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Analyzing and managing risks – on the importance of gender differences in risk attitudes

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Abstract

Purpose – This paper seeks to show optimal strategies for firms to cope with analysis and management of risks.

Design/methodology/approach – Empirical and experimental studies on gender differences in risk analysis and risk management are reported and assessed.

Findings – Women appear less sensitive to probabilities and more pessimistic towards gains than men. In risk management, women seem to have a comparative advantage with respect to diversification and communication tasks.

Research limitations/implications – Empirical testing of the hypothesis that mixed teams of senior managers optimize risk analysis and management is still missing. Deeper insights into the optimal structure of men's and women's cooperation with respect to risk analysis and management are missing.

Practical implications – A well established cooperation of men and women at the senior management level appears recommendable for firms which strive for an optimization of their risk analysis and risk management. Furthermore, such cooperation is desirable with respect to a society's perspective.

Originality/value – Identification of gender differences in risk analysis and management are pointed. Such differences matter since analysis and management of risk are decisive issues for firms.

Keywords Risk analysis, Risk management, Gender, Diversification, Communication

Paper type Conceptual paper

1. Introduction

Analysis and management of risks are decisive issues for any firm. The risk attitudes of decision makers in firms play an important role for the choices made and hence for the firm's future performance.

A well known stereotype says that on average women are more risk averse than men. If this was true, decisions in firms made by women may be such that they forego chances on very positive results so that the firms finally end up with worse results than their competitors.

In this paper, key characteristics of risk as well as risk analysis and risk management in firms will be looked at (sections 2 and 3). In addition, the relevance of the above mentioned stereotype will be discussed (section 4). Finally, in section 5, the importance of gender differences in risk attitudes for the analysis and management of risks will be examined. Conclusions will be drawn in section 6.

2. Notion and characteristics of "risk"

Usually, we talk about "risk" when we have to make decisions or choices between different alternatives with uncertain future consequences. We tend to concentrate on

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negative future consequences or outcomes, i.e. situations in which an expected or desired result – the "reference result" – will not be achieved. As example consider the case of a failure to reach a particular desired return on an investment.

In many cases, we have some information about the probabilities of future consequences. One usually distinguishes between cases of "pure risk" and cases of "ambiguity". In the former, we can precisely quantify the probabilities involved. In the latter, the best we can do is to rank the outcomes according to their likelihood of occurrence ("outcome A is more likely than outcome B"). Cases of pure risk are rare in reality because they require records showing the relative frequency of specific consequences in the past. Such records should be used as a reliable basis for estimating the relevant probabilities. Records of this sort tend to be available for events like traffic accidents, thefts, illnesses, etc. However, in most cases of business decisions such records are missing and one has to rely on expert opinions or subjective estimates of the likelihood that a specific future consequence will occur.

Depending on the key aspects of the various consequences, we distinguish between economic, environmental, technical, political, social and other risks. From the business point of view, distinctions can also be drawn between the following risks: strategic risks, i.e. developments that endanger the existing corporate strategy; financial risks; operational risks; commercial risks such as the loss or defection of suppliers, clients or managers; IT risks concerning the security and functionality of hardware and software; and technical risks, like the destruction of a company's physical infrastructure by fire, explosion, flood, etc. Companies are also concerned about environmental risks (e.g. acts by environmental activists), human capital risks (e.g. "erosion" of employee motivation, direct and indirect costs of replacing senior executives), and political risks (e.g. expropriations, military conflicts).

3. Analysis and management of risk in firms

Various methods and procedures can be used to analyze risks. Depending on the method selected, different risk assessments will be arrived at in one and the same decision situation. The appropriateness of a method depends on the information available to the decision-maker, on the size of her budget and on the decision-maker's goals.

The most commonly used methods of risk analyses combine loss and probability information. Examples are the calculation of expected loss values, risk mapping or the calculation of value at risk (i.e. of the probability that a specific loss will not be exceeded). They all require the consideration of the decision-maker's preferences in order to yield the definite choice of one specific alternative. There are a large number of other methods for risk analyses, though only few have proved popular in terms of practical application. Therefore they are not mentioned here (cf. for instance Goodwin and Wright, 1991; Keeney, 1982).

Information about future potential losses and their likelihood to occur has to be created in every individual case. There is usually a fair amount of scope in terms of design and interpretation since neither loss nor likelihood are filed away somewhere ready for use. The scope is exploited primarily through the application of different (mental) heuristics, i.e. cognitive "rules of thumb". As a consequence, the experts involved may over- or underestimate "true" probabilities and "true" losses depending on their personality, background, experience, or on the way they formulate the decision problem (Jungermann *et al.*, 1998; Slovic, 2000). As a consequence, risk analyses will

never be as clear-cut as one would wish. Good risk analyses are transparent and comprehensive ones.

Risk management means structuring a firm's portfolio of activities such that the level and composition of risks and returns is "optimal", i.e. value maximizing (Meulbroek, 2002). Hereby, one has to take into consideration that the correlation between risks and returns is typically positive. Given the shareholders', owners' or investors' preferences, the optimal combination of risk (represented for example by the variance of future returns) and of returns (represented for example by the expected value of future returns) can be identified. Various types of capital asset pricing models may serve as basis (Sharpe, 1964; Lintner, 1965; Merton, 1973). Risk management strategies have to be tailored to each individual firm. They have to be based on insights on the relationship between a firm's value and risky future returns.

Main risk management options are diversification (of products or regions) and insurance, along with various other internal and external measures (Frenkel *et al.*, 2000). An important internal and at the same time external measure is risk communication. A different way of structuring risk management options is to differentiate between modifications in firm's operations, adjustments of capital structures and employment of various financial instruments (Meulbroek, 2002). Diversification corresponds to the first option, insurance is a specific part of the third option. For the sake of simplicity, the less comprehensive notion of risk management will be used in the following. This means that diversification and insurance will be looked at.

Product or region diversification means first a broadening of the activities' portfolio of a firm. This can be interpreted as some sort of internal insurance of a firm. The broader a company spreads its alternatives or activities, the better it will be able to compensate losses in one area by successes in other areas. However, successful diversification relies on the most accurate, up-to-date and trustworthy information about potential losses in all different areas of business. This in turn requires regular, transparent and meaningful risk reporting. Equally important, this reporting has to be an integral part of the corporate strategy.

Secondly, diversification also includes measures to reduce the risk of a given alternative. Such measures are referred to as "risk defusing operators" (Huber *et al.*, 2001). Risk defusing operators transform the gross risk of an alternative into a net risk, i.e. the risk remaining after risk reducing measures. Examples for risk defusing measures are technical improvements of products which make them safer, changes in infrastructure, changes in production processes etc. Any such measure reduces the risk of an alternative at the price of higher costs, i.e. reduced returns. It is up to the evaluation method and mainly up to the decision-maker's preferences whether such changes are judged positively or negatively.

The insurance option is only feasible if size and probability of possible future losses can be quantified. Only then insurance premia can be calculated which are financially sustainable for the insurance companies. For some risks (nuclear reactors, pharmaceutical products, etc.) the potential losses are too big for a single insurer to handle. Then, reinsurance companies or pools of insurance companies become relevant. Potential losses that would exceed the capacity of such a pool, but which society still demands to cover have to be taken on by the state, i.e. by the society as a whole.

Managing risks successfully – both before and after actual losses occur – also requires regular and reliable communication with those who may potentially be

affected. One of the most important aspects here is to ensure that measures are in place to minimize and cushion the impact of actual losses.

There is no general recipe for good risk management in practice. However, knowledge of the crucial determinants of potential gains and losses as well as of their likelihood helps to balance innovations against the risks they bring in tow. In addition, integrated risk management is superior to the management of single risks or risk types in isolation (Meulbroek, 2002). Integrated risk management is directed towards a firm's total risk and tries to optimize the firm's position as a whole, for instance by means of diversification and consideration of cross-risk effects.

4. Men's and women's risk aversion – empirical evidence

It is a well-known stereotype that when confronted with risky decisions women choose low-risk alternatives, whereas men choose alternatives with higher risks. This may be interpreted such that women are more risk averse than men. The stereotype has important implications. If for instance employers assume that women are more risk averse than men, and also assume that top managers have to be generally more risk seeking than others, statistical discrimination of women may arise. Women are not promoted to top management positions even if their individual level of risk aversion is low. This implies an inefficient utilization of risk assessment and risk management capacities in a society.

To check the relevance of such inefficiencies, gender differences in risk attitudes have to be analyzed empirically. A review of the empirical evidence (Powell *et al.*, 2001) shows that in experiments with risky gambles women tend more strongly to avoid risks than do men (Levin *et al.*, 1988; Johnson and Powell, 1994; Powell and Ansic, 1997 1999). Similar results hold for contextual risky decision problems (Barsky *et al.*, 1997; Jianakoplos and Bernasek 1998; Grossmann and Eckel, 2000). However, contradictory evidence also exists (Johnson and Powell, 1994; Schubert *et al.*, 1999). Under specific circumstances, women appear as risk loving as men or even more risk loving. Which are convincing explanations for such contradictory empirical evidence?

A first explanation lies in the use of inconsistent terminology (Schoemaker, 1993) and varying theoretical backgrounds over the different studies. A second and more interesting explanation is the importance of individual characteristics and of the decision tasks' framing. The more familiar a women is with a specific type of decision problems and the more experienced she is in the corresponding domain, the more risk loving she will be (Levin *et al.*, 1988; Johnson and Powell, 1994; Schubert *et al.*, 1999). Social roles influence individuals' risk attitudes (Voelz, 1985; Radecki and Jaccard, 1996) as well as differences in personality. A dominant finding with respect to individual characteristics is that in decision making under risk men are more confident and more overconfident than are women (Estes and Hosseini, 1988; Stinerock *et al.*, 1991; Zinkhan and Karnade, 1991; Lundeberg *et al.*, 1994; Beyer and Bowden, 1997; Barber and Odean, 2000; Gervais and Odean, 2001). As a consequence, men tend to take higher risks than women.

Further gender differences lie in the interpretation of the meaning of "risk". Men typically focus on the probability or likelihood component of risks, whereas women focus on future consequences. If future consequences are losses, women on average perceive higher risks than do men (Vlek and Stallen, 1981; Von Winterfeldt *et al.*, 1981; Hansson, 1989; Drottz-Sjöberg, 1991; Yates and Stone, 1992; Schubert *et al.*, 1999). In addition, money matters. Money represents a specific form of personal property, and gender differences arise in attitudes to property (Furnham, 1984; Dittmar, 1992; Prince,

1993). Women appear more fearful of losses in general, and property loss in particular. Therefore, they appear as more risk averse than men.

Women perceive higher risks than do men for specific activities, such as smoking and air travel (Slovic, 1992; Flynn *et al.*, 1994; Jungermann *et al.*, 1996; Schubert, 1997) and for specific domains such as environment and nuclear power plants (Drottz-Sjöberg, 1991; Brun, 1994; Greenberg and Schneider, 1995). These differences can be linked to factors like dread and knowledge (Cutter *et al.*, 1992; Schubert, 1997): women perceive higher risks if they feel badly informed, whereas men perceive higher risks when they fear future events.

Risk attitudes differ between men and women because of the role of emotional variables (Loewenstein *et al.*, 2001). In general, risk assessments and risk behavior are influenced by cognitive assessments as well as by emotional reactions. Quite often, emotional reactions drive attitudes and behavior in a stronger way than cognitive judgments. Emotions which matter in the context of decision making are mainly anticipatory emotions. They depend on the vividness of imagery, on the background mood of the decision maker, on the time course of the decision etc. (Meehan and Overton, 1986; Loewenstein *et al.*, 2001). Women report more and better imagery than do men and they report to experience emotions in general and fear and nervousness, in particular, more intensely than do men. As a consequence, women appear more risk averse than men.

Empirical work which is strongly related to prospect theory-based decision models gives the following main results (Powell *et al.*, 2001; Fehr-Duda *et al.*, 2004): In general, risky decisions result from a combination of outcome evaluations and probability judgments. Men and women hardly vary in their value functions for the outcomes (these may be utility functions, risk-return functions, etc.). There are, however, gender differences in the probability weighting functions. These differences are twofold. First, women's probability weighting functions are flatter than men's, i.e. women are less sensitive to probability changes. This underlines that – presumably due to women's more vivid imagery – women are mainly outcome oriented. If the probability for a positive outcome increases, women are not necessarily more likely to choose the corresponding alternative. This may be called risk averse. Secondly, women underestimate high probabilities for positive outcomes more strongly than men. This may be called a "pessimistic" attitude. A high degree of underestimation may also be interpreted as risk aversion.

The overall result of various empirical studies is that there seems to be some truth in above mentioned stereotype that women are more risk averse than men. However, the stereotype does not hold unconditionally. There are a number of constellations in which women are as risk averse or risk prone as men are or even more risk prone than men. In all loss constellations, for instance, if women are experienced and familiar with specific risky situations, if they feel properly informed etc. women are not particularly risk averse. Under all these conditions, not promoting women to top management positions implies the above mentioned inefficient utilization of risk assessment and management capacities in a society. How to cope with this situation will be discussed in section 5.

5. Consequences for risk analysis and risk management

Given the results from chapter 4, two aspects are important for achieving "optimal" risk analyses and risk management from a firm's and a society's perspective. First, for all those cases in which gender differences in risk attitudes occur, men's and women's

risk assessments and risk management strategies will vary. The question then is whether risk assessments should be undertaken and risk management strategies should be designed by men or by women or by mixed teams. Secondly, for cases in which men and women do not differ significantly with respect to their risk aversion or risk proneness we observe the above mentioned statistical discrimination of women. How should one cope with the resulting inefficiencies?

Let us first consider the cases in which women appear more risk averse than men. It had been pointed out that women are less sensitive towards probabilities and more outcome oriented than are men. Women focus emotionally on future outcomes and they seem to be strongly loss averse. Furthermore, they are more pessimistic than men about (high) gain probabilities. Insights from social psychology show that women esteem events less often controllable than men, that they are less confident, that they overestimate the probability of unpleasant events and that they rather overestimate the probability of bad things happening to themselves (Slovic, 1992; Asch, 1952; Lloyd and Archer, 1976).

With respect to risk analyses such differences matter since the influence the assessment method chosen as well as the subjective outcome and probability judgments. Women perceive smaller probabilities for gains than men and they are less probability oriented. Hence, for one and the same alternative, women will end up with higher expected losses and a higher risk judgment than men. As a result, men and women will finally tend to choose different alternatives. Men's alternatives will typically be characterized by higher risks and – as a consequence – by higher long-term future returns than women's.

With respect to the risk management, women seem to be less prone than men to buy insurance (Powell *et al.*, 2001). This can be attributed to the fact that women tend to take lower risks and try to avoid losses. The need for insurance is therefore low. Diversification appears as much more appropriate strategy for women. Mixed portfolios – may they consist of financial or "real" products – seem to meet the requirements of rather risk averse decision makers who are nevertheless willing to take some risks. In addition, women seem to have better multi-tasking skills than men which makes them more capable and more willing to run various tasks at the same time. These skills qualify women especially for the desired integrated risk management. Besides better multi-tasking skills women also seem to dispose of better communicative capabilities than men (Wajcman, 1988). This means that, on average, they are more aware of the importance of good risk communication and more successful in making risk communication effective – before and after losses occur. Women seem to be especially well prepared to handle situations in which individuals or groups of person are already affected by losses – no matter of which type. Taking all different aspects together, women seem to have a comparative advantage in risk management including risk communication.

Considering risk analyses and risk management strategies jointly, women – on average – tend to perceive risks higher than men and therefore tend to make decisions which are less risky and yield lower returns in the long run. On the other hand, they seem to have good qualities with respect to managing risks once that decisions for specific alternatives in firms' have been made.

These insights provoke an interesting conclusion: risk analyses and risk management strategies like for instance diversification strategies, including the search for risk defusing measures should be put forward by a mixed team of men and women. From a firm's perspective, men's comparative advantages seem to lie in the field of risk

analysis where they tend to be more risk taking than women and hence are moving more towards better long term results, towards innovation and towards capturing new markets. Women on the other hand have comparative advantages with respect to the management of risks, especially with respect to diversification, and integrated perspective and communication. Bringing together these different strengths of men and women, one should be able to end up with alternatives which, guarantee an optimal, i.e. value-maximizing result for the firms. Men alone would opt for too risky alternatives, neglecting good risk management strategies to reduce the net risks of alternatives. Women alone would, on the other hand, opt for alternatives that are not risky enough with respect to the value-maximizing goal of firms. A cooperative approach would enable firms to optimize their risks, costs and future returns.

In cases where men and women do not differ significantly with respect to their risk aversion, women are statistically discriminated since they are not promoted to high level management positions due to the risk aversion stereotype. Compared to men, only few women become senior managers responsible for risk analyses and integrated risk management. This discrimination causes inefficiencies to the society as a whole as the risk analysis and management capacities which are available are not adequately utilized. Therefore, it seems reasonable to postulate an increase in the percentage of women at senior management level positions.

Obviously, one can conclude that irrespective of the existence of gender differences in risk aversion there are strong arguments in favor of mixed teams at the senior management level drafting and implementing risk assessments and risk management strategies. If risk analyses and risk management are generally undertaken by mixed teams of male and female senior managers, individual firms as well as the society as a whole will profit most.

6. Resumé

The overall stereotype that women are more risk averse than men does not generally hold. However, under a magnitude of different constellations such tendency is observable. Therefore, firms should be interested in hiring relatively risk seeking men for risk analyses, pushing their firms forward. Women, however, seem to have comparative advantages with respect to an integrated management of risks including communication aspects. Therefore, firms should be especially interested in women for risk management purposes.

Since in many cases risk analyses and risk management are combined firms seem to profit most if they let men and women cooperate. The cooperation should take place at the senior management level. Within this cooperation, the risk analysis tasks should be mainly taken by men and the risk management tasks mainly by women. There is a high probability that the resulting choices will contribute to an optimization of the firm's value and position. In addition, the society as whole will profit from the ascribed mixed risk assessment and management teams.

Until now, empirical research testing the above hypothesis that mixed teams of senior managers optimize risk analysis and management from the individual and from the societal perspective is substantially missing. It would be worthwhile to undertake such research in the future, for instance, by means of experimental research. In addition, it would be important to get deeper insights into the optimal structure of men's and women's cooperation with respect to risk analysis and management. Here again experimental research might be helpful.

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