

Risk tools for the assessment of strategic risk: An exploratory study

Abstract: Recent literature on risk management has suggested that the selection of risk assessment tools may be influenced by the type of risk being managed. Particularly, the assessment of strategic risk seems to imply the use of both quantitative and qualitative techniques. This exploratory study attempts to investigate whether this characterisation holds in practice, based on a survey considering a random sample of 61 large manufacturing firms from Italy.

Results point out that surveyed firms tend to use both quantitative (probabilistic and non-probabilistic) and qualitative techniques (risk maps) to evaluate strategic risk. The statistical analysis also indicates that the quantitative techniques are perceived as important as the qualitative ones, and that they are moderately relevant overall. These survey results, to be further tested on larger samples, suggest that what risk management literature posits about the use of tools for strategic risk assessment broadly aligns with the responses of Chief Financial Officers.

Key words: management control; large firms; strategic risk; risk tools

1. Introduction

In a dynamic environment characterized by increasing competition, and in the wake of global financial crisis, risk management as a formal practice is becoming a priority for firms (Bhimani & Bromwich, 2010). The use of risk management practices has moved from a narrow financial perspective to gain prominence as a critical facet of management control systems, where “timely identification, assessment and management of the portfolio of risks faced by an entity are linked with the achievement of its goals and objectives” (Subramaniam et al., 2011). From this perspective, risk management is typically viewed as an organizational process based on monitoring and feedback which owes much to cybernetic control thinking (Power, 2007). Although risk management cannot assure that risk sources are eliminated, many firms understand that managing risk is a preferable alternative to reacting, maybe too late, to unfortunate events (Noreen et al., 2011).

In recent years, a number of combined factors, such as regulation, standards for internal control, stakeholders' demands and business competitiveness (Bhimani, 2009; Davila, 2012; Huber & Scheytt, 2013), have driven firms to consider risk holistically from an overall corporate perspective (enterprise risk management, ERM) instead of managing different risk sources individually in different departments (silo-based risk management). Although some ambiguities on what exactly constitutes ERM are still present in the ongoing scholarly debate, a consensus about the core elements of ERM has begun to emerge (Bromiley et al., 2015). Following Mikes and Kaplan (2015), ERM consists of active processes that can be unpacked into a set of fundamental components (the "ERM mix"), such as processes for identifying risks, risk tools (quantitative and qualitative techniques for risk assessment), linkages between risk management and other control process, the organizational roles involved (Chief Risk Officer and risk function). Under ERM, appropriate risk controls help firms to ensure, as far as possible, that organizational objectives are achieved and complement the existing management control practices (Soin & Collier, 2013).

Normative texts developed by international organizations, such as CoSO (2004), and several academic studies (e.g. Arena et al., 2010; Gatzert & Martin, 2015; Gordon et al., 2009; Mikes, 2009) have suggested that there is no universally ideal ERM and that the choice of appropriate ERM components can be affected by firm-specific contextual factors. Interestingly, Mikes and Kaplan (2015) have argued that the types of risk being managed may also have an impact on the design and application of risk management components. They introduced a taxonomy comprising three types (categories) of risk events - preventable, strategic and external – which are likely to differ according to their sources, degree of controllability, approaches and tools for identification and assessment and actions for mitigation.

This paper focuses on risk tools used for the assessment of strategic risk, which is the risk associated to strategic choices (Bromiley et al., 2016). As the largest risks often lie in strategic areas, firms are increasingly willing to take actions aimed at managing strategic risk in line with stakeholders' risk appetite and expectations, by developing processes and investing more resources (Kaplan & Mikes, 2016). Further, strategic choices should be supported by appropriate and effective information systems, including those providing information on risk. The use of risk tools, ranging from qualitative descriptions to quantitative complex calculations of expected loss and exposure, can provide such information to inform the process of risk assessment in strategic planning. Actually, risk tools enable to estimate probability and impact of potential events (strategic risk sources) arising from or affecting different strategic choices, allowing

managers to evaluate the expected performance outcomes of strategic alternatives and implement appropriate responses to risk (Johnson et al., 2005).

The motivation of this study is that despite the growing interest and prescriptive conceptual models on how to effectively assess strategic risk, there is still quite restricted evidence about firms practices. Particularly, the research seeks to make two connected contributions. First, according to prior literature and normative texts, the assessment of strategic risk seems to imply that the use of both quantitative and qualitative techniques can play a significant role. This study attempts to investigate whether risk assessment practice aligns with this suggestion, by empirically testing two propositions and providing an overview of the use and importance of risk tools in the surveyed firms. Secondly, while most of the existing literature have tended to study risk management at a high level of aggregation (Paape & Speklè, 2012), this work addresses risk tools as a specific component of risk management processes. Risk tools taken into account include a set of quantitative and qualitative techniques drawn from CoSO framework (2004), which is a widespread risk management template (Power, 2009).

Findings are based on a questionnaire survey considering a random sample of 61 large manufacturing firms in Italy, where the number of surveyed firms reflects the exploratory nature of the study.

The paper is structured as follows. In section 2 a theoretical framework is provided with a literature review on strategic risk and risk tools. Section 3 describes the data collection process and the research methods employed. The findings are then presented in section 4 and they are followed (section 5) by the conclusions, together with the limitations of the research.

2. Theoretical framework

2.1. Strategic risk: an overview

As outlined in the introduction, Mikes and Kaplan (2013, 2015) suggest that the effectiveness of risk management is also contingent on different types of risk events being managed. They distinguish three types of risk: preventable, strategic and external. Preventable risk stems from routine operational breakdowns or from employees illegal, incorrect or inappropriate actions. Managers effort should seek to reduce as much as possible the incidence of these events as they are inherently detrimental. External risk arises from events that the company cannot influence. As such, they are unavoidable and impossible to predict, and the concern would be about firm resilience after the events occur. In contrast, firms voluntarily

take on strategic risk in order to generate superior returns. Managers can identify and influence both the likelihood and the impact of their strategic risk, but some residual risk will always remain. As suggested by Bromiley et al. (2016), strategic risk can be viewed as the risk associated with strategic choices. Actually, strategy is concerned with the direction and scope of a firm over the long term and is achieved through strategic choices involving decisions at different levels (corporate, business, operational). At the corporate level decisions are focused on the overall scope of the firm's activities, dealing with the allocation of resources among various businesses or divisions of a firm; at the business level, decisions address how to compete successfully to satisfy the needs of customers and meet the economic expectations of stakeholders, dealing with competitive position issues; at the operational level decisions deal with the actions within firm functions and relate to deliver effectively the corporate and business level strategies in terms of resources, processes and people. Further, strategic choices are complex in nature, non-routine, involve several internal and external variables, create change and are made in situation of uncertainty about the future (Johnson et al., 2005; Wilson, 1991).

Strategic risk arises since all outcomes of strategic choices are affected by varying degrees of uncertainty and involve variability in firm performance (Allan & Beer, 2006). Miller (1992) stated that strategic choices “determine a firm's exposure to uncertain environmental and organizational components that impact firm performance”. Further, Baird and Thomas (1985) highlight that in strategic choices “a condition of risk usually exists because these decisions, by definition, involve uncertain outcomes that in the long run are important to firm survival”. Alternative strategic choices may have a different impact on performance (financial and non-financial) depending on a number of events which are direct implication of strategic choices, such as competitor reactions, changes in customers behavior, variations in the level of demand (Porter, 1980). As firms need to find an optimal balance between performance goals and related risk, when management evaluates various strategic alternatives intended to achieve performance goals, related risks across each alternative should be included in the evaluation process “to determine whether the potential returns are commensurate with the associated risks that each alternative brings” (Beasley & Frigo, 2007). Further, the risk that a firm takes on in pursuing a particular strategy should align with stakeholders' expectations and risk appetite (Johnson et al., 2005). Hence, managing strategic risk is an issue deserving time and attention by executive management and the board of directors, adequately supported by people involved in risk management within the firm.

According to Frigo and Anderson (2011), managing strategic risk involves “a process for identifying, assessing and managing risk anywhere in the strategy”. The process deals with potential internal and external events, representing sources of risk, which can affect or arise from strategic choices. Strategic risk management aims to anticipate these significant events, estimating their likely impact on firm performance, in order to provide information fostering the ex-ante comparisons among alternative strategic choices and reduce uncertainty supporting the strategic decision-making process. The inability to respond to these events could lead to a failure in attaining or sustaining the strategy or to an erosion of the competitive advantage, along with industry evolution, hampering the achievement of strategic objectives (Porter, 1980) and potentially having dramatic effects on firm’s growth path and shareholder value (Slywotzky & Drzik, 2005; Walker et al., 2015).

Risk management prescriptive frameworks (e.g. CoSO, 2004) and literature (e.g. Gates, 2006; Beasley & Frigo, 2007) tend to incorporate strategic risk into ERM, whose processes can also be viewed as shaping an idealized sequence including various stages (Power, 2007). This view emphasizes the importance of event identification and risk assessment as basic stages to prepare reporting in order to evaluate alternative strategic choices and establish appropriate strategic risk controls. Risk identification concerns the identification of the sources of strategic risk (Baird & Thomas, 1985; Slywotzky & Drzik, 2005). It entails preparing and promptly updating a list of potential events and scenarios linked to strategic choices that could affect firm performance and the ability to achieve objectives (O’Donnell, 2005; Frigo & Anderson, 2011). Simons (1998) has provided a general classification for sources of strategic risk that can affect every firm. He defines a source of strategic risk as “an unexpected event or set of conditions that significantly reduces the ability of managers to implement their intended business strategy”, and divide sources in four groups: operations, asset impairment, competitive and reputation risk. Operations risk derives from the consequences of a breakdown in a core operating, manufacturing, or processing capability, that could become a source of strategic risk in the occurrence of a critical product or process failure. Asset impairment risk is linked to a loss of current value in balance sheet assets or intangible resources, limiting the possibility that they can spawn future cash flows. Asset impairment can turn into a strategic risk if there is a decline in financial value, intellectual property rights, or physical condition of assets that are important for the implementation of strategy. Competitive risk is linked to market rivalry and can emerge from changes in the competitive environment (e.g. the actions of competitors, changes in regulation, shifts in customers’

needs or suppliers choices) that could weaken the firm's ability to differentiate its products or services and remain profitable. Finally, reputation risk arises when the consequences of one or more of the aforementioned sources (breakdown in operations, impairment of assets, or loss of competitive strength) are extensive, influencing the overall public perception of a firm. In particular, reputation risk "occurs when business problems or actions negatively affect customer perceptions of value in using the business's goods or services" (Simons, 1998).

The identification of the events representing sources of strategic risk provides the basis for assessment (Baird & Thomas, 1985). Generally speaking, risk assessment is shaped by an a priori investigation and estimation of probability and impact of potential future events on the firm's performance for a given time horizon (Noy & Ellis, 2003). Risk assessment is based on the use of risk tools, which is the theme of the next section.

2.2. Risk tools

Risk tools may range from simple representations of probability (the possibility that an event will occur) and impact (severity of the consequences) of risk events to data-intensive statistical analysis and modeling (Mikes & Kaplan, 2015). Their use is more effective when contextual dynamics and changes are not so fast to compromise possible timely responses, allowing to deal with uncertainty, anticipate events and to influence strategic choices. As such, the use of risk tools has an ex-ante, forward-looking orientation, as it addresses future events, "those that have not yet occurred, and may never occur" (Kaplan and Mikes, 2016).

Risk tools enable a proactive use of the information they provide, as do not merely describe risk, but direct managerial attention on the most important threats and opportunities, enhancing responsibility, accountability and decision making. Then, as it focuses on events arising from either within the firm or the external environment, the use of risk tools is both inward-looking and outward-looking. Although some authors are very critical about its effectiveness, the use of risk assessment tools plays a role in estimating both the likelihood and the impact of strategic risk sources and helping managers to decide what to do about risk. Actually, Johnson et al. (2005) advocate that information derived from risk assessment can support better informed decisions related to environmental analysis, strategic alternatives generation and selection, appraisal of strategic choices acceptability. Further, the information obtained by risk assessment

and included in reports directed to managers may be useful as feedback to inform possible countermeasures to strategic risk (mitigation, acceptance, avoidance) and how to control it.

Risk tools can be classified in two groups: quantitative techniques and qualitative techniques. Quantitative techniques (probabilistic or non-probabilistic) require numerical data (historical or simulated), either internally or externally collected. They allow quantified estimates of probability or impact of potential events on firm financial performance to be generated and enables more rigorous assessment¹. In particular, probabilistic techniques estimate the likelihood and impact of a range of outcomes based on distributional assumptions of the behavior of events with different time horizons, while non-probabilistic techniques allow to quantify the impact of a potential event, but without determining likelihood of event occurrence (CoSO, 2012). On the other hand, qualitative techniques involve the role of managerial judgment, comprehension of potential events, experience and intuition (Mikes, 2009; Schroeder, 2014). Qualitative assessments may address the use of descriptive scales or scoring methods (e.g. managers subjectively rate impact and probability of potential events), they are relatively quicker and easier to implement and understand than the quantitative ones and typically result in the construction of risk maps (Bozzolan, 2004). Risk maps represent potential risky events within a Cartesian coordinate system, classifying them along two axes, the probability and impact, often standardized in qualitative terms of high, medium or low (Jordan et al., 2013).

DeLoach (2000) has also attempted to classify risk assessment techniques by the relative degree of sophistication, from low to high, according to the level of difficulty and amount of data required. This author attributes the lower degree of sophistication to individual qualitative self-assessment and the higher degree to statistical analysis based on probabilistic models.

There are many possible factors affecting the selection of risk tools. Mikes and Kaplan (2015) refer to the “(1) availability of data and knowledge about a particular risk (loss) and (2) how relevant and reliable the available risk tools are in the eyes of risk experts and everyone else using the tools”, where risk tools “tends to be associated with the firm’s calculative culture - the measurable attitudes that senior decision makers display towards the use of sophisticated risk models”. Cost of implementation, level of capability desired by management and regulatory requirements are other factors (DeLoach, 2000). Moreover, firm size is positively related to sophisticated quantitative controls, as larger firm size results in relative lower costs of

¹ See CoSO (2012) for a comparison of advantages and disadvantages between quantitative and qualitative techniques.

information processing (Cadez & Guilding, 2008), while Bozzolan (2004) stresses that the use of quantitative (sophisticated) techniques can be required by the relevance of risk being assessed, although recognizing the significance of qualitative techniques.

Few previous research surveys have concentrated on risk tools used for strategic risk assessment. Gates (2006) reported statistics about the incidence of a variety of quantitative and qualitative techniques in a sample of large firms from different industries (manufacturing, financial and services). His results show a relatively higher proportion of firms using qualitative techniques whereas probabilistic models tend to be used to a lesser extent. Noy and Ellis (2003) also find a limited use of quantitative risk assessment techniques based on forecasts. In their Israel-based study, the authors point out that managers are well aware of the importance of risk in strategic choices but they mostly seem to rely on qualitative considerations of risk (e.g. subjective perceptions of past experience).

Normative texts such as CoSO (2004) or IMA (2007), and conceptual frameworks such as those from Clarke and Varma (1999), Slywotzky and Drzik (2005) or Beasley and Frigo (2007), are inherently pluralistic about the use of risk tools, since quantitative methods of risk analysis remain relevant but they are positioned within a wider set of assessment techniques, many of which are highly judgemental and used for populating risk maps.

Importantly, Bromiley et al. (2016) contend that data availability and collection about some events representing sources of strategic risk are difficult, and that some other events do not lend themselves to quantification. In such cases, firms usually make use of qualitative techniques as a substitute. Further, Mikes (2009) notes that some sources of strategic risk (e.g. operational risk or financial impairment of strategic assets) are intrinsically susceptible of measurement by quantitative, statistics-based techniques, while others (e.g. reputation risk, or operational risks that materialize only rarely) are non-quantifiable and qualitative assessments, such as risk maps, are thus recommended. In addition, Schroeder (2014) advocates a balanced approach for assessing strategic risk, where analytical tools for systematic quantification of probability and impact of risk events and managerial intuition in understanding potential threats should complement each other. According to these arguments, the following propositions on the use and importance of risk tools are presented:

P1: Large firms use both quantitative techniques and qualitative techniques (risk maps) for strategic risk assessment.

P2: Quantitative techniques are considered as important as qualitative techniques (risk maps) in strategic risk assessment.

3. Research method and data collection

Data used in this study were collected employing a web questionnaire survey. The survey considered only large firms (those with at least 500 employees) from the manufacturing sector, as a number of studies show that the size of a firm is a significant determinant in the adoption of risk management (e.g. Beasley et al., 2005).

An initial sample of 179 firms was randomly selected from a population of 479 large manufacturing firms included in the data set obtained from the Italian Industrial, Commerce and Agriculture Confederation (CCIAA). The survey was carried out in two phases. In the first phase, an e-mail directed to the Chief Executive Officer (CEO) or Chief Financial Officer (CFO) of the firms was sent to present the topic of the research and to ensure participation. 70 firms agreed to be surveyed. In the second phase, an e-mail was sent enclosing the cover letter, access code and web link to the questionnaire. A total of 61 complete and usable questionnaires were returned, with a response rate of approximately 34.1%. The respondents were mainly CFOs.

In order to assess the possibility of non-response bias, we conducted a comparison of the profiles of respondents against the manufacturing sub-sectors of firms in the selected sample. This comparison showed that respondents are significantly similar to sampled firms with regard to sector. For the sample selection, we considered the hypothesis of missing-at-random.

The questionnaire was formulated to investigate the use of risk management practices in firms, focusing on risk tools for the assessment of strategic risk. The study employs the same approach used by previous surveys (e.g. Fatemi & Glaum, 2000; Bezzina et al., 2014), in which firms were asked to indicate the use and rate the perceived importance of a set of different risk tools. In particular, in order to explore the perceived importance, the study utilizes ordinal scores (five-point Likert scale), considering the median as measure of central tendency and the inter-quartile range (IQR) and range as measures of variability. However, the mean is also reported. To examine whether certain items were rated significantly higher or lower than others, the study uses the Friedman test, a non-parametric statistical test that detects differences across mean ranks in related samples (Conover, 1980). Then, to determine which pairs of items

significantly differ, a multiple comparisons post-hoc analysis (Wilcoxon signed ranks test) was carried out. In post-hoc analysis, the Bonferroni correction was applied to take into account the problem of multiple comparisons increasing the Type I error (the probability of obtaining by chance a significant difference when there is no true difference).

4. Results

4.1. Classification of responding firms

In order to test the propositions, we were interested in identifying firms explicitly addressing strategic risk in the risk management process. With this aim, firms were asked whether they systematically focus on different sources of strategic risk in the risk identification stage. Sources were taken from Simons' framework (1998) and a brief description was provided in the questionnaire to aid interpretation.

Table 1 suggests that the majority of large firms in the sample (more than 60%) explicitly address strategic risk, as they focus on the sources of strategic risk in identifying potential risk events.

TABLE 1 SHOULD BE PLACED AROUND HERE

Operations risk and competitive risk are found to be broadly considered in risk identification, as in the survey by Fatemi and Glaum (2000) about risk management practices in German firms. Further, the results seem to suggest that reputation risk has become a notable concern. In global markets the possibility or danger of losing reputation can threaten firms in many ways, and the loss of reputation influences competitiveness, the trust and loyalty of stakeholders, the legitimacy of operations and the financial performance. Potential events that can damage a firm's reputation need to be accurately identified and staved off. A new challenge for firms is also linked to the rise of social media and immediate global communication as potential drivers of risk exposure. Actually, contents shared and diffused in social media may impact how firms are perceived in the marketplace and cannot always be controlled in advance by firms (Aula, 2010).

Overall, 41 surveyed firms explicitly address at least one of strategic risk sources in their risk management process (Table 2). Conversely, 20 firms in the sample responded that they do not manage strategic risk.

TABLE 2 SHOULD BE PLACED AROUND HERE

4.2. The use of risk tools for strategic risk assessment

As risk assessment builds on the identification stage, the analysis of the use and importance of risk tools is developed on the sub-sample of 41 firms having an explicit consideration of strategic risk sources.

First, firms were asked to indicate which risk tools they use in assessing strategic risk. The set of risk tools was drawn from CoSO (2004) and comprised both quantitative (probabilistic and non-probabilistic) and qualitative techniques². Probabilistic quantitative techniques are: Value-at-risk, Cash flow-at-risk, Earnings-at-risk and Loss distribution. Non-probabilistic quantitative techniques are sensitivity analysis and stress testing. Qualitative tools are represented by risk maps. Some techniques, such as scenario analysis and benchmarking, may be classified as quantitative/qualitative (IMA, 2007). A brief description of each technique was provided in the questionnaire to help interpretation.

The table below (Table 3) shows that each technique is used by more than 75% of the firms included in the sub-sample. In particular, the techniques with higher frequencies are “performance-at-risk” methods, followed by sensitivity analysis, risk maps and scenario analysis.

TABLE 3 SHOULD BE PLACED AROUND HERE

Table 4 shows that, in most cases (82.9%), firms opt for the application of both quantitative and qualitative techniques, whereas 12.2% mainly ground the assessment on the use of quantitative techniques.

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Further, as reported in table 5, the overwhelming majority of respondent firms explicitly addressing strategic risk seem to integrate manifold (three or more) techniques in their risk assessment practice. This is coherent with the literature suggesting that firms should use different techniques when analyzing and estimating the impact of different strategic risk sources. Mikes (2009), for example, highlighted that value-at-risk is the most frequently mentioned technique for measuring quantifiable risks (such as operational

² See CoSO (2004) or IMA (2007) for a thorough discussion on risk assessment techniques and their application.

risk), whereas techniques that are not statistics-based, such as scenario analysis or risk maps, may be suitable to handle non-quantifiable risk (such as reputation risk). In addition, “no single quantitative measure will prove satisfactory in all strategic situations” (Gates, 2006). It is interesting to note that very few firms neglect the use of quantitative techniques to evaluate strategic choices. Although this result is in contrast with the findings of Noy and Ellis (2003), that suggest a limited use among Israel’s largest industrial companies due to managerial lack of confidence in forecasts, it is consistent with the increasing number of risk sources that can be quantified, measured and controlled, due to the substantial advances in the risk measurement capabilities and technologies (Mikes, 2009). An additional possible interpretation is that, as suggested by Paape and Speklè (2012), the use of quantitative techniques contributes to perceived risk management effectiveness.

Ultimately, tables 3, 4 and 5 seem to suggest that both quantitative (probabilistic and non-probabilistic) and qualitative risk assessment techniques are commonly used in firms explicitly addressing strategic risk, as expected in Proposition 1.

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4.3. The importance of risk tools for strategic risk assessment

Firms were also asked to rate the perceived importance of risk tools they use in assessing strategic risk. Next to each technique, a Likert scale ranging from “1” (not important), to “5” (crucial) was placed in the questionnaire.

Table 6 focuses on the importance of risk assessment techniques and reports summary statistics, Friedman test and Wilcoxon signed ranks test output. Cash flow-at-risk emerges as the technique with the greater median score (Median = 4, IQR = 3-5), followed by sensitivity analysis, scenario analysis and risk maps (Median = 3, IQR = 3-4). On the other hand, loss distribution have the lower (Median = 2, IQR = 1-3). Basically, most of the techniques tend to be attributed a moderate importance, with the median score being the midpoint of the scale and the mean score within the range 2.5-3.5.

Friedman test (p-value = 0.005) shows that the importance (as perceived by the respondents) of at least one of the reported techniques significantly differs from at least one of the others. To refine this finding, the Wilcoxon signed ranks test was used to make pairwise comparisons. Statistically significant differences in

importance across risk assessment techniques at $p \leq 0.0014$ (after applying Bonferroni correction) are indicated by different letters. Pairwise comparisons have mostly revealed that no techniques were rated significantly higher than others, with the following exceptions: 1) cash flow-at-risk and sensitivity analysis (which are the techniques with higher mean rank) are judged to be more important than loss distribution in the assessment of strategic risk; 2) cash flow-at-risk is judged to be more important than stress testing. For all these three techniques are quantitative, no significant differences are found in the importance between quantitative and qualitative techniques for the assessment of strategic risk.

Particularly, Cash flow-at-risk is indicated by the letter “A”, meaning a significant difference in perceived importance compared with techniques indicated by the letter “B” and “C”. Sensitivity analysis is indicated by the letters “A” and “B”, as its importance is significantly greater than that of loss distribution (which is indicated by the letter “C”).

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As regards the importance of cash flow-at-risk, Andr n et al. (2005) have emphasized that it is gaining popularity among non-financial firms as “it sums up all the company’s risk exposures in a single number that can be used to guide corporate risk management decisions”. It provides managers with information on how various macroeconomic, market or internal variables are expected to influence firm’s cash flow and its estimated variability. About sensitivity analysis, it “allows each of the important assumptions underlying a particular strategy to be questioned and challenged” (Johnson et al., 2005), and within a strategic risk assessment it may be used to simulate (“what if” analysis) how changes in key assumptions (e.g. involving production costs, price levels, capacity utilisations) would impact on the predicted performance or outcome (e.g. profit). The importance of sensitivity analysis as risk assessment technique was also showed in a UK-based study by Abdel-Kader and Dugdale (1998), who attributed its widespread use by large firms to its “simplicity and the availability of computer packages which can help in applying it in practice”. Anyway, risk maps also show a mean importance greater than the midpoint of the scale. Jordan et al. (2013) underlined that risk maps, as judgmental methods, “become particularly important for the assessment of non-quantifiable risks” and how they can play a role that goes deeper than just increasing attention towards early warning signals from potential risk events.

5. Conclusions

Risk management literature places emphasis on the use of risk tools as fundamental components of the risk management process and seem to suggest a combined use of quantitative and qualitative techniques for the assessment of strategic risk. The aim of this exploratory paper is to investigate whether this characterization holds in practice, by testing two propositions and providing some insights into the use and perceived importance of a set of risk assessment techniques. These vary from quantitative (probabilistic and non-probabilistic) to qualitative techniques (risk maps) and are drawn from CoSO framework (2004).

The findings are based on a questionnaire survey conducted on a sample of large manufacturing firms in Italy. First, the results reveal that the majority of the responding firms explicitly address strategic risk in their risk management process, identifying and assessing potential events (strategic risk sources) that either affect or arise from strategic choices. Then, the empirical analysis conducted on the sub-sample of firms explicitly addressing strategic risk indicates that they commonly use both quantitative techniques and qualitative risk maps for assessing strategic risk, which are equally attributed a moderate degree of importance. This mainly suggests that both the data-driven output of quantitative models and managerial judgement involved in the use of risk maps can be bases for strategic decision-making, and that quantitative (probabilistic or non-probabilistic) assessment cannot replace managerial judgement in comparing alternative strategic choices. Quantitative and qualitative techniques seem to be complementary rather than alternative, and this is generally consistent with Kaplan and Mikes (2016), who note that firms seem to “avoid the artificial choice between quantitative and qualitative risk management, allowing both to play important roles in identifying and assessing risks, and then in making decisions and allocating resources to mitigate the risks in a cost-efficient and moral manner”. In sum, survey results (that however should be tested on a larger sample) suggest that what academic literature and normative texts on risk management posit about the use of techniques for the assessment of strategic risk broadly aligns with the responses of firms’ Chief Financial Officers.

However, it has also to be noticed that whereas most of the risk tools included in the study are commonly used to evaluate risk associated to strategic choices, they are attributed only a moderate degree of importance (with the exception of high importance attached to cash-flow-at-risk and low importance to loss distribution). This may be a signal of the difficulties inherent in the assessment of strategic risk, whose

completely objective measurement is often not possible because of difficulties related to data collection. Further, literature highlights that even if the use of risk tools make early warning signs and risk information available to decision makers in advance of the events, sometimes behavioral biases and organizational barriers can prevent the information from being acted on (Kaplan and Mikes, 2016), and this could affect the perceived importance of risk tools.

The study has a number of limitations, which should be considered in results interpretation. The main limitation concerns the number of the surveyed firms used in the study, that reflects the exploratory nature of the research. To increase the validity of the results and to help determine the extent to which they can be generalized, the findings need to be tested on a larger sample. In a similar vein, due to the sample size there is a possible non-response bias. The test performed to check this threat were negative but they do not consent to eliminate it.

Yet, this paper has only focused on one type of risk and the risk tools used for its assessment. The study should be extended to other types of risk (preventable or external) to provide a better comprehension of their assessment and some foundations to investigate the relationships between the type of risk and the use and importance of risk tools under a congruence approach (Gerdin & Greve, 2004), where the risk tools could be considered as the dependent variable and the type of risk as the independent. Given the evolving nature of risk management, comparisons over time as well as comparison among firms from different countries would also be beneficial.

At the same time, it is worth exploring how risk tools are used, in terms of factors driving their adoption, processes, people involved, frequency and organisational outcomes, to delve into the diversity of risk assessment implementation and to increase the practice-based knowledge of risk management. Such an issue may also require a different research approach. The development of in-depth case studies could offer more detailed descriptions of the use of risk tools and their effectiveness in managing uncertainty and supporting strategic choices.

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Table 1: Firms focusing on sources of strategic risk in the risk identification stage

	No. of firms	%
Operations risk	39	63.9
Asset impairment risk	40	65.6
Competitive risk	40	65.6
Reputation risk	40	65.6

Table 2: Firms explicitly addressing strategic risk

	No. of firms	%
Yes	41	67.2
No	20	32.8

Table 3: Firms using risk assessment techniques (n = 41)

	No. of firms	%
Cash flow-at-risk	38	92.7
Value-at-risk	38	92.7
Earnings-at-risk	36	87.8
Sensitivity analysis	36	87.8
Risk maps	36	87.8
Scenario analysis	35	85.4
Loss distribution	34	82.9
Benchmarking	32	78.0
Stress testing	32	78.0

Table 4: Strategic risk assessment approaches

	No. of firms	%
Risk assessment based on the use of quantitative techniques	5	12.2
Risk assessment based on the use of both quantitative and qualitative techniques	34	82.9
Risk assessment based on the use of qualitative techniques	2	4.9
Total firms explicitly addressing strategic risk	41	100.0

Table 5: The amount of risk assessment techniques used

Risk assessment techniques used	No. of firms	%
3 or more	38	92.7
2	1	2.4
1	2	4.9
Total firms explicitly addressing strategic risk	41	100.0

Table 6: The importance of risk assessment techniques used

	Median	IQR (Range)	Mean	Mean rank	Wilcoxon signed ranks test summary
Cash flow-at-risk	4	3-5 (1-5)	3.66	6.54	A
Sensitivity analysis	3	3-4 (1-5)	3.47	5.72	A, B
Risk maps	3	3-4 (1-5)	3.42	5.28	A, B, C
Scenario analysis	3	3-4 (1-5)	3.37	5.32	A, B, C
Value-at-risk	3	2-4 (1-5)	3.16	4.84	A, B, C
Earnings-at-risk	3	2-4.75 (1-5)	3.06	4.48	A, B, C
Benchmarking	3	2-4 (1.5)	2.97	4.48	A, B, C
Stress testing	3	2-4 (1-5)	2.69	4.48	B, C
Loss distribution	2	1-3 (1-5)	2.35	3.94	C

Friedman test: $\chi^2(8) = 21.797$, p-value = 0.005