

Why the current practice of operational risk management in insurance is fundamentally flawed - evidence from the field

Dr Madhu Acharyya

macharyya@bournemouth.ac.uk

*The Business School, Bournemouth University, Executive Business Centre, 89
Holdenhurst Road, BH8 8EB, Bournemouth, United Kingdom*

Abstract

This paper evaluates the current practice of operational risk management in the insurance sector. Although operational risk is nothing new in insurance but due to the regulatory requirements the insurance companies initiated computation of risk capital for their operational loss. I observed that the current effort on the management of operational risk in insurance is not a naturally evolve phenomena. I found that operational risk, in its Basel II definition, is unlikely a significant cause of insurers' failure. In addition, the current Basel II definition for operational risk is not suitable for insurance business. Consequently, invention of models and tools in insurance based on this definition is incomplete and appears illusory. My findings are based on the analysis of a dozen of interviews with insurance industry professionals. I demonstrated the way how operational risk is quantified in practice and I found that the result obtained from this computation is of little use in managerial decision making. I proposed a set of policy recommendations illustrating the characteristics of operational risk in insurance. This study can be used a platform of launching dialogues to initiate new and fresh thinking of operational risk in insurance beyond the current artificial and narrow boundaries.

Acknowledgement: I gratefully acknowledge the financial support of the Society of Actuaries to conduct the study. This paper is an output of the original study.

1. Introduction

The Basel II defines operational risk as “The risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events”. This definition includes legal risk¹ thus recognising it as a subset of operational risk. However, strategic risk and reputational risk are not included in this definition. The Basel committee believes that this is appropriate for risk management and, ultimately, the measurement (Basel, 2001). It is clear that the motive behind this definition is to manage the operational risk associated with the core business risks of a bank (e.g., market, credit, liquidity). Two other risks i.e., strategic risk and reputational risk are intentionally ignored firstly they are not sufficiently understood and the existing tools and techniques are inadequate to quantify them.

There are evidences of banking failure due to the operational risk. For example, BCCI was collapsed in 1991 due to its involvement in money laundering and the financing of arms trafficking. In 1995 Barings bank was failed due to a trader’s fraudulent actions. The crisis of Daiwa Bank was happened in 1995 due to lax regulatory controls at a branch in New York that resulted bad debts and loans. All these banking failures were triggered by isolated events outside market, credit and liquidity risks thus fall under operational risk. It is understood that the Basel Capital Adequacy regulation added operational risk as a separate risk category in Basel II as a response of these banking failures. Consequently, the factors that caused such failures were included in the definition of operational risk in Basel II. As a result the definition of operational risk, from general perspective, is incomplete. However, the cause of systematic failure in the banking industry that we observed in the aftermath of 2007 credit crunch followed by global financial crisis is fundamentally different from the causes of the failures of Barings, BCCI, Daiwa, etc. The analysis of the recent systemic failure of banks suggests that no single factor actually triggered the failures. The factors range from excessive risk taking in banks’ participation in unsecured mortgage securitisation, accumulation of high-risk associated with investment banking functions with comparatively low-risk retail banking, etc. to failed merger and acquisitions. For example, the ABN Amro merger with Royal Bank of Scotland has proved wrong and so that with Lloyd’s TSB with HBOS. The bankruptcy of Merrill Lynch and Lehman Brothers were caused due to excessive risk taking in the mortgage securitisation market. This systemic market failure happened due to the failure of several organisations and they cannot be seen as isolated events. Consequently, it is hard to justify operational risk as this systemic failure in the banking industry. It indicates that we are endangered with a different kind of risk that has caused all these full and near failure incidents across the banking industry in recent financial crisis. Clearly, the causes of this market-wide failure include top-level strategic decisions which eventually proved faulty in real world scenarios. In fact, the banking industry as a whole was living with this invisible risk for long, it took long time to be visible with a delay of understanding its slow-poisoning characteristics. Yes, this is the risk that the Basel II did not recognise in the definition of operational risk. It is the strate-

¹ No universally agreed definition of legal risk exists. It is understood that the by including legal risk in operational risk the Basel Committee assumed that there are legal aspect of operational risk associated with the core banking risks e.g., market, credit, liquidity and non-compliance of regulations The list of legal risk may include fraud, misreporting of positions, inappropriate employment practice that cause excessive workers compensation claims and liabilities, fiduciary breaches, etc.

gic risk that includes faulty decisions at the entire organisational level that not only harm the organisation but severely affect the entire industry.

The focus of this article is to observe the significance of operational risk in insurance and evaluate its status in the current practice. However, it is important to distinguish strategic risk from operational risk in light of the definition as proposed in Basel II. While strategic risk is the degree of risk associated with the quality of strategy (robust or faulty), the operational risk is the errors associated with executing the strategy.

Following the practice of operational risk management in banking, the leading reinsurance and insurance companies e.g., Swiss Re, Zurich, AXA and Lloyd's market, etc. in Europe started to develop operational risk management function under their Group Enterprise Risk Management framework. The insurers' solvency regulation, EU Solvency II in particular, adopted operational risk as one of the core risk of insurance business. The FSA in UK also recognised operational risk with considerable attention. However, it is important to mention here that unlike banking the invention of operational risk in insurance was not triggered by organisational failures. Moreover, there is no claim that insurers' insolvency was triggered by bank-like operational risk. For example, the independent insurance in the UK failed due to mis-selling of insurance products i.e., under-pricing and unethical actions of the top-management. The equitable life, also in the UK, failed due to mis-selling of high guarantee annuity options (GAOs) that led the life insurer into financial problems. The HIH in Australia failed due to failure in FAI insurance acquisition and its aggressive accounting practices in the illegal financial reinsurance transaction to cover up financial distress. Recently, the AIG in the USA failed due to its massive exposure on mortgage based securities through credit default swaps that was considered against the core principle of insurance business. In fact, operational risk was never been considered as a core risk of any insurance company's failure. This study focuses on the operational risk in the insurance industry. Hence the question arises whether management of operational risk is significant on insurers' survival strategy. Moreover, what does operational risk mean in insurance? What are its drivers? What is the best way to manage insurers' operational risk? Is the banking approach in managing operational risk suitable in insurance? Should we need a different approach in understanding and alternative tools in measuring and managing operational risk? These questions still remain unanswered in the literature and practice.

These emphasised the fact that the existing incomplete knowledge on operational risk across the financial sector is an overarching problem in understanding and managing risks other than the clearly identified core business risks. It is important to mention that insurance business model is different from that of banking. Moreover, even in banking the operational risk associated with investment banking operation is much higher than the retail banking. As mentioned earlier, the definition of operational risk as prescribed by Basel II is adopted in insurance. In addition, the majority of current research on operational risk is based on this definition. Moreover, the Basel II focuses more on the measurement side of operational risk rather than understanding its causes and characteristics. The concern is that if this practice continues then the true characteristics of operational risk will not reveal and all the exercises and efforts on operational risk will be useless and wastage of effort and time. Con-

sequently, the business will not be benefited by the current efforts or research and practice in management of operational risk. This article provides a better understanding of operational risk.

This article is structured in six sections. *First*, a literature review on operational risk is conducted. In this section I, amongst other topics, discussed the difference between banks business model with insurance; the risk profile of banks and insurance companies; the theoretical foundation of operational risk and the gap in operational risk management literature. *Thereafter*, I described methodology and the quantitative data and demonstrated the techniques of quantifying operational risk. This is a qualitative study where the quantitative number and computation have been used to justify the arguments. I conducted interviews with several operational risk managers in insurance companies both in Europe and North America. I followed the structure of the operational risk database as maintained by the British Insurers Association is studied. *Third*, the result of this risk quantification exercise was then compared and analysed with the literature and the interview data obtained from the insurance managers. It is revealed that that the current technique for the measurement of operational risk is fundamentally flawed. *Fourth*, I proposed five policy recommendations which illustrate the characteristic of operational risk insurance business. *Finally*, the conclusion is drawn.

2. Literature review

Operational risk is still an observed phenomenon and the properties of which are not entirely understood by academics and practitioners. It was not long ago when the measurement and management of operational risk was first introduced in Basel II as a reaction of preventing the potential failure of banks due to operational errors as happened in Barings² and Daiwa (Power, 2005)³. The definition of operational risk is thus primarily linked, as its origin, to the components of risk associated with similar events related to trading activities in the derivative market. Over the time, this operational risk concept was extended to the credit risk management practice, where the managers in banks' credit division raise concerns on the integrity of settlement systems. Moreover, operational risk is treated as a left-over category from the core banking risks. However, strategic risk and reputational risk was not included in the operational risk category in Basel definition mainly due to avoid the complexity associated with understanding and quantifying these risks. Consequently, the evolution of the operational risk management as a management function is a regulatory driven approach which binds managers to must compute the level of risk capital⁴ for this left-over category of risks that a bank face. Because this is mandatory and a must-do job, the banking institutions consequently reactively acted to comply with the regulatory bindings. In order to comply with the regulatory requirements there was an im-

² The bankruptcy of Barings bank happened in 1995 primarily due to the operational (fraud, in particular) 'rogue' trading activities of Nicholas Lesson in Singapore.

³ A list major industry events due to operational and strategic failures of several organisations is added in Acharyya (2010)

⁴ The Basel II originally set a 20% of the current minimum regulatory capital as a benchmark deriving from practice. Thereafter, this level was reduced to 12%.

mediate need of data gathering and model development by leading banks. All of these efforts were aimed to produce a model generated number and there were no much interest to considering the quality, adequacy and reliability of data. In practice, three groups of professionals are interested with the management of operational risk. One is the internal auditors, who work independent of management, and they, by professional training, works with process driven function to provide assurance on the implementation of strategy with minimal error. Other group of people are the risk modellers with skill on quantitative financial modelling techniques. The concentration of their modelling and measurement approaches are entirely on the skewed and fat tailed risks with an understanding that the standard risk management framework and practice that traditionally existed in the industry cannot deal with these extreme risks. Another group of professionals, who are the business managers and they manage the operational risk on day-to-day basis as a part of business management practice.

In the academic side a majority of published research on operational risk are written on the banking sector. Comparatively, a few researches were done on the operational risk in the insurance industry. However, the relevant studies bear at least two common characteristics. First, they all focused on the quantification of operational risk and second, they are based on the definition of operational risk as prescribed by Basel II. For example, Caudhury (2010) wrote on developing the capital adequacy models of operational risk for banks. Until now only few papers i.e., Verrall (2007) and Tripp *et al* (2004) focused specifically on the operational risk of insurance companies and Cummins *et al* (2006)⁵ focused on both banking and insurance in their publications. In line with the Basel II requirements, Scandizzo (2005) provided a systematic method for mapping operational risk in the process of its management (i.e., identification, assessment, monitoring/reporting and control/mitigation). He observed that operational failures are originated (created) from risk drivers, such as people, process, technology and external agents, and he linked them to consequent financial losses by using key risk indicators that are the ultimate challenge for operational risk management. He suggested a scorecard with the inputs of both qualitative and quantitative information, which can be utilised as a monitoring tool of operational risk, in order to take appropriate preventive and control measures. A number of studies; for example, Jobst (2007), Moosa (2008) and Flores *et al.* (2006) have discussed several statistical techniques for operational risk measurement and subsequent regulatory requirements. In identifying the causes of operational risks, a number of studies e.g., Cummins *et al.*, 2006; Dickinson, 2001; Guillen *et al.*, 2007 categorise them into internal and external sources. They listed incidents, such as breach of laws and agreements, fraud, professional misconduct in client services and business practices, business disruption and model/system/process failures, as common internal causes of operational risks. Furthermore, they argue that organizations may hold operational risk due to external causes, such as failure of third parties or vendors (either intentionally or unintentionally), in maintaining promises or contracts. Ideally, organizations have a little control over such external causes. They are mostly insurable to a certain limit but the concern is that the losses, which exceed the limits (i.e., long-tail events), have massive potential for destroying the bottom-line (i.e., survival)

⁵ They conducted an event study with the aim to analyse the impact of operational loss events on the market values (i.e., stock price performance) of the selected US banks and insurance companies.

of the firm. These discussions indicate that not enough research on operational risk has been done in insurance compared to banking.

2.1. Difference between Banks Business Model with Insurance

We argued that insurance business model is different from banking and hence the characteristics of operational risk are also different in these two sectors. Insurers receive premiums upfront and pay claims later. In extreme cases, such as long term liability claims, payments can stretch over decades. In this type of 'pay now and get service later' model, insurers actually perform a major money-holder role of their clients. Since underwriting of new business and settlement of old claims is a continuous process, the amount of money on hold (unless something unexpectedly happens) remains remarkably stable in relation to the volume of premiums. Consequently, the amount of money on hold grows with the growth of and insurer's business. If premiums exceed the total of expenses and eventual losses, insurers end up with underwriting profit that is then added to the investment income. This combination of underwriting profit and investment income allows insurers to enjoy the use of free money and holding money becomes an accretive way of generating profit. Unfortunately, this lucrative holding model is often penalized by markets through tough competition, which, in turn, causes the insurance industry, the property-causality business in particular, a significant underwriting loss. In usual circumstances, this underwriting loss is fairly low. However, in some years when the industry faces more than the expected number of large catastrophes, the overall size of claims exceeds the underwritten premiums and outstanding claims reserves. This exposes the insurance company to deep trouble and some insurers really struggle to survive (Buffett, 2009).

This specific nature of insurance business makes it very different from financial intermediaries, such as banks. Whilst banks are in the borrowing and lending business, insurers act as risk takers and managers of insurable risks that arise either from individuals or from small and large businesses. Insurers manage their underwritten risk through pooling in the insurance and reinsurance market; meanwhile, banks manage their risk through hedging in the derivative market. Within banking, the retail/commercial and wholesale/investment banks have different business operations and risk management. In addition, their risk profiles are very different from each other. The banking, investment banking in particular, is a transactional business supported by short-term funding, which heavily depends on disruptions in the capital market or funding, and it significantly affects the creditworthiness of the investment banks. This was seen in the 2007 financial crisis. Unlike banks, insurers' business is not transactional. Insurers cover risk exposures through reinsurance, which is global by nature. Consequently, insurers are exposed to fewer operational errors and, even then, they are not life threatening. It is argued that, unlike banks, insurers do not create systemic risk in the economy (GA, 2010).

2.2. The Risk Profile of Banks and Insurance Companies

It is recognised that credit risk is the core risk in banking. In the commercial banking the credit risk arises from the default from the borrowers, private, commercial or

government in lending contracts. In investment banking a large amount of credit risk is attached with trading contracts. The banks use careful lending, purchase of credit insurance to reduce credit risk. Moreover, banks massively use credit derivatives to hedge loans. However, in insurance, credit risk is not a big issue because insurers receive premium upfront from the policyholders. There is a little element of credit risk from the reinsurance side but the insolvency of reinsurers is historically rare. The liquidity risk in both commercial and investment banking is huge. In commercial banking this type of risk mainly occurs due to withdrawal of deposits (i.e., run on bank). However, in investment banking the wrong position in trading and imprudent underwriting typically arise liability that may cause liquidity risk. The banks typically reduce liquidity risk by interbank markets and money-market access. In addition, banks pool their liquidity risk with investment community through securitisation. In contrast, adverse movement of claims frequency and severity (e.g., natural catastrophes, asbestos, etc.) may require insurers liable to pay large claims that may in turn give rise of liquidity risk. In the life insurance sector the liability risk arises due to long term promises to pay in the event of premature death of insured or longevity as to pay life annuities and pensions. Insurers typically use careful underwriting techniques and reinsurance to reduce liquidity risk. In addition, some large reinsurers use insurance derivatives (e.g., catastrophic bonds) to swap their liabilities with each other and even with large institutional investors. The asset investment risk due to the volatility of investment prices and lack of marketability of investments is a big concern for both banks and non-life insurers. They manage their investment risk by portfolio diversification, changing investment policy or using stock market derivatives. However, non-life insurers are less concerned for their investment risk rather than banks partly because a majority of insurers' investment are by law in high rated securities and bonds. Life insurance companies are not much concerned with the volatility of investment values because of the long term nature of their investment. Interest rate risk on fixed interest investment is not a big issue for banks because of their less exposure on this that the banks reduce by the purchase of interest rate derivatives (e.g., interest rate swaps) and matching the borrowing and lending rates. This is also a little problem for non-life insurers since non-life insurance contracts do not pay interest. However, life-insurance and annuity contracts contain implicit guaranteed rates of interest thus causing high risk for life insurers. They reduce interest rate risk by holding fixed-rate bonds which are duration matched. In addition, the currency risk is a potential problem for non-life insurers than banks. This is because insurance is international and the fluctuation in exchange rates may adversely affect settlement of claims in foreign currency. For example, premium received in one currency (\$) and claims paid in another (£) may be affected by currency risk. Insurers reduce their currency risk by currency matching of investing the same currency as claims as payable.

If we define operational risk as the risk of human error in executing the strategy then operational risk is attached in all these core risks as discussed above. However, the investment banking model is different from commercial banking and insurance business. Due to the massive exposure of technology where human gets less time for intervention and integration of several functions the investment banking is a complex and highly risky business. The human and technological error can massively affect the profitability and reputation of investment banks. The correct interaction of human and technology is key investment banking. The factors that are associated with this interaction are fraud, modelling and technological error, quality of human judgement

are massive in investment banking. These are not the case in commercial banking and insurance business. In most cases the insurers add an amendments and a cancellation clause in the policy contracts which actually act as a protection of insurers' operational risk. All these discussions mean that the risk profiles of commercial banks, investment banks and insurance companies are different from each other and operational risk unlikely to significantly contribute in insurers' failure compared to banks.

2.3. Theoretical Foundation of Operational Risk

The literature discussed above indicates that previous research did not sufficiently look to characterise operational risk in terms of its sources. In this effect, we need to understand the distinction between two issues that causes operational risk in business. The first one is the formulation of strategy and the other is the implementation of strategy. The success or failure in the implementation of strategy raises question whether the strategy is itself robust or faulty and mistakes (either intentional or unintentional) was committed in executing the strategy. In practice, the formulation and approval of strategy is done at the top i.e., board level (with directors and CEO - the principal) and the managers (the agents) execute the strategy in real-world environment. However, there may be circumstances that a robust strategy may be proved wrong (faulty) at an adverse economic environment. In addition, there may be instances that the strategy that was not formulated with due care and skill turned up as a good strategy at future point of time. For example, many homeowners who did not purchase mortgage or re-mortgage their property with tracker mortgage are benefitted with the lower interest rate regime due to 2007 financial crisis. This discussion on the formulation and execution of strategy indicates that operational risk is a produce to faulty strategy and organisation should concentrate on the robustness of the strategy in order to reduce operational risk. These discussions emphasises the fact that risk management has obvious limitations and it is difficult to distinguish the real cause or risk of any organisational failure. In this sense the emphasis on any specific category of risk with less attention to other categories is meaningless. Consequently, risk management is holistic and in our discussion the management of operational risk and strategic risk should be done in an integrated framework. The theoretical foundation of operational risk needs to recognise this understanding.

An analysis of literature suggests that the theoretical foundation of operational risk has evolved from the field of strategic management research. Although there is insufficient academic literature that explicitly gives theoretical foundation of operational risk, there are considerable works of strategists that can be utilised to establish a conceptual framework of operational risk for financial firms. In a theoretical paper, Wiseman and Catanach (1997) discussed several organizational and behavioural theories, such as agency theory and prospect theory, which influence managerial risk-taking attitudes. They found that, within the variety of relations among risk choices, managers exhibit simultaneous low and high-risk preferences.

Utilising the notion of the utility theory, Jensen and Meckling (1976), in the light of the agency theory, suggested that an agent's risk preference changes with the variability of an owner's vigilance or monitoring status. Alternatively, agents' superb perfor-

mance diminishes owners' levels of monitoring whilst demonstrating risk-seeking characteristics and vice-versa. This proposition is reflected in Wiseman and Gomez-Mejia's (1998) behavioural agency model of managerial risk taking, in which it is argued that variability in firms' incentive structures, such as income stream uncertainty, changes executives' risk preferences and behaviour. Likewise, the behavioural theory of the firm suggests that managerial risk taking initiatives, such as hedging, is encouraged by the deteriorating performance of the firm (Palmer and Wiseman, 1999). In essence, a managerial risk-taking attitude is considered as a proxy of measuring organizational risk (Bowman, 1982; Fiegenbaum and Thomas, 1988, 2004). In line with Kahneman and Tversky's (1979) prospect theory, Bowman (1980, 1982) discovered an inverse relationship between risk and return. It was suggested that managers demonstrate risk-seeking characteristics in the case of gain and risk aversion regarding loss relative to a reference point. Tversky and Kahneman (1982) argued that managers' decentralised risk choices may be different from that of owners, who exhibit a holistic view, and the sum of silo risk choices considerably differs from that of the consolidated portfolio. The strategists' conclusion of managerial risk taking initiatives is also recognised by finance researchers. For example, Stulz (1984, 1990) identified that firms intend to maximise hedging until the variance of the investment portfolio (i.e., risk) is minimised; whereas, managers trading in hedging contracts individually, face significant costs (Froot *et al.*, 1993). If we believe that operational risk is a subset of strategic risk then we need to analyse the root of strategic risk in order to derive the foundation of operational risk.

2.4. The Gap in Operational Risk Management Literature

The literature review suggests at least two sets of knowledge emerged in the literature of operational risk management. The first set of knowledge affirms the quantification of operational risk, in which proposing a solution (i.e., determination of risk-adjusted [economic] capital as a buffer to risk) is the key focus. The consideration of operational risk is an issue for top management where the focus is to save the firm from high-profile [financial] losses, which severely damage the bottom line issues and/or survival) of the firm. The second set of knowledge undertakes a broader view of operational risk while the complexities and heterogeneity are acknowledged. The purpose of such a view is to explore the complexities associated with the operational risk of a firm within a holistic perspective whilst recognising the relationship between operational risks with other risks of the firm. Clearly, this approach is targeted to identify problems and make recommendations rather than to providing precise solutions. However, both approaches have merits and demerits.

The modelling approach, which is advocated by management science and financial economics, takes an analytical view to suggest precise solutions to the associated problems. The second view takes the philosophical route within the perspective of strategic management and detects the interrelationships between operational risk factors with others to conceptualise the potential overall consequences. However, it does not focus much on providing precise solutions, unlike the former approach. Apart from the definition and quantification-related issues, there remains some criticism in the literature regarding the effectiveness of the approach of capital adequacy for operational risk. For example, Kuritzkes (2002) argues that no amount of capital is realistically reliable for operational risks; in particular, those arising from external events, such as September 11, because management effectively holds little control over them.

3. Methodology and Data

We have seen in the above literature that the characteristics of operational risk are not well understood in insurance. However, several vendors maintain database for company specific and publically available operational loss data for banking and insurance sectors. For example, Fitch's OpVar is a database of publicly reported operational risk events showing nearly 500 losses of more than then million dollars between 1978 and 2005 in the U.S. The 2004 Loss Data Collection Exercise (LDCE) collected more than a hundred loss events in the U.S. valued at 100 million dollars or more in the ten years to 2003. In addition, the Operational Riskdata eXchange Association (ORX) provides a database of operational risk events in banking. It is a consortium collecting data from thirty member banks from twelve countries and it has more than 44,000 losses, each over €20,000 in value. Moreover, Open Pages, SAS and Willis also created a database of public operational risk loss events from the financial services industry. The Operational Risk Consortium Ltd (ORIC), established by the Association of British Insurers (ABI), provides a database of operational risk events exclusively for insurance sector. It is a consortium-based loss data for insurers' operational losses events reported by its members, who; in return, get access to anonymous, pooled industry data on operational loss events and near miss incidents. In this context, the study looked into the structure of the ORIC database through a prearranged WebEx interview with one of the ORIC staff. Unfortunately, the ORIC database is not public and is for exclusive use of the consortium members.

Since I cannot get access on the ORIC database, e I instead created a dummy dataset for five categories of operational risk (i.e., internal fraud, external fraud, damage to physical assets, business disruptions and system failures, and Execution, Delivery & Process Management) between 1st January 2008 and 31st December 2010 (36 months) assuming that each loss falls between \$10,000 (minimum) and \$200,000 (maximum). This is in line with the structure of ORIC database. For simplicity, I assumed that no more than ten events occurred in any given month within the time horizon. The exercise is to demonstrate how operational risk is stored and quantified in practice. I created scholastic random numbers in EXCEL between the minimum and maximum range under the four categories of operational risk mentioned above. Because the objective of this study is to demonstrate the methodology of quantifying operational risk and use of results rather than their accuracy, the validity of data is a less important issue in this study. The following table summarizes the data.

Table 1: Summary of Operational Loss Data

No. of events per Month	Operational Risk Categories									
	Internal Fraud		External Fraud		Damage to Physical Assets		Business Disruptions & System Failures		Execution, Delivery & Process Management	
	No. of Month	Total no. of events	No. of Month	Total no. of events	No. of Month	Total no. of events	No. of Month	Total no. of events	No. of Month	Total no. of events
k	n(k)		n(k)		n(k)		n(k)		n(k)	
0	7	0	4	0	4	0	4	0	2	0

1	0	0	2	2	5	5	3	3	3	3
2	4	8	2	4	2	4	2	4	2	4
3	3	9	3	9	3	9	3	9	4	12
4	4	16	3	12	3	12	3	12	3	12
5	5	25	6	30	6	30	4	20	4	20
6	2	12	4	24	3	18	3	18	3	18
7	2	14	2	14	2	14	2	14	2	14
8	2	16	1	8	2	16	2	16	3	24
9	0	0	1	9	1	9	1	9	1	9
10	1	10	3	30	3	30	4	40	4	40
Number of events		110		142		147		145		156
Number of months		36		36		36		36		36
Average number of events per month (λ)		3.06		3.94		4.08		4.03		4.33

The Table 1 suggests that there were seven months within the time horizon (i.e., 1st January 2008 and 31st December 2010 = 36 months altogether) where no internal fraud occurred or reported. Hence the total number of events occurred within this seven months is zero. Similarly, there were altogether four months within the same 36 months' time horizon where ten events occurred in each month. Hence the total number of events occurred within this four-month window are 40.

For simplicity I assumed that there were 100 numbers of observations (loss data) for each category of loss within the stipulated time horizon (i.e., 36 months). The following Tables 2 and 3 shows the summary statistics of frequency and severity the data respectively created for analysis.

Table 2: Summary Statistics of Frequency Loss Data

	Internal Fraud	External Fraud	Damage to Physical Assets	Business Disruptions & System Failures	Execution, Delivery & Process Management	Average
Number of events	110	142	147	145	156	700
Number of months	30	31	34	31	31	157
Average number of events per month (λ)	3.06	3.94	4.08	4.03	4.33	3.89

Table 3: Descriptive Statistics of Severity Loss Data

	Internal Fraud	External Fraud	Damage to Physical Assets	Business Disruptions & System Failures	Execution, Delivery & Process Management	Average
Minimum (\$)	11,629.81	34,154.57	28,254.02	17,295.17	26,338.26	
Maximum (\$)	199,734.09	461,535.19	467,152.57	719,922.09	311,739.24	
Mean (\$)	108,165.98	55,881.49	76,977.50	139,744.89	69,203.62	89,994.70
Standard deviation (\$)	56,767.93	62,093.00	70,895.66	97,461.74	35,201.25	64,483.92

In Table 2 we find that out of 36 months horizon altogether 110 events occurred under Internal Fraud category and there were six months no events under this Internal

Fraud category happened. In average there were four events in each month over the 36-year horizon. In Table 3, we can see that the individual maximum loss was recorded in Execution, Delivery & Process Management functions amounting to \$386,196.53 and \$11,629.81 as minimum in Internal Fraud category. In addition, the mean loss for all categories was recorded as \$106,677.59 with an average standard deviation of \$25,265.57.

I used Monte Carlo simulation to generate stochastic loss distributions based on the historical data. The following Table 3 illustrates the aggregated loss parameters of the operational risk data. We assumed that the discrete frequency data will follow the behaviour of Poisson distribution and the continuous loss severity data will follow Pareto distribution⁶. The values for mean and standard deviation of the observed loss data were picked up from Table 2.

Table 2: Parameters of Loss Distributions from Aggregated Observed Loss Data

	Aggregated Operational Loss Parameters		Distribution Type
Frequency	Mean=Variance	3.89	Poisson
Severity	Mean (\$)	89,994.70	Pareto
	Standard deviation (\$)	64,483.92	

I used @Risk software to run the simulation and choose 1000 iterations and 1 simulation in each run. It means that the computer 1000 times run the simulation where it created randomly generated data and (thereafter furnishes the combined result in a probability distribution curve in terms of frequency and severity). The following Table 4 illustrates the summary statistics of the total aggregated loss data. This is important to remember that this summary statistics will change in each run because the computer choses randomly generated values in each and every iteration and they are different from earlier runs.

Table 3: Parameters of Loss Distributions after Monte Carlo Simulation

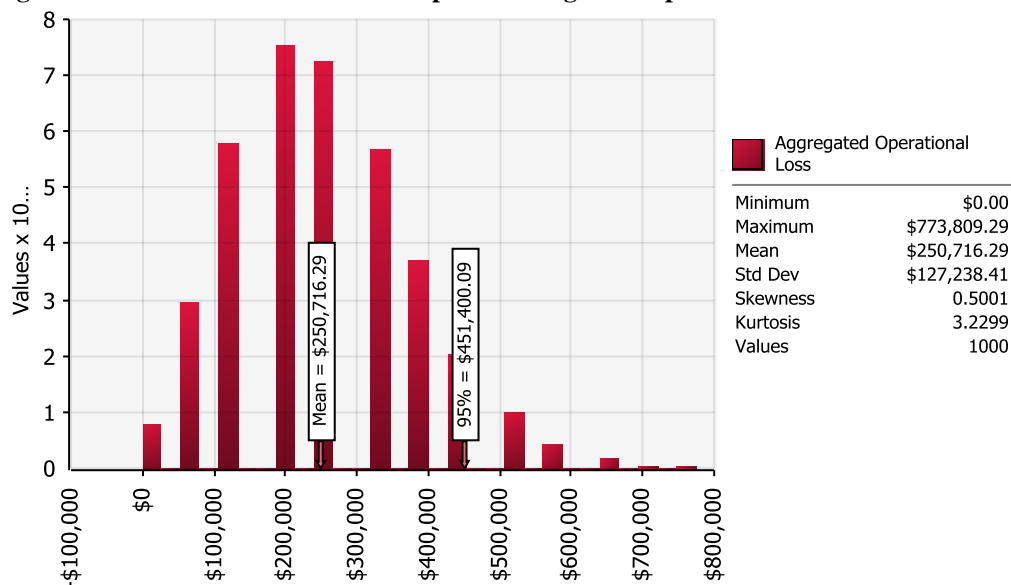
Aggregated Operational Loss Data Summary for Monte Carlo Simulation using @Risk

Frequency	4.00
Severity (\$)	64,484.632979
Total Aggregated Operational Loss (\$)	257,938.53

Each time the software created both frequency and severity distributions of each category and produce a probability distribution curve. They are shown at the appendix A.

⁶ One can choose Lognormal distribution instead

Figure 1: Monte Carlo Simulation Output for Integrated Operational Risk



The above Figure 1 shows the Monte Carlo simulation output of total operational risk of the firm. From the graph we can see that the total expected loss (i.e., mean) is equal to \$ 250,716.29 and unexpected loss is \$200,683.80 (total loss less expected loss). Therefore the Value at Operational Risk (i.e., OpVar) at 95% confidence level is \$200,683.80. It means that every 20 years that there is a 5% probability that the operational loss of this firm will exceed \$200,683.80. The firm needs to gauge an appropriate amount of risk capital as required by the regulators for this amount of unexpected loss. I took 95% just to illustrate an example. However, in practice this confidence level will vary at any level below 100% (typically 99.5%) based on firm's risk appetite.

4. Analysis and Findings

This computation of Operational Risk VaR is not convincing for several reasons as it does not represent the true picture of pure operational risk that a firm holds at a point of time. Consequently, the modeling exercises end up with unreliable results in the application of real business environment. In the following paragraphs I will explain this argument with the literature and the data obtained from the interviews with the operational risk professionals in the insurance industry. They demonstrate my understanding on the characteristics of operational risk in insurance business.

4.1. Operational risk is embedded in all core risks

The operational loss data that I have used in the computation of Operational Risk VaR do not contain pure operational risk components. There are components of oth-

er risks within these numbers. Alternatively, operational risk is embedded into banks and insurers core risks (i.e., credit, market, underwriting, etc.) and the data that have been used in analysis do not represent the pure operational risk. In effect, it is difficult to separate operational risk from other risks because all organizational actions involve human interventions either directly or indirectly where human errors often occur. Consequently, the barrier between operational risk and other types of risk (e.g., market risk) does not always work because of the overlapping characteristic of operational risk. This has also been echoed in the literature where de Fontnouvelle et al (2003) found that the capital requirement for operational risk at some large financial institutions often exceed that for market risk (Chaudhury, 2010). Similarly, Cummins, et al (2006) and Perry and Fontnouvelle (2005) found that the operational risk substantially impact the market value of the firm. All these mean that the operational loss data already included the market losses while quantifying operational risk. This conclusion suggests that the so called operational loss data that are preserved by several vendors and as well as banks and insurance companies are faulty and do not necessarily represent the loss data solely for the operational errors. Moreover, there are many operational risks in insurance which are not classified as operational within the Basel II definition.

Despite the overlapping characteristics of operational risk with other core risks some respondents found this segregation useful and a respondent argued “it is important for us to segregate what is pure credit, market and insurance risks and what are their operational components. This separation gives our each group a clear scope to manage them on the frontline within their allocated areas and responsibilities.”

Overall, no database is possible that represents the pure operational risk of banks in and insurance business. Alternatively, operational risk is embedded in all core risks.

4.2. Operational Risk in Insurance Is Not a Major Area of Concern

Since many areas of insurance business operational by nature, the way operational risk management is currently designed and implemented in practice (mostly aligned to meet regulatory requirements), does not entirely fit with insurance companies’ actual operational risk profile. The literature review revealed that that actual operational risk management is about identifying risks, thinking about risk, trying to compare risk appetite across different lines of business, thinking about the control, mitigation, and exploitation strategies, including the scope of business opportunities. The analysis of interviews found that there is quite a good discipline regarding operational risk management around the insurance industry. However, there appears a lack of understanding in separating operational risk from insurance underwriting risk. A respondent suggested “managing our underwriting portfolio is ultimately managing the operational risk associated with the portfolio.” Consequently, the analysis suggest that since operational risk is embedded in the insurance risk, operational risk can be managed best as a part of an insurance (e.g., underwriting) risk management process. Therefore, consideration of operational risk as a separate risk category along with insurers’ other significant risks is debatable.

This conclusion is vital to distinguishing the operational risk of insurance companies with other financial services, particularly banking. Insurance policies often provide a long-term promise to compensate the insured in the case of designated insurable events. Typically both parties of an insurance contract hold the right to cancel the

contract in the case of any breach [unlikely] happening during its term. In addition, there is a scope for insurers to amend operational errors, if any, which committed during the underwriting process. However, this is not the case for banks when executing a trading contract or a contract for lending money. In addition, while reinsuring the underwritten risks, [primary] insurance companies can insure for operational risk associated with the underwriting process⁷. Consequently, as the study found, the operational risk in insurance is not a major area of concern.

4.3. Objective View on a Subjective Problem

Operational risk is found as characterized by individual actions, organizational culture, individual's emotions, understanding, response to risky situations, etc. Moreover, unlike financial risk, operational risk is not traded in the capital market. Consequently, operational loss data, which includes a high level of subjectivity, cannot be directly fed into mathematical and statistical models. Therefore, the VaR type risk measurement technique as I demonstrated above may be effective for market risk but does not fit well for measurement of operational risk. I found that organizations are struggling with the measurement of operational risk because of the subjective nature of the data. Most importantly, there is a debate on where to draw a line between the subjective and objective data relevant to operational risk. On this basis it can be concluded that the management of operational risk cannot progress effectively without considering the subjectivity associated with operational elements of the business. However, the line dividing the subjective and objective elements of operational risk depends on the individual insurer's risk philosophy, business model and corporate strategy to achieve its business objectives. This argument has been echoed by one respondent suggesting "I am not persuaded on the understanding that modelling should lead the operational risk management practice in the insurance industry. In market risk it can help a bit but I can see that insurers' spending a lot of money in operational risk management but I don't think they are getting any value out of it because all initiatives and moneys have been focused on quantifying it." Another respondent added, "We did not quantify our operational risk at all until the Solvency II said we must quantify this."

There is another factor that prevents subjectivity to be included in operational loss data. It is recognised that the practice of operational risk in developed countries is comparatively more robust than other countries, which is partly due to the matured regulatory landscape and superior management culture. However, I observed that for some countries outside the UK (for example), the notion of reporting errors, mistakes or failures is something quite strange to many people because they think that there will be an immediate penalty or fine, if they do so. That is why subjective issues, such as organizational culture, are an important issue in operational risk management. Consequently, it appears the current practice of operational risk measurement tends to take an objective view on a subjective problem.

4.4. Strategic Risk Gives Rise of Operational Risk and Vice Versa

⁷ To know more about insurers' unique functions and business model, interested readers are recommended to read the work of the Geneva Association on the "Systemic Risk in Insurance" (GA, 2010).

It is evident that in many instances, operational failures happen due to sloppy or poor management actions. However, it is noticed and discussed in the literature that management failure in many circumstances combines with some on-going business environment issues that actually trigger massive losses and even the failure of the entire organization (i.e., insolvency). The debate is whether the management emphasis more on the formulation of strategy or the execution of strategy. I have discussed this in the literature review under the theoretical foundation of operational risk. This argument is in line with the comments of a respondent suggesting “we believe that an extreme event e.g., failed M&A resulting insolvency, which we categorize as strategic risk, do not happen in its own. We found several other elements, which are beyond strategic controls, effectively influence the ultimate extreme events”. History suggests that the root (approximate) causes of large and catastrophic losses are mostly small and often unimaginable and overlooked by traditional internal control and corporate governance systems. The 2007 financial crisis is a prominent example for such oversight. The recent (April 2011) interim report⁸ of Independent Commission of Banking in the UK identified that the conglomeration of retail and investment banking is the root cause of the financial crisis. The near collapse of AIG happened because of the liability created by AIG FP (that generated only 3% of AIG’s revenue) is another example of overlooking small/medium size events in the early days of the development of large/catastrophic losses. However, it seems that the insurance industry in practice does not recognise the difference and association between strategic risk and operational risk. The same respondent told “we report such cause of failures as operational risk in our database.” Moreover, interviews found that mis-selling, which ultimately triggers an insurance product failure, is often categorized as both operational risk and strategic risk in insurers database. This indicates that operational risk needs to be managed along with insurers’ strategic risk in an integrated framework.

4.5. The Research and Practice of Operational Risk Management Should Focus From the Perspectives of Management Theories

In this context, the study raises a vital question whether insurers’ operational risk should be studied either from finance and economic theories or management theories. The analysis of literature and respondents’ statements suggests that management of operational risk is a decision making problem given the organizational internal complexities involving business peoples’ attitude and understanding in risk taking, reporting, communication, integrity, skill, etc.,. Consequently, operational risk can be best studied from the perspective of management theories instead of from financial and economic theories.

An indication of further research areas on this argument is discussed in the literature review under the foundation of operational risk management. However, that investigation remains outside the scope of this study.

⁸ The report is accessed at <http://s3-eu-west-1.amazonaws.com/htcdn/Interim-Report-110411.pdf> on 30th January 2012

5. Conclusion

Unlike financial risk the management of operational risk has limitations. Since operational risk does not have opportunity part, there is no advantage for the business to engage in trading activities of operational risk in the market with other parties. This is because nobody will be interested to buy operational risk for obvious reasons (only participating in loss). In this sense operational risk can be compared with the insurance risk. Consequently, I believe that the management of operational risk may follow the techniques (i.e., risk sharing and pooling) that insurers' utilize in reducing their insurance (underwriting) risk. It is difficult to justify risk-return trade-off in case of operational risk.

The interviews revealed that operational risk taking is not intentional and we can view operational risk as a bi-product of financial and strategic risk taking activities. This implies that the sophistication and efficiency of financial risk taking will reduce the level of operational risk of a business and vice versa. This is one way we can manage operational risk.

In contrast to the majority of published articles those focused on the accuracy of modelling and quantification techniques this study focused on the characteristics of operational risk. I argued that at the current stage of development it is paramount important to understand operational risk and its linkages with other types of risks. I, with hypothetical dummy data, proved that the output of VaR exercise is fundamentally flawed to compute operational risk of an insurance company.

I found that the Basel II definition of operational risk is not only incomplete but it is inappropriate to adopt in insurance. The sources of operational risk are not only different from that of banking; the characteristics of operational risk are also very much different. As opposed to banking contracts (e.g., lending and trading) the insurance policies holds built-on wordings (e.g., cancellation clauses) and they reduce insurers' exposure to operational risks. Alongwith the empirical evidence I argued that operational risk holds overriding character with other type of risk (e.g., market risk) and the way operational risk data is recorded is incorrect and this type of operational risk data actually include other types of risk. I prefer to term it as "illusionary effect". Consequently, the operational risk exposure of insurance companies can be substantial and often more than other risk exposure.

I also discovered that organisational failures do not happen for a single cause. There might be a single factor that initially triggers the event, however, multiple factors eventually get linked with the initial problem thus promoting the scale and complexity of the problem further and further up to the organisational failure leading to bankruptcy. The operational risk is such an initial single cause but cannot be blamed alone for the total organisational failure.

I found that insurers are not much concern about their operational risk exposure within the Basel II definition. In essence, every development usually follow three steps i.e., discovery, invention and solution. In the banking sector the discovery was that banks (investment banks, in particular) failed due to operational risk and on the basis of this observation several models and tools were innovated to determine the optimal amount of capital as a buffer to protect banks' failure due to their operational risk. However, operational risk management in insurance is not a naturally evolved phenomenon. This is because until now no insurance company's failure was ob-

served due to operational error (at least within the scope of Basel II definition). Hence the invention of models and tools for insurers' operational risk in order to determine the optimal level of capital is mostly a compliance function. In this perspective the current emphasis on operational risk in insurance business seems an externally driven task, which has been imposed upon by a group of professionals, who do not necessarily have background on the core insurance profession (underwriting, in particular). It is evident that in practice one group of professionals holds the ultimate power of quantifying and modelling operational risks while the other group takes the responsibility of failure of the management of operational risk. In reality, these two groups of professionals have very different perception of operational risk and subsequently hold very diverse opinion on the way operational risk to be management in the business. I proposed that in order to add value to the business the operational risk management should go beyond this risk quantification boundary.

This paper provides a platform to generate new debates on the management of operational risk both in insurance and banking beyond the current narrow approach.

References

- Acharyya, M. The role of operational risk and strategic risk in the enterprise risk management framework of financial services firms. *Internal Journal of Services Sciences*, 2010, 3(1): 79-102
- Basel Committee on Banking Supervision, 2001. Consultative Document, Operational Risk, Basel: Bank of International Settlement. Available from: <http://www.bis.org/publ/bcbsca07.pdf> [Accessed 1st January, 2012].
- Bowman, E. H. A risk/return paradox for strategic management. *Sloan Management Review*, 1980, 23(4), 33-42.
- Bowman, E. H., Risk seeking by troubled firm. *Sloan Management Review*, 1982, 23(4), 33-42.
- Buffett, W. E. Chairman's letter to the Shareholders. Berkshire Hathaway Inc., 2009, Available from: <http://www.berkshirehathaway.com/letters/2009ltr.pdf> [Accessed 4 January 2012].
- Chaudhury M. A review of the key issues in operational risk capital modelling. *Journal of Operational Risk* 2010, 5(3): 37-66
- Cornalba, C and Giudici, P. Statistical models for operational risk management. *Physica*. 2004: 338. 166-172
- Cummins JD, Christopher LM, Wei R. Market value impact of operational loss events for US banks and insurers. *Journal of Banking and Finance* 2006, 30(10):2605-34.
- De Fontnouvelle, Patrick, Eric S. Rosengren and John S. Jordan, "Implications of Alternative Operational Risk Modeling Techniques." Ch.10 in Mark Carey and René Stulz (eds.), *Risks of Financial Institutions*, NBER, 2006, 475-505. And comment by Andrew Kuritzkes 505-511.
- Dickinson, G. Enterprise risk management: its origin and conceptual foundation. *The Geneva Papers on Risk and Insurance: Issues & Practice*, 2001, 26(3), 360-366.
- Fiegenbaum, A. and Thomas, H., Attitudes toward risk and risk-return paradox: prospect theory explanations. *The Academy of Management Journal*, 1988, 13(1), 85-106.
- Flores, F., Bonson-Ponte, E. and Escobar-Rodriguez, T. Operational risk information system: a challenge for the banking sector. *Journal of Financial Regulation and*

Compliance, 2006, 14(4), 383-401.

- Froot, K. A., Scharfstein, D. S., Stein, J. C. Risk management: coordinating corporate investment and financing policies. *Journal of Finance*, 1993, 48(5), 1629-1658.
- GA, Systemic Risk in Insurance – An analysis of insurance and financial stability. 2010, Geneva: Geneva Association.
- Guillen, M., Gustafsson, J., Nielsen, J. P. and Pritchard, P. Using external data in operational risk. *The Geneva Papers on Risk and Insurance: issues & Practice*, 2007, 32(2), 178-189.
- Jensen, M. C. and Meckling, W. H. Theory of Firm: Managerial Behaviour, Agency Cost, and Ownership Structure. *Journal of Financial Economics*, 1976, 15 (4), 305-360.
- Jobst, A. A., It's all in the data – consistent operational risk management and regulation. *Journal of Financial Regulation and Compliance*, 2007, 15(4), 423-449.
- Kahneman, D. and Tversky, A. Prospect theory: an analysis of decision under risk. *Econometrica*, 1979, 47(2), 263-292.
- Kuritzkes, A. Operational risk capital: a problem definition. *The Journal of Risk Finance*, 2002, 4(1), 47-56
- Moosa, I. A. A critique of the advanced measurement approach to regulatory measurement approach to regulatory capital against operational risk. *Journal of Banking Regulation*, 2008. 9(3): 151-164
- Palmer, T. B. and Wiseman, R. M. Decoupling risk taking from income stream uncertainty: a holistic model of risk. *Strategic Management Journal*, 1999, 20(11), 1037-1062.
- Power, M. The invention of operational risk. *Review of International Political Economy*, 2005, 12(4): 577-599
- Scandizzo, S. Risk mapping and key risk indicators in operational risk management. *Economic notes by Banca Monte dei Paschi di Siena SpA*, 2005: 34(2), 231-256.
- Stulz, R. M. Managerial discretion and optimal financing policies. *Journal of Financial Economics*, 1990, 26(1), 3-27.
- Stulz, R. M. Optimal hedging policies. *Journal of Financial and Quantitative Analysis*, 1984, 19(2), 127-140.
- Tripp MH, Bradley HK, Devitt R, Orros GC, Overton GL, Pryor LM, Shaw RA. Quantifying operational risk in general insurance companies. *British Actuarial Journal* 2004,10(5):919-1012.
- Tversky, A. and Kahneman, D. Judgment under uncertainty: heuristics and biases. In: Kahneman, D., Slovic, P. and Tversky, A., ed. *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, CB: Cambridge University Press, 1982, 3-20.
- Verrall R J, R Cowell, Y Y Khoon (2007), 'Modelling Operational Risk with Bayesian Networks', *Journal of Risk and Insurance*. 2007: 74(4), 795-827
- Wiseman, R. M. and Gomez-Mejia, L. A behavioural agency model of managerial risk-taking. *Academy of Management Review*, 1998, 23(1), 133-53.
- Wiseman, R. M. and Catanach, A. H., Jr., A longitudinal disaggregation of operational risk under changing regulations: evidence from the saving and loan industry. *The Academy of Management Journal*, 1997, 40(4), 799-830.

Appendix A

Figure 2: Monte Carlo Simulation Output for Internal Fraud Category

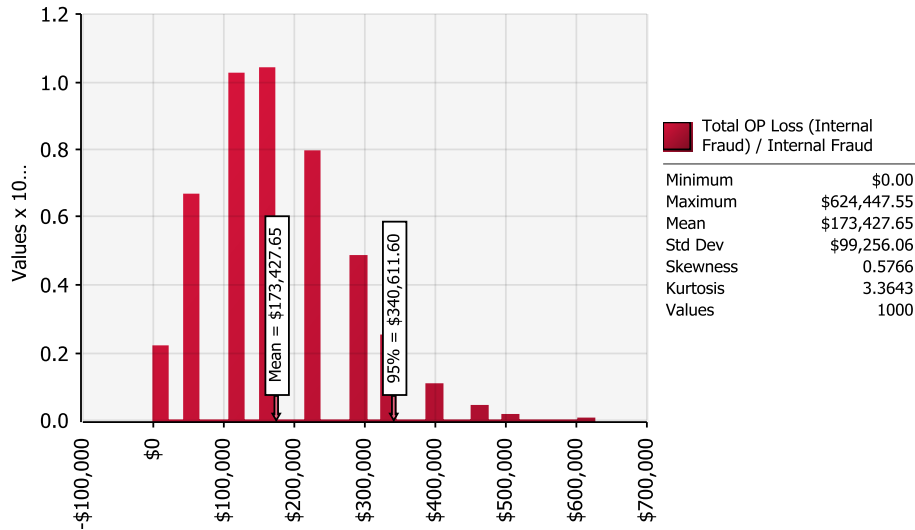


Figure 3: Monte Carlo Simulation Output for External Fraud Category

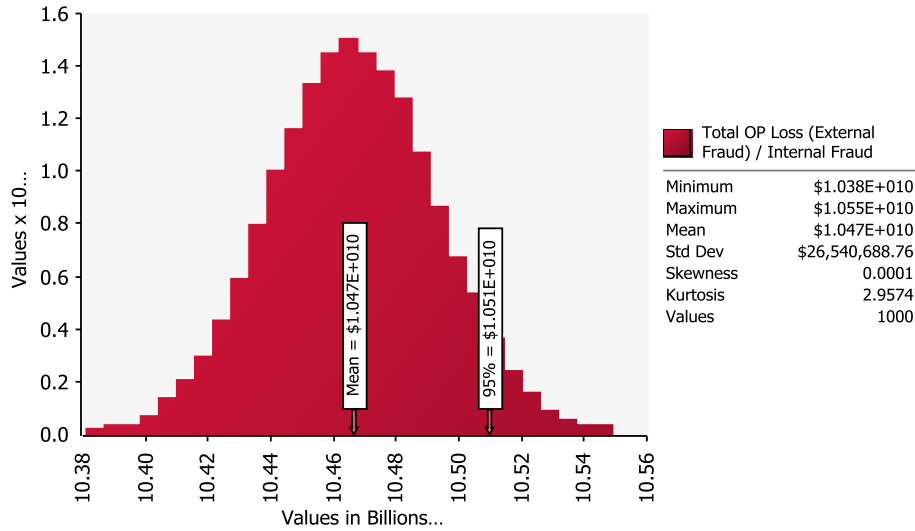


Figure 4: Monte Carlo Simulation Output for Damage to Physical Asset Category

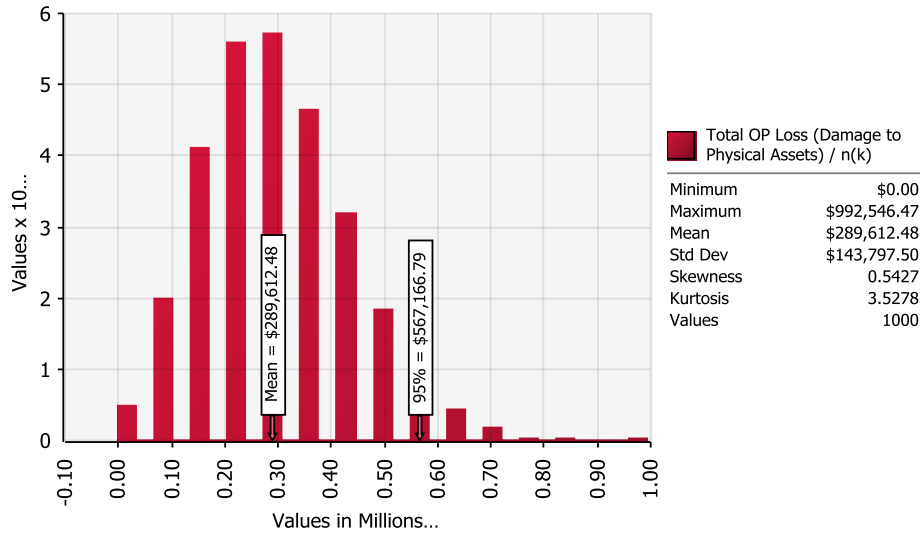


Figure 5: Monte Carlo Simulation Output for Business Disruption and System Failures Category

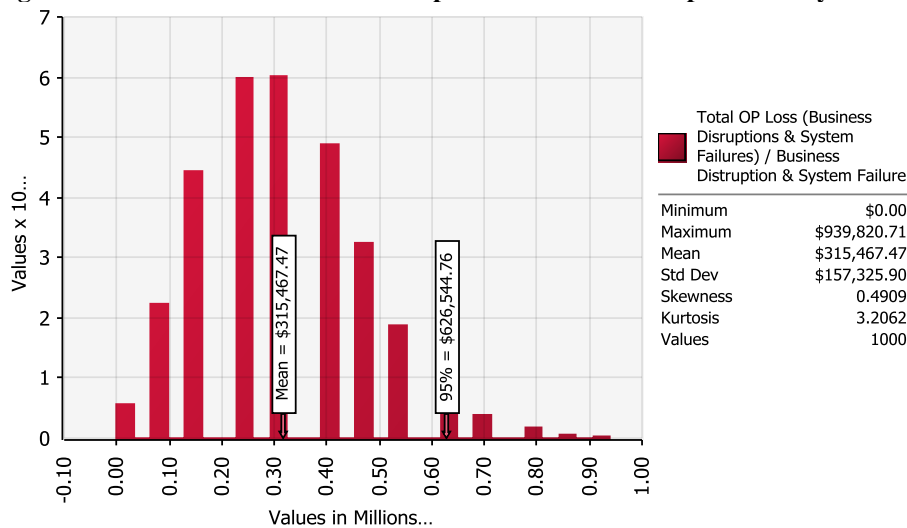


Figure 6: Monte Carlo Simulation Output for Execution, Delivery and Process Management Category

