

# **Beyond traditional performance metrics: Incorporating operational risk into measuring banks' financial performance**

## **Au-delà des indicateurs traditionnels de performance : Intégration du risque opérationnel dans la mesure de la performance financière des banques**

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### **Abstract:**

This paper aims to open the discussion on the implementation of performance metrics that are adjusted to operational risk in the context of banks. It introduces the subject of new and improved versions of RAROC and EVA, the two main risk-adjusted performance metrics, but this time, taking into account the probable loss caused by operational risk within banks or banks business units. It is based on a narrative literature review, using a flexible approach to engage in a critical and conceptual discussion on incorporating operational risk into bank performance indicators. This work followed a logical order of analysis, discussing financial performance as well as operational performance before diving into operational risk and glossing over some of the difficulties associated with measuring and managing it, all while discussing the Basel II requirements associated with it. Towards the end, it establishes the relationship between financial performance and operational risk and proceeds to dismantle the traditional performance metrics such as ROA for their lack of consideration of operational risk or any risk for that matter and reaffirms the need of performance risk-adjusted metrics especially ones attuned to operational risk due to both its variety and complexity.

**Key Words:** Risk-adjusted performance measurement, Value At Risk, Financial Performance, RAROC, EVA.

**Classification JEL:** G20

**Paper Type:** Theoretical Research.

### **Résumé :**

Cet article a pour objectif d'ouvrir la discussion sur la mise en place de mesures de performance ajustées au risque opérationnel dans le contexte bancaire. Il aborde le sujet des nouvelles versions améliorées de RAROC et EVA, les deux principaux indicateurs de performance ajustée au risque, mais cette fois en tenant compte de la perte probable causée par le risque opérationnel au sein des banques ou de leurs unités opérationnelles. Cet article est basé sur une revue de la littérature narrative, utilisant une approche flexible pour engager une discussion critique et conceptuelle sur l'intégration du risque opérationnel dans les indicateurs de performance bancaire. Le travail accompli suit un ordre logique d'analyse, en abordant la performance financière ainsi que la performance opérationnelle, avant de se pencher sur le risque opérationnel et de survoler certaines des difficultés liées à sa mesure et à sa gestion, tout en discutant des exigences de Bâle II qui y sont associées. Vers la fin, il établit la relation entre la performance financière et le risque opérationnel, puis procède à la remise en question des indicateurs traditionnels de performance tels que le ROA, en raison de leur absence de prise en compte du risque opérationnel ou de tout autre risque, et réaffirme la nécessité de mesurer la performance à l'aide d'indicateurs ajustés au risque, en particulier ceux adaptés au risque opérationnel en raison de sa diversité et de sa complexité.

**Mots-clés:** Mesure de la performance ajustée au risque, Valeur en Risque, Performance financière, RAROC, EVA.

**JEL Classification :** G20

**Type du papier :** Recherche théorique.

## **1. Introduction**

Upon the first introduction of the Basel I requirements in 1988, the focus was primarily on credit and market risk, as these risks were considered more easily measurable and manageable. The Basel Committee on Banking Supervision aimed to standardize capital adequacy regulations for these risks, providing a global benchmark for banks (Basel Committee on Banking Supervision, 1988). Operational risk, on the other hand, was not included in this framework, as it was not fully understood, and the literature at the time predominantly concentrated on credit and market risks (Chernobai, Jorion, & Yu, 2011). This omission was due in part to the difficulty in quantifying and managing operational risk, which involves a broad range of factors from human error and system failures to fraud and regulatory breaches. The oversight of operational risk became more evident after a series of major financial losses. One of the most notable was Société Générale's \$7.2 billion loss in 2008, primarily attributed to weak internal controls and poor management of operational risks (Chernobai et al., 2011). This incident, alongside others, such as the Barings Bank collapse in 1995, where rogue trading led to a \$1.4 billion loss, highlighted the dangers of neglecting operational risk. The 2008 financial crisis also underscored the importance of operational risk management, as many financial institutions faced substantial losses due to failures in handling operational risks (Jongh et al., 2013). These events were catalysts for a shift in how operational risk was viewed within financial institutions, leading to the introduction of more comprehensive regulatory frameworks.

In response to these incidents, the Basel II framework, introduced in 2004, incorporated operational risk for the first time, requiring banks to hold capital specifically to cover operational risk exposures (Basel Committee on Banking Supervision, 2004). This was a significant step in acknowledging that operational risk could have a profound impact on a bank's financial stability and that regulatory frameworks must evolve to address this risk. Operational risk is distinct from market and credit risks in that it is not confined to specific business areas; rather, it spans across all functions of a bank, from front-office operations to back-office processes. Dev (2006) points out that operational risk is not only poorly understood but also much harder to measure compared to more traditional risks, as it involves a wide array of unpredictable events and human factors. This makes developing effective risk management frameworks and performance metrics particularly challenging.

As the significance of operational risk became clearer, it raised critical questions about how banks measure their financial performance. The conventional performance metrics, such as Return on Assets (ROA) and Return on Equity (ROE), often fail to account for the impact of risk, leading to incomplete or misleading assessments of a bank's true financial health (Jorion, 2007). Many research papers have shown that effective management of operational risk is positively correlated with better financial outcomes for banks, as mitigating operational losses helps to protect profitability and preserve capital. However, this raises the question: how is financial performance in banks measured? and is it possible to measure financial performance while taking into account operational risk? is operational risk-adjusted performance the true metric that can expect the downfall of important banks?

Traditional performance metrics do not adequately reflect the role of operational risk, which makes it necessary to develop new, risk-adjusted performance measures that can more accurately capture the true performance of banks. Operational risk-adjusted performance metrics are a potential solution to this problem, as they incorporate both the potential for operational risk losses and the costs of managing these risks into performance evaluations. However, the widespread adoption of such metrics is relatively new, and further research is needed to refine these models and assess their applicability across different banking environments.

Unlike market and credit risks, which tend to be confined to specific areas of the business, operational risk is inherent to all businesses and processes: it is a broader concept than merely operations or back-office risks. Operational risk is anything but well understood (Dev, 2006: 12) thus making the process of establishing risk-adjusted metrics for performance a complex one. This article will address these challenges through a literature review of existing studies on operational risk and its impact on financial performance, followed by a critical analysis of the limitations of traditional performance metrics. It will highlight the evolution of risk management frameworks and discuss the development of risk-adjusted performance metrics that better incorporate operational risk into the evaluation of banks' financial health.

The first paragraph establishes the types and metrics of performance in banks, the second paragraph discusses operational risk in terms of measurement and management, the third paragraph links financial performance to operational risk and examines their relationship while dismantling traditional performance metrics. The fourth and final paragraph advocates for new risk-adjusted metrics that are modified to account for operational risk.

## **2. Bank performance: definition and metrics**

Bank performance can be defined from many angles, which is what makes it a complex concept to understand. For many, performance is only financial since profit is the main goal for most organizations, including banks. However, financial performance is merely a result of other performance types, as shown in the study by Venkatraman and Romanujan (1986). They established that bank performance can be either financial or operational, with the operational aspect serving as the driving force behind financial profit.

This distinction allows for performance to be defined depending on the context in which it is discussed, leading to different measurement methods. For bank performance, some studies employ accounting measures such as ROA and ROE (for example, Andres and Vallelado, 2008; Grove et al., 2011; Pathan and Faff, 2013; Liang et al., 2013; Gafoor et al., 2018), while others favor market-based measures like the price-to-book value ratio and equity return (for example, Belkhir, 2009; García-Meca et al., 2015; Zagorchev and Gao, 2015), or frontier-based measures such as technical efficiency, profit efficiency, and cost efficiency (for example, Tanna et al., 2011; Dong et al., 2017; Adeabah et al., 2019).

### **2.1 Financial performance:**

Financial performance is derived from the outcome-based financial indicators that are assumed to reflect the fulfillment of the economic goals of the firm. (Venkatraman and Romanujan (1986)). The traditional measures to assess commercial banks' performance are return on total assets (ROA) and return on total equity (ROE). Analysts and bank regulators have used these metrics in (a) assessing industry performance (b) forecasting market structure trends (used to predict bank failures and mergers) and (c) other purposes where a profitability measure is needed (Gilbert and Wheelock, 2007).

### **2.2 Operational performance:**

In order to conceptualize business performance, it's only logical to discuss indicators of operational performance in addition to the financial performance indicators previously mentioned.

While financial performance is palpable by the means of tangible profits, operational performance often refers to the effectiveness and the efficiency with which a bank manages its processes, operations and resources, it is usually measured with various metrics that can reflect the operational aspect of the business such as Cost to Income Ratio, loan processing time, Capital adequacy ratio, Customer satisfaction scores, IT System downtime or market share.

These metrics, although operational, can lead to financial performance when they are positive, hence the importance of defining performance under different types of lenses.

Of course, this classification of performance is one of many that have been proposed in the banking research community, but it doesn't in any shape or form limit the possibilities of other classifications for banking performance. The choice to feature it in this paper was mainly based on the fact that this classification provides a rather comprehensive look.

### **3. Operational risk in the context of banks**

#### **3.1 The emergence of operational risk:**

Before we define operational risk, it is rather interesting to see the history of its emergence in the banking scene. Before the Basel II reforms, operational risk was widely overlooked as a type of risk that was difficult to measure, let alone prevent. The generic term "Operations risk" had already been officially coined in 1991 COSO, but did not acquire widespread currency until the Basel II proposals were developed.

The Basel II reforms introduced operational risk to the banking scene and provided guidelines on how to handle many of its types like fraud or system failures but in the years that followed the publication of the Basel II reforms, and specifically after the subprime mortgage meltdown and The Great Recession of 2008, it had become clear that this type of risk needed a much more detailed and comprehensive model in order to assess, predict and effectively manage it.

#### **3.2 The path to defining operational risk:**

To define operational risk, there have been many research papers published with the sole conclusion that it is a rather difficult concept to discern. (Goodhart, 2001). The attempts to define it only led to a bigger question than its meaning: who's responsible for ensuring that operational risk is properly managed? Surely, a risk related to information systems can be traced back to the IT manager, and a risk in HR can be blamed on the HR manager, but in the midst of all of the operational risk aspects, it becomes clear that many parties can be involved in managing it.

The only problem was that managing operational risk involved a whole set of steps, such as assessment, prediction, and then response. Many argued that a separate function must be created to serve as a single point of contact for the stakeholders in matters related to operational risk; this position was coined as "Operational risk manager".

The options for definitions were thoroughly debated until Basel II eventually defined operational risk as "The risk of direct or indirect loss resulting from inadequate or failed internal processes, people or systems or from external events." In the Basel II approach, this definition includes legal risk, but excludes strategic and reputational risk. This definition, although concise, was strategically put together to reflect only the probable causes of loss.

#### **3.3 Managing operational risk:**

Given the changing nature of risk and the even bigger changing economic and financial environment, managing operational risk is no easy task; it is a complex and intricate task but a necessary one in regards to the expected level of performance demanded of banks and the type of anticipatory reflexes required to face the global economic crises.

It should be noted, though, that the process of managing operational risk is not a size fits all kind of ordeal, but it's rather built on a unique and tailored approach depending on the bank's size and scale/materiality in regards to risks. "Operational risk is determined by a multitude of factors as the complexity of the bank structure, the geographical dispersion of its activities and units, the complexity, range of products and services, number of staff and its professional skills,



experience and training and risk management culture” as was stated by Victoria STANCIU in “Managing Operational Risk In Banks” (2010, pp 251).

An essential step of managing operational risks within the framework of the Basel accords is securing the Regulatory capital, which is the amount of capital a regulator requires a bank to hold to safeguard it against operational risk, so in order to calculate it, banks will implement one of three approaches:

- **Basic Indicator Approach:** This approach uses gross income as a proxy for operational risk, with the capital charge equal to 15 per cent of the average of gross income for the last three years.
- **Standardized Approach:** This approach also employs gross income as a proxy measure for operational risk, but in this case, it is divided into eight standard business lines, each with a different risks weight factor to calculate capital.
- **Advanced Measurement Approach (AMA)** In the AMA approach, the regulatory capital requirement is the risk measure generated by the bank’s internal operational risk measurement system (model).

The objective of all of the three approaches is to define a capital percentage to put aside as a cushion in case any type of operational loss occurs, however, and in addition to satisfying the regulatory capital condition, banks are more encouraged to apply their own framework of managing operational risk in a practical way that could be summarized in the following steps:

- Creating a system for collecting data related to operational incidents and losses;
- Establishing a set of key risk indicators;
- Establishing the potential operational risk that can occur;
- Designing and implementing adequate controls for the potential operational risk;
- Periodical test on the implemented controls, reporting controls’ failure, and taking measures for controls’ improvement.

It seems that these steps are methodical in nature, however many obstacles can be highlighted starting from the first step, “data collection” as this step is the cornerstone of the whole process, one thing is sure: “There is often a high degree of ambiguity inherent in the process of categorizing losses and costs” (Basel Committee on Banking Supervision, 2001a, para 8). Data collection in this context is based largely on identifying the events that could lead to a financial loss, these events fall either on the lower side or the higher side of both frequency and impact, thus creating two polarized types of events: high impact low low-frequency events and low impact high high-frequency events. And even if the bank overcomes the ambiguity related the categorizing these types of losses, can we be sure that it succeeds in its mission of identifying all of the probable events that can take place? Surely depending on the history of the bank’s losses to identify comprehensively all of the possible losses cannot be sufficient, as the past can never predict the future, and COVID-19 is the best example to illustrate this one truth.

As if these limitations weren’t enough, Data Collection is a declarative process by nature meaning that it’s up to a large number of bank employees to declare their probable losses and while internal auditors and internal controllers might be incentivized to declare any type of probable loss in order to highlight their added value within the organization as it is literally their job to spot anomalies, operational staff such as the HR department or the purchasing department can be tempted to hide the losses or eventual risks related to their roles in an effort to seem productive as the productivity is often linked to the smooth sailing of operations.

#### **4. Operational risk and Traditional bank performance metrics:**

Having shed light on both the concept of “Bank Performance” and “Operational Risk”, it is only logical to begin to associate these two concepts in an effort to study the relationship they share, as well as the research that’s been done up to this day.

#### 4.1 The association of bank performance to operational risk: a research history:

Up to this day, many research papers have featured the relationship between banks' performance and operational risk as a topic in an effort to prove that optimal management of operational risk can only lead to enhanced financial performance.

One of the firsts to explore this relationship was Bekele (2015), who analyzed data from eight Ethiopian commercial banks between 2004 and 2013. Although the study covered various risks, operational risk was emphasized, and the results indicated a positive and significant impact of operational risk management on banks' performance.

Similarly, Muriithi (2016), analyzing 43 Kenyan banks from 2005 to 2014, found that liquidity risk, market risk, credit risk, and operational risk all negatively affected financial performance, with operational risk having the greatest impact.

Meshack and Mwaura (2016) studied 34 Tanzanian commercial banks and concluded that operational efficiency significantly influenced financial performance.

In Nigeria, Fadun and Oye (2020) also observed a positive impact of sound operational risk management on banks' financial performance. Despite the different geographical and regulatory contexts, all these studies reached the same conclusion: effective operational risk management improves banks' financial performance.

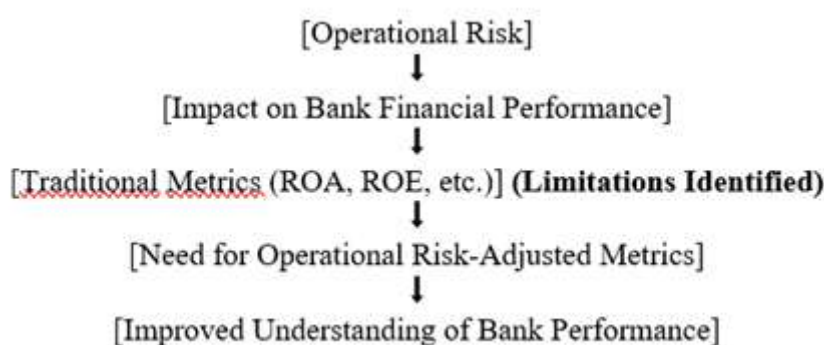
The tangible impacts of operational risk management are further illustrated by several studies:

- Lower capital charges, improved decision-making, enhanced customer and staff satisfaction, and better regulatory compliance (Accenture, 2015);
- Reduction of operational losses, compliance and audit costs, prompt identification of illegal activities, and mitigation of future risks (Habib et al., 2014);
- Better identification and management of risks beyond banks' expertise, leading to improved resilience against systemic crises (Barbu et al., 2008).

Although the reviewed studies consistently emphasize the positive impact of operational risk management on financial performance, several limitations emerge when comparing their findings. While these studies acknowledge operational risk as a significant factor influencing financial performance, they predominantly measure performance through traditional financial ratios like Return on Assets (ROA) and Return on Equity (ROE). These metrics, although useful, do not explicitly adjust for operational risk, leaving a methodological gap regarding how risk factors are integrated into performance evaluation.

Taken together, these observations highlight a gap in the existing literature: while the impact of operational risk management is well acknowledged, there is limited empirical work proposing or analyzing operational risk-adjusted performance metrics. Addressing this gap, the present paper focuses on reviewing the existing metrics and discussing how they could be enhanced to better reflect operational risk exposure.

*Figure N°1: Conceptual model of the relationship between operational risk and the need for adjusted bank performance metrics.*



Source: Auteurs

## 4.2 Banks' performance metrics: any sign of operational risk?

In the first part of this article, we tried to show that financial performance is often just a resultant of operational performance, and that eventually what matters to banks stakeholders is actually the profitability side of things, so for the sake of staying relevant, the following part of this paper will only address the measurement of financial performance thus prioritizing financial metrics.

In order to answer the question in the title, which can be reformulated as follows: Is operational risk reflected in banks' financial metrics? It's only fair to enumerate how bank performance is measured as well as the studies conducted in that context.

In the Appendix to the report on EU banking structures "Beyond ROE – How to measure bank performance", **traditional performance metrics** are listed as follows in an order spanning from most used to least used:

**Table N°1: Traditional Financial Metrics Used in Banking Sector Analysis**

Metric	Formula	Description
<b>Return on Assets (ROA)</b>	$ROA = \text{Net Income} / \text{Average Total Assets}$	Indicates how efficiently a bank uses its assets to generate net income.
<b>Return on Equity (ROE)</b>	$ROE = \text{Net Income} / \text{Average Total Equity}$	Measures the profitability relative to shareholders' equity. Preferred by analysts for evaluating return on investment.
<b>Cost-to-Income Ratio</b>	$\text{Cost-to-Income} = \text{Operating Expenses} / \text{Operating Revenues}$	Assesses a bank's ability to derive profit from its revenue stream. Lower ratios suggest higher efficiency.
<b>Net Interest Margin (NIM)</b>	$NIM = \text{Net Interest Income} / \text{Total Assets (or interest-bearing assets)}$	Reflects the income-generating capacity of a bank's intermediation function, specifically from interest-related activities.

*Source: Appendix "Beyond ROE – How to measure bank performance"*

Traditional metrics such as Return on Assets (ROA), Return on Equity (ROE), and the Cost-to-Income Ratio have long been used as proxies for bank performance. For instance, Bekele (2015) employed ROA to examine the link between risk management practices and performance in Ethiopian banks, concluding that operational risk management had a statistically significant impact on ROA. Similarly, Muriithi (2016) found that operational risk negatively affected ROE in Kenyan banks, suggesting a need to re-evaluate the adequacy of traditional metrics in capturing such risks.

However, these indicators present limitations. As highlighted by the ECB (2010), ROE can be distorted by leverage, while ROA overlooks risk exposure entirely. In the context of operational risk, these shortcomings are even more pronounced, they fail to account for potential internal process failures, regulatory fines, or reputational damage, all of which can materially affect a bank's performance without immediately impacting these headline ratios. Thus, relying on ROE or ROA to establish an order of banks from the most performing to the least performing can have misleading results, especially during a financial crisis; hence, the need for other performance metrics that can reflect a bank's true performance.

Apart from traditional performance metrics, other metrics have been mentioned in the same appendix. let's start with **market-based metrics** of performance:

Market-based measures of performance characterize the way the capital markets value the activity of any given bank, compared with its estimated accounting or economic value. The most commonly used metrics include:



**Table N°2: Market-Based Metrics Used in Banking Sector Analysis**

Metric	Formula	Description
<b>Total Share Return (TSR)</b>	$TSR = (\text{Dividends} + \text{Stock Price Increase}) / \text{Initial Market Stock Price}$	Measures the total return to shareholders, combining dividend income and capital gains.
<b>Price-Earnings Ratio (P/E)</b>	$P/E = \text{Share Price} / \text{Earnings per Share}$	Indicates how much investors are willing to pay per dollar of earnings. Often used to assess market expectations and company valuation.
<b>Price-to-Book Ratio (P/B)</b>	$P/B = \text{Market Value of Equity} / \text{Book Value of Equity}$	Compares a firm's market valuation to its book value. A high P/B may indicate investor confidence or overvaluation.
<b>Credit Default Swap (CDS)</b>	$CDS = \text{Cost to Insure an Unsecured Bond over a Specific Period}$	A risk premium indicating the market's perception of the institution's creditworthiness. Higher CDS spreads imply higher perceived risk.

*Source: Appendix "Beyond ROE – How to measure bank performance"*

Market-based measures are a step forward in comparison to the traditional financial metrics previously discussed, their use can reflect a firm's financial performance more accurately. Market-based measures are different from the accounting-based measures because they focus on the present value of future inflows of income, whereas accounting-based measures focus on past performance. (Seth, 1990). In this context, market-based measures are more attuned to operational performance. However, they are still lacking because they don't have a risk component that can take into account future expected losses.

Several studies have explored the relevance of market-based performance metrics such as TSR, P/E, P/B, and CDS in assessing banks' financial health and risk profiles. For example, Bawa (2019) critically examined P/E from a shareholder value perspective and emphasized its utility in capturing long-term value creation. Similarly, the ECB's report "*Beyond ROE*" (2010) acknowledged the growing role of market-based indicators like CDS and P/B in signaling market confidence and risk, but highlighted their volatility and sensitivity to external factors, which may limit their reliability during periods of financial stress. So, it seems that despite the positive correlation between effective management of operational risk and financial performance, the metrics still widely used do not incorporate the aspect of operational risk, whether it's for difficulty or scarcity of data.

## 5. Towards bank performance metrics that are adjusted to operational risk?

### 5.1 Risk-adjusted performance metrics: a research history

Works pertaining to Risk-adjusted performance mostly started from the late 90s and early 2000s with Matten (2000) and Bessis (2002) pioneering the movement, and Saita (2003) applying the methodology to banks in his working paper "Measuring risk-adjusted performances for credit risk".

Although the original concept of applying risk to performance demands a correct estimation of the losses, it's safe to say that risk-adjusted performance cannot exist without the VaR Method launched by JP Morgan in 1994 in RiskMetrics™. VaR is the maximum potential loss relative to a single position, or a portfolio of positions, with a given confidence interval and a given time horizon.

VaR can be estimated using different methodologies that can measure the maximum potential loss for the bank or one of its business units, this loss is equal to the risk absorbed and can therefore be used to identify the exact capital which the bank, ideally, must hold available for the business units so to allow them to operate and take on risks. This capital is often called Capital at Risk (CaR), and it is the basis of the following risk-adjusted performance metrics:

Risk-adjusted performance metrics are often referred to as **economic metrics**, which aim to assess the contribution of a bank towards shareholders' wealth creation by utilizing its assets on **risk risk-adjusted basis**, as risks can lead to losses that can consume the capital base of banks and ultimately their viability. These metrics can be used to :

- Sort (by order) several banks according to their risk-adjusted performance
- Sort (by order) several business lines within the same bank according to their risk-adjusted performance
- Serve as a criteria by which we can determine the bonuses for bank unit employees.
- Introduce risk-adjusted pricing of activities that are particularly exposed to risk.

- **Economic Value Added (EVA):**

Developed by Stern and Stewart in 1991, EVA is defined as excess of the risk adjusted earnings over the opportunity cost of the capital employed (Dunbar, 2013, Everts & Haarhuis, 2005, Sharma & Kumar, 2010) measuring whether a company generates an economic rate of return higher than the cost of invested capital in order to increase the market value of the company.

$$\text{EVA} = \text{NOPAT} - \text{WACC} \times \text{Invested Capital}$$

- NOPAT: net operating profit after taxes
- WACC: weighted average cost of capital

In the case of banks, it is usually applied in a variant, where only the cost of equity capital times capital at risk is deducted, and EVA is calculated as

$$\text{EVA} = \text{NOPAT} - (\text{Target Return for Equity Capital} - \text{Risk-free Rate}) \times \text{Capital At Risk}$$

EVA measures the performance of a company and its management through the idea that a business is only profitable when it creates wealth and returns for shareholders, thus requiring performance above a company's cost of capital.

- **Risk Adjusted Return on Capital (RAROC):**

RAROC (risk-adjusted return on capital, i.e., the expected result over economic capital) allows banks to allocate capital to individual business units according to their business risk. As a performance evaluation tool, it then assigns capital to business units based on their anticipated economic value added.

$$\text{RAROC} = (\text{Revenues} - \text{Expected Losses}) / \text{Capital At Risk}$$

Although both RAROC and EVA can be considered risk-adjusted metrics, they provide different views of the same information, While RAROC measures return on capital and hence (in percentage) the efficiency of capital usage, EVA is a measure in currency terms identifying how much value has been created in a single year by producing earnings in excess of shareholders' requests. And while higher-ups might be interested in how large this amount of excess earnings may be, they certainly are also eager to identify any need for a change in capital allocation in accordance with the return produced by one unit of extra capital.

It seems that both EVA and RAROC are widely recognized risk-adjusted metrics, serving as a way to see performance differently and to align profit with the risk taken in order to reach it. Although these two metrics have been utilized in the context of both market and credit risk (for credit risk in order to evaluate lending performance for specific units and for market risk in order to adapt to changing market conditions and particularly market instability during crisis), they are yet to be fully applied to operational risk.

## 5.2 The incorporation of Operational risk in banks' risk-adjusted performance metrics:

As the requirements of Basel-III came into place, the performance of banks can only gain more importance as it serves as criteria for investors eager to quantify banks' ability to generate returns in accordance with their risk profile. In this context, the need to develop a framework that measures the performance of banks on an operational risk-adjusted basis is evident.

To even begin thinking of using RAROC or EVA to measure a bank's performance while taking into account the need to adjust it to operational risk, we must first calculate the possible maximum operational loss expected for a bank or just for a business unit inside it. This possible loss is what we can call VaR, a metric that was largely applied to market and credit risk, while operational risk was left out because of its complexity until 2008 when "Calculating operational value-at-risk (OpVaR) in a retail bank" was published by Esterhuysen et al, the study showed how Operational Value at risk can be calculated and used in the context of calculating the regulatory capital imposed by the Basel II accords. The purpose of the study differed from the general objective of this discussion, which is to reaffirm the need for operational risk-adjusted metrics for banks, but nonetheless provided a glimpse of possibility.

The paper "Practical Methods for Measuring and Managing Operational Risk in the Financial Sector: A Clinical Study" published by Chappellea et al in 2004 and revised by 2007 also mentioned operation VaR but this time in a context more befitting of the objective of this discussion: applying operational risk to a risk-adjusted metric of performance, RAROC.

As mentioned above, RAROC was mostly applied to the credit activities in banks and also in the context of market research, but since the introduction of the regulatory condition to uphold a certain regulatory capital for operational risk, banks ought to develop an equivalent RAROC for operational risk. In order to do so, we must identify:

- expected losses due to operational events;
- economic capital necessary to cover the unexpected operational losses;
- revenues generated by taking operational risks.

The formula is thus:

**Opé RAROC** = (Revenues generated by taking operational risks - Expected Losses due to operational events) / Capital At Operational Risk

Chappellea et al, concluded that expected losses due to operational events could be easily deducted once a comprehensive list of possible operational losses can be identified: Operational VaR, and that The capital subject to operational risk can be easily calculated by deducting the Operational Var from the Capital but what makes this hard is the Concept of Revenues generated by taking operational risks as, unlike credit risk for example where revenues account to the interest paid by the borrowers, operational revenues in a bank are non-existent because the nature of operational risk isn't specific to the bank activity alone. So in order to keep going, they estimated that the revenues should be kept as total revenues for the business unit or of the bank, depending on the purpose of calculating RAROC.

$$\text{Opé RAROC} = (\text{Revenues} - \text{Expected Losses due to operational events}) / \text{Capital At Operational Risk}$$

Having introduced both EVA and RAROC as risk-adjusted metrics in the previous part, it is only logical to address the lack of mention of EVA in this paragraph. As of today, the same work of calculating operational EVA in the context of banks hasn't been attempted, and the use of both RAROC and EVA to reflect operational risk within banks or banks' business lines hasn't been established in the context of reflecting true performance. The gap in this area of risk-adjusted metrics is still wide, which paves the way for new work.

## 6. Conclusion:

The growing complexity of the banking industry and the increasing impact of operational risk call for a reassessment of traditional performance metrics. While frameworks like Basel II and III have established guidelines for operational risk management, they do not fully address how this risk affects banks' financial performance measurement. This discussion paper has highlighted the limitations of traditional metrics such as ROA, which often underestimate operational risk's influence on profitability and capital allocation.

By presenting a modified version of metrics such as RAROC that explicitly incorporate operational risk, this paper exposes the need for a more comprehensive approach to performance evaluation. A performance measurement framework that better accounts for operational risk would enhance banks' strategic decision-making, improve risk-adjusted returns, and support more effective capital allocation.

Future research should focus on empirically testing these modified models, assessing their predictive power, in order to refine how banks integrate operational risk into financial performance assessment. As operational risk continues to evolve, particularly with emerging threats such as cyber risks and regulatory penalties, developing robust, risk-adjusted performance indicators will remain critical for the long-term stability and resilience of the banking sector.

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