

Why the Current Practice of Operational Risk  
Management in Insurance is Fundamentally Flawed:  
Evidence from the Field

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# Why the Current Practice of Operational Risk Management in Insurance is Fundamentally Flawed: Evidence From the Field

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## **Abstract**

This paper evaluates the current practice of operational risk management in the insurance sector. Operational risk is nothing new in insurance, but, because of regulatory requirements, companies have initiated computation of risk capital for their operational losses. The current effort to manage operational risk is not a naturally evolving phenomenon, and operational risk, in the Basel Committee on Banking Supervision's Basel II definition, is unlikely to be a significant cause of insurers' failure. In addition, the current Basel II definition of operational risk is not suitable for the insurance sector. Consequently, the invention of models and tools based on the definition is incomplete and illusionary. My findings are based on the analysis of dozens of interviews with insurance industry professionals. I demonstrate the way operational risk is quantified in practice, show that the result obtained from this computation is of little use in managerial decision making and propose a set of policy recommendations illustrating the characteristics of operational risk in insurance. This study can be used as a platform for launching dialogues to initiate fresh thinking about operational risk in insurance beyond the current artificial and narrow boundaries.

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## **1. Introduction**

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” (Basel Committee on Banking Supervision 2001). This definition includes legal risk,<sup>1</sup> thus recognizing it as a subset of operational risk. However, strategic and reputational risks are not included in this definition. The Basel Committee on Banking Supervision believes this is appropriate for risk management and, ultimately, the measurement. It is clear 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, strategic and reputational, are intentionally ignored; they are not sufficiently understood, and the existing tools and techniques are inadequate to quantify them.

There are evidences of banks failure because of operational risk. For example, Bank of Credit and Commerce International (BCCI) collapsed in 1991 due to its involvement in money laundering and the financing of arms trafficking. In 1995, London-based Barings Bank failed due to a trader’s fraudulent actions. The crisis of Daiwa Bank of Japan happened in 1995 due to lax regulatory controls at a branch in New York that resulted in bad debts and loans. All these banking failures were triggered by isolated events outside market, credit and liquidity risks and thus arguably fall under operational risk.

It is understood that the Basel capital adequacy regulation added operational risk as a separate category in Basel II as a response to these banking failures. 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 a general perspective, is incomplete. However, the cause of the banking industry’s systematic failure in the aftermath of the 2007 credit crunch is fundamentally different from the causes of the collapses 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 unsecured mortgage securitization, accumulation of high risk associated with investment banking functions with comparatively low-risk retail banking, etc., and failed mergers and acquisitions. For example, the ABN AMRO merger with Royal Bank of Scotland has not worked nor has that between Lloyd’s TSB and HBOS. The bankruptcies of Merrill Lynch and Lehman Brothers were caused by excessive risk taking in the mortgage securitization market. This systemic market failure happened because of the collapse of several organizations

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

simultaneously due to some common causes; they cannot be seen as isolated events. Consequently, it is hard to justify that operational risk is solely responsible for the banking industry's failure. The recent financial crisis indicates that we are endangered with a different kind of risk, one that bred all the full and near failures across the banking industry. Clearly, the causes include top-level strategic decisions that eventually proved faulty in real-world scenarios. In fact, the banking industry as a whole was living with this invisible risk for a long period of time as there was a delay in understanding its slow-poisoning characteristics. Yes, it is strategic risk, which includes faulty decisions at the organizational level that not only harm the institution but severely affect the entire industry that Basel II did not recognize in the definition of operational risk.

The focus of this article is to observe the significance of operational risk in the insurance sector 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), 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 in the Europe , e.g., Swiss Re, Zurich, AXA and Lloyd's market, started to develop operational risk management functions under their group enterprise risk management frameworks. The insurers' solvency regulations, EU Solvency II in particular, adopted operational risk as one of the core risks of insurance businesses. The United Kingdom's Financial Services Authority (FSA) also recognized 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 organizational failures. Moreover, there is no claim that insurers' insolvency was triggered by bank-like operational risk. For example, Independent Insurance in the United Kingdom failed due to mis-selling of insurance products, including under-pricing and unethical actions of the top management. Equitable Life, also in the United Kingdom, failed due to mis-selling of high guarantee annuity options (GAOs) that led the life insurer into financial difficulties. The HIH in Australia collapsed due to its FAI Insurance acquisition and its aggressive accounting practices during the illegal financial reinsurance transaction initiated to cover up financial distress. Recently, AIG in the USA failed due to its massive exposure on mortgage-based securities through credit default. Issuance of coverage for the credit derivative contracts that include the elements of speculation are against the principle of insurability. In fact, operational risk was never considered 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 to 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? If not, do we need a different approach in understanding operational risk and alternative tools in measuring and managing this particular risk? These questions remain unanswered in the literature and practice.

This gap in the literature emphasizes the fact that incomplete knowledge of operational risk across the financial sector is an overarching problem beyond the understanding of core business risks (e.g., market, credit, liquidity, etc.). It is important to mention that the insurance business model is different from that of banking. Moreover, even in banking, the operational risk associated with investment banking is much higher than with 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, and Basel II focuses more on the measurement side of operational risk than understanding the behavioral aspect of its causes and characteristics. The concern is that if this practice continues, the true characteristics of operational risk will not be revealed and all the exercises and efforts on operational risk may be proved useless at a later stage of research and practice. 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. Section 1 discusses the difference between banks' business models and insurances', the risk profile of banks and insurance companies, and the theoretical foundation of operational risk and the gap in operational risk management literature. Thereafter, the methodology and quantitative data is described and the techniques of quantifying operational risk are demonstrated. This is a qualitative study where the quantitative numbers and computational technique have been used to justify the arguments. I conducted interviews with several operational risk managers in insurance companies both in Europe and North America and followed the structure and dummy data of the operational risk database as maintained by the Association of British Insurers. Third, the result of this risk quantification exercise was then compared and analyzed with the literature and the interview data obtained from the insurance managers. It is revealed that the current technique for the measurement of operational risk is fundamentally flawed. Fourth, I proposed five policy recommendations that illustrate the characteristics of operational risk for insurance businesses. Finally, the conclusion is drawn.

## **2. Literature review**

Operational risk is still an observed phenomenon and its properties are not entirely understood by academics and practitioners. It was not long ago that the measurement and management of operational risk was introduced in Basel II in the

hope of preventing bank failure due to operational errors, as happened with Barings<sup>2</sup> and Daiwa (Power 2005).<sup>3</sup> The definition of operational risk is thus primarily linked, at its origin, to the components of risk associated with events related to trading activities in the derivative market. Over time, this operational risk concept was extended to the credit risk management practice, where banks' credit division managers raised concerns about the integrity of settlement systems. Moreover, operational risk is treated as a category left over from the core banking risks. However, strategic and reputational risks were not included in Basel II's operational risk definition mainly to avoid the complexity associated with understanding and quantifying those risks. Consequently, the evolution of operational risk management is a kind of regulatory-driven phenomena that binds managers to compute the level of risk capital<sup>4</sup> for this leftover category of risks in their risk management functions. Because this is mandatory, the banking institutions consequently began to comply by gathering data and developing models. These efforts were aimed at producing a model-generated number and there was not much interest in the quality, adequacy or reliability of the data. In practice, three groups of professionals are interested in the management of operational risk. One is the internal auditors, who work independent of management, and they, by professional training, work with process-driven functions to provide assurance on the implementation of strategy with minimal error. A second group is the risk modelers, with skills relating to quantitative financial modeling techniques. The concentration of their modeling and measurement approaches are entirely on the skewed and fat-tailed risks with an understanding that the standard risk management framework and practice which traditionally existed in the industry cannot deal with these extreme risks. Another group of professionals, the business managers, oversee the operational risk on a day-to-day basis.

On the academic side, a majority of published research on operational risk is on the banking sector. So far a little research has been done on the operational risk in specific to insurance industry. However, the relevant studies on operational risk in the financial sector 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, Chaudhury (2010) wrote on developing the capital adequacy models of operational risk for banks. Until now, only a few papers (i.e., Cowell, Verrall and Yoon 2007; Tripp et al. 2004), focused specifically on the operational risk of insurance companies and Cummins, Lewis and Wei (2006)<sup>5</sup> focused on both banking and insurance in their publications. In line with the Basel II requirements, Scandizzo (2005) provided a

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<sup>2</sup> The bankruptcy of Barings Bank in 1995 happened primarily because of the operational (fraud, in particular) "rogue" trading activities of Nicholas Leeson in Singapore.

<sup>3</sup> A list of major industry events due to operational and strategic failures of several organisations is included in Acharyya (2010).

<sup>4</sup> Basel II originally set 20 percent of the current minimum regulatory capital as a benchmark deriving from practice. Thereafter, this level was reduced to 12 percent.

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

systematic method for mapping operational risk in the process of its management: identification, assessment, monitoring/reporting and control/mitigation. He observed that operational failures are originated 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 utilized 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, Bonson-Ponte and Escobar-Rodriguez (2006), have discussed statistical techniques for operational risk measurement and subsequent regulatory requirements. In identifying the causes of operational risks, a number of studies (e.g., Cummins, Lewis and Wei 2006; Dickinson 2001; and Guillen et al. 2007), categorize 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 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 or survival of the firm. In fact there is no effective insurance technique available to transfer these low frequency and high severity risks. The above discussions indicate that not enough research on operational risk has been done in insurance compared to banking.

### **2.1. Difference between bank and insurance business models**

The insurance business model is different from banking's; hence, the characteristics of operational risk are also different in many circumstances. 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 for their clients. Since underwriting of new business and settlement of old claims is a continuous process, the amount of money on hold (unless something unexpected happens) remains remarkably stable in relation to the volume of premiums. Consequently, the amount of money on hold grows with the growth of an insurer's business. If premiums exceed the total of expenses and eventual losses, insurers end up with underwriting profits 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 to generate 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).

The specific nature of insurance business makes it very different from financial intermediaries such as banks. While banks are in the borrowing and lending business thus contributing on the flow of funds (money), insurers act as risk takers and managers of insurable risks that arise either from individuals or businesses. In other words, insurers (life insurers, in particular) contribute on wealth transfer from one generation to another. 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. 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 2008 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, such operational errors do not threaten their survival. It is argued that, unlike banks, insurers do not create systemic economic risk (Geneva Association 2010).

## **2.2. The risk profile of banks and insurance companies**

Credit risk is the core risk in banking. In commercial banking, the credit risk arises from defaults from the borrowers—private, commercial or government—in lending contracts. In investment banking, a large amount of credit risk is attached to trading of derivatives contracts. However, banks use careful lending and the purchase of credit insurance including hedging to reduce credit risk from borrowers default. In insurance, credit risk is not a big issue because insurers receive premiums upfront from the policyholders. Although there is an element of credit risk from the purchase of reinsurance but reinsurer insolvency 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, or a run on the bank. However, in investment banking, the wrong position in trading and imprudent underwriting typically creates liability that may cause liquidity risk. Banks typically reduce liquidity risk with interbank markets and money-market access. In addition, banks pool their liquidity risk within the investment community through securitization.



In contrast, adverse movement of claims frequency and severity (e.g., natural catastrophes or asbestos) may make insurers liable to pay large claims that, in turn, can give rise to liquidity risk. In the life insurance sector, liability risk arises from long-term promises to pay in the event of premature death of insureds or, for life annuities and pensions; this may be due to longevity. 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 with their investment risk than banks. This is 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 investments. Interest rate risk on fixed-interest investment is not a big issue for banks because banks reduce their exposure by purchasing interest rate derivatives (e.g., interest rate swaps) and matching the borrowing and lending rates. This is also only a small 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 that are duration matched. In addition, currency risk is a potential problem for non-life insurers rather than for banks. This is because the insurance business is international and the fluctuation in exchange rates may adversely affect settlement of claims in foreign currency. For example, premiums received in one currency (\$) and claims paid in another (£) may be affected by currency risk. Insurers reduce this risk by currency matching.

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 models. Human and technological error can massively affect the profitability and reputation of investment banks, making it a complex and highly risky business. This is not the case in commercial banking and the insurance business. In most cases, the insurers add amendments and a cancellation clause in the policy contracts that 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 is unlikely to significantly contribute to insurers' failure compared to that of banks.

### **2.3. Theoretical foundation of operational risk**

The literature discussed above indicates that a majority of previous research did not sufficiently look to characterize operational risk in terms of its sources. In this effect, we need to understand the distinction between two issues that cause operational risk in business. The first one is the formulation of strategy and the other is the implementation of strategy. The success or failure of strategy implementation raises questions about whether the strategy is itself robust or faulty and mistakes (either intentional or unintentional) were 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 chief executive officer, the principal); the managers (the agents) execute the strategy in a real-world environment. However, there may be circumstances where a robust strategy is proved wrong (faulty) in an adverse economic environment. In addition, there may be instances where a strategy that was not formulated with due care and skill turned into a good strategy. For example, many homeowners who purchased mortgages or remortgaged their property with tracker or adjustable-rate mortgages (as opposed to high fixed rate mortgages) were benefitted from the lowering interest rate regime following the 2008 financial crisis. This discussion on the formulation and execution of strategy indicates that operational risk is a product of faulty strategy and the organization should concentrate on the robustness of the strategy to reduce operational risk. These discussions emphasize the fact that risk management has obvious limitations and it is difficult to distinguish the real causes of risk of any organization's 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. This needs to be recognized in the theoretical foundation of operational risk management.

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 the theoretical foundation of operational risk, there is considerable work by strategists that can be utilized to establish a conceptual framework of operational risk for financial firms. In a theoretical paper, Wiseman and Catanach (1997) discussed several organizational and behavioral 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.

Employing the concept of both utility and agency theories, Jensen and Meckling (1976) suggested that an agent's risk preference changes with the variability of an owner's vigilance or monitoring status. Alternatively, agents' superb performance diminishes owners' levels of monitoring while demonstrating risk-seeking characteristics and vice versa. This proposition is reflected in Wiseman and Gomez-Mejia's (1998) behavioral 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 behavior. Likewise, the behavioral 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 in measuring organizational risk (Bowman 1982; Fiegenbaum and Thomas 1988). 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' decentralized 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 recognized by finance researchers. For example, Stulz (1984, 1990) identified that firms intend to maximize hedging until the variance of the investment portfolio (i.e., risk) is minimized, whereas managers trading in hedging contracts individually face significant costs (Froot, Scharfstein and Stein 1993). If we believe that operational risk is a subset of strategic risk, we need to analyze the root of strategic failure of an organization 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 have emerged. The first set affirms the quantification of operational risk, in which proposing a solution—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 that severely damage the bottom line and/or survival of the firm. The second set of knowledge undertakes a broader view of operational risk where 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 from a holistic perspective while recognizing the relationship between operational risks and other risks for the firm. Clearly, this approach is targeted to identify problems and make recommendations rather than to provide precise solutions. However, both approaches have merits and demerits.

The modeling 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 conceptualize 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 Sept. 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 databases for company-specific and publicly 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 \$1 million between 1978 and 2005 in the United States. The 2004 Loss Data Collection Exercise (LDCE) collected more than 100 loss events in the United States valued at \$100 million or more in 10 years up 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 30 member banks from 12 countries and it has more than 44,000 losses, each over €20,000 in value. Moreover, IBM's OpenPages, SAS' OpRisk and Willis' Operational Risk Loss Database were created to track 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 the insurance sector. Members report data for operational loss events and, 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 an interview with one of the staff. Unfortunately, the database is not public and is for exclusive use of consortium members.

Without access to the ORIC database, I instead created a dummy dataset for five categories of operational risk (internal fraud, external fraud, damage to physical assets, business disruptions and system failures, and execution, delivery and process management) between Jan. 1, 2008, and Dec. 31, 2010 (36 months), assuming that each loss falls between \$10,000 and \$200,000. This is in line with the structure of the ORIC database. For simplicity, I assumed that no more than 10 events occurred in any given month. 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 five 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	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 event occurring months	30		31		34		31		31	
Average number of events per month ( $\lambda$ )		3.06		3.94		4.08		4.03		4.33

The row # 3 in Table 1 suggests that there were seven months (denoted by n(k)) within the time horizon where no (i.e., 0) internal fraud occurred or was reported (denoted by k). Hence the total number of events that occurred within these seven months is zero ( $=7*0$ ). Similarly, in Business Disruptions & System Failures category there were four months within the same 36 months' time horizon where 10 events occurred in each month. Hence the total number of events that occurred within this four-month window is 40 ( $=10*4$ ). It is important to note that in table 1 the number of months in five categories actually totals range from 30 to 34. However, for simplicity, we distribute the events across the entire period i.e., 36 months.

For simplicity, I assumed there were 100 observations (loss data) for each category of loss within the stipulated time horizon. Tables 2 and 3 show 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	Total	Average
Number of events	110	142	147	145	156	700	140
Number of months when the actual event happened	30	31	34	31	31	157	31
Average number of events per month ( $\lambda$ )	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 Disruption & System Failure	Execution, Delivery & Process Management	Average
N	100	100	100	100	100	
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 over 36 months, 110 events occurred in the internal fraud category and there were six months where no events happened under the same category. On average, there were four events in each month over the 36-year horizon for all categories. In Table 3, we can see that the individual maximum loss was recorded in Business Disruption & System Failure amounting to \$719,922.09 and \$11,629.81 was the minimum, in the internal fraud category. In addition, the mean loss for all categories was recorded as \$89,994.70 with an average standard deviation of \$64,483.92.

I used Monte Carlo simulation to generate stochastic loss distributions based on the dummy historical data. Table 4 illustrates the aggregated loss parameters of the

operational risk data. We assumed that the discrete frequency data will follow the behavior of Poisson distribution and the continuous loss severity data will follow Pareto distribution.<sup>6</sup> The values for mean and standard deviation of the observed loss data were picked up from tables 2 and 3.

Table 4. Parameters of loss distributions from aggregated observed loss data

	<b>Aggregated operational loss parameters</b>		<b>Distribution type</b>
<b>Frequency</b>	Mean=Variance	3.89	Poisson
<b>Severity</b>	Mean (\$)	89,994.70	Pareto
	Standard deviation (\$)	64,483.92	

The @RISK software has been used to run the simulation and choose 1,000 iterations and one simulation in each run; the computer runs the simulation 1,000 times, creates randomly generated data and thereafter furnishes the combined result in a probability distribution curve in terms of frequency and severity. Table 5 illustrates the summary statistics of the total aggregated loss data. It is important to remember that the summary statistics will change in each run because the computer chooses randomly generated values in each and every iteration and they are different from earlier runs.

Table 5. Parameters of loss distributions after Monte Carlo simulation

**Aggregated operational loss data summary for Monte Carlo simulation using @RISK**

<b>Frequency</b>	4.00
<b>Severity (\$)</b>	64,484.632979
<b>Total aggregated operational loss (\$)</b>	257,938.53

Each time, the software created both frequency and severity distributions of each category and produced a probability distribution curve, which are shown in appendix A.

<sup>6</sup> One can choose lognormal distribution instead.

Figure 1. Monte Carlo simulation output for integrated operational risk

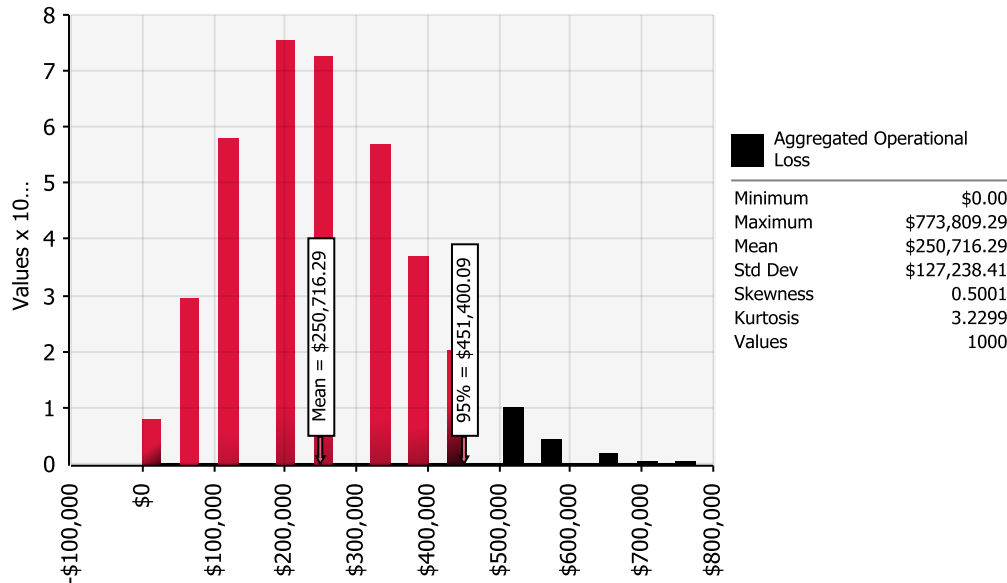


Figure 1 shows the Monte Carlo simulation output of total operational risk of the firm. From the graph, we can see the total expected loss (i.e., mean) is equal to \$451,400.09 and unexpected loss is \$322,409.20 (total loss less expected loss). Therefore, the operational value at risk (OpVaR) at 95 percent confidence level is \$322,409.20. It means that every 20 years, there is a 5 percent probability that the operational loss of this firm will exceed \$322,409.20. 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 percent just to illustrate an example. However, in practice, this confidence level will vary at any level below 100 percent (typically 99.5 percent) based on the firm's risk appetite.

#### 4. Analysis and findings

It is important to mention here that irrespective of the accuracy of the model to compute OpVaR is not convincing. Indeed, the numerical result, which is the output of the simulation exercise, does not represent the true picture of pure operational risk that a firm holds at a point of time. In the following paragraphs, I will present and explain the arguments to support this statement. The arguments have been developed from the literature and the data obtained from the interviews with the operational risk professionals in the insurance industry. In addition, they demonstrate my understanding of the characteristics of operational risk in the insurance sector.

##### 4.1. Operational risk is embedded in all core risks

The operational loss data I have used in the computation of OpVaR do not contain pure operational risk components. There are components of other risks within these numbers. Alternatively, operational risk is embedded into banks' and insurers' core risks (credit, market, underwriting, etc.) and the data used in analysis do not represent 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. 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, Rosengren, and Jordan (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 de Fontnouvelle (2005) found that operational risk substantially impacted the market value of the firm. All this means that the operational loss data already included the market losses while quantifying operational risk. This conclusion suggests that the so-called operational loss data preserved by several vendors as well as banks and insurance companies are faulty and do not necessarily represent the loss data solely for operational errors. Moreover, there are many operational risks in insurance 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 one 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 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 and insurers. 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 is operational by nature, the way operational risk management is currently designed and implemented (mostly aligned to meet regulatory requirements) does not entirely fit with insurance companies’ actual operational risk profiles. The literature review revealed that actual operational risk management is about identifying risks, thinking about risk, comparing risk appetite across different lines of business, and considering 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 suggests 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 from 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 in an insurance contract hold the right to cancel the contract in the case of any breach during its term. This is unlikely to occur. In addition, there is a scope for insurers to amend operational errors 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 process.<sup>7</sup> 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 characterized by individual actions, organizational culture, and individual's emotions, understanding and response to risky situations, etc. Moreover, unlike financial risk, operational risk is not traded in the capital market. 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 the 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 the 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. This argument was echoed by one respondent, who said, "I am not persuaded on the understanding that modeling 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' are 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 monies have been focused on quantifying it." Another respondent added, "We did not quantify our operational risk at all until Solvency II said we must quantify this."

There is another factor that prevents subjectivity from being included in operational loss data. It is recognized that the practice of operational risk in developed countries is comparatively more robust than in other countries, which is partly due to the matured regulatory landscape and superior management culture. However, I observed that for some countries outside the United Kingdom (for example), the

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<sup>7</sup> To know more about insurers' unique functions and business model, interested readers are recommended to read "Systemic Risk in Insurance: An Analysis of Insurance and Financial Stability" (Geneva Association 2010).

notion of reporting errors, mistakes or failures is something quite strange because they think there will be an immediate penalty or fine. 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 to operational risk and vice versa**

It is evident that in many instances, operational failures happen due to sloppy or poor management actions. However, it is noted and discussed in the literature that management failure in many circumstances combines with ongoing business environment issues that actually trigger massive losses and even the failure of the entire organization.

The debate is whether the management emphasis is more on the formulation or 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: “We believe that an extreme event, e.g., failed M&A resulting in insolvency, which we categorize as strategic risk, does not happen on its own. We found several other elements, which are beyond strategic controls, effectively influence the ultimate extreme events.”

History suggests that the root causes of large and catastrophic losses are mostly small, often unimaginable and overlooked by traditional internal control and corporate governance systems. The 2007 financial crisis is a prominent example of such oversight. The April 2011 interim report of the Independent Commission of Banking in the United Kingdom identified that the conglomeration of retail and investment banking is the root cause of the financial crisis. The near collapse of AIG—due to liability created by AIG Financial Products Corp., which generated only 3 percent 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 recognize the difference between strategic risk and operational risk. The same respondent said, “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 insurer databases. 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 stem from the perspectives of management theories**

In this context, the study raises a vital question: Should insurers' operational risk be studied 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 employees' attitudes 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.

Further research areas are discussed in the literature review under the foundation of operational risk management. However, that investigation remains outside the scope of this study.

## **5. Conclusion**

Unlike financial risk, the management of operational risk has limitations. There is no advantage for the business to engage in trading operational risk in the market. This is because nobody will be interested to buy operational risk for obvious reasons. In this sense, operational risk can be compared with [unwanted] insurance risk, the risk that an insured does not want to hold. Unfortunately, all operational risks are not insurable. Consequently, mitigation through controlling in its origination could be the best strategy where ex-ante measurement of risk and deployment of capital may have a little role where management of operational risk is concerned. Furthermore, it is difficult to justify the economic concept of the risk-return trade-off in the case of operational risk.

The interviews revealed that operational risk taking is not intentional and we can view operational risk as a byproduct of financial and strategic risk-taking activities. This implies that the simplification 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 that focused on the accuracy of modeling and quantification techniques, this study focused on the characteristics of operational risk. I argued that at its current stage of development, it is paramount to understand operational risk and its linkages with other types of risks. I proved, with hypothetical dummy data, that computing operational risk for an insurance company with VaR output is fundamentally flawed.

I found that the Basel II definition of operational risk is not only incomplete but is inappropriate in regard to the insurance sector. The sources and characteristics of operational risk are very different from those found in banking. As opposed to banking contracts (e.g., lending and trading), the insurance policies holds built-in

wording, such as cancellation clauses, that reduce insurers' exposure to operational risks. With the empirical evidence, I argued that operational risk holds overriding characteristics of other types of risk (e.g., market risk) and the way operational risk data is recorded is incorrect and actually includes other types of risk. I prefer to term it the "illusory effect." Consequently, the operational risk exposure of insurance companies can be substantial and often larger than sectors' risk exposure.

I also discovered that organizational failures do not happen because of 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, leading to bankruptcy. The operational risk is such an initial single cause but cannot be blamed alone for the total organizational failure.

I found that insurers are not much concerned about their operational risk exposure as defined by Basel II. In essence, every development usually follows three steps: discovery, invention and solution. In the banking sector, the discovery was that banks (investment banks, in particular) failed due to operational risk. On the basis of this observation, several models and tools were innovated to determine the optimal amount of capital needed to prevent bank failure due to operational risk. However, operational risk management in insurance is not a naturally evolved phenomenon. There was nothing to discover because, until now, no insurance company's failure was observed due to operational error (at least within the scope of the Basel II definition). Hence, the invention of models and tools to determine the optimal level of capital needed for insurers' operational risk is mostly a compliance function. In this perspective, the current emphasis on operational risk in the insurance sector seems an externally driven task, which has been imposed by a group of professionals who do not necessarily have a core insurance profession (underwriting, in particular) background. It is evident that, in practice, one group of professionals holds the ultimate power of quantifying and modeling operational risks while the other group takes the responsibility for the failure of operational risk management. In reality, these two groups have very different perceptions of operational risk and subsequently hold very diverse opinions on how to manage the risk. I proposed that to add value to the business, operational risk management should go beyond this risk-quantification boundary.

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

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## Appendix A

Figure 2. Monte Carlo simulation output for internal fraud category

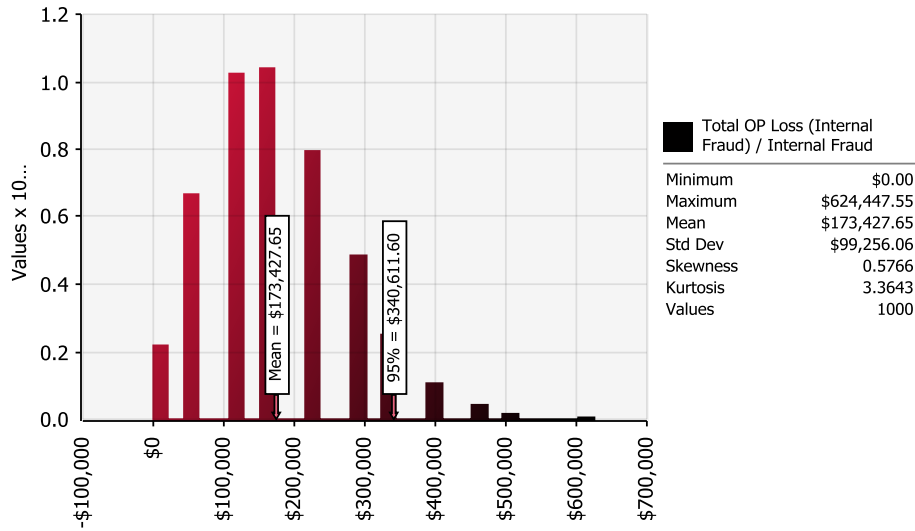


Figure 3. Monte Carlo simulation output for external fraud category

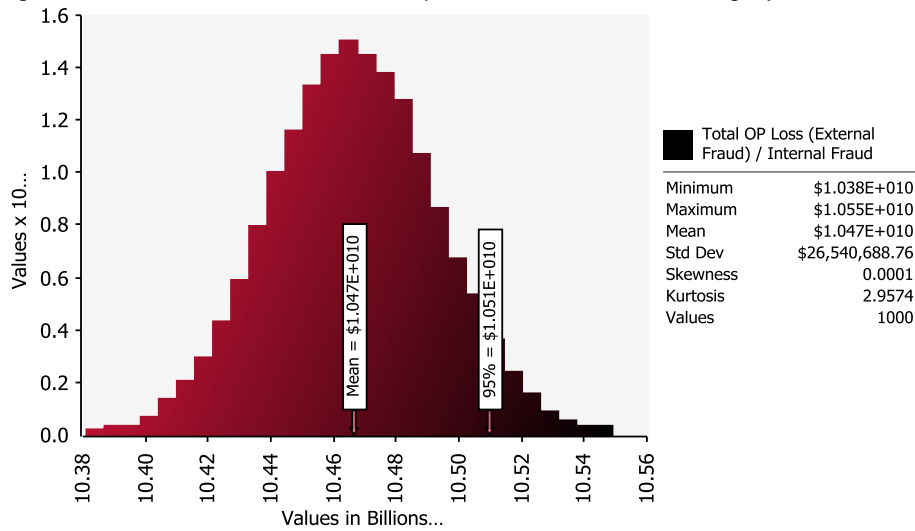


Figure 4. Monte Carlo simulation output for damage to physical asset category

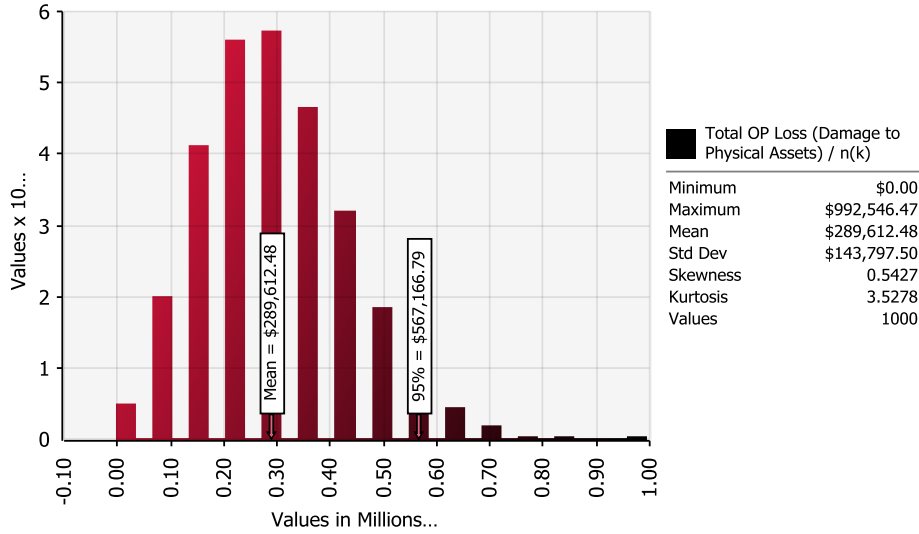


Figure 5. Monte Carlo simulation output for business disruption and system failures category

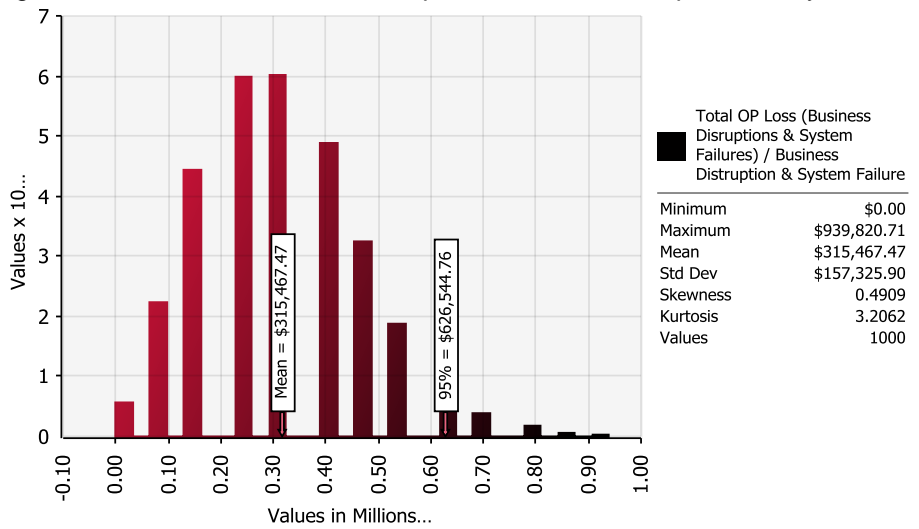


Figure 6. Monte Carlo simulation output for execution, delivery and process management category

