CORPORATE RISK COMMUNICATION AS PART OF CORPORATE GOVERNANCE – INSIGHTS FROM A BEHAVIORAL RISK PERSPECTIVE

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Abstract

When corporate ownership and control are separated, information asymmetries arise between the uniformed principal (investor) and the informed agent (manager). Within this principal agent conflict, the communication of risks faced by the entity is crucial within a corporate governance context, as investor decisions concerning a company are mainly driven by the evaluation of chances and especially of risks regarding the future prosperity of the company. Risks can thereby only be communicated reliably as part of corporate communication (i.e. without inducing unexpected behaviors), when the informational needs of the investors are understood. In order to derive insight about which variables are important in explaining how investors perceive risks disclosed by an entity, I develop a structural equation model in which I combine two theoretical approaches of human risk perception: the "decision theory view" and the "behavioral risk perspective". For estimating the model, I make recourse to data derived from a survey that was conducted with 32 students who were asked to assess five risks which the fictitious "Alpha group" discloses in its management commentary. I chose the management commentary as the object of study, as it has a unique and increasing relevance as an instrument of capital market communication. My results suggest that both theoretical approaches are important in explaining investors´ risk perceptions. This finding calls into question that standard-setters predominantly adopt a decision theory view concerning risk reporting, and has further implications for the development of a company´s risk communication strategy within a corporate governance context.

Keywords: Perceived Risk, Management Commentary, Risk Communication

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1 Introduction

Social scientists have spent much effort on developing models of human risk perception and have identified multiple practical uses for such models (Yates (ed.), 1992). Especially, models of human risk perception can aid in predicting how people will react when being confronted with certain risks (Kraus and Slovic, 1988). Holtgrave and Weber (1993) remark that "studies of subjective risk perception and risk acceptability show, for example, that people tend to reject comparisons about the magnitudes of risks […] when these risks are qualitatively different" (e.g., voluntary versus involuntary, controllable versus incontrollable etc.). Comparable findings can help to guide the design of corporate risk communication and regulatory efforts.

While the international as well as the German standard-setter primarily focus on disclosures of loss probabilities and/or loss outcomes concerning risk reporting and thereby – at least implicitly – capture a decision theory view, which proposes that risk judgments are based on probabilities and potential outcomes, scholars that adopt a behavioral risk perspective argue that an investor´s perception of risk is influenced by risk dimensions that have little to do with outcomes and their probabilities (like for example, to what extent a risk is controllable, new, or causes worry; see also Koonce et al., 2005). I will later show that both the decision theory view as well as the behavioral risk perspective makes a major contribution to the explanation of risk perceptions of investors. This finding calls into question the regulatory framework´s primary focus on disclosures of loss probabilities and/or loss outcomes. Furthermore, in situations where corporate ownership and control are separated, my findings give advice on how managers should report about corporate risks out of a corporate governance perspective, in order to mitigate information asymmetries between the uniformed principal (investor) and the informed agent (manager). The determination of a corporate risk

communication strategy as an adequate solution of this principal agent conflict is of paramount relevance, as investor decisions concerning a company are mainly driven by the evaluation of chances and especially of risks regarding the future prosperity of the company.

To summarize, as Morgan (1993) puts it, "the only way to communicate risks reliably is to start by learning what people […] need to know" (Morgan, 1993: 29). Thus, the intention of this study is to contribute to a better understanding of an investor´s informational needs, because this understanding is not only essential for a prediction of an investor´s reaction to risk-related information. Furthermore, the definition of a risk communication strategy as part of the corporate governance structure of a company implies such understanding. So far, there is little empirical evidence on how the users of financial reports assess risk, as most risk-related research focuses on effects of risk. Correspondingly, there is little guidance on how risk reporting disclosure can support investors in assessing risks (Schrand and Elliot, 1998: 276). The first purpose of this paper is to provide evidence concerning the variables which explain investor´s risk perception. Second, the paper wants to give guidance to the reporting entity on how to report about risks under a corporate governance perspective in order to avoid unintended reactions by the investor. Third, the empirical findings could encourage regulators to reconsider and to extend the assumptions on which they base their risk-related disclosure requirements.

2 Regulatory framework

I chose the management commentary as the object of study out of two reasons: First, the management commentary has a unique an increasing relevance as a tool for investors to assess the reporting entity (Kajüter and Blaesing 2010), (1) as it provides information in addition to and different from the information provided in the financial statements and (2) because the management commentary supports the investors in evaluating an entity's future prospects through the disclosure of information about the entity's future risks and chances (Theis et al. 2012). Second, the management commentary is of major interest out of a corporate governance perspective, as normative requirements concerning the management commentary bear great discretionary latitude for the management in deciding what to disclose (in general, but about risks in particular) within the management commentary.

With the publication of the exposure draft ED/2009/6 "Management Commentary" in June 2009 (IASB, 2009) and the passing of the consequent Practice Statement "Management Commentary" in December 2010 (IASB, 2010) the IASB recognizes that financial statements do not necessarily provide all the information that potential investors could need to make their economic decision "because the financial statements largely portray the financial effects of past events and do not provide non-financial measures of performance or a discussion of future prospects and plans" (IASB, 2010: BC3). With the Practice Statement, the IASB presents a "broad, non-binding framework" for the presentation and preparation of a management commentary in accordance with IFRSs (IASB, 2010: IN1). The IASB thereby also takes into account that for many entities the management commentary is already an important element of their communication with capital markets because users of financial reports in their capacity as capital providers routinely use the type of information provided in a management commentary to evaluate an entity´s possible prospects and its general risks (IASB, 2010: IN3).

Consequently, risk information is one of the non-financial indicators of future performance that should be disclosed according to the Practice Statement. The disclosure requirement includes the "entity's principal risk exposures and changes in those risks, together with its plans and strategies for bearing or mitigating those risks, as well as disclosure of the effectiveness of its risk management strategies". With the disclosure of risk-related information, the opportunity "to evaluate the entity's risks as well as its expected outcomes" (both IASB, 2010: mn. 31) should be provided to the user of the management commentary.

In comparison to the recent development of the normative framework in terms of the IFRSs, the national German legislator as well as the European Union have early identified the need for insight that exceeds the disclosure of pure financial information. As early as 1986, the concept of a management commentary was codified[8] in the German Commercial Code (HGB), and therewith relevant for German corporations and groups (with exceptions according to German Company Law).[9] Since then, the requirements for a management commentary in accordance with the German Commercial Code have increased. One of the cornerstones of that legal development has been the introduction of risk reporting in 1998: As a reaction to prominent corporate crises and breakdowns, and in order to meet the informational needs of international investors (which by that time became increasingly important as capital providers for German public corporations), the Law on Corporate Control and Transparency (KonTraG) amended §§ 289(1), 315(1) HGB by requiring disclosures on the risks of the entity´s future development in the management commentary (Dobler, 2005: 1192-1193). Developed further by

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[8] With the commencement of the Accounting Directives Act (BiRiLiG).

[9] See for further reading: Beurskens, 2010 and Tesch and Wißmann, 2009.

amendments after 1998,[10] German risk reporting exists in its present form since 2009 (with the commencement of the German Accounting Law Modernisation Act (BilMoG)): In addition, a description of the key characteristics of the accounting-related internal control and risk management system became mandatory. Hence, the German legislator has recently acknowledged the relevance of key corporate governance mechanisms in the context of risk reporting.

In order to specify the comprehensive legal risk reporting requirements of the §§ 289(1) and 315(1) HGB, the private standard-setter German Accounting Standards Board (GASB) issued a detailed German Accounting Standard No. 5 (GAS 5). Its risk reporting requirements will soon be incorporated by the recently introduced draft for a new GAS on Management Commentaries (E-DRS 27). The new standard will furthermore replace the existing GAS 15 "Management Reporting". According to the draft, risks are still – corresponding to GAS 5 – mainly understood as defined by loss probabilities and loss outcomes (E-DRS 27, mn. 154/164/165). As a reaction to the commencement of BilMoG, the draft also emphasizes the relevance of disclosure concerning the risk management system and internal controls.

For the purpose of the study it is important to understand in this context, that the international as well as the German national regulatory frameworks do not only leave leeway for the management to decide what and how to report about risks, but that they also have a strong focus on disclosures of loss probabilities and/or loss outcomes concerning risk reporting: In terms of risk reporting, in general, the international as well as the German standard-setter – at least implicitly – adopt a decision theory view, which proposes that risk judgments are based on probabilities and potential outcomes. That is, when assessing risk, investors (or people in general) are presumed to assess the severity and likelihood of the possible outcome.[11]

While empirical research supports this perspective (Weber, 1988),[12] scholars do not agree on how people think about risk (Slovic and Weber, 2002). Over the years, another dominant view on risk has developed in the academic debate: The behavioral risk perspective (Koonce et al., 2005). Both the decision theory view as well as the behavioral risk perspective shall be discussed in the following section.

3 Theoretical Background and Related Literature

Processes affecting risk perceptions can be studied scientifically. For this purpose, three approaches can be distinguished: the socio-cultural paradigm, the axiomatic measurement paradigm, and the psychometric paradigm (Weber, 2001). Studies within the socio-cultural paradigm examine the effect of group- and culture-level variables on risk perceptions. Studies within the axiomatic measurement paradigm focus on the way in which people subjectively transform objective risk information (like possible consequences of financial losses and their likelihood of occurrence) in ways that reflect the impact that these events have on their lives. Research within the psychometric paradigm wants to identify people´s emotional reactions to risky situations that affect judgments of the riskiness of physical, environmental, financial and material risks in ways that go beyond their objective consequences (Slovic and Weber, 2002). While the socio-cultural paradigm concentrates on how *a person*´s socio-cultural attributes influence this person´s risk perception, I am rather interested in which variables related to *a risk´s* attributes explain how a person perceives risk. In the following, I therefore exclude the socio-cultural paradigm from closer consideration.

The decision theory view can be considered as part of the axiomatic measurement paradigm and shall be discussed first in order to deduce the decision theory variables which are used in the study.[13] Traditionally, a dominant approach to study individual decision making under uncertainty relies on a probabilistic framework. It is assumed that the uncertainty about the state of the world is described by a probability distribution, and that the ranking of acts is done according to the expected utility of the consequences of these acts, when modeling a decision maker´s rational choice between acts according to the decision theory view. This proposal was initially made by Neumann and Morgenstern (1947) and Savage (1954). Not only does empirical research support this perspective. Also valuation models within accounting and finance exhibit the tendency to follow the decision theory view by defining risks in terms of expected cash flows or earnings, or in terms of the covariance of these measures with market factors (Froot et al., 1993). Altogether, the decision theory view seems to underlie many risk-related accounting standards and regulatory frameworks, which often focus on disclosure of loss probabilities and/or loss

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[10] Especially for developments concerning the transformation of both the Modernisation Directive and the Fair Value Directive into German law by the Reform Act on Accounting Regulation (BilReG), see Dobler, 2004: 51-52.

[11] For a more detailed description of the respective regulatory framework see Theis, 2011.

[12] For further reading see Weber and Bottom, 1989; also see Weber and Bottom, 1990.

[13] For examples of uses of axiomatic measurement theory, see: Narens and Luce, 1993. Furthermore, the decision theory view was justified on an axiomatic basis by Savage in 1972; See Savage, 1972.

outcomes.[14] Although the decision theory view can be statistical in nature (by using calculated variances as a measure of risk), it can also be viewed in terms of perceptions, such as how people react to variance or perceive probability data (Koonce et al., 2005).

In contrast, adopting a psychometric paradigm, the behavioral perspective of risk argues that people´s perceptions of risks are influenced by risk dimensions that have little to do with outcomes and their probabilities. With a behavioral perspective of risk, the psychometric paradigm is a common approach for studying perceived risk by developing a taxonomy for hazards that can be used to understand and predict responses to their risks. A taxonomic scheme can help to explain people´s extreme aversion to some hazards as well as their indifference to others, and the discrepancy between these reactions and expert opinions. The psychometric paradigm "uses psychophysical scaling and multivariate analysis techniques to produce quantitative representations or 'cognitive maps' of risk attitudes and perceptions." (Slovic, 1987: 281). Within the psychometric paradigm, people are often asked to make quantitative judgments about the current riskiness of diverse hazards. These judgments are then related to judgments about other properties, such as the hazard´s status on characteristics that have been hypothesized to account for risk perceptions and attitudes. Slovic (1987) identifies several of such variables of perceived risk and aggregates them to two underlying factors which he labels as "dread" and "unknown". The dread factor captures a risk´s perceived controllability and voluntariness, as well as the amount of worry and the catastrophic potential associated with the risk. Supplementary, the unknown factor captures the observability of a risk, the immediacy of the risk´s effects, its newness and the knowledge about the risk.

While prior studies often tend to focus on either the decision theory variables or the Slovic variables there is evidence that the two sets of variables capture distinct information and that investors will rely on both types of information when judging risk (Loewenstein et al., 2001: 274). For example, as outlined by Koonce et al. (2005), the Slovic variable voluntariness describes, whether the decision to invest in a company with a certain risk would only occur if the participant had no knowledge of that risk, or whether the participant would also invest in knowledge of that risk, i.e. voluntary, *given* the loss probability and potential loss outcome for that certain risk. The variable controllability captures the degree to which the management engaged with the risk has control over the consequences evoking from the risk, i.e. whether actions can be taken to minimize an existing risk and not the likelihood of a particular risk

or its magnitude. The four variables that form the unknown factor (newness, immediacy, knowledge, observability) capture how well a risk item is understood, which clearly differs from the probability of a particular outcome from that risk item. For example, the perceived probability of a risk could be low, yet a decision maker could either have a high or low understanding of the risk. Although Slovic variables might sometimes be correlated with decision theory variables (i.e., high controllability may suggest low loss outcomes), "the two sets of variables capture distinct information" (Koonce et al., 2005).

Following this line of reasoning I develop a structural equation model which includes the decision theory variables as well as the Slovic variables in order to achieve a better understanding of an investor´s informational needs. I also want to contribute to a better prediction of an investor´s reaction to risk-related information. While I will adapt the research instrument outlined by Koonce et al. (2005) by the introduction of a modified structural equation model for the purposes of my specific research question, I extend prior literature by investigating risk perception processes in the context of corporate risk reporting within the management commentary. Thereby, I acknowledge the paramount relevance of the management commentary as an instrument of corporate risk communication in the context of corporate governance.

In the following section I first describe the procedures of the survey and how my study was designed in general.[15] I will then present the estimation results of my structural equation model and discuss the findings.

4 Study design and procedures

4.1 Structural Equation Model

Merging the preceding theoretical deliberations, I introduce the structural equation model as depicted in figure 1. The model consists of four latent variables (constructs). For all estimations described in the following I applied the partial least squares (PLS) method and utilized the software SmartPLS (Ringle et. al 2007) to run the analysis (all constructs were specified reflectively, due to the nature of the data at hand). As suggested by theory, the exogenous construct "Decision Theory Variables" consists of the indicators "Loss Probability" and "Potential Loss Outcome". Accordingly, I included the two Slovic factors "Dread" and "Unknown" as latent variables into the model in order to cover the Behavioral Risk/Slovic variables. The endogenous "Dread" construct is reflected by the indicators "Controllability", "Voluntariness", "Amount of Worry" and "Catastrophic Potential" corresponding

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[14] See the evidence provided above. For US-American evidence also see SOP No. 94-5, FRR No. 48, SFAS Nos. 5, 106, and 140.

[15] For further details concerning the methodological approach see Theis, 2011.

with the described theoretical framework. In line with Koonce et al. 2005, I included two indicators to cover different aspects of the knowledge variable ("Knowledge Participant" and "Knowledge Management"). I did not include an indicator for the Slovic variable observability, as doing so proved to be obsolete in pilot testing. As a result of providing rather detailed information about the risk item that has to be assessed, in fact participants will always affirm the observability of a risk item. Hence, the construct "Unknown" consists of the indicators "Newness", "Immediacy", "Knowledge Participant" and "Knowledge Management". Finally, the endogenous construct of major interest, the "Perceived Risk" is reflected by a single corresponding indicator of the same name. To capture the described indicators, an extensive questionnaire was designed. Its general design and the questions asked for each indicator will be described later.

Mirroring the implications of theory, I implement a direct influence of both the decision theory variables and the behavioral risk variables on investor´s risk perception by modeling paths between the constructs "Decision Theory Variables" and "Perceived Risk" (Path 1) as well as between the constructs "Dread"/"Unknown" and "Perceived Risk" (Path 2a/2b). Path 1 reflects the not formally stated hypothesis, that *people´s risk perception is explained by decision theory variables* while the paths 2a and 2b stand for the not formally stated hypothesis, that *people´s risk perception is explained by Slovic variables*. In addition, I explicitly model an interaction between the decision theory variables and the behavioral risk variables by including a direct influence of the construct "Decision Theory Variables" on both Slovic factors ("Dread" and "Unknown", Path 3a/3b). Hence, I expect that the potential extent of a loss as well as its probability will have an effect on the behavioral aspects of risk perception, such as the perceived catastrophic potential of or the amount of worry associated with a risk. After a description of the research instrument utilized to capture the indicators, I will describe the results of the model estimation with reference to the recently described (not formally stated) hypotheses.

Figure 1. Structural Equation Model Including Behavioral Risk/Slovic and Decision Theory Variables
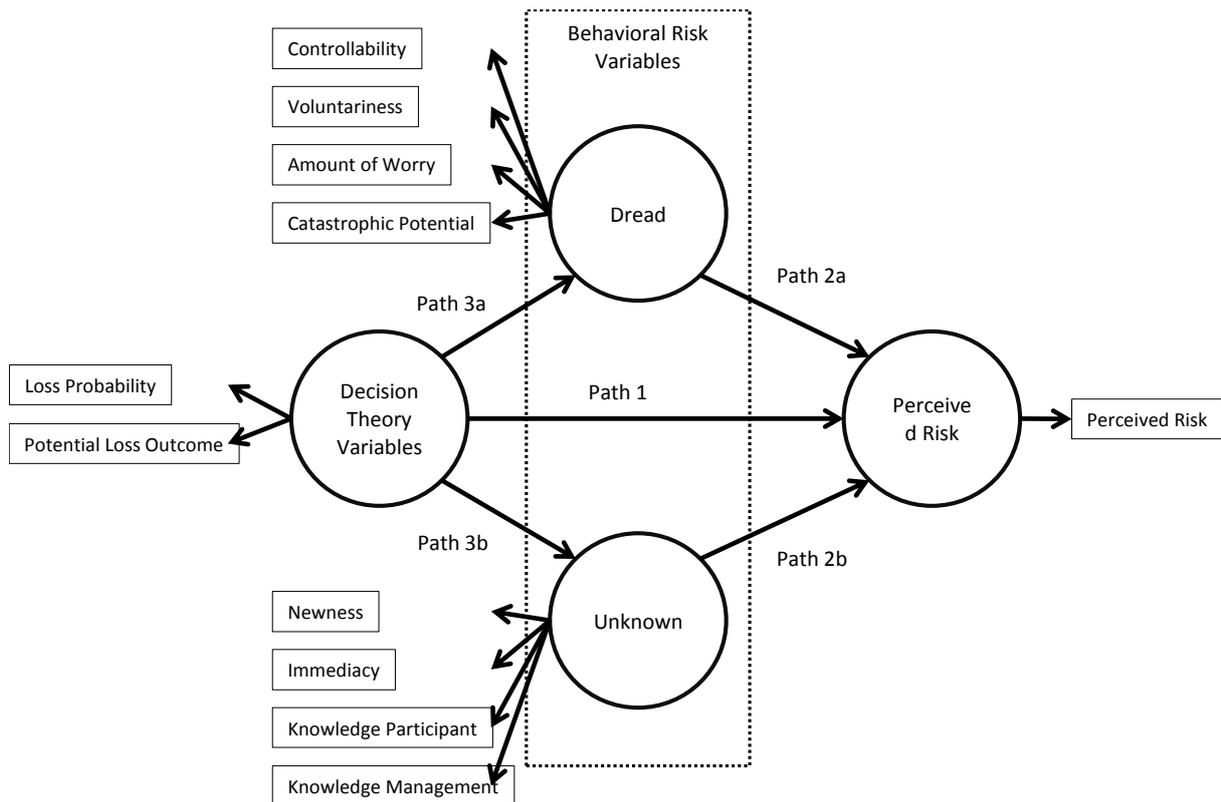
4.2 Questionnaire

4.2.1 General design

The questionnaire that was handed out to the participants consists of 14 pages, including a cover letter, an introductory part to the questions and the set of questions itself. With the cover letter the participants are instructed to carefully read the introductory part to the questions ("I. Introduction") first, where all risk items together with the corresponding excerpts of the risk report of a group

which I named Alpha group were consecutively presented (This procedure should enhance the ability of the participants to make meaningful distinctions among the items, as suggested by prior studies (Koonce et al., 2005)). The participants were then asked to continue with answering the questions – a set of 11 identical questions for each risk item – in the second part of the questionnaire ("II. Questions"), whereby the excerpts of the risk report of the Alpha group were repeated for each risk item before each block of questions in order to facilitate the participants´ assessments. The participants had 45 minutes to complete the questionnaire and returned it after 25-30 minutes on average.

While the name of the Alpha group is fiction, the risk information provided is not. I chose to utilize excerpts from the risk reporting section of the 2009 group management commentary of a German manufacturer of sports equipment. The choice was made after reviewing a quality-ranking for annual reports, which is conducted on a yearly basis. The group I chose scored high concerning the management commentary within the annual report 2009 (Manager Magazin, 2009). In order to avoid that participants´ responses to my questions are influenced by information other than the information I provided about risks, I took best care to ensure that neither the real-world counterpart to the Alpha group nor the industry in which the Alpha group operates, is revealed to the participant (I kept explanations as short as possible and did not reveal the intention of the study in order to avoid demand effects, which could be a threat to the construct validity of my study. For further reading see Shadish et al., 2002: 73). I use a German real-world management commentary as a pattern for the questionnaire, because the risk report within the management commentary supplies exactly the (risk) information needed as input for a study that intends to achieve a better understanding on how users of financial reports in their capacity as capital providers (investors) assess risks. Asking the participants of the survey to assess risk upon unique, company specific information, allows us to reproduce

the scenario that is intended to be covered by the study best (Yet, choosing the described design involves the danger of a reduced generalizability): management commentaries are important tools of capital market communication for German groups and corporations (Kajüter and Blaesing, 2010: 459-460), and therefore a group (or corporation) uses the management commentary (and the risk report) to disclose the information that the group *wants to share* with the investor (within the boundaries of mandatory disclosure requirements).

4.2.2 Risk items

Figure 2 displays the risk-related information that I prepared to be assessed by the participants. The five risk items I chose to provide were the macroeconomic risk, the social and environmental risk, the personnel risk, the financing and liquidity risk, and the product design and development risk (I limited the number of risk items to five, as similar studies suggest that cognitive restrains lead to the maximum number of 5-6 items that could possibly be distinguished and assessed by the participants, if the items are presented within a complex context (Koonce et al., 2005)). The risk items were selected in order to reflect the wide range of the Alpha group´s economic activity. Besides that, the selection was made in order to create meaningful variations in the evaluations of the participants to ensure interpretable results (Koonce et al., 2005: 226). The intention thereby was to include risk items so that some were likely to be perceived as high (e.g., macroeconomic risk), some as medium (e.g., personnel risk) and some as low risk (e.g., social and environmental risk) (A review of the descriptive statistics in table 2 reveals that I indeed created meaningful variation in the perceived risk by choosing the mentioned risk items). Additionally, prior research has shown that making relative judgments (that is, having multiple items to evaluate) considerably improves the quality of judgments (Hsee et al., 1999).

Figure 2. Risk items utilized and provided excerpts of the annual report of the Alpha Group

Macroeconomic Risk

Growth in our industry is influenced by consumer confidence. Abrupt economic downturns, in particular in regions where the Alpha Group is highly represented, therefore pose a significant short term risk to sales development. To mitigate these risks the Alpha Group strives to balance sales across key global regions and also between developed and emerging markets. In addition, a core element of performance positioning is the utilization of an extensive global event and partnership portfolio where demand is more predictable and less sensitive to macroeconomic influence. In 2010, the Alpha Group expects the global economy to grow modestly after the global recession of the prior year. Nevertheless, a high degree of uncertainty prevails in expectations regarding the pace and magnitude of economic recovery. Performance per geographic region is also expected to be mixed.

Social and Environmental Risk

We have a continuing responsibility to our workers, suppliers and the environment. Malpractice in these areas, in particular human rights violations and dubious employment practices, can have a significant impact on the reputation and operational efficiency of our Group and our suppliers. To limit this risk, we have established workplace standards to which suppliers must conform before and during business relationships with the Alpha Group. Internal inspections of supplier factories verified by extensive independent audits are conducted regularly. In the event of non-compliance with these standards, we develop joint actions plans and set deadlines for compliance and further improvement. If these deadlines are not met, business relations are terminated. In order to minimize the environmental impact of producing and distributing our products, in 2009 the Alpha Group continued to proactively engage in developing more environmentally sustainable products which included the first products from our "Better World" program. In 2010, we intend to grow the share of sustainable products by intensifying our "Better World" initiatives within all product categories of the Alpha Product Performance division.

Personnel Risk

Achieving the Alpha Group´s goal of becoming the global leader in our branch of industry is highly dependent on our employees and their talents. Loss of key personnel in strategic positions, to competitors or others, is therefore a significant risk we face. In addition, as labour markets become increasingly competitive, we also face the risk of being unable to identify, recruit and retain the most talented people that best meet the specific needs of our Group. To reduce this risk and enable our employees to make use of their full potential, we strongly engage in developing a motivating working environment. Our goal is to make the Alpha Group the "Employer of Choice" within our industry. This is supplemented by offering attractive reward and incentive schemes as well as long-term career opportunities and planning. Our overall assessment of personnel risks remain unchanged compared to the prior year. Although we expanded our own-retail activities (where employee turnover is higher than the group average) and increased our employee base in emerging markets (where higher levels of wage inflation increase the volatility of the employment market) in 2009, the current economic environment is likely to reduce employee turnover.

Financing and Liquidity Risk

Liquidity risks arise from not having the necessary resources available to meet maturing liabilities with regard to timing, volume and currency structure. In addition, the Alpha Group faces the risk of having to accept unfavorable financing terms due to liquidity restraints. Our Group´s treasury department uses an efficient cash management system to manage liquidity risk. At December 31, 2009, Group cash and cash equivalents amounted to 775 million Euro (2008: 244 million Euro). Moreover, our Group maintains 2.2 billion Euro bilateral short-term credit lines and a 2 billion Euro vomited medium-term syndicate loan facility with international banks, which does not include a market disruption clause. The 4.2 billion in credit lines are designed to ensure sufficient liquidity at all times. In order to mitigate financing risks and to reduce the dependence on banking financing, in 2009 the Alpha Group issued a German private placement in the amount of 200 million Euro in two tranches with a maturity of three and five years respectively, and a Eurobond in a nominal amount of 500 million Euro with a maturity of five years. In 2009, we reduced net debt by 1.272 billion, which resulted in the achievement of our medium-term target of financial leverage below 50% at year end.

Product Design and Development Risk

Innovative and attractive products generate strong sales and – more importantly – create a halo effect for other products. The speed with which new product technologies and fresh designs are brought to market is decisive for maintaining competitive advantage. In 2009, all brands generated the majority of their sales with products which had been brought to market over the past 12 to 18 months. If the Alpha Group failed to maintain a strong pipeline of new innovative products over a sustained period of time, we would risk a significant sales decline. We focus on pursuing our innovation and design strength. To ensure we can quickly adapt to changing consumer preferences, we focus on streamlining research and development processes to speed up the time to market.

4.2.3 Questions

In the second part of the questionnaire ("II. Questions"), the participants were asked to answer a number of identical questions on a scale from 0 to 100 for each risk item. The questions asked are generally in line with those used by Koonce et al. (2005) but were adapted for the scenario which I intended to cover. With reference to each of the five risk items I repeated the same set of eleven questions: Relating to the decision theory view, the participants had to assess the loss probability and the loss outcome concerning the risk items. Relating to the behavioral risk perspective, I asked questions in order to capture the indicators associated with the conctructs "Dread" and "Unknown" (that is, the Slovic variables, see above). Finally, the participants had to assess their perceived risk in total for each of the five risk items. I

intentionally did not provide a definition of risk within the questionnaire, as doing so would have defeated the objective in determining how investors think about risk (Koonce et al., 2005). In order to enhance the participants´ comprehension and commitment, the survey was conducted in German. For a summary of the questions forming the indicators and for a presentation of how the endpoints of the scale from 0 to 100 were labeled for each question, see table 1.

Table 1. Indicators of the measurement model

Latent Variable		Indicators	Questions forming the indicator [Endpoints on Scale from 0 to 100]
Decision Theory Variables	x_{11}	Loss Probability	"What do you think is the probability of an economic loss to to the Alpha group from the risk item?" [0% probability], [100% probability]
	x_{12}	Potential Loss Outcome	"If there were an economic loss to the Alpha group, from the risk item, how big a loss would you expect?" [no loss], [very high loss]
Dread	y_{11}	Controllability	"How difficult is it for the Alpha group´s management to use their skill and diligence to control the risk item?" [very difficult], [very easy]
	y_{12}	Voluntariness	"Would you invest in the Alpha group in knowledge of the risk item or would you only invest without knowledge of the risk item?" [in knowledge of the risk], [without knowledge of the risk]
	y_{13}	Amount of Worry	"To what extent would you as a potential investor be worried because of the risk item to the Alpha group?" [no worry], [very high worry]
	y_{14}	Catastrophic Potential	"What do you think is the probability of a threat to the going concern of the Alpha group arising from the risk item?" [0% probability], [100% probability]
Unknown	y_{21}	Newness	"At your own valuation, is the risk item a novel or a long-known risk to the Alpha group?" [novel], [long known]
	y_{22}	Immediacy	"To what extent is the risk item to the Alpha group immediate or is it likely to occur over time?" [immediate], [over time]
	y_{23}	Knowledge Participant	"To what extent is the risk item to the Alpha group known by you?" [unknown], [known in detail]
	y_{24}	Knowledge Management	"To what extent is the risk item to the Alpha group known by the Alpha group´s management?" [unknown], [known in detail]
Perceived Risk	y_{31}	Perceived Risk	"At your own valuation, how high is the risk item for the Alpha group in total?" [no risk], [very high risk]

4.3 Participants

The participants of the study were 32 students of a German Business School which had attended advanced lectures in accounting. Although I am aware that conducting the survey with students could be considered as a threat to the external validity of my study, I argue that it was adequate to utilize students for my purposes. First, other studies suggest that students are valid surrogates for (nonprofessional) investors (Elliot et al., 2007).[16] Furthermore, the students are not only surrogates for nonprofessional investors, my participants *are indeed* (nonprofessional) investors, as their indicated investment experience suggests. However, with access to professional investors, it could be up to further research to provide explicit evidence that my findings hold for both nonprofessional as well as for professional investors.

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[16] See also evidence from related research: Liyanarachchi and Milne, 2005.

4.4 Model Estimation and Results

The assessment of five risk items per questionnaire by 32 participants leads to 160 data sets which are included in the descriptive statistics and which are utilized to estimate the structural equation model as described below. Each data set consists of a value for the indicator constituting the endogenous construct of major interest ("Perceived Risk") and values for the indicators reflecting the other latent variables.

Table 2 provides the descriptive statistics for the decision theory, the Slovic and the overall perceived risk variables, including the means and standard deviations of the assessments made by the participants for each variable, grouped by the risk items.

Table 2. Descriptive Statistics

Descriptive statistics, grouped by risk items (Means and standard deviations)

	Risk Macroeconomic		Social and Environmental		Personnel		Financing and Liquidity		Product Design and Development	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Loss Probability	58.13	24.02	23.13	16.74	36.25	24.33	49.06	26.32	47.19	20.67
Loss Outcome	64.06	31.71	32.50	22.72	42.5	25.53	62.81	24.52	64.38	20.47
Controllability	25.94	21.38	67.50	28.51	58.44	27.13	42.19	21.06	46.88	25.20
Voluntariness	49.69	27.65	22.19	22.68	33.75	28.71	45.00	31.72	42.81	30.82
Amount of Worry	61.25	26.73	16.56	13.10	29.06	21.31	50.31	29.89	45.63	25.52
Catastrophic Potential	54.69	33.60	17.81	18.27	32.19	21.81	50.63	30.58	51.56	22.45
Newness	51.88	35.05	57.19	32.05	74.06	21.38	58.13	25.71	51.88	30.00
Immediacy	34.06	28.38	62.81	22.03	57.5	25.02	40.00	26.52	42.50	32.03
Knowledge Management	45.63	28.84	71.56	21.27	74.06	19.15	66.56	23.64	67.19	65.12
Knowledge Participant	30.00	26.27	41.88	21.91	43.44	23.36	38.75	24.98	34.06	25.00
Perceived Risk	66.25	24.59	21.88	15.33	41.25	21.96	52.5	25.27	60.94	23.47

The table reports the Means and Standard Deviations for all Slovic and Decision Theory variables, calculated over all participants and per risk item.

In a first step, it is necessary to assess the reliability and validity of the structural equation model. As outlined in table 3, the values for Cronbach´s Alpha and the Composite Reliability of the latent variables exceed in general the value of 0.7, which can be interpreted as the highest of potentially critical values (Fornell and Larcker 1981). The internal consistency of the indicators reflecting the constructs is therefore high and the construct reliability can be confirmed. As the values for the Average Variance Extracted (AVE) associated with the constructs are in general higher than 0.5 (Fornell and Larcker 1981), our measurement models are distinguished by a high level of convergence validity: the variances recorded by the constructs significantly exceed the variances induced by measurement errors. Both convergence validity and the reliability of the measurement model can be verified by the analysis of the construct´s standardized loadings and the respective bootstrap-t-statistics (Anderson and Gerbing 1988). The majority of the loadings takes values higher than 0.7, while all loadings are highly significant.

Table 3. Reliability and validity measures

Latent Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Decision Theory Variables	0.77	0.89	0.81
Dread	0.81	0.88	0.64
Unknown	0.64	0.78	0.48
Perceived Risk	-	-	-

Lastly, the discriminant validity of the reflective measurement models can be largely affirmed with making recourse to the Fornell-Larcker criterion (Fornell and Larcker 1981): In general, the square root of the Average Variance Extracted for each construct is higher than the correlation between the respective construct and all other constructs. In other words, when discriminant validity is affirmed, each of

the latent variables explains the variances of its own indicators better than the variance of all other latent variables (compare table 4).

Table 4. Correlations between latent variables

Correlations between latent variables*	Decision Theory Variables	Dread	Unknown	Perceived Risk
Decision Theory Variables	**0.90**	0.81	0.52	0.79
Dread		**0.80**	0.52	0.82
Unknown			**0.69**	0.44
Perceived Risk				-

* Numbers shown in boldface denote the square root of the average variance extracted

When model estimation results of a structural equation model are assessed, the explanatory potential of the model is of substantial interest.[17] As shown in table 5, the R^2 values for the endogenous constructs are extraordinary high in comparison to other studies (for further discussion, see Mertenskötter 2011). The estimation of the model yields in an overall R^2 value of 0.728 for the main (dependent) construct "Perceived Risk", and in an R^2 value of 0.664 (0.275) for the "Dread" ("Unknown") construct. All in all, the explanatory potential of the presented structural equation model is very good, which again supports the validity of the study.

Table 5 also presents the estimated path coefficients with the associated significances and effect sizes. A significantly positive, moderately strong (effect size $f^2 > 0.15$, see Wilson et al. 2007 for all inferences concerning effect sizes) effect emerges from the exogenous construct "Decision Theory Variables" on the endogenous construct "Perceived Risk" with a loading of 0.368 (path 1). Hence, in a first step I can confirm that *people´s risk perception is explained by decision theory variables* in the context of corporate risk communication. With reference to the constructs that constitute the behavioral risk variables ("Dread" and "Unknown"), a significantly positive, strong effect (effect size $f^2 > \approx 0.35$) on the "Perceived Risk" construct can only be affirmed for the "Dread" construct with a loading of 0.535 (path 2a), while the respective path coefficient for the "Unknown" construct is negative and insignificant (path 2b). Consequently, I can only partly prove that *people´s risk perception is explained by Slovic variables*. The insignificant results for the construct "Unknown", reflecting the respective Slovic factor, first of all correspond with findings in other studies.[18]

In particular, the insignificant results could also partly be a consequence of the setting I chose. Out of the reasons explained above, participants were asked to assess risk upon unique, company specific information, *reported by the management* according to the case. Under these circumstances, participants might have judged the "Knowledge (of the) Management" to be to be high, no matter what their perceived risk for the risk item was. In contrast, as very specific risk information was provided, it is possible that participants judged their own "Knowledge (of the) Participant" in comparison to the knowledge of the management to be low in general (a review of the descriptive statistics supports this view). Finally, the results show significantly positive and strong effects of the exogenous construct "Decision Theory Variable" on the endogenous constructs "Dread" and "Unknown", with loadings of 0.815 and 0.525. As expected, the potential extent of a loss as well as its probability has a determining effect on the behavioral aspects of risk perception, the Slovic factors dread and unknown, which amplifies the decision theory variable´s impact on the perceived risk. This again highlights the necessity of a broad understanding of all variables influencing an investor´s risk perception in order to define a corporate risk reporting strategy as part of good corporate governance and calls into question the general adoption of a decision theory perspective by regulators and standard setters.

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[17] Please note that I controlled for participant-related biases when I estimated the structural equation model. All reported estimation results were obtained with a control-construct included in the model. The control-construct consists of the participant-specific demographic variables "Age", "Gender" and "Investment Experience" and directly connects to the endogenous construct "Perceived Risk". The control-construct is omitted in all figures and tables in order to avoid redundant complexity.

[18] See Holtgrave and Weber 1993, Koonce et al. 2005.

Table 5. Structural model results and effects sizes (f^2)

Criterion	Predictors	R^2	Path coefficient	f^2
Dread	Decision Theory Variables	0.664	***0.815	1.98
Unknown	Decision Theory Variables	0.275	***0.525	0.38
Perceived Risk	Dread	0.728	***0.535	0.34
	Unknown		-0.041	-
	Decision Theory Variables		***0.368	0.16

*** significant at <0.01 level (two-tailed test)

Effect size f^2 measures the relevance of each predictor of a dependent latent variable and is based on the relationship of determination coefficients when including or excluding a particular predictor from the structural equation.

5 Conclusion

I identify two sets of different variables that could potentially describe how investors perceive risks when they assess risk-related information from a management commentary by introducing two theoretical perspectives. Following the decision theory view, individual decision making under uncertainty relies on a probabilistic framework. Thus, the variables loss probability and loss outcome are expected to have a significant influence on an investor´s risk perception. In contrast, the behavioral risk perspective argues that an investor´s perception of risk is influenced by risk dimensions that have little to do with outcomes and their probabilities.

I argue that both sets of variables capture distinct information. The evidence that I generate with this study supports this view. In a structural equation model, both the decision theory variables as well as the Slovic variables significantly prove to be relevant for the explanation of how investors perceive risks when they assess risk-related information from a management commentary. Even further, through an interaction between both sets of variables, the behavioral aspects of risk perception amplify the influences driven by decision theory variables. These findings are of great importance, as I also show, that regulators mostly focus on disclosures of loss probabilities and/or loss outcomes concerning risk reporting, and thereby – at least implicitly – capture a decision theory view.

Interestingly, the recent change of the German Risk Reporting regulation focusing on key corporate governance aspects can be advocated adopting a behavioral risk perspective. With the commencement of the German Accounting Law Modernisation Act (BilMoG), a description of the key characteristics of the accounting-related internal control and risk management system became mandatory. Thereby, a strategy which my results would suggest to risk reporting companies became mandatory in Germany. An expanded disclosure of accounting-related internal control and risk management systems could mitigate an investor´s perceived risk through the favorable

effects of a reduced amount of worry, higher perceived controllability and a better understanding of the risk item. Based upon the evidence which my study provides, I suggest, that:

(1) Companies, regardless of whether they are subject to the German regulatory framework (§§ 289(1), 315(1) HGB in particular), consider the beneficiary effects of a detailed description of key corporate governance aspects just as the characteristics of the accounting-related internal control and risk management system when they develop a risk communication strategy and rather exceed possibly existing legal requirements. This should especially be considered out of a corporate governance perspective in order to meet the investors´ informational needs.

(2) Future changes in the framework for the preparation and presentation of a management commentary in accordance with IFRS should contain explicit and emphasized disclosure requirements concerning an internal control and risk management system that reach beyond the recommendation for the disclosure of the management´s strategies for managing risks as well as the effectiveness of those strategies, as suggested by the Practice Statement. The forthcoming German Accounting Standard (GAS) on management commentaries could have the potential to serve as a model.

(3) The assumptions on which the international as well as the German regulatory frameworks are based in terms of risk-related disclosure requirements shall be extended, as my results suggest that an investor´s perception of risk is not only influenced by risk dimensions that capture outcomes and their probabilities, but also by dimensions that rather relate to emotional reactions to financial risks in ways that go beyond their objective consequences.

(4) Companies should not solely adopt a decision theory view (as suggested by the regulatory framework) when developing a risk communication strategy, because risks can only

be communicated reliably (i.e. without inducing unexpected behaviors) when the informational needs of the investors are met. From a behavioral risk perspective, a company could for example reduce an investor´s perceived risk concerning a reported risk item by appropriately reducing an investor´s dread and increasing his understanding of the risk (i.e., reducing the unknown-component of the risk item), *given* certain loss outcomes and loss probabilities related to the risk item. Thereby the company would communicate risks reliably and unintended overreactions of investors could be avoided. The definition of suchlike corporate risk reporting strategies needs to be subject to deliberations in the context of good corporate governance, as these strategies do not only fill the contentual gap left by the normative risk reporting frameworks, but should also narrow management´s discretionary in risk reporting, in favor of the investor.

My failure to provide statistically significant evidence for the relevance of the Slovic factor unknown in explaining the perception of risks could be a possible starting point for future research. Proving that unknown has a significant influence on the perception of an investor´s risk could have further interesting implications for a company´s risk disclosure strategy. GAS 5.10 states that information about a risk shall be provided within a risk report, when the risk is associated with "a danger that the economic position of the group could suffer a significant deterioration or when there are indications that the existence of the entity may be threatened either for economic or legal reasons", i.e. when the risk is highly material. In contrast, evidence for the relevance of the Slovic factor unknown in explaining the perception of risks would suggest a rather different disclosure strategy. The careful disclosure and early introduction of a risk which is not yet material could be beneficiary to the company, when the management anticipates that the risk will become highly material in the future. The behavioral risk perspective would suggest that slowly increasing the investor´s knowledge about the risk in combination with the reduction of the perceived newness of the risk leads to a mitigated perception of the particular risk when it becomes material.

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