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Abstract

In the increasingly complex and dynamic financial landscape, managing operational risks poses a crucial challenge for financial institutions. Evolving regulations, the rise of cyber threats, and growing stakeholder expectations make a rigorous and systematic approach to quantifying and managing these risks essential. In this context, Basel 4 focuses on a more robust framework for operational risk management, introducing a standardized approach for calculating operational risk capital. This framework aims to encourage greater 'risk sensitivity' in risk assessment and requires an increase in the capital that banks must hold to address losses arising from operational events, such as internal errors, fraud, or natural disasters. Basel IV will have significant implications for financial institutions. The greater capital requirements imposed by the introduction of the new regulations will push banks to revise their processes and strategies in order to contain the higher capital absorptions.

Key Words: financial institutions , Improving operational risk management framework, New Regulation on capital requirements for operational risks, financial stability, new standardised method for operational risk, new impact on capital

1. Introduction

Operational risk is defined as the risk of incurring losses resulting from the inadequacy or malfunction of procedures, human resources, and internal systems, or from external events. This category includes, among other things, losses resulting from fraud, human error, operational disruptions, system unavailability, contractual breaches, and natural disasters. Operational risk includes legal risk but does not include strategic and reputational risk (Bank of Italy, 2006).

Operational risk management for banks is a process that aims to identify, assess, mitigate, and monitor risks that may adversely impact. In particular, it helps prevent losses, protects reputation, ensures financial stability, and meets regulatory requirements. Effective operational risk management allows for process optimization, efficient resource allocation, and reduced waste, thus improving overall efficiency.

Today, effectively managing operational risk in banks is equivalent to enabling the organization to pursue its business objectives. Given the regulatory frameworks and competitive landscape that characterize the financial world, a proper approach to operational risk management is no longer simply about mitigating the damage resulting from the materialization of hypothesized threats: it becomes a true tool for verifying and correcting activities, processes, and strategies to minimize the impact of events that could alter their outcomes (Intonti M. 2012).

The experience of the financial crisis has highlighted that not all types of exposures are suitable for modelling in a sufficiently reliable manner. The crisis has highlighted two main shortcomings. Firstly, the capital requirements for operational risk turned out to be insufficient to cover the operational losses incurred by banks. Secondly, the nature of these losses has highlighted the reduced predictive effectiveness of internal models. Basel IV increases the financial resilience of banks and global operational uniformity with effects on asset management and technological and infrastructural development. EU Regulation 2024/1623 (CRR3) has amended EU Regulation 2013/575 (CRR) with regard to credit risk requirements, credit valuation adjustment (CVA) risk, operational risk, and market risk. The new rules were designed to improve the prudential regulation, supervision and risk management of banks in response to the 2007-2008 global financial crisis, with the aim of increasing the resilience of EU banks to economic shocks and strengthening their supervisory and risk management frameworks. CRR3 is the European translation of the latest revision of the Basel standards for banking supervision published in 2017 and commonly referred to as Basel IV (although the Basel Committee continues to call it Basel III).

In December 2017, the Basel Committee on Banking Supervision (BCBS 2017) has released new rules for measuring the own funds requirement against operational risks. With reference to the assessing the calculation of capital requirements for operational risk, the final text of 19 June provides for a single “non-model based approach” (SA, Standardized Approach) as defined by the Committee reform. With the introduction of the new model in force from January 2025, the Basel Committee has decided to proceed with a clear simplification by replacing the four approaches currently applicable with a single standardized approach.

In particular, for operational risk, the lack of risk sensitivity of standardised methods and comparability of advanced measurement methods resulting from a wide range of internal modelling practices by individual banks was noted. CRR3 in force from 1 January 2025 provides for the elimination and replacement of all existing methods for calculating own funds requirements

[1] The opinions expressed are personal and do not in any way commit the institution to which they belong.

for operational risk (Basic Indicator Approach (BIA), Traditional Standardised/Alternative Standardised Approach (TSA/ASA) and Advanced Measurement Approaches (AMA)) with a single standardised method defined as the Business Indicator Component (BIC).
Basic Indicator Approach (BIA) uses the intermediation margin as a proxy for risk exposure, applying a coefficient to determine the capital absorption;
Traditional Standardized Approach (TSA) for the management of operational risk, provides for the division of a bank's activities into eight business lines, for which specific criteria and documented policies are developed. This approach allows the risk indicator to be distributed among the different business lines, taking into account their specificities and the activities carried out.
Advanced Measurement Approach (AMA) is a approach that banks can use, subject to regulatory approval, to estimate unexpected losses arising from operational risk events. This approach combines internal and external data, scenario analysis and assessment of internal controls to assess the potential impact of such events.
In this work, we will analyze the new standardized method for operational risks and the implications in terms of capital and management determined by the new regulations. Based on the Basel standard, the capital requirement is a function of the operational size of individual banks and, for medium and large banks only, of the historical past of operational risk losses. In this context, the logic introduced by Basile 4 will no longer be predictive, but retrospective: those who have historicized and correctly classified past events will be rewarded; those who have underestimated the processes of loss data collection will find themselves paying a capital premium.

2. Literature Review on the topic of operational risk

Recent literature on operational risks emphasizes the complexity of these risks and the importance of adopting proactive and systematic approaches to their management to ensure the resilience and sustainability of companies in the long term.
In an evolving context, it is clear that operational risk can also arise from the management of environmental issues (for example, it could arise from greenwashing activities carried out by client companies and which reflect on the intermediaries who have provided them with financing, or from incorrect disclosure of ESG reporting) and from the evolution of banks' business models, resulting from the so-called digital transformation.
Given the systemic importance of operational risk, over the years it has increasingly been the subject of study and analysis by regulatory and supervisory authorities as well as by legal scholars who have investigated not only the methodologies that can be implemented to predict and reduce potential losses or imbalances resulting from the emergence of operational risk, but also its correlations with other risk categories.
A first interrelationship is found between legal risk (a component of operational risk) and compliance risk. In its 2011 "Guidelines on Internal Governance"—updated first in 2017 and again in 2021— the EBA developed a nearly identical definition, indicating the similarity and near-perfect fit between these two risk categories. Specifically, compliance risk is defined as "the current or prospective risk to profits and capital arising from violations of, or non-compliance with, laws, rules, regulations, agreements, prescribed practices, or ethical standards that could result in fines, damages, and/or cancellation of contracts and diminish the reputation of an institution" (EBA, 2011).
One of the possible interdependencies between operational risk and credit risk, however, has been studied by McNulty & Akhigbe (2014, 2015, and 2017), whose empirical contribution highlighted how credit risk can easily transform into operational risk. Aggressive lending policies adopted by intermediaries can, in fact, lead to higher short-term profits, but they also likely lead to disputes with customers.
A close link is also found between operational risk and reputational risk, as events of the first type negatively impact a bank's reputation, as well as with cyber risk, whose exposure is accompanied by an operational loss that often entails a legal and reputational impact (Porretta and Santoboni, 2022).
There is a negative correlation between operational risk, the efficiency of internal control systems, corporate culture, and corporate governance. The possible interdependence between these variables is based on the following considerations:
- A bank with an efficient internal control system should experience a reduction in potential litigation arising from its activities;
- bank with a greater number of independent directors should experience fewer litigation events and, consequently, a lower level of operational risk;
- Corporate culture influences the framework within which managers operate and, therefore, the internal control system.
Focusing on the governance structure, it appears crucial not only to have independent directors on the bank's board of directors, but also to focus on identifying specific areas of responsibility to be assigned to each director (Oliveira et al., 2023). This would allow, in the event of a dispute, thanks also to the implementation of so-called "individual accountability regimes," to identify the director responsible for the disputed conduct, rather than placing all responsibility on the intermediary, thus preventing a loss of trust on the part of banking customers.

It should be emphasized that effective internal control systems allow the bank not only to reduce the probability of incurring risks that could compromise its economic, financial and capital stability, but also to strengthen the trust of customers, investors and shareholders for whom the adequacy of internal control systems will represent a guarantee for the protection of their assets (Murè, 2021).
According to the Basel Committee, one of the primary objectives that banks should achieve to absorb the impacts arising from the various possible manifestations of operational risk is "operational resilience," defined as "the ability of a bank to deliver critical operations through disruption" (BCBS, 2021), the tolerance threshold for which can be identified on a case-by-case basis. In this sense, banks should ensure the fulfillment of critical functions, defined by the Financial Stability Board (FSB, 2014) as the set of activities, processes, services, and related support activities whose disruption would be significant for the continuation of the bank's operations or its role in the financial system.
To contain the costs arising from the manifestation of operational risk (for legal fees, fines and sanctions imposed by supervisory authorities and, more generally, any operational loss), Eceiza et al. (2020) propose a shift from a qualitative, manual control of this type of risk to real-time monitoring based on the analysis of data present within each bank. This shift should be accompanied by the use of an interdisciplinary team of professionals, aimed at quickly and promptly addressing the issues, threats and risks emerging from the bank's normal operations.
In this regard, the European System Risk Board (ESRB, 2015) conducted an analysis of so-called misconduct risk in the banking sector – defined, as a subcategory of operational risk (within legal risk), as "the current or prospective risk of losses for an institution".
To contain the costs arising from the manifestation of operational risk (for legal fees, fines and sanctions imposed by supervisory authorities and, more generally, any operational loss), Eceiza et al. (2020) propose a shift from a qualitative, manual control of this type of risk to real-time monitoring based on the analysis of data present within each bank. This shift should be accompanied by the use of an interdisciplinary team of professionals, aimed at quickly and promptly addressing the issues, threats and risks emerging from the bank's normal operations.

3. New rules for measuring the own funds requirement against operational risk

The new single standard model for all banks, for the calculation of capital requirements for operational risks is based on three factors:

1) the Business Indicator (BI) which is a balance sheet-based proxy for operational risk;
2) the Business Indicator Component (BIC), which is calculated by multiplying the BI by a set of marginal coefficients determined by the regulation
3) the Internal Loss Multiplier (ILM), which is a scaling factor based on the average historical losses of a bank and the BIC

The first factor "BI" is a measure that indicates how much a bank is potentially exposed to operational risk. This indicator is given by the sum of three aggregates reported below:

- Income from interests, dividends and financial leases (ILDC);
- Income from services (SC);
- Financial income (FC).

BI = ILDC + SC + FC (art. 312 CRR3) of which:

ILDC (interest leases dividend component) = min (IC, 0.0225*AC) +DC

Where:

IC (Interest and leases Component): interest income from all financial assets and other interest income, including financial income from finance leases, income from operating leases and profits from leased assets, net of interest expenses from all financial liabilities and other interest expenses, including interest expenses from finance and operating leases, depreciation and amortization, and losses on operating leased assets, calculated as the annual average of the absolute values of the differences in the last three financial years.
AC (Asset Component): total sum of gross loans, advances, interest-bearing financial instruments, including government bonds, and leased assets, calculated as the annual average of the last three financial years based on the amounts recorded at the end of each financial year.

DC (Dividend Component): dividend income from investments in shares and funds not consolidated in the institution's balance sheet, including dividends from subsidiaries, associates and unconsolidated joint ventures, calculated as the annual average of the last three financial years.
About SC (Service Component), this is equal to:

SC =Max (OI, OE) + Max (FI, FE)

Where:

OI (Other operating Income): annual average of the last three financial years of the institution's revenues from ordinary banking operations not included in other items of the business indicator but of a similar nature.
OE (Other operating Expenses): annual average of the last three financial years of the institute's expenses and losses arising from ordinary banking operations not included in other items of the business indicator but of a similar nature, as well as from operational risk events.
FI (Fee and commission Income): annual average of the last three financial years of the institution's revenues from the provision of consultancy and services, including revenues received by the institution as an external provider of financial services.
FE (Fee and commission Expenses): annual average of the last three financial years of the expenses incurred by the institution for receiving advice and services, including commissions paid for the outsourcing of financial services, but excluding commissions paid for the outsourcing of non-financial services.

Finally, regarding the Financial component, we can say that:FC (Financial Component) = TC + BC

TC (Trading book Component): annual average of the absolute values of the last three financial years of net profit or loss, on the institution's trading portfolio, including trading assets and liabilities, hedging accounting and exchange differences.
BC (Banking book Component): annual average of the absolute values of the last three financial years of the net profit or loss, as applicable, on the institution's non-trading portfolio, including financial assets and liabilities measured at fair value through profit or loss, hedging derivatives, exchange rate differences and profits and losses realized on financial assets and liabilities not measured at fair value through profit or loss.

Exclusively for the financial component (FC), institutions are required to report the approach used (Accounting Approach (AA) or Prudential Boundary Approach (PBA).
The use of the AA provides for an alignment between the trading portfolio on which to calculate the TC component and the accounting trading portfolio. The use of the PBA would make it possible to avoid unjustified increases in the TC and BC components resulting from the accounting of specific transactions (i.e. implicit derivatives within hybrid financial instruments) that are closely correlated to each other but of opposite sign in the two portfolios.
The second factor, for the calculation of capital requirements for operational risks, "BIC" is obtained by multiplying BI by the marginal coefficients (table 1): 12% for BI values lower than €1 billion euros, 15% for BI intermediate values (greater than one billion euros and not greater than 30 billion euros), 18% for BI values higher than €30 billion
The third factor, ILM, Internal Loss Multiplier, measures how much the bank has proven to be concretely capable of controlling operational risks in the past and depends on the historical average of the related losses. In this way, virtuous banks, with few losses, are rewarded with a lower capital requirement. It is calculated with the following algorithm that compares past losses («loss component», «LC») with the BIC.

Table 1: Marginal coefficients

Coefficient α		
Bucket	BI range (€/bn)	α coefficient
1	<=1	12%
2	1<BI>=30	15%
3	>30	18%

Source: CRR3 data processing

The new standard method is based on the assumption that the relationship between the Business Indicator BI and the exposure to operational losses is relatively similar for banks that have similar BI values.
The losses recorded by the individual bank affect the calculation of the capital requirement through the Internal Loss Multiplier (ILM) defined by the following formula:

$$\text{ILM}=\text{Ln}\left(\exp(1)-1+\left(\frac{\text{LC}}{\text{BIC}}\right)^{0.8}\right)$$

where the loss component (LC) is equal to 15 times the average annual losses recorded for operational risks over the last 10 years. ILM varies as a function of LC:

1. when LC is equal to the BI component (i.e. the historical average measure, which takes into account the actual operating losses historically recorded by the bank, is exactly equal to the average level of operating losses of the reference bucket), then ILM = 1; consequently, the own funds requirement is exactly equal to the BI component;
2. when LC is lower than the BI component (i.e. the historical average measure, which takes into account the actual operating losses historically recorded by the bank, is lower than the average level of operating losses of the reference bucket), then ILM < 1; consequently, the own funds requirement is lower than the BI component;
3. when LC is higher than the BI component (i.e. the historical average measure, which takes into account the actual operating losses historically recorded by the bank, is higher than the average level of operating losses of the reference bucket), then ILM > 1; consequently, the own funds requirement is higher than the BI component;
4. when LC is equal to 0 (i.e. the bank has not historically recorded any operating loss in the last 10 years), then ILM has a lower limit at the level Log [exp (1)-1] ≈ 0.541; at the same time, the own funds requirement is approximately equal to 11% of the BI.

For loss data, a bank must have documented procedures and processes for the identification, collection and processing of internal operational loss data. These processes and procedures must be validated and checked by internal and external functions of the bank. -Internal operational loss data must capture all banking activities. The minimum threshold for including a loss event in the collection of average annual losses is EUR 20,000. At the discretion of the national supervisory authority, this limit may be increased to EUR 100,000 for banks that fall into buckets 2 and 3 (table 1). In addition to information on gross loss data, the bank must collect additional information, such as the date of occurrence, accounting, etc. It is also required to collect data on recoveries and descriptive information useful for understanding the determinants and causes of the manifestation of the loss event. The level of detail of the descriptive information should be commensurate with the size of the loss.

4. The new impacts in light of the new legislation

The new calculation method will be the same for all credit institutions, regardless of their size and business model. The original proposal of the Basel Committee envisaged the combination of the BIC component and the ILM component for the calculation of the capital requirement for operational risks. The new CRR proposes to place an ILM equal to 1, thus sterilizing the effect on the regulatory capital requirement of historical data on the operational losses of each bank. Furthermore, the new CRR defines specific regulatory requirements for the implementation of the operational risk management framework that were previously not binding for banks that did not use advanced methods. Credit institutions with a BIC higher than €750 million are required to calculate and report the historical loss levels of the last 10 years. The potential organizational and business process impacts will be significant for large banks (over €750 or €1 million) that do not currently use the basic method, which will have to, in addition to the definition and maintenance of a risk management framework, ensure a Loss Data Collection based on articles and high quality standards. For banks that currently adopt the TSA (Traditional Standardized Approach), the interventions to be planned may only have to concern specific refinements to the Loss Data Collection. LSI banks with an indicator below the aforementioned threshold can still refer to the new regulatory provisions to improve overall their operational risk measurement, control and management framework.
On 20 June 2024, the EBA published the final document in the Pillar III disclosure area «Final Draft Implementing Technical Standards on public disclosures by institutions of the information referred to in Titles II and III of Part Eight of Regulation (EU) No 575/2013», which defines the new methods of third pillar disclosure through the introduction, as regards Operational Risk, of a qualitative table (EU ORA) and the following three templates:

- EU OR 1: provides information on the number and amounts of operational risk losses incurred in the last 10 years, based on the accounting date and considering any recoveries and exclusions;
- EU OR 2: provides information on the calculation of the Business Indicator (BI) for the last three financial years and on the value of the Business Indicator Component (BIC)

• EU OR 3: provides information on the minimum capital requirements (Operational Risk Own Funds - OROF) for operational risk.

The revisions to the Operational Risk framework result in an overall increase in the Minimum Required Capital (MRC) for operational risk of 28.4% (table 2), with an increase of 32.0% for Group 1 banks and 10.5% for Group 2 banks.

The cumulative impact analysis uses a sample of 152 banks. The sample is divided into 60 Group 1 banks (large, internationally active banks) and 92 Group 2 banks. Group 1 banks are those with Tier 1 capital above €3 billion and active internationally; all other banks are classified as Group 2 banks.

The impact is greater for Group 1 banks using the AMA model (35.3%) than for Group 2 banks (10.1%). Overall, banks migrating from AMA approaches are more impacted (33.7%) than those using other approaches (23.3%).

15 of the 21 banks using AMA models (90% of the AMA OpRisk MRC) belong to Group 1.

Table 2: Changes in T1 MRC assigned to operational risk only; in % of T1 MRC assigned to operational risk under CRR2/CRD5

Bank group	AMA	Others	Total
All banks	33,7	23,3	28,4
Group 1	35,3	28	32,0
G-SIIs	33,9	45,7	37,2
Group 2	10,1	10,1	10,5

Source: EBA Qis data (december 2023)

The baseline impact assessment (Table 3) quantifies the difference in minimum capital requirements between the Basel (CRR2/CRD5) and the final version of Basel III (CRR3/CRD6) at the time of full implementation in 2033.

The new final capital requirements of Basel III determine an increase for operational risks of 2.8% (table 2). The increase in the MRC for the operational risk is mainly due to the increase in the net interest margin (NIM) which determined the increase in the BIC with a particularly significant impact for AMA banks.

Table 3: Change in total T1 MRC, as a percentage of the overall current T1 MRC, due to the implementation of the final Basel III framework under the EU-specific scenario (including all buffers and P2R capital requirements – frozen); weighted averages in %

Bank group	Credit Risk				Market Risk	CVA	Op risk	Output Floor	Other pillar 1	Total Risk based	Revised LR	Total
	SA	IRB	Sec.	CCPs.								
All banks	1,2	-1,5	0,0	0,0	1,1	0,3	2,8	5,7	-0,8	8,8	-1,0	7,8
Group 1	1,2	-1,7	0,0	0,0	1,3	0,4	3,1	6,4	-0,9	9,7	-1,2	8,6
G-SIIs	1,4	-1,4	0,0	0,0	2,7	0,5	3,8	8,6	-0,5	14,8	-2,6	12,2
O-SIIs	1,0	-2,1	0,0	0,0	-0,2	0,3	2,6	5,2	-1,2	5,5	-0,1	5,5
Other	0,5	0,5	0,0	0,0	4,1	0,4	2,8	0,5	-0,7	8,0	0,0	8,0
Group 2	1,5	-0,5	0,0	0,0	0,3	0,1	0,8	2,0	-0,1	4,0	-0,3	3,6
O-SIIs	1,4	0,0	0,0	0,0	0,3	0,0	0,9	1,4	-0,2	3,7	-0,5	3,2
Other	1,6	-1,2	0,0	0,0	0,5	0,1	0,6	2,9	-0,1	4,3	0,0	4,2
Universal	1,3	-1,1	0,0	0,0	1,3	0,3	2,9	5,4	-0,8	9,2	-1,1	8,2
Retail oriented	1,7	-0,8	0,0	0,0	-0,3	0,3	0,5	2,7	-0,3	3,7	-0,7	3,0
Corporate oriented	-0,1	-6,5	0,0	0,0	0,2	1,1	2,6	9,7	-0,3	6,8	-0,8	6,0

Source: EBA Qis data (december 2023)

There are several reasons why Group 1 banks have a higher MRC than Group 2 banks2. Firstly, 15 of the 21 banks using AMA models (90% of the AMA OpRisk MRC) belong to Group 1. On average, these banks manage to significantly reduce their capital requirements compared to the current standardized approaches.

[2] EBA (2023)

Secondly, Group 1 banks, or large Group 2 banks, mainly operate fee-based business models, while the rest of the Group 2 banks tend to offer more diversified banking services, less dependent on fees. For banks operating fee-based business models, the new indicator has been set at a more conservative level to reflect the higher operational risks typically observed in these models. The marginal coefficient increases from 0.12 (band 1) to 0.18 (band 3), leading to an increasing average marginal coefficient as the business indicator increases, with the result that large banks are generally more affected. Finally, banks active in different geographical areas with significant differences in their NIM (Net Interest Margin), could significantly reduce their capital requirements using either the Standardised Approach (TSA) or the Alternative Standardised Approach (ASA). In the new framework, the NIM will be calculated at group level, making such reductions no longer possible. The figure below highlights that the distribution of operational risk capital requirements for AMA Group 2 banks is significantly wider than the corresponding distribution for AMA Group 1 banks, while the simple mean and median are lower than for AMA Group 1 banks. This is because the business models of Group 1 banks offer universal services and therefore have relatively homogeneous operational risk characteristics, while Group 2 banks comprise a variety of business models offering specialised or more diversified types of services. Some Group 2 banks are particularly specialised and do not offer services that would be subject to credit or market risk. Operational risk is therefore the most important risk category for them.

5. Case Studies

In order to verify the capital impacts through the use of the new methodology introduced by Basel 4, an analysis was carried out on 6 banks comparing any differences. In particular, 6 italian banks were analyzed:

- two banks (Annex 1) with assets exceeding one billion that used the BIA model (belonging to Group 2);
- two banks (Annex 2) with assets exceeding 30 billion that used the TSA model (belonging to Group 1);
- two systemic banks (Annex 3) with assets exceeding 30 billion that used the AMA model (belonging to Group 1).

It emerged, in line with the EBA results, that the greatest impacts in terms of capital requirements for operational risks are found in the systemically important banks that used the AMA model.
Below we will verify the average impacts that the new methodology BIC determines compared to the use of the previous models: BIA, TSA and AMA

5.1 Case Study Banks A1, A2 with assets exceeding one billion that used the BIA model

The Italian banks A1 and A2 of Group 2 (Figure 1 and 2- Annex 1), analyzed, have adopted the BIA approach in the years 2021, 2022 and 2023 for the calculation of the regulatory requirement for operational risks. To verify the new impact regarding the replacement of the BIA approach with the new standardized approach of Basel 4, the BI and the BIC (average balance sheet items - Annex 1) were calculated. The BI comprises three components: the interest, leases and dividend component (ILDC); the services component (SC), and the financial component (FC). which is calculated by multiplying the BI by a set of regulatory determined marginal coefficients (figure 1). In the calculation of the capital requirement, an ILM, Internal Loss Multiplier, equal to 1 was considered as proposed by the CRR (Capital Requirements Regulation). The balance sheets and annual reports available online from 2021 to 2023 were used. The calculated BIC value was compared with the value of Own Funds allocated for operational risk present in the Pillar 3 public disclosure. The NIM (Net Interest Margin) and the SC Component (Service Component) have a significant impact on the BI indicator than the other components (Annex 1A, Graphs 1 and 3). The application of the min (IC, 2.25% * Assets) prevents overcapitalization from occurring, ensuring that regulatory capital is adequately balanced with respect to the operational risk faced. The lack of compensation between commission income and expense (Annex 1A, Graphs 2 and 4 has a impact on the calculation of the regulatory requirement operational risks. The results obtained highlighted an average increase in the regulatory requirement for operational risks equal to 10,44%. This result is in line with EBA estimates which an overall increase in the MRC for operational risk equal to 10.6% (table 1). The data analyzed show a very limited increase in own funds compared to the BIA approach. The capital requirement under the BIA method is calculated by applying a regulatory ratio, equal to 15%, to an indicator of the company's operating volume, identified as the three-year average of intermediation margin. This methodology is in line with the BIC estimate which provides for the application of a marginal coefficient equal to 15% for banks with assets exceeding one billion.

5.2 Case Study Banks B1, B2 with assets exceeding 30 billion that used the TSA model

The Italian banks B1 and B2 of Group 1 (Figure 1 and 2- Annex 2), analyzed, have adopted the TSA approach in the years 2021, 2022 and 2023 for the calculation of the regulatory requirement for operational risks. To verify the new impact regarding the replacement of the TSA approach with the new standardized approach proposed by Basel 4, the BI and the BIC (average balance sheet items - Annex 2) were calculated. In the calculation of the capital requirement, an ILM equal to 1 was considered as proposed by the CRR. The balance sheets and annual reports available online from 2021 to 2023 were used. The calculated BIC value was compared with the value of Own Funds allocated for operational risk present in the Pillar 3 public disclosure. The NIM (Net Interest Margin) and the SC Component (Service Component) have a significant impact on the BI indicator than the other

components. (Annex 2B, Graphs 1 and 3). The lack of compensation between commission income and expense (Annex 2B, Graphs 2 and 4) generate an increase on the BI and consequently has an impact on the regulatory requirement. The results obtained highlighted an average increase in the regulatory requirement for operational risks equal to approximately 31,5% compared to the TSA method. The estimate obtained is in line with the EBA estimates that show an overall increase in the MRC for operational risk equal to 28% (table 1). The data analyzed show that the new methodology determines a more significant capital impact compared to banks that used the BIA method. The Traditional Standard method (TSA) is characterized by the determination of the capital requirement through the application of coefficients differentiated by business line (which vary between 12% and 18%) to the average of the relevant indicator defined by CRR 2013/575 of the last three financial years divided by business line. While the Base Method is characterized by the highest degree of simplicity. In this approach, a fixed rate of 15% is applied to the intermediation margin, the standard method provides that the bank's activities are divided into eight lines of business. Within each line of business, the intermediation margin represents a general indicator of the size of the activity and the possible operational risk to which it is exposed. The capital requirement for each line of business is calculated by multiplying GI - gross income or intermediation margin - by a factor β assigned to each line of business.

5.3 Case Study Banks C1, C2 with assets exceeding 30 billion that used the AMA model

The Italian systemic banks C1 and C2 of Group 1 (Figure 1 and 2 - Annex 3), analyzed, have adopted the AMA approach in the years 2021, 2022 and 2023 for the calculation of the regulatory requirement for operational risks. To verify the new impact regarding the replacement of the AMA approach with the new standardized approach proposed by Basel 4, the BI and the BIC (average balance sheet items – Annex 3) were calculated. In the calculation of the capital requirement, an ILM equal to 1 was considered as proposed by the CRR. The balance sheets and annual reports available online from 2021 to 2023 were used. The calculated BIC value was compared with the value of Own Funds allocated for operational risk present in the Pillar 3 public disclosure. The NIM (Net Interest Margin) and the SC Component (Service Component) have a significant impact on the BI indicator than the other components. (Annex 3C, Graphs 1 and 3). The NIM has a greater impact on BI than the SC component. The lack of compensation between commission income and expense generate a significant increase on the BI. Commission Income have a significant impact on the regulatory Requirement operational Risk (Annex 3C, Graphs 2 and 4). The results obtained highlighted an average increase in the regulatory requirement for operational risks equal to approximately 40,3% compared to the AMA method. The estimate obtained is in line with the EBA estimates that show an overall increase in the MRC for operational risk equal to approximately 35,3% (table 1). The data analyzed show that the new methodology determines a more significant capital impact compared to banks that used the BIA and TSA method. The result obtained is in line with the EBA estimates which highlight a greater impact in terms of capital requirement for banks that used the AMA method. This is because the new method aims to standardize the calculation of regulatory capital, reducing the discretion and complexity associated with AMA models, which rely on internal data and more elaborate scenario analyses.
Table 4 shows the balance sheet items used to calculate the BI and BIC:

Table 4: Balance sheet items used for the calculation of BI and BIC

IC		Interest and similar income	
		Interest and similar expenses	
		NIM=(Interest and similar Income - Interest and similar expenses)	
		Dividend Income	
AC		Asset Component	Cash and cash balances
			Financial assets held for trading
			Financial assets mandatorily at fair value
			Financial assets at fair value through other comprehensive income
			Financial assets at amortised cost
			Hedging derivatives
			Tangible assets to functional use (right-of-use assets acquired under leases)
ILDC		Income from interests, dividends and financial leases	**ILDC=min (IC, 0,0225*AC)+DC**
SC		Other Operating Expenses (OOE)	
		Other Operating Income (OOI)	
		Fee and commissions Income(FI)	
		Financial and commission expenses(FE)	
		SC=(Service Component)=MAX (OI,OE) +MAX (FI,FE)	
FC	TB	Trading Book Component	Net gain (loss) on trading activities
	BC	Banking Book Component	Net gain (loss) on hedging activities

			Net gain (loss) on the disposal or repurchase of:
			Net gain (loss) of other financial assets and liabilities measured at fair value through profit or loss
	FC =Financial Component=TB+BC		
		FC=TB+BC	
BI		Business Indicator	BI=ILDC + SC + FC
BIC		Business Indicator Component	% MARGIN Component *BI

Source: Aifirm[3]

6. Conclusion

With the introduction of Basel IV[4], the phase of uncertainty regarding the regulatory framework of the banking sector finally ended. The reforms enacted after the 2007-2009 financial crisis represent a corpus of appropriate and desirable interventions, set out to remedy some significant gaps in the prudential regulation of banks. The impact of the regulatory changes has been the subject of periodic monitoring for several years by the Basel Committee at global level and at a European Banking Authority (EBA) at European level. Thanks to the reforms implemented in recent years, banks have faced the COVID-19 crisis starting from capital and liquidity conditions that were significantly better than those prevailing on the eve of the global financial crisis of 2007-08 and the European sovereign debt crisis of 2011-12. The need for binding regulation of the banking system lies in the extreme importance that this system has in the economy of each country and, at the same time, in its permeability to risks that can lead banking institutions to collapse, with serious repercussions on citizens and the national economy. Making the banking system more vigorous by increasing capital requirements and liquidity standards, strengthening governance structures and increasing the quality of regulatory capital is absolutely necessary to ensure the stability of a system from which the economy cannot ignore. To make the capitalization system more solid and improve confidence in the banking system, the regulator has implemented a new reform process. The set of reform measures prepared by the Basel Committee on Supervision aim to strengthen the regulation and risk management of the banking sector, as well as to ensure greater uniformity and comparability among financial institutions in relation to the capital requirements required for banking activities. The management of operational risks is an essential component for the stability and sustainability of the financial sector. The changes established, especially with reference to the use of standard models, go in the direction of limiting the excessive advantages associated with the use of these methodologies, in particular for G-SIB banks. Basel IV introduces higher capital requirements, particularly for operational risk. This means that G-SIBs will have to hold larger capital buffers, reducing their profitability and ability to generate profits. The implementation of Basel IV will have significant implications for financial institutions. The increase in capital requirements will first require a reassessment of banks' capital management strategies. Firms will have to increase their capital ratios, which could theoretically lead to an adjustment in lending practices and a potential increase in financing costs for consumers and businesses. Financial institutions will also be forced to better orient their business models to focus on highly specialized areas. Basel 4 provides for an increase in RWA (Risk Weighted Assets) related to operational risk, with the aim of strengthening the stability and resilience of the banking system. The analysis shows that for smaller banks, the impact of the more restrictive treatment of fees is negligible. This is because such institutions, with traditional business models and simplified operational structures, do not extensively rely on commission-based strategies, which are generally associated with a higher operational risk. Larger banks, on the other hand, are more affected by the method, due to the gradual increase in the marginal coefficient, which reaches 18% as the Business Indicator (BI) rises. In the absence of the FINREP report, the BI items have been mapped to the balance sheet items by applying some approximations (e.g. operating losses not included in the calculation of OE). The entry into force of the new regulations requires careful planning and the adoption of targeted strategies to optimize capital requirements and mitigate business impacts. The assessment of operational risk in the future requires a holistic perspective that considers the entire organizational ecosystem. To avoid losses, it is necessary to correct processes in advance. The implementation of Basel IV requires careful planning and the adoption of targeted strategies to optimize capital requirements and mitigate business impacts. Financial institutions must be ready to implement the necessary actions to address these new challenges and seize the opportunities presented by the new framework. It is therefore essential to effectively and efficiently manage, measure, and produce information on operational risks in order to ensure the sustainability of the business over time, improve operational efficiency and competitive positioning, and safeguard the continuity of the organization.

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