Bank Representatives on the Board of Directors and their Influence on the Firm’s Investment Decision

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Abstract

This paper examines the role of bank representatives on the firm’s board of directors and their influence on the firm’s big-scale lump-sum investment decision. When debt financing is used, the bank representatives are inclined to lower the firm’s exposure to risk, which is contrary to the shareholder’s interests of taking on more risk when the firm is highly leveraged. We use a one period discrete model to show that the bank representatives on the board can also become desirable from the shareholders’ perspective. This happens because the bank representatives on the board act as a commitment device for the board to implement a less risky strategy. Through this, they not only lower the bank’s ex ante interest rate but also lower the manager’s expected compensation. For the less profitable projects this results in higher project profitability and alleviation of the hold-up problem, caused by debt financing.

Keywords: board of directors, bank representative, investment decision

JEL Classifications: D82, G32, G34, M40

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1 Introduction

27% of the 403 non-financial firms included in the S&P500 Index had at least one representative of a commercial bank sitting on their board of directors in 2002 and almost 12% had not just a bank representative, but an executive of the bank that extended at least one loan to the firm in the last year (Sisli-Ciamarra, 2012). For example, the board of directors of General Electric and IBM currently have one board member that is a bank representative, whereas the board of directors of both Google and Apple have no bank representative on the board of directors. The same trend is also visible in Europe, where Thyssenkrupp and Total have one bank representative on the board of directors, while BMW and Bosch have none.

The board of directors is a heterogeneous group that collectively performs the board’s tasks of incentivizing and compensating the manager, and whose members are involved in the firm’s strategic decision making. Now, if we imagine a diversified board that comprises only two types of members: the independent board members and the board members that are at the same time representatives of a bank (like the boards of IBM or Thyssenkrupp). Then, it is reasonable to assume that the independent members are purely concerned about the shareholders’ best interest and that the bank representatives might also be considering the bank’s well-being (either subconsciously or as a hidden agenda). What is more, because they are board members they will also have the means of enforcing their interests. This does not mean that the board members, that are also bank employees or CEO’s, would neglect their fiduciary duty and intentionally disregard or even sabotage the shareholders’ interests. On the contrary, this means that the board’s diversity is taken into account and that the board members with different backgrounds, knowledge, and experience have different viewpoints on some topics. This diversity encourages more debate and can lead to better decision making (Larcker and Tayan, 2016, p.137). One of these debate prone topics is the firm’s risk strategy. The benefit of the bank representatives on the board is that they can identify not only the direct and positive effects, but also the negative and more indirect effects of taking on risk. Because the shareholders only have a limited view on risk, from their perspective the bankers on the board are meddling into the firm’s affairs and would, therefore, be considered undesirable. Dittmann et al. (2010) show that the bank representatives on the board of directors are associated with a decrease in the firm’s profitability.
In fact, if the bank representatives on the board are so undesirable, why do some firms allow or even encourage bankers’ presence on the board? What could such a biased board member contribute to the board’s expertise so that the board becomes more efficient in its work? Of course, the regulators (in Section 407 of the 2002 Sarbanes-Oxley Act addressing the audit committee financial expert) have encouraged that more financial experts, with an understanding of accounting principles, be present on the board, because they could reduce the company’s risk taking strategy. Moreover, a bank would always want to have a bank representative on the board of directors of the firm it is lending to due to its risk interest. Namely, a bank must insure a minimal capital requirement. Bank’s assets, weighted according to risk, are used for this purpose. The riskier the asset in place (the riskier the loan), the higher the amount that the bank must put aside and cannot use for further investment.\textsuperscript{1} Therefore, lower risk is in the interest of the bank. Finally, from the firm’s perspective, a usual argument for the bank representatives on the board of directors is that they decrease the costs of the firm’s borrowing (Sisli-Ciamarra, 2012). To be able to do that, there must be some strategic decision of the bank representatives on the board of directors that would influence the bank to accept a lower interest rate. If this were true for all firms, then in that case all firm’s would want to have a bank representative on their board. This, however, is not the case, as we can see from the empirical evidence.

Our paper explores the potential shareholder benefits of having bank representatives as members on the firm’s board of directors. We identify the circumstances under which the bank representatives on the board of directors can be desirable from the shareholders’ perspective. We focus our analysis on the board of directors and consider it as having three major tasks: incentivizing and compensating the manager, setting the firm’s risk strategy, and approving the firm’s big-scale lump-sum investment decisions.\textsuperscript{2} Setting the firm’s risk strategy is part of the advisory capacity that ensures the balance between the risk that the firm takes and the associated reward (Larcker and Tayan, 2016, p.57). The board members make sure that the risk management policy is designed and implemented consistently with the firm’s risk strategy and

\textsuperscript{1} For details on risk-weighted assets see Basel III Regulatory framework (Basel Committee on Banking Supervision, Bank for International Settlements, 2010).

\textsuperscript{2} Next to these tasks, the board of directors is also responsible for hiring and replacing the CEO (Laux, 2008; Jongjaroenkamol and Laux, 2017). We do not study the impact of bank representatives’ influence on the hiring and replacing decisions.
risk needs, and that no excessive risk is taken on. The board puts its expertise to use, on the one hand, through setting the firm’s risk strategy and, on the other hand, by approving the firm’s big-scale lump-sum investment decisions. This is applicable for example to companies with a car production line on which different types of cars can be produced and assembled. In case of an approved investment project, the board arranges debt with the bank, if the debt is needed for the project’s financing. The bank and shareholder representatives on the board would have the same interest while fulfilling the first and third task, respectively, while the second task, setting the risk strategy, might prove to be a conflicting one. Since the bank representatives are experienced in assessing risk, they would especially be concerned with the firm’s risk strategy, while keeping in mind the interests of the bank. But, if through their influence these directors are lowering the firm’s exposure to risk, they act contrary to the shareholder representatives. The shareholders, being interested in the firm’s expected residual value, are inclined to take on more risk when the firm is highly leveraged, since in this case they do not bear the costs of failure. The firm’s risk strategy influences the expected compensation needed to incentivize the manager to provide high effort for implementing the project. Through this, the profitability of the investment project is affected.

We use a one period discrete model to show that, somewhat contrary to the initial intuition, under certain circumstances the bank representatives on the board are even desirable from the shareholders’ perspective. This occurs because the bank representatives act as a commitment device for the board to impose a less risky strategy and, thus, lower both the expected compensation of the manager and the bank’s interest rate ex ante. Projects that were less profitable, due to the high risk strategy, now with a low risk strategy turn into more profitable ones, because of the reduced expected compensation of the manager. Moreover, low profitable projects that would not be conducted without bank representatives become positive NPV projects for shareholders when bank representatives are present. This way a hold-up problem, that is caused by the need for lending, is alleviated.

The theoretical findings allow some empirical implications. First, bank representatives on the board are associated with low firm profitability. Second, for firms with the same low ex ante profitability, the bank representatives on the board are associated with a lower interest rate. Third, the model predicts no difference in the level of the manager’s compensation between a
highly profitable firm and a low profitable firm with bank representatives on the board. Empirical evidence shows that firm’s characteristics and complexity of its operations influence the optimal size of the board and its composition (Boone et al., 2007; Cicero et al., 2013). More specifically, our results, where bank representatives on the board of directors affect the firm’s investment decision, are reflected in the evidence from Güner et al. (2008) and Dittmann et al. (2010). Dittmann et al. (2010) claim that bank representatives on the boards of the 100 largest listed companies in Germany obstruct the firm’s performance. Contrary to them, we show that the inverse holds, namely, that bank representatives never deteriorate the firm’s profitability, but that they are demanded on the boards of those firms where low future profitability is anticipated. Our model does not provide different results, but a different interpretation and causality of their evidence. Additionally, Sisli-Ciamarra (2012) finds that firms that have bankers on the board have a higher level of investment. This evidence is in line with our findings. We show that firms with less profitable projects can benefit from the bankers on the board because they increase these projects’ profitability and ensure that these projects are conducted.

The importance of the structure of the board of directors is a topic covering a vast amount of the corporate governance literature. Most of the literature on the board structure concentrates on the different motives of independent members (outsiders), who pursue the shareholders’ interests, and management-dependent members (insiders), who represent the manager’s interests. Different strategic goals of the firms will lead the firms to adopt different governance structures (Hermalin, 1994). On the one hand, insiders on the board can be thought of as a limitation to the board’s monitoring function (Yermack, 2004), but on the other hand they could be the ones that stimulate a higher degree of monitoring (Drymiotes, 2007, 2011). The benefits of a less independent board have been examined and shown in the context of aligning the firm’s and the manager’s interests (Almazan and Suarez, 2003), gathering, sharing, and disclosing private information (Adams and Ferreira, 2007; Laux, 2008; Baldenius et al., 2017), and evaluating investment opportunities (Raheja, 2005). Empirical evidence regarding board independence and the cost of debt financing is provided by Anderson et al. (2004). They show that a higher level

3 Reviews of corporate governance literature are presented in Armstrong et al. (2010); Brickley and Zimmerman (2010); Bushman and Smith (2001), and Tirole (2001). For a review of literature on the boards of directors see Adams et al. (2010).
of board independence is associated with lower cost of debt financing.

We extend the literature on the board structure by examining bank representatives and their incentives and actions. Therefore, we focus on the board of directors that consists of two types of independent directors: the shareholder representatives that have the shareholders’ interest at heart and the bank representatives that follow the bank’s interest.

Our paper is also related to the papers of Dewatripont and Tirole (1994), Berkovitch and Israel (1996), and Douglas (2009). Dewatripont and Tirole (1994) study the capital structure of a firm as a disciplining device for managers and as an incentive scheme for debt holders (e.g. banks) and shareholders. Their model predicts that debt holders obtain the control regarding the decision whether to continue or stop the project (or divest, reduce the size, etc.) after a low firm performance. Berkovitch and Israel (1996) also focus on the allocation of internal control rights and the capital structure of the firm. Their results illustrate that delegating some internal control to the debt holder representatives (e.g. by deploying them for the board) is beneficial for shareholders when the firm’s cash flow is relatively insensitive to managerial effort. Douglas (2009) examines the simultaneous and interacting incentive conflicts among shareholders, debt holders, and managers. He finds that for both the manager and the shareholder controlled firm, debt holders obtain some influence on the firm’s investment decisions and on the design of the manager’s compensation (e.g. by having a seat on the board).

In contrast to Dewatripont and Tirole (1994), Berkovitch and Israel (1996), and Douglas (2009), we explicitly consider the profitability of the investment project and the competitive arrangement of debt with the bank. By endogenizing the arrangement of debt, our model allows predictions regarding bank representatives’ influence on the board and the face value of debt as well as the associated interest rate. Examining the profitability of the investment opportunity allows the reinterpretation of empirical findings that bank representatives’ influence on the board leads to a lower firm profitability. We find that deploying bank representatives on the board is beneficial for shareholders when the profitability of the investment project is low. This is not the case for highly profitable investment projects. Bank representatives are deliberately chosen for the board because their presence increases the profitability of low profitable investment projects. This is achieved by following the bank representatives’ incentives to implement a low risk strategy. Low risk is associated with low expected compensation for the manager. Thus, for low
profitable investment projects, bank representatives on the board allow the firm to reduce the expected compensation payment to the manager.

Our findings highlight that bank representatives’ influence on the board of directors increases the investment project’s profitability for low profitable projects. Through this, the hold-up problem created by the need for lending is alleviated. Thus, we illustrate that bank representatives affect the firm’s big-scale lump-sum investment decisions. This adds to the literature examining the impact of bank representatives on managerial and accounting choices. For example, empirical evidence by Erkens et al. (2014) shows that bank representatives’ influence on the board of directors is associated with less conservative accounting. This is imputed to lender monitoring.

We also follow the debt contracting literature and the models of Holmstrom and Tirole (1997) and Innes (1990), but do not consider equity or capital structure. Instead we consider the influence of the board members on the firm’s big-scale lump-sum investment decisions and the lender’s financing conditions.

The rest of the article is organized as follows. Section 2 describes the model. Section 3 solves for the optimal compensation scheme, risk strategy, and investment decision when the firm is fully equity financed and when debt is needed in order to finance the investment. Section 4 analyzes the optimal board structure, discusses the main results, and provides further interpretation of them. In section 5, the results of comparative statics on the bank representatives on the board are presented. In section 6, empirical implications are derived from the theoretical findings. Section 7 concludes the paper.

2 Model Description

The firm with limited liability comprises a board of directors and a manager. The shareholders of the firm deploy the board. All three parties, i.e., the shareholders, the board of directors, and the manager, are risk-neutral.

The firm has a potential big-scale lump-sum investment project that generates a risky outcome $x$. The outcome $x$ is observable and contractible. The outcome of the investment project can be either high $x_H$, medium $x_M$, or low $x_L$, where $x_H = x_M + \delta$, $x_L = x_M - \delta$, $x_M > 0$, and $\delta \in (0, x_M)$. The probabilities of the possible outcomes are affected by the risk strategy of the firm $\theta$. 
\[ \theta \in [0, 1] \]. The risk strategy \( \theta \) is not contractible. A \( \theta \) close to zero captures a high risk strategy, whereas a \( \theta = 1 \) indicates a low risk strategy of the firm. The medium outcome is realized with probability \( \theta p \), where \( p \in (0, 1) \) represents the market conditions of available projects. Probability \( p \) expresses the notion of market influence and uncertainty that cannot be controlled by the firm. In addition to the risk strategy \( \theta \), the probability to generate a high or low outcome is affected by the manager’s unobservable and personally costly effort supply \( e \), where \( e \in \{e_L, e_H\} \) with \( e_H \in (0, (1 - p)/2) \) and without loss of generality \( e_L = 0 \). In particular, the probability to obtain a high outcome is \((1 - \theta p)/2 + e\). The low outcome is realized with probability \((1 - \theta p)/2 - e\). The expected outcome of the project is \( x_M + 2e\delta \). Hence, the risk strategy of the firm does not have an impact on the expected profitability of the project. The investment project under a low risk strategy second-order stochastically dominates the investment project under a high risk strategy. However, the shareholders are risk-neutral and hence, their expected utility from the outcome of the risky investment project is unaffected by the risk strategy of the firm. When this risky investment project is conducted the firm incurs investment costs \( I \), where \( I \in (I_L, I_H) \).

The board has three tasks. First, the board sets suitable incentives for the manager by determining the compensation scheme \( w \). For a high, medium, or low realized outcome the manager is paid a compensation payment of \( w_H, w_M, \) or \( w_L \), respectively. Second, the board sets the risk strategy \( \theta \) of the firm. Third, the board decides on conducting the big-scale lump-sum investment project.

When the investment project is approved, the manager implements the project by choosing his unobservable effort level \( e \). The personal costs of the manager for supplying effort are denoted by \( C(e) \). Providing high effort \( e_H \) is associated with personal costs of the manager of \( C(e_H) = c > 0 \). For low effort \( e_L \), the manager does not incur personal costs, i.e., \( C(e_L) = 0 \).

Throughout the paper, high effort is assumed to be optimal for the shareholders. The manager

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4 \( I_L := x_M - \delta \) and \( I_H := x_M - \delta/2(1 - p - 2e_H) \). The restrictions on the investment costs are explained in footnote 8.

5 Designing the compensation contract is performed by the compensation committee of the board of directors. We assume that the objective of the board of directors and its compensation committee are aligned. The impact of delegating different board functions to different committees on the design of the manager’s compensation contract is studied by Laux and Laux (2009).

6 High effort is optimal for the shareholders when the personal costs \( c \) are smaller than \( c = 4\delta e_H^2/(2e_H + 1 - p) \)(see the proof of Propositions 1 and 2 in the appendix).
is protected by limited liability and has a reservation utility equal zero. The expected utility of
the manager is given by
\[ E[U_M] = E[w] - C(e). \]

The firm needs to take on debt in order to finance the total investment costs \( I \) of the project.\(^7\) \( D \)
characterizes the face value of debt. The debt is provided by a bank. We assume that there is a
competitive debt market so that the bank does not earn any extra rents. Without loss of generality
the risk free interest rate equals zero. The shareholders can appoint bank representatives of
the financing bank to the board. In particular, the shareholders choose the influence of bank
representatives on the board \( \beta \in [0, 1] \) before the debt is arranged. When the low outcome \( x_L \) is
realized, the firm defaults.\(^8\) In this case, the bank does not receive the face value of debt \( D \), but
only gets the residual after having paid the manager. The bank representatives on the board act
in the best interest of the bank. Hence, after the debt has been arranged the bank representatives
on the board are interested in maximizing the expected repayment of the debt:
\[ E[U_B] = Pr[x - w \geq D] \cdot D + (1 - Pr[x - w \geq D]) \cdot E[x - w]. \]

The shareholder representatives on the board seek to maximize the expected residual of the
project’s outcome taking the compensation payments for the manager and the debt repayment
into consideration:
\[ E[U_S] = E[\max\{x - w - D, 0\}]. \]

For every level of the bank representatives’ influence \( \beta \) and for every arranged debt \( D \), the
expected utility of the board is determined as a weighted average of the bank’s utility and of the

\(^7\) As long as the project is partially debt financed this does not affect our findings.

\(^8\) The restrictions on the level of investment costs \( I \in (\bar{I}, \bar{T}) \) are set in order to study a setting in which debt financing
might be problematic for the lender. In particular, the restrictions ensure that the lending bank suffers from the
firm’s default if and only if the low outcome is realized. For \( I < \bar{L} \), debt \( D \) would equal investment costs \( I \). Then,
there would be no possibility of default and bankers would have no impact. \( I < \bar{T} \) ensures that in equilibrium, the
firm only defaults for \( x = x_L \). In the case of \( I \in (\bar{x}_M - \delta / 2(1 - 2e_H), \bar{T}) \) and off-the-equilibrium path, the firm will
default for \( x = x_M \) as well. This increases the face value of debt \( D \). However, the bank representatives on the board
still want to have less risk. Therefore, in this case it is sufficient to restrict the investment costs \( I \) to the interval
\( (\bar{I}, \bar{T}) \). If we would allow \( I \) to be higher than the upper bound, the firm might also default in other cases than \( x = x_L \).
This would lead to numerous case distinctions in the analysis without providing further insights. The qualitative
results of the paper would remain unchanged.
shareholders’ utility

\[ E[\text{U}_{\text{BoD}}] = \beta \cdot E[U_B] + (1 - \beta) \cdot E[U_S]. \]

This characterization of the influence of bank representatives on the board bases heavily on the characterization for independence of directors from the CEO and their impact on the board’s decisions found in the literature (Drymiotes, 2007; Laux and Mittendorf, 2011).

We consider a setting where the board sets the firm’s risk strategy and makes the investment decision. For example, a car manufacturer can use a production line for assembling different car models like small cars or big SUVs. For some car models demand might be riskier than for others. Whether a car manufacturer wants to produce small cars or big SUVs is a strategic decision approved by the board of directors. This strategic decision affects the sales risk of the production line’s produced cars. The timing of the game is illustrated in figure 1.

<table>
<thead>
<tr>
<th>t=0</th>
<th>t=1</th>
<th>t=2</th>
<th>t=3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholders choose the influence of bank representatives on the board $\beta$</td>
<td>The board decides on the investment decision and debt $D$ is arranged. The board also sets the risk strategy $\theta$ and the manager’s compensation scheme $w$</td>
<td>Manager provides effort supply $e$</td>
<td>Outcome $x$ is realized, manager is compensated; for $x = x_L$, residual is paid to the bank; otherwise, debt $D$ is returned</td>
</tr>
</tbody>
</table>

Figure 1: Timeline

3 Analysis

The model is solved by backward induction. First, we look at the optimal compensation scheme of the manager. Second, the optimal investment decision and risk strategy is examined both for the benchmark case, where the firm’s project is equity financed, and for the case when debt is needed in order to finance the investment project.
3.1 Optimal Compensation Scheme

At time $t = 2$, the manager provides unobservable and personally costly effort. For designing the optimal compensation scheme, the board has to consider the manager’s existing incentives. On the one hand, the board has to ensure that the manager wants to work for the firm (participation constraint, PC M). This is achieved when in expectation the manager receives at least the reservation utility that equals zero. On the other hand, the board has to design a compensation scheme that induces the manager to choose the high effort level for any determined risk strategy $\theta$ (incentive compatibility constraint, ICC M). In addition, the limited liability of the manager prohibits negative compensation payments (limited liability, LL M). In sum, the board faces the following constraints for designing the manager’s compensation scheme for $e \in \{e_L, e_H\}$:

\begin{align*}
E[w \mid e] - C(e) & \geq 0 \quad \text{(PC M)} \\
E[w \mid e_H] - c & \geq E[w \mid e_L] \quad \text{(ICC M)} \\
w_H, w_M, w_L & \geq 0 \quad \text{(LL M)}. 
\end{align*}

The limited liability constraints (LL M) ensure that the manager’s expected compensation in the case of a low effort level is non-negative. As a consequence, the participation constraint (PC M) in the case of low effort supply is always fulfilled. In addition, the participation constraint (PC M) in the case of high effort is met whenever the incentive compatibility constraint is fulfilled. According to the incentive compatibility constraint (ICC M), inducing the manager to provide high effort is achieved by any compensation contract that satisfies

\[ w_H - w_L \geq \frac{c}{e_H}. \]  

(1)

The board wants to pay the risk-neutral manager as little as necessary. The compensation pay-
ment in the case of a medium outcome does not affect the manager’s incentives to provide high effort. According to inequality (1), a positive compensation payment for a low outcome makes incentivizing the manager unnecessarily expensive. Therefore, the optimal compensation contract pays

\[ w_H = \frac{c}{e_H}, w_M = 0, \text{ and } w_L = 0. \]  

(2)

This compensation contract is affected by risk. For low risk, the likelihood of observing \( x_H \) when the manager has supplied high effort increases relative to the likelihood that low effort has been provided. Thus, less expected compensation is needed to motivate the manager to choose high effort. The lower the risk of the firm the lower the expected compensation of the manager. Low risk is captured by a high level of the firm’s risk strategy \( \theta \).

**Lemma 1.** *The expected compensation of the manager is decreasing in the risk strategy of the firm \( \theta \).*

**Proof.**

\[
E[w \mid e_H] = \left[ \frac{1}{2} (1 - \theta p) + e_H \right] w_H = \left[ \frac{1}{2} (1 - \theta p) + e_H \right] \frac{c}{e_H}
\]

\[
\frac{\partial E[w \mid e_H]}{\partial \theta} = -\frac{pc}{2e_H} < 0.
\]

\[ \square \]

### 3.2 Optimal Investment Decision and Risk Strategy — Benchmark Case

The board decides to conduct the investment project and arranges the debt with the bank at time \( t = 1 \). The board also sets the risk strategy \( \theta \) of the firm. In this section, we consider the benchmark case in which the firm’s project is fully financed by the firm’s equity and there are no bank representatives on the board. In this case the board sets the firm’s risk strategy so as to maximize the expected utility of the shareholders \( E[U_S] \). In particular,

\[
\max_{\theta} E[U_S] = \max_{\theta} E[\max\{x - w, 0\}] =
\]

\[
= \max_{\theta} \left[ \frac{1}{2} (1 - \theta p) + e_H \right] (x_M + \delta - w_H) + \theta p x_M + \left[ \frac{1}{2} (1 - \theta p) - e_H \right] (x_M - \delta) =
\]
\[
\max_{\theta} \left( x_M + 2 e_H \delta \right) - \left[ \frac{1}{2} (1 - \theta p) + e_H \right] \frac{c}{e_H} .
\]

The first derivative with respect to \( \theta \) is \((pc)/(2e_H) > 0\). Therefore, the optimal risk strategy of the board with an equity financed project and without the bank representatives is to implement the lowest possible risk, i.e., \( \theta^*_{\text{equity}} = 1 \). Recall that both the shareholders and the manager are risk-neutral. Nevertheless, the board acting in the full interest of the shareholders optimally implements the low risk strategy. This is optimal because only the expected compensation payment to the manager, \( E[w | e_H] = \left[ (1/2)(1 - \theta p) + e_H \right] \left( c/e_H \right) \), is affected by the risk strategy. Lemma 1 discussed that low risk results in a low expected compensation of the manager. As noted in section 2, the expected outcome of the project is \( x_M + 2 e_H \delta \) for any risk strategy. Therefore, setting the low risk strategy does not affect the expected outcome of the project, whereas, the expected compensation payment is reduced.

At \( t = 1 \), the investment decision is made by the board. When the project is fully financed from the firm’s equity, the board decides to conduct the investment project whenever the expected outcome of the project less the expected compensation payment for the manager is higher than the investment costs \( I \). Specifically, in the benchmark case, the investment project is approved whenever
\[
I \leq I_{\text{equity}}, \quad \text{where} \quad I_{\text{equity}} := x_M + 2 e_H \delta - \left[ \frac{1}{2} (1 - p) + e_H \right] \frac{c}{e_H} .
\]

As described in section 2, the investment costs are assumed to lie in the range \((I, \bar{I})\). For any level of investment costs belonging to this range, the board conducts the investment project in the benchmark case, i.e., \( \bar{I} < I_{\text{equity}} \), and sets the optimal low risk strategy.

### 3.3 Optimal Investment Decision and Risk Strategy — Debt and Bank Influence

Differently from the benchmark case with equity financing and without bank influence on the board, we now examine the optimal risk strategy, face value of debt, and investment decision in the case when the debt is needed in order to finance the project and when there is bank influence on the board. Once the debt has been arranged, the bank representatives on the board are solely interested in maximizing the expected repayment of the debt. Thus, the objectives of the bank
and shareholder representatives on the board diverge. Nevertheless, they jointly determine the risk strategy of the firm, which greatly depends on the bank representatives’ influence on the board $\beta$:

$$
\max_\theta E[U_{BoD}] = \max_\theta [\beta \cdot E[U_B] + (1 - \beta) \cdot E[U_S]].
$$

The first derivative with respect to $\theta$ determining the optimal adapted risk strategy $\theta$ is

$$
\frac{p}{2} \left[ \beta \frac{D - (x_M - \delta)}{D} + (1 - \beta) \left[ -\frac{D - (x_M - \delta)}{D} + \frac{c}{\epsilon_H} \right] \right].
$$

Bank representatives on the board seek to implement a low risk strategy $\theta = 1$ because low risk is associated with a low possibility of project and firm default. A low possibility of default results in a high expected repayment of the debt for the bank. The firm defaults when the outcome realization of the investment project is low, $x_L = x_M - \delta$. Then, the face value of debt $D$ is larger than the realized low outcome $x_M - \delta$. This positive effect of low risk for the bank is denoted as ‘bank effect’ in (4). In the case of default, the bank bears the loss, whereas, the shareholders of the firm neither bear parts of the loss nor receive any payments. Thus, the downside of the risky investment project is borne by the bank and not by the shareholders.

The sole beneficiary of the upside of the risky investment are the shareholders. The possibility to obtain the high project outcome is high for a high risk strategy of the firm. Through debt financing, the risky investment project becomes an option for the shareholders. A low risk strategy of the firm leads to a reduced option value for the shareholders. This negative effect of low risk for the shareholders is captured by the ‘option value effect’ in (4). In section 3.2 and lemma 1, we identified the effect of low risk on the expected compensation payment for the manager. This positive ‘compensation effect’ for shareholders also occurs in the case of debt and bank influence on the board and is included in (4).

The shareholder representatives on the board have to trade off the negative ‘option value effect’ and the positive ‘compensation effect’ of implementing a low risk strategy. When the

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$^{10}$The face value of debt depends on the level of investment costs. This will be discussed in the remaining parts of this section and the following section. The interval of possible levels of investment costs $(L,T)$ is determined to ensure that the firm defaults only for the low realized outcome.
‘compensation effect’ exceeds the ‘option value effect’, the objectives of the bank and shareholder representatives are aligned. Then, setting the strategy to low risk is in the interest of both, i.e., $\theta^{*}_{\text{debt}} = 1$. For the case when the ‘compensation effect’ is smaller than the ‘option value effect’, the shareholder representatives seek to implement a high risk strategy. However, the bank representatives still want to set a low risk strategy. Therefore, when the influence of bank representatives $\beta$ is small (high), the board implements a high (low) risk strategy $\theta^{*}_{\text{debt}} = 0$ ($\theta^{*}_{\text{debt}} = 1$). Ex ante both the shareholder representatives and the bank representatives are risk neutral. The bank representatives do not like to bear risk because of the debt financing. For a large ‘option value effect’, debt financing results in risk seeking incentives for the shareholder representatives. Thus, debt financing induces risk aversion for the bank representatives and makes shareholder representatives risk-loving in the case of a large ‘option value effect’.

**Observation 1.** With equity financing of the investment project the bank and the shareholder representatives are risk-neutral. With debt financing and a large ‘option value effect’ there exists an induced risk-aversion for the bank representatives and an induced risk-lovingness for the shareholder representatives.

In the benchmark case, the risk strategy only affected the expected compensation payment, and a low risk strategy was preferred by the shareholder representatives on the board. Hence, with equity financing the ‘compensation effect’ induces the shareholder representatives to exhibit risk aversion. As observation 1 illustrates, with debt financing shareholder representatives might be induced to become risk-loving.

Whether the ‘option value effect’ exceeds the ‘compensation effect’ depends on the face value of debt $D$. For a small face value of debt the benefits from a reduced compensation are larger than the ‘option value effect’. Moreover, the face value of debt depends on the level of the financed investment costs. Specifically, in a competitive debt market the bank is willing to finance the investment project if the expected repayment of debt is at least as high as the investment costs. This is captured by the bank’s participation constraint (PC B):

$$E[U_B] \geq I \quad (\text{PC B}).$$
Bank financing is least costly for the firm when the expected repayment equals the investment costs. Thus, the face value of debt is determined by \( I = E[U_B] \) and equals:

\[
D = x_M - \delta + \frac{I - (x_M - \delta)}{\left(1 - \theta p + \theta p + 2eH\right)^2}.
\] (5)

The risk strategy of the firm \( \theta \) is anticipated by the bank during the debt arrangement. In particular, a low risk strategy results in a small face value of debt and a low associated interest rate. As stated above, the bank and shareholder representatives’ objectives regarding the risk strategy diverge whenever the ‘option value effect’ exceeds the ‘compensation effect’. In other words, this occurs when the benefits from transferring the downside risk to the bank is higher than the costs of higher manager compensation due to higher risk. The bank representatives on the board seek a low risk strategy, whereas the shareholder representatives prefer a high risk strategy. For a large influence of bankers on the board, a low risk strategy is implemented by the board. Low risk induces the bank to demand a low interest rate which is expressed by a low face value of debt. This finding is summarized in lemma 2.

**Lemma 2.** A large influence of bank representatives on the board results in a low interest rate and a small associated face value of debt.

**Proof.**

\[
\frac{\partial D}{\partial \theta} = \frac{(-2p)(I - (x_M - \delta))}{(1 + \theta p + 2eH)^2}.
\]

\( I \) is larger than \( I = x_M - \delta \). Thus, the first derivative of \( D \) with respect to \( \theta \) is negative. With a large influence of bank representatives on the board, the board sets a low risk strategy \( \theta^*_\text{debt} = 1 \).

Next, we consider the investment decision of the board at time \( t = 1 \) without the influence of bank representatives on the board and then, with the influence of bank representatives. The investment decision of the board depends on the face value of debt. As noted above, the face value of debt in (5) depends both on the level of investment costs and the set risk strategy.

With debt financing and without influence of bank representatives on the board, the board implements a low risk strategy whenever the ‘compensation effect’ exceeds the ‘option value effect’ in (4). The bank anticipates this low risk strategy. Thus, the ‘compensation effect’ dominates
the ‘option value effect’ whenever

\[
\frac{c}{e_H} \geq D - (x_M - \delta) \iff \frac{c}{e_H} \geq \frac{I - (x_M - \delta)}{\frac{1}{2}(1 - p) + e_H + p} \iff 
\]

\[I \leq I_{\text{option}}, \quad \text{where} \quad I_{\text{option}} := x_M - \delta + \frac{c(1 + p + e_H)}{2e_H}. \tag{6}\]

Therefore, the project approval depends also on the effect that dominates. In case of debt financing and a dominating ‘compensation effect’, the board approves the investment project in the same manner as it would approve an equity financed project, so:

\[
E \left[ \max \{x - w - D, 0\} \mid \theta = 1 \right] \geq 0 \iff I \leq I_{\text{equity}}. \tag{7}\]

As described in section 2, the investment costs are assumed to lie in the interval \((I,T)\). The upper bound \(T\) exceeds the cut-off value \(I_{\text{option}}\) which is smaller than \(I_{\text{equity}}\) stated in (3). Thus, whenever the ‘compensation effect’ dominates the ‘option value effect’ the investment project is approved by the board.

On the other hand, for high investment costs \(I > I_{\text{option}}\), the ‘option value effect’ dominates the ‘compensation effect’ and the shareholder representatives prefer a high risk strategy. This high risk strategy is anticipated by the bank and leads to the bank accepting only a high face value of debt. Thus, with debt financing and a dominating ‘option value effect’, the board comprising solely shareholder representatives approves the investment project whenever

\[
E \left[ \max \{x - w - D, 0\} \mid \theta = 0 \right] \geq 0 \iff 
\]

\[I \leq I_{\text{debt}}, \quad \text{where} \quad I_{\text{debt}} := x_M + 2e_H \delta - \frac{c(1 + 2e_H)}{2e_H}. \tag{8}\]

The cut-off value \(I_{\text{debt}}\) stated in (8) is smaller than the cut-off value of the benchmark case \(I_{\text{equity}}\) stated in (3). In addition, for a high level of personal costs \(c\) of the manager, the cut-off value \(I_{\text{debt}}\) becomes smaller than \(T\). In this case, investment projects that are approved in the benchmark case are not conducted with debt financing. Specifically, as discussed in observation 1 debt financing induces shareholder representatives on the board to become risk-loving. The shareholder representatives’ inclination towards risk results in a high risk strategy of the firm.
This is contrary to the shareholders’ preferred risk strategy in the benchmark case. Thus, debt financing creates a hold-up problem whenever the ‘option value effect’ exceeds the ‘compensation effect’.

Next, we examine the impact of the influence of bank representatives on the board. When the ‘compensation effect’ dominates the ‘option value effect’, having the influence of bank representatives on the board does not change the board’s preference for implementing a low risk strategy. Thus, for $I \leq I_{\text{option}}$ as described in (6), the risk strategy and investment decision remain unchanged.

In the case where in (4) the ‘option value effect’ exceeds the ‘compensation effect’, having a sufficiently large influence of bank representatives on the board changes the risk strategy. Whereas without the influence of the bank representatives the high risk strategy is chosen by the board, the low risk strategy is preferred with a high influence of bank representatives on the board. The bank representatives are indifferent between conducting and not conducting the investment project because the debt market is competitive. However, with the low risk strategy the shareholder representatives always strictly prefer the implementation of the investment project as outlined in (7). As a consequence, for $I > I_{\text{option}}$ and a large influence of bank representatives on the board, the investment project is approved for any level of investment costs. These findings are summarized in lemma 3.

**Lemma 3.** For large investment costs $I > I_{\text{option}}$ there exists a threshold level of bank representatives’ influence on the board of directors $\hat{\beta} \in (0, 1/2)$ where:

- for $\beta \geq \hat{\beta}$, the board approves the investment project and implements a low risk strategy
  \[\theta_{\text{debt, high } I, \beta \geq \hat{\beta}}^* = 1.\]
- for $\beta < \hat{\beta}$, the board approves the investment project if and only if $I_{\text{option}} < I < I_{\text{debt}}$.
  When the investment project is approved, the board implements a high risk strategy
  \[\theta_{\text{debt, high } I, \beta < \hat{\beta}}^* = 0.\]

For small investment costs $I \leq I_{\text{option}}$, the board approves the investment project and implements a low risk strategy $\theta_{\text{debt, low } I}^* = 1$.

**Proof.** The proof regarding the level of $\hat{\beta}$ is stated in the appendix.
4 Main Results

Having determined the board’s optimal risk strategy and investment decision (lemma 3), the minimal face value of debt that the bank is willing to accept for lending the funds (equation (5)), as well as the bank representatives’ influence on both of them, we now look at the influence of the bank representatives on the project profitability. What is more, we will tackle the question of when and why the bank representatives would be a useful addition to the board, and when not.\[1\]

We regard the project profitability from the ex ante perspective, i.e., profitability equals expected outcome less investment and compensation costs. Under highly profitable projects we consider such projects that need small financing costs \(I\) compared to the potential expected outcome that can be generated at the end of the project. Therefore, for the same expected outcome \(x\) highly profitable projects will be the ones demanding low investment costs \(I\), whereas the low profitable projects will be the ones demanding high investment costs \(I\). When there is no need for outside financing all the projects that demand lower investment costs than \(I < I_{\text{equity}}\) will be approved (as in (3)). In other words, all positive NPV projects will be approved whenever there is equity financing. The pool of approved projects becomes smaller when the internal financing is not sufficient and a loan from the bank is needed (formally when \(I \leq I_{\text{debt}} < I_{\text{equity}}\)). With the need for the loan, the bank representatives on the board of directors can become useful due to their influence on the firm’s risk strategy. As stated in lemma 2, the interest rate is lower with the bank representatives’ influence on the board, but contrary to the first impression, this does not drive our results. The reason behind this is that the bank always breaks even with the investment costs \(I\) as an expected return. When the risk is lower, the probability of default is also lower, and thus, a smaller face value of debt \(D\) is demanded. The total effect of low risk on the expected return of the bank is zero and, therefore, the effect on the interest rate can be considered a ‘side effect’ and not the driving force of the results regarding the usefulness

\[1\] We consider bank representatives on the board of directors as useful if they provide strictly positive benefits to shareholders. We concentrate on the bank representatives’ influence on the set risk strategy. Nevertheless, we acknowledge that there may be costs to having bank representatives on the board. These costs may be the manager not sharing private decision-relevant information with manager-dependent board members like for example bankers (Adams and Ferreira, 2007; Laux, 2008).
of the bank representatives. The driving force behind the project approval is the manager’s compensation (lemma 1). Proposition 1 summarizes the results.

**Proposition 1.** For highly profitable projects ($I \leq I_{\text{option}}$) there is no benefit of having bank representatives’ influence on the board of directors.

For low profitable projects ($I > I_{\text{option}}$) bank representatives’ influence on the board of directors guarantees an increase in the project’s profitability.

*Proof.* The proof is stated in the appendix.

The first part of the proposition is straightforward. When the firm’s projects are very profitable and the same high outcome $x$ can be reached with a lower investment $I < I_{\text{option}}$, then the bank representatives on the board of directors have the same interests regarding the risk, as do the shareholder representatives on the board. Since the investment is low so is the face value of debt $D$, which in turn reduces the negative effect of the reduced option value and, thus, ensures that the ‘compensation effect’ of less risk dominates. Due to the lower risk, the compensation to the manager will be lower, so the interests of the bank representatives on the board are aligned with the interests of the shareholders and their representatives on the board. Thus, there would be no benefit of a bank representative on the board.

The second part of the proposition states when and why the bank representatives on the board of directors might be positively regarded by the shareholders. For ex ante positive NPV projects with a low profitability, where the investment level needed for the project is high, $I > I_{\text{option}}$, the benefit of the bank representatives on the board of directors can be observed. Since the investment needed is now higher, so is the face value of debt $D$, which in this case, increases the negative effect of the reduced option value of less risk and ensures that the ‘option value effect’ dominates the ‘compensation effect’. Now, since the ‘option value effect’ dominates for the shareholder representatives on the board, a board without bank influence would implement a high risk strategy. This high risk strategy would increase the manager’s compensation. Anticipating this, the bank, in order to break even, demands a higher interest rate ex ante. In order to convince the bank that a less risky strategy will be implemented, the shareholders might be willing to give up a part of their influence on the board in the bank’s favor. This will lower the manager’s compensation costs and, consequently, decrease the acceptable interest rate. There-
fore, a sufficiently high influence of the bank representatives on the board of directors would act as a guarantee to the bank that the anticipated low risk strategy would, indeed, be implemented. Although, the risk strategy influences the decrease in the face value of debt, this decrease does not have any influence on the project’s profitability. Recall that only the manager influences the project’s economic profitability, or the probability that a high outcome realizes in the end. Therefore, the increased profitability of the firm, due to the presence of bank representatives on the board, does not stem from the project itself, but from the benefits of a lower expected manager’s compensation. Figure 2 illustrates the usefulness of bank representative on the board of directors. Bank representatives’ influencing of the firm’s risk strategy leads to a higher project profitability and a higher shareholder value.

![Figure 2: Comparison of project profitability under different board structures](image)

Now let us focus on the low profitable projects that would not be conducted without a bank
representative on the board of directors \((I > I_{\text{debt}})\). The benefits of bank representatives stem from the reduced expected compensation of the manager. The level of effort costs determines the extent of this ‘compensation effect’. Therefore, in the case of a low profitable project, the benefits of bank representatives on the board can take on two different specifications. For small effort costs of the manager, the investment project’s profitability increases due to the change in the risk strategy. For high effort costs of the manager, the bank representatives on the board lead the board to approve the investment project which they would not approve without the bank representatives. Notice that these projects would be conducted in the benchmark case, because they would be profitable projects if there were no requirements for debt. Thus, a hold-up problem occurs due to the need for debt financing. In this case, the firm itself would have chosen the low risk strategy, lowering the manager’s expected compensation. If debt is used to finance the project and no bank representatives are deployed on the board, these projects become unprofitable because the board implements a high risk strategy. With a high risk strategy, the manager receives a high expected compensation. However, with a sufficiently high influence of the bank representatives on the board a low risk strategy is employed and the manager’s expected compensation is decreased. Because the bankers can ensure ex post a low risk strategy, this changes the profitability of the project so that the investment decision changes in favor of conducting the project. In sum, for these investment projects the bank representatives on the board change the investment decision and, thus, alleviate the hold-up problem. These results are summarized in proposition 2.

**Proposition 2.** For a low profitable project and:

- small effort costs of the manager, the benefits of bank representatives’ on the board manifest themselves in an increased project profitability.

- high effort costs of the manager, the bank representatives on the board alleviate the hold-up problem.

*Proof.* The proof is stated in the appendix.

The influence of the personal costs \(c\) for the manager also plays an important role. Recall that the firm’s risk strategy is endogenously chosen by the board of directors and that the choice
Figure 3: Benefits of bank representatives’ influence on the board of directors for $\beta \geq \hat{\beta}$

$(c_1 = \delta e_H \frac{1 + 2e_H - p}{1 + 2e_H}, c_2 = \delta e_H \frac{1 + 2e_H}{1 + 2e_H + p/2} \text{ and } \bar{c} = \delta e_H \frac{4e_H}{2e_H + 1 - p})$

depends on the ‘option value effect’ and on the ‘compensation effect’ dependent on the risk strategy. The higher the personal costs $c$ the more powerful the ‘compensation effect’, while the ‘option value effect’ of debt stays unchanged. Therefore, the ‘compensation effect’ dominates more often and ensures that the interests of all board members, shareholder and bank representatives, are aligned. Thus, for an increasing value of $c$ the range when bankers are beneficial becomes smaller. When the manager’s costs are high ($c_1 < c < \bar{c}$ in figure 3)$^{12}$, the bank representatives’ influence on the board induces a change in the board’s investment decision and alleviates the hold-up problem. This is because the higher the manager’s personal costs $c$ are the more the shareholders can save on the expected compensation of the manager when the board chooses a low risk strategy compared to a high risk strategy. In other words, more projects become profitable. Figure 3 shows the interaction between the manager’s personal costs $c$.

$^{12}$ For $c \geq \bar{c}$, the shareholders do not want the manager to provide high effort. As stated in section 2, we restrict the analysis to the case where the shareholders find inducing high effort optimal.
the investment costs $I$, and the influence of the bank representatives on the project choice and project profitability.

## 5 Comparative Statics

Proposition 1 highlights that bank representatives’ influence on the board of directors is beneficial for shareholders when the project has low profitability. The benefit stems from bank representatives affecting the board of director’s chosen risk strategy. Whereas firms with a low profitable project and solely shareholder representatives implement a high risk strategy, firms that also allow a sufficient influence of bank representatives set a low risk strategy. Whether a given level of bank representatives’ influence is considered sufficient is determined by the threshold level $\hat{\beta}$ identified in lemma 3:

$$\hat{\beta} = \frac{2(I - x_M + \delta)e_H - c(1 + p + 2e_H)}{4(I - x_M + \delta)e_H - c(1 + p + 2e_H)}.$$  \hspace{1cm} (9)

The threshold level $\hat{\beta}$ determines the minimum influence level of bank representatives, which is needed in order to deploy their benefits for shareholders of firms with a low profitable project. This threshold is increasing in the investment costs $I$ and $\delta$ which captures the difference in the project’s outcomes. A raise in the investment costs $I$ or in $\delta$ results in a higher face value of debt (see equation (5)). This leads to an increasing ‘bank effect’ and a decreasing ‘option value effect’. The ‘compensation effect’ is unaffected. Due to the positive ‘compensation effect’ the threshold $\hat{\beta}$ is always smaller than 50%. Therefore, the decrease in the ‘option value effect’ dominates the increase in the ‘bank effect’. This means that a higher influence of bank representatives is needed on the board of directors to ensure a low risk strategy.

**Proposition 3.** The threshold level of bank representatives’ influence on the board of directors $\hat{\beta}$ is increasing in the investment costs $I$ and in the difference in the project’s outcomes $\delta$.

**Proof.**

$$\frac{\partial \hat{\beta}}{\partial I} = \frac{\partial \hat{\beta}}{\partial \delta} = \frac{2ce_H(1 + 2e_H + p)}{(c(1 + 2e_H + p) - 4e_H(I - (x_M - \delta)))^2} > 0.$$
When the expected return for the bank increases, the face value of debt decreases. This is the case when the medium outcome $x_M$ and/or the probability factor $p$ increase. Recall that the probability $p$ can be interpreted as the market conditions of available projects. A reduced face value of debt leads to a reduction in the ‘bank effect’ and a raise in the ‘option value effect’, which means that this negative effect is losing impact. The increase in the ‘option value effect’ dominates because the threshold $\hat{\beta}$ is always smaller than 50%. As a consequence, a smaller bank representatives’ influence is needed to induce the board of directors to implement the low risk strategy for a higher medium outcome $x_M$ and/or probability factor $p$.

**Proposition 4.** The threshold level of bank representatives’ influence on the board of directors $\hat{\beta}$ is decreasing in the medium outcome $x_M$ and in the probability factor $p$.

**Proof.**

\[
\frac{\partial \hat{\beta}}{\partial x_M} = -\frac{2c e_H (1 + 2e_H + p)}{(c(1 + 2e_H + p) - 4e_H(I - (x_M - \delta)))^2} < 0,
\]

\[
\frac{\partial \hat{\beta}}{\partial p} = -\frac{2c e_H(I - (x_M - \delta))}{(c(1 + 2e_H + p) - 4e_H(I - (x_M - \delta)))^2} < 0.
\]

An increase in the manager’s personal costs $c$ enhances the ‘compensation effect’ while the ‘bank effect’ and the ‘option value effect’ are unaffected. A higher ‘compensation effect’ reduces the need for the bank representatives’ influence on the board of directors to induce the low risk strategy implementation. Hence, the threshold level $\hat{\beta}$ decreases.

**Proposition 5.** The threshold level of bank representatives’ influence on the board of directors $\hat{\beta}$ is decreasing in the manager’s personal costs $c$.

**Proof.**

\[
\frac{\partial \hat{\beta}}{\partial c} = -\frac{2c e_H (1 + 2e_H + p)(I - (x_M - \delta))}{(c(1 + 2e_H + p) - 4e_H(I - (x_M - \delta)))^2} < 0.
\]

While an increase in the above discussed parameters affected either the ‘bank effect’ and ‘option value effect’ or the ‘compensation effect’, a raise in the manager’s high effort $e_H$ influences all three effects. An increase in the manager’s high effort $e_H$ results in a smaller face value of debt.
This leads to a smaller ‘bank effect’ and a higher ‘option value effect’. Because of \( \hat{\beta} < 0.5 \) the ‘option value effect’ dominates. This decreases the threshold level \( \hat{\beta} \). However, an increase in \( e_H \) also decreases the ‘compensation effect’ which leads to an increase in the threshold level \( \hat{\beta} \). In sum, the raise in the ‘compensation effect’ dominates the negative net effect of the ‘option value effect’ and the ‘bank effect’. As a consequence, an increase in the manager’s high effort raises the minimum level of bank representatives’ influence necessary to induce the board of directors to set the low risk strategy.

Proposition 6. The threshold level of bank representatives’ influence on the board of directors \( \hat{\beta} \) is increasing in the manager’s high effort \( e_H \).

Proof. 

\[
\frac{\partial \hat{\beta}}{\partial e_H} = \frac{2c(1 + p)(I - (x_M - \delta))}{(c(1 + 2e_H + p) - 4e_H(I - (x_M - \delta)))^2} > 0.
\]

6 Empirical Implications

As stated in proposition 1 and figure 2, bank representatives on the board increase the shareholder value for low profitable projects. For highly profitable projects bank representatives on the board neither harm nor benefit the shareholders. The shareholders anticipate the bank representatives’ impact on the project profitability. Thus, the model predicts that bank representatives are deployed on the board when the firm faces low profitable projects.

Corollary 1. Bank representatives’ influence on the board of directors is associated with low firm profitability.

Empirical evidence by Güner et al. (2008) and Dittmann et al. (2010) documents that having bank representatives on the board is associated with low firm profitability.\(^{13}\) Güner et al. (2008)

\(^{13}\) We use an ex ante formulation of profitability whereas empirical evidence reports ex post profitability. In our model the ex ante profitability corresponds to the ex post profitability for a large population of firms. That is, for both highly and low profitable projects, a firm defaults only if the low outcome is realized. The probability for default does not depend on the level of investment costs. Thus, on average, the same (ex ante) proportion of highly and low profitable firms persists ex post for a large proportion of firms. Hence, no survivor bias occurs and the ex ante profitability corresponds to the observed ex post profitability.
and Dittmann et al. (2010) impute this finding to harmful lending contrived by bank representatives that follow the interest of their bank even when the shareholders’ and bank’s objectives diverge. Although we study a setting in which the bank representatives solely strive to meet the bank’s interests, which are not aligned with the shareholders’ interests, we provide a different reasoning for this empirical finding. Our findings illustrate that shareholders are not necessarily harmed by the presence of bank representatives on the board. On the contrary, shareholders benefit from bank representatives whenever the projects have low profitability. They do so by reducing the firm’s risk and lowering the manager’s expected compensation. In addition, shareholders anticipate that without bank representatives some positive NPV projects would not be conducted because of the hold-up problem. In this case, having bank representatives on the board alleviates the hold-up problem and, thus, increases the shareholder value. In sum, the finding of corollary 1 allows the reinterpretation of the empirical findings that bank representatives are associated with low firm profitability. Whereas Güner et al. (2008) and Dittmann et al. (2010) argue that bank representatives induce low firm profitability, we illustrate the opposite relation. Anticipated low firm profitability in the future induces shareholders to want bank representatives on the board.

Next to the association between bank representatives and firm profitability, we consider the impact of bank representatives on the costs of lending, i.e., the interest rate. Lemma 2 highlights that a large influence of bank representatives on the board leads to a low interest rate. The induced risk-aversion of bank representatives motivates them to enforce a low risk strategy of the firm. In a competitive debt market, low risk results in a low interest rate. Proposition 1 and figure 2 depict that a large influence of bank representatives on the board is beneficial for shareholders when the project has low profitability. Then, the bank representatives ensure that a low risk strategy is set which leads to a low expected compensation of the manager. For highly profitable projects, no bank representatives are needed to induce the board to choose a low risk strategy. As a consequence, a firm with highly profitable projects and a firm with low profitable projects and bank representatives on the board implement the same risk strategy. The loss in the case of default is higher for a low profitable project due to high investment costs. Therefore, despite the same risk strategy, the firm with a low profitable project faces a higher interest rate in a competitive debt market.
Corollary 2. The level of the interest rate for a highly profitable firm is lower than for a low profitable firm with bank representatives’ influence on the board of directors. For firms with the same low ex ante profitability, bank representatives’ influence on the board of directors is associated with a lower interest rate.

Proof. The proof is stated in the appendix.

When a firm with low profitable projects does not have a bank representative, the board sets a high risk strategy (see lemma 3). For a high risk strategy, the financing bank demands a high interest rate and, thus, a high face value of debt. In this situation, having a bank representative on the board is beneficial and lowers the interest rate. This is in line with the empirical findings of Sisli-Ciamarra (2012). These findings indicate that a bank representative on the board decreases the cost of borrowing, which we completely capture with the interest rate. However, Sisli-Ciamarra (2012) notes that self-selection with regard to firms that choose to have a bank representative occurs. Her empirical analysis implies that a nonobservable firm characteristic exists, which causes a firm to have a bank representative on the board, as well as causes the firm to have a high interest rate. The presence of bank representatives counteracts this high interest rate. Our analysis reveals that the profitability of the firm’s future investment projects might be this nonobservable firm characteristic.

In addition to the interest rate, the risk strategy of the firm also affects the expected compensation of the manager. As presented in lemma 3, the board sets a low risk strategy whenever the investment costs are small (highly profitable projects) or the investment costs are high (low profitable projects) and bank representatives have a large influence on the board. Proposition 1 clarified that for low profitable projects, the shareholders benefit from a large influence of bank representatives on the board. The benefit stems from an increased project profitability and from the alleviation of the occurring hold-up problem in the case of high effort costs for the manager. Thus, both firms with highly and low profitable projects choose a low risk strategy. Small risk decreases the expected compensation costs, which are needed to motivate the manager to provide high effort (see lemma 1). Thus, for any profitability level of the investment project, the board provides the same expected compensation to the manager.

Corollary 3. The level of the manager’s expected compensation for a highly profitable firm and
for a low profitable firm with bank representatives’ influence on the board of directors is the same.

Proof. The proof is stated in the appendix. □

In line with corollary 3, Güner et al. (2008) find that bank representatives on the board do not influence the compensation policy of the firm.

7 Conclusion

Bank representatives are often found to have a seat on the firm’s board although they are expected to act in the interest of their employing bank. Empirical findings seem to support this conjecture. They indicate that bank representatives on the board are harmful for shareholders by decreasing the firm’s profitability. We examine the relation between bank representatives on the board acting in the best interest of their bank and the firm’s big-scale lump-sum investment decision. Specifically, we investigate potential shareholder benefits of having bank representatives on the board.

For studying the relation between bank representatives and the firm’s investment decision, we consider the strategic interactions among the shareholders, the manager, the bank, and the bank representatives. Shareholders choose the influence of bank representatives on the board. The board is responsible for designing the compensation scheme for the manager, setting the firm’s risk strategy, and making the investment decision. The manager is employed to implement the investment strategy by providing unobservable, personally costly effort. The potential investment project of the firm is risky. In the case of a bad outcome, the firm defaults and is unable to pay back the face value of debt. This results in an induced risk-aversion of the bank representatives, whereas shareholders become risk-loving when the ‘option value effect’ is large. Then, the diverging interests of the bank and the shareholder representatives create a hold-up problem. Low profitable projects, that would have been positive NPV projects if the firm had enough equity to finance them, are now not conducted.

The analysis highlights that for highly profitable projects there is no benefit of the bank representatives. However, for low profitable projects having bank representatives on the board is beneficial for shareholders. Bank representatives on the board induce a low risk strategy of the
firm. With low risk the manager’s expected compensation for motivating high effort supply is also low. Thus, bank representatives help the firm to save on compensation costs. This increases the overall profitability of the project. For high effort costs of the manager, this benefit becomes so large that the hold-up problem is alleviated.

The findings allow several empirical implications. First, the presence of the bank representatives on the board is associated with a low firm profitability. The reason is that shareholders only benefit from having bank representatives on the board for low profitable investment projects. Second, firms with highly profitable projects face a lower level of interest rate than firms with low profitable projects and bank representatives on the board. Third, these firms display the same level of expected compensation of the manager. The second and third implication result from the optimal risk strategy of the firm. For highly profitable projects, the ‘compensation effect’ of risk outweighs its ‘option value effect’. The board implements a low risk strategy that results in low expected compensation for the manager. For low profitable projects, the ‘option value effect’ exceeds the ‘compensation effect’ which induces a board comprising only shareholder representatives to implement a high risk strategy with high expected compensation. In this case, shareholders benefit from deploying bank representatives on the board by allowing them to alter the incentives of the board. Whereas shareholder representatives seek to implement a high risk strategy, bank representatives prefer a low risk strategy. Thus, for low profitable projects and a large influence of bank representatives on the board, a low risk strategy and low expected compensation are implemented by the firm. Despite the same implemented risk strategy, the bank demands a higher interest rate for firms with low profitable projects because of the larger loss in the case of default.
8 Appendix

Proof of Lemma 3

For $I > I_{\text{option}}$, the ‘option value effect’ exceeds the ‘compensation effect’ in (4). Thus, shareholder representatives prefer to set $\theta$ equal to zero. The ‘bank effect’ in (4) is always positive and bank representatives seek to implement $\theta = 1$. For $\beta = 1$, the first derivative in (4) is positive and the board comprising only bank representatives chooses $\theta = 1$. For $\beta = 0$, the first derivative in (4) is negative and the board comprising only shareholder representatives sets $\theta = 0$. The first derivative in (4) is continuous. According to the intermediate value theorem, a $\hat{\beta}$ between 0 and 1 exists for which the first derivative becomes 0. A board with an influence of bank representatives of $\beta \geq \hat{\beta}$ implements $\theta = \theta_{\text{debt, high } I, \beta \geq \hat{\beta}} = 1$. Considering the set risk strategy $\theta_{\text{debt, high } I, \beta \geq \hat{\beta}} = 1$ and the associated face value of debt $D$ according to equation (5), the first derivative in (4) is zero if and only if

$$\frac{p}{2} \left[ \hat{\beta} [D - (x_M - \delta)] + (1 - \hat{\beta}) \left[ -D + (x_M - \delta) \right] + \frac{c}{e_H} \right] = 0$$

$$\iff \frac{p}{2} \left[ \hat{\beta} \left[ \frac{I - (x_M - \delta)}{\frac{1}{2} (1 - p) + e_H + p} \right] + (1 - \hat{\beta}) \left[ - \frac{I - (x_M - \delta)}{\frac{1}{2} (1 - p) + e_H + p} + \frac{c}{e_H} \right] \right] = 0$$

$$\iff \hat{\beta} = \frac{2(I - x_M + \delta) e_H - c(1 + p + 2e_H)}{4(I - x_M + \delta) e_H - c(1 + p + 2e_H)},$$

where $\hat{\beta} \in (0, 1/2)$.

Proof of Propositions 1 and 2

We compare the expected ex ante shareholder values under all contingencies. At $t = 1$, the board of directors decides on whether a project should be conducted or not. All the projects with a positive ex ante NPV will be conducted. Which projects are profitable depends on whether the project needs outside financing and whether there are bankers on the board that will ensure low risk strategy ex post.

a) Case of an equity financing:

$$E[U_S | \text{equity}] = E[x] - E[w] = x_M + 2e_H \delta - \frac{(1 - p)c}{2e_H} - c - I.$$
All projects that need a lower initial cost than $I_{\text{equity}}$ will be financed and according to lemma 3 low risk strategy $\theta = 1$ will be chosen, where $I_{\text{equity}}$ is presented in equation (3).

Throughout the paper we assume that the shareholders prefer the provision of high effort by the manager. This is true as long as the managerial costs for high effort $c$ are small, i.e. high effort is preferred by shareholders if and only if

$$E[U_S | \text{equity}] \geq E[U_S | \text{equity}, e = e_L]$$

$$\iff x_M + 2e_H\delta - \frac{(1-p)c}{2e_H} - c \geq x_M + \delta \left[ \frac{1}{2} (1 - \theta p) - \frac{1}{2} (1 - \theta p) \right] - I$$

$$\iff c \leq \bar{c} := \frac{4e_H}{2e_H + 1 - p}.$$

b) Case when debt is needed, but there is no bank representative’s influence on the board:

$$E[U_S | \text{debt, no banker}] = E[x] - E[w] - E[D].$$

i) For $I < I_{\text{option}}$, all projects will be financed and conducted under the same conditions as if they were equity financed, since according to lemma 3 the board of directors chooses a low risk strategy $\theta = 1$ and

$$E[U_S | \text{debt, no banker, } I < I_{\text{option}}] = x_M + 2e_H\delta - \frac{(1-p)c}{2e_H} - c - I = E[U_S | \text{equity}].$$

ii) For $I > I_{\text{option}}$, the shareholder value is:

$$E[U_S | \text{debt, no banker, } I > I_{\text{option}}] = x_M + 2e_H\delta - \frac{c}{2e_H} - c - I < E[U_S | \text{equity}].$$

All projects in the range of $I_{\text{option}} < I < I_{\text{debt}}$ will be conducted and according to lemma 3, a high risk strategy $\theta = 0$ will be chosen, where $I_{\text{debt}}$ is presented in equation (8).

The set is not empty for $I \in (I_{\text{option}}, I_{\text{debt}})$ if $I_{\text{debt}} - I_{\text{option}} > 0$.

$$I_{\text{debt}} - I_{\text{option}} = \left( x_M + 2e_H\delta - \frac{c(1+2e_H)}{2e_H} \right) - \left( x_M - \delta + \frac{c(1+p+e_H)}{2e_H} \right) = \delta(2e_H + 1) - c\frac{1+2e_H+p/2}{e_H}.$$
This difference is positive if the manager’s costs \( c \) are not too high:

\[ c < c_2 := \frac{\delta e_H (2e_H + 1)}{2e_H + 1 + p/2}. \]

c) **Case when debt is needed and bank representatives have an influence on the board:**

\[ E[U_S | \text{debt, banker}] = E[x] - E[w] - E[D] \]

Ex ante the bank and the shareholder representatives all regard only the shareholders’ interest since there is still no debt in place.

   i) For \( I < I_{\text{option}} \), all projects will be financed and conducted under the same conditions as if they were equity financed since

\[ E[U_S | \text{debt, bankers, } I < I_{\text{option}}] = x_M + 2e_H \delta - \frac{(1-p)c}{2e_H} - c - I = E[U_S | \text{equity}]. \]

   ii) For \( I > I_{\text{option}} \), the board structure matters for the decision on the risk strategy ex post. The proof of lemma 3 states the exact influence of the bank representatives needed in order for a low risk strategy to be implemented.

   - For \( \beta \geq \hat{\beta} \)

\[ E[U_S | \text{debt, bankers, } \beta \geq \hat{\beta}] = x_M + 2e_H \delta - \frac{(1-p)c}{2e_H} - c - I = E[U_S | \text{equity}]. \]

   - For \( \beta < \hat{\beta} \)

\[ E[U_S | \text{debt, bankers, } \beta < \hat{\beta}] = x_M + 2e_H \delta - \frac{c}{2e_H} - c - I < E[U_S | \text{equity}]. \]

**Proof of Corollary 2**

According to proposition 1, the shareholders choose a large influence of bank representatives on the board for low profitable projects. The influence is considered large when \( \beta \geq \hat{\beta} \) (see proof of lemma 3). Lemma 3 states that for small investment costs (highly profitable projects)
the implemented risk strategy is $\theta_{\text{debt, low}}^* = 1$ and for large investment costs (low profitable projects) the chosen risk strategy is $\theta_{\text{debt, high}}^* = 1$. Thus, in both cases the board implements the same risk strategy $\theta = 1$, which determines the face value of debt $D$ (equation (5)). The firm receives from the bank funds $I$ in order to finance the project. Thus, the face value of debt $D$ already includes the interest rate for debt financing. The interest rate associated with the debt financing is $i = D/I$. Using equation (5) and $\theta = 1$, we obtain

$$i = \frac{D}{I} = \frac{2}{1 + p + 2e_H} \left[ 1 + \frac{1}{I} (x_M - \delta) \left( \frac{1}{2} (p - 1) + e_H \right) \right], \quad (10)$$

where $p \in (0, 1)$ and $e_H \in (0, 1/2(1 - p))$. Thus, the second term of equation (10) is negative.

The interest rate $i$ for large investment costs $I > I_{\text{option}}$ (low profitable projects) is larger than for small investment costs $I \leq I_{\text{option}}$ (highly profitable projects).

According to lemma 3, the influence of bank representatives affects the chosen risk strategy for high investment costs $I > I_{\text{option}}$. Thus, for a specific $I > I_{\text{option}}$, boards with bank representatives’ influence $\beta \geq \hat{\beta}$ choose a low risk strategy, whereas no or small bank representatives’ influence results in a high risk strategy. According to lemma 2, the firm with bank representatives’ influence $\beta \geq \hat{\beta}$ pays a smaller interest rate.

Proof of Corollary 3

The determined risk strategy affects the manager’s expected compensation

$$E[w \mid e_H] = \left[ \frac{1}{2} (1 - \theta p) + e_H \right] w_H,$$

where $w_H = c/e_H$ according to (2). As noted in the proof of corollary 2, for a firm with highly profitable projects and for a firm with low profitable projects with $\beta \geq \hat{\beta}$, the board implements a low risk strategy $\theta = 1$. All other determinants for the manager’s expected compensation are exogenous. Thus, in both cases the same level of expected compensation is paid.
References


