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Enterprise risk management and firm performance: The Italian case

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ABSTRACT

This paper investigates whether a relationship exists between the extent of implementation of enterprise risk management (ERM) systems and the performance of Italian listed companies. While many contributions in the literature focus on the determinants of ERM adoption and use one-dimensional feature to proxy for ERM implementation, we detect the consequences of ERM implementation and capture a variety of features to measure the sophistication of the ERM system. The results show that firms with advanced levels of ERM implementation present higher performance, both as financial performance and market evaluation. Additional tests also corroborate the expectation that effective ERM systems lead to higher performance by reducing risk exposure and that reverse causality between ERM and performance is not present in the short term. The study provides a twofold contribution to the ERM literature. First, it introduces new and more complete measures for ERM implementation, concerning not only corporate governance bodies dedicated to risk management, but also the characteristics of the risk assessment process. Moreover, it provides evidence of a positive relationship between ERM implementation and firm performance in an under-investigated context such as Italy.

1. Introduction

International literature on enterprise risk management (ERM) argues that organisations may improve their performance by adopting a holistic approach to risk management (RM). The introduction and development of ERM systems is deemed to reduce direct and indirect costs of financial distress and earnings variability, as well as negative surprises in financial markets. Moreover, it may improve the decision-making processes to select the best investment opportunities. As a consequence, ERM may favour the increase of firm value (a.o., Beasley, Pagach, & Warr, 2008; Beasley, Clune, & Hermanson, 2005; Ellul & Yerramilli, 2013; Hoyt & Liebenberg, 2011; Nocco & Stulz, 2006; Paape & Speklé, 2012).

Notwithstanding such considerations, empirical evidence on the relationship between ERM and performance is still limited (Farrell & Gallagher, 2014; McShane, Nair, & Rustambekov, 2011). Most ERM studies investigate the relationship between the determinants and quality of ERM systems, while only a few concentrate on the consequences of ERM on firm

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financial and market performance (Baxter, Bedard, Hoitash, & Yezegel, 2013; Hoyt & Liebenberg, 2011; McShane et al., 2011). One reason behind this lack of empirical evidence is the difficulty in explaining the relationship between ERM and firm performance, as a direct relation or simply a consequence of risk reduction (Ellul & Yerramilli, 2013; Nocco & Stulz, 2006).

Although initial studies signal a positive relationship between ERM adoption and firm performance, so far the context of investigation has been mainly confined to the US. Little is known about ERM in European countries, such as Italy, where the attention on RM practices by corporate governance (CG) codes has increased considerably in recent years, especially following big financial scandals like Parmalat and Cirio (Enriques & Volpin, 2007; Melis, 2005). As Italian firms have significantly different characteristics compared to US firms, the results could advance the knowledge of the international community on ERM in new contexts. First of all, Italian public companies are a minority in respect to the large majority of small and medium private firms, usually family owned and characterized by close ownership (Viganò & Mattessich, 2007; Zattoni, 1999). As owners exert stringent control over the company they tend to avoid formal ERM practices. Secondly, the Italian capital market is under-developed compared to the US one and failed in becoming the main source of capital for Italian companies (Zambon, 2002).[1] Therefore, it is doubtful whether Italian investors are capable of pricing the ERM adoption, thus determining a change in firms' market value. Thirdly, Italy constitutes a good context to study the implications of RM enforcement, as only in 2011 the CG code stressed the importance of RM practices. Finally, despite such differences, Italy was hit by similar financial scandals as the US and since early 2000 it was subject to the tightening of CG regulation. Recently, initial qualitative studies focused on the Italian context have brought to attention the importance of experts' ability for the ERM functioning and for its change (Arena, Arnaboldi, & Azzone, 2010, 2011; Giovannoni, Quarchioni, & Riccaboni, 2016), the integration of risk management in CG (Florio & Leoni, 2013), and the way ERM allows credit cooperative banks to achieve both economic and social performance (Caldarelli, Fiondella, Maffei, & Zagaria, 2016).

In consideration of the above premise, this study tests whether a relationship between the extent of implementation of ERM systems and the performance of Italian listed companies exists, controlling for CG and firm characteristics. On the one hand, while previous empirical studies on ERM mainly adopted one-dimensional proxies, we investigate in detail ERM integration in CG by considering the appointment of a chief risk officer (CRO), the presence of an internal control and risk committee (ICR committee), and the reporting frequency of the ICR committee to the board of directors (BoD). We also investigate ERM operating mechanisms by focusing on risk assessment frequency, depth, and methodology. Finally, we create an overall measure of ERM sophistication, which encompasses all the ERM components mentioned. On the other hand, two measures of performance are used to capture different perspectives: the historical accounting performance of the company, measured by the return on assets ratio (ROA), and performance on the capital market, measured by Tobin's Q.

The results shed light on whether and how the ERM components, both separately and jointly, have a positive effect on firm performance. We find that the adoption of quantitative methods for risk assessment in addition to qualitative methods positively affects ROA, while presence of an ICR committee positively affects Tobin's Q, as well as the frequency of reporting between the ICR committee and the BoD and the level at which risk is assessed. Finally, advanced ERM systems positively affect both ROA and firm value. Therefore, we argue that the sophistication of ERM systems as a whole, rather than just single elements, contributes to the improvement of firm performance.

With its results, this paper responds to the call for more research in the ERM field (Beasley et al., 2005) and contributes to the limited, and sometime contradicting, insights on the relationship between ERM sophistication and firms' performance in several ways. Firstly, the paper provides new evidence to support the positive effect of ERM on improving both financial and market performance of listed companies. Secondly, with insights from an alternative and under-investigated context, the study offers support to standard setters and market regulators to address RM issues in European countries with smaller firms and financial markets as compared to the US. Thirdly, it contributes to the ERM research by widening the set of measures and determinants of ERM sophistication, adding more detailed characteristics of the risk assessment process to the traditional ERM proxies.

The rest of the paper is organized as follows. Section 2 reviews the literature on the relationship between RM and firm performance, describes the Italian institutional background, and develops the hypotheses. Section 3 explains the research design, while Section 4 reports descriptive and empirical results. Sections 5 and 6 offer some additional analyses and sensitivity tests, respectively. Section 7 concludes the paper and suggests further research development.

2. Prior research, regulatory context, and hypotheses development

2.1. Prior research on risk management and performance

The relationship between risk and performance has drawn the attention of practitioners and academics for a long time, especially because the association between risk and value is not verified in imperfect markets (Modigliani & Miller, 1958). In the meanwhile, internal control and RM systems diffused among firms to reduce risks and improve performance (Woods, 2009).

Initially, RM maintained a silo-based approach on financial risks only, but suffered the limitation of managing one risk at a time whilst risks are interrelated (Grace, Leverty, Phillips, & Shimpi, 2015; Power, 2009) especially in complex and globalised

[1] The number of companies listed on the main stock market was slightly lower than 250 in late 2000, and has surpassed the threshold of 300 only recently (www.borsaitaliana.it).

firms facing the financial crisis (Bertinetti, Cavezzali, & Gardenal, 2013). Therefore, in recent years, RM evolved into ERM to offer a more integrated approach (Gordon, Loeb, & Tseng, 2009), which requires that risks assessment, quantification, and management encompass the entire organization, throughout all functions and levels. [2]

Governments and industry engaged to translate the 'integration' of RM into practice and improve firms ability to manage risks (Arena et al., 2010; Woods, 2009). CG codes worldwide started to recommend the creation of dedicated bodies, e.g., board risk committee and CRO, to induce the integration of RM in CG systems (Brown, Steen, & Foreman, 2009; Lundqvist, 2015), as well as the introduction of proper risk assessment processes.

The topic of RM, therefore, has gained attention in both accounting and corporate governance literature. First exploratory large-scale studies associate ERM implementation to the nomination of dedicated risk committees and/or CROs (Liebenberg & Hoyt, 2003; Subramaniam, McManus, & Zhang, 2009; Yatim, 2010), investigating ERM determinants among several firm characteristics. Conversely, other studies explore the ERM implementation from an organizational perspective using case study approach. Indeed, RM was found to reinforce strategic control systems in a UK retailer (Woods, 2008), whilst in the Italian context ERM functioning is argued to depend on ERM experts' ability to integrate the ERM system (Arena et al., 2010, 2011) and to change it (Giovannoni et al., 2016).

Because 'enterprising RM […] in the sense of wealth creation' (Power, 2009) means 'to optimize earnings—and ultimately the firm's value' (Standard & Poor's, 2007), other studies have investigated the effects of the ERM sophistication on firm performance. Risk management is deemed to improve performance because it helps firms to avoid losses, bankruptcy, and reputational costs (Baxter et al., 2013; Gordon et al., 2009; Pagach & Warr, 2010, 2011). It is also supposed to enhance firms decision-making (Farrell & Gallagher, 2014; Grace et al., 2015; Nocco & Stulz, 2006) and capital allocation processes (Baxter et al., 2013; Hoyt & Liebenberg, 2011). While these arguments are largely promoted by the literature, empirical evidence on their validity is still limited. Indeed, the relation between ERM sophistication and firm performance cannot be taken for granted, especially considered that 'ERM can be different things in different organisations, or even within the same organization at different times' (Arena et al., 2010, p. 659). Gordon et al. (2009) claim that the relation between ERM and firm performance is contingent upon firm-specific factors, namely environmental uncertainty, industry, firm size, and BoD activity. In their turn, Nocco and Stulz (2006) indicate it still remains unquestioned whether ERM sophistication leads to an increase of firm performance through more, less or no change in firm risk. Moreover, efficient ERM may decrease firm risk-taking to a very low level from a diversified shareholder's point of view, reversing the relation between ERM sophistication and performance into a negative one, especially in stable economy times (Ellul & Yerramilli, 2013).

Existing empirical research on the association between ERM and performance offers mixed results. Beasley et al. (2008) find CRO appointment determines positive equity market reactions for non-financial firms, but not for financial firms. Conversely, focusing on US insurance companies, Hoyt and Liebenberg (2011) find a positive relationship between firm value and CRO appointment, while McShane et al. (2011) find a positive relationship between RM advancement from a silo-based to an ERM approach and firm value, yet they find no additional increase in value for firms moving to an even further ERM sophistication. Baxter et al. (2013) find that ERM quality is positively associated with firm value in a sample of US banks and insurance companies, but only during the global financial crisis (Baxter et al., 2013, p. 3). Bertinetti et al. (2013) find similar results between ERM adoption and enterprise value in a sample of European financial and non-financial companies. In an international and multi-industry study, Farrell and Gallagher (2014) demonstrate that firms with more mature ERM exhibit higher firm value, due to embedded risk culture, ERM integration within the organization, and the view of ERM as a component of strategy and planning activities. Finally, Grace et al. (2015) show that the use of economic capital models and dedicated risk managers improve operating performance, while the use of more advanced models and/or market-based risk metrics, and the presence of a CRO, have no incremental effect. They also find that the more the ERM initiatives implemented (i.e., adoption of a simple economic capital model, dedicated risk manager appointment, cross-functional RM committee nomination, risk manager reporting to the BoD or CEO), the higher the firm value.

In concert with these mixed results, recent studies have shown criticism on the effectiveness of 'compliance-based' ERM systems due to the 'everybody does it' syndrome (Woods, 2008). Indeed, with the tension surrounding the creation of risk-focused CG systems, ERM may translate to a mere compliance task that is not improving risk prevention nor affecting firm performance (Arena, Arnaboldi, & Azzone, 2011, 2010; Power, 2009). New evidence on the effects of ERM adoption on firm performance could respond to such issues, either by demonstrating the effectiveness of ERM implementation or by confirming the concerns about ERM becoming a mere compliance exercise. Thus, the purpose of this study is to provide new empirical evidence on the relationship between ERM and firm performance, by studying a context other than the US one and by relying on more detailed measures to assess firm commitment to designing a holistic ERM system.

[2] As suggested by the COSO guidance (2004), ERM is integrated in an organization if it involves the entity's board of directors, management, and other personnel, considers risk in strategy setting and across the enterprise, is able to identify potential events that may affect the organization, and manages risk to remain within the entity's risk appetite.

2.2. Regulatory framework of corporate governance and risk management in Italy

In response to financial scandals and later to global financial crisis, RM has gained increasing attention by regulators, as well as by academics and practitioners all over the world. After Enron and WorldCom scandals and then to face the financial crisis, more stringent rules were issued in US (e.g., Sarbanes-Oxley Act in 2002 and the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010), to constraint opportunistic behaviors and force companies to improve their RM systems.

In the meanwhile, at the international level, the Committee of Sponsoring Organization of the Treadway Commission (COSO, 2004, 2012) released the ERM Integrated Framework, which immediately became the guideline of reference for RM programs, overcoming the traditional RM approach.

As a matter of fact, both financial scandals and financial crisis did not only affect the US, but also other European countries, and Italy in particular.

Similarly to Enron and WorldCom, Parmalat and Cirio scandals urged the need to strengthen listed companies CG and RM systems. Therefore, several regulatory reforms took place also in Italy from late 1990s, and then reinforced due the international financial crisis. The first CG code was issued in 1999 by the Italian Stock Exchange (*Borsa Italiana*) and has been revised several times since then (2002, 2006, 2010, 2011). Since 2001 all listed companies in Italy are required to publish a corporate governance report (Mallin, 2011) and the CG code was meant to help companies in maximizing their value to the benefit of shareholders and in accessing national and international financial markets more easily, by means of the improvement of their CG system. The CG code offers an organizational and functional model of reference for CG, based on the 'comply or explain' principle: each listed company may decide whether to comply to the CG code or to explain why it does not— partially or entirely—comply.

Among the several improvements to the Italian CG code, the most important for the aims of this study is the 2011 reform, effective in 2012. Such revision recommends the creation of an integrated system of internal control and RM, designed as a system of rules, procedures and organizational bodies deputed to identify, measure, manage and monitor main risks (Borsa Italiana, 2011; art. 7.P.1). While the internal control system and the related internal control committee were already regulated, recommendations about RM are a significant element of novelty. Such recommendations assume that a modern vision of controls necessarily relies on risk assessment and monitoring. Therefore, on the one hand, internal control and RM shall be integrated and treated as a unitary system focused on risks and, on the other hand, the internal control system—including RM—shall be integrated within the overall organizational, administrative and accounting system of the firm.

This integration stems from both the subjects involved on internal control and risk assessment procedures, as well as their interaction. Indeed, the subjects involved are the BoD, the internal control and risk (ICR) officer, the internal control and risk (ICR) committee, the internal auditor, and the statutory board. More specifically, the ICR officer is charged to create and maintain an effective internal control and RM system, while the ICR committee is entitled to support BoD evaluations and decisions referred to the same system (Borsa Italiana, 2011; art. 7.P.3). Interactions among the subjects involved in the internal control and RM process shall be constant, with the recommendation that the ICR committee periodically verifies the reports about the evaluation of the internal control and RM system, and refer to the BoD on the activity run and the adequacy of the internal control and RM system at least biannually. At the same time, the ICR officer is required to promptly report to the ICR committee or directly to the BoD about any critical situation borne, so they may intervene straightaway.

Table 1 summarizes the main RM responsibilities of the board of directors, the ICR committee and officer according to the Italian CG code revised in 2011.

2.3. Hypotheses development

Both the above literature review and the renovated CG regulation shed light on the need for further investigation into the consequences of ERM implementation, especially in under-investigated contexts, like Italy.

In this study, we first focus on the association—if any—existing between single components of a good ERM system, as suggested by the Italian CG code and previous international literature. We refer to components signalling the RM integration in CG first, and then to the risk assessment process. Finally, we consider ERM components all together, by estimating a more encompassing measure of ERM sophistication. The first part of the analysis partially replicates prior empirical studies, but in a new context and relying on a more detailed and consistent dataset to verify a number of hypothesis that were previously tested only on different samples and periods. On its turn, the second part of the analysis aims to overcome the limits of stand-alone ERM proxies by contemplating ERM as an integration of governance and operating activities (Gordon et al., 2009; Lundqvist, 2014).

Moreover, we test the effect of ERM on two types of performance. As ERM implementation may reduce the negative consequences of risks and improve operational and strategic decisional processes, a positive effect on accounting performance is expected. Considering that the expected improvement of the operating performance, as well as the communication of new RM bodies and practices within company's CG reports may positively influence investors' perceptions, a positive association between ERM and market performance is also expected. However, it is possible that investors incorporate information about changes or improvements in ERM system with a certain time lag (Hoyt & Liebenberg, 2011).

Table 1
Risk management duties according to the 2011 Italian CG code.

Subject	Duties
Board of Directors (BoD)	• Lead the internal control and risk management (ICRM) system to favour the identification, measurement, management, and control of risks in the company and its subsidiaries, according to its risk appetite and its strategy. • Evaluate, at least yearly, the suitability and the effectiveness of the ICRM system according to the characteristics of the company and its risk appetite. • Endorse, at least yearly, the IC program, consulting the Board of Statutory Auditors (BoSA) and the ICR officer. • Describe in the CG report the main features and the suitability of the ICRM system. • Assess, in accordance with the BoSA, the results of the external audit. • Appoint and overrule the internal audit manager, ensure the availability of his resources, and define his remuneration according to the company's policies.
Internal Control and Risk (ICR) committee	• Evaluate, in collaboration with the chief financial officer, the external auditor, and the BoSA, the accuracy of the use of accounting principles. • Give opinions about the approach to the identification of the firm's risks. • Study the reports provided by the ICRM system and the internal audit function. • Check the independency, suitability, effectiveness, and efficacy of the internal audit function. • Report to the BoD, at least biyearly, about its activity and the suitability of the ICRM system.
Internal Control and Risk (ICR) officer	• Identify the company's risks, with reference to the characteristics of the business, and report timely on risks to the BoD. • Carry out the guidelines provided by the BoD, programming, executing, and managing the ICRM system, maintaining constant control of its suitability and effectiveness. • Accomplish the coordination of the ICRM system with the operating and regulatory conditions. • Ask for verifications from the internal audit function regarding compliance with rules and strategy, reporting to the BoD, the ICR committee, and the BoSA. • Report timely to the ICR committee (in case of absence to the BoD) about identified critical issues.

With reference to the integration of RM functions in CG, we first focus on the appointment of an ICR officer responsible for identifying firm risks, for programming, executing and managing the internal control and RM system, and for reporting timely on critical issues to the BoD/ICR committee (Borsa Italiana, 2011). The appointment of such key-person is also deemed to signal to investors that RM is entrusted to expert, senior-level executives, thereby improving equity market reaction (Beasley et al., 2008), and positively affecting firm value (Hoyt & Liebenberg, 2011; Lundqvist, 2014).

Secondly, we investigate the nomination of an ICR committee (or a specific risk committee besides the IC committee) with a risk advisory role in the BoD about the RM system and the internal audit (Borsa Italiana, 2011). Previous literature mainly focuses on the risk committee nomination as a proxy of ERM sophistication, demonstrating that such committees tend to exist in companies with strong board structures (Subramaniam et al., 2009; Yatim, 2010). Although the implications of nominating a dedicated risk committee or an ICR committee on firm performance remain un-investigated, we expect that the presence of such committee denotes higher attention to RM and better coordination of the RM function.

The last aspect under consideration is the reporting frequency between the ICR committee and the BoD, which shall be at least biannual according to the Italian CG code (Borsa Italiana, 2011). Existing literature acknowledges that an active BoD participation is positively related to an effective ERM system (Sobel & Reding, 2004). In addition, existing literature claims that '[c]orporate governance and RM are interrelated and interdependent' and that '[the stability and improvement of the company's performance are highly dependent on the effective role of both components' (Quon, Zeghal, & Maingot, 2012, p. 264). As a consequence, a company with frequent interactions between the ICR committee and the BoD relies on communication to identify risky events, effectively react to them (Arena et al., 2010; Frigo & Anderson, 2011; Paape & Speklé, 2012) and, ultimately, improve its performance (Ellul & Yerramilli, 2013).

Combining recommendations from the CG code, previous empirical evidence, and the general feeling towards increased level of integration of RM in CG driving to improved firm performance, we expect that each one of the above mentioned ERM components will positively affect the performance of Italian companies. Thus, the first set of hypotheses is formulated as follows:

HP 1a. There is a positive association between ICR officer appointment and firm performance.

HP 1b. There is a positive association between the appointment of an ICR committee and firm performance.

HP 1c. There is a positive association between the reporting frequency between the ICR committee and the BoD and firm performance.

As to the operating aspects of ERM implementation, we focus on risk assessment, i.e., the process of risk analysis (including risk identification, description, and estimation) and evaluation. In this regard, the Italian CG code makes reference to the national and international guidelines and best practices (Borsa Italiana, 2011; art. 7.P.1).While management literature offers case studies on risk assessment implementation (Mikes & Kaplan, 2013), large-sample studies on the implications of risk assessment characteristics are needed.

Three main aspects characterise risk assessment. The first one is its timing and refers to the frequency of the assessment. According to COSO (2012, p. 2), risk assessment shall be carried out continually, at least with regard to the most dynamic risks, such as certain market and production risks. Of course, to effectively maintain a control over risks, the frequency shall be adjusted according to the evolution rate of business risk, thus context with high evolution rates require higher frequency than other businesses (Mikes & Kaplan, 2013). However, because economic settings worldwide are becoming more and more complex and fast changing, and because of the current global financial crisis, higher frequency of risk assessment may help to detect changes in risk levels and risk correlations, even in contexts that are deemed to be stable. As a consequence, we hypothesise that higher frequency of risk assessment may increase ERM effectiveness, and in turn, firm performance.

The second characteristic of risk assessment is its depth. As recommended by COSO (2012, p. 2), risk identification and assessment shall be executed at both the corporate level and business units, organising risks by category and sub-category. In this regard, previous research shows that risk monitoring by business units is the best practice to uncover and track risks (Farrell & Gallagher, 2014). Given that listed companies are complex organisations, a deeper risk assessment is essential to achieve ERM effectiveness, and, thus, a performance improvement. Indeed, failing the level of depth for risk assessment may reduce the ability of the company to prevent specific risks, with negative repercussions on its performance.

The third aspect is the methodology applied to risk assessment, which can be only qualitative or also quantitative. The COSO (2012, p. 2) suggests that—after an initial qualitative risk screening—companies shall perform quantitative analysis on the most important risks, while previous empirical evidence shows that formalized measures of risk provide a positive contribution to the firm's ability to uncover and track risks (Farrell & Gallagher, 2014). Consistently, we assume that companies using both qualitative and quantitative methodologies have more sophisticated ERM systems, which can improve their ability to detect risks and, ultimately, their performance.

According to ERM recommendations and the above assumptions, we postulate the following three hypotheses:

HP 2a. There is a positive association between risk assessment frequency and firm performance.

HP 2b. There is a positive association between risk assessment depth and firm performance.

HP 2c. There is a positive association between the adoption of both qualitative and quantitative risk assessment methodologies and firm performance.

As suggested by CG recommendations and existing literature, these six aspects are all components of an ERM system and their joint presence may contribute to the ERM sophistication (Borsa Italiana, 2011; COSO, 2004). But existing evidence offers opposite results on the relation between the joint presence of aspects representing a sound ERM implementation and firm performance (Grace et al., 2015). Studying stand-alone proxies of ERM sophistication is helpful to analyse their single contribution to the performance, but it fails in detecting their joint effect. Therefore, to capture the implications of an holistic ERM where RM system is integrated into governance and operating activities (Gordon et al., 2009), we combine the six aspects in a score of ERM and split the sample into high ERM committed firms (with at least four ERM components) and low ERM committed firms, with the purpose of verifying whether the implementation of more advanced ERM systems affects the performance. This measure aims also to give a sort of flexibility to the concept of an advanced ERM system, especially considering the limits of an 'one size fits all' approach in the implementation of ERM systems (Mikes & Kaplan, 2015). We expect that high committed firms will obtain cost savings, e.g., through avoidance of duplication of RM expenditure (Farrell & Gallagher, 2014), and will formulate better strategic and operating business choices, thus reporting higher performance. Accordingly, our hypothesis is stated as follows:

HP 3. There is a positive association between the ERM sophistication and firm performance.

As formulated, the hypotheses are based on the idea that an effective ERM is beneficial to the firm. However, the verification of this association may be challenged by peculiar circumstances. In fact, certain characteristics deemed to provide effectiveness to the ERM system may simply masquerade formal compliance and not a real implementation (Arena et al., 2011, 2010; Power, 2009; Woods, 2008), which may fail in improving firm performance. As an example, the ICR committee reporting to the BoD may be frequent but only formal, thereby damaging effective risk monitoring at executive level and making the reporting a costly rather than a profitable activity. Also, the larger compliance requirements—like *ad hoc* RM officers and committees —and more detailed risk assessment process may lead to higher resource consumption, with costs exceeding benefits and ERM sophistication hurting, rather than improving, the firm performance. As an example, more frequent/deep/sophisticated risk assessment bears material monetary expenses and opportunity sacrifices (Farrell & Gallagher, 2014) which may hurt operating performance, especially in smaller companies or companies operating in more stable industries. Finally, as the investors' ability to price ERM sophistication cannot be taken for granted, the costs of ERM improvement might exceed its benefits. As an example, an average investor may be incapable of evaluating the advanced risk assessment of a company due to the high technical knowledge required. Moreover, the incorporation of new information on RM into the share prices may not be timely, due to different maturity of financial markets, like the under-developed Italian market.

Conscious of the above circumstances and that one ERM system, although classified as advanced in this study, may not 'fit all' (Mikes & Kaplan, 2013, 2015), we expect that the benefits of ERM implementation outweigh its costs.

Table 2
Variable labels and definitions.

Variables	Definitions [source]
ROA	Ratio of operating income to total assets at the end of the year expressed in percentages [AIDA item 499]
Q	Sum of market capitalisation and book value of liabilities, divided by book value of total assets [{Bloomberg CUR_MKT_CAP + (AIDA item 1074 − AIDA item 1084)}/AIDA item 1074]
CRO	Dummy variable equal to 1 if the company has designated a chief risk officer or an ICR officer, and 0 otherwise [CG Report] Example of *CRO = 1*: *'The establishment of the new system was finalised in 2013 with a Chief Risk Officer being appointed to manage the ERM process'* [Prysmian S.p.A., 2013, p. 32]
RiskCommittee	Dummy variable equal to 1 if the company has designated a specific risk committee or an ICR committee, and 0 otherwise [CG Report] Example of *RiskCommittee = 1*: *'Creation of a Risk Committee that comprises Edison's Chief Executive Officer, Chief Financial Officer and Risk Officer, the manager of the Gas Midstream Energy Management & Optimization, the manager of the Exploration & Production Division and the Chief Executive Officers of the Edison Trading and Edison Energia subsidiaries and is responsible for reviewing, at least once a month, the levels of assumed risks, comparing them with the ceilings approved by the Board of Directors, and approving the hedging strategies that may be appropriate if the approved ceiling has been exceeded'* [Edison S.p.A., 2013, p. 44]
RCtoBoD	Dummy variable equal to 1 if the CG body responsible for risk management, i.e., the specific risk committee or the ICR committee or, these two lacking, the IC committee, refers to the BoD at least biannually, and 0 otherwise [CG Report] Example of *RCtoBoD = 1*: *'The Committee reports on the Board of Directors, at least at the time of the approval of the financial statement and at the end of each quarter, on the activities performed and on the adequacy on the Internal Control System'* [Esprinet S.p.A., 2011, p. 23]
RAfrequency	Dummy variable equal to 1 if the company performs the risk assessment procedure at least biannually, and 0 otherwise [CG Report] Example of *RAfrequency = 1*: *'The Group has been implementing for several years a semiannual risk self-assessment process for operational risks'* [Parmalat S.p.A., 2013, p. 23]
RAlevel	Dummy variable equal to 1 if the company carries out the risk assessment procedure at a level lower than the overall company (e.g., by business unit or function), and 0 otherwise [CG Report] *Examples of RAlevel = 1*: *'Risks are identified at both the entity level and the process level'* [Enel S.p.A., 2013, p. 26]
RAmethod	Dummy variable equal to 1 if the company adopts both qualitative and quantitative methods of risk assessment, and 0 otherwise [CG Report] Example of *RAmethod = 1*: *'The perimeter of the Group companies to be included in the assessment is determined with regard to the specific level of risk, in both quantitative terms (for the level of materiality of the potential impact on the consolidated financial statements) and qualitative terms (taking into account the specific risks connected with the business or the process)'* [Enel S.p.A., 2013, p. 26]
ERMscore	Sum of the following variables: *CRO*, *RiskCommittee*, *RCtoBoD*, *RAfrequency*, *RAlevel*, *RAmethod*
ERMadvanced	Dummy variable equal to 1 if *ERMscore* is equal to or higher than 4, and 0 otherwise
BoDsize	Number of BoD members [CG Report]
BoDindependence	Percentage of the independent BoD members according to the CG code [CG Report]
Size	Natural logarithm of total assets at the end of each year [AIDA item 1074]
Leverage	Ratio of financial debts to equity ratio at the end of each year [AIDA item 493]
ROE	Ratio of net income to equity at the end of the year expressed in percentages [AIDA item 449]
Industry	Categorical variable representing the industry in which the company operates and equal to 1 for utilities, 2 for information and communication technology, 3 for consumer goods, 4 for industrials, 5 for health care, 6 for consumer services, and 7 for oil & gas and basic materials [Borsa Italiana]

3. Research design

3.1. Sample and data

We test our hypotheses on the population of non-financial companies listed on the Milan Stock Exchange.[3] We consider years from 2011 to 2013 because in 2011 new recommendations about RM were released in Italy, but they became effective only starting from 2012. The three-year period allows to understand the RM practices evolution and its implications on firm performance.

[3] This is the 'Mercato Telematico Azionario of Borsa Italiana'. Only listed companies are selected as they are more involved in RM practices than non-listed firms and their accounting-based and market-based performance measures are easily accessible, as well as data about RM and CG characteristics. Financial companies are excluded because they are subject to *ad hoc* regulations and their accounting-based performance measures are not consistent with those of non-financial companies.

Data about ERM components and CG features are collected from the CG report of each company by means of a manual content analysis (see Table 2 for details), while accounting data are gathered from the AIDA database[4] and market data from the Bloomberg database. After excluding companies with missing data, the final sample consists of 462 firm-year observations, which represent around 80% of Italian listed non-financial companies.

3.2. Empirical model

To test the hypotheses, we estimate multivariate OLS regressions clustered by firm, while controlling for CG and firm specific factors.[5]

The dependent variable is represented by firm performance, alternatively proxied by an accounting and a market measure of performance, following the approach by Baxter et al. (2013). For the former we select the return on assets ratio (*ROA*), i.e. operating income on total assets, while for the latter we select Tobin's Q ratio (*Q*), i.e. market value of equity plus book value of liabilities divided by the book value of assets (Gordon et al., 2009; Hoyt & Liebenberg, 2011; McShane et al., 2011). [6] The higher *Q* is, the better is the judgment expressed by the financial market about the company. The two measures of performance are capturing different perspectives in terms of both the assessing subjects—the company (*ROA*) and the financial market (*Q*)—and timeframes—historical performance (*ROA*) and future investors' expectations (*Q*).

The test variables represent the ERM sophistication, whose representation in an encompassing measure is quite challenging. To this aim, previous literature adopts different binary variables referring to the appointment of a CRO or a Risk Committee (Beasley et al., 2008; Hoyt & Liebenberg, 2011; Liebenberg & Hoyt, 2003; Pagach & Warr, 2011), or relying on content analysis on companies' reports (Bertinetti et al., 2013; Gordon et al., 2009). In further cases, the ERM sophistication is summarised by scores and indexes of compliance, determined from companies reports (Ellul & Yerramilli, 2013), surveys to chief audit executives (Beasley et al., 2005), or RM agency ratings (McShane et al., 2011). More recently, the above proxies were also used in conjunction to design more accurate measures (Baxter et al., 2013; Desender, 2011; Ormazabal, 2010) and we agree this is the more consistent approach to measure an integrated ERM.

Therefore, to measure the ERM sophistication we adopt a two-step approach. First, we separately consider six binary variables representing the ERM components; then, we create a comprehensive score for ERM sophistication as the sum of all previous indicators. Three variables represent RM integration into CG and measure whether the company has an ICR officer or a Chief Risk Officer (*CRO*), whether it has an ICR committee or a risk committee (*RiskCommittee*), and the reporting frequency between risk committee or ICR committee[7] and the board of directors (*RCtoBoD*). Other three variables represent the characteristics of the risk assessment procedure: *RAfrequency* is the frequency of the assessment, *RAlevel* is the depth of the procedure regarding the overall company or single business units, and *RAmethod* refers to the methodology for the assessment, which can be qualitative only or also quantitative.[8] The comprehensive ERM score (*ERMscore*) is the sum of all the six binary variables and ranges from 0 to 6. From the *ERMscore*, a dummy variable for ERM sophistication is derived (*ERMadvanced*) equal to 1 if the *ERMscore* is equal to or higher than 4, and 0 otherwise.

The model also includes two sets of control variables. The first one takes into account corporate governance characteristics previous literature suggests to consider while modelling firm performance, i.e., the number of board directors (*BoDsize*) and the percentage of independent directors (*BoDindependence*) (Baxter et al., 2013; Beasley et al., 2005; Desender, 2011; Fama & Jensen, 1983; Mazzotta & Veltri, 2014; Reverte, 2009). The second set of control variables comprises firm characteristics, namely size (*Size*), and industry (*Industry*) (Baxter et al., 2013; Bertinetti et al., 2013; McShane et al., 2011). Size is likely to affect the scope of firm risks and constrain the resources available for the ERM system, while companies pertaining to different industries may present both different degrees of ERM adoption and performance levels (Baxter et al., 2013).

Finally, we control for firm leverage (*Leverage*) and the return on equity ratio (*ROE*) when modelling market valuation. *Leverage* controls for the ambiguous relationship between capital structure and market evaluation,[9] while *ROE* is intuitively expected to be positively related to market performance.

All variables included in the model and data sources are illustrated in Table 2.

[4] AIDA is the Italian company information and business intelligence database provided by Bureau van Dijk (http://www.bvdinfo.com/en-gb/our-products/company-information/national/aida).

[5] The regression model is clustered to recognize repeated observations referring to the same company in subsequent years. More precisely, we specify that the standard error allows for intragroup correlation, relaxing the usual requirement that the observations be independent. That is, the observations are independent across groups (clusters), but not necessarily within groups (Cameron & Trivedi, 2009, pp. 82–83).

[6] Both dependent variables *ROA* and *Q* were winsorized at 1%, both tails, to ensure that few firms with extreme values are not driving the analysis.

[7] To preserve the independent definition of the *RCtoBoD* variable from the *RiskCommittee* variable, we assume that where there is not a specific risk committee or the ICR committee, the RM function is carried out by the internal control committee, as recommended by the 2006 CG code. Therefore, while defining the *RCtoBoD* variable we referred to the specific risk committee or the ICR committee, or, these two lacking, to the IC committee.

[8] The three characteristics of risk assessment are directly collected from the CG reports of the companies under investigation. The three binary variables are constructed on the basis of the information provided by each company when describing the risk assessment process. In particular, for *RAfrequency* we refer to how often the company assesses the risks; for *RAlevel*, we identify if the company assesses the risk for the overall company or more deeply at different business units or by function; and for *RAmethod*, we consider whether the risk assessment methodology declared by the company is based only on a qualitative approach or refers also to risk measures, indexes and rates.

[9] Leverage may increase both firm net performance and its probability of default. Recent empirical evidence on European companies shows a negative relationship between leverage and Tobin's Q (Bertinetti et al., 2013).

Given the research design and variables, four regression models are derived:

$$\mathbf{ROA_{it}} = \alpha + \beta_1 CRO_{it} + \beta_2 RiskCommittee_{it} + \beta_3 RCtoBoD_{it} + \beta_4 RAfrequency_{it} + \beta_5 RAlevel_{it} + \beta_6 RAmethod_{it} + \beta_7 BoDsize_{it} + \beta_8 BoDindependence_{it} + \beta_9 Size_{it} + \sum_{j=10}^{15} \beta_j Industry_{it} + \varepsilon \quad (1a)$$

$$\mathbf{ROA_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10} \beta_j Industry_{it} + \varepsilon \quad (1b)$$

$$\mathbf{Q_{it}} = \alpha + \beta_1 CRO_{it} + \beta_2 RiskCommittee_{it} + \beta_3 RCtoBoD_{it} + \beta_4 RAfrequency_{it} + \beta_5 RAlevel_{it} + \beta_6 RAmethod_{it} + \beta_7 BoDsize_{it} + \beta_8 BoDindependence_{it} + \beta_9 Size_{it} + \beta_{10} Leverage_{it} + \beta_{11} ROE_{it} + \sum_{j=12}^{17} \beta_j Industry_{it} + \varepsilon \quad (2a)$$

$$\mathbf{Q_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} + \beta_6 ROE_{it} + \sum_{j=7}^{12} \beta_j Industry_{it} + \varepsilon \quad (2b)$$

Table 3
Descriptive statistics.

Panel A: Summary statistics for performance and control variables.

	Mean	Median	SD	Min	Max
ROA	1.269	2.865	10.242	−46.260	28.400
Q	1.137	1.001	0.546	0.418	3.158
BoDsize	9.569	9.000	3.186	2.000	24.000
BoDindependence	0.406	0.385	0.180	0.000	1.000
Size	20.137	19.687	1.939	16.594	25.863
Leverage	1.258	0.600	5.054	−35.627	67.650
ROE	−0.638	3.900	91.574	−759.721	767.403
N	462				

Panel B: Frequency distribution of ERM attributes and industry.

Variable	Equal to	Freq. 2011–2013	% 2011–2013	% 2011	% 2012	% 2013
CRO	0	430	93.07	95.45	92.86	90.91
	1	32	6.93	4.55	7.14	9.09
RiskCommittee	0	197	42.64	95.45	18.83	13.64
	1	265	57.36	4.55	81.17	86.36
RCtoBoD	0	84	18.18	19.48	18.18	16.88
	1	378	81.82	80.52	81.82	83.12
RAfrequency	0	400	86.58	87.66	79.87	92.21
	1	62	13.42	12.34	20.13	7.79
RAlevel	0	164	35.50	55.19	30.52	20.78
	1	298	64.50	44.81	69.48	79.22
RAmethod	0	207	44.81	52.60	40.26	41.56
	1	255	55.19	47.40	59.74	58.44
ERMscore	0–1	83	17.97	35.71	10.39	7.79
	2–3	230	49.78	58.44	46.11	44.80
	4–6	149	32.25	5.85	43.51	47.40
ERMadvanced	0	313	67.75	94.16	56.49	52.60
	1	149	32.25	5.84	43.51	47.40
Industry						
Utilities	1	48	10.39	10.39	10.39	10.39
Information and communication technology	2	57	12.34	12.34	12.34	12.34
Consumer goods	3	114	24.68	24.68	24.68	24.68
Industrials	4	144	31.17	31.17	31.17	31.17
Health care	5	18	3.90	3.90	3.90	3.90
Consumer services	6	60	12.99	12.99	12.99	12.99
Oil & gas and basic materials	7	21	4.55	4.55	4.55	4.55
N	462					

4. Results

4.1. Descriptive statistics

Table 3 presents descriptive statistics for the dependent and independent variables, divided into continuous (Panel A), binary and categorical variables (Panel B).

Sampled companies present a low operating profitability on average, as mean *ROA* is equal to 1.27%, due to some year-firm observations recording strong negative performance; indeed, median *ROA* is equal to 2.87%. Mean Tobin's Q ratio (*Q*) is slightly higher than 1, signalling the alignment between market evaluation and the replacement cost of assets.

With reference to the test variables, the ICR officer or the CRO is present in just 6.93% of our sample, indicating the small diffusion of the officer in Italy as compared to the US (Desender, 2011). The risk committee is more present, with more than 57% of firms with a dedicated risk committee or an ICR committee. Almost 82% of ICR committees report to the BoD (*RCtoBoD*) at least biannually, as recommended by the Italian CG code. Only 13.42% of firms perform the risk assessment at least twice a year, while more that 64% of companies apply the assessment to levels lower than the overall corporation. 55% of the companies adopt of both qualitative and quantitative methods in the assessment. 32.25% of the sample shows an advanced ERM system, having 4 or more ERM components.

Looking at the ERM development along the 3-year period (Table 3, Panel B), the number of firms appointing an ICR officer or a CRO increases, but remains limited, confirming the novelty of such executive in the Italian context. The number of companies nominating an ICR or risk committee strongly increases from 2011 to 2012, following the enforcement of the new CG code, and are stable in 2013. All risk assessment characteristics significantly improve in 2012. Finally, the number of companies with a sophisticated level of ERM remarkably increases from 6% in 2011 to 43.5% in 2012, confirming the impact of the new Italian CG code on the ERM system.

4.2. Determinants of ERM sophistication

The idea guiding this study is that an integrated approach to RM can positively impact on firm performance. Through the study of *ERMscore* (Table 4, Panel A) and *ERMadvanced* (Table 4, Panel B) variables, some insights into ERM sophistication and its determinants are provided among firms and years. We comment 1-to-1 combinations, matching each stand-alone RM variable to the *ERMadvanced* variable.

Table 4
Determinants of ERM sophistication.

Panel A: One-to-one combinations between RM attributes and *ERMscore*. Years 2011–2013.

*ERMscore**	*CRO*		*RiskCommittee*		*RCtoBoD*		*RAfrequency*		*RAlevel*		*RAmethod*		Total
	0	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	
0	18	0	18	0	18	0	18	0	18	0	18	0	18
1	65	0	55	10	27	38	64	1	55	10	59	6	65
2	96	2	62	36	22	76	95	3	58	40	59	39	98
3	123	9	51	81	14	118	117	15	28	104	63	69	132
4	109	3	11	101	2	110	93	19	3	109	6	106	112
5	19	18	0	37	1	36	13	24	2	35	2	35	37
Total	430	32	197	265	84	378	400	62	164	298	207	255	462

Panel B: One-to-one combinations between RM attributes and *ERMadvanced*. Years 2011–2013.

ERMadvanced	*CRO*		*RiskCommittee*		*RCtoBoD*		*RAfrequency*		*RAlevel*		*RAmethod*		Total
	0	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	
0	302	11	186	127	81	232	294	19	159	154	199	114	313
1	128	21	11	138	3	146	106	43	5	144	8	141	149
Total	430	32	197	265	84	378	400	62	164	298	207	255	462

Panel C: One-to-one combination between *ERMscore* and *ERMadvanced*. Years 2011–2013.

ERMadvanced	*ERMscore*						Total
	0	*1*	*2*	*3*	*4*	*5*	
0	18	65	98	132	0	0	313
1	0	0	0	0	112	37	149
Total	18	65	98	132	112	37	462

Notes.
All variables are defined in Table 2.
**ERMscore* = 6 omitted as none of the sampled companies reaches the maximum *ERMscore*.

In most cases, firms with more sophisticated ERM (*ERMadvanced = 1*) show high reporting frequency between the risk committee and the BoD and are assisted in the risk management activity by a dedicated ICR or risk committee. Moreover, such companies tend to perform the risk assessment procedure at the business unit level or by function and adopting both qualitative and quantitative methods. Conversely, notwithstanding the advanced ERM, firms generally do not appoint a CRO or an ICR officer, nor carry out the risk assessment procedure frequently.

Untabulated year data also reveal that there is a degree of variability on the combination of ERM sophistication components along the period investigated, which finds explanation in the adaptive nature of RM and assessment practices to the companies' characteristics. Both risks outside the company, as well as risk perception inside the company, can have great variability, which is consequently reflected in changes of risk assessment practices adopted by Italian companies.

Further elaborations highlight the association between *ERMscore* and *ERMadvanced* variables (Table 4, Panel C). As underlined above, 32.25% of the sampled companies are characterized by a sophisticated ERM system, with 112 firms presenting 4 ERM components simultaneously and only 37 firms presenting 5 components. No company reaches the maximum score of 6 points. Almost 67% of companies show lower attention to ERM, with scores between 2 and 3 points (98 and 132 cases, respectively) and 5.75% of companies have no ERM components.

4.3. Empirical results

HP 1 to 3 predict that ERM is positively associated with both firm accounting performance and market evaluation. Regression results are reported in Table 5.

To test whether increasing ERM sophistication is associated with accounting performance, return on assets ratio (*ROA*) is set as dependent variable in Equations (1a) and (1b). Among individual ERM components, the coefficient of *RAmethod* is positively and significantly associated with *ROA* (at $p < 0.1$), supporting HP 2c. On the contrary, none of the other ERM components affect firm accounting performance. While these first results signal how the approach to risk appraisal may strengthen the overall ERM system and thus, increase the firm operating performance, they also indicate that the integration of RM into CG alone is not powerful enough to achieve the same purpose. Such results are partially in line with previous literature, which indicates minimal power of risk assessment and CRO appointment in increasing firm's performance (Grace et al., 2015). Dedicated risk officers/committees appear to be inconsequential for performance also in the Italian context. The results seem to validate the idea that the appointment of dedicated RM bodies is just a formal task or a cost bearing activity that does not produce consistent benefits for the company. Differently, more sophisticated techniques of risk assessment seem to have a positive impact on operating performance. Therefore, we can argue that better estimates of risk and its changes lead companies towards better informed strategic and operating decisions, which positively impact on financial results.

With reference to the overall degree of implementation of ERM, the coefficient of the binary variable *ERMadvanced* is positive and highly significant (at $p < 0.01$), revealing a positive relationship between more advanced ERM systems and firm accounting performance. This result supports HP 3 with reference to *ROA*, and highlights how companies with more sophisticated ERM systems record higher operating performance than companies with less evolved systems. In summary, the more integrated ERM initiatives are, the higher is the firm performance.

We also test the effect of ERM implementation on the market performance proxied by Tobin's Q ratio (*Q*). Results of Equations (2a) and (2b) are reported in Table 5, Columns (3) and (4). Among individual ERM components, the coefficients of *RiskCommittee* and *RCtoBoD* are positive (at $p < 0.01$ and $p < 0.1$, respectively), meaning that both the presence of a CG body specifically dedicated to RM and the interaction between bodies in charge of supervising risks and the principal CG body (i.e., the BoD) are perceived as key value drivers by the financial market. Assuming *Q* as a measure of performance, HP 1b and HP 1c are therefore verified. Moreover, the coefficient related to *RAlevel* is positive and significant (at $p < 0.1$), signalling that the development of risk assessment practices at deeper levels affects market evaluation and supporting HP 2b.

These results underline how the financial market positively evaluates the effective implementation of ERM, which is represented by: the appointment of a committee entrusted not just with generic internal control tasks, but with specific RM tasks; the interactions between the RM bodies and the company's directors, as suggested, but not always demonstrated, by previous literature (Beasley et al., 2008; Grace et al., 2015); and, finally, the greater detail with which the risk assessment procedure is carried out, namely at business unit and/or by function instead of considering the whole company as a single object of analysis.

By aggregating all ERM bodies and risk assessment practices and splitting the sample into companies with advanced ERM systems and companies with elementary or absent ERM, we find a positive and highly significant coefficient (at $p < 0.01$), revealing that the market tends to reward companies that engage in more sophisticated ERM systems, as hypothesized in HP 3. This last finding suggests that the aggregated measure of ERM implementation, which takes into account several aspects regarding the holistic approach to RM, stands for a good proxy of ERM maturity and overcomes the limits of the fragmentation when representing the ERM implementation. As a matter of fact, an overall measure for ERM better represent that holistic approach to the issue, which is not completely gathered by single proxies.

Overall, our results suggest that both accounting and market performance are positively affected by the implementation of more sophisticated ERM systems. These findings are meaningful for all the market participants, especially for those Italian

Table 5
Multivariate analysis of ERM sophistication on firm performance using accounting performance (*ROA*) and market performance (*Q*).

	Expected Sign	(1) *ROA*	(2) *ROA*	(3) *Q*	(4) *Q*
CRO	+	−0.2412		0.1380	
		(1.9415)		(0.1517)	
RiskCommittee	+	0.8988		0.0982***	
		(0.9070)		(0.0346)	
RCtoBoD	+	2.3386		0.1042*	
		(1.6146)		(0.0661)	
RAfrequency	+	0.2377		0.0819	
		(1.0926)		(0.1036)	
RAlevel	+	−1.8744		0.0981*	
		(1.3341)		(0.0556)	
RAmethod	+	2.2573*		−0.0257	
		(1.3847)		(0.0553)	
ERMadvanced	+		2.7974***		0.1906***
			(1.0118)		(0.0664)
BoDsize	?	−0.1787	−0.1333	0.0086	0.0103
		(0.2357)	(0.2188)	(0.0134)	(0.0129)
BoDindependence	+	−3.7905	−4.3230	0.3458	0.3708*
		(4.6192)	(4.4111)	(0.2170)	(0.2118)
Size	+	1.6183***	1.6323***	−0.0583***	−0.0521***
		(0.5217)	(0.5293)	(0.0196)	(0.0196)
Leverage	?			−0.0016	−0.0008
				(0.0031)	(0.0030)
ROE	+			0.0004	0.0004
				(0.0003)	(0.0003)
Industry controls		Yes	Yes	Yes	Yes
Constant		−30.9503***	−30.2007***	1.7163***	1.6794***
		(10.2977)	(10.2247)	(0.3585)	(0.3680)
N		462	462	462	462
R^2		0.1793	0.1724	0.2091	0.2008
F		2.2926	3.0223	3.1437	2.8466

Notes.
Results from Equation (1a) in Column (1), (1b) in Column (2), (2a) in Column (3), and (2b) in Column (4).
All variables are defined in Table 2. OLS regression model with standard error clustered by company. Robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

directors and executives who are complaining about the increasing complexity of the RM system (KPMG, 2012). Indeed, they signal that the simultaneous adoption of different ERM components is beneficial for companies, as they record higher operating profitability and are better judged by financial investors. However, accounting and market performance respond differently to different individual ERM components, with *Q* being more reactive than *ROA* when RM integration in CG is concerned. This result signals that investors are able to disentangle the increased attention to RM, as well as to positively evaluate the risk assessment process while the operating performance is higher in companies with more advanced level of ERM as a whole, but is not significantly affected by single ERM components.

With reference to control variables, our findings reveal that firms with more independent BoD (*BoDindependence*) obtain higher market evaluations and that bigger companies tend to report higher operating performance, but lower market value.

5. Additional tests

In this section, we conduct additional analysis to address some issues about the relationship occurring between the ERM system and firm performance, namely risk taking and reverse causality.

5.1. ERM, risk taking, and performance

One claim arising from the extensive literature in the area is that ERM sophistication may reduce companies' risk exposure and, thus, lead to better performance. Indeed, risk reduction may prevent both direct costs (e.g., losses and bankruptcy), and indirect costs (e.g., reputational effects with customers and suppliers) (Baxter et al., 2013; Gordon et al., 2009; Pagach & Warr, 2010). In its turn, risk awareness enhancement may favour operational and strategic decisions (Grace et al., 2015), improving accounting performance.

On the other hand, the reliance on ERM might decrease firm risk-taking to a level that may be perceived as too low by shareholders, reversing the relation between ERM sophistication and market evaluation into a negative one, especially in stable economy times (Ellul & Yerramilli, 2013). Moreover, it still remains unquestioned whether ERM sophistication leads to an increase in firm performance through more, less or no change in firm risk (Nocco & Stulz, 2006).

In light of such concerns, we directly examine the link between ERM sophistication, firm risk, and performance. In detail, we explore whether firms adopting an advanced ERM system (*ERMadvanced* = 1) bear a significantly different risk level compared to companies less committed to RM. We employ two proxies for risk taking: firm leverage (*Leverage*), a common proxy for the likelihood of financial distress (Opler & Titman, 1994; Wilkins, 1997), and systematic risk (*Beta*), which represents the volatility of the stock price given a 1% variation in the overall stock market index and is considered a good risk-taking estimator (Ormazabal, 2010).

To investigate the effects of ERM on firms' risk-taking behaviour, we estimate multivariate OLS regressions assuming the proxies for risk as dependent variable (*Leverage* and *Beta*) and the dummy *ERMadvanced* as test variable. Control variables and model specifications remain unvaried. Results for this additional analysis are shown in Table 6, Panel A.

Empirical evidence collected shows that companies with a sophisticated ERM system present a lower level of risk, in that *ERMadvanced* is negatively and significantly related with both *Leverage* and *Beta*.

After having verified the impact of ERM sophistication on firm risk, we verify whether *ERMadvanced* affects *ROA* and *Q* when companies' risk-taking behaviour (in terms of *Leverage* or *Beta*) is considered. As reported in Table 6, Panel B, the coefficient for *ERMadvanced* remains positive and significant. On the other hand, *Leverage* maintains its negative effect on *Q* and *Beta* its negative effect on *ROA*.

Although some endogeneity concerns on the relationship between risk-taking and ERM sophistication remain (Ellul & Yerramilli, 2013), the above tests corroborate the expectation that effective ERM systems lead to higher accounting and market performance (also) by reducing risk exposure.

Table 6
Additional robustness tests.

Panel A: Multivariate analysis on the effect of ERM sophistication on risk.

$$\boldsymbol{Leverage_{it}/Beta_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10}\beta_j Industry_{it} + \varepsilon$$

	(1) *Leverage*	(2) *Beta*
ERMadvanced	−0.7274**	−0.0431**
	(0.3682)	(0.0198)
BoDsize	−0.1362	0.0051
	(0.1252)	(0.0043)
BoDindependence	1.3667*	0.1794***
	(0.8050)	(0.0643)
Size	−0.1413**	0.0408***
	(0.0621)	(0.0072)
Industry controls	Yes	Yes
Constant	5.2220***	−0.2595*
	(1.8519)	(0.1482)
N	462	437
R^2	0.0215	0.2536
F	1.7984	9.4767

Panel B: Multivariate analysis on the effect of ERM sophistication and risk on alternative measures of firm performance.

$$\boldsymbol{ROA_{it}/Q_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 Leverage_{it} + \beta_3 BoDsize_{it} + \beta_4 BoDindependence_{it} + \beta_5 Size_{it} + \sum_{j=6}^{11}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{ROA_{it}/Q_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 Beta_{it} + \beta_3 BoDsize_{it} + \beta_4 BoDindependence_{it} + \beta_5 Size_{it} + \sum_{j=6}^{11}\beta_j Industry_{it} + \varepsilon$$

	(1) *ROA*	(2) *Q*	(3) *ROA*	(4) *Q*
ERMadvanced	2.8298***	0.1920***	2.0697**	0.1937***
	(1.0167)	(0.0669)	(0.9914)	(0.0719)
Leverage	0.0444	−0.0037**		
	(0.0715)	(0.0019)		
Beta			−13.9532***	−0.0974
			(3.2890)	(0.1650)
BoDsize	−0.1273	0.0097	−0.0897	(0.0133)
	(0.2195)	(0.0129)	(0.1978)	
BoDindependence	−4.3837	0.3651*	−1.2415	0.4144*
	(4.4170)	(0.2107)	(4.4118)	(0.2246)
Size	1.6386***	−0.0504**	2.1741***	−0.0498**
	(0.5324)	(0.0196)	(0.5938)	(0.0215)
Industry controls	Yes	Yes	Yes	Yes
Constant	−30.4326***	1.6545***	−32.9495***	1.6504***
	(10.3445)	(0.3687)	(10.3856)	(0.3749)
N	462	462	437	437
R^2	0.1729	0.1981	0.2264	0.2103
F	2.7958	2.7513	3.7828	2.8213

Notes.
Beta is the systematic risk and corresponds to the Bloomberg item APPLIED_BETA. All other variables are defined in Table 2. OLS regression models with standard error clustered by company. Robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

5.2. Reverse causality between ERM and performance

As extensively discussed by Ellul and Yerramilli (2013), empirical studies that examine the association between ERM and firm outcomes are inevitably subject to endogeneity concerns. Reverse causality is one of such concerns that might affect inferences in this study: indeed, one can argue that more profitable firms can invest more resources in ERM, leading to a positive association between ERM sophistication and firm performance. To mitigate such concern, we test whether firms presenting a higher commitment towards RM (*ERMadvanced* = 1) recorded a significantly higher operating performance in previous year(s) compared to companies with less ERM sophistication. To such extent, firm operating profitability is proxied by ROA ratio, calculated with reference to three different timeframes: the previous year only (*l1ROA*), the average of the previous three years (*l3ROA*), and the average of the previous five years (*l5ROA*). We estimate a probit regression model clustered by firm and control for CG and firm specific factors. Results of the probit regressions are shown in Table 7.

The results clearly demonstrate that the level of ERM sophistication is not influenced by operating profitability in the short term, as *l1ROA* is not significantly associated with *ERMadvanced*. However, there is some evidence that in the medium term different levels of accounting performance make available more or less resources to be invested (also) in designing and performing the ERM system: indeed, the variables *l3ROA* and *l5ROA* are positively and significantly related with *ERMadvanced*[10].

Overall, this empirical evidence demonstrates that ERM sophistication is not extemporaneous and cannot be attributed to just one-year good or bad performance. However, a persistently higher operating performance facilitates the implementation of more advanced ERM practices.

6. Robustness analysis

6.1. Distinction between governance-related and operational ERM measures

To capture the importance of a holistic approach to RM, in the main analysis we have considered both separately and jointly six possible components of a sophisticated ERM system, underlining that they may be distinguished into two categories. Now we study more in detail the impact of each category on firm performance.[11]

Table 7
Multivariate analysis of the effect of past firm performance on ERM sophistication.

$$\boldsymbol{ERMadvanced_{it}} = \alpha + \beta_1 l1ROA_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10} \beta_j Industry_{it} + \varepsilon$$
$$\boldsymbol{ERMadvanced_{it}} = \alpha + \beta_1 l3ROA_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10} \beta_j Industry_{it} + \varepsilon$$
$$\boldsymbol{ERMadvanced_{it}} = \alpha + \beta_1 l5ROA_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10} \beta_j Industry_{it} + \varepsilon$$

	(1) *ERMadvanced*	(2) *ERMadvanced*	(3) *ERMadvanced*
l1ROA	0.0092		
	(0.0078)		
l3ROA		0.0206**	
		(0.0087)	
l5ROA			0.0216**
			(0.0086)
BoDsize	0.0369	0.0366	0.0365
	(0.0264)	(0.0264)	(0.0265)
BoDindependence	0.7090	0.7448*	0.7396*
	(0.4355)	(0.4401)	(0.4380)
Size	0.0224	0.0055	0.0022
	(0.0504)	(0.0510)	(0.0514)
Industry controls	Yes	Yes	Yes
Constant	−1.1189	−0.8061	−0.7277
	(0.9162)	(0.9249)	(0.9368)
N	453	453	453
R^2	0.0731	0.0796	0.0797

Notes.
l1ROA is the percentage ratio of operating income to total assets at the end of the previous year; *l3ROA* is the mean percentage ratio of operating income to total assets of the previous three years; *l5ROA* is the mean percentage ratio of operating income to total assets of the previous five years. All other variables are defined in Table 2.
Probit regression models with standard error clustered by company. Robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

[10] In an untabulated test, we replaced the dependent variable *ERMadvanced* with the variable *ERMscore* and run an ordered probit regression clustered by firm. Results confirm that only along the five-year period firms recording higher performance present a more sophisticated ERM system.

[11] In untabulated tests, to verify whether individual ERM components affect performance when isolated from the components pertaining to the other category, we divided test variables into two sub-samples and run two separate regressions for RM integration in CG and risk assessment practices. All the results are similar to those of the main analysis: when modelling for *ROA*, only the variable *RAmethod* presents a positive and significant coefficient, while *Q* is positively affected by *RiskCommittee* and *RCtoBoD*.

From the *ERMadvanced* variable, we derive other two variables: *CGadvanced*, which summarizes the level of sophistication in RM integration within CG, and *RAadvanced*, which measures the level of sophistication of the risk assessment process. Both variables are binary and equal to 1 if more than half of the ERM category components are present, and 0 otherwise. We run OLS regression models assuming *CGadvanced* and *RAadvanced* as test variables, first separately and then jointly. These tests lead us to understand whether specific ERM characteristics are more directly related to firm performance than others. The results are reported in Table 8, Panels A and B.

When modelling for accounting performance (Panel A), we find that *CGadvanced* is positively and significantly associated with *ROA*, while the coefficient of *RAadvanced* is positive but not significant. This is true if we consider the two independent variables separately, as well as jointly in the same regression model. Such results, therefore, provide some empirical evidence to our claim that integrating RM activities in company's CG is more important. Given the specific duties assigned to dedicated bodies in designing the RM system and presiding over risk identification, and considered their stability over time, integration of RM in CG may obfuscate the contribution of risk assessment to performance.

When modelling for market evaluation (Panel B), the results corroborate the hypotheses: both *CGadvanced* and *RAadvanced* are positive and significantly related with *Q* in separate models, as well as in the overall final model. Such results suggest that investors rely on and positively evaluate RM reinforcement both at CG level and within the risk assessment procedure.

6.2. Alternative measures of firm performance and ERM sophistication

To further validate results obtained by the main regression models, we test the hypotheses changing both the dependent and the independent variables.[12] We replace *ROA* with the return on sales ratio (*ROS*), i.e., EBITDA divided by total revenues.[13] Regression results show that *ERMadvanced* and *RiskCommittee* are positively and significantly related with *ROS*, confirming the robustness of the main test.

Assuming the market-to-book ratio (*MtBratio*) as a substitute for Tobin's Q—and therefore moving from an asset side perspective to an equity side perspective for market evaluation—we find again that *ERMadvanced* and *RiskCommittee* are positively and significantly related with *MtBratio*. Overall, these results provide further evidence on the capability of an integrated approach to RM, which relies on a system of dedicated structures and mechanisms, to improve firm performance both summarised in accounting numbers and perceived by the financial market.

We also create a further proxy for ERM extent of implementation as an ERM rating (*ERMrating*) that is equal to 1 if *ERMscore* is 0 or 1; equal to 2 if *ERMscore* is 2 or 3; equal to 3 if *ERMscore* varies from 4 to 6. We re-run Equation (1b) for accounting performance (*ROA*) and Equation (2b) for market evaluation (*Q*) replacing the *ERMadvanced* binary variable with the *ERMrating* categorical variable. Results confirm that both *ROA* and *Q* tend to increase when *ERMrating* increases and are significantly higher in the third sub-sample (*ERMrating* = 3) compared to the first one (*ERMrating* = 1). Therefore, the results are robust to a change in the definition of the variable used to proxy for the extent of ERM implementation.

6.3. Changes in regulatory framework, RM practices, and performance

In this subsection we deal with possible implications of the change in the Italian regulatory framework and the related change in RM practices— presented in previous section 2.2—on firm performance.

To investigate contingent differences between the pre- and post-reform periods, and given that the last revision of the Italian CG code became effective in 2012, we split the sample and run Equations (1b) and (2b) separately for the years 2011 (pre-reform) and 2012–2013 (post-reform).[14] Regression results are reported in Table 9.

Both with reference to accounting performance and market evaluation, the coefficient of *ERMadvanced* is positive but not significant in 2011, while it is positive and highly significant in the 2012–2013 period. Overall, such results confirm that the higher attention to ERM conveyed by the CG reform in Italy had a positive impact on performance.

7. Conclusions, limitations, and further research

This paper investigates whether the implementation of ERM systems affects firm accounting performance and market evaluation in a sample of Italian non-financial listed companies in the timeframe 2011–2013. As such, it follows a relatively new line of large-scale research investigating whether increased attention towards ERM revealed by the creation of *ad hoc* RM officers and committees and the adoption of certain risk assessment mechanisms affect firm performance. Calls for research in this field of study stem from regulators, practitioners, and academics, and increased both after financial scandals occurred

[12] The results of the sensitivity tests described in this section are displayed in the tables for the sake of simplicity, but are available on request.

[13] As EBITDA does not include estimated expenses such as amortisation, depreciation, and impairment losses, ROS is an accounting ratio less subject to managerial discretion as compared to ROA.

[14] In untabulated analysis, we also verified whether the impacts of single ERM components are different in 2011 compared to 2012–2013. Results show that in 2011 companies assessing risks more deeply (*RAlevel* = 1) and/or adopting both qualitative and quantitative methods for risk assessment (*RAmethod* = 1) obtain higher *ROA* than the others. In contrast, in the period 2012–2013, only the coefficient of *RiskCommittee* is positively and significantly associated with *ROA*. *Q* is not affected by individual ERM components in 2011, while in the 2012–2013 period it is positively associated with *RAlevel*.

Table 8
Additional multivariate analysis.

Panel A: The effects of the two sub-components of ERM sophistication on accounting performance.

$$\boldsymbol{ROA_{it}} = \alpha + \beta_1 CGadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{ROA_{it}} = \alpha + \beta_1 RAadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{ROA_{it}} = \alpha + \beta_1 CGadvanced_{it} + \beta_2 RAadvanced_{it} + \beta_3 BoDsize_{it} + \beta_4 BoDindependence_{it} + \beta_5 Size_{it} + \sum_{j=6}^{11}\beta_j Industry_{it} + \varepsilon$$

	(1) *ROA*	(2) *ROA*	(3) *ROA*
CGadvanced	1.5960*		1.3951*
	(0.8452)		(0.8493)
RAadvanced		1.5910	1.3821
		(1.0626)	(1.0571)
BoDsize	−0.1380	−0.1047	−0.1361
	(0.2175)	(0.2172)	(0.2167)
BoDindependence	−4.1778	−3.4983	−3.9469
	(4.4979)	(4.4447)	(4.5278)
Size	1.6817***	1.6061***	1.6210***
	(0.5408)	(0.5278)	(0.5276)
Industry controls	Yes	Yes	Yes
Constant	−30.5753***	−29.9142***	−30.2889***
	(10.3775)	(10.2643)	(10.2588)
N	462	462	462
R^2	0.1633	0.1631	0.1674
F	2.9571	2.8353	2.7207

Panel B: The effects of the two sub-components of ERM sophistication on market evaluation.

$$\boldsymbol{Q_{it}} = \alpha + \beta_1 CGadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} + \beta_6 ROE_{it} + \sum_{j=7}^{12}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{Q_{it}} = \alpha + \beta_1 RAadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} + \beta_6 ROE_{it} + \sum_{j=7}^{12}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{Q_{it}} = \alpha + \beta_1 CGadvanced_{it} + \beta_2 RAadvanced_{it} + \beta_3 BoDsize_{it} + \beta_4 BoDindependence_{it} + \beta_5 Size_{it} + \beta_6 Leverage_{it} + \beta_7 ROE_{it} + \sum_{j=8}^{13}\beta_j Industry_{it} + \varepsilon$$

	(1) *Q*	(2) *Q*	(3) *Q*
CGadvanced	0.1625***		0.1468***
	(0.0416)		(0.0404)
RAadvanced		0.1291**	0.1069*
		(0.0635)	(0.0624)
BoDsize	0.0085	0.0121	0.0087
	(0.0129)	(0.0130)	(0.0129)
BoDindependence	0.3656*	0.4302**	0.3827*
	(0.2139)	(0.2151)	(0.2140)
Size	−0.0486**	−0.0550***	−0.0532***
	(0.0196)	(0.0199)	(0.0199)
Leverage	−0.0023	−0.0010	−0.0016
	(0.0030)	(0.0029)	(0.0030)
ROE	0.0003	0.0004	0.0003
	(0.0003)	(0.0003)	(0.0003)
Industry controls	Yes	Yes	Yes
Constant	1.6461***	1.7055***	1.6649***
	(0.3649)	(0.3728)	(0.3683)
N	462	462	462
R^2	0.1976	0.1894	0.2062
F	3.3695	2.7611	3.0554

Notes.
CGadvanced is a dummy variable equal to 1 if at least two ERM components indicating risk management integration within CG bodies (i.e., *CRO*, *Risk-Committee*, *RCtoBoD*) are present, and 0 otherwise. *RAadvanced* is a dummy variable equal to 1 if at least two ERM components indicating risk assessment procedure (i.e., *RAfrequency*, *RAlevel*, *RAmethod*) are present, and 0 otherwise. All other variables are defined in Table 2.
OLS regression models with standard error clustered by company. Robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

all around the world and throughout the current economic crisis. Moreover, focusing on the Italian context, the study moves the attention from the US to a European country that, like the US, has been plagued by corporate scandals, followed by a number of regulatory interventions stressing the crucial role of RM in the CG system. But, it is characterized by smaller firms and capital market, and weaker investor protection as compared to the US, which makes it an alternative context of study.

By measuring the extant of ERM sophistication as the simultaneous adoption of different ERM components, which are identified from guidelines and best practices, the study discriminates between companies with sophisticated ERM and companies with basic or lacking ERM. To such purpose, ERM integration in CG is investigated, considering the appointment of an ICR officer or a CRO, the presence of an ICR committee or a risk committee, and the reporting frequency of the ICR committee to the BoD. Moreover, the study takes into account ERM operating mechanisms like the risk assessment frequency,

Table 9
Multivariate analysis of ERM sophistication on firm performance in different sub-periods.

$$\boldsymbol{ROA_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \sum_{j=5}^{10}\beta_j Industry_{it} + \varepsilon$$

$$\boldsymbol{Q_{it}} = \alpha + \beta_1 ERMadvanced_{it} + \beta_2 BoDsize_{it} + \beta_3 BoDindependence_{it} + \beta_4 Size_{it} + \beta_5 Leverage_{it} + \beta_6 ROE_{it} + \sum_{j=7}^{12}\beta_j Industry_{it} + \varepsilon$$

	Expected sign	(1) *ROA 2011*	(2) *ROA 2012–2013*	(3) *Q 2011*	(4) *Q 2012–2013*
ERMadvanced	+	0.6784	4.1523***	0.0987	0.1605*
		(3.5527)	(1.3590)	(0.1496)	(0.0861)
BoDsize	?	−0.2255	−0.1134	0.0050	0.0130
		(0.2946)	(0.2420)	(0.0125)	(0.0152)
BoDindependence	+	2.7855	−7.6381	0.3481*	0.3799
		(4.5750)	(4.7956)	(0.1926)	(0.2601)
Size	+	1.5363***	1.6620***	−0.0414*	−0.0543**
		(0.5425)	(0.5198)	(0.0228)	(0.0215)
Leverage	?			0.0045	−0.0027
				(0.0082)	(0.0029)
ROE	+			0.0005	0.0004
				(0.0005)	(0.0004)
Industry controls		Yes	Yes	Yes	Yes
Constant		−30.2575***	−30.2766***	1.6114***	1.6748***
		(10.3856)	(10.0078)	(0.4374)	(0.4099)
N		154	308	154	308
R^2		0.1314	0.2273	0.1538	0.2146
F		2.1636	3.3292	2.1349	2.7754

Notes.
All variables are defined in Table 2. Results in Columns (1) and (3) are determined by an OLS regression model, while results in Columns (2) and (4) are determined by an OLS regression model clustered by company. Robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

depth, and methodology. The analysis demonstrates that companies with more sophisticated ERM systems are both more profitable and better evaluated by financial markets, and this result is robust after several tests to control for different periods, practices and performance measures. On the contrary, companies with rudimentary or no ERM systems are found to be less profitable and less appreciated by investors, thereby demonstrating that an incomplete adoption of ERM components has minimal or no effect on firm performance. Several additional tests reject an array of criticisms about the possibility that ERM sophistication is undermined by mere formalisms or higher implementation costs. Indeed, such tests confirm how companies with sophisticated ERM systems have lower firm risk, and better performance, suggesting that ERM systems contribute to improve operational and strategic decisions and to reduce direct and indirect costs of risks. Moreover, the study mitigates the concerns about the reverse causality between ERM sophistication and performance, demonstrating that only in the medium term companies with better performance are also able to design more sophisticated ERM systems.

By detecting the positive effects of RM sophistication on both accounting and financial market performance of Italian listed companies, this research provides several contributions to the literature on ERM and firm performance in a new context. Firstly, the study adds to the contradicting arguments on the relationship between ERM systems and their impacts on firm's performance, by arguing that this relation is positive when ERM systems reach sophisticated levels. Secondly, it provides new insights on ERM effectiveness in alternative and under-investigated contexts, and specifically in Italy, where it offers an innovative approach, being the first empirical analysis on a large dataset. Thirdly, it may be of support to accounting and market institutions and organizations that are addressing new RM guidelines and requirements in contexts similar to Italy. Finally, it offers new insights on the determinants of the ERM sophistication, among the many components, which are said to foster an integrated and holistic approach to RM. In particular, it demonstrates the importance of the overall integration of RM tasks in CG and of the quantitative methods of risk assessment for ERM implementation. The study is not free from limitations, which also suggest new room for further research on the relationship between ERM and performance. Firstly, like large-sample empirical research, the study provides compelling evidence on whether and how certain characteristics of ERM affect firm performance, rather than on the actual implementation of ERM practices and firm performance (Mikes & Kaplan, 2013). In this regard, we believe a continuous interaction between large-sample archive research, surveys and in-depth case studies would be beneficial to improve the knowledge on company behaviour towards ERM. Secondly, although grounded in previous literature and authoritative practice guidance on RM, the factors selected to define ERM are somewhat discretionary and represent just some possible ERM components. For example, we limit the analysis to the presence of a CRO and a risk committee: further analysis may focus on their specific characteristics, e.g., CRO centrality, risk committee experience, and meetings frequency. Moreover, depending on data sources available and the context of reference, further investigations may proxy for ERM sophistication by making reference to all the 13 elements of the ERM system by COSO (2004), as well as, to the 'ERM mix' proposed and discussed by Mikes and Kaplan (2013). Thirdly, for ERM proxies, we relied on the disclosures provided by companies in their CG reports. Although it is reasonable to expect that firms with advanced ERM systems are willing to signal this circumstance to the market, disclosure may be incomplete and sometimes not clear enough. Finally, future research may extend this investigation to other countries with different CG systems, both within and outside Europe, to detect differences and similarities in the consequences of ERM implementation.

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