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The influence of Business strategy and Ownership on Management accounting innovations and Risk management techniques: An empirical analysis in large manufacturing companies in Italy

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The influence of Business strategy and Ownership on Management accounting innovations and Risk management techniques: An empirical analysis in large manufacturing companies in Italy[1]

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ABSTRACT

Purpose – This research aims to explore possible relations between firms characteristics, such as business strategy and ownership patterns as contextual contingent factors, and innovative Management Accounting (MA) and Risk Management (RM) techniques.

Methodology/approach – The paper is based on a questionnaire survey. The survey was completed by Chief Financial Officer (CFO) and Chief Executive Officer (CEO) of Italian manufacturing large companies. The sample is selected from the data set (479 firms) obtained by Industrial, Commerce and Agriculture Confederation (CCIA). The data set captures all the Italian companies and it includes companies listed on the Milan Stock Exchange.

Findings – The results of the statistical analysis show that our expectation of a significant relationship between prospectors business strategy and integrated Sophisticated Management Accounting (SMA) was not supported by the data. In addition, the results show that our expectation of a significant relationship between prospectors business strategy and Sophisticated Risk Management (SRM) was not supported by the data. In conclusion, the use of SRM techniques is not influenced by business strategy in large companies in Italy. Finally, the results show that our expectation of a significant relationship between listed firms and SRM was supported by the data. In particular, tests highlight that there is a significant relationship between listed firms and non-probabilistic risk assessment techniques.

Research limitations – In reflecting upon the results, we recognize that specific research limitations might reduce their generalization, especially the number of statistical observations.

Originality/Value of paper – The paper contributes to the contingency theory research by considering innovative Management Accounting, rather than concentrating on traditional issues such as modern cost measurement, and by incorporating a number of Risk Management techniques (probabilistic and non-probabilistic) to understand corporate practices.

Key words: Business strategy; Ownership patterns, Contingency theory, Management accounting innovations; Risk management.

1. Introduction

Global competition characterised the contemporary manufacturing environment. Understanding the determinants of the prosperity of manufacturing firms is needed. This effort required contribution from many disciplines. Some commentators (e.g. Banker et al., 1993) suggest that firms have responded to these challenges by implementing Innovative Managerial Practices (IMPs), investing in Advanced Manufacturing Technologies (AMT) and emphasising products innovation, products quality, delivery and flexibility in order to meet customer needs. In parallel with these changes, many firms introduced innovative Managerial Accounting (MA) techniques. As suggested by Abdel-Kader and Luther (2008, p. 3) "these new accounting techniques have been designed to support modern technologies and new management processes, such as Total Quality Management (TQM) and Just-In-Time (JIT) production systems, in the search for competitive advantage to meet the challenge of global competition". The literature reviewed in this paper suggests that innovative MA, as sophisticated MA that produces information for managers within an organization, can play a critical role in this challenge by deemphasizing short-term financial measures (information) and developing non-financial measures of manufacturing performance that are more coherent with long-term competitiveness and profitability (Kaplan, 1983). More importantly, it is well accepted that "monitoring performance and indeed the planning of performance may be improved if non-financial information is utilised together with financial information" (Bromwich and Bhimani, 1994, p. 12).

The development of the global markets in the last years with the 2008 crisis, that presents an incremental challenge, stresses Risk Management (RM) as a critical factor for the success of manufacturing firms. "The combination of extensive financial volatility, rapid technological change and the impacts of the force of globalisation has produced a climate of extreme change and risk" (Bhimani and Bromwich, 2010, p. 95). Management accounting and control researchers have advanced different RM models (e.g. Mikes, 2009). One interesting observation is that RM is being approached from different angles. An important angle "is looking at Enterprise Risk Management (ERM) and how it is deployed in organizations. ERM are triggered by regulation, shareholder's demands, and business competitiveness. These systems combine quantitative approaches to evaluate and manage risk exposure traditional of the financial word with qualitative approaches that emphasize sensitivity toward risk and ethical criteria decision making" (Davila, 2012, p. 79).

Our paper contributes to the contingency theory research by considering innovative MA, rather than concentrating on traditional issues such as modern cost measurement, and by incorporating a number of RM techniques (probabilistic and

non-probabilistic) to understand corporate practices. Two groups of firms characteristics, such as business strategy and ownership patterns, are examined as contextual contingent factors that could affect innovative MA and RM techniques in large Italian companies.
The paper comprises six sections. First, we review the relevant literature on contingency theory in management accounting and risk management, innovative MA models, and RM models. Section three develops the hypotheses on the basis, either implicitly or explicitly, of the existing literature. Section four describes the research design. Section five reports the statistical analysis and analyzes the associations between dependent and contingent variables. Final section draws conclusions from the analyses and relates them to the literature.

2. The literature

2.1 Contingency theory

Since our research aims to explore possible relations between firms characteristics, such as business strategy and ownership patterns as contextual contingent factors, and innovative MA and RM techniques, our methodological approach is based on contingency theory. In this section, therefore, we focus on the contingency theory of management accounting and risk management.
"The contingency theory of management accounting represents an attempt to identify the most appropriate (accounting-based) control system for a given set of circumstances" (Otley, 1995, p. 52). However, as suggested by Gerdin and Greve (2004, p. 303), "contingency theory in the accounting control area has for long time been criticized for being fragmentary and contradictory as results of methodological limitation". Although the approach used by contingency theory studies is limited, the extensive research signals its importance. For Tillema (2005, p. 103) "the question of which contingency factors influence the level of sophistication of an organization's management accounting systems (MAS) has received considerable attention in the literature".
In more recent years, the contingency perspective of risk management is suggested by a stream of empirical research investigating the factors that influence ERM. Gordon et al. (2009, p. 303) observe that "the contingent view of enterprise risk management systems is consistent with the literature that examines the more generic notion of management control systems". Further, Mikes and Kaplan in their working paper (2013) outline a "minimum necessary contingency framework" which advocates to stop treating ERM as a one-dimensional variable. They propose to

unpack the “ERM mix” into its components (processes for identifying, assessing and rolling up risks; risk tools; linkage to other MCS; the roles of risk function).

A brief overview of researches that have a relevance for this study is presented below.

Chenhall and Langfield-Smith (1998) examined management accounting practices and performance with different strategic priorities. They found that product differentiation strategies with high performance were associated in particular with team-based structures and employee-based measures. While, low price strategies were associated with activity-based techniques and manufacturing system innovation.

Anderson and Lanen (1999) examined the relationship between competition and management accounting practices. They found a change in management accounting practices whether the firms were domestic or international and whether they implemented prospector or defender strategies.

Abdel-Kader and Luther (2008) examined the relationships between firm characteristics (external, organizational and processing) and the factors that explain MAS sophistications. They found that “differences in MA sophistication are explained by environmental uncertainty, customer power, decentralization, size, AMT, TQM, and JIT”. While, the relationship between competitive strategy and MA sophistication was not supported.

Mikes (2009) includes business strategy in a set of contingency variables influencing risk management practices. In her investigation focused on two banks, she suggested that variations in the use of risk management mixes are associated also to different business strategies.

Kleffner, Lee and McGannon (2003) employed a set of firm characteristics in order to examine the difference between ERM firms and non-ERM firms. They found no significant differences between listed and non-listed firms regarding whether they were using ERM, although evidences indicated that “compliance with Toronto Stock Exchange Guidelines was an important consideration in adopting ERM”.

Paape and Speklè (2012) examined the association between a number of internal and external factors (regulatory influences, internal influences, ownership, auditor influence, firm and industry-related characteristics) and “the level of development of ERM practices across organizations”. They found that listed firms have more mature ERM systems.

2.2 Management Accounting development model

Management Accounting (MA), in contrast with financial accounting, produces internal reporting to help the work of managers within an organization. “It is

primarily concerned with the process of identifying, measuring, accumulating, analyzing, preparing, interpreting and communicating information that aims to help managers to pursue organizational objectives" (Bhimani et al., 2012, p. 3).

A statement by International Federation of Accountants (IFAC, 1998) explains the development of MA in four sequential stages. In the first stage, prior to 1950, the focus of MA was on cost determination and financial control. In the second stage, in the 1950s and 1960s, the focus of MA expanded to include provision of information for planning and control purposes. MA, as part of management control systems, tend to be reactive only when there are deviations from the plan (Langfield-Smith, 1997; Abdel-Kader and Luther, 2008). So, the management controls were oriented toward manufacturing (internal factors) rather than strategic and environmental aspects.

The focus of MA in its third stage of evolution, as a consequence of world recession in the 1970s and global competition in the early 1980s, shifted toward "reduction of waste in business resources". The global competition was accompanied by investments in Advanced Manufacturing Technologies (AMT) in order to improve products quality and flexibility and, in some cases, to reduce costs. With this change the traditional financially based performance measurement systems were insufficient. The challenge for a new MA for accounting researchers was to develop financial information together with non-financial measures of performance to support the managers (Kaplan, 1983). The development of Activity-Based Costing (ABC), in the late 1980s, captures the cost behaviour pattern changing. The introduction of the Balanced Scorecard (BCS), in the early 1990s, focuses on causality between different strategic objectives and strategy maps.

The focus of MA in its fourth stage of evolution shifted toward "creation of value through effective resource use". The focus of MA incorporated a new set of conditions. In the 1990s the challenge of global competition continued to increase and in parallel the business environment presented a high uncertainty. In this context value creation is an integral part of corporate governance in contemporary organizations. The development of new metrics, such as Economic Value Added (EVA), captures value creation better than traditional accounting measures like earning (Bouwens and Speklè, 2007).

The framework, with its limitations, provides a good view of MA evolution to classify its sophistication. "We interpret the fourth stage of MA development as fourth level of sophistication of MAS. The first stage represents a lack of sophistication and the fourth stage is the highest level of sophistication" (Abdel-Kader and Luther, 2008).

The fourth stage of MA development can also be useful to analyze management accounting innovation. As suggested by Ax and Bjørnenak (2007, p. 358) "we see management accounting innovations as a set of design characteristics, such as the type of cost object (e.g. products, customers), allocation bases (e.g. non-volumes

related cost drivers), or data (financial or non-financial). For example, ABC can be seen as a combination of a set of cost objects and allocation bases".
Following the literature reviewed (e.g. Chenhall and Langfield-Smith, 1998; Ax and Bjornenak, 2007) this paper identifies as relevant MA innovations: Activity-Based Costing (ABC); Balanced Scorecard (BSC); Economic Value Added (EVA) and incorporates a number of contemporary management accounting practices (MAPs) such as budgeting for long term plan, target costing, strategic costing, life cycle costing, customers profitability analysis, evaluating the risk of major investment projects using probability analysis, benchmarking. Further, the study comprises (ten) non-financial measures that "have attained greater theoretical prominence since the promotion of the balanced scorecard" (Abdel-Maksoud, Dugdale and Luther, 2005).

2.3 Risk management model

Risk management has become an important topic in the last decade (Olson and Wu, 2008), and the interest has intensified in the aftermath of 2008 crisis and other corporate disasters (Mikes and Kaplan, 2013). Risk management is gaining increasing attention as a critical aspect of management control system in academic literature, while, in the context of corporate governance, risk issues are influencing regulatory frameworks and organizational policies at a growing extent (Bhimani, 2009).
Risk refers to the effect of uncertain events, where the effect is knowable by probability distributions (Knight, 1921). Risk management concerns "timely identification, assessment and management of the portfolio of risks faced by an entity" and their link with the achievement of entity objectives (Subramaniam, Collier, Phang and Burke, 2011, p. 133).
In recent years, in a dynamic global environment, "a paradigm shift has occurred in the way organizations view risk management" (Gordon, Loeb and Tseng, 2009, p. 1). In particular, there has been a tendency to move from a "silo-based" approach toward an enterprise-wide approach (ERM), characterized by an integrated or holistic view of risks (Olson and Wu, 2008).
In the "silo-based" approach, which is the traditional risk management approach, individual categories of risks are managed independently in separate units or functional areas ("silo") within the firm (Altuntas, Berry-Stöltle and Hoyt, 2011). The silo-based approach is grounded on a disaggregate method of manage risks.
On the other hand, as suggested by Liebenberg and Hoyt (2003), ERM addresses each of the categories as a part of firm risk portfolio, that is managed holistically at a company-wide level. For Dickinson (2001) ERM is a systematic, integrated approach to managing all risks facing an organization.

A definition of ERM has been established by the Committee of Sponsoring Organizations of the Treadway Commission (CoSO, 2004, p. 2): "Enterprise risk management is 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 risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives".

As the CoSO definition suggests, the event identification is a critical part of the ERM process. It has the scope to provide a sample listing of potential events affecting the achievement of objectives (CoSO, 2004). Some organizations find it helpful to group significant events in categories (IMA, 2007). Simons (1999), in recognizing events or conditions that can reduce the ability of managers to implement their business strategy, provides four types of risk categories: operations risk, asset impairment risk, competitive risk and reputation risk.

Another key element in ERM is risk assessment, which has the aim to estimate likelihood and impact of a potential event on the achievement of objectives. Likelihood is the possibility that a given event will occur. Impact refers to the extent to which a risk event might affect the enterprise (CoSO, 2012). A set of techniques may be used in assessing risks.

Mikes (2009) proposes four ideal types of ERM, which differ according to institutional background, main purposes and applied techniques of risk assessment: risk silo management, integrated risk management, risk-based management, holistic risk management. She shows that in a given organization ERM ideal types are mixed, depending on top managerial attitude (calculative culture) towards risk quantification.

Despite the importance of risk assessment techniques, literature paid little attention to the use and significance of specific techniques in firms. Drawing on CoSO framework, in this study we consider a set of risk assessment techniques with different degrees of sophistication (DeLoach, 2000).

3. Development of hypotheses

3.1 Business strategy

Since the 1970s, a number of business strategic typologies have been advanced in the literature (Simons, 1990). These typological classifications can not encompass every form of organizational behaviour, because its complexity and changeability. Nevertheless, they could be useful for research purposes in order to predict the behaviour of an organization given its typological classification. For Langfield-Smith

(1997) the most frequently used in the contingency research are those by Miles and Snow (1978), Porter (1980), Miller and Friesen (1982), Gupta and Govindarajan (1984).

This research paper uses the Miles and Snow (1978) strategic typology because it is more useful to investigate the relationship between business strategy and MA or RM.

Miles and Snow (1978) identify four business strategy typologies (defenders, prospectors, analyzers and reactors) using the rate of change in products or markets. Defenders operate in a relatively stable context, characterized by a limited product-market range and narrow product innovation. They compete through high quality, pricing, customer service, and pay attention to efficiency emphasizing cost control. Prospectors operate within a dynamic product-market domain, and continually search for new product and market opportunities. They adopt more flexible and broad scope MA. Analyzers combine the strengths of both defenders and prospectors offering a limited set of cost-efficient products and move out of it only after the viability of new products-markets has been demonstrated. Reactors are an unsuccessful organizational type. They are not aggressive in defending their product-market domain, nor are willing to take new risks.

In this research paper we consider only prospector and defenders, because they are the most important typologies of business strategy.

The relationship between business strategy and MA sophistication were not supported by the results of Abdel-Kader and Luther (2008) research, while some authors (e.g. Callahan and Gabriel, 1998; Ittner and Larcker, 2001, Chenhall, 2003) suggest that prospector strategy leads to the adoption of MA innovations.

Anderson and Lanen (1999) found a change in management accounting practices whether the firms implemented prospector or defender strategies.

By using Porter (1980) strategic typology, Chenhall and Langfield-Smith (1998) argue that firms emphasizing product differentiation (as prospectors) place a strong emphasis on MA innovations based on a variety of contemporary practices including balance performance measures, benchmarking and activity-based techniques. Baines and Langfield-Smith (2003) agree with these results.

Focusing, in particular, on activity-based techniques and building on the Miles and Snow (1978) typology, Gosselin (1997) finds that there is a positive relationship between MA innovations as Activity Management and prospector strategy.

These considerations lead to the following hypothesis:

H1: A prospector strategy in large firms is positively associated with MA innovations and the adoption of non-financial measures.

Epstein and Rejc (2005) consider business strategy as an input of risk management process, and underline how firms expanding to new markets and developing new products affect the design of RM.
Mikes (2009) includes strategy as a contingency variable affecting risk management practices. In her case study (2009), she contrasts two ERM models. A conservative (defender) business strategy is associated with quantifiable risks (ERM by the numbers), while an entrepreneurial (prospector) business strategy is associated with quantifiable as well as non-quantifiable risks (holistic ERM). Holistic ERM requires both probabilistic risk assessment techniques and non-probabilistic risk assessment techniques.
For DeLoach (2000), the sophistication of risk assessment techniques is driven by the complexity of the environment also in terms of number of risks. He attributes to probabilistic models the higher degree of sophistication, and a high or moderate degree of sophistication to non-probabilistic models such as scenario analysis or sensitivity analysis.
According to Miles and Snow (1978), prospectors typically perceive more environmental change and uncertainty than defenders, and prospector strategies are inherently riskier than other strategies (Luo, Tan and O'Connor, 2001).
These considerations lead to the following hypothesis:

H2: There is a positive relationship between sophisticated risk assessment techniques and prospector strategy.

3.2 Ownership patterns

The problem of the relationship between risk management and ownership patterns concerns the demands of regulators and legislation, which are a driver of risk management practices and exert influence on the methods adopted for risk management (Collier, Berry and Burke, 2006).
As Paape and Speklè (2012, p. 538) notice, "in many countries, regulators are pressing firms to improve risk management and risk reporting". The pressure to improve risk management is linked to requirements of corporate governance and is largest for listed firms. In fact, for listed firms the compliance with the requirements of corporate governance codes is typically mandatory. In Italy, the Committee for Corporate Governance promoted by Italian Stock Exchange published on December 2011 a revised code of corporate governance (Code of Self-discipline), in which firms are encouraged to measure risks. Bozzolan (2004) outlines that the adoption of sophisticated risk assessment techniques may be necessary if required by an external pressure (e.g. regulatory).

Berg and Westgaard (2012), in their analysis based on a sample of Norwegian power companies and banks, propose that regulation has enhanced ERM.
Kleffner, Lee and McGannon (2003), in a study on the use of ERM by Canadian firms, found no differences between listed and non-listed firms in terms of propensity to use ERM, while Paape and Speklè (2012), using data from 825 organizations in the Netherlands, demonstrated that listed firms have more fully developed ERM systems than non-listed firms.
These considerations lead to the following hypothesis:

H3: Sophisticated risk assessment techniques are more important in listed firms than in non-listed firms

4. Research design and data collection

The research is based on primary data. Information are collected by a self-compiled questionnaire.

The method

The survey was completed by Chief Financial Officer (CFO) and Chief Executive Officer (CEO) of Italian manufacturing large companies. The sample is selected from the data set (479 firms) obtained by Industrial, Commerce and Agriculture Confederation (CCIA). The data set captures all the Italian companies and it includes companies listed on the Milan Stock Exchange.
In the first phase a letter of participation was sent by mail to CEO and CFO of the 179 companies included in the sample. The names and addresses were noted from the websites of the firms. Of the 179 letters of participation sent there were 70 responses with a response rate of 39.1%. Of these ones, 12 (6.7%) were negative for different reasons. The remaining 58 responses were positive, giving a positive response rate of 32.4% of all questionnaires sent (table 1).

Table 1. Analysis of the responses of the Sample Firms

Number of participation letters sent		179
Number of questionnaires sent	70	
Positive responses	58	
Negative responses	12	

In a second phase, the questionnaires were sent by e-mail[2] to the firms with positive responses. The survey was completed via web by the CFO or CEO.
In Italy this positive response rate was favourable in comparison with previous surveys on management accounting[3].
The questionnaire consists of four sections: Information on firm characteristics, pressures from business environment and business strategies implemented by listed and non-listed in large manufacturing firms, impact of the business strategy on management accounting innovations, influence of the business strategy on risk management techniques.
The questionnaire was pilot tested with eight Chief Risk Officer (CRO) or CFO operating in different sectors. Pilot testing included face to face meeting with semi-structured interviews.
The objective of the questionnaire was to determine the impact of firms characteristics, such as business strategy and ownership patterns, on MA innovations and the adoption of different levels of Sophistication of Risk Management (SRM).

Methodologies of data analysis

Respondents were asked to indicate their perceptions by answering five point Likert scale.
We were also concerned with possible non-response bias in the responses. Collected data present a structure similar to the designed sample with regard to manufacturing sectors.
The statistical test[4] used in this study is the Wilcoxon Test (a mean comparison non-parametric test) (Hollander and Wolfe, 1999). In the results the P-value of tests was shown. A 10% significance level was used.
For the sample selection we consider the hypothesis of missing at random.

5. Survey results

5.1. Classification of responding companies

This study is based on a final sample of 58 large Italian companies. Table 2 presents statistics regarding types of strategic decisions adopted by the surveyed companies.

[2] Copy of the questionnaire is available from the authors on request.
[3] For example, in the study of Cinquini et al. (1999) on cost accounting practices in Italian large and medium size manufacturing firms the response rate was 11.6%.
[4] All the results (with statistical analysis) were carried out using the R software (version 15.2).

Respondents were asked to indicate three strategic decisions on a range which mixes both prospector and defender strategy characteristics (Miles and Snow, 1978). The table reports that 72.41% of companies focus on high quality products, while more than half address to the introduction of new markets. The lower percentages are associated to prompt delivery and limited range of products.

Table 2 – Types of strategic decisions

	n	%
High quality products	42	72.41%
Low cost production	3	5.17%
Low prices	12	20.69%
Quick changes in product design and introduction of new products	17	29.31%
Quick changes in product mix	11	18.97%
Prompt delivery	1	1.72%
After-sales customer service	13	22.41%
Customize products	18	31.03%
Limited range of products	1	1.72%
Introduction of new markets	31	53.45%
Product/market flexibility	28	48.28%

According to the strategic decisions they selected, the large firms were classified in two groups of business strategy (BS): prospector BS (those adopting introduction of new markets, quick changes in product design and introduction of new products, quick changes in product mix, prompt delivery, customize products, product/market flexibility) and defender BS (those adopting high quality products, low cost production, low prices, after-sales customer service, limited range of products)[5].
Table 3 summarizes the number and the percentage of each group of business strategy and ownership patterns. The sample comprises 39 large companies with a prospector BS, 16 defender BS and 3 firms that cannot be classified as prospector BS or defender BS. If we classify the firms in the two groups of ownership patterns, there are 33 non-listed and 25 listed on the Milan Stock Exchange.

Table 3 – Categories of business strategies and ownership patterns

	Ownership patterns		
Business strategy	**Listed companies**	**Non-listed Companies**	**Total**
Prospector	16	23	**39**
Defender	7	9	**16**
Other	2	1	**3**
Total	**25**	**33**	**58**

[5] The classification of prospector BS and defender BS is in accordance with Kober, Ng and B. J. Paul (2007).

5.2. Categories of business strategy and innovative MA

Table 4 summarizes responses on innovative MA considering financial and non-financial information. Mean and standard deviation are displayed separately for each innovative MA and for the two groups of business strategy (prospectors and defenders). The results of statistical analysis (one-sided Wilcoxon test) are also presented, with the aim to understand whether prospector strategy affects innovative MA, as an integrated sophisticated management accounting (SMA), with financial and non-financial information.

Table 4 – A comparison of innovative MA for the two groups of business strategy

	Prospector (n = 39)		Defender (n = 16)		Wilcoxon	
	Mean	SD	Mean	SD	test	P-value
Financial measurements						
Economic value added, EVA	2.92	1.36	3.00	1.37	321.5	0.576
Balanced scorecard, BSC	2.54	1.14	3.19	0.83	420.0	0.981
Budgeting for long term (strategic) plan	3.82	1.07	4.00	0.73	331.0	0.649
Activity based costing, ABC	2.67	1.03	2.62	1.31	302.5	0.431
Target costing, TC	3.49	0.88	3.31	1.08	283.5	0.291
Strategic costing, SC	3.00	1.17	2.56	1.09	237.5	**0.076**
Life cycle costing, LCC	2.49	1.25	2.62	1.20	335.0	0.673
Benchmarking	3.59	0.97	3.37	0.72	265.0	0.178
Customer profitability analysis, CPA	3.51	1.23	3.37	1.02	285.0	0.305
Evaluating the risk of major investment projects using probability analysis	3.10	1.29	3.06	1.34	306.5	0.462
Non-financial measures						
Number of set-ups (% batches)	2.38	1.09	2.56	1.03	345.5	0.743
Manufacturing cycle efficiency	3.33	1.06	3.44	0.89	335.5	0.683
Defects (% of total production)	3.49	1.10	3.75	0.68	350.0	0.779
Efficiency (standard hours produced/hours worked)	4.00	0.83	3.75	1.00	270.5	0.206
Capacity utilization (hours worked/hours budgeted)	3.72	0.76	3.62	1.02	301.5	0.421
Schedule adherence (%)	3.33	1.01	3.31	0.60	298.5	0.399
On-time delivery to customers	3.82	1.00	4.00	0.73	334.0	0.670
Proportion of overtime worked	2.85	1.01	3.06	0.77	355.0	0.807
Number of complaints from customers	3.49	1.14	3.87	0.81	373.0	0.884
Number of customer returns	3.00	1.32	3.00	1.32	313.0	0.511

P-values of the test show that there are no statistically significant differences between prospector and defender business strategies related to innovative MA as an integrated SMA. However, there is a relationship between strategic costing and

prospector strategy (p-value = 0.076). Therefore, the first hypothesis (H1) is rejected with the exception of strategic costing. This research result confirms the UK-based empirical findings of Abdel-Kader and Luther (2008), who argued that the relationship between competitive strategy and MA sophistication was not supported by the data.

5.3. RM process formalisation

A theme in the recent literature is RM. In theory, RM process formalisation involves a systematic process of risk identification, risk assessment and risk controls (Subramaniam et al., 2011).

5.3.1. Risk identification

Risk identification is based on the development or update of a list of potential events that could affect business process performance and the ability to achieve objectives (O'Donnell, 2005). Simons (1999) focuses on unexpected events or set of conditions that significantly limit "the ability of managers to implement their intended business strategy". He considers four sources of (strategic) risk that may affect companies: operations risk, asset impairment risk, competitive risk and reputation risk.

Operations risk derives from any error in operating and manufacturing activity. Asset impairment risk results from a value reduction of an asset. It may be linked to a decline of value for financial assets on the balance sheet (e.g. credit risk), to intellectual property rights impairment, or to deterioration of physical conditions of assets. Competitive risk relates to changes in the competitive environment which affect the ability of a company to differentiate its products/services from its competitors. Reputation risk occurs "when business problems or actions negatively affect customer perceptions of value in using the business's goods or services".

Respondent companies were asked to express an opinion, on a five-point Likert scale (from not important to crucial), about the importance of the four sources of strategic risk. Table 5 displays the distribution of the responses and the mean score for each source of risk.

Table 5 - Opinions of respondents regarding sources of strategic risk

Sources of strategic risk	% of respondents						
(Simons, 1999)	Score 1	Score 2	Score 3	Score 4	Score 5	Mean	SD
Operations risk	0.0	14.3	22.9	48.6	14.3	3.63	0.90
Asset impairment risk	2.8	13.9	19.4	55.6	8.3	3.53	0.93
Competitive risk	0.0	5.6	25.0	47.2	22.2	3.86	0.82
Reputation risk	0.0	13.9	27.8	36.1	22.2	3.67	0.97

For this specific question the response rate is about 62% (36/58 respondent companies).
All respondents agree with the statement that is necessary to pay attention on the four sources of strategic risk (SR). In particular, competitive risk is the source of SR with the higher importance (mean score = 3.86). However, mean scores highlight that large firms are sensitive, more or less, to all sources of SR.

5.3.2. Risk assessment

Risk assessment is based on the use of techniques which allow firms to evaluate likelihood of potential risk events and estimate their probable impact.
Mikes (2009) proposes four ideal types of enterprise-wide risk management, which vary also in terms of techniques used: risk-silo management, integrated risk management, risk-based management, holistic risk management.
Risk silo management focuses on assessing risk types that may be quantified by statistical techniques. Integrated risk management concerns risk aggregation, and the technique used for its assessment is the calculation of economic capital. Risk-based management refers to risk-based performance measurements (e.g. risk adjusted return on capital), while holistic risk management encompasses both quantifiable and non-quantifiable risks. The assessment of non-quantifiable risks is not statistics-based and requires techniques such as scenario analysis or risk mapping.
According to Mikes, in practice RM process is an assembly of RM ideal types. Respondent companies were asked to indicate the degree of development for each RM ideal type ranging from fully implemented, less implemented, considered but not implemented.
The results are shown in table 6. For this specific question the response rate is about 55% (32/58 respondent companies).

Table 6 - Consideration of respondents for the four ideal types of RM (% of respondents)

ERM ideal types (Mikes, 2009)	1 = fully implemented	2 = less implemented	3 = considered but not implemented
Risk silo management	58.6	17.2	24.1
Integrated risk management	46.4	10.7	42.9
Risk-based management	59.4	12.5	28.1
Holistic risk management	48.4	12.9	38.7

In Italy, among large firms there is at least a consideration of RM ideal types. The majority have implemented risk-based management and risk silo management.

However, a significant majority of respondents do not consider the implementation of RM ideal types, especially holistic risk management.
Focusing on risk assessment, in this study we investigate the impact of BS and OP on SRM techniques in large Italian companies. In order to provide a theoretical framework for modeling the sophistication of RM we consider DeLoach (2000) model. While, we use the framework of CoSO model (2004) to classify SRM techniques as probabilistic and non-probabilistic. Probabilistic techniques are based on distributional assumptions of behavior of events and they include "at-risk" models and assessment of loss events. Non-probabilistic techniques (such as scenario analysis, sensitivity analysis, stress test, risk maps) allow to estimate the impact of a potential event, but without assigning likelihood of event occurrence.

5.4. Categories of business strategy and sophisticated risk assessment techniques

In order to test Hypothesis 2 (H2), the responding companies were asked to indicate the sophisticated risk assessment (SRM) techniques employed and to rate them. SRM techniques constitute the dependent variable of the test and the two groups of BS the independent variable.

Table 7 – A comparison of sophisticated risk assessment techniques for the two groups of business strategy

	Prospector		Defender		Wilcoxon	
Sophisticated risk assessment techniques	**Mean**	**SD**	**Mean**	**SD**	**test**	**P-value**
Probabilistic techniques						
Value-at-Risk (VaR) (prospector, n = 22; defender, n = 11)	3.32	1.46	2.73	1.56	94.5	0.154
Earning-at-Risk (EaR) (prospector, n = 21; defender, n = 12)	3.24	1.58	4.00	1.21	159.5	0.906
Cash flow-at-Risk (CaR) (prospector, n = 21; defender, n = 11)	2.90	1.51	3.45	1.57	139.0	0.835
Loss Distribution (LD) (prospector, n = 19; defender, n = 11)	2.32	1.25	2.45	1.51	109.0	0.589
Non-probabilistic techniques						
Sensitivity Analysis (SA) (prospector, n = 20; defender, n = 11)	3.40	1.06	3.39	0.92	92.5	0.224
Scenario Analysis (ScA) (prospector, n = 20; defender, n = 10)	3.33	0.90	3.12	1.11	83.5	0.229
Stress Testing (ST) (prospector, n = 18; defender, n = 10)	3.07	1.21	2.44	1.26	106.5	0.800
Risk maps (prospector, n = 20; defender, n = 10)	3.56	1.03	2.87	1.02	111.0	0.703

Table 7 presents responses on SRM techniques in large firms. Mean score and standard deviation are provided separately. The results of statistical analysis (one-sided Wilcoxon test) are also reported, with the aim to describe whether there is a positive relationship between SRM techniques and prospector strategy.
P-values of the test indicate that we were unable to find significant evidence of a positive relationship between sophisticated risk assessment techniques and prospector strategy. Hence, the hypothesis 2 is rejected. We can conclude that the use of sophisticated risk assessment techniques is not influenced by business strategy.

5.5. Ownership patterns and sophisticated risk assessment techniques

Hypothesis 3 (H3) seeks to identify a relationship between listed firms and sophisticated risk assessment techniques. In order to test H3 we use responses on SRM techniques and the two groups of ownership patterns: listed and non-listed large firms.
Table 8 displays mean score and standard deviation for responses on sophisticated risk assessment techniques provided by listed firms and non-listed firms. The statistical test is included as well.

Table 8 – A comparison of sophisticated risk assessment techniques for the two groups of ownership patterns

	Listed firms		Non-listed firms		Wilcoxon	
Sophisticated risk assessment techniques	**Mean**	**SD**	**Mean**	**SD**	**test**	**P-value**
Probabilistic techniques						
Value-at-Risk (VaR) (listed firms, n = 17; non-listed, n = 18)	3.18	1.55	3.11	1.41	145.5	0.406
Earning-at-Risk (EaR) (listed firms, n = 17; non-listed, n = 18)	3.53	1.50	3.56	1.42	152.0	0.493
Cash flow-at-Risk (CaR) (listed firms, n = 16; non-listed, n = 18)	2.75	1.73	3.22	1.35	170.0	0.825
Loss Distribution (LD) (listed firms, n = 15; non-listed, n = 17)	2.27	1.49	2.47	1.23	140.5	0.704
Non-probabilistic techniques						
Sensitivity Analysis (SA) (listed firms, n = 15; non-listed, n = 18)	3.40	1.06	3.39	0.92	141.5	0.608
Scenario Analysis (ScA) (listed firms, n = 15; non-listed, n = 17)	3.33	0.90	3.12	1.11	116.5	0.338
Stress Testing (ST) (listed firms, n = 14; non-listed, n = 16)	3.07	1.21	2.44	1.26	78.5	**0.079**
Risk maps (listed firms, n = 16; non-listed, n = 16)	3.56	1.03	2.87	1.02	83.5	**0.040**

The P-values of the test highlight that there are significant relations between listed firms and non-probabilistic sophisticated risk assessment techniques. The results of Wilcoxon test support the hypothesis 3 as regards stress testing[6] and risk maps, which is a representation of impact plotted versus likelihood of potential risk events. In this analysis, results are consistent with the study by Paape and Speklè (2012), who found that listed firms have more mature ERM systems.

6. Discussion and conclusion

In this research study we have examined the effect of two groups of firms characteristics on MA and RM in large Italian companies. In particular, we have sought to ascertain the extent to which characteristics relating to a firm's business strategy and ownership patterns explain the sophistication levels of its MA and RM.
The paper contributes to the contingency theory research by considering innovative (sophisticated) MA, rather than concentrating on traditional issues such as modern cost measurement, and by incorporating a number of RM techniques (probabilistic and non-probabilistic) to understand Risk management practices (RMPs) in large firms.

In order to provide a theoretical framework for modeling the sophistication of MA we used the IFAC statement of MA evolution. We consider third and fourth stage of IFAC statement to classify sophistication (innovations) of MA, such as EVA, BSC, ABC. Then we develop an integrated sophisticated management accounting (SMA) with financial and non-financial information.
By statistical analysis we examined the differences between the two groups of business strategy (prospector and defender BS) in large firms to find out if this contextual contingent factor affects integrated SMA with financial and non-financial information. The results of the statistical analysis show that our expectation of a significant relationship between prospectors business strategy and integrated SMA was not supported by the data. Therefore, hypothesis 1 (H1) is rejected. However, there is a relationship between strategic costing and a prospector strategy.

In addition, in order to provide a theoretical framework for modeling the sophistication of RM we consider the DeLoach (2000) and Mikes (2009) models and we use the framework of CoSO (2004) to classify sophisticated risk management (SRM) techniques, such as non-probabilistic and probabilistic techniques.

[6] For Olson and Wu (2008) stress testing is considered a specific type of scenario analysis.

Then, we examined the differences between the two groups of business strategy (defenders and prospectors) in large firms to find out if this contextual contingent factor affects sophisticated risk management (SRM) with non-probabilistic and probabilistic techniques. The results of the statistical analysis show that our expectation of a significant relationship between prospectors business strategy and SRM was not supported by the data. Therefore, hypothesis 2 (H2) is rejected. In conclusion, the use of SRM techniques is not influenced by business strategy in large companies in Italy.

Finally, we examined the differences between the two groups of ownership patterns (non-listed and listed companies) to find out if this contextual contingent factor affects sophisticated risk management (SRM). The results of the statistical analysis show that our expectation of a significant relationship between listed firms and SRM was supported by the data. In particular, P-values of tests highlight that there is a significant relationship between listed firms and non-probabilistic risk assessment techniques. Therefore, the results of one-sided Wilcoxon test support the hypothesis 3 (H3) with regard to stress testing and risk maps.
In reflecting upon the results, we recognize that specific research limitations might reduce their generalization, especially the number of statistical observations.

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