The CFO's predicament: Between controller and business partner *

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Abstract

Recently, the role of the CFO has shifted towards that of executive manager, but it is unclear how this influences their traditional financial conscience role. To shed light on this issue, we analyze the responses of 263 active CFOs, CEOs and non-executive directors in an interactive survey. The results show a striking difference between expectations about the CFO and CFO choices. Respondents expect the non-executives and the CFOs to be significantly less willing to take corporate risk than the CEOs. As expected, the CEOs demand less return and experience less risk than non-executives for a given investment scenario. Against all expectations, however, CFOs experience less risk and demand a lower return than even the CEOs. Furthermore, discussions with groups of directors show that their role in the board is defined by contrasting it to other boardroom roles. A shift in role of the CFO should, therefore, cause corresponding shifts in the roles of other board members. In our survey, the shift of the CFO appears to be misjudged, which calls into question the shift in other roles. These findings suggest that models on corporate governance should be reviewed in light of the new role of the CFO.

Keywords— Corporate governance, CFO, Non-executive, Survey,

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1 Introduction

As the head of the finance and control departments, the CFO traditionally embodies the financial consciousness of the organization and, as such, is part of board-level controls. Over the last decades, the CFO's role has shifted towards that of a business partner to the CEO. However, most commentators argue that this shift should not cause the CFO to abandon the financial consciousness role (Favaro, 2001; Zorn, 2004; Zoni and Merchant, 2007; Han et al., 2015; PwC global power & utilities, 2015; Deloitte, 2016; Mailliard, 2016; EY, 2016). Following the suggestions of these commentators and combining these dual roles, financial conscience and executive manager, creates a predicament for the CFO. As both part of management and part of board-level controls, he becomes part of the controls on himself. With limited time and mental resources, the CFO is likely to have to choose: should the CFO first facilitate corporate governance and board-level control, or should the CFO first be part of executive management? The non-executives[1], as another board-level control aspect, face a similar uncertainty. To be effective in their governance capacity, they need to know when they can expect to be dealing with the financial conscience CFO, and when they should expect the executive manager CFO(Uhde et al., 2017). In any given situation, the non-executives therefore have to ask themselves: "Is the CFO acting as financial consciousness, or as business partner?"

Both of these CFO roles, financial consciousness and executive manager, are much discussed in the literature. However, very little is known about how actual CFOs deal with conflicts between these roles, and even less about the expectations held by directors about the CFOs' choices. Direct measures of these choices and expectations are needed to open the black box of the boardroom and further this research agenda (Hambrick, 2007; Leblanc and Schwartz, 2007; Priem et al., 1999; DellaVigna, 2009). In this paper, we add to the literature by measuring and comparing the expectations and choice patterns of 263 active directors, CEO's, CFO's and non-executives through an interactive survey. These directors expect little difference between non-executives and CFOs in terms of

[1]We have collected data in the Netherlands, where the two-tier board system is the standard. All non-executive directors are, therefore, supervisory board members and we will use these terms interchangeably.

willingness to take corporate risks, while they expect the CEOs to be much more risk-tolerant than both CFOs and non-executives. Agreement on this ranking is universal, all groups of subjects expect the CFOs to be as careful with risks as the non-executives. These expectations show that, on the boardroom scale of executive manager (CEO) to control (non-executives), the respondents expect CFOs to act as a board-level control, and thus as the financial conscience. However, in realistically sized investment scenarios with sizeable risks, the choices of these same directors show a very different pattern. As expected, CEOs are willing to take more risk than non-executives. However, where all respondents expect the CFO to have similar risk tolerance as non-executives, we find that CFO report to experience less risk and demand lower returns for a given investment than both the non-executives and the CEOs. Against all expectations, their choices place the CFOs on the executive manager end of the boardroom scale.

To shed more light on the difference between the choices and expectations of these directors, and in particular on how these expectations were formed, we organized discussion meetings, one with CFOs and one with non-executives (with executive experience). The discussions confirm that the difference between expectations and choices was a surprise to the directors. In both groups, the discussion indicated that directors' roles are defined by dividing tasks within the shared responsibility of managing the company. This makes the expectations directors have about each other even more important. If non-executives expect the CFO to be the financial control, they are likely to spend less attention on that control task in favor of other tasks. Making expectations explicit, as we did in this survey, can therefore help define the distribution of tasks within the board.

We designed our study to meet three, difficult to combine objectives, we want to study: (1) relevant actors, (2) that make relevant choices, (3) while maintaining exogenous variation. Active directors are notoriously difficult to approach for participation in research. To maximize participation, we approached participants through the networks of the master and post-initial educational programs on our university, and asked the network administrators to cosign the invitation. We extensively beta-tested initial versions of the survey to reduce the probability of loosing participants. Furthermore, we provided

feedback to all participants through individualized reports. Each report showed the participant both their own responses and the distribution of responses of their peers. These reports allowed them a unique opportunity to reflect on how they compared to their peers outside of their organizations. The combination of these measures resulted in a response rate of 35% (see section 3 for more details).

The second and third objective let us to incorporate some experimental tools in the survey. To get relevant choices, we looked for conflict between the roles of financial conscience and business executive. This conflict is particularly likely to occur with corporate investments and Mergers and Acquisitions, where financial risks could prime the financial conscience role, and the desire to grow the business could prime the executive manager role. However, asking participants about corporate investments in their (recent) past, is likely to trigger recollection biases and potential reputational concerns. Furthermore, previous investment choices are highly endogenous to the professional position, background, and experience of the participants, all of which are variables of interest. With both endogeneity issues and reporting biases, observational or standard survey data would not allow us to do any causal inference (Gow et al., 2016; Floyd and List, 2016). Building on earlier work in survey experiments (e.g. Kuziemko et al., 2015), we therefore created a survey tool with dynamic elements that allows exogeneous variation in customized questions. To maintain relevance, the survey uses the answers given in the first part of the survey to make the investment scenarios resemble typical decisions taken by the participant. To create exogeneous variation, the survey randomly selected scale, investment type and success rate of each scenario. By comparing over several of these scenarios, we can identify the effects we are after: differences between CEOs, CFOs and non-executives in terms of perceived risk and willingness to invest for an exogenously given investment.

As part of our survey, we collected demographic information about our participants to test previously discussed relationships between demographics and risk tolerance (e.g. Hambrick, 2007; Plöckinger et al., 2016) using the individual choices of our directors. We find that age, experience and functional background of the individual directors correlates with the decisions made, but effects are weak. Participants with greater experience

appear more cautious in required return, but also report to experience less risk. Against expectations, younger respondents tend to require a higher return. We cannot replicate the effect of gender, but this is likely caused by the low number of female board members.

The comparison between expectations and behavior of active CEOs, CFOs and non-executives has direct relevance for practice. Corporate directors are not perfectly rational, their judgment and decision making is influenced by their personalities, frames of reference, and style (Plöckinger et al., 2016; Ge et al., 2011), as well as the environment and task they involved in (Bonner, 1999; Krische, 2011). Expectations are an important, but often implicit, aspect of the frame of reference, while a large part of a director's environment is determined by the other directors (Uhde et al., 2017). Furthermore, the finding that the CFOs' predicament might cause them to switch from financial conscience to executive manager - perhaps even during a meeting – could imply expectations have to be reconsidered by practitioners and researcher alike. Making expectations about tasks and behavior explicit, like in our survey experiment, is a relatively simple exercise to implement in boards (or any other team for that matter) to ensure mutual understanding. In our discussion meetings, the non-executives noted that making these expectations explicit and checking them was a useful exercise.

After the spectacular failures of internal governance and risk controls in the 2008 crisis, governance structures and the organizational design of risk control have come under renewed scrutiny (see e.g. Adams and Ferreira, 2007; Hopwood, 2009; Brown et al., 2011; Van der Stede, 2011). The CFO holds an important position in traditional models of governance, but it is unclear how effective the executive manager CFO can be in governance tasks. Since the board members define their own task by contrasting it with the tasks of the other board members, a shift of the tasks of the CFO is likely to cause changes to other roles as well. The traditional models of boardroom control and corporate governance will, therefore, likely need to be revised to ensure they meet current needs and expectations. By involving active directors in this research, we can increase the relevance of this research (DellaVigna, 2009) and spread the research findings more effectively to this important audience.

In Section 2 we discuss the the background and research questions. The interactive survey and other data collection is described in Section 3, followed by the results. Section 5 concludes. An example of the survey instrument, description of data, and some relevant quotes from the semi-structured interviews can be found in the appendix

2 Background and research questions

Practitioners and academics alike are clearly interested in the role of the CFO in the board. The practitioner consensus appears to be that CFOs are transforming from bean counters towards strategic managers (PwC global power & utilities, 2015; Deloitte, 2016; EY, 2016; Mailliard, 2016). A similar conclusion is appearing in the academic literature, with many authors stating that the CFO's role is becoming more and more strategic and operational (e.g. Favaro, 2001; Zorn, 2004; Zoni and Merchant, 2007; Han et al., 2015). However, none of these authors suggest that the finance function, nor the CFO as head of finance, should completely abandon the traditional duties of controller and steward. In fact, most commentators still place these traditional duties at the top of the list of CFO tasks, creating the dual role of 'financial consciousness - executive manager'. Some commentators go even further, suggesting that it is undesirable for the CFO or his controllers to become too tied up in management (e.g. Indjejikian and Matejka, 2006; Zoni and Merchant, 2007; CIMA, 2016) as this could risk governance functions in the organization. However, several studies have found that the performance of firms, and even the control function within firms, can be improved by allowing controllers and the CFO to be involved in the firm's strategic decision-making (Maas and Matejka, 2009; Han et al., 2015). This implies that complete separation between (executive) management, and the control and governance aspects of the firm is unlikely to be optimal. This is also the gist of section 302 of the Sarbanes-Oxley Act[2], which requires that the CEO and CFO *together* give assurances about the control situation in the company.

The dual role, and divergent advice place CFOs in a predicament. Like all others, CFOs have a limited amount of time, energy and focus, so they will often have to choose

[2]The Sarbanes–Oxley Act of 2002, Public Law 107–204, 116 Stat. 745

what to do first: focus on control, or focus on strategic management. Since the CFO's role is complex and multi-faceted, this makes his behavior more difficult to predict. This prediction is, however, quite important for the other directors. The primary focus of the CFO, will impact the responses required of the non-executives in both their supervisory and advisory roles. If it is difficult for non-executives to predict the CFOs focus, it will be difficult for them to effectively act in their corporate governance function.

Uhde et al. (2017) recently provided a very interesting overview on the literature studying the relation between CFO and supervisory board. They note that relatively little is known about the CFO and the link between the CFO and the board, and outline an agenda and framework for future research. The present paper adds to this research agenda by studying several inputs of the boardroom process, and the relationship between the CFO and the board by measuring and contrasting the individual expectations and investment choices of the board members. Furthermore, by comparing the investment decisions made by CEOs, CFOs and non-executives, we directly answer one of the research questions posed by Uhde et al. (2017). We find that in investments, CEOs and CFOs are likely to work as a team rather than as counteracting forces.

2.1 Research on the functioning of the board

The cognitive bases and values, or the heuristics of individuals in the top management team, are difficult to observe as we usually lack the required level of access. Hambrick and Mason (1984) and Hambrick (2007) suggest using a methodology inspired by marketing studies, where demographic variables and background characteristics are used as proxies for the cognitive bases, values and perceptions of upper level managers. These demographic variables are more easily observed, allowing researchers to relate observable board characteristics to measurable corporate decisions and outcomes. A similar body of literature in behavioral finance addresses overconfidence and optimism of executives, see e.g. Graham et al. (2013) and references therein. Our survey allows us to test the relations between perceptions and cognitive bases suggested by the upper echelon literature on more direct measures of the relevant constructs and individual choices. This provides

strong complementary evidence on the relationships found.

In their survey of the upper echelon literature in accounting, Plöckinger et al. (2016) find that age, tenure, experience and education seem to reduce risk tolerance in financial reporting, similar effects are found in other directors (e.g. MacCrimmon and Wehrung, 1990; McClelland et al., 2012; Berger et al., 2013). Consistent with these earlier findings, we expect that age will decrease the risk tolerance of our participants. Similarly, tenure has been found to diminish the appetite for risks among most decision-makers (Finkelstein and Hambrick, 1990; Hambrick and Fukutomi, 1991; Wiersema and Bantel, 1992; Sanders, 2001). As we have cross-sectional data, it is impossible to disentangle tenure and age effects through time variation. However, we do observe differences in previous exposure to risky investment decisions. Since previous exposure to risk can change how one perceives new risky choices, this is exposure is likely one of the drivers of the relation between tenure and risk appetite. We therefore expect that previous experience with risky projects will decrease the appetite for risk. Similarly, we expect that participants who have previous experience with larger investments will be more risk-averse.

The roles of different actors in the boardroom have been discussed in several professional fora, as well as in a small number of academic papers. Traditionally, the non-executive board members are considered as gate-keepers (e.g. Mace, 1972), the CFO a bean counter, and the CEO a leader or entrepreneur. However, over time the role of the CFO has expanded and became more strategic (see e.g. Farag et al., 2011; Hiebl, 2013; PAIB Committee, 2013). Since the CFO has more than one task, and individual choices and expectations can depend on the task and circumstances, it is difficult to predict how the CFO will compare to the other board members in a given situation. As the literature review of Menz (2012) shows, research into the CFO focuses mainly on the consequences of CFO turnover and incentives, so that it gives little guidance in this matter. Rather than developing an independent theory about expectations and relative risk tolerance, we structured this study as an exploratory endeavor. We asked our respondents to indicate what they expected of each other. This allows us to show and compare insiders' expectations and with relevant, insider choices.

3 Methodology

Twenty years after the original upper echelon article, Hambrick (2007) summarized the literature that followed it, along with a review of strengths and weakness of the methodology. Any upper level manager will only be presented with those choices he was selected for. The background characteristics, values and cognitive bases of the individual are exactly what brought the individual to the position they are in. Identification on observed behavior will therefore always have to be concerned with endogeneity and reverse causality. In this paper we add to literature by studying investment choices and perceived risks of several groups of directors in a setting with exogenous variation. This approach strongly complements the literature, as it involves the relevant decision makers in a controlled manner, thus combining some of the strengths of surveys and experiments.

Designs that change the questions, or information on respondents' screen based on their responses is fairly new in research. An early methodological example is Kuziemko et al. (2015) whose appendix provides a useful overview of design considerations. A branching method of selecting questions was used by Bodnar et al. (2011) to study risk management practices. This type of interactive surveys are relatively new, so they are not yet in methodological overviews like Harrison and List (2004); Bloomfield et al. (2016); Floyd and List (2016). In terms of the Bloomfield et al. (2016) terminology, our study has similar properties to laboratory studies, as we control the data-generating setting. However we do not randomize the boardroom position of participants (manipulate independent variables). In the terminology of Harrison and List (2004) and Floyd and List (2016) our methodology is closest to framed field experiments. We take the population that is ultimately relevant, corporate directors, and introduce a setting that mirrors the field setting, but in our case without incentives.

In this study, we isolate the decision makers from their normal environment, their normal team, and their normal discussions to identify specific effects, much like one would in a lab experiment. Like a lab in the field, or framed field experiment study, we are dealing with a non-standard subject pool, active corporate directors. Whenever corporate directors are asked to make a decision in an experiment or study, they bring

part of who they are with them. As we are ultimately interested in the decisions of these relevant actors, allowing us to study these decision in isolation is a big advantage of this approach.

3.1 Survey

Data was collected through a web-based survey. The translated survey instrument can be found in the online appendix. Each respondent received a hyperlink with a unique token that allowed the respondents to start, pause and continue the survey at their own convenience. The token in the hyperlink also allowed us to use the information gained early in the survey to tailor later questions to the specific participant.

The survey first elicits some basic information from the respondents about their job and experience. We ask for their position within the company, the approximate size of the company revenues (with five choice options, ranging from 'below €50 million' to more than '€1 billion'), the company's industry and the number of employees (ranging from 'less than 50' to 'more than 10.000'). We then ask the respondents to indicate the number and size of investments they have decided upon in the last 15 years, for each of five categories (new market expansion, expansion of production capacity, R&D projects, IT projects, and mergers and acquisitions).

The dynamic elements in the survey use the answers to questions about typical investments in the past to tailor hypothetical investment scenarios to the participant. The procedure is similar to the branching described in Bodnar et al. (2011), but allows more flexibility in the individual questions. Respondents who have experience with a category of investments are asked to evaluate two scenarios with investment possibilities in this familiar category (except for M&A that was believed too different during the prototype tests). The investment possibilities contain three parameters that are varied exogenously: an estimated probability success, a non-recoverable investment, and a short description of the type of investment. The size of the investment depends on the typical investment decisions made by the respondents (derived from the first part of the survey) multiplied with a random factor (0.5 or 1.25) to obtain relatively small and large investments within

a familiar range. From beta-tests and discussion prior to the survey, we found that most proposal discussed in the board had high estimated success rates, therefore success rates where either either 0.80 or 0.95. For each scenario, respondents are asked to indicate the minimum Net Present Value (NPV) they require before they can give their approval to this investment. We chose the NPV because it summarizes all information of the return in a single number and it is theoretically the best measure of profitability of an investment. It is also a measure that is widely understood and taught in business schools and economic curricula, as well as used in practice. The survey fixes the probabilities and the initial investment so that each participant is essentially asked when he believes the expected return is high enough to compensate for the risk. A more careful or more risk averse individuals should therefore indicate a higher required NPV. After they provided an NPV, our respondents were asked to self-reflect and to indicate how much risk they experienced from this investment on a 7-point scale.

As we are interested in the roles played by the participants, we make the role of the individual participant salient in our survey. A CFO, for example, would be asked:
"What should be the minimum net present value (the value of the revenues after deduction of the investment discounted back to today) of this expansion be, so that you, in your role as *CFO*, agree with this investment?"
The central part of our survey thus asks participants to judge corporate investment scenarios, that resemble the investment decisions they make for their company - but are constructed using identifiable random shocks- while being reminded of their role in their company.

After this central part of the survey, we ask our respondents to rate how they perceive the willingness to take risks of i) themselves in general, ii) themselves in their professional role, iii) the average CEO, iv) the average CFO, and v) the average non-executive. All these ratings are given on the same 11-point scale ranging from 'Not willing to take any risk' (0) to 'Very willing to take risks' (10). These questions are based on a question developed and tested in Dohmen et al. (2011). We then ask the respondents about demographic information, like gender and age as further controls.

The novelty in the survey is in the amount of individualization of the investment scenarios. Through these individualized questions, the interactive part of the survey automates aspects of a structured interview without actually requiring the direct time and logistical investment of interviews. It allows us to ask respondents about relevant aspects of their experience without breaking the guarantee of anonymity or having to bring large groups of respondents together at any one point in time. Similarly, this approach allows us to apply methodological aspects of experimental economics, most importantly randomization, pre-structured interaction, and exogenously imposed variation in the survey. Unlike normal survey data about risky investments, our measures do not suffer from recollection biases, or biased reporting by the respondents. Furthermore, illusion of control, commitment to good outcomes cannot skew the results in this one-shot survey, such that we avoid some of the normal methodological issues(Gow et al., 2016; Floyd and List, 2016). The survey thus makes it possible to compare realistically sized investment scenarios both within and between subjects using variation generated by the researchers.

We created and tested several prototypes of our survey to make sure questions were clear and achieved the required effect. The first tests were conducted on people within academia that had some boardroom experience, later tests were with a small group of directors. In these tests we were able to ask post-survey questions to find out whether the manipulation of the investment sizes used and the way of presenting the questions had the desired effects.

3.2 Respondents

The respondents of the survey are CEOs, CFOs, non-executives and a reference group consisting of (non-executive) managers, consultants and analysts. The respondents work for Netherlands-based national, international or multinational companies, both listed and unlisted, in a range of industries. All participants report to have experience in making investment decisions for their company. Our database contains personal data and is therefor protected, participants are treated anonymously in this study.

All our respondents work for a company based in The Netherlands, so they operate in

a two-tier board. The Top Management Team (TMT) forms the executive board and the non-executives form a supervisory board. This European model reflects the division of duties in management and governance as advocated by Fama and Jensen (1983). Although this structure could have a different influence on the board processes than the one-tier board, the task of the complete board (TMT and non-executives together) remains the same. That is, the directors jointly manage the company. In both one- and two-tier boards there is a big difference between theory and practice of governance (Mace, 1972; Roberts et al., 2005). Empirically, there are many similarities between boards in different countries (Demb et al., 1992). Given that all boards share the common task of managing the company, and the fact that we isolate our participants from confounding group effects, we feel confident that our results can be applied to one-tier boards as well.

3.2.1 Survey logistics

We sent an invitation to participate in our survey to Dutch business professionals who once showed their interest in our school's activities, in particular post-initial (executive) education. To increase the response rate we implemented several measures in line with suggestions made by Bednar and Westphal (2006). All directors were invited through the network they were part of. Invitations included a cover letter (co-)signed by the administrator of the network and a professor of the University, which should increase the legitimacy and authority attached to the survey. Respondents were promised an individualized report which increased the response rate by a factor 2.5 in (Bednar and Westphal, 2006). For these reports we contrast the answers the director gave to those of the peer group. This allows the participants to compare themselves to a larger group of their peers, a rare opportunity for many directors. This comparison becomes more valuable if the answers given are more accurate. Few of the survey questions had a socially desirable answer, so we believe the comparison provided an incentive to answer accurately.

In total, 894 invitations were sent out between 2011 and 2019, and 52% of the sample responded favorably. 345 (35%) Respondents completed the entire survey. Another 159

(16%) respondents did not answer all the questions, but we can still use their answers for part of the analysis. We removed 20 (2%) respondents from the data prior to analysis, because of invalid data entry.

3.3 Semi-structured interviews

Our survey only allows us to identify if certain differences between board members exist, but it gives very little insight in why these differences exist or where they come from. To place the statistical findings in clearer context, we presented our initial results in several executive education programs at our school. We furthermore invited a group of 6 CFOs and a separate group of 6 non-executives with executive experience for more in dept discussions. The later group also included a current CEO and all of them had experience as CEO. We summarized the set-up of the experiment and analysis and then asked them open questions that can be summarized as: "How do you define your role in the board?" and "How are the other board roles defined?" and "How does that relate to the decisions in our survey?" and more importantly "What do you thing about the mismatch between expectations and behavior?". During the resulting discussion we tried to summarize their opinions and verify our interpretations of their answers with the directors that were present.[3]

4 Results

Table 1 Panel a gives some summary statistics of the variables used in our main regressions and their distribution over the board positions. In Panel b we display the distribution of age and gender in the wider population of board-members listed in the Capital IQ - Professional dataset (data obtained on on November 23, 2016).

To see how our subsample of CEOs, CFOs and non-executives compares to the relevant population, we compare our sample to the sample of directors in the Capital IQ - Professional dataset. From the Capital IQ data, we selected all individuals who were reg-

[3]The online appendix shows the translation of the relevant notes taken during the discussions.

TABLE 1
Selected Summary Statistics and comparison to Capital IQ database

(a) Respondent Characteristics

			Respondent				
			CEO	CFO	Non-Exec	Other	Total
		Number of responses	86	195	46	139	466
		Complete cases	61	177	25	62	325
		Professional willingenss to take risk	7.15	6.42	5.84	6.85	6.59
		(11-point Likert scale)	(1.58)	(1.63)	(1.72)	(1.62)	(1.66)
		Male	0.84	0.88	0.80	0.87	0.86
			(0.37)	(0.32)	(0.41)	(0.34)	(0.34)
		Average age (in years)	50.83	47.33	57.45	44.70	48.26
			(7.55)	(6.05)	(5.95)	(10.00)	(7.91)
Professional background	(dummy, 1 if equals)	Entrepreneur	0.30	0.03	0.28	0.13	0.12
			(0.46)	(0.18)	(0.46)	(0.34)	(0.33)
		Finance	0.21	0.93	0.56	0.60	0.70
			(0.41)	(0.26)	(0.51)	(0.49)	(0.46)
		Marketing / Sales	0.13	0.00	0.04	0.13	0.05
			(0.34)	(0.00)	(0.20)	(0.34)	(0.22)
		Operations	0.10	0.00	0.00	0.06	0.03
			(0.30)	(0.00)	(0.00)	(0.25)	(0.17)
		Otherwise	0.26	0.04	0.12	0.08	0.10
			(0.44)	(0.20)	(0.33)	(0.27)	(0.29)
Investment experience, last 15 years	Number of decisions	Expansion to new market	8.80	8.15	7.64	7.91	8.19
			(4.60)	(3.98)	(3.80)	(4.20)	(4.13)
		Expansion production capacity	9.07	8.09	7.90	7.65	8.17
			(5.01)	(5.19)	(4.41)	(4.83)	(5.03)
		R&D and innovation	11.07	8.75	8.48	8.52	9.12
			(6.18)	(4.98)	(5.26)	(5.64)	(5.43)
		IT	10.42	10.30	8.26	8.61	9.84
			(5.33)	(5.56)	(4.16)	(5.84)	(5.52)
	Size, % turnover	Expansion to new market	13.11	8.25	12.68	8.95	9.64
			(17.01)	(10.92)	(12.76)	(15.38)	(13.38)
		Expansion production capacity	13.97	8.19	11.24	7.55	9.39
			(18.59)	(11.61)	(15.19)	(15.76)	(14.38)
		R&D and innovation	9.15	5.29	6.44	5.12	6.07
			(14.52)	(8.98)	(9.07)	(10.92)	(10.66)
		IT	6.17	4.73	3.88	5.65	5.11
			(7.53)	(5.89)	(5.27)	(13.80)	(8.23)

(b) Capital IQ board members

Variable	**Capital IQ, Professional dataset**					
	Netherlands			**Western Europe**		
	CEO	**CFO**	**Non-exec. Director**	**CEO**	**CFO**	**Non-exec. Director**
N	114	27	1116	1063	134	5176
Gender (male)	0.97	0.85	0.88	0.94	0.93	0.87
	(0.19)	(0.36)	(0.32)	(0.23)	(0.26)	(0.34)
Average age	56.01	50.41	60.83	56.54	51.96	59.03
	(8.24)	(6.65)	(9.36)	(8.64)	(7.67)	(9.91)

Notes: Cells display the mean value (standard deviation) of relevant variables in each of the samples. The survey sample reports the means for complete cases. Investment experience was measured on discrete scales, each answer was then converted to the mid-point of the range corresponding to each answer. E.g. we register a value of 3 for each participant that answers "1 to 5 times" the appendix contains further details.

istered as a board member on November 23, 2016. For each individual we only used the their primary affiliation. An individual whose job title contains 'Chief Executive Officer' is considered a CEO. An individual whose job title contains 'Chief Financial Officers' is listed as CFO. Individuals with titles containing 'supervisory board', or 'non-executive' are considered to be non-executives. The Capital IQ data does not specify gender. To obtain a reliable proxy for gender, we joined the first names of all directors in the Capital IQ with a database of first names and gender, as administered by the Sociale Verzekeringsbank (SVB).[4] Individuals with a first name that is both used by males and females were removed from the sample.

The Capital IQ data has relatively few CFOs and relatively many non-executives. On average, our respondents are about 3–5 years younger and slightly more likely to be female than the average director in the Capital IQ data set. These differences are most likely due to the fact that we approached alumni of (post-initial) educational programs of the Erasmus University, which attract relatively young directors. Beyond these differences, our respondents compare reasonably well to the more general population. The modal board member appears to be a middle-aged male; the CFOs are the youngest, the CEOs are slightly older, and the non-executives are the oldest group. To check the robustness of our findings to possible selection effects, we control for demographic variables in later analysis.

Table 2 shows the correlation between the independent variables measured in the survey. The correlation between the exogenously varied size multipliers and success probability is close to zero by construction and thus not reported. The strongest correlations found are between the dummies for different roles and different backgrounds. As these dummies are mutually exclusive, this is not a surprise. Age and the role dummies are also strongly related, showing that the non-executives are older on average. Interestingly, the male dummy is positively correlated to reported willingness to take risk, a common finding in the literature on overconfidence (e.g. Malmendier and Tate, 2005).

[4]SVB is the organization that implements national insurance schemes in The Netherlands.

TABLE 2
Correlation between the independent variables measured in the survey.

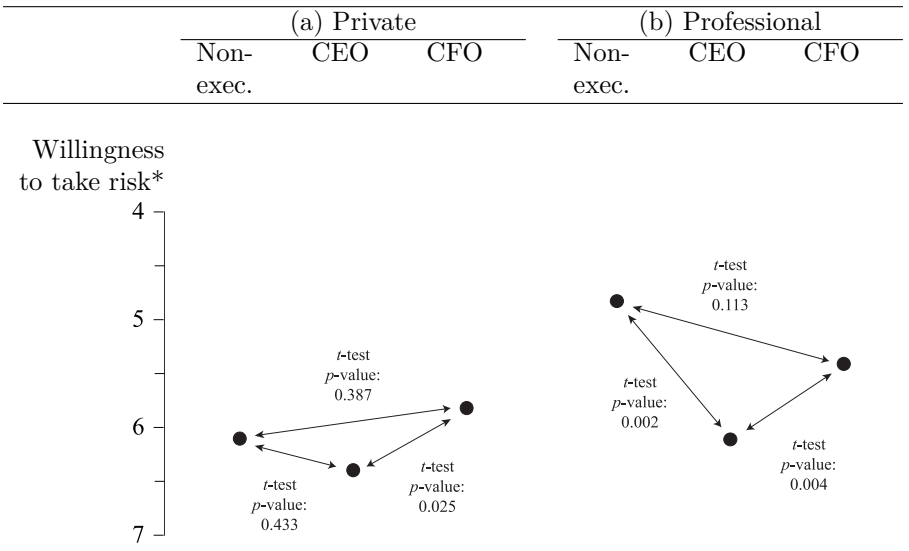
	Gender (male)	Age	Role: Non-executive director	Role: CEO	Role: CFO	Role: Other	Background: Entrepreneur	Background: Finance	Background: Marketing / Sales	Background: Operations	Background: Other	Typical size of previous investments	Maximum number of previous investments	Self-reported professional willingness to take risk professionally
Gender (male)	1,00													
Age	0,00	1,00												
Role: Non-executive director	-0,03	0,32	1,00											
Role: CEO	-0,05	0,18	-0,16	1,00										
Role: CFO	0,06	-0,05	-0,28	-0,40	1,00									
Role: Other	0,00	-0,31	-0,22	-0,31	-0,55	1,00								
Background: Entrepreneur	0,08	0,22	0,07	0,20	-0,18	-0,03	1,00							
Background: Finance	0,13	-0,16	-0,13	-0,35	0,55	-0,21	-0,33	1,00						
Background: Marketing / Sales	0,03	-0,15	-0,03	0,13	-0,17	0,09	-0,06	-0,21	1,00					
Background: Operations	-0,03	-0,01	-0,06	0,12	-0,14	0,09	-0,05	-0,18	-0,03	1,00				
Background: Other	-0,19	0,13	0,12	0,15	-0,36	0,18	-0,22	-0,72	-0,14	-0,12	1,00			
Typical size of previous investments	0,03	0,06	0,06	0,14	-0,07	-0,09	0,24	-0,09	-0,02	0,01	-0,05	1,00		
Maximum number of previous investments	0,06	0,04	0,00	0,12	0,07	-0,18	0,03	0,02	0,00	-0,02	-0,03	0,05	1,00	
Perceived willingness to take risk professionally	0,21	0,00	-0,14	0,14	-0,11	0,09	0,15	-0,09	0,09	-0,01	-0,08	0,05	-0,02	1,00

4.1 Self- and cross-perceptions

Before turning to the analysis of the investment decisions, we first discuss the respondents' self-reported and perceived willingness to take risk, followed by the cross-perceptions. Results of t-tests comparing the averages are shown for each comparison. To save space, we do not present the answers given by analysts, managers and consultants in this subsection.

The self-reported willingness to take risks in private (Figure 1a) only shows a different between CEOs and CFOs, with the CFOs reporting a slightly higher willingness to take risks. However, over all board roles the distributions are close. In their professional roles, CEOs report a higher willingness to take risks than CFOs and non-executives, as can be seen in Figure 1b. We only find no significant differences between the reported professional risk tolerance of CFOs and non-executives. Figure 2 displays the cross-perceptions of

FIGURE 1: Self-perceptions on the willingness to take risk.

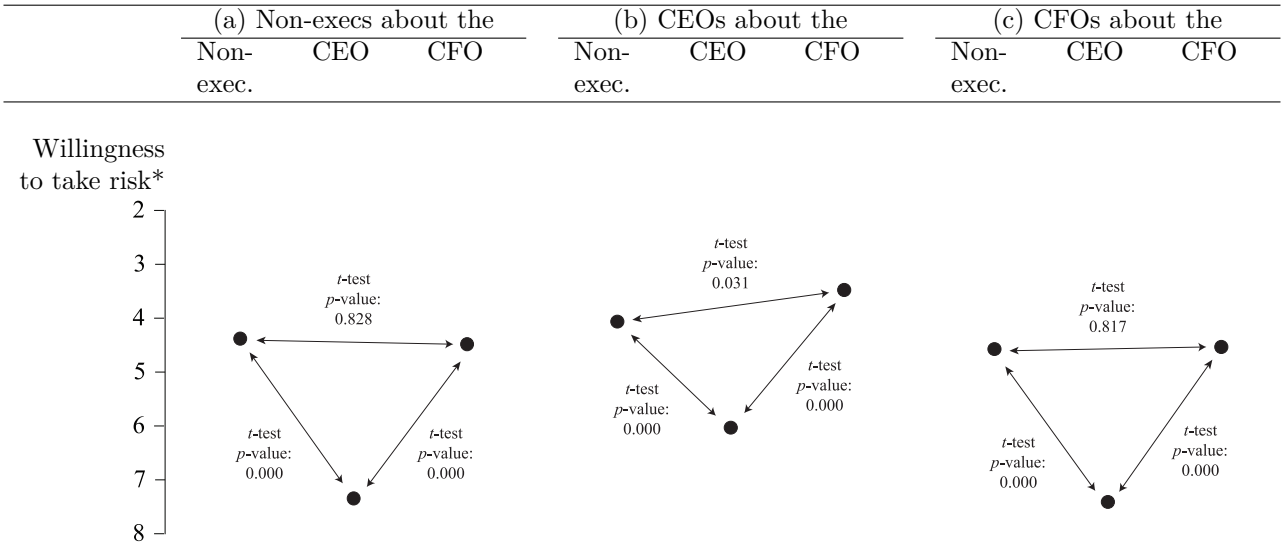


Notes: Average self-reported willingness to take risk in private and professional setting of non-executives, CEOs and CFOs. Responses are on an 11-point Likert-scale, where 0 denotes: 'Not at all willing to take risk' and 10 denotes: 'Very willing to take risk.' Results of two-sided t-tests are shown next to the arrows. The vertical runs from top to bottom to increase comparability with Figure 3.

the willingness to take risks of the different groups of board members, grouped by the professional role of the respondent. There appear to be small differences in the level of the average answer given by the different groups of directors, but the comparisons within the responses of the different board roles is consistent and in line with the self-perceptions

in Figure 1. CEOs are considered to be significantly more willing to take risks by all members of the corporate elite. On average CFOs and non-executives are perceived to have more or less the same risk tolerance. This shows that the board members expect the CFOs to be at the non-executive, or control end of the boardroom in terms of professional willingness to take risk.

FIGURE 2: Cross-perceptions on the willingness to take risk.



Notes: Average perceived willingness to take risk of groups in boardroom positions. Responses are on an 11-point Likert-scale, where 0 denotes: 'Not at all willing to take risk' and 10 denotes: 'Very willing to take risk.' Results of two-sided t-tests are shown next to the arrows. The responses are split by position of the respondents, such that panel (a) displays the perceptions of the average CEO. The vertical axis runs from top to bottom to increase comparability with Figure 3.

4.2 Investment scenarios

We relate the minimally required NPV and the experienced risk with a variety of possible explanatory variables in two econometric models.

First, we use a linear panel-data model with random effects to explain the natural logarithm of the NPV, $\log(NPV_{ij})$:

$$\log(NPV_{ij}) = \beta + \boldsymbol{\gamma V_i} + \boldsymbol{\delta W_j} + (\alpha_i + \varepsilon_{ij}) \tag{1}$$

where $\alpha_i \sim N(0, \sigma_\alpha^2)$, $\varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2)$ and $\{\beta, \boldsymbol{\gamma}, \boldsymbol{\delta}, \sigma_\alpha^2, \sigma_\varepsilon^2\}$ are unknown parameters. Here we index the respondents by i, where $i = 1, ..., N$, and the investments by j, where

$j = 1, ..., 8$.

The survey consists of up to four investment categories and respondents are asked to evaluate two scenarios per category, but only if they indicated to have experience with investments in the mentioned category. As a result, the number of investments judged by individual i, varies between 2 and 8. The variables $\boldsymbol{V_i}$ are individual-specific regressors such as age, gender and the respondent's professional role. The variables $\boldsymbol{W_j}$ are investment-specific regressors, including the size of the investment, the probability of success and the dummies for investment category. The variable α_i denotes an individual-specific random effect and ε_{ij} denotes an idiosyncratic error term. By including α_i we account for unobserved heterogeneity among the respondents that is not correlated with the independent variables. It is assumed that α_i and ε_{ij} are mutually independent and independent of the regressors $\boldsymbol{V_i}$ and $\boldsymbol{W_j}$.

Second, to explain a respondent's experienced risk, we employ a panel ordered-probit model as originally developed by McKelvey and Zavoina (1975). The model is relevant in applications such as questionnaires in which respondents express their preferences on an ordinal scale. In our case respondents are asked how risky they consider the presented investments on a 7-point Likert scale, ranging from 'risk-free' (-3) via 'neither risk-free nor risky' (0) to 'very risky' (3).

We assume that a respondent experiences risk on a continuous scale, captured by the unobserved variable y^*_{ij}, while we only observe the multinomial variable $y_{ij} \in \{-3, ..., 0, ...3\}$. We assume that the latent variable y^*_{ij} can be explained by the same set of explanatory variables $\boldsymbol{V_i}$ and $\boldsymbol{W_j}$ discussed earlier, that is,

$$y^*_{ij} = \boldsymbol{\gamma V_i} + \boldsymbol{\delta W_j} + (\alpha_i + \varepsilon_{ij}) \tag{2}$$

where $\alpha_i \sim N(0, \sigma^2_\alpha)$, $\varepsilon_{ij} \sim N(0, 1)$ and $\{\boldsymbol{\gamma}, \boldsymbol{\delta}, \sigma_\alpha\}$ are unknown parameters. Note that the variance of ε_{ij} is standardized to 1 as no scaling of the underlying utility model can be deduced from the observed data. Again, we assume that α_i and ε_{ij} are mutually independent and independent of the regressors $\boldsymbol{V_i}$ and $\boldsymbol{W_j}$. The latent variable y^*_{ij} gets mapped onto the observable rating y_{ij} by the rule:

$$y_{ij} = \begin{cases} 3 & \text{if } \tau_2 < y_{ij}^* \leq \tau_3 \\ 2 & \text{if } \tau_1 < y_{ij}^* \leq \tau_2 \\ 1 & \text{if } \tau_0 < y_{ij}^* \leq \tau_1 \\ 0 & \text{if } \tau_{-1} < y_{ij}^* \leq \tau_0 \\ -1 & \text{if } \tau_{-2} < y_{ij}^* \leq \tau_{-1} \\ -2 & \text{if } \tau_{-3} < y_{ij}^* \leq \tau_{-2} \\ -3 & \text{if } \tau_{-4} < y_{ij}^* \leq \tau_{-3} \end{cases}$$

where the parameters τ_{-4} to τ_3 are unobserved thresholds which satisfy $\tau_{c-1} < \tau_c$ for $c = -3, -2, ..., 3$.

Because the boundary values of our latent variable y_{ij}^* are unknown, it is common to set τ_{-4} and τ_3 equal to $-\infty$ and $+\infty$ respectively. The thresholds $\tau_{-3}, \tau_{-2}, ..., \tau_2$ will be estimated from the data.

The parameters of Model (1) can be estimated relatively straightforward using maximum likelihood, see Breusch (1987) among others. Model (2) belongs to the class of generalized linear mixed models (GLMMs). Rabe-Hesketh et al. (2004, 2005) show that the parameters of this model can conveniently be estimated using the Penalized Quasi-likelihood method. The estimated coefficients of Model (1) and (2), together with their standard errors, are presented in Table 3. As we collected repeated observations on the same individuals, we use a cluster-robust variance estimator, allowing for correlation between the answers provided by the same individual. To identify the effects of different project types, we use IT-projects as the reference investment category. As the reference group for the role effects we consider the pool of analysts, managers and consultants (i.e. respondents outside of the board), and identify the effect of board positions through dummies. We use dummies to denote participants with a functional background as entrepreneur, in finance, in marketing or sales, or in operations, all other functional backgrounds are used as reference group.

TABLE 3
Estimation results of models (1) and (2)

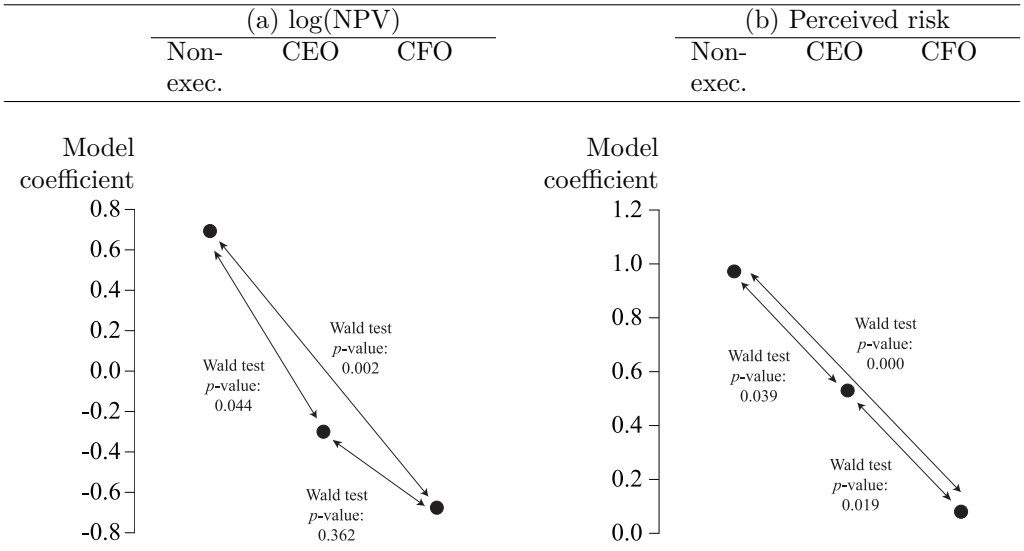
	VARIABLES	Log(NPV) (1)	Perceived risk (2)
Individual Characteristics	Role: CEO	-0.300	0.528**
		(0.465)	(0.206)
	Role: CFO	-0.676*	0.0780
		(0.355)	(0.154)
	Role: Non-Executive director	0.693	0.970***
		(0.527)	(0.198)
	Gender (male)	-0.0264	0.159
		(0.364)	(0.191)
	Age Quantile 2	-0.111	0.317*
		(0.363)	(0.173)
	Age Quantile 3	-0.701**	-0.109
		(0.351)	(0.145)
	Age Quantile 4	-0.775*	0.227
		(0.399)	(0.149)
	Max. size previous investments	0.0339*	-0.0251***
		(0.0190)	(0.00850)
	(Max. size previous investments)^2	-0.000380	0.000260**
		(0.000287)	(0.000112)
	Max. number of previous investments	0.0567	-0.00925
		(0.102)	(0.0575)
	Background: Entrepreneur	0.732	-0.267*
		(0.557)	(0.156)
	Background: Finance	0.0868	-0.327**
		(0.386)	(0.158)
	Background: Marketing/Sales	0.580	-0.310
		(0.542)	(0.449)
	Background: Operations	1.712*	0.290
		(0.967)	(0.214)
	Perceived willingness to take risk in professional role	0.0450	0.0224
		(0.0729)	(0.0591)
Properties of the investment	Log(Investment)	0.477***	0.248***
		(0.0414)	(0.0355)
	Probability of success	-1.892***	-5.452***
		(0.345)	(0.479)
	New market	0.330***	-0.00405
		(0.0883)	(0.0966)
	R&D investment	0.224**	-0.255**
		(0.113)	(0.105)
	Capacity increase	0.300***	-0.423***
		(0.0928)	(0.0954)
Auxiliary parameters	Constant	1.509*	
		(0.774)	
	σ_α	1.877	1.405
			(0.163)
	σ_α	0.900	1.000
	Observations	1,610	1,962
	Number of respondents	267	295

Notes: The superscripts ***, **, * denote significance at the 1% 5% and 10% level respectively. The estimates of the thresholds, τ_i, are not shown for ease of presentation. Robust standard errors are in parentheses. Note that the number of observations included in Model (1) and Model (2) differs. It was not mandatory for respondents to answer both questions, to prevent biasing the results we included all measured responses.

4.2.1 Differences between directors

We identify a coefficient for all three board positions by using the group of managers and analysts as a control group, so that we can compare across different groups of directors. Looking at Table 3 and Figure 3, it is clear that non-executives ask a higher NPV than CEOs and CFOs for a given investment scenario. CEOs and CFOs tend to demand the same NPV for a given investment. Thus, in terms of required return, there seems to be a sharp distinction between the non-executives on the one hand and the executive board members on the other hand. The same ordering appears in the experienced risk of investing for a given investment scenario. Non-executives report to experience the highest risk. They score higher than both CEOs and than CFOs. CEOs experience slightly more risk than CFOs.

FIGURE 3: The coefficients for boardroom positions, as detailed in Table 3



Notes: Coefficients on the effect of boardroom positions on required return and Perceived risk of subjects. Results of Wald-tests comparing the coefficients are shown next to the arrows. A high value of the coefficient implies a higher required return and a higher perceived risk of a given investment.

We find a large gap between the responses of the executives and the non-executives. This contradicts the expectations of the respondents found in perceptions on willingness to take risk, as summarized in Figure 1 and in Figure 2. While all members of the corporate elite perceive the CEO to be more risk tolerant than the CFO and non-executives,

our results indicate that the CFO is at least as willing to take risk as the CEO in corporate investments. The difference in behavior between the non-executive and executive board members is striking. The NPV that non-executives require is much higher than that of the executives, even when presented with the same investment. Similarly, non-executives experience more risk for a given scenario, even after they asked for a much higher return. Their behavior in risky investment scenarios places the CFOs at same end of the boardroom scale as the CEOs, quite far away from the control-minded non-executives.

In the observational studies on top management team behavior, age and gender are consistently used as predictors. The differences in required NPV and experienced risk between non-executives and executives is larger than the maximal difference between any two age groups, and an order of magnitude larger than our estimated gender effect. The role dummies capture a significant amount of variance in individual director's responses, even when controlling for demographics, professional background, experience, and investment characteristics. The role of a board member is thus a strong predictor of individual behavior.

4.2.2 Effects of gender, age and experience

The effects of gender on the appetite for risk are not evident in our data. While some scholars argue that women are more risk-averse than men (see, for example, Byrnes et al., 1999), others find that the risk distributions of men and women are largely overlapping (see, for example, Nelson (1972)). In our data, we do not find support for a gender effect. This may also be due to the fact that only 16% of our respondents are women.

There is more consensus in the literature about the relationship between risk tolerance and age and experience. Berger et al. (2013), MacCrimmon and Wehrung (1990), Sanders (2001), Wiersema and Bantel (1992) and Haleblian and Finkelstein (1999) found that the appetite for risk decreases with both age and experience. This suggests that the demanded NPV and the experienced risk should increase in both age, and experience. We indeed find a significant effect of age and experience in our data. However, effects are neither linear nor consistent. The youngest two quantiles demand a larger return, which violates

our expectations. However, no clear age effects appear in experienced risk, showing that age likely only has a weak effect in this setting.

The size of previous investments is a self-reported measure of experience. The scale runs from 0% to 75% of annual revenue for each of the four investment categories (IT, Expansion of production capacity, R&D and market expansion). We use the maximum percentage reported over the four categories as measure of experience with investment size. The number of investment decisions a participant has experience with in the last 15 years is measured on a 5-point scale from never to more than 15 times. We take the mid-point of the range of each answer category (0, 2.5, 7.5, 12.5, 17.5) and use the maximum over the four categories as measure of experience in our regressions. Our results indicate that participants who have experience with large investments experience less risk of any given investment, but do increase the required return. The number of previous investments seems to have a similar, non-significant effect. Experiencing risk seems to make participants more careful, but less sensitive to the experience of risk in later investments. This is consistent with more experienced participants being used to larger investment numbers, but also be more careful on a cognitive level.

4.2.3 Effects of professional background and professional risk tolerance

We asked our respondents about their professional background (i.e. entrepreneurial, finance, marketing/sales, operations or other, the last category is the reference category in the models). The perceived risk of a given investment appears marginally lower for entrepreneurs and individuals with a finance background. However, this is not found in the regression against log(npv), where the operations background is marginally significant. The effect of professional background variables appears be very weak overall.

Next, we use respondents' self-reported professional willingness to take risk on the same 11-point scale that was used to measure expectations. This question was originally developed and tested by Dohmen et al. (2011) to measure individual's risk tolerance. After controlling for other observable characteristics, we do not find a significant effect

of this metric.[5] As the standard error on the coefficients is also relatively small, this null-effect seems to imply that this measure did not capture any risk-appetite beyond what is implicitly coded in the other variables.

4.2.4 Effects of the investment characteristics

Our questions are meant to simulate realistic investment scenarios. If our manipulations are effective, we expect the respondents to demand a higher NPV and experience more risk as the investment size increases or the probability of success decreases. This is confirmed by the estimated coefficients. The demanded NPV has an estimated elasticity of approximately +0.5, implying that a 1% increase in the size of the initial investment translates to a 0.5% increase in the demanded NPV. Respondents report to experience more risk when they are confronted with larger investments. As the probability of a successful investment outcome increases, individuals are prepared to accept a lower NPV and experiences less risk.

Depending on the experience of the participants, we ask the participants to consider investments in R&D, market expansion, IT, and/or an increase in production capacity. Several authors have suggested that different types of investments are treated differently by the corporate directors Aggarwal and Samwick (2003); Malmendier and Tate (2008); Sanders (2001), but the endogeneity of the choices makes it virtually impossible to disentangle these effects through observed behavior alone. In our setting there is no a-priori indication about which investment types would be considered more risky, while all respondents only judge investment scenario types they have experience with. In terms of desired return, IT investments are clearly below the other three frames, it appears that IT is mostly a cost to these board members. They do indicate a lower experienced risk for R&D and capacity increases –more or less normal business investments– than for expending to new markets. All of the investment frame coefficients are, however, smaller than the differences between board-members.

[5] We also tried with a similar measure asking about 'personal willingness to take risk', as well as two multiple price lists from Holt and Laury (2002). Results were qualitatively similar.

4.3 Matching estimators of boardroom differences

In Section 4 we used regression techniques to identify the effects of various personal characteristics and investment characteristics on our participants' choices. To account for potential non-linear effects of background characteristics and selection into the board, this section presents matching estimators of the role effects within the subsample of board members as a robustness check (Abadie and Imbens, 2006). Matching is done both on investment and individual characteristics (chance, log(investment size), perception of professional risk tolerance, age, maximum experienced size, gender, investment frame) using the NNMATCH package in Stata (Abadie et al., 2004).

TABLE 4
Nearest Neighbor matching coefficients within the boardroom subsample.

Num of obs	Dependent var.	Role	Coefficient	Std.err.	p-value
		CFO	-0.874***	0.148	0.000
1342	Log(NPV)	CEO	0.244	0.160	0.126
		Non-exec.	1.965***	0.300	0.000
		CFO	-.793***	0.097	0.000
1648	Perceived risk	CEO	0.529***	0.104	0.000
		Non-exec.	1.126***	0.167	0.000

Notes: The superscripts ***, **, * denote significance at the 0.1% 1% and 5% level respectively.

Table 4 presents the matching coefficients, they show stronger role effects than the regression results, both in terms of size and statistical significance. CFOs appear to be more risk tolerant than all other board members, both in terms of the return that they require, as in terms of the risk that they perceive of a given investment. The non-executives are on the other end of the spectrum, demanding both a higher return and perceiving more risk than executive board members for any given investment. The CEOs take the middle ground in this role-by-role comparison, with a significantly higher perceived risk and demanded return than the CFOs and lower than the non-executives they are matched with. Our matching estimates confirm the placement of the CFO at the management side of the boardroom scale. Otherwise similar CEOs and CFOs experience less risk and require less return than non-executives for similar investments. Remarkably, the differences between the CFOs and the other board members we find in our regressions and in our matching estimators run counter to the expectations of our participants.

4.4 Semi-structured interviews

To provide some qualitative corroboration and get some context to the patterns we found in the data, we separately invited two groups of directors for a more in-dept discussion of our results. The first group consisted of current CFOs, the second of current supervisory board members with executive experience. The discussions in the semi-structured interviews provide some indications of where the disconnect between expectations and behavior stems from. All directors indicated that they changed their behavior according to the demands of their role. One of the non-executives put this very clearly when she said: "I am now a non-executive in the company I used to lead as CEO. I know perfectly well what happens in this company, so I make the CEO convince me. So yes, I put the bar higher now, that is my job now." When we asked about the definition of their roles, the directors referred to the shared duties and tasks involved in leading the company. In the group of CFOs, this was most succinctly described as: "Leading the company is a joint task of the board where the CEO and CFO play the leading roles." The CFOs added that the tasks within this board are divided based on training, affinity and personality. "The CFO, as the most numbers-driven and analytic board member, is normally the financial conscience of the company. After the CEO, as big-picture and sales person, sells the new projects and strategy to the supervisory board, it is our task as CFO to show that the numbers are correct and provide the financial guarantee and the guarantee that risks have been properly accounted for." This was also what they felt they were hired for. Several CFOs received the question: "Are you independent enough to act as a counterweight to our CEO?" as part of the selection process. To them, this meant that the current division of tasks acts as a self-fulfilling prophecy. The CFO of one of these companies added that the image of being 'the numbers guy' and the 'financial conscience' was extremely important to his job. His company's products come with 20-year maintenance contracts – if their clients had any doubts about whether they would still be there in twenty years, his company would go under. Maintaining the image of the careful 'numbers guy' allows them to do their job. In this sense, managing their reputation with the outside world is part of their job.

Particularly given the shift in the role of the CFO, it‘s possible that expectations about the CFO still have to catch up. It is also possible that CFOs are selling their conservative image so convincingly that it drives expectations. Note that this in no way means that the non-executives were unaware of the possibility that CFOs could behave like managers. Most non-executives had experienced themselves how easy it is to get carried away with new projects as executives. They believed in the importance of considering different aspects and risks during the preparation of new projects. Doing so requires a disciplined approach by the executive team. As non-executives, they want to check that this preparation process has been carried out carefully and completely, i.e. that the executives have applied enough discipline during the preparation. By asking the CEO and CFO to demonstrate this preparatory work, and by throwing up hurdles, they felt they could check the safeguards. Whether these hurdles provide enough safeguard, and are a sufficient and correct response, remains and interesting question for future research. When confronted with the results of the survey, the non-executives also acknowledged the importance of the expectations and the roles they were assigned for their behavior in the boardroom. As one of them remarked, the survey "made explicit what we implicitly take with us into the boardroom".

5 Conclusions

The shift in the role of the CFO, from financial consciousness towards executive manager, has received much attention in the academic literature and in public debate. However, the debate has not covered the potential conflict between these roles. Where the roles conflict, the CFO has to choose: is he executive manager first and controller second, or is he the financial consciousness first and executive manager second? The choice the CFO makes also affect the roles played by other directors, particularly non-executives, when they interact with him. By their own admission, directors define their role within the board through contrast with the roles of others. So if the CFO changes his role from financial control to executive management, the non-executives need to increase their focus

on controlling the CFO (Uhde et al., 2017).

Interactions between the directors occur within a boardroom setting that is difficult to observe and for which only limited direct evidence exists. In this paper, we provide direct measures of CFOs choices in investment scenarios where the financial conscience and the executive manager roles of the CFO can conflict. We compare the choices made by the CFOs to the expectations and choices of other directors. Participants expect CEOs to be most willing to take risks, with little perceived difference between the CFOs and non-executives. However, for any given investment, CFOs require less return and perceive less risk than either the CEOs or the non-executives. The similarity in the directors' expectations about the CFOs and non-executives indicates that the CFOs are expected to be the financial consciousness in the boardroom. CFOs choices in investment scenarios, however, are much closer to those of an executive manager, the CEO, than to those of the non-executives. The apparent difference between expectations about the CFOs and the choices of the CFOs, shows the relevance of the call for research into how CFOs' are monitored (Uhde et al., 2017). If the non-executive directors misjudge the CFO – expect he is he acting like the financial conscience, when he acts as executive manager– then effective governing of the CEO-CFO management team is difficult.

Interactive surveys, like the one employed in this paper, are useful new tools for research on difficult to reach groups like directors. These tools allow researchers to create a new balance between competing research goals, which makes them a good complement to existing methods. Interactive surveys require more effort to collect observations than archival methods, and there is less control over the environment than in the lab. However, an interactive survey makes it easier to gather direct measures of busy directors than with laboratory research. Simultaneously, the dynamic elements in the survey allow similar flexibility in questions and measures as found in the lab. This flexibility allows us to get closer to individual decision-making, while offering more exogenous variation than either archival methods or surveys, opening up the possibility of answering different types of question.

In this paper, we collect direct measures of boardroom expectations and behavior.

This provides a small glimpse in the difficult to explore boardroom setting. We look at one particular aspect of board members' tasks — risky corporate investment. However, the board's joint task of managing the company is much wider. Direct evidence on what is expected of the CFO (or other board members) or what choices they make in other tasks is quite limited. Furthermore, our survey does not allow us to find out when the CFO acts as financial consciousness and when as executive manager, or how he switches between these roles. We just observe that CFOs act like executive managers, not that they actually switch. Getting more data on if, when, how, and why they switch focus would allow a much clearer picture of boardroom process. In short, this paper gives a first glimpse of a much larger picture of board decision making and corporate governance. To update the existing models of corporate governance to reflect the new role of the CFO, much research remains to be done.

References

Abadie, Alberto and Guido W Imbens, "Large sample properties of matching estimators for average treatment effects," *econometrica*, 2006, *74* (1), 235–267.

_ , Jane Leber Herr, Guido W Imbens, David M Drukker et al., "NNMATCH: Stata module to compute nearest-neighbor bias-corrected estimators," *Statistical Software Components*, 2004.

Adams, Renee and Daniel Ferreira, "A theory of friendly boards," *The Journal of Finance*, 2007, *62* (1), 217–250.

Aggarwal, R.K. and A.A. Samwick, "Why Do Managers Diversify Their Firms? Agency Reconsidered," *Journal of Finance*, 2003, *58* (1), 71–118.

Bednar, Michael K and James D Westphal, "Surveying the corporate elite: Theoretical and practical guidance on improving response rates and response quality in top management survey questionnaires," in "Research methodology in strategy and management," Emerald Group Publishing Limited, 2006, pp. 37–55.

Berger, Allen, Thomas Kick, and Klaus Schaeck, "Executive board composition and bank risk taking," *Journal of Corporate Finance*, 2013, *28*, 48–65.

Bloomfield, Robert, Mark W Nelson, and Eugene Soltes, "Gathering data for archival, field, survey, and experimental accounting research," *Journal of Accounting Research*, 2016, *54* (2), 341–395.

Bodnar, Gordon M, Erasmo Giambona, John R Graham, Campbell R Harvey, and Richard C Marston, "Managing risk management," *AFA 2012 Chicago Meetings Paper*, 2011.

Bonner, Sarah E, "Judgment and decision-making research in accounting," *Accounting Horizons*, 1999, *13* (4), 385–398.

Breusch, Trevor, "Maximum likelihood estimation of random effects models," *Journal of Econometrics*, 1987, *36* (3), 383–389.

Brown, Philip, Wendy Beekes, and Peter Verhoeven, "Corporate governance, accounting and finance: A review," *Accounting & finance*, 2011, *51* (1), 96–172.

Byrnes, J., D. Miller, and W. Schafer, "Gender differences in risk raking: A meta-analysis," *Psychological Bulletin*, 1999, *125* (3), 367–383.

CIMA, "The role of the CFO on the modern board," Technical Report, London, United Kingdom 2016.

DellaVigna, Stefano, "Psychology and economics: Evidence from the field," *Journal of Economic literature*, 2009, *47* (2), 315–72.

Deloitte, "Four faces of the CFO," 2016.

Demb, Ada, Fredrich Neubauer et al., "The corporate board: Confronting the paradoxes," *Long range planning*, 1992, *25* (3), 9–20.

der Stede, Wim A Van, "Management accounting research in the wake of the crisis: some reflections," *European Accounting Review*, 2011, *20* (4), 605–623.

Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp, and Gert Wagner, "Individual risk attitudes: Measurement, determinants and behavioral consequences," *Journal of the European Economic Association*, 2011, *9* (3), 522–550.

EY, "The changing role of the CFO," Technical Report, United Kingdom 2016.

Fama, Eugene and Michael Jensen, "Separation of ownership and control," *Journal of law and economics*, 1983, *26*, 301–325.

Farag, Hady, Frank Plaschke, and Marc Rodt, "Evolving capital markets and the changing role of the CFO," in "The Strategic CFO," Springer, 2011, pp. 127–142.

Favaro, Paul, "Beyond bean counting: The CFO's expanding role," *Strategy & Leadership*, 2001, *29* (5), 4–8.

Finkelstein, Sydney and Donald Hambrick, "Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion," *Administrative science quarterly*, 1990, pp. 484–503.

Floyd, Eric and John A List, "Using field experiments in accounting and finance," *Journal of Accounting Research*, 2016, *54* (2), 437–475.

Ge, Weili, Dawn Matsumoto, and Jenny Li Zhang, "Do CFOs have style? An empirical investigation of the effect of individual CFOs on accounting practices," *Contemporary Accounting Research*, 2011, *28* (4), 1141–1179.

Gow, Ian D, David F Larcker, and Peter C Reiss, "Causal inference in accounting research," *Journal of Accounting Research*, 2016, *54* (2), 477–523.

Graham, John, Campbell Harvey, and Manju Puri, "Managerial attitudes and corporate actions," *Journal of Financial Economics*, 2013, *109* (1), 103–121.

Haleblian, J. and S. Finkelstein, "The influence of organizational acquisition experience on acquisition performance: A behavioral learning perspective," *Administrative Science Quarterly*, 1999, *44* (1), 29–56.

Hambrick, Donald, "Upper echelons theory: An update," *Academy of management review*, 2007, *32* (2), 334–343.

_ **and Gregory Fukutomi**, "The seasons of a CEO's tenure," *Academy of Management Review*, 1991, *16* (4), 719–742.

_ **and Phyllis Mason**, "Upper echelons: The organization as a reflection of its top managers," *Academy of management review*, 1984, *9* (2), 193–206.

Han, Jing, Jidong Zhang, and Jian Han, "CFO as a strategic partner of the CEO: Relational demography and firm financial performance," *Journal of Business and Management*, 2015, *21* (1), 59.

Harrison, Glenn W and John A List, "Field experiments," *Journal of Economic literature*, 2004, *42* (4), 1009–1055.

Hiebl, Martin RW, "Bean counter or strategist? Differences in the role of the CFO in family and non-family businesses," *Journal of Family Business Strategy*, 2013, *4* (2), 147–161.

Holt, Charles and Susan Laury, "Risk aversion and incentive effects," *American Economic Review*, 2002, *92* (5), 1644–1655.

Hopwood, Anthony G, "The economic crisis and accounting: Implications for the research community," *Accounting, Organizations and Society*, 2009, *34* (6), 797–802.

Indjejikian, Raffi J and Michal Matejka, "Organizational slack in decentralized firms: The role of business unit controllers," *The accounting review*, 2006, *81* (4), 849–872.

Krische, Susan D, "Discussion of "Do CFOs Have Style? An Empirical Investigation of the Effect of Individual CFOs on Accounting Practices"," *Contemporary Accounting Research*, 2011, *28* (4), 1180–1189.

Kuziemko, Ilyana, Michael I Norton, Emmanuel Saez, and Stefanie Stantcheva, "How elastic are preferences for redistribution? Evidence from randomized survey experiments," *The American Economic Review*, 2015, *105* (4), 1478–1508.

Leblanc, Richard and Mark Schwartz, "The Black Box of Board Process: Gaining Access to a Difficult Subject," *Corporate Governance: An International Review*, 2007, *15* (5), 843–851.

Maas, Victor S and Michal Matejka, "Balancing the dual responsibilities of business unit controllers: Field and survey evidence," *The Accounting Review*, 2009, *84* (4), 1233–1253.

MacCrimmon, Kenneth and Donald Wehrung, "Characteristics of risk taking executives," *Management Science*, 1990, *36* (4), 422–435.

Mace, Myles L., "The President and the Board of Directors," *Harvard Business Review*, 1972, *50* (2), 37.

Mailliard, Don, "The rise of the renaissance CFO," 2016.

Malmendier, Ulrike and Geoffrey Tate, "CEO overconfidence and corporate investment," *Journal of Finance*, 2005, *60* (6), 2661–2700.

_ **and** _ , "Who makes acquisitions? CEO overconfidence and the market's reaction," *Journal of Financial Economics*, 2008, *89* (1), 20–43.

McClelland, Patrick, Vincent Barker III, and Won-Yong Oh, "CEO career horizon and tenure: Future performance implications under different contingencies," *Journal of Business Research*, 2012, *65* (9), 1387–1393.

McKelvey, Richard and William Zavoina, "A statistical model for the analysis of ordinal level dependent variables," *Journal of mathematical sociology*, 1975, *4* (1), 103–120.

Menz, M., "Functional Top Management Team Members: A Review, Synthesis and Research Agenda," *Journal of Management*, 2012, *38* (2), 45–80.

Nelson, Julie A., "Are women really more risk-averse than men? A re-analysis of the literature using expanded methods," *Journal of Economic Surveys*, 1972, pp. 1–20.

PAIB Committee, "The Role and Expectations of a CFO: A Global Debate on Preparing Accountants for Finance Leadership," *IFAC Discussion paper*, 2013, pp. 1–39.

Plöckinger, Martin, Ewald Aschauer, Martin RW Hiebl, and Roman Rohatschek, "The influence of individual executives on corporate financial reporting: A review and outlook from the perspective of upper echelons theory," *Journal of Accounting Literature*, 2016, *37*, 55–75.

Priem, Richard L, Douglas W Lyon, and Gregory G Dess, "Inherent limitations of demographic proxies in top management team heterogeneity research," *Journal of Management*, 1999, *25* (6), 935–953.

PwC global power & utilities, "The changing role of the CFO," Technical Report 2015.

Rabe-Hesketh, Sophia, Anders Skrondal, and Andrew Pickles, "Generalized multilevel structural equation modeling," *Psychometrika*, 2004, *69* (2), 167–190.

_ , _ , and _ , "Maximum likelihood estimation of limited and discrete dependent variable models with nested random effects," *Journal of Econometrics*, 2005, *128* (2), 301–323.

Roberts, John, Terry McNulty, and Philip Stiles, "Beyond agency conceptions of the work of the non-executive director: Creating accountability in the boardroom," *British Journal of Management*, 2005, *16* (s1), S5–S26.

Sanders, Wm Gerard, "Behavioral responses of CEOs to stock ownership and stock option pay," *Academy of Management Journal*, 2001, *44* (3), 477–492.

Uhde, David Alexander, Patricia Klarner, and Anja Tuschke, "Board monitoring of the chief financial officer: A review and research agenda," *Corporate Governance: An International Review*, 2017, *25* (2), 116–133.

Wiersema, Margarethe and Karen Bantel, "Top management team demography and corporate strategic change," *Academy of Management journal*, 1992, *35* (1), 91–121.

Zoni, Laura and Kenneth A Merchant, "Controller involvement in management: an empirical study in large Italian corporations," *Journal of Accounting & Organizational Change*, 2007, *3* (1), 29–43.

Zorn, Dirk, "Here a chief, there a chief: the rise of the CFO in the American firm," *American Sociological Review*, 2004, *69* (3), 345–364.

A Variables and variable construction

		Variable	Question(s), Appendix A	type of variable
Role:		Non-executive director	1	dummy
		CEO	1	dummy
		CFO	1	dummy
		Reference Group / Other	1	dummy
Background:		Entrepreneur	22	dummy
		Finance	22	dummy
		Marketing / Sales	22	dummy
		Operations	22	dummy
		Otherwise	22	dummy
Age			24	numeric value
Gender (male)			25	dummy
Investment Experience, last 15 years	Number of decisions:	Expansion to a new market	5	5-point scale, transformed to mid-point of answer range
		R&D - projects	5	
		Increase in production capacity	5	
		IT-projects	5	
		Maximum number of previous investments		maximum of 4 questions above this one
	Size, % of turnover	Expansion to a new market	6	11-point scale, transformed to mid-point of answer range
		R&D - projects	6	
		Increase in production capacity	6	
		IT-projects	6	
		Typical size of previous investments		Average of 4 questions above this one
Self-reported private willingness to take risk			15	11-point scale
Self-reported professional willingness to take risk			16	11-point scale
Preceived willingness to take risk of the CEO			17	11-point scale
Preceived willingness to take risk of the CFO			18	11-point scale
Preceived willingness to take risk of the non-excutives			19	11-point scale

	Variable	Question(s), Appendix A	type of variable
Properties of the investment	Log(investment)	computer generated	numeric value, calculated based on answers on question 6 multiplied by a random factor and answer to question 3
	Probability of success	computer generated	random 0,8 or 0,95
	Expension to a new market	computer generated	dummy
	R&D-project	computer generated	dummy
	Increase in capacity	computer generated	dummy
Perceived risk		8,10,12,14	11-point scale
Log(NPV)		7,9,11,13	numeric value

B Translated Survey Instrument

Survey study about decision making in the boardroom

Dear participant,

This survey consists of three parts:

- The first part concerns your experiences and perceptions of certain business decisions.
In other words, it concerns your experiences as a **professional**.
- The second part is about your **personal choices**.
- The third part concerns your **background**.

Please click "Next >>" to start Part I of the survey.

Thank you in advance for your time!

Sincerely,

XXXXXX

Part I: Your background

1 What is your current professional role?

- O supervisory board member
- O CEO, or president
- O CFO or controller
- O COO
- O board member
- O consultant
- O manager
- O analyst

2 In which sector does your company operate in?

- O Automotive
- O Construction / Materials
- O Chemistry
- O Retail / Wholesale
- O Services
- O Electronics
- O Engineering
- O Pharmacy
- O Financial institutions
- O Information
- O Media
- O Metal
- O Non-profit
- O Oil / Mining
- O Education / Science
- O (Semi-) government
- O Paper / Packaging
- O Telecommunications
- O Transport
- O Utilities (gas / electric / other)
- O Food and beverages

3 What is your company's annual revenue?

- O Less than € 50 million
- O Between € 50 and € 100 million
- O Between € 100 and € 500 million
- O Between € 500 million and € 1 billion
- O More than € 1 billion

4 How many persons are employed in your company?

- O Less than 50
- O Between 50 and 100
- O Between 100 and 1,000
- O Between 1,000 and 10,000
- O More than 10,000

Your background

5 How often were you involved in making the following investment decisions in the last fifteen years?

	Never	1 to 5 times	5 to 10 times	10 to 15 times	More than 15 times
Expansion into new markets	○	○	○	○	○
Expansion of production capacity	○	○	○	○	○
An innovation or R&D process	○	○	○	○	○
An IT-project	○	○	○	○	○
An aquisition	○	○	○	○	○

6 What is the typical size (in % of the annual turnover of the company) of the following investment decisions that you dealt with?

	Not applicable	1%	2%	3%	4%	5%-10%	10%-20%	20%-30%	30%-40%	40%-50%	More than 50%
Expansion into new markets	○	○	○	○	○	○	○	○	○	○	○
Enlargement of production capacity	○	○	○	○	○	○	○	○	○	○	○
An innovation or R&D process	○	○	○	○	○	○	○	○	○	○	○
An IT-project	○	○	○	○	○	○	○	○	○	○	○
An aquisition	○	○	○	○	○	○	○	○	○	○	○

Scenarios

7 Suppose you are asked to assess the following investment opportunity:

In a strategy meeting it became clear that expansion of your business is possible by establishing a new marketing channel abroad. Your marketing and sales department estimates the cost at € [amount] million. If this plan fails, your company loses this amount, but there is no further damage. Whether the channel can fulfill the high expectations, is still unclear. Your marketing and sales department estimates the probability of success to be [success rate].

What should the minimum net present value (the value of the revenues after deduction of the investment discounted back to today) of this investment be, before you, in your role as [professional position], agree with this investment?

8 How risky do you consider this investment to be?

	Riskless			Neither riskless nor risky			Very risky
I find this investment	○	○	○	○	○	○	○

Scenarios

9 Suppose you are asked to assess the following investment opportunity:

Your company considers taking a big step in its development by expanding the production facilities. This involves a total investment of € [amount] million. If it turns out that the expansion is not sustainable in the future, your business will lose this investment, but there is no further damage. The probability that the expension is successful, is currently estimated to be [success rate].

What should the minimum net present value (the value of the revenues after deduction of the investment discounted back to today) of this expansion be, before you, in your role as [professional position], agree with this investment?

10 How risky do you consider this investment to be?

	Riskless			Neither riskless nor risky			Very risky
I find this investment	○	○	○	○	○	○	○

Scenarios

11 Suppose you are asked to assess the following investment opportunity:

Your R&D department suggests establishing a new manufacturing technique within the current business. To find out whether this technique is feasible, research has to be done. If it turns out that the new technique is not feasible, your company loses the research costs, but there is no further damage. Development costs are estimated at € [amount] million. The probability that the production technology will be feasible is estimated to [success rate].

What should the minimum net present value (the value of the revenues after deduction of the investment discounted back to today) of this project be, before you, in your role as [professional position], agree with this investment?

12 How risky do you consider this investment to be?

	Riskless			Neither riskless nor risky			Very risky
I find this investment	○	○	○	○	○	○	○

Scenarios

13 Suppose you are asked to assess the following investment opportunity:

The IT department of your company considers using a different system, which in time can lead to a significant saving in costs. The costs for the introduction of the system are € [amount] million. If it appears that the new system cannot fulfill the expectations, your company loses this amount, but there is no further damage. Whether the system can fulfill the high expectations is still unclear. Your IT department currently estimates this probability to be [success rate].

What should be the minimum net present value (the value of the revenues after deduction of the investment discounted back to today) of this IT-project be, before you, in your role as [professional position], agree with this investment?

14 How risky do you consider this investment to be?

	Riskless			Neither riskless nor risky			Very risky
I find this investment	○	○	○	○	○	○	○

End of Part I

15 How do you rate yourself: Are you in general a person who is willing to take risks, or are you someone who tries to avoid risks?

Please fill in the scale where a value of 0 means "Not at all willing to take risks" and the value 10 means "very willing to take risks".

0: Not at all willing to take risks	1	2	3	4	5	6	7	8	9	10: Very willing to take risks
○	○	○	○	○	○	○	○	○	○	○

16 Are you, in your role, willing to take risks or try to avoid risks?

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

17 How do you assess a typical CEO, president in his or her role: Is that a person who is willing to take risks or is that someone who tries to avoid risks?

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

18 How do you assess a typical CFO or controller in his or her role: Is that a person who is willing to take risks or is that someone who tries to avoid risks?

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

19 How do you assess a typical non-executive director in his or her role: Is that a person who is willing to take risks or is that someone who tries to avoid risks?

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Part II: Personal choices

You completed the first and largest part of this survey (86%). This part was about choices that you had to make in your professional environment.

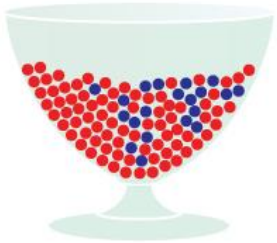
In the second and last part, which consists of three pages, we ask you some questions about your personal choices.

Two possibilities

In this part of the questionnaire we would like you to each time make a choice between two options: participation in a lottery or receiving a fixed amount.

20 In this first question your options are as follows:

Option 1:	You participate in a lottery where a random ball is drawn from a vase. The vase contains 100 balls of which 20 are blue and 80 are red. When a blue ball is drawn, you will receive € 50,--. When a red ball is drawn, you will receive € 1000,--.
Option 2:	You will receive an amount with certainty.



Below the choices are presented with a variable yield in option 2. For each choice, please indicate which option you prefer.

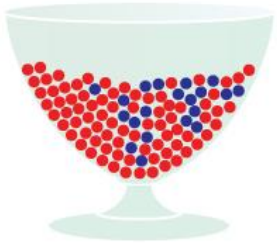
O Option 1: You participate in the lottery.	O Option 2: You will receive €1.000,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €900,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €800,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €700,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €600,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €500,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €400,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €300,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €200,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €100,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will neither receive nor pay.

Two possibilities

We'd like to ask you again to make a choice between participating in a lottery and receiving a fixed amount. This differs from the previous lottery: by drawing a blue ball, you will have to pay.

21 In this first question your options are as follows:

Option 1:	You participate in a lottery where a random ball is drawn from a vase. The vase contains 100 balls of which 20 are blue and 80 are red. When a blue ball is drawn, you will **pay** € 200,--. When a red ball is drawn, you will **receive** € 1000,--.
Option 2:	You will either **receive or pay** an amount with certainty.



Below the choices are presented with a variable yield in option 2. For each choice, please indicate which option you prefer.

O Option 1: You participate in the lottery.	O Option 2: You will receive €1.000,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €900,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €800,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €700,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €600,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €500,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €400,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €300,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €200,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will receive €100,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: You will neither receive nor pay.
O Option 1: You participate in the lottery.	O Option 2: You will **pay** €100,-- with certainty.
O Option 1: You participate in the lottery.	O Option 2: you will **pay** €200,-- with certainty.

Part III: background

22 What is your main background?

- O Entrepreneur
- O Specialist (among which accountants, doctors and lawyers)
- O Finance
- O Marketing/Sales
- O Operations
- O Other

23 Did you use a calculator to answer this questionnaire?

- O Yes
- O No

24 What is your date of birth?

(Note: we solely use this to classify the results by age group)

25 What is your gender?

- O Male
- O Female

Dear participant,

Thank you very much for your time!

We will keep you informed on our progress.

Sincerely,

XXXXXXXX

C Feedback sessions with board members

Meeting on September 7, 2017
Attendees: seven CFO's and the research team

Why does everyone expect CFOs and supervisory board members to be relatively cautious, and CEOs to be more willing to take risk?

- "Presented with the same figures related to an investment decision, the CEO and the CFO might demand the same return, but there are always multiple scenarios available involving alternative figures. CEOs tend to be more likely to believe in a scenario showing stronger figures."

- "CEOs tend to feel the pressure to move the company forward, making them more willing to embrace risk."

- "A CFO should be the financial conscience of their company – that is, they have a compliance role in relation to the supervisory board members – and should avoid downside risk."

- "We sell maintenance contracts with a 20-year term. These would become unmarketable if our customers had even the slightest doubt regarding our company's financial stability. My role as the guardian of this stability is therefore crucial to the company's survival."

- "CEOs and CFOs focus on different aspects of an investment:
    - CEOs are likely to look at the market, technology, and innovation
    - CFOs tend to be concerned with information on sales, purchasing, financing, and compliance.

  This means that their risk assessments may vary from each other."

- "A company will lose its credibility if its finances are not on solid footing. It is only when those are in order that a CFO can switch to a role as co-pilot. The CFO is vital when it comes to creating stability in the company – it's our job to offer proof of financial stability."

How does the vignette study demonstrate that CFOs are just as willing to take risk as CEOs, and that only supervisory board members are relatively cautious, contrary to common perception?

- "It is the joint responsibility of the CEO and CFO to lead the company."

- "My role has moved more and more towards that of the CEO's co-pilot."

- "Information asymmetry. As supervisory board members have less information at their disposal, they are compelled to allow for a larger margin of error. The CEO and CFO do both have access to all information."

- "Being more focused on regulation, supervisory board members tend to be more conservative – they want to steer clear of any kind of complications, not least because of liability and the risk of reputational damage."

- "Opportunism is a factor for both CEOs and CFOs on account of the bonuses involved."

- "In the experiment, the CEO and the CFO have access to the same information about the investment decision, but this is not the case in reality."

- "In reality, the two executives tend to interpret the final details of the investment differently than the supervisory board members, as they were involved in the process leading up to the investment. (This is yet another form of information asymmetry.)"

- "CEOs and CFOs tend to enjoy a successful investment more than supervisory board members. After all, the latter are not rewarded based on success, but based on failure – not just financially but also in social terms."

- "Supervisory board members no longer have any say in the investment project once the decision is made, whereas the CEO and CFO do retain that control."

- "CFOs must be business leaders (co-pilots) – they need to drive the business forward."

Meeting on November 21, 2017
Attendees: one CEO and five non-executive directors all having served as CEO in the past, and the research team

How does the vignette study demonstrate that CFOs are just as willing to take risk as CEOs, and that only supervisory board members are relatively cautious, contrary to common perception?

- "My CFO and I are both in the driver's seat. We both know how the duties are divided: I step on the gas, whereas his job is to put on the brakes. Yet we are both responsible for achieving the results. I tend to do that by generating more revenue, while he focuses on curbing expenses. Today's CEOs and CFOs are developing closer working relationships, and the gap is narrowing. Sometimes, I am even more reserved than the CFO."

- "By the time a proposal is submitted to the supervisory board, the CEO and CFO already agree with each other. If a company's CEO and CFO consistently fail to see eye to eye, one of the two will have to leave."

- "The executive board makes sure that all questions from the supervisory board have been answered before the request is submitted to place the item on the agenda. We submit a file in which all possible questions are answered, a large number of which are completed by our due diligence team. They tend to proceed with caution in their approach to the investment."

- "The pipeline is the CEO's responsibility. The question I had to answer was: in what markets will we be looking for acquisition candidates? I came in as CEO and wondered if we were

doing the right thing. It was only once I was convinced that we were, that the due diligence team was called in, along with the CFO."

- "While I did not expect these results, when I think about it they do make sense to me. Since CEOs and CFOs interact so closely with each other, they tend to develop a similar risk appetite."

- "A common perception is that CFOs are cautious, but that's more of a preconceived notion. 'We are told that CFOs are cautious.'"

- "Since numbers are the CFO's comfort zone, I would interpret those vignettes differently."

- "CEOs and CFOs are accustomed to working together closely when calculating investment returns, so they're likely to start using the same methods after a while."

- "CFOs have zero uncertainty when it comes to the completeness and accuracy of the information, so that might explain the difference between perception and vignettes."

Would you agree that you are more circumspect in your role as supervisory board member than you were in your previous role as CEO?

- All: "Yes, definitely! That can be attributed to information asymmetry."

- "I also feel that, as a supervisory board member, you lack the strong belief in investment opportunities – that non-rational sense of euphoria. The CEO and CFO could be engaging in what is known as 'escalation of commitment.'"

- "The supervisory board member should answer the following questions: 'Has this investment issue been analyzed critically enough? Have the CFO and CEO spent enough time butting heads? Has everything been kept in check?' As a supervisory board member, you observe the interaction between the CFO and the CEO."

- "I wasn't aware of any role-play behavior, but it's true that I tend to act differently as a supervisory board member than I did as a director."

- "I was actually aware of that. I am a lot more critical now, as a supervisory board member at the same company, than I was back when I was CEO. I would describe my attitude toward the current CEO as one of: 'Go on, convince me.'"

- "I do acknowledge the importance of roles: if you dress the part, you'll feel the part."

- "It only makes sense that supervisory board members tread with caution, as the weight of responsibility that comes with the job is pretty daunting."

- "I find this outcome to be very valuable, as I have become more aware of the effect of perceptions. You have made explicit what we implicitly take with us into the boardroom."