 1996;
- [25]. Yamai, Y., Yoshida, T.: "Comparative analyses of expected shortfall and Value-at-Risk: Their estimation error, decomposition, and optimization". *Monetary and Economic Studies*, pp. 87–121 (January 2002).