The determinants of Enterprise Risk Management in the Moroccan Banking sector

Les déterminants de la Gestion Globale des Risques dans le secteur bancaire Marocain

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Abstract

This article explores the growing importance of risk management in both academic and professional spheres, particularly in the banking sector where poor risk management can have serious global economic consequences. With regulatory requirements increasing and evolving consumer expectations and technology transforming the way companies work, the concept of Enterprise Risk Management (ERM) has gained significant interest as an effective response to these challenges. However, the best measure of ERM and the characteristics of companies implementing ERM effectively are still being debated. By adopting a contingency based approach, this study focuses on the contingent factors that determine the degree of ERM implementation in the Moroccan banking industry using a robust measure of ERM based on public disclosures and a panel data framework covering the period between 2007 and 2021. In line with previous studies, the findings indicate that banks with higher ERM implementation tend to be larger, more diversified, and highly leveraged, and that regulatory pressure contributes to the expansion of ERM practices. The article concludes by highlighting the need for more consistent and detailed risk management disclosures in the future.

Keywords: Enterprise Risk Management; ERM; Contingency-approach; Determinants; Banks.

Résumé

Cet article explore l'importance croissante de la gestion des risques à la fois dans les milieux académiques et professionnels, en particulier dans le secteur bancaire où une mauvaise gestion des risques peut avoir de graves conséquences économiques. Avec l'augmentation des exigences réglementaires, l'évolution des attentes des consommateurs et la transformation de la technologie, le concept de Gestion Globale des Risques (GGR) a suscité un intérêt croissant en tant que réponse efficace à ces défis. Cependant, une mesure adéquate de la (GGR) et les caractéristiques des entreprises qui la mettent en œuvre de manière efficace sont encore débattues. En utilisant une approche contingente, cette recherche se focalise sur les facteurs qui déterminent le degré d'implémentation de la Gestion Globale des Risques (GGR) dans le secteur bancaire marocain. Elle utilise une méthode de mesure solide de la (GGR) et emploie un modèle estimé sur données de panel couvrant la période entre 2007 et 2021. Conformément aux études précédentes, les résultats indiquent que les banques avec un degré élevé d'implémentation de la (GGR) ont tendance à être plus grandes, plus diversifiées et fortement endettées, et que la pression réglementaire contribue à l'expansion des pratiques de l'ERM. L'article souligne aussi la nécessité de divulgations plus cohérentes et détaillées en matière de gestion des risques.

Mots clés : Gestion Globale des Risques ; GGR ; Contingence ; Déterminants, Banques.

Introduction

In a fast-paced changing environment characterized by the proliferation and interdependence of risks, managing these risks have become one of the most important topics in the academic and professional spheres. Particularly in the banking sector, where the previous crisis shown that poor risk management may have a serious impact on the global economy. In fact, the changes anticipated in the financial environment are more significant than those experienced in the previous decade for the following reasons: 1) the regulatory requirements are increasing for the usual themes as capital allocation (Bale IV) and compliance guidelines, but also new rules for the non-financial risks will put more pressure on banks (for example, the risk management of environmental issues faces problems related to availability of the data, the complexity of models and the loss of the no-conforming clients or even some segments as coal); 2) the consumers expectations are evolving continually and new entrants (Fintech) are capturing the most lucrative segments and 3) the evolution of technology and the advanced analytical tools are transforming the way people and companies work.

In this context, the evolution of risk management models et techniques was essential (Rannane & Talbi, 2019), and the concept of "Enterprise Risk Management" (ERM) has gained a lot of interest and was recognized as the effective response to risk management challenges (Paape & Speklé, 2012). To demonstrate the importance given by the academicians to ERM, (Choi et al., 2015) analyzed the evolution of publications on the topic between 2000 and 2014. The graph below confirms the topic's ever-increasing attention among researchers.

Figure N°1: Publications trends on "enterprise risk" since 2000
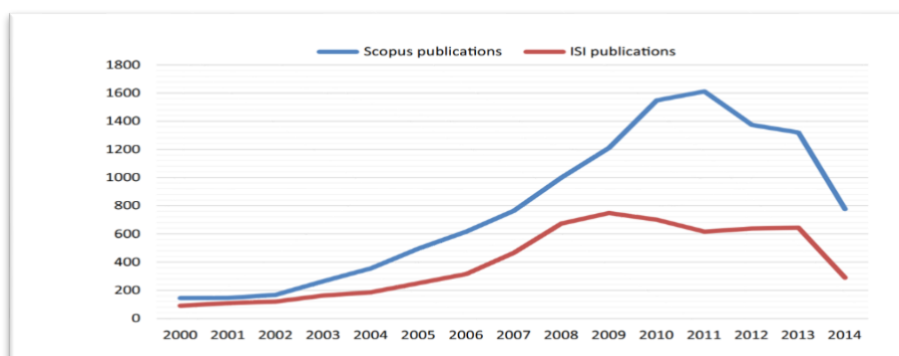
Source : (Choi et al., 2015)

One of the main objectives pursued in this body of work is the impact of ERM on firm value. Nevertheless, the divergence of the findings has led a lot of authors to consider the contingent

character of ERM (Mikes, 2015). Thus, several studies tried to define what is the best measure of ERM and understand the characteristics of the companies implementing ERM (Bohnert et al., 2018; Hoyt, 2003; Hoyt & Liebenberg, 2011; Pagach & Warr, 2011). By adopting a MSC perspective, we aim to shed light on the contingent factors that determine the degree of ERM implementation in the Moroccan banking industry. So, with this paper, the main questions to answer are:

- What are the characteristics of banks with a high degree of ERM implementation?
- Does the strengthening of regulatory requirements contribute to the spread of ERM practices?

To achieve the goals of this study, we use a robust measure of ERM based on public disclosures, adapted to the financial institutions, and capturing both breadth and depth of ERM implementation. Also, we use panel data framework, for the time period from 2007 to 2021, to test the hypothesis related ERM. The empirical analysis is conducted using the fixed and random effects model, and heteroscedasticity and serial correlation tests are performed to confirm the validity and efficiency of the analysis.

The reminder of this paper is structured as follows. First, we provide a review of the literature on contingency theory in management system control (MSC) and the "classical" determinants examined in MSC. Then, we generate hypotheses by explaining the factors from the literature review and past studies, as well as the underlying data, technique, and research design. The fourth part summarizes the empirical findings, which are presented in the conclusion.

1. Literature review:

The Committee of Sponsoring Organizations of the Treadway Commission (COSO) defined ERM as "*a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives*" (COSO 2004, 6).

(Mikes & Kaplan, 2013) have identified similarities between this definition and Anthony's widely quoted definition of management control to strengthen that ERM is a Management Control System. Indeed, in recent years, the idea that ERM is a MCS has gained widespread acceptance (Mikes, 2015). So different studies tried to examine or to explain the various aspects of ERM by applying the contingency approach.

Contingency-based research has a long tradition in the study of management control systems (MCS) (Chenhall, 2003). Contingency theory claims that firms must choose the most appropriate control system by considering contingency attributes. (D. T. Otley, 1980) considers that "*a contingency theory must identify 1) **specific aspects** of an accounting system which are associated with certain 2) **defined circumstances** and demonstrates an 3) **appropriate matching***".

These conditions are the three main goals in the studies involving ERM. We structured our literature review by answering the following questions:

1)What are the aspects of ERM to be explained?

Most of the studies focused on the "holistic" aspect of the ERM and used the hiring of a CRO as proxy of the implementation of ERM. Other researchers investigated the extent of implementation by considering the various dimensions of ERM, either by considering some ERM frameworks such as COSO 2004 and ISO 31000 or by identifying the various techniques that should be implemented in an ERM program.

2)How the defined circumstances to be selected?

To answer this question, researchers assessed characteristics derived from the contingency literature either by adopting a MSC perspective as strategy, size, and environment uncertainty or by integrating some specific characteristics applied only for ERM as leverage, liquidity, or opacity.

Some studies, using an agency theory perspective, concentrated on determinants related to governance risk management, such as the presence of a risk committee, the size of the board, and the independence of board members.

3)What is the right matching?

In simple studies, the presence of the MCS was interpreted as evidence of matching. However, contingency theory states that successful tailoring a control system into the firm's characteristics will result in better firm performance (Fischer, 1998). As a result, despite the likelihood that MCS have a small impact on performance and the use of different measures to capture firm performance, the majority of studies used a variant of firm performance to indicate whether matching has been found (D. Otley, 2016).

(Fisher, 1995) also criticized the use of the firm performance by arguing that the desired outcome of the implementation of ERM can be a non-financial goal.

In this paper we consider different dimensions of ERM captured by the measure employed, the defined circumstances are drawn from the contingency literature and the previous studies, and the existence of ERM is taken as evidence of matching.

As a reminder, Morocco has embarked in a series of reforms including risk governance (Berkchi, 2021), and particularly in the banking sector. Indeed, given the importance of the banking sector in the stability and the development of the economy, the Moroccan regulator has strengthened prudential regulations, and demanded clearly the implementation of ERM in the circular CN 40/G/2007. The main objective of the reform is to ensure the sustainability of the financial institutions (Hajar, 2023).

2. Hypotheses development, empirical method, and data sample

2.1. Hypotheses development

The "classical" factors affecting ERM (MSC perspective)

H1: Strategy is positively associated with the degree of ERM implementation.

It is widely accepted in the literature that strategy influences management control systems (Chenhall, 2007; Gordon et al., 2009; Mikes et al., 2013; D. Otley, 2016; D. T. Otley, 1980). In the case of risk management, the strategy is analyzed according to its complexity. Indeed, the more a company adopts a strategy that increases its complexity, the more it will have to manage a high number of risks with significant interdependencies, and therefore it will be more likely to adopt an advanced control system such as ERM. The dimension most mobilized in previous empirical studies is "Diversification" either of activities or geographical. Diversification imposes the need for a more sophisticated organizational structure to facilitate knowledge sharing, coordination of tasks and efficient allocation of resources (Stulz, 1996). In this way, the most diversified companies have a higher propensity to adopt ERM because they are more likely to benefit from it (Hoyt & Liebenberg, 2011).

H2: Size is positively associated with the degree of ERM implementation.

Several papers address the association between the degree of ERM implementation and bank size (Baxter et al., 2013; Beasley et al., 2008; Faisal et al., 2021; Farrell & Gallagher, 2014; Florio & Leoni, 2017; Hoyt & Liebenberg, 2011; Lechner & Gatzert, 2018; Lundqvist & Vilhelmsson, 2016; Malik et al., 2019). However, there is a lack of definitive proof in the available literature about the correlation.

On one hand, Scholars have noted that bigger banks are inclined to adopt ERM, as they are more intricate and therefore can take advantage of the benefits of the all-encompassing ERM approach. This association is attributed to the fact that larger banks are more complex. Similarly, bigger banks are better equipped to allocate sufficient resources towards the implementation of an ERM program.

On the other hand, literature highlights the inflexibility and cumbersome nature of the bureaucratic processes that are linked with large banks, which can reduce the implementation of ERM to compliance practices that have no or a negative impact on the improvement of risk management.

In a banking institution, size refers to the volume of assets. Thus, in most studies that have used this variable, the size is measured as follows:

$$Size = Log \ (Total \ Assets)$$

Similarly, we measured size by the logarithm of book value of the total assets.

H3: Environment pressure is positively associated with the degree of ERM implementation.

The external environment is a powerful textual variable that underlies contingency research (Chenhall, 2003). In general, the most studied aspects of the environment are uncertainty, hostility, and complexity. We maintained a separate aspect for our investigation, which relates to the pressure associated with prudential regulation. Indeed, (Chenhall, 2003) considers that the attributes of the environment are in perpetual evolution and that among the attributes to be explored is the pressure related to governance, environmental and social issues that organizations face. It is in this sense that Granlund and Lukka (1998) noted that pressure can come from economic causes, institutional coercion, normative pressure derived from appropriate social conduct, and the tendency to imitate seemingly successful practices. Thus, the attribute relating to regulatory pressure appears relevant for the field of our study, which exclusively includes the banking sector, especially since the period studied has seen significant changes in terms of capital allocation. As a result, regulatory pressure is accelerating the implementation of GGR practices.

The "specific" factors affecting ERM.

H4: Opacity is positively linked to the degree of ERM implementation.

(Hoyt, 2003) considers that more opaque companies should benefit more from ERM implementation programs that communicate risk management objectives and strategies. The

arguments put forward are that "opaque" companies are more difficult to value (Hoyt & Liebenberg, 2011) and their "opaque" assets are more difficult to liquidate in the event of financial difficulty (Pagach & Warr, 2011), and therefore disclosures associated with their risk management increase third-party insurance and reduce the risk of financial distress. Opacity is defined in the literature by the ratio of intangible assets to the book value of total assets (Baxter et al., 2013; Bohnert et al., 2018; Farrell & Gallagher, 2014; Lechner & Gatzert, 2018).

H5: Quality of management is positively associated to the degree of ERM implementation.
In corporate finance research, an often-unobserved factor is the quality of managerial skills. It can be assumed that banks with superior management quality would implement better risk management systems, leading to a reduction in default risk and improved value creation. However, this improvement may not be solely attributed to the risk management system, but rather to the superior management quality(Lundqvist & Vilhelmsson, 2016).

H6: Leverage is negatively associated to ERM implementation.
There is a substantial body of work on the relationship between leverage and ERM implementation. Researchers have investigated the impact of the leverage level on the degree of ERM and explained the negative impact by the fact that the implementation of a risk management system can influence decision-makers to take more risk since they are confident and believe that risk management makes it possible to reduce and control the financial risks facing the company (Baxter et al., 2013; Beasley et al., 2008; Berry-Stölzle & Xu, 2018; Bohnert et al., 2018; Hoyt & Liebenberg, 2011; Lin et al., 2012; Michael K. McShane, 2011; Pagach & Warr, 2011; Sax & Andersen, 2019).

H7: Organizational growth impacts ERM implementation.
The relationship between growth opportunities and ERM is ambiguous in the literature. Although it appears evident that organizations with high growth prospects confront growth challenges (coordination, resource allocation, etc.) that increase the risks they face, companies with high growth opportunities are more likely to apply ERM to control the risks connected with this growth (Farrell & Gallagher, 2014). On the other hand, (Pagach & Warr, 2011) believed that firms that are on a high growth trend will be distracted from implementing structuring programs, such as ERM. A second argument put forward by (Berry-Stölzle & Xu, 2018) is that companies with low growth opportunities are often large companies with

substantial franchise value and therefore have an interest in protecting this value by adopting ERM.

Table 1: Summary of the expectations and description of the measurement of the relevant variables, their symbols, and a representative sample of their use in the literature.

Variable	Proxy	Sign	Symbol	Sample of the literature
Strategy	Non-interest income/total income	+	DIV	(Gordon et al., 2009; Hoyt & Liebenberg, 2011; Mikes & Kaplan, 2013)
Size	Natural log of total assets	+	SIZE	(Baxter et al., 2013; Florio & Leoni, 2017; Malik et al., 2019)
Environment	Equity/ total assets	+	ENV	(Jabbour & Abdel-Kader, 2015)
Opacity	Intangible assets/ total assets	+	OPA	(Bohnert et al., 2018; Hoyt, 2003; Lechner & Gatzert, 2018)
Quality of management	Net income/ total assets	+	ROA	(Lundqvist & Vilhelmsson, 2016)
Leverage	Debts/ total assets	-	LEV	(Beasley et al., 2008; Lin et al., 2012; Sax & Andersen, 2019)
Growth	Percentage growth of total assets between two consecutive years	+/-	GROW	(Berry-Stölzle & Xu, 2018; Farrell & Gallagher, 2014; Pagach & Warr, 2011)

2.2. Empirical method and data sample

2.2.1. The measure of the degree of implementation of ERM

We are convinced that a good measure to estimate the degree of implementation of ERM should capture both breadth and depth of ERM. One of the methods that can respond to these objectives is the use of public disclosures in term of risk management. However, According to (Hoyt, 2003), it is common for firms to not openly disclose their utilization of ERM practices, and risk management disclosures tend to pertain to individual risks. Consequently, it becomes challenging to identify companies that have implemented ERM. To overcome this limitation, researchers have developed a metric to gauge the extent of ERM adoption by utilizing text-based searches of annual reports for word combinations that are associated with various ERM

dimensions(Desender & Lafuente, 2011; Hoyt & Liebenberg, 2011; Lundqvist, 2014; Lundqvist & Vilhelmsson, 2016). For this study, we employed a measure developed by (Lundqvist & Vilhelmsson, 2016) that is also used in the banking sector and comprises 83 dimensions of ERM substantially influenced by COSO (2004).

Of course, the created measure might encompass ERM disclosure, risk management in general, or even the overall amount of transparency. To address these apprehensions, we included the overall word count of the annual report as a control variable in the regression analysis, as recommended by (Lundqvist & Vilhelmsson, 2016). The outcomes of our model align with their discoveries, as they indicate that our measure of the extent of ERM implementation encompasses a facet that differs from the overall disclosure.

2.2.2. Data sample

Our research focuses on the Moroccan banking industry; thus, we look at a sample of eight banks whose combined assets account for more than 90% of the sector's total assets from 2007 to 2021. The total observation in our sample is 120.We obtained the annual reports from the banks' web sites but given the lack of data on certain banks or certain years, our panel is unbalanced.

2.2.3. Empirical method

The previous studies have been using different methods to identify the ERM determinants. The most recommended method is the panel data analysis because it takes into consideration both time and cases and allows to express better the dynamics of change. First, we analyzed the descriptive statistics of the variables mobilized. Second, we ran a correlation analysis to assess the correlation and multicollinearity among our variables before conducting a regression analysis. Additionally, we carried out tests for heteroscedasticity and serial correlation to ensure the accuracy and effectiveness of our analysis. For our panel data analysis, we will use the two primary methods: fixed effects model (FE) and random effects model (RE).

3. Empirical results

The following section displays the empirical findings, wherein we used a panel data approach to identify the key factors affecting ERM in our sample. Our empirical analysis was conducted using both fixed and random effects models, which enable variable intercepts and account for heterogeneity across firms, thereby ensuring the accuracy and effectiveness of estimates. To ensure the validity and efficiency of our analysis, we first present the descriptive statistics and

conduct essential tests for heteroscedasticity and serial correlation. These tests are of utmost importance and provide necessary confirmation for our analysis.

3.1. Descriptive statistics

Table 2: The descriptive statistics for all banks for the study period, 2007–2021.

Variables	N	Mean	Std	Minimum	Maximum
ERM	103	60.570	14.740	16.000	80.000
ROA	120	0.010	0.003	0.001	0.017
SIZE	120	18.550	0.840	17.000	20.210
ENV	120	0.093	0.023	0.017	0.139
LEV	120	0.701	0.081	0.497	0.827
OPA	120	0.003	0.002	0.0004	0.008
DGEO	120	0.375	0.486	0.000	1.000
DSEG	120	0.011	0.004	0.002	0.022
GROW	120	0.077	0.079	- 0.065	0.427
NBR_WORD	103	5.230	2.940	1.061	13.360

Source: Authors Computation

In 2021, the ERM index of Moroccan banks stood at 74. This was 155% higher than its level in 2007. The union sample has an average value of 60,5 (73%) over the whole period. This figure is close to 61,2, the average degree of ERM implementation for the banks with high degrees of implementation (90th percentile), found by (Lundqvist & Vilhelmsson, 2016).

Figure N 2: The evolution of ERM index from 2007 to 2021
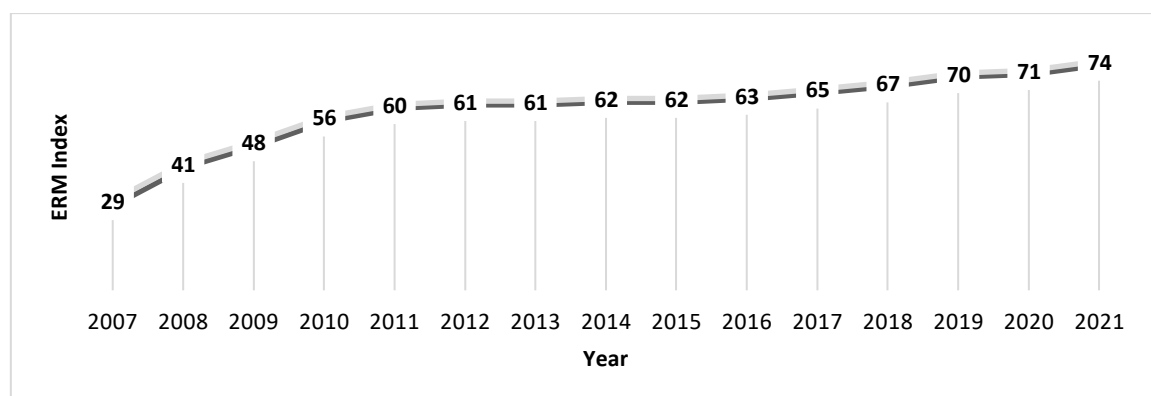
Source: Authors Computation

3.2. Correlation matrix and diagnostic tests

Before addressing the empirical procedure, it is necessary to conduct a correlation analysis. In this sense, to assess the correlation and multicollinearity among our variables, we generated a correlation matrix and variance inflation factor (VIF) were produced. The resulting correlation matrix can be seen in Table 3.

Table 3: Correlation matrix

Variables	ERM	ROA	SIZE	ENV	LEV	OPA	DGEO	DSEG	GROW	NBR_WORD
ERM	1.000									
ROA	-0.027	1.000								
SIZE	0.618	0.352	1.000							
ENV	0.138	0.419	0.040	1.000						
LEV	-0.207	-0.218	-0.707	0.351	1.000					
OPA	0.101	-0.144	-0.018	-0.073	0.015	1.000				
DGEO	0.413	0.500	**0.894**	0.071	**-0.795**	-0.148	1.000			
DSEG	0.457	0.514	0.700	0.265	-0.441	0.002	0.708	1,000		
GROW	-0.235	0.178	0.005	-0.409	-0.370	-0.170	0.159	0,026	1.000	
NBR_WORD	-0.537	0.025	-0.509	-0.027	-0.347	0.154	0.439	0,332	-0.107	1.000

Source: Authors Computation

We found a high level of correlation between the variable "DGEO" and the variables "SIZE" and "LEV". Therefore, to evaluate whether the sample is affected by multicollinearity, we generated the variance inflation factor (VIF). According to Table 4, the VIF value of the explanatory variable "DGEO" is very important and exceeds the threshold value of 10 (Alin, 2010).

Table 4: Variance inflation factor (VIF)

Variables	VIF	1/VIF
DGEO	12.790	0.078
SIZE	6.730	0.149
LEV	5.690	0.176
DSEG	2.560	0.391
ENV	2.380	0.421
ROA	2.230	0.449
GROW	1.740	0.573
NBR_WORD	1.540	0.650
OPA	1.260	0.794
Mean VIF	4.100	

Source: Authors Computation

A straightforward method to correct multicollinearity is removing the variable showing a high correlation. Table 5 shows the VIF calculated after the elimination of the variable "DGEO", we observed that the VIF of all the variables are in the accepted range (under 5 according to (Daoud, 2017)). Indeed, the values suggest that there is a moderate correlation, but not sufficient to consider corrective measures.

Table 5: Variance inflation factor (VIF) after the omission of "DGEO" variable

Variable	VIF	1/VIF
SIZE	4.200	0.238
LEV	3.340	0.300
DSEG	2.470	0.405
ENV	2.200	0.455
ROA	1.970	0.507
GROW	1.740	0.573
NBR_WORD	1.490	0.670
OPA	1.090	0.913
Mean VIF	2.310	

Source: Authors Computation

To test for heteroscedasticity in our model, Breusch-Pagan test was employed. The p-value is under 5%, so we rejected the hypothesis H0 and concluded that there is heteroscedasticity in our model. Besides, the Wooldridge test for serial correlation was conducted, and the results indicate the existence of serial autocorrelation. To correct for heteroscedasticity and autocorrelation, we employed the command "Cluster" in STATA.

In order to determine the most appropriate model for our analysis, we conducted a Hausman test. The results of the test indicate that for our model, the fixed effect approach is the most suitable.

3.3. Results of the multivariate analysis and discussion

Table 6: The impact of the determinants on ERM.

Variables	Random effect	Fixed effect
ROA	-1.494***	-564.7
	(414.1)	(487.8)
SIZE	13.91***	**32.52*** **
	(2.229)	(3.805)
ENV	47.00	**192.4** **
	(58.40)	(77.19)
LEV	76.92***	**61.04** **
	(21.33)	(22.11)
OPA	349.4	1,288
	(576.0)	(973.5)
DSEG	494.8	**853.1*** **
	(343.5)	(134.6)
GROW	5.994	11.64
	(15.88)	(8.616)
NBR_WORD	1.045***	0.579
	(0.393)	(0.432)
Constant	-255.1***	**-618.5*** **
	(50.07)	(67.63)
Observations	103	103
Number of Banks	8	8
R-squared	0.613	0.826

Source: Authors Computation

Notes: The bold coefficients denote the statistically significant values. Asterisks show the significance at the 1 % (*), 5 % (**) and 10 % (***) level. Based on Hausman test, the results of the fixed effects model will be considered in this study.

As presented in Table 6, bank size is positively associated with the degree of ERM implementation, at a significant level of 10 %. This result is consistent with prior findings, claiming that larger banks have higher quality ERM program (Baxter et al., 2013; Beasley et al., 2015). Two main arguments are put forward: first, larger banks are more complex and face a wide range of risks, so they are more in need of a robust risk management practices (Pagach

& Warr, 2011). Second, the expenses of the implementation of ERM are significant, and only larger entities can afford the cost.

The current study documents also a positive relationship between strategy and the degree of ERM implementation, at significant level of 10 %. This result is in coherence with the precedent finding, as size and a strategy of diversification are both features of the firm complexity (Hoyt & Liebenberg, 2011). Larger banks are relatively more diversified, so, as mentioned above, the fact that they are more complex allows them to take better advantage of ERM deployment.

Regarding the environment-ERM association, the relationship was found to be statistically significant at a 5 % significance level. The results support the hypothesis formulated that the regulatory pressure increases the degree of ERM implementation. In fact, the strengthening of capital involves the improvement of the risk appetite process, the enhancement of the information and decision-making system and the reviewing of the authorization system. All these changes are part of an effective ERM program.

The results shown above are consistent with the theoretical framework used--the contingency-based approach--and demonstrate that ERM is determined by an MSC's classical contingent elements.

For the other factors considered in this study, only leverage is found statistically significant.

In contrast to (Hoyt & Liebenberg, 2011; Sax & Andersen, 2019) who demonstrated that ERM is negatively linked to leverage, the current research reports a positive link between leverage and the degree of ERM implementation. This result corroborates the results documented by (Beasley et al., 2008), who found a positive and significant relationship between leverage and the announcement of CRO's for the financial firms in their sample. Other studies also reported a positive link (Hoyt, 2003) and explained this sign by the fact that more leverage firms are likely to benefit from ERM. More robust ERM practices may lead to lower financing costs (Beasley et al., 2008).

Finally, although the impact of opacity has been widely discussed in previous studies, we found no significant impact on the level of ERM implementation.

Conclusion

The crisis faced by "Credit Suisse", one of the 30 largest banks in the world, is a typical case of the failure of risk management. In fact, the bank has been entangled in a series of scandals and management controversies, caused by deficiencies in their risk management and ranging from shortcomings in the risk assessment process to a weak risk culture. So, despite the reinforcement of the regulatory requirements and the proliferation of principles, guidelines, and standards about the ERM, the implementation of an effective risk management system remains a challenging agenda. In this sense, Academics regard the use of a contingency approach to risk management as a response to effective ERM design and implementation (Mikes, 2015).

To the best of our knowledge, our study is the first to consider different dimensions of ERM (83 dimensions) expressing both breadth and depth of ERM implementation in Moroccan banks.

This paper analyses the determinants of the level of ERM implementation. The results contextualize the findings of the previous studies in this body of work. Thus, this study provides interesting results showing that banks with higher degree of ERM implementation are likely to be larger, more diversified, and highly levered. Moreover, our research proves that the reinforcement of capital allocation and the increasing of the regulatory pressure are positively contributing to the expansion of ERM practices.

As with all research, this study is not free from limitations. We have faced a lot of difficulties to construct our measure of ERM implementation. First, there was a problem of availability of financial report for the periods before 2014. Second, there is no consistency in Moroccan banks' risk management disclosures. So, as reported by (Florio & Leoni, 2017), our research also reveals the need to provide more details about the risk management system.

Another recurring limitation in the Moroccan setting is the small sample size, which restricts the power of our analysis as well as the generalizability of our findings. A future study could look at a wider sample size by incorporating other countries.

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