Essays on corporate governance

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Essays on Corporate Governance

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PROEFSCHRIFT

Ter verkrijging van de graad van doctor aan de Universiteit Maastricht,
op gezag van de Rector Magnificus, Prof. dr. A.C. Nieuwenhuijzen Kruseman,
volgens het besluit van het College van Decanen, in het openbaar te verdedigen op
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Preface

Most of the chapters in this thesis have already appeared as articles. A Dutch version of Chapter 2 appeared as Rebers (1997). Chapter 3 is a revised version of Rebers *et al.* (1997). Chapter 4 is a revised version of Rebers (1996). Chapter 5 is joint work with Enrico Pennings.

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Chapter 1

Introduction

1.1 Introduction

This thesis bundles four essays (Chapters 2 to 5) on corporate governance, i.e., the governance of the modern corporation.¹ There are two important reasons why this subject has received (and still receives) a lot of attention, both in the scientific literature as well as in the popular press.² The first reason is that the modern corporation is of great economic importance to society. Although the number of modern corporations is relatively small compared to the number of small and medium-sized firms, their mere size makes their contribution to economic output considerable. The second reason is that the modern corporation has many stakeholders, which implies that the distribution of financial claims and control rights is non-trivial (see Section 1.2).

The number of issues that have been studied in relation to corporate governance is overwhelming.³ A certain focus is therefore needed. Section 1.3 illustrates the choices that we have made, i.e., the scope of this thesis. Moreover, it provides a short overview of the main issues that can be found in one of the next four chapters. A chapter-by-chapter overview of the remainder of the thesis is given in Section 1.4.

¹The modern corporation can be roughly described as a large and listed company. We will say more on the modern corporation in Section 2.2.

²Unfortunately, it is mainly negative publicity that reaches the popular press, like reporting about firms in financial distress, or excessive severance payments.

³See Shleifer and Vishny (1997) for a recent survey.

1.2 The Stakeholders of the Modern Corporation

Without the intention of being complete, we have drawn Figure 1-1 to give an impression of the great variety of stakeholders, both inside and outside the modern corporation.

Figure 1-1: The stakeholders of the modern corporation.

Economists have studied two important issues resulting from the interaction between these different stakeholders (economic agents). The first is the distribution of financial claims (Section 1.2.1), the second the distribution of control rights (Section 1.2.2).

1.2.1 Financial Claims

In some sense, all the stakeholders in Figure 1-1 are financial claimholders to the corporation. Inside the corporation, the management, the Board of Directors, and the employees all receive a salary from the corporation. Salaries can be a fixed amount, but also some form of profit-sharing. The suppliers need to be paid for the products they deliver, either directly, or on account. Customers can have an option to get their money back if the products do not satisfy their expectations, or they may need the corporation for future

services, like repairs or spare parts. The State has a claim on the profits in the form of corporate taxes. Fixed amounts need to be paid to the banks, which include interest. Last but not least, the shareholders have the right to all the profits of the corporation that remain after all the other claims have been paid. They will eventually be paid out in the form of dividends. Since all the stakeholders have genuine claims on the corporation, the question arises as to who should have some influence on the policy of the corporation. This brings us to the issue of control rights.

1.2.2 Control Rights

It is clear that a system with so many stakeholders cannot exist for a long time if one stakeholder has absolute control over the corporation, so that a more sophisticated system of checks and balances is needed. In fact, there are many regulations, institutions, and conventions that guarantee at least a minimum protection of the interests of the stakeholders. To mention a few, there are accounting regulations to ensure that taxes can be properly determined, unions to protect the most fundamental rights of employees, and covenants in debt contracts to ensure the repayment of the loans. This, however, holds for almost any firm, and is therefore not particular to the modern corporation.

The separate treatment of the modern corporation has become common use after the pathbreaking book of Berle and Means (1932). One of the most distinguishing features of the modern corporation is the separation of ownership and control. This is illustrated in Figure 1-1 by the fact that management and shareholders are two separate entities. In this respect it is important to note that shareholders are *residual* claimants, which implies that their interests are least protected. Therefore, their payoff is highly dependent on top-level corporate decisions. It is mainly (top-)management, however, that actually takes these decisions. To be sure, the interests of management and shareholders are not necessarily the same. Therefore, the distribution of the (residual) control rights concerning important corporate decisions is an important issue in corporate governance, which we address in the next section.

1.3 Focus and Main Issues

In this thesis, we focus on a subset of all the stakeholders of the modern corporation as described in Figure 1-1. This subset is depicted in Figure 1-2. The interaction of these three

Figure 1-2: The main stakeholders of the modern corporation that are studied in this thesis.

stakeholders, which is often formalized in a contract, already gives rise to an important number of issues that have been studied in the literature. In the following three subsections, we illustrate the main issues that can be found in this thesis.

1.3.1 The Board of Directors

In most corporations, the Board of Directors has a pivotal role in monitoring the actions of management. This raises two important questions. Firstly, *in whose interests* should the Board of Directors perform its monitoring task? Two groups with opposing views can be distinguished. The first group argues that mainly the interests of the shareholders (the ‘owners’) should be protected (shareholder capitalism). The second group argues that shareholders are just one of the interest groups of the corporation and, hence, that the interests of all the stakeholders should be protected (stakeholder capitalism). This ongoing debate will be further discussed in Chapter 2.

The other important question is *how* the Board of Directors should perform its monitoring task. The clear advantage of having a small Board of Directors which is close to management is that they will be better able to obtain useful information than a dispersed group of shareholders. However, it is not obvious that this information will be put to good

use. The issue of possible collusion between management and Board of Directors is studied in Chapter 3.

1.3.2 Asymmetric Information

The fact that management handles the day-to-day business of the corporation implies that it will have an informational advantage over the shareholders. This has serious consequences if the shareholders and the (management of the) firm decide to do business or, more formally, to enter into a contract. Two potential problems that result from this information asymmetry have been extensively studied in the literature. A first problem arises for example in the context of a labor contract between shareholders and management. The presence of asymmetric information implies that shareholders should take into account the possibility that management, *after* the contract has been signed, can take actions which are unobservable by the shareholders. This phenomenon is known as moral hazard.

A second problem arises when shareholders, *before* they sign the contract, do not know the type of the firm (or manager) that they are dealing with. This phenomenon is known as adverse selection. A possible solution is that management signals its type to the shareholders, an issue that is taken up in Chapter 4.

1.3.3 Unverifiable Variables

Even if there is no asymmetric information, signing a contract may be problematic. If a contract specifies that some action be taken contingent on the realization of some variable, then it is not sufficient that the parties can observe this variable (symmetric information). It is also necessary that the specified action can be enforced by a court of law. This will not be the case in the case of unverifiable variables. For example, a judge may lack the skills to underpin a judgement on the realization of the variable, or it is (infinitely) expensive to gather evidence on this variable. An important problem with unverifiable variables is that no party can *commit* itself to an action based on its realization. This issue is further studied in Chapter 5.

1.4 Outline

In this section we systematically introduce and describe the main results of the next four chapters.

Chapter 2 puts the Dutch system of corporate governance, and especially one of its most important features, the ‘Structuurregime’, in an international perspective. In this chapter, a clear distinction is made between shareholder capitalism and stakeholder capitalism, and it is shown that the Structuurregime belongs to the latter system of corporate governance. We argue that the relatively autonomous position and wide powers of the Board of Directors under the Structuurregime has two important (and related) advantages. Firstly, it enhances the independence and competence of the directors, because they can be purely chosen on the basis of their skills, and not of their interests. This, in turn, guarantees a balanced protection of the interests of all the stakeholders. Secondly, it supports the liquidity of the stock market, because there is less need for concentrated shareholdings if the Board of Directors performs a large part of the monitoring function. Therefore, it is our opinion that the Structuurregime should not disappear. However, in order to enhance the accountability of the board, two obvious (and related) improvements could be implemented. Firstly, the report by the Board of Directors in the annual report should become much more detailed. This is necessary if shareholders want to form a serious opinion about the directors. Secondly, if shareholders are better informed, they should have more opportunities to dismiss a failing director.

A strong position of the Board of Directors is often criticized for fear of collusion between the Board of Directors and management, at the expense of the shareholders. In **Chapter 3** we develop a model which shows that such collusion may be in the interest of the shareholders. In the model, a shareholder delegates the decision to fire a manager or not to a director. The manager faces stochastic firing costs and, hence, needs to be compensated for those costs. We study the optimal incentive scheme for the director, allowing for the possibility that the manager bribes the director in order to change his firing intentions. The problem with a non-colluding director is that he does not internalize the firing costs of the manager. In other words, managers will be fired relatively often, and will therefore require a high compensation for the expected firing costs. We show that

allowing for collusion can be beneficial for the shareholder, because it avoids the need to (ex ante) compensate the manager for very high realizations of his firing costs (these are precisely the cases in which collusion occurs). In the Anglo-Saxon countries, the position of directors is weaker, and they can be more easily fired by the shareholders. Although this may prevent collusion, it may also explain why directors require a higher compensation.

Chapter 4 takes up the issue of adverse selection. An example of adverse selection arises when managers have inside information about the true value of their firm (say, 'good' or 'bad') which investors do not have. If investors do not get additional information, the value of the firm as inferred by the market will be a weighted average of the values of all the firms. In other words, if they buy a (share of the) firm, they incur the risk of investing in (adversely selecting) a bad one, i.e., one of low value. Ross (1977) developed a managerial incentive schedule to induce managers to signal the true value of their firm. We formalize Ross's model into a signalling game, simultaneously making the personal penalty that managers incur dependent on the bankruptcy costs, as follows. Managers are compensated in proportion to the value of the firm, and signal the true value of their firm by means of its debt level. By raising the debt level, managers face a trade-off between a higher value of the firm as perceived by the market, and a lower value of the firm as result of the increased risk of going bankrupt. We determine the exact conditions under which Ross's unique competitive equilibrium can survive. In this equilibrium, managers of good firms are recognized as such by the market, because they will choose a debt level which is too expensive for managers of bad firms to imitate (because they have higher expected bankruptcy costs). The adverse selection problem, then, is resolved.

Finally, **Chapter 5** develops a model in which a shareholder has the option to fire a manager at any moment in time. The manager, again, incurs stochastic personal firing costs when he is fired and, hence, needs to be compensated for these costs. This can either be achieved by raising the salary of the manager above his reservation wage in each period that he is still employed, or by granting the manager a severance payment (golden handshake) at the moment he is fired. The optimal compensation scheme and its relation to the nature of the firing costs is studied. We show that with the system of a higher salary, the shareholder has the incentive to fire the incumbent manager relatively often, resulting

in high expected firing costs. Since the manager will anticipate this, he will require a correspondingly high compensation. The problem is that, once the higher salary is fixed, the shareholder faces no additional costs at the moment of firing the manager, i.e., the ex post marginal cost of firing is zero. This problem is relieved with the system of a severance payment, because this system implies an additional cost for the shareholder at the moment of firing. Therefore, from the point of view of the shareholder, the severance payment is an efficient means to credibly commit not to fire the manager too early. The negative publicity by which the high severance payment is often surrounded should therefore be qualified.

Chapter 2

Corporate Governance in the Netherlands; the ‘Structuurregime’ in an International Perspective

2.1 Introduction

Corporate governance is a highly multidisciplinary topic. Not only do we find contributions to the scientific literature on economics, politics, and law, the popular press as well is highly interested in the governance of the corporation. That financial economists have a very pronounced voice in this debate stems from the fact that many issues in corporate governance directly concern the shareholders, or more generally all the claimholders of the firm.

Each country has developed its own system of corporate governance, including all the laws and conventions that surround the governance of the modern corporation. Yet it is useful, and common practice, to make a distinction between two main systems of corporate governance. The first is the Anglo-Saxon system of corporate governance. Here, the corporation is seen as an *instrument* in the hands of the shareholders, and these shareholders are supposed to have a key position in the governance of the corporation. This system is prevalent in the United States and the United Kingdom.

The second system is the Continental-European system of corporate governance. Here,

a more *institutional* view of the corporation prevails, where different interests and interest groups come together. The governance of the corporation is no longer directed by, and solely in the interest of the shareholders. The emphasis is more on the whole body of laws and conventions that takes account of all the interests of all the stakeholders in the corporation.¹ Every country has its own specific implementation and features. Well known examples are the strong position of German banks due to their large voting power ('Depotstimmrecht'), and the large number of cross-holdings of French corporations ('noyaux durs'). Important features of the Dutch system of corporate governance are the great number of legal barriers encountered when taking over the control of a corporation, and the so-called 'Structuurregime', which determines the division of power between the employees, the shareholders, and the Board of Directors. The Structuurregime will be discussed in some detail in Section 2.3.

An important issue in the corporate governance debate is the question of how to discipline management. Again we make a distinction between the two main systems. The Anglo-Saxon system relies to a great extent on the functioning of the take-over market, which confirms the key position of the shareholders in this system. In contrast, the Continental-European system relies more on internal control mechanisms, in which the board of directors has an important monitoring role. In this light, the Anglo-Saxon system is often referred to as *market oriented*, and the Continental-European system as *network oriented*.²

In the past few years there has been an increasingly strong call for more influence of shareholders in the Continental-European system. In the Netherlands, this call is especially pronounced by the association of shareholders, the so-called 'Vereniging van Effectenbezitters' (VEB). Especially the strong position of the Board of Directors in the Structuurregime is heavily criticized. The call for more shareholder influence is gradually accepted, and we see a certain shift towards the Anglo-Saxon system. However, the Anglo-Saxon system itself is also being criticized, especially after some excrescences of the restructurings in the

¹Note that the Anglo-Saxon system and the Continental-European system are often described as shareholder capitalism and stakeholder capitalism, respectively.

²Apart from its geographic location, one could also classify Japan, with its network-oriented system known as *Keiretsu*, as Continental-European.

80s. It is often argued that the shareholder influence in this system may be too strong. Moreover, there is an ongoing discussion on the role and position of the Board of Directors in the Anglo-Saxon system. Since both the Anglo-Saxon and the Continental-European system are in a process of change, it is useful to consider them simultaneously when we take a closer look at some aspects of corporate governance.

In this chapter we focus on the functioning of the *Structuurregime*, especially with respect to the disciplining of management. The *Structuurregime* is one of the most important elements of the Dutch system of corporate governance. It contains some features which are clearly distinct from other systems of corporate governance (the strong position of the Board of Directors being the most distinguishing among them). This makes a comparison to other systems of corporate governance more interesting, and offers the opportunity to evaluate the functioning of both the Dutch system as well as the other systems. Since the Dutch system belongs to the Continental-European system of corporate governance, we compare most of its features with the Anglo-Saxon system of corporate governance.

The remainder of this chapter is as follows. In Section 2.2, we describe the main characteristics of the modern corporation which are useful to understand the actual discussion on corporate governance. A description of the main features of the *Structuurregime* follows in Section 2.3. We argue that the wide powers that it allots to the Board of Directors promotes an independent and competent Board of Directors (Section 2.3.1), a balanced protection of interests of all the stakeholders (Section 2.3.2), and good communication between the Board of Directors and management (Section 2.3.3). Section 2.4 contains a discussion of the merits of the *Structuurregime*. We focus on three aspects: the trade-off between effective control and liquidity (Section 2.4.1), the accountability of the Board of Directors (Section 2.4.2), and the market for corporate control (Section 2.4.3). Section 2.5 concludes. At the end of the chapter we have added an Epilogue, in order to discuss the main extracts of the report of the Dutch Committee on Corporate Governance ('*Commissie Peters*') which relate to the discussion in this chapter.

2.2 The Modern Corporation

It is impossible to imagine economic life today without the modern corporation. Technological innovations have increased the scope of the firm, which has led to a larger average size of the firm. This process of increasing scale is aptly summarized by three well-documented merger waves.³ A fundamental characteristic of the modern corporation is the separation of ownership and control, i.e., managers and shareholders constitute separate entities of the firm. This contrasts sharply with (small) owner-manager firms, where an entrepreneur, or sometimes whole families, contribute the necessary funds themselves.

The separation of ownership and control entails an important agency relation between the managers and the financial claimholders of the corporation. This relation involves many potential problems, which are illustrated by an impressive body of literature on the subject, starting with the seminal work of Berle and Means (1932). According to Jensen and Meckling (1976), ‘the most important conflict arises from the fact that as the manager’s ownership claim falls, his incentive to devote significant effort to creative activities such as searching out new ventures falls’ [p.313].

De *raison d’être* of the modern corporation can be concisely described by a need of sufficient funds, diversification considerations, and specialization of management. These three elements imply that the suppliers of funds and the entrepreneur need one another. The first do not have the time or skills to carry out the management of the firm themselves, while the latter do not have sufficient funds, or are unwilling to put all their money in the venture. The mere existence of the modern corporation seems to imply that its advantages more than outweigh its intrinsic problems. However, this otherwise interesting issue is beyond the scope of this chapter. We simply assume the appropriateness of this organizational structure in certain markets and in certain times.⁴

If we compare the position of the small shareholder in the modern corporation to that of an owner-manager, then it is immediately clear that the former has lost direct control

³The first merger wave is often referred to as ‘The Great Merger Movement’ (1895-1905), the second as ‘The Visible Hand’ (1920-1929), and the third as ‘Big is Beautiful’ (1950-1970) [e.g., Wildenberg (1990)].

⁴One of the challenges of ‘transaction cost economics’ is to describe the factors that determine the optimal size and organization of firms and markets. This type of research starts with Coase (1937), and has received new impetus from Williamson (1985).

over his stake in the firm. Nevertheless, his shares offer good opportunities to build a well-diversified portfolio that can be readily sold at any moment in time without too much cost. Berle and Means (1932) already indicated the trade-off between effective control and liquidity. We will return to this issue in some detail in the discussion (Section 2.4.1). For the moment it is important to note that the modern corporation, in contrast to the owner-manager firm, needs some additional control mechanisms. This is not only because its mere size makes the modern corporation a complex organization of high social value with many stakeholders, but also because of the intrinsic agency relation between the managers and the financial claimholders.⁵ This is exactly the topic of corporate governance.

According to Boot (1994), corporate governance relates to the mode and extent to which the different stakeholders can exercise some influence on the decision processes of the modern corporation. This includes the way in which management gives accountability of its performance.

Traditionally, the discretionary power of management is assumed to be restricted in at least three ways [e.g. Moerland (1989)]. Firstly, competition in the product markets will impose some limits on the possible behavior of management. Secondly, the internal and external labor markets for managers will have some disciplining effects on management, since their market value is (partly) determined on the basis of their past performance. Finally, the market for corporate control can function as a last resort to correct poor performance of managers.⁶

The 80s have witnessed a dramatic increase in the activity on the market for corporate control. Almost everybody agrees that some form of restructuring was necessary as a reaction to the unbridled conglomerate merger waves of the 60s. Wildenberg (1990) cheers the return of the owner-manager.⁷ Jensen (1989) even professes the eclipse of the modern corporation. More recently, however, some doubts have arisen about the efficiency of the

⁵See also Fama and Jensen (1983a) for their definition of complex organizations.

⁶If we define the market for corporate control as 'a market in which alternative managerial teams compete for the rights to manage corporate resources' [Jensen and Ruback (1983)], then this market will have many similarities with the labor market for managers.

⁷Although Wildenberg (1990) welcomes the resurrection of the owner-manager, he describes the 80s as a traumatic experience for the United States. According to the author, it is not so much the question when Europe and Japan will convert to the classic economy of Adam Smith, but rather when the United States and the United Kingdom will start to protect their corporations against the sale to foreigners and corporate raiders!

market for corporate control. Prahalad (1994) claims that ‘the activity of the “corporate control” market during the 80s was not an indication of the success of the US corporate governance system, but rather a clear sign of its failure. The stockholder activism of the ’80s was a response of last resort, and it therefore functioned as a very blunt instrument of corporate reform.’

The market for corporate control can be characterized as an *external* control mechanism, which has been particularly prevalent in the Anglo-Saxon world. The changing view on its efficiency, however, has gradually shifted attention to *internal* control mechanisms. In most corporations, the Board of Directors plays an important role in this. Therefore, much attention is directed at questions regarding the task and composition of this board. Morck *et al.* (1989), and Byrd and Hickman (1992) mention an increased interest in these matters, as a consequence of a failing market for corporate control.

It is well-known that the Dutch Structuurregime allots a very specific task to the Board of Directors. Moreover, in order to perform this task, it assigns many powers to the Board of Directors. The features of the Structuurregime will be described in some detail in the next section, followed by a discussion of its pros and cons in Section 2.4.

2.3 The Structuurregime

In the 60s, a number of committees were established in the Netherlands, with the assignment to investigate the functioning of the corporate system. This resulted in a number of new laws, two of which are of special importance to us. The first law concerned the Employees Council. Besides non-negligible influence through their unions, employees now received genuine voice within the corporation. The Employees Council can demand for information on almost any issue, and has advisory rights in all important corporate decisions. All this has implied an institutionalization of the participation of the employees, and can be seen as an implementation of what has been previously referred to as the institutional view on the corporation.

The second law concerned the implementation of the Structuurregime in 1971. This law was in line with the law on the Employees Council. In fact, the law did nothing more than institutionalizing the weakened position of the shareholders. This was effectuated by

transferring important powers from the general meeting of shareholders to the Board of Directors. The most important of these are:

1. The appointment and dismissal of management,
2. The composition of the annual report,
3. The approval of important corporate decisions, such as:
 - (a) mergers and acquisitions,
 - (b) changes of the corporate charter,
 - (c) important investments.

The final piece of the *Structuurregime* was to have the Board of Directors be appointed by a system of so-called 'controlled co-optation.' This implies that the board itself appoints its own members. The co-optation is controlled, because the general meeting of shareholders and the Employees Council both have an equal, albeit a marginal influence on these appointments by means of an advisory right and a proviso right of veto.⁸

The *Structuurregime* is often described as 'the miracle from The Hague⁹,' and its advocates claim it to be a unique solution to the everlasting conflict between labor and capital. As already noted, the *Structuurregime* is in line with the law on the Employees Council, which is for example illustrated by the fact that the general meeting of shareholders and the Employees Council both have an equal influence on the appointment of directors. This is a second demonstration of the fact that the institutional view on the corporation prevails in the Netherlands.¹⁰

More details are not important for this chapter. The most important features are that the board appoints itself, and that it controls almost every important event in the corporation. Before we continue with our discussion of the strong and weak aspects of

⁸The advice is not binding. The right of veto is proviso in the sense that it can be overruled by a judge.

⁹The government of the Netherlands has its seat in The Hague.

¹⁰In this respect it is interesting to evoke the Dutch 'poldermodel', which has recently received some attention in the (international) press. One of its main features is that the 'social partners' (the stakeholders of society) often consult each other in social affairs. The institutional (network oriented) view on the corporation is a clear exponent of this 'corporate economy.'

the Structuurregime in comparison with the Anglo-Saxon system (Section 2.4), we will first spend a few more paragraphs on the potential advantages of having a strong and independent Board of Directors. According to Rinnooy Kan (1994), there are three crucial conditions that need to be satisfied in order to have a well-functioning Board of Directors:

1. Independent and competent Board of Directors,
2. A balanced protection of the interests of all the stakeholders,
3. Good communication between management and Board of Directors

In the following three subsections we argue that the Structuurregime satisfies these conditions satisfactorily.

2.3.1 Independent and Competent Board of Directors

The United States have a 'single-tier' system, in the sense that management (the executives) are chosen from and by the Board of Directors. Moreover, it is common practice that the Chief Executive Officer (CEO) also presides the Board of Directors.¹¹ Although this may facilitate the communication between management and Board of Directors, Boot (1994) argues that it may be one of the most important reasons of why the monitoring of management seems to fail in the United States. In this respect, he cites Grundfest (1990): 'Investors' ability to monitor corporate performance and to control the assets that they ultimately own has been subordinated to the interests of other constituencies, most notably corporate management.'

The Netherlands have a 'two-tier' system, in which the management and the Board of Directors are two clearly separated entities of the corporation. In this respect, the Dutch director is more independent than his American counterpart. The Dutch director bears much resemblance with the 'outside' director of Byrd and Hickman (1992), whose '[...] objectivity and independence is especially important if shareholders interests are to be represented, because only they can ask the hard questions that even conscientious managers may overlook.'

¹¹For a good overview of the American situation, see Charkham (1994).

The system of co-optation implies that directors are not chosen by or from any interest group whatsoever. This serves two important goals. Firstly, it guarantees that the directors are independent, not only from management, but also from the direct wishes of the interest groups. This encourages a balanced protection of interests.¹² Secondly, it enlarges the pool of potential directors to choose from. Hence, they can be chosen on the basis of their skills, and not of their interests. This lays the foundation for effective and confidential communication with management.

The remark that directors need to be competent seems rather superfluous. However, it has to be understood in the light of the specialization of management as discussed in Section 2.2. In order to act both as a sounding board for and a monitor of management, it seems obvious that at least some form of specialization is needed to offer some resistance *vis-à-vis* a well-informed and highly specialized management. This is another illustration of the importance to be able to select directors on the basis of their skills, and not on the basis of whose interests they serve.

2.3.2 Balanced Protection of the Interests of All the Stakeholders

This is very typical for the institutional view on the corporation. It recognizes that the various stakeholders have different interests, all of which can vary over time in importance. An independent Board of Directors is in the right position to balance all these different interests. To be sure, at a certain moment in time, when its interests are at stake, some interest group could wish to have more influence on corporate decisions. However, it is very well conceivable that, from an *ex ante* point of view, each interest group is better off by delegating the monitoring role to an independent Board of Directors.

2.3.3 Good Communication

The modern corporation is almost by definition a very complex organization. Therefore, in order to perform the monitoring task in a satisfactory way, adequate information is

¹²Rinnooy Kan (1994) notices that the German system is mesmerized by the fifty-fifty split between employers and employees, which implies that both have the right to an equal number of seats on the Board of Directors ('Mitbestimmung'). As a consequence, meetings are very formal, and discussions are oftentimes not properly completed.

required. However, Moerland (1995) discerns three potential problems if management tries to diffuse its information to its stakeholders in general:

1. To protect the firm's competitive position, full dissemination of information can be very harmful to the corporation and its stakeholders. Take the following example of a corporation that has just developed a potentially very profitable new technology. Management could explain all of the details of the new technology to its stakeholders, such that they can estimate more precisely the impact on the value of the firm. However, if (potential) competitors also receive this information, then the corporation will probably not be able to exploit the new technology to the full extent.
2. Management may find it hard to convince their stakeholders that their information is reliable. After all, if management knows that their information will be used for monitoring purposes, they will have a natural tendency to depict the results in the most optimistic (maybe opportunistic) way. A vast amount of literature on signalling, more specifically referred to in Chapter 4, supports this.
3. There is a genuine danger that some stakeholders will become better informed than others, which may result in insider trading. Since the corporation itself has some responsibility to prevent insider trading, some prudence is called for.¹³

Delegating the monitoring role from the stakeholders to the Board of Directors implies that a large part of the information flow from management will directly go to the Board of Directors. This will alleviate the three problems mentioned above, the main reason being that the Board of Directors is a relatively small group of specialized people, to whom it is easier to (confidentially) communicate information than to a highly dispersed group of stakeholders. For the same reason, directors can more easily be made responsible for misuse of information.

¹³See Rietkerk (1984) for a very pronounced view on this matter.

2.4 Discussion

The Dutch legislator has been guided by the institutional view on the corporation in designing the Structuurregime. A central role is occupied by the Board of Directors, whose main duty is to monitor and advise the management of the corporation, in order to assure a balanced protection of interests of all the stakeholders of the corporation. To that end, as we have argued in the previous section, it is crucial that the Board of Directors be an independent entity, staffed with competent directors, who can confidentially communicate with management. We will now discuss the pros and cons of the Structuurregime in three different subsections.

2.4.1 Trade-off between Liquidity and Effective Control

Grundfest (1990), Roe (1990) and Bhidé (1993) have shown that in the trade-off between effective control and liquidity (see Section 2.2), the financial policy of the United States has clearly been to enhance the latter. There are numerous rules and regulations that promote fragmented holdings of shares. Promoting liquidity also includes the protection of small shareholders, such that they will not leave the market. For example, the United States have a long tradition of regulations to prevent insider trading.

Well functioning (liquid) capital stock markets are of great importance to an economy. They provide an efficient way to build a diversified portfolio. Modern portfolio theory would not exist without these markets. Entrepreneurs who have profitable possibilities to expand their business, could face considerable problems if the providers of the (risky) funds would lack these possibilities of diversification.

Another important advantage of liquid stock markets is that they contribute to the situation in which every shareholder is better off if management maximizes the net present value of the future cash flows of the firm. In contrast, if investors can not be sure to be able to sell their shares at any moment in time without considerable costs, then '[...] it is rational for risk bearers to attribute lower current value to uncertain cash flows than is implied by capital market prices for the future resources' [Fama and Jensen (1983b)]. This, in turn, would result in a suboptimal investment policy of the corporation. In other words, liquid stock markets guarantee that different time and/or risk preferences of investors do

not disturb the optimal (investment) policy of the corporation.

Hence, the choice that the United States have made in favor of liquidity definitely has some major advantages. However, it also makes clear why their market for corporate control has failed. After all, effective control by shareholders almost necessarily requires a high concentration of stockholdings. This is not only necessary to make effective control *possible*, but also to make it *profitable*. A shareholder who wishes to intervene in the corporate policy will have to make some (considerable) costs to obtain the necessary information. He will only do this if the expected return of doing this is sufficiently high, which will be the case only when his stake in the firm is also sufficiently high.¹⁴

The United States are somehow stuck between two thoughts. On the one hand, they want to enhance the liquidity of the stock market by protecting small shareholders but, on the other, they rely on these small shareholders to function as good monitors! The Dutch system is more consistent in this respect. By transferring some powers from the shareholders to the Board of Directors, the latter can perform the monitoring function, without harming the liquidity of the stock market.

2.4.2 Accountability of the Board of Directors

Although an independent and competent Board of Directors is very important, it is beyond any doubt that this Board of Directors needs to be monitored as well. Who monitors the monitor? In the *Structuurregime*, both the general meeting of shareholders and the Employees Council already have some influence on the co-optation by means of the advisory right and the proviso right of veto. However, almost unanimous consensus exists on the fact that a stronger accountability of the Board of Directors is needed. For example, involuntary dismissal of a director is only possible through the ruling of a judge. However, she will only allow the dismissal in situations of gross negligence.

As a first step, the report of the Board of Directors in the annual report should become more comprehensive. For example, a *critical* assessment of the strategy and the risks involved in the corporation should be part of any annual report. Also, an argued explanation of the extent of its compliance with the recommendations of the Committee on Corporate

¹⁴The free-rider problem in take-over situations is a good illustration of this [Grossman and Hart (1980)].

Governance (1997) could be included. In that way, directors will have to clarify their activities in a much more detailed way during the general meeting of shareholders, such that the latter are in a better position to form an opinion about the director. Moreover, benevolent and competent shareholders will then be able to enter into debate with the directors. As a sequel to this, shareholders should get more possibilities to bring the dismissal of a director before the court. An objective lack of confidence in a director should be sufficient ground for his dismissal.¹⁵

To rely on a judge as a last resort has some serious drawbacks. According to Manne (1965): 'courts are loath to second-guess business decisions or remove directors from office.' However, if the report of the Board of Directors in the annual report is put to good use, publicity can bear a helping hand. Directors, like managers, eventually have to yield in the case of continuous criticism. If not, the more detailed report of the Board of Directors can serve as a benchmark against which the board can be held responsible, which will increase the possibility of success of the dismissal procedure in court. If they let things come this far, directors must have a sure stance. Moreover, the negative publicity will have a downward effect on the stock price in a liquid stock market. This, in turn, will have a disciplining effect, because it increases the probability of a hostile take-over. Furthermore, the corporation will have to redeem its reputation on the stock market in order to be able to issue new stock.¹⁶

2.4.3 The Market for Corporate Control

When discussing the issue of shareholder influence on corporate decisions, we can make a distinction between the situation of a (hostile) take-over, and the situation of no take-over. According to De Haze Winkelman (1994), former chairman of the VEB and a clear oppo-

¹⁵I deliberately only speak of more influence on the dismissal of a director, not of its appointment. The latter would be incompatible with the previously discussed concept of independent and competent directors.

¹⁶It should be noticed that the threat of dismissal of a malfunctioning director remains a last resort to discipline directors. The same goes for the management of a corporation, and in practice we witness an increasing interest for incentive compensation as a disciplining device for management. In this light it is surprising that the previously mentioned report of the Committee on Corporate Governance (1997) claims that 'the remuneration of Supervisory Board members should not be dependent on the results of the company.' See in this respect also Chapter 3, where incentive compensation for directors is crucial from the point of view of the shareholders.

nent of the Structuurregime in its current form, the Structuurregime cannot be used as a defence mechanism against take-overs. Management will need convincing arguments, based on corporate interests, to prevent a take-over, but this will be difficult if the bidder is bona fide. If there is no take-over situation, De Haze Winkelman continues, the predominant position of the Board of Directors in the Structuurregime hampers an active contribution of the shareholders, which has a negative impact for all the stakeholders.

However, in our opinion it is better to reverse this argument. In the short run, the Structuurregime offers protection to the corporation against opportunistic behavior of shareholders, but in the long run, it will eventually have to bend for solid arguments. We will now put forward two arguments to support the hypothesis that the corporation needs some protection against too hasty take-over decisions. The first is based on differences between investors and managers, the second on information that is needed in take-over situations.

As a consequence of the separation of ownership and control, investors and managers have become specialized in their own tasks. An important difference between the two comes to light if we consider the way in which both constituencies are used to handle processes of change. Professional investors are used to almost instantaneously and frictionlessly adapting their portfolios in reaction to new information. In contrast, managers operate in relatively inefficient markets, where time is a relatively important decision variable in the process. This difference is nicely described by Donaldson (1994), who concludes: 'As a result, professional investors typically lack the experience, expertise, and particularly the patience needed to manage a major corporate restructuring.' Hence, Donaldson indicates that some protection in the short run is needed. However, he also recognizes that in the long run, the take-over market should be able to function properly: '[...] The potential for external intervention by capital-market agents is needed as a last resort, the threat of which helps keep management focused on action necessary to preserve its cherished independence.'

The importance of adequate information in take-over situations has already been described by Manne (1965). In this light he argued that it would be a good thing if corporations themselves could also play an active role in this market. With this point of view, Manne took a stance against the very strict merger regulations of the day. However, it also

indicated that he was afraid for premature take-over decisions: 'Managers of a competing firm, unlike free-wheeling individual participants in the market for corporate control, almost automatically know a great deal of the kind of information crucial to a takeover decision.'

2.5 Concluding Remarks

From a corporate governance point of view, the most important characteristic of the *Structuurregime* is the very strong position of the Board of Directors. The extensive powers and the system of co-optation of this Board of Directors serve two important goals. Firstly, it increases and facilitates the possibilities to hire independent and competent directors, capable of performing their task of monitoring and advising a specialized management. Secondly, it guaranties a balanced protection of interests of all the stakeholders of the corporation. Moreover, the extra layer between shareholders and managers discourages opportunistic behavior of the former, which secures equal rights for all shareholders and, therefore, the liquidity of the stock market.

It is our opinion that the *Structuurregime* should not be abolished (as suggested for example by the VEB). However, it seems that two obvious improvements of the system should be enforced. First of all, the report of the Board of Directors in the annual report and in the general meeting of shareholders should become far more comprehensive. Secondly, more opportunities to dismiss a malfunctioning director should emerge. A combination of these two improvements will lead to greater, and more transparent accountability of the Board of Directors, without compromising the advantages of the *Structuurregime* as previously discussed.

Epilogue

As a result of an agreement between the Association of Securities Issuing Companies and the Amsterdam Stock Exchange Association, a Committee on Corporate Governance

(CCG) was established in the Netherlands in April 1996.¹⁷ The purpose of the CCG was to document the existing system of corporate governance, and to propose improvements in this system which could be enforced without changing the existing law. The CCG has produced two reports. The first report was published in October 1996, and carried the subtitle 'The initiation of change and an invitation to debate.' The invitation has readily been accepted, and the CCG has received a large number of reactions from institutions, organizations, companies, and private persons. An important reaction came from the 'Vereniging van EffectenBezitters' (VEB), the Dutch Association of Stockholders. The CCG has extensively discussed all the reactions, and published their second and final report, incorporating some of the reactions, in June 1997.

The report of the CCG has certainly intensified the public debate on corporate governance. A full discussion of the report and the resulting debate is not possible in this epilogue, simply because the number of issues that are discussed in the report is too large. However, we will discuss some of the issues of the report that bear relation to the main topic of this thesis, i.e., the relation between management, Board of Directors, and shareholders. We will first elaborate on the current need for a discussion about the system of corporate governance in the Netherlands. After that, we will return to two important issues that have been put forward in this chapter, i.e., the independence and accountability of the Board of Directors. Finally, we will give a few comments on incentive compensation.

The Need for Discussion The position of the shareholder in the Continental-European system of corporate governance is weaker than in the Anglo-Saxon system. In this chapter, we have shown that this is also the case for the position of the Dutch shareholder under the *Structuurregime*. According to the VEB, 'it is evident that the weak position of the Dutch shareholder has led to a low activity on the general meetings of shareholders.' According to the VEB, shareholders, and especially institutional investors, will more actively use their voting rights if their position is strengthened.

However, it should be noted that the *Structuurregime* was established to institutionalize the weakened position of the shareholders. Because of low attendance rates and low quality

¹⁷In the Netherlands, this Committee is often referred to as the 'Commissie Peters'.

of the discussions in the general meeting of shareholders, it was considered wise to transfer some powers from the general meeting of shareholders to the Board of Directors, in order to guarantee some continuity in the decision making. The CCG therefore follows another line of reasoning than the VEB: 'The Committee is confident that if the shareholders, especially the institutional investors and other major shareholders, are in fact present at the general meeting of shareholders and make their views heard, this will lead to higher attendance rates and to a considerable improvement in the quality of the general meeting of shareholders. As the attendance rate at the general meeting of shareholders becomes more representative of the investors, the Committee believes that the need and justification for limiting the influence of the providers of risk capital will diminish.'

In this 'chicken-and-egg' problem, we think that the argument of the CCG is more convincing, i.e., the position of the shareholders should only be enforced if their contribution is adequate. However, the Netherlands are in the middle of this process, and still witness an increased interest from shareholders in corporate governance issues. Internationalization has made the Anglo-Saxon concepts of shareholder value and investor relations more accepted, and the larger shareholdings of institutional investors has made them reconsider their position as shareholders. This increased shareholder activism makes a re-evaluation of the position of the shareholder in the Dutch system desirable, and this is exactly one of the things that the report of the CCG intends to do.

Independent Directors We have already stated that institutional investors are becoming increasingly active in corporate governance issues. When they express their opinion, they are likely to take account of the interests of the people they work for, i.e., their policyholders. The VEB states this as follows: 'It is important that representatives of the institutional investors have the possibility and freedom to focus their attention *solely* in the interests of those for whom they work.'

As long as the institutional investors limit their activities to expressing their opinion in the media or in the general meeting of shareholders, there is nothing wrong with this point of view. However, as we have pointed out in this chapter, directors should be able to perform their monitoring task independently, i.e., independent from management, and independent from any interest group. Therefore, one should be reticent when considering

appointing representatives of institutional investors in the Board of Directors. The CCG: 'Members of the Board of Directors who have been appointed on the basis of a nomination should perform their duties without a mandate from those who nominated them and independently of the subsidiary interests associated with the company. This means that - like other members of the Board of Directors - they should not commit to certain subsidiary interests while neglecting other associated interests.'

Being reticent in choosing directors from any interest group is in line with our reasoning earlier in this chapter that directors should be chosen on the basis of their skills, and not of their interests. The CCG: 'It is important that members of the Board of Directors are selected from a wide circle.'

Accountability In this chapter we have argued that 'the report of the Board of Directors in the annual report should become more comprehensive.' Both the CCG and the VEB support this view. More explicitly, they claim that at least information should be provided on the company's objectives, strategy and the associated risks, and the mechanisms needed to control risks of a financial nature. Only if this information is provided in sufficient detail, 'a thorough exchange of ideas can take place between company executives and investors in the general meeting of shareholders.' Moreover, to make sure that 'each company's general meeting of shareholders is the forum to which the management and the Board of Directors report and to which they are accountable for their performance', both the CCG and the VEB propose that the approval of the annual accounts and of the policy pursued should be separate items on the agenda.

The thorough exchange of ideas supports the basic principle that 'the management and the Board of Directors should have the confidence of the shareholders' meeting.' Earlier in this chapter we have claimed that the more detailed information in the annual report and the more active discussions in the general meeting of shareholders will result in an improved accountability of management and Board of Directors. For example, the better information can be put to good use if the shareholders start a dismissal procedure for a director in a court of law. The VEB wants to create the possibility that a manager can be voted away (dismissed) by a qualified majority in the general meeting of shareholders. We think that dismissing a manager should remain a task for the Board of Directors in the

Dutch system. However, if the accountability does not improve with the proposed changes in the report of the CCG, one could consider to allow for the dismissal of a director by the voting procedure as just described.

Incentive Compensation It is generally accepted that incentive compensation is a useful tool to align the interests of shareholders and executives. This view is shared both by the CCG and the VEB. However, implementation of incentive compensation, e.g. by means of stock option plans, should be carried out cautiously, because it can easily lead to wrong incentives, or to bold-faced enrichment of the executives. The VEB mentions three conditions that the stock option plans have to satisfy in order to make them useful from the point of view of the shareholders:

1. *The option should work as a long term incentive.* The main concern of the VEB is that managers should not have the incentive to increase profits in the short run at the expense of the long term profitability of the firm. This is of course a genuine concern, but one should not forget that managers can also sacrifice short term profits in favor of long term profitability. Therefore, it is probably more apt to state that the incentives resulting from the stock option plans should balance the short term and the long term profitability. Another important concern is that stock option plans only provide the right incentives if their payoff is dependent on the specific performance of the firm, and not of general (stock) market conditions. This can be implemented by making the compensation dependent on relative performance measures, i.e., relative to the performance of other firms in the same industry.
2. *The granted stock options should be in a reasonable proportion to the fixed component of the salary.* This is to ensure that stock option plans are only introduced to create the proper incentives, and not to simply increase the salaries of executives to unreasonable levels.
3. *Exercising the options should not result in a large increase in the owner's equity.* To avoid dilution, companies can choose to buy back their own shares on the market instead of issuing new stock. This is already common practice in the Netherlands [Herst and Rebers (1996)].

If these three conditions are satisfied, implementation of stock option plans will better align the interests of executives and shareholders, and therefore lead to an increased performance of the corporation.¹⁸ To ensure a proper implementation, a special Remuneration committee of the Board of Directors could periodically set down the incentive compensation plans in a separate document, which can be made subject to approval in the general meeting of shareholders. Both the CCG and the VEB have made suggestions in this direction.

Concluding Remarks With respect to the issues that we have discussed, we think that the report of the Committee on Corporate Governance offers good prospects for improved and more up-to-date corporate governance in the Netherlands. The CCG recognizes the need for discussion, and proposes changes to improve the position of the shareholders and the accountability of the Board of Directors. We are sympathetic to the idea that changes in corporate governance should be gradual, if possible within the existing law. For example, we should not become too enthusiastic in reinforcing the position of the shareholder in the Dutch system by pointing at the Anglo-Saxon system. As mentioned earlier in this chapter, the Anglo-Saxon system is reassessing their position as well, and it is frequently argued that the position of the shareholder might be too strong. It is therefore advisable not to take to hasty decisions, and to place any change in the context of the whole system of corporate governance.

¹⁸Earlier in this chapter, we have already mentioned that we do not see a good reason why the CCG claims that stock option plans, or incentive compensation in general, should be implemented only for managers, and not for directors.

Chapter 3

When to Fire Bad managers: The Role of Collusion Between Management and Board of Directors

3.1 Introduction

Even among capitalist economies there are pronounced differences in the way corporations are run. In the United States, for example, most of the large firms are supervised by a Board of Directors. The Board of Directors is composed of outside directors as well as executive directors, who are involved in the day-to-day management of the firm. The ultimate power, however, rests with the shareholders, who always have the possibility to fire the management. The Anglo-Saxon system is therefore often cited as an example of how corporate management should be organized in Continental-European countries, where shareholders have much less influence on the way the company is run.

In Continental Europe it is common to have a separation between the management and the Board of Directors. In such a two-tier system, the Board of Directors often acts as an autonomous body which is beyond the control of the shareholders.¹ It is frequently argued that this lack of shareholder power gives rise to situations in which the management and

¹An example are the Netherlands, where only the Board of Directors has a right to appoint or to fire the management. The Board of Directors also appoints its own successors, without interference from the shareholders [see, for example, Moerland (1995)].

the Board of Directors mutually protect each other at the expense of the shareholder. In this chapter, however, we argue that such collusion between management and directors is not always bad for the shareholders.

To show why this may be the case, consider a simple two-period model of a firm which hires a manager at the start of the first period. The match between the manager and the firm may turn out to be either good or bad. The quality of the match is beyond the control of the manager or the firm: it is merely a "move by Nature". If the match is bad, the shareholder would like to fire the manager at the end of the first period.² At that moment the manager also learns about the firing cost he will incur and for which he needs to be compensated *ex ante* in order to be willing to run the firm. In the ideal situation, the shareholder would observe this firing cost also and be able to commit *ex ante* to not firing the manager in those cases in which his firing cost exceeds the expected gain from hiring a new manager.

Rather realistically, however, we assume that the shareholder can only learn about the quality of the match through the observation of the firm's first-period cash flow. Moreover, the shareholder does not observe the realization of the firing cost. Therefore, the shareholder may want to delegate the power whether or not to fire the manager to a director who monitors the company more closely and thus can make better informed decisions. If the firing cost of a (bad) manager turns out to be relatively high, he has the incentive to bribe the director not to fire him. The possibility of such collusion may be in the interest of the shareholder, because it saves him the resources needed to compensate the manager *ex ante* for potentially high realizations of the firing cost. Thus, collusion avoids part of the deadweight losses associated with firing decisions. Indeed, this may be an important advantage of the Continental-European style of corporate management when compared with the Anglo-Saxon system, where managers' salaries of companies of comparable size are generally much higher [see, for example, Conyon *et al.* (1995), and the Economist (1995a,b)].

In practice, there are various types of costs the manager incurs when he is fired. These can take the form of foregone income as well as the loss of resources in the process of

²With some slight abuse of terminology, we will refer to the manager as being good (bad) if the quality of the match between the manager and the firm is good (bad).

searching for a new job and moving to another place. But there may also be other, less tangible costs, such as the loss of reputation and valuable contacts. It is reasonable to assume that these costs are, at least partly, unknown *ex ante*, for example because it is not clear what the manager's job market position or legal position will be in the future.

For simplicity, the model assumes that collusion between the manager and the director takes place through a monetary transfer from the former to the latter. In reality, however, such a bribe would often be less tangible. For example, in a corporate system with interlocking directorships and strong informal ties across firms the manager might recommend the director at other firms for a directorship. Another example would be a tightening of buyer-seller relations between the manager's firm and firms in which the director has a stake or of which he is manager himself.

This chapter is related to a principal-agent literature which focuses on designing compensation schemes that a shareholder can use to extract the optimal level of effort from a manager.³ This standard model has been extended to incorporate a supervisor as another layer between the principal and the agent [e.g. Baron and Besanko (1984)]. According to Kofman and Lawarrée (1993), however, 'the research in this area has by and large neglected the possibility of collusion.'

An important exception is Tirole (1986), who adds a set of 'coalition incentive compatibility constraints' to the usual individual rationality and incentive compatibility constraints, such that the final allocation is coalition proof. Kofman and Lawarrée (1996) develop a model in which it may be optimal for the principal to allow for collusion. However, this result is obtained because deterring collusion is costly in their model. In contrast, in our model, even if it is *costless* to prevent collusion, allowing for collusion between management and director can be beneficial to the principal.⁴

Our argument is developed in the following steps. Section 3.2 presents the basic model. In Section 3.3 we study the benchmark case of a shareholder who, after one period, can observe the manager's type (good or bad) as well as his firing cost. Moreover, the shareholder

³For example, Ross (1973), Holmstrom (1979), Grossman and Hart (1983), and Holmstrom and Milgrom (1987). For empirical evidence on incentive compensation, see, for example, Jensen and Murphy (1990) and Garen (1994).

⁴For other examples where collusion can be in the interest of the principal, see for example the excellent survey by Tirole (1992).

is able to commit at the start of the first period (when contracts are signed) to a firing rule based on the realization of the firing cost. This is the ideal situation with the highest payoff for the shareholder. Section 3.4 relaxes the assumption that the shareholder can observe the type and the firing cost of the manager. The shareholder receives only a noisy signal in the form of a realization of the firm's cash flow. He therefore fixes a threshold for the cash flow. If the cash flow is below (above) this threshold he fires (retains) the manager. The next step (Section 3.5) then is to delegate the firing decision to a director, who has an information advantage because he monitors the manager more closely. The salary of the director depends on the cash flow of the firm. The manager receives a fixed salary as well as a fixed severance payment which is paid only when he is fired. Because a higher severance payment reduces the incentive of a bad manager to bribe the director, the shareholder would want to set it as high as possible if collusion is undesirable. However, in those cases where it is desirable to allow for collusion, the severance payment will help to ensure that firing takes place only when the realized firing cost is relatively low. Section 3.6 explores under what conditions the shareholder would allow collusion, even if he were able to prevent it (e.g., through intensified monitoring of the director) without any cost. Section 3.7 concludes the chapter.

3.2 The Basic Model

We consider a two-period model without discounting and in which all agents are risk neutral. Qualitatively speaking, the assumption of risk neutrality does not affect our results. A firm is owned by a shareholder, who randomly selects a manager at the start of the first period. The cash flow generated by the firm in any given period depends on how the firm and the manager fit together. At the moment the manager is selected neither he nor the shareholder knows how good the match will be. A manager fits the firm well if he is 'the right man at the right time at the right place'. Such a manager is called a 'good' manager. A manager that does not fit the firm well is called a 'bad' manager.

The firm's cash flow in a given period, x , is stochastic. It depends not only on the type of the manager but also on random factors which are beyond his control. If the manager is good, the distribution of the cash flow is described by a density function $f_G(x)$. Similarly,

if he is bad, the density function of the cash flow is $f_B(x)$. Details about the density functions are reported in Figure 3-1. Both density functions are restricted to the domain $[0, X]$, $X > 0$. They are linear with a slope $\frac{2}{X^2}$ for the good manager and slope $-\frac{2}{X^2}$ for the bad manager. Thus, a good manager has a higher probability of producing a higher cash flow. The expected cash flow of the firm when the manager is good (bad) is μ_G (μ_B). Without loss of generality we assume that the *a priori* probabilities of the manager being good or bad, $\Pr\{G\}$ and $\Pr\{B\}$, respectively, are both equal to $\frac{1}{2}$. Hence, the expected cash flow generated by a randomly selected manager is $\bar{\mu} \equiv \Pr\{B\}\mu_B + \Pr\{G\}\mu_G$. Because of the assumed symmetry, $\mu_G - \bar{\mu} = \bar{\mu} - \mu_B \equiv \Delta\mu$. Hence, $\Delta\mu$ is the (absolute) difference between the average expected cash flow and the expected cash flow under a good or bad manager.

Bad manager:

A priori probability $\Pr(B) = \frac{1}{2}$

$$f_B(x) = \frac{2}{X} - \frac{2}{X^2}x$$

$$\mu_B = \frac{1}{3}X$$

Good manager:

A priori probability $\Pr(G) = \frac{1}{2}$

$$f_G(x) = \frac{2}{X^2}x$$

$$\mu_G = \frac{2}{3}X$$

Note that:

$$\bar{\mu} = \Pr(B)\mu_B + \Pr(G)\mu_G = \frac{1}{2}X$$

$$(\bar{\mu} - \mu_B) = (\mu_G - \bar{\mu}) \equiv \Delta\mu = \frac{1}{6}X$$

Figure 3-1: The cash flow density functions of the two types of managers.

Managers have a reservation wage of $W_m > 0$ in each period. At the end of the first period, the manager can either be retained or be fired and replaced by another manager. This decision will of course depend on the available information about the type of the manager, as we will see below. A manager who is fired incurs a personal firing cost c . The firing cost is stochastic and uniformly distributed on the interval $[0, C]$. We assume that it is (statistically) independent of the cash flow under either type of manager. The realization of the firing cost is revealed to the manager at the end of the first period.

To induce the manager to run the firm he must be compensated somehow for his expected firing cost, which we denote by c^e . Of course, c^e depends on the probability that the manager will be fired. This, on its turn, depends on the specific arrangements (e.g., a

director who can be bribed) to be considered below. Compensation takes place through a fixed salary s , and a fixed severance payment, $p \geq 0$, which the manager receives in the case he gets fired.⁵ Hence, in the first period his participation constraint is given by:

$$W_m \leq s + p^e - c^e, \quad (3.1)$$

where p^e is his expected severance payment (which depends also on the probability that the manager will be fired).

If the manager is not fired at the end of the first period, he will receive a fixed wage W_m in the second period. If he is fired, he is assumed to be able to obtain his second-period reservation wage somewhere else.

3.3 The First Best

The shareholder's payoff is maximized if he can observe perfectly both the type of the manager and his firing cost at the end of the first period, and if he can commit *ex ante* (i.e., at the start of the first period when contracts are signed) to a firing rule which depends on the realized firing cost. The resulting solution will be termed the *first best*.⁶

Firing a bad manager and replacing him with a randomly selected new manager at the end of the first period raises the expected cash flow of the firm in the second period by $\Delta\mu$, while firing a good manager reduces the expected future cash flow of the firm by $\Delta\mu$. To induce a manager to run the firm, he has to be compensated for his expected firing costs. While *ex post* the shareholder would always want to fire a bad manager, from an *ex-ante* point of view, in those cases where the realized firing cost exceeds the expected increase in the second-period cash flow of the firm, the shareholder would not want to fire the manager.

Suppose first that $C \leq \Delta\mu$ (see Figure 3-2(a)). Even from an *ex-ante* point of view the

⁵Note that if the firing decision does not depend on the value of p , compensation for expected firing costs could instead take place through a higher s . The distinction between s and p becomes relevant only in Section 3.5.2.

⁶Strictly speaking, the ideal situation for a shareholder would be if he knew the type of the manager at the start of the first period. This case is trivial and is, therefore, neglected.

Figure 3-2: The relevant configurations of C and $\Delta\mu$ for the optimal firing decision.

shareholder would always want to fire a bad manager. Hence, the value of commitment to an optimal firing rule, based on the realized firing cost, is zero.

Now suppose that $C > \Delta\mu$ (see Figure 3-2(b)). *Ex ante* it would be optimal to fire only if $c < \Delta\mu$ and not to fire if $c \geq \Delta\mu$. The value of commitment for the shareholder is the sum of two components. The first component is the reduction in the compensation that the manager requires for the expected firing cost he incurs, $\frac{1}{2}\bar{C} - \frac{1}{2}\left(\frac{\Delta\mu}{C}\right)\frac{1}{2}\Delta\mu$, where $\bar{C} \equiv E[c] = \frac{1}{2}C$. Here, $\frac{1}{2}\bar{C}$ is the compensation he requires if he is always fired when he turns out to be bad. If the shareholder can commit himself to only firing a bad manager if $c < \Delta\mu$, the manager requires a compensation of $\frac{1}{2}\left(\frac{\Delta\mu}{C}\right)\frac{1}{2}\Delta\mu$. This is the probability that he is bad, $\frac{1}{2}$, times the probability that $c < \Delta\mu$, times the expected firing cost conditional on $c < \Delta\mu$, which is $\frac{1}{2}\Delta\mu$. The second component is (minus) the reduction in the expected second-period cash flow from not always firing a bad manager in the case of commitment, $\frac{1}{2}\Delta\mu - \frac{1}{2}\left(\frac{\Delta\mu}{C}\right)\Delta\mu$. Always (instead of never) firing a bad manager raises the expected cash flow with the probability that the manager is bad, $\frac{1}{2}$, times the expected increase in the cash flow from firing the bad manager, $\Delta\mu$. Only firing a bad manager if $c < \Delta\mu$, merely raises the expected cash flow by the probability that the manager is bad, times the probability that $c < \Delta\mu$, $\frac{\Delta\mu}{C}$, times the expected increase in the cash flow from firing the bad manager. Hence, the value of commitment is:

$$\left[\frac{1}{2}\bar{C} - \frac{1}{2}\left(\frac{\Delta\mu}{C}\right)\frac{1}{2}\Delta\mu\right] - \left[\frac{1}{2}\Delta\mu - \frac{1}{2}\left(\frac{\Delta\mu}{C}\right)\Delta\mu\right] = \frac{1}{4}\frac{(C-\Delta\mu)^2}{C}. \quad (3.2)$$

Not surprisingly, for given $\Delta\mu$ ($< C$) the value of commitment is increasing in C .

3.4 No Director

From now on we assume that the shareholder neither observes the type of the manager, nor his firing cost at the end of the first period.⁷ Therefore, the only information upon which the shareholder can base his firing decision is the realization of the first-period cash flow, x_1 . More specifically, at the start of the first period the firm and the manager sign a contract which specifies a fixed threshold τ for x_1 . The manager will be fired at the end of the first period if and only if $x_1 < \tau$.

The shareholder chooses the threshold τ so as to maximize his expected payoff.⁸ The only relevant variables that enter his objective function are the expected cash flow of the firm in the second period, denoted by x_2^e , the fixed salary of the manager in the first period, and the expected severance payment at the end of the first period. These are the variables that depend on the firing decision, and, hence, are affected by the threshold. Because there is no reason to pay the manager more than his reservation wage, the participation constraint of the manager will be binding. Hence, using (1) with equality, one has:

$$SV = x_2^e - s - p^e = x_2^e - W_m - c^e, \quad (3.3)$$

where SV is the shareholder value. Throughout, we thus ignore the manager's second-period salary as well as the contribution of the expected first-period cash flow ($\bar{\mu}$) to the shareholder value. This is irrelevant for any of the results.

In the Appendix we show that (3.3) can be rewritten as:

$$SV = \bar{\mu} - W_m + \frac{1}{2} [F_B(\tau) - F_G(\tau)] \Delta\mu - \frac{1}{2} [F_B(\tau) + F_G(\tau)] \bar{C}, \quad (3.4)$$

where $F_B(\cdot)$ and $F_G(\cdot)$ are the distribution functions corresponding to $f_B(\cdot)$ and $f_G(\cdot)$, respectively.

The intuition for (3.4) is as follows. If the shareholder would never fire a manager

⁷We assume also that, in the absence of a director, the manager is not able to observe his own type at the end of the first period. This precludes the possibility of a long-term revelation contract between the shareholder and the manager such that the first best (see Section 3.3) is achieved.

⁸One can show that the optimal threshold yields the highest payoff to the shareholder of all possible contracts where the choice to fire or not is based on x_1 only.

($\tau = 0$), the shareholder value is simply the average cash flow of the firm minus the reservation wage of the manager ($\bar{\mu} - W_m$). If a threshold $\tau > 0$ is imposed, the shareholder will fire a bad manager with probability $\frac{1}{2}F_B(\tau)$, which is the probability that the manager is bad times the probability that $x_1 < \tau$, given that the manager is bad. Similarly, the shareholder will fire a good manager with probability $\frac{1}{2}F_G(\tau)$, which reduces the expected second-period cash flow by $\Delta\mu$. Finally, the expected cost of setting a threshold is $\frac{1}{2}[F_B(\tau) + F_G(\tau)]\bar{C}$. This is the probability that the manager is fired, $\frac{1}{2}[F_B(\tau) + F_G(\tau)]$, times his average firing cost, $\bar{C}$.

Differentiating the right-hand side of (3.4) yields the necessary and, in this case, sufficient first-order condition for τ :

$$\bar{C} = \left(\frac{f_B(\tau) - f_G(\tau)}{f_B(\tau) + f_G(\tau)} \right) \Delta\mu. \quad (3.5)$$

Hence, the optimal threshold, denoted by τ^* , is:

$$\tau^* = \frac{1}{2}X \left(1 - \frac{\bar{C}}{\Delta\mu} \right), \text{ if } \bar{C} < \Delta\mu, \quad (3.6)$$

where we have used the distributional properties reported in Figure 3-1. If $\bar{C} \geq \Delta\mu$, the shareholder sets $\tau^* = 0$. Because the expected firing cost exceeds the expected increase in the cash flow of the firm in this case, it is optimal not to impose a positive threshold. Equation (3.6) shows that the threshold is always below $\frac{1}{2}X$. Moreover, τ^* is positively related to $\Delta\mu$ and negatively related to $\bar{C}$. An increase in $\Delta\mu$ raises the likelihood that a below-average performance, i.e. $x_1 < \frac{1}{2}X$, can be attributed to the manager being bad. Ceteris paribus, an increase in $\bar{C}$ raises the expected firing cost for the manager and thus requires the shareholder to offer him a higher salary. To compensate for this, the shareholder sets a higher threshold, thereby reducing the probability that the manager will be fired.

Finally, for $\tau = \tau^*$, the shareholder value is (see the Appendix):

$$SV = \begin{cases} \bar{\mu} - W_m + \frac{1}{4}\Delta\mu - \frac{1}{2}\bar{C}\left(1 - \frac{1}{2}\frac{\bar{C}}{\Delta\mu}\right), & \text{if } \bar{C} < \Delta\mu, \\ \bar{\mu} - W_m, & \text{if } \bar{C} \geq \Delta\mu. \end{cases} \quad (3.7)$$

Higher average firing costs reduce the shareholder value (if $\bar{C} < \Delta\mu$). The reason is that the shareholder has to compensate the manager for the higher expected firing cost by increasing his salary accordingly.

The current arrangement involving a threshold is dominated by the first best (see Section 3.3) for two reasons. The first is that the shareholder no longer perfectly observes the type of the manager. He can make either one of two errors: firing a good manager or not firing a bad manager. The second reason is that, because the shareholder does not observe the realization of the firing cost, he cannot commit himself to not firing the manager if $c \geq \Delta\mu$.

3.5 Introducing a Director

From now on, the shareholder can delegate the firing decision to a director. The director may be expected to have more information about the manager than the shareholder. According to Fama (1980), the director can be viewed as a market-induced institution, ‘[...] whose most important role is to scrutinize the highest decision makers in the firm.’ In his role of monitoring the manager, the director can obtain and use confidential information about the firm and the manager. This information is not always at the disposal of the shareholders, for example in order to avoid that competitors would profit from it. In particular, we assume that the director can observe the type of the manager perfectly at the end of the first period. This assumption may be motivated by the fact that the director often is a director at other firms as well. Comparing the performance of these other firms with the firm under consideration enables the director to infer whether the manager is good or bad. Finally, we assume that also the manager himself observes his type at the end of the first period. This should not be unreasonable for a firm in which the manager interacts with his director on a sufficiently frequent basis.

The reservation wage of the director is $W_d > 0$. We assume that W_d is not too large, because otherwise it would not be profitable to have a director at all. Specifically, it turns out that the following restriction will be convenient:

$$W_d \leq \left(\bar{\mu} + \frac{1}{2}\Delta\mu\right) \text{Min} \left[1, \frac{c}{\Delta\mu}\right]. \quad (3.8)$$

We assume that the director receives a proportion $\alpha \geq 0$ of the second-period cash flow of the firm. This should give him an incentive, albeit not always perfect, to make the appropriate firing decision from the viewpoint of the shareholder. Such a simple, linear incentive scheme can be motivated as follows. First, it captures the spirit of most of the incentive schemes implemented in practice, namely providing a simple link between reward and performance. Second, it yields the basic result of this chapter, i.e., that collusion can be beneficial for the shareholder. This result also holds for more sophisticated incentive schemes (see Footnote 12 below).

We adopt an incomplete contract approach.⁹ That is, our starting point is that there is a director who takes a firing decision which maximizes his compensation. Given this, we will investigate the potential for collusion between the manager and the director. More specifically, we allow for the possibility that the manager offers a bribe to the director in order to influence his firing decision.

The shareholder value, the participation constraint of the manager, and the participation constraint of the director, are given by, respectively:

$$SV = x_2^e - s - p^e - \alpha x_2^e, \quad (3.9)$$

$$W_m \leq s + p^e - c^e - b^e, \quad (3.10)$$

$$W_d \leq \alpha x_2^e + b^e, \quad (3.11)$$

where b^e is the expected bribe paid by the manager to the director in order to influence his firing decision.

3.5.1 No Collusion

For the moment, we disregard the possibility of collusion. Hence, b^e drops out of (3.10) and (3.11). Therefore, the payoff to the director depends only on the second-period cash flow of the firm. Hence, for any $\alpha > 0$, the director will always fire a bad manager, but never fire a good manager. Therefore, firing takes place with probability $\frac{1}{2}$. This implies

⁹For an intuitive introduction to incomplete contracts, see Hart (1995). For a recent survey, see Tirole (1994).

that $x_2^c = \frac{1}{2}\bar{\mu} + \frac{1}{2}\mu_G = \bar{\mu} + \frac{1}{2}\Delta\mu$. The expected firing cost is $\frac{1}{2}\bar{C}$, which is the probability that a manager is bad multiplied by the average firing cost.

Define α^0 as the minimum value of α for which the participation constraint of the director, (3.11), is satisfied. Hence,

$$\alpha^0 = \frac{W_d}{\bar{\mu} + \frac{1}{2}\Delta\mu} > 0. \quad (3.12)$$

Observe that $\alpha^0 \leq 1$, as implied by (3.8). Because the firing decision of the director is independent of α (if $\alpha > 0$), it is optimal for the shareholder to set $\alpha = \alpha^0$. Combined with the fact that (3.10) is binding, this implies that:

$$SV = \bar{\mu} + \frac{1}{2}\Delta\mu - W_m - \frac{1}{2}\bar{C} - W_d. \quad (3.13)$$

To compare this with the shareholder value in the absence of a director, one has to distinguish between the case in which the shareholder would choose to set $\tau^* = 0$ (i.e., if $\bar{C} \geq \Delta\mu$) and the case in which he would set $\tau^* > 0$ (i.e., if $\bar{C} < \Delta\mu$).

$\bar{C} \geq \Delta\mu$: Comparing (3.13) and the second line of (3.7), we see that the shareholder would want to hire a director if and only if:

$$W_d \leq \frac{1}{2}(\Delta\mu - \bar{C}). \quad (3.14)$$

Hence, in this case ($\bar{C} \geq \Delta\mu$), the shareholder would never hire a director. The intuition is straightforward. The director, who observes the type of the manager perfectly, will always fire a bad manager. However, he does not take into account the (ex-ante) compensation that the manager requires for his expected firing cost, $\bar{C}$, which exceeds the increase in the expected second-period cash flow from always firing a bad manager.

$\bar{C} < \Delta\mu$: Comparing (3.13) and the first line of (3.7), it follows that the shareholder would hire a director if and only if:

$$W_d \leq \frac{1}{4}\Delta\mu \left[1 - \left(\frac{\bar{C}}{\Delta\mu} \right)^2 \right]. \quad (3.15)$$

Because the right-hand side of (3.15) is positive, a director is hired if his reservation wage

is not too high. Hiring a director is more profitable if $\Delta\mu$ is larger and if the average firing cost, $\bar{C}$, is lower.

3.5.2 Collusion

Now we allow for the possibility that the manager pays a bribe to the director at the end of the first period in order to influence his firing decision. The shareholder takes this into account when setting the compensation schemes at the start of the first period. He optimizes over α , s and p . Because the severance payment is paid only when the manager is fired, it will affect the expected bribe. Hence, there is an independent role for the severance payment now.

Figure 3-3: Extensive form representation of the game if collusion is possible.

Figure 3-3 shows the extensive form representation of the new game. At the start of the first period the shareholder (S) selects α , p and s . At the end of the first period there is a move by nature (N) concerning the realization of the firing cost, c , and the type of the manager. The manager, G(ood) or B(ad), each possibility with probability $\frac{1}{2}$, can then offer a ‘take-it-or-leave-it’ bribe to the director in order to influence his firing decision. The offer is denoted by the combination (b_F, b_{NF}) and has the following form: “I pay you b_F if you fire me and b_{NF} if you do not fire me.” On the basis of this offer, the director either fires (F) the manager or does not fire (NF) him (decision nodes D). We assume that the manager and the director both stick to the agreement, if the latter accepts the offer.

Figure 3-3 also shows the (expected) payoffs for each outcome. As before, we include only those variables that are affected by the actions in the game tree. It is easy to derive

the payoffs from equations (3.9) to (3.11). Because the game is one of perfect information, we can use backwards induction to solve for the Subgame Perfect Equilibria.

The first step is to investigate the incentives of the director to fire at the end of the first period. In Section 3.5.1 we saw that in the absence of collusion the director will always fire a bad manager and never fire a good manager. If collusion is allowed, both a bad manager and a good manager may have an incentive to bribe the director in order to change his firing intentions. A bad manager would be prepared to offer a bribe of up to $(c - p)$ if this induces the director not to fire him. The director accepts this bribe if it is not lower than his expected gain from firing $(\alpha\Delta\mu)$. Therefore, if $c \geq p + \alpha\Delta\mu$, the bad manager successfully offers a bribe of $\alpha\Delta\mu$ and is not fired. A good manager would be prepared to offer a bribe of up to $(p - c)$ if this induces the director to fire him. This bribe is accepted if it equals or exceeds the director's expected loss from firing a good manager $(\alpha\Delta\mu)$. Therefore, if $c \leq p - \alpha\Delta\mu$, the good manager successfully offers a bribe of $\alpha\Delta\mu$ and is fired.

However, we argue that at an optimum (α^*, p^*) it should be the case that $p^* \leq \alpha^*\Delta\mu$: hence, a good manager is never fired. Suppose that the opposite holds. Then, for every realization of c smaller than $(p^* - \alpha^*\Delta\mu)$, a good manager will succeed in bribing the director to fire him. However, such a value for p cannot be optimal: reducing p to $\alpha^*\Delta\mu$ increases the probability that a bad manager is not fired, but, to the same extent, also decreases the probability that a good manager is fired. Therefore, the net effect on the expected cash flow of the firm is nil, while the expected firing cost is reduced (so that $s + p^c$ is reduced).

A bad manager is fired with probability $\frac{p + \alpha\Delta\mu}{C} \leq 1$. This inequality holds at an optimum because any choices of p and α such that $p + \alpha\Delta\mu > C$ can be improved upon by decreasing α : this does not change the incentives for the director but it increases the shareholder value. Hence, one has:

$$x_2^c = \frac{1}{2}\mu_G + \frac{1}{2}\left(\frac{C - p - \alpha\Delta\mu}{C}\mu_B + \frac{p + \alpha\Delta\mu}{C}\bar{\mu}\right) = \bar{\mu} + \frac{1}{2}\frac{p + \alpha\Delta\mu}{C}\Delta\mu, \quad (3.16)$$

$$p^c = \frac{1}{2}\frac{p + \alpha\Delta\mu}{C}p, \quad (3.17)$$

$$c^c = \frac{1}{2}\frac{p + \alpha\Delta\mu}{C}\frac{1}{2}(p + \alpha\Delta\mu), \quad (3.18)$$

$$b^e = \frac{\frac{1}{2}C - p - \alpha\Delta\mu}{C} \alpha\Delta\mu. \quad (3.19)$$

The director receives a proportion α of the expected cash flow of the firm, plus the expected bribe from the manager. Using (3.16) and (3.19) the director's expected payoff is:

$$\alpha x_2^e + b^e = \alpha(\bar{\mu} + \frac{1}{2}\Delta\mu). \quad (3.20)$$

The expected payoff depends only on α and not on p . This is not surprising. The expected second-period cash flow of a firm with a director who always fires bad managers and never fires good managers is $\frac{1}{2}\bar{\mu} + \frac{1}{2}\mu_G = \bar{\mu} + \frac{1}{2}\Delta\mu$. If a director is bribed into not firing a bad manager, the expected cash flow decreases. Hence, for a bribe to be successful, it must at least compensate the director for his loss from a reduced expected cash flow. However, the manager will offer the lowest possible bribe, which is the one that exactly compensates for this loss.

Because $p^* \leq \alpha^* \Delta\mu$, (3.17) and (3.18) imply that $p^e \leq c^e$. In addition, because $W_m > 0$, one has (by (3.10)) that $s > 0$. However, because s does not affect the firing decision of the director, the shareholder can set s such that the participation constraint of the manager (3.10) is binding.

Finally, combining (3.9), (3.10, with equality), (3.16), (3.18), and (3.20), we obtain the following expression for the shareholder value, which is to be maximized over α and p :

$$SV = \bar{\mu} + \frac{\frac{1}{2}p + \alpha\Delta\mu}{C} \Delta\mu - W_m - \frac{\frac{1}{2}p + \alpha\Delta\mu}{C} \frac{1}{2}(p + \alpha\Delta\mu) - \alpha(\bar{\mu} + \frac{1}{2}\Delta\mu). \quad (3.21)$$

From (3.20), α^0 as defined by (3.12) is again the minimum value of α for which the participation constraint of the director is binding. Furthermore, define $\tilde{\alpha}$ as the optimum for α if we ignore the participation constraint for the director. In the Appendix we prove the following two lemmas:

Lemma 1 *Suppose that $\Delta\mu > C$, that is, the expected difference between the cash flow generated by a good or a bad manager and the cash flow of an average manager exceeds the maximum firing cost.*

1. If $\tilde{\alpha} \leq \alpha^0$ (i.e., the participation constraint of the director is binding), then $\alpha^* = \alpha^0$. In this case, p^* is equal to the minimum of $\alpha^0 \Delta\mu$ and $C - \alpha^0 \Delta\mu$.
2. If $\tilde{\alpha} > \alpha^0$ (i.e., the participation constraint of the director is not binding at the optimal unconstrained α), then $\alpha^* = \tilde{\alpha}$ and $p^* = \tilde{\alpha} \Delta\mu$ at the optimal solution.

Here, $\tilde{\alpha} = \max[0, \min(\frac{2\Delta\mu - 7C}{4\Delta\mu}, \frac{C}{2\Delta\mu})]$.

Lemma 2 Suppose that $\Delta\mu \leq C$, that is, the maximum firing cost exceeds the expected difference between the cash flow generated by a good or a bad manager and the cash flow of an average manager. Then, $\alpha^* = \alpha^0$ and p^* is the minimum of $\alpha^0 \Delta\mu$ and $(1 - \alpha^0) \Delta\mu$.

The intuition for Lemma 1-1 is as follows. If $\tilde{\alpha} \leq \alpha^0$, the shareholder has to set α at α^0 , because a lower value for α violates the participation constraint of the director, while a higher value for α reduces the shareholder value, as follows from the definition of $\tilde{\alpha}$. Because $\Delta\mu > C$, firing a bad manager is (ex-ante) efficient for every realization of c . Given that a bad manager will not be fired if $c \geq p^* + \alpha^* \Delta\mu$, the shareholder sets p as high as possible, with the exception that p^* cannot be higher than $\alpha^* \Delta\mu$. Otherwise, a good manager would get fired with positive probability. This is not optimal, as we argued earlier. If $\tilde{\alpha} > \alpha^0$ (Lemma 1-2), then, again by definition of $\tilde{\alpha}$, the shareholder sets $\alpha = \tilde{\alpha}$. As in Lemma 1-1, he wants to set p as high as possible. That is, he sets $p = \tilde{\alpha} \Delta\mu$.¹⁰

Although from an ex-ante perspective it would always be optimal to fire a bad manager, under the optimal arrangement (α^*, p^*) collusion will occur with positive probability whenever $p^* = \alpha^* \Delta\mu$. The reason is as follows. The shareholder would rather set the severance payment higher in those cases. However, this would result in a good manager being fired with positive probability.

Now, suppose that $\Delta\mu \leq C$ (Lemma 2). In this case, firing a bad manager is ex-ante efficient only if $c \in [0, \Delta\mu]$, because if $c > \Delta\mu$, the firing cost exceeds the expected increase in the future cash flow. Under the optimal arrangement (α^*, p^*) collusion will always occur with positive probability. To avoid that a good manager can get fired, the shareholder sets

¹⁰The final part of the Lemma 1 implies that $\tilde{\alpha} \leq C/(2\Delta\mu)$. The intuition is as follows. Suppose that the opposite is true, i.e. $\tilde{\alpha} > C/(2\Delta\mu)$. In that case, the shareholder can decrease α and simultaneously increase p without changing the firing decision of the director. This yields the same expected cash flow, but a lower expected salary for the director, which contradicts the optimality of $\tilde{\alpha}$.

p at $\alpha^0 \Delta\mu$, if $\alpha^0 \Delta\mu < (1 - \alpha^0) \Delta\mu$. Otherwise, he sets $p = (1 - \alpha^0) \Delta\mu$, which prevents collusion between the bad manager and the director if $0 < c \leq \Delta\mu$, but induces them to collude if $c > \Delta\mu$.

3.6 When is it Optimal to Allow for Collusion?

Suppose that the shareholder is able to (costlessly) prevent the possibility of collusion, for example through intensified monitoring of the director or through provisions in the corporate charter or the corporate law which make it easier to punish a director for bad decisions. Under what circumstances should the shareholder prevent collusion?

To address this question, we need to distinguish between $\Delta\mu > C$ and $\Delta\mu \leq C$. If $\Delta\mu > C$, then firing a bad manager is always efficient from an *ex-ante* perspective. This is precisely what a non-colluding director establishes. Hence, in this case, it would be optimal to prevent collusion.

Now, suppose that $\Delta\mu \leq C$. Hence, if $c \in [\Delta\mu, C]$, firing a bad manager would no longer be efficient from an *ex-ante* perspective. A colluding director is bribed by a bad manager if $c \geq \alpha^* \Delta\mu + p^*$. As discussed in Section 3.3, this is bad for the shareholder if $c \in [\alpha^* \Delta\mu + p^*, \Delta\mu)$, but it is beneficial for him if $c \in [\Delta\mu, C]$.¹¹

To see whether preventing the possibility of collusion may be in the interest of the shareholder, we compare his losses (relative to those under the first best, see Section 3.3) for the case where collusion is allowed with those for the case where it is prevented. The first best requires that a bad manager be fired if and only if $c \in [0, \Delta\mu]$. When collusion is prevented, a bad manager is fired also when $c \in [\Delta\mu, C]$. The expected loss (relative to that for the first best) associated with prevention is:

$$\frac{1}{2} \frac{C - \Delta\mu}{C} \left[\frac{1}{2} (C + \Delta\mu) - \Delta\mu \right], \quad (3.22)$$

which is the probability that a manager is bad, $\frac{1}{2}$, multiplied by the probability that the firing decision would be (*ex-ante*) inefficient, $\frac{C - \Delta\mu}{C}$, multiplied by the expected loss associated with inefficient firing, $\frac{1}{2} (C + \Delta\mu) - \Delta\mu$.

¹¹Note that $\alpha^* \Delta\mu + p^* \leq \Delta\mu$, as follows from Lemma 2.

When collusion is allowed, it takes place whenever the manager is bad and $c \geq \alpha^* \Delta\mu + p^*$. The optimal arrangement (α^*, p^*) in Section 3.5.2 thus makes a trade-off between having collusion from time to time when this would not be *ex-ante* efficient, i.e., if $c \in [\alpha^* \Delta\mu + p^*, \Delta\mu)$, and collusion occurring when this is indeed *ex-ante* efficient, i.e., if $c \in [\Delta\mu, C]$. Hence, the difference between the case where collusion is allowed and the first best (see Section 3.3) is that in the former case a bad manager is not fired if $c \in [\alpha^* \Delta\mu + p^*, \Delta\mu)$. If $(1 - \alpha^0) \Delta\mu \leq \alpha^0 \Delta\mu$, this interval is empty (as follows from Lemmas 1 and 2) and the solution with collusion being allowed in fact coincides with the first best. In the following we therefore assume that $(1 - \alpha^0) \Delta\mu > \alpha^0 \Delta\mu$. Compared with the first best, the loss associated with allowing for collusion is:

$$\frac{1}{2} \frac{\Delta\mu - (\alpha^* \Delta\mu + p^*)}{C} \left[\Delta\mu - \frac{1}{2} (\Delta\mu + \alpha^* \Delta\mu + p^*) \right], \quad (3.23)$$

which is the probability that a manager is bad, $\frac{1}{2}$, multiplied by the probability that not firing a bad manager would be (*ex-ante*) inefficient, $\frac{\Delta\mu - (\alpha^* \Delta\mu + p^*)}{C}$, multiplied by the expected opportunity cost of not firing a bad manager, $\Delta\mu - \frac{1}{2} (\Delta\mu + \alpha^* \Delta\mu + p^*)$.

Expression (3.22) is increasing in C , while expression (3.23) is decreasing in C . Hence, a larger value of C increases the desirability of allowing for collusion. For C sufficiently large, expression (3.23) is smaller than expression (3.22), i.e., allowing for collusion is better than preventing collusion. The reason is that the possibility of collusion offsets part of the loss associated with the failure to commit to not firing a bad manager if his firing cost is relatively high.¹²

3.7 Concluding Remarks

In this chapter we have argued that collusion between the Board of Directors and the management of a firm is not always bad for the shareholders of the firm. In particular,

¹²Note that any incentive scheme for a director with a positive relation between x_2 and his salary gives him the incentive never to fire a good manager, and always to fire a bad manager. As in the case of a linear incentive scheme, it would then be efficient to have collusion if $c \in [\Delta\mu, C]$. Hence, although one might be able to devise better incentive schemes (from the shareholder's perspective) than the linear scheme, this does not change the basic insight that it may be profitable to allow for collusion.

collusion alleviates the costs associated with the failure to commit to not firing a bad manager if his personal firing cost is relatively high. The possibility of collusion reduces the compensation required by the manager.

Our analysis may explain why management salaries are substantially higher in the Anglo-Saxon system than in many other countries. In the Anglo-Saxon system, managers require more compensation because of a higher risk to be fired. This arises from the fact that it is relatively easy for shareholders to fire a manager.

An interesting direction for further research would be to allow for the possibility to fire the director in the case of a bad performance by the firm or the manager. This may reduce the scope for collusion between the director and the manager. However, if allowing for collusion is in the interest of the shareholder, this would be an argument in favor of legal restrictions on the ease with which directors can be fired. In many European countries such restrictions exist. Therefore, such an analysis could shed some light on the advantages and disadvantages of the various corporate systems that we observe. In particular, it may contribute to the current discussion about the disadvantages of the alleged shareholder short-termism in the Anglo-Saxon system [e.g., Albert (1991), Miles (1993, 1995) and Satchell and Damant (1995)].

Appendix

From equation (3.3) to equation (3.4)

For clarity we restate equation (3.3) in the text:

$$SV = x_2^c - W_m - c^c. \quad (3.A.1)$$

The expected firing cost depends both on the probability that the cash flow of the firm in the first period falls below the threshold τ , as well as on the expected realization of the firing cost *given* that a manager is fired. A manager is always fired if $x_1 < \tau$. Hence, the expected firing cost equals $\Pr\{x_1 < \tau\}\bar{C}$. Therefore, the shareholder value can be rewritten

as:

$$SV = x_2^e - W_m - \Pr\{x_1 < \tau\}\bar{C}. \quad (3.A.2)$$

The expected cash flow of the firm in the second period depends on the manager's type in that period. If the incumbent manager is retained, the expected second-period cash flow is μ_B if he is bad and μ_G if he is good, respectively. If he is fired, a new manager of unknown type will be hired. He generates an expected cash flow of $\bar{\mu}$. Hence:

$$\begin{aligned} SV = & \Pr\{x_1 < \tau\}\bar{\mu} + \Pr\{x_1 \geq \tau\}(\Pr\{B \mid x_1 \geq \tau\}\mu_B \\ & + \Pr\{G \mid x_1 \geq \tau\}\mu_G) - W_m - \Pr\{x_1 < \tau\}\bar{C}, \end{aligned} \quad (3.A.3)$$

where B (G) stands for the event of the manager being bad (good).

Bayes' rule yields:

$$\begin{aligned} \Pr\{x_1 < \tau\} &= \Pr\{B\}F_B(\tau) + \Pr\{G\}F_G(\tau), \\ \Pr\{B \mid x_1 \geq \tau\} &= \frac{\Pr\{B\}[1-F_B(\tau)]}{\Pr\{x_1 \geq \tau\}}, \\ \Pr\{G \mid x_1 \geq \tau\} &= \frac{\Pr\{G\}[1-F_G(\tau)]}{\Pr\{x_1 \geq \tau\}}, \end{aligned}$$

where $F_B(\cdot)$ and $F_G(\cdot)$ are the distribution functions associated with $f_B(\cdot)$ and $f_G(\cdot)$, respectively. Substituting the above expressions into (3.A.3), we obtain:

$$\begin{aligned} SV = & (\Pr\{B\}F_B(\tau) + \Pr\{G\}F_G(\tau))(\bar{\mu} - \bar{C}) \\ & + \Pr\{B\}[1 - F_B(\tau)]\mu_B + \Pr\{G\}[1 - F_G(\tau)]\mu_G - W_m. \end{aligned} \quad (3.A.4)$$

Subtracting and adding $\Pr\{B\}F_B(\tau)\mu_B + \Pr\{G\}F_G(\tau)\mu_G$, and rearranging yields:

$$\begin{aligned} SV = & \Pr\{B\}F_B(\tau)(\bar{\mu} - \mu_B - \bar{C}) \\ & + \Pr\{G\}F_G(\tau)(\bar{\mu} - \mu_G - \bar{C}) + \Pr\{B\}F_B(\tau)\mu_B \\ & + \Pr\{B\}[1 - F_B(\tau)]\mu_B + \Pr\{G\}F_G(\tau)\mu_G \end{aligned}$$

$$+ \Pr\{G\} [1 - F_G(\tau)] \mu_G - W_m. \quad (3.A.5)$$

Because

$$\begin{aligned} & \Pr\{B\} F_B(\tau) \mu_B + \Pr\{B\} [1 - F_B(\tau)] \mu_B \\ & + \Pr\{G\} F_G(\tau) \mu_G + \Pr\{G\} [1 - F_G(\tau)] \mu_G = \bar{\mu}, \end{aligned}$$

we obtain, after some rearranging:

$$\begin{aligned} SV &= \bar{\mu} - W_m + \Pr\{B\} F_B(\tau) (\bar{\mu} - \mu_B) \\ &\quad - \Pr\{G\} F_G(\tau) (\mu_G - \bar{\mu}) - \Pr\{x_1 < \tau\} \bar{C}, \end{aligned} \quad (3.A.6)$$

which, after substituting $\Delta\mu$ for $(\bar{\mu} - \mu_B)$ and $(\mu_G - \bar{\mu})$, $\Pr\{G\} = \Pr\{B\} = \frac{1}{2}$ and $\frac{1}{2} [F_B(\tau) + F_G(\tau)]$ for $\Pr\{x_1 < \tau\}$, equals (3.4) in the text.

Derivation of equation (3.7)

We start from equation (3.4) in the text:

$$SV = \bar{\mu} - W_m + \frac{1}{2} [F_B(\tau) - F_G(\tau)] \Delta\mu - \frac{1}{2} [F_B(\tau) + F_G(\tau)] \bar{C}. \quad (3.A.7)$$

Using the details of Figure 3-1, we have the following:

$$\begin{aligned} F_B(\tau) &= \int_0^\tau f_B(x_1) dx_1 = \frac{2}{X} \tau - \frac{1}{X^2} \tau^2, \\ F_G(\tau) &= \int_0^\tau f_G(x_1) dx_1 = \frac{1}{X^2} \tau^2. \end{aligned}$$

Substituting these results and (3.6) into (3.A.7), we get, after rearranging:

$$SV = \bar{\mu} - W_m + \frac{1}{4} \Delta\mu - \frac{1}{2} \bar{C} (1 - \frac{1}{2} \frac{\bar{C}}{\Delta\mu}), \quad (3.A.8)$$

which is the first line of equation (3.7). In Section 3.4 we explain that if $\bar{C} \geq \Delta\mu$, the shareholder sets $\tau^* = 0$, which implies that the shareholder value reduces to $\bar{\mu} - W_m$, which is the second line of equation (3.7).

Proof of Lemmas 1 and 2.

The shareholder maximizes (3.21) over α and p . Dropping terms that do not depend on α and p , we can write the shareholder's problem as:

$$\begin{aligned} \max_{\alpha, p} \quad & SV' \equiv \frac{p+\alpha\Delta\mu}{C} \Delta\mu - \frac{p+\alpha\Delta\mu}{C} \frac{1}{2}(p + \alpha\Delta\mu) - 2\alpha(\bar{\mu} + \frac{1}{2}\Delta\mu), \\ \text{s.t.} \quad & p \leq \alpha\Delta\mu, \\ & p + \alpha\Delta\mu \leq C, \\ & \alpha \geq \alpha_0 \equiv \frac{W_d}{\bar{\mu} + \frac{1}{2}\Delta\mu}, \\ & \alpha \geq 0, p \geq 0. \end{aligned}$$

The first constraint has been discussed in the text and ensures that a good manager is never fired. The second constraint, also discussed in the text, ensures that the probability $(p + \alpha\Delta\mu)/C$ does not exceed one. The third constraint is the participation constraint of the director.

Note that

$$\frac{\partial SV'}{\partial p} = \frac{\Delta\mu}{C} - \frac{p+\alpha\Delta\mu}{C} = 0 \iff p = (1 - \alpha)\Delta\mu. \quad (3.A.9)$$

Case 1 ($\Delta\mu > C$)

For the moment, ignore the constraint $\alpha \geq \alpha^0$. The admissible area is the triangle OAB. For a given α , SV' is a quadratic function of p , which reaches its maximum for $p = (1 - \alpha)\Delta\mu$ (see (3.A.9)). Hence, the optimum must be located on OA or AB. Suppose that it is located on AB. Then, $p + \alpha\Delta\mu = C$. This can be substituted into the objective function, which reduces to $SV' = \Delta\mu - \frac{1}{2}C - 2\alpha(\bar{\mu} + \frac{1}{2}\Delta\mu)$. Hence, α should be chosen as low as possible. Hence, if the optimum is located on AB, it must be at A. But this implies that it is located on OA. Hence, $p = \alpha\Delta\mu$. Substitute this into the objective function to eliminate p . Maximize the resulting function with respect to α and apply the restriction that $0 \leq \alpha \leq C/(2\Delta\mu)$ (to ensure that the optimum is located on the line piece OA). If we use in addition that $\bar{\mu} + \frac{1}{2}\Delta\mu = \frac{7}{2}\Delta\mu$ (see Figure 3-1), we obtain:

$$\tilde{\alpha} = \max[0, \min(\frac{2\Delta\mu - 7C}{4\Delta\mu}, \frac{C}{2\Delta\mu})]. \tag{3.A.10}$$

Finally, apply the constraint $\alpha \geq \alpha^0$, which we have neglected so far. Because $\alpha^0 \leq C/\Delta\mu$, as follows from (3.8), we have:

$$\begin{aligned} \text{If } \tilde{\alpha} \leq \alpha^0, \text{ then } \alpha^* &= \alpha^0 \text{ and } p^* = \begin{cases} \alpha^0\Delta\mu, & \text{if } \alpha^0 \leq \frac{C}{2\Delta\mu}, \\ C - \alpha^0\Delta\mu, & \text{if } \frac{C}{2\Delta\mu} < \alpha^0 \leq \frac{C}{\Delta\mu}. \end{cases} \\ \text{If } \tilde{\alpha} > \alpha^0, \text{ then } \alpha^* &= \tilde{\alpha} \text{ and } p^* = \tilde{\alpha}\Delta\mu. \end{aligned}$$

Case 2 ($\Delta\mu \leq C$)

In this case, OAB is again the admissible area, and by (3.A.9) the optimal solution

must be located on OD or on DE. As before, if the solution lies on DE, it must be located at D. Going through similar steps as in *Case 1*, we obtain:

$$\tilde{\alpha} = \max[0, \min(\frac{2\Delta\mu - 7C}{4\Delta\mu}, \frac{1}{2})] = 0. \quad (3.A.11)$$

Applying that $\alpha \geq \alpha^0$ yields the solution

$$\alpha^* = \alpha^0 \text{ and } p^* = \begin{cases} \alpha^0 \Delta\mu, & \text{if } \alpha^0 \leq \frac{1}{2}, \\ (1 - \alpha^0) \Delta\mu, & \text{if } \frac{1}{2} \leq \alpha^0 \leq 1. \end{cases}$$

Chapter 4

Incentive Signalling and Bankruptcy

4.1 Introduction

In their seminal paper, Modigliani and Miller (1958) show that in perfect capital markets the market value of any firm is independent of its capital structure.¹ The basic idea behind this proposition is that the market value of a firm is determined by capitalizing the expected profit stream of the assets. Changing the way in which these expected profits are distributed between shareholders and debtholders should not alter the value of the firm.

An important line of follow-up papers considers the tax advantage of corporate debt, an issue that Modigliani and Miller (1963) discussed themselves as well. Interest expenses are deductible, so by issuing debt firms can reduce their tax bill and increase their market value. As a consequence of this theory, firms should be leveraged 100%! However, other theories have stressed the fact that increased leverage also means an increased risk of getting into financial distress. This, in turn, implies an increased risk of incurring bankruptcy costs, both direct (e.g., fees for lawyers) as well as indirect (e.g., loss in reputation). Compromising theories explain an optimal capital structure as a trade-off between these tax advantages and bankruptcy costs.²

Subsequently a second important line of follow-up papers developed, which was inspired by the development of agency theory. Agency theory focuses on the possible conflict

¹By capital structure, we mean the proportion of equity and debt.

²For example: Kraus and Litzenberger (1973), Scott (1976) and Kim (1978).

of interest between management and the different claimholders of the firm. Two major approaches can be distinguished. The first concentrates on the *moral hazard* aspect of the agency relation, and its discussion was initiated by the pathbreaking paper of Jensen and Meckling (1976).³ In their paper, they give many examples of how management can take actions which are bad for the claimholders, and of how the claimholders will anticipate this behavior.

The second approach focuses on the *adverse selection* aspect of the agency relation, following a well-known paper by Akerlof (1970). In this paper, Akerlof shows how asymmetric information may prevent a transaction between two agents, even if this transaction is profitable for both agents ('market breakdown'). Signalling can mitigate this adverse selection problem.⁴ The incentive-signalling approach of Ross (1977), upon which the model in this chapter is based, should be placed in this last category of information asymmetry.^{5,6}

Ross considers a world in which managers have private information about the true value of their firm. This gives rise to adverse selection problems. If investors do not get additional information, the value of the firm as inferred by the market will be a weighted average of the values of all the firms. In other words, if they buy a (share of the) firm, they incur the risk of investing in (adversely selecting) a bad one, i.e., one of low value.

A management compensation scheme is designed to give the managers of the firms an incentive to signal to the market the true value of their firm. By increasing the debt level, managers can increase the value of their firm *as perceived* by the market. Because their compensation is proportional to this perceived value, they will have an incentive to raise their debt level to some maximum. However, managers will incur a personal penalty

³Another important paper is Myers (1977), who focuses on the moral hazard aspects of corporate borrowing. More recent contributions in this area explore the possible interactions between financial and product market decisions, e.g., Titman (1984), Brander and Lewis (1986), Maksimovic (1988), and Maksimovic and Titman (1991).

⁴The term 'signalling' and its basic properties were introduced into the economic literature by Spence (1973).

⁵Two other important signalling papers are Bhattacharya (1979) and Leland and Pyle (1977). The former uses cash dividends that are taxed at a higher rate than capital gains as a signal, the latter the unsystematic risk borne by the entrepreneurs who hold a fraction of their own project or firm.

⁶Ross uses the term moral hazard problem, but we think that adverse selection problem better fits this particular setting. Cools (1993) refers to moral hazard in situations where both parties are equally informed at the time of the contract and where only after the contract one of the parties obtains superior information. Adverse selection then refers to situations where the parties are unequally informed prior to the contract being drawn up.

when the firm goes bankrupt. Hence, by increasing the debt level, each manager faces a trade-off between an increased value of the firm and an increased expected penalty. In the equilibrium that Ross was looking for, managers will, as a consequence of this trade-off, distinguish themselves by choosing the debt level in such a way that the debt level increases with the true value of their firm. The adverse selection problem, then, is resolved.

The same result could have been obtained if managers of good firms simply assert a liability of the size of the penalty if the cash flow falls below a certain threshold. According to Ross, however, using debt has the advantage that it is an instrument which is priced in the market. Hence, implicit in the argument is that it is cheaper to monitor if a firm goes bankrupt or not than monitoring an ad hoc assertion of liability.

This chapter makes two contributions. Firstly, we take the line of reasoning of the preceding paragraph one step further. If debt has the advantage that it is a market device, then the next logical step is to allow for a penalty system which is determined by the market as well. Since it is bankruptcy that triggers the penalty to be paid, we use the (market determined) bankruptcy costs as the penalty system. Managers are compensated in proportion to the value of their firm and, therefore, still face a trade-off between a higher value of their firm as perceived by the market in the first period, and a lower expected value of the firm in the second period due to the bankruptcy costs.

Secondly, we formalize Ross's incentive-signalling approach by using game-theoretic concepts that were subsequently developed after his paper. More specifically, we obtain a unique separating equilibrium by using the intuitive criterion of Cho and Kreps (1987). In such an equilibrium, the manager of the bad firm chooses a debt level of zero, and he is recognized by the market as being bad. The manager of the good firm is recognized by the market as being good by choosing a debt level that is sufficiently high to discourage the manager of the bad firm to imitate him. However, we show that this unique equilibrium, which is similar to Ross's unique competitive (separating) equilibrium, can only survive if the bankruptcy costs are sufficiently high. Otherwise, only pooling equilibria exist, in which both the bad and the good manager chose the same debt level, such that the market cannot distinguish between the two managers.

One of the most important aspects of debt is the possibility to take over control from

the incumbent management in case of a default. In Harris and Raviv (1990), managers are reluctant to liquidate the firm under any circumstances and are unwilling to provide detailed information to investors that could result in such an outcome. Continuously monitoring the firm would be very costly for the investors. Therefore, debt is used to discipline management, much in the spirit of the free cash flow theory [Jensen (1986)]. The mere repayment of the debt obligations provides information about the firm's prospects. In case of bankruptcy, investors are willing to pay the bankruptcy costs in order to generate information that is useful for an optimal liquidation decision. Hence, in Harris and Raviv (1990), bankruptcy costs can be seen as the necessary agency costs to relieve problems of moral hazard.

Note that for the signalling mechanism to work in our model, the firm has to be forced into bankruptcy in the case of default. If managers would anticipate an informal reorganization (workout) instead of a formal bankruptcy in some states of the world, the expected bankruptcy costs would change. This, in turn, would change the incentives of raising debt and, hence, the equilibria as well. Therefore, in our model, the bankruptcy costs can be seen as the necessary agency costs to relieve problems of adverse selection.

The remainder of this chapter is structured as follows. Section 4.2 presents the basic model, introducing the players, the actions, and the payoff functions. Moreover, it provides a short, intuitive introduction to signalling games. In Section 4.3 we analyze the Perfect Bayesian Equilibria of the game. We show that multiple equilibria exist, both separating (Section 4.3.1) as well as pooling (Section 4.3.2). In Section 4.4 we introduce a stronger equilibrium concept, the intuitive criterion of Cho and Kreps (1987), to end up with a unique equilibrium.⁷ Section 4.5 concludes, and briefly discusses the connection with the workout literature in bankruptcy.

4.2 The Basic Model

Signalling games belong to the broader subclass of dynamic games of incomplete information. A signalling game involves two players. One of the players has private information,

⁷For an elementary introduction to signalling games, Perfect Bayesian Equilibria, and the intuitive criterion, see Gibbons (1992).

the other is uninformed about this information. The informed player sends a signal and the uninformed player then chooses a response to this signal. A basic feature of a signalling game is that the sender has different types ($t_i \in T$), which reflects the private information of the sender. Typically, a distinction is made between 'good' types and 'bad' types. The key idea is that communication occurs if the good type of the informed player is willing to send a signal that is too expensive for the bad type to imitate.

We consider a two-period model with two types of firms, good firms (G) and bad firms (B).⁸ Their cash flows in period 1 are uniformly distributed on the interval $[0, G]$ and $[0, B]$, respectively, with $B < G$. Investors only have an *a priori* belief about the distribution of these firms, whereas managers know the true value of their firm. As long as investors do not receive additional information, the value of the firm as inferred by the market will be a weighted average of the values of all the firms. This adverse selection problem will be resolved if the managers can be induced to signal to the market the true value of their firm. We will, much in the spirit of Ross, explore how to design a managerial compensation scheme that accomplishes this.

The main idea is as follows. Managers can signal the value of their firm by issuing debt, with face value F . We assume that the capital structure of the firm does not alter its investment opportunities. Managers are compensated in proportion to the value of their firm. If the firm goes bankrupt it will incur bankruptcy costs C and, hence, the compensation of the manager will decrease proportionally. Hence, by issuing debt, all managers face a trade-off between a higher *perceived* value of their firm in the first period ($V_0(F)$), and an increased risk of going bankrupt and a lower *true* value of their firm in the second period ($V_1(F)$). However, because a good firm has a lower risk of going bankrupt, given the face value of the debt, its manager has a stronger incentive to issue debt. In (a separating) equilibrium, each manager issues debt in proportion to the true value of their firm and the market will correctly deduce the type of firm from the signal it receives.⁹

To complete the description of the game, we make the following assumptions:

⁸Abusing terminology, we will refer to the managers of these good and bad firms as good managers and bad managers, respectively.

⁹One should be careful when confronting this result with the Modigliani-Miller irrelevance theorem. In our model, capital structure not only influences the *true* value of the firm because of the expected bankruptcy costs, it also influences the *perceived* value of the firm resulting from the signalling mechanism.

Assumption 1 The managers' incentive compensation schedule is common knowledge.

The incentive schedule (payoff function) for the manager is given by:

$$S = \gamma_0 V_0(F) + \gamma_1 V_1(F), \quad (4.1)$$

where γ_0 and γ_1 are fixed non-negative weights. In other words, the manager receives a fraction γ_0 of the perceived value of the firm in the first period, and a fraction γ_1 of the true value of the firm in the second period. As we will see below, this will result in the previously discussed trade-off of raising debt (F).

Assumption 2 A firm will always be declared bankrupt when it cannot meet its debt obligations.

Hence, we exclude the possibility of an informal reorganization. This allows us to highlight the factors which determine whether the unique equilibrium that survives is pooling or separating. In Section 4.5, we will briefly describe the consequences of allowing for an informal reorganization in some states of the world.

Assumption 3 Managers cannot trade in the financial instruments issued by their own firm.

Relaxing this assumption would change the nature of the incentive schedule as indicated in (4.1). In most countries, managers are prohibited by law from trading in the financial instruments of their own firm, especially around event dates, i.e., at moments when adverse selection problems due to asymmetric information can be severe.

Assumption 4 Financial markets are competitive and perfect (i.e., there are no transaction costs or tax effects). Moreover, all agents are risk-neutral and the interest rate is zero.

These are commonly made assumptions which help us to highlight more clearly the basic intuitions behind the model. The payoff function for the market is as follows:

$$R = -[V_0(F) - V_1(F)]^2. \quad (4.2)$$

In other words, the payoff is highest when the perceived value is equal to the true value.¹⁰

The game is represented graphically in Figure 4-1. It starts with a move of nature (N), which draws one of two possible types of firms: a good firm (G) with probability θ and a bad firm (B) with probability $(1 - \theta)$. The manager then signals the value of his firm by choosing a debt level F , where $F \in [0, G]$.¹¹ Note that, given a debt level F , the true value of a good firm is $\frac{G}{2} - \frac{FC}{G}$, which is simply the expected cash flow minus the expected bankruptcy costs. Mutatis mutandis, the true value of a bad firm is $\frac{B}{2} - \frac{FC}{B}$. The receiver, in our model the market (M), does not know whether the signal was from a good or a bad firm. This is represented by the vertical broken line between two nodes of the same signal, and such a pair of nodes is called an information set.¹² At such an information set, the market has belief p that the firm that sent the signal is good, and $(1 - p)$ that it is bad.¹³

Figure 4-1: Extensive form representation of the signalling game.

The action of the market is to value the firm somewhere between $\frac{G}{2} - \frac{FC}{G}$ and $\frac{B}{2} - \frac{FC}{B}$, using as a weight α , where $\alpha \in [0, 1]$. Hence, α can be interpreted as the unique factor that determines the price the market is prepared to pay for the firm. At the terminal nodes the payoffs of both players are indicated between square brackets, the first for the manager of the firm and the second for the market.¹⁴ These payoffs are based upon equations (4.1) and (4.2), respectively.

¹⁰As we will see at the end of this section, this specification ensures that the market values the firm according to its beliefs, which is in line with the competitive character of the market.

¹¹The undulating line indicates that any debt level within the given boundaries is possible. A debt level greater than G could never function as a credible signal, because even a good firm would never be able to repay this debt completely.

¹²Note that there as many information sets as there are possible values for F .

¹³For further explanation of the beliefs p at the decision nodes for the receiver, we refer to Section 4.3.

¹⁴Note that there are as many terminal nodes as there are possible combinations of (t, F, α) .

The payoff function for the market is constructed such that it represents a perfect and competitive market. This means that investing in a firm must have a zero net present value. In Section 4.3 (Lemma 1) we will see that the optimal action of the market is to value the firm according to its beliefs. If an investor values the firm different from his beliefs, then either he pays too much ($\alpha > p$) or his offer is insufficient ($\alpha < p$), resulting in an opportunity loss because another investor will buy the firm at ($\alpha = p$).¹⁵

4.3 Perfect Bayesian Equilibria

In this section we determine the Perfect Bayesian Equilibria (PBE) of the game.^{16,17} Such an equilibrium satisfies the following conditions.

Signalling Requirement 1 After observing a message F , the receiver must have a belief about which types could have sent F . Formally, we denote the receiver's belief that the sender is of type t_i , given the signal F , by the probability distribution $p(t_i | F)$, where $p(t_i | F) \geq 0$ for each t_i , and $\sum_{t_i} (p(t_i | F)) = 1$.

Signalling Requirement 2r For each F , the receiver's action $\alpha^*(F)$ must maximize his expected payoff, given its beliefs $p(t_i | F)$ about which types could have sent F . That is, $\alpha^*(F)$ solves

$$\max_{\alpha} \sum_{t_i} p(t_i | F) U_r(t_i, F, \alpha), \quad (4.3)$$

where $U_r(\cdot)$ is the receiver's payoff.

Signalling Requirement 2s For each t_i in T , the sender's message $F^*(t_i)$ must maximize the sender's expected payoff, given the receiver's strategy $\alpha^*(F)$. That is, $F^*(t_i)$

¹⁵The fact that the optimal action of the receiver will always be to value the firm according to its belief expresses the underlying competitive process on the capital market. One could, for example, assume a form of Bertrand competition between risk-neutral investors, where profits are driven to zero. If a firm has to finance itself on a non-competitive market (e.g., in a bargaining process with a limited number of banks), then α may depend on other factors than the beliefs, such as the relative bargaining power of the different parties.

¹⁶Much of the formal notation in this and the following section is drawn from Gibbons (1992).

¹⁷Note that, because we have a signalling game with discrete types, every PBE is also a sequential equilibrium [see Corollary 5.8, Perea y Monsuwe *et al.* (1997)].

solves

$$\max_F U_s(t_i, F, \alpha^*(F)), \quad (4.4)$$

where $U_s(\cdot)$ is the sender's payoff.

Finally, let T_j denote the set of types that, in equilibrium, send the message F_j , i.e., t_i is a member of the set T_j if $F^*(t_i) = F_j$.

Signalling Requirement 3 For each F_j , if there exists a t_i in T such that $F^*(t_i) = F_j$, then the receiver's belief at the information set corresponding to F_j must follow from Bayes' rule and the sender's strategy:

$$p(t_i | F_j) = \frac{p(t_i)}{\sum_{t_i \in T_j} p(t_i)}. \quad (4.5)$$

where $p(t_i)$ is the unconditional belief of the receiver that the sender is of type t_i .

Definition A Perfect Bayesian Equilibrium in a signalling game is a pair of strategies and beliefs satisfying Signalling Requirements 1, 2r, 2s and 3.

We can now turn to Lemma 1 as discussed at the end of Section 4.2.

Lemma 1 *The optimal action of the receiver will always be to value the firm according to its beliefs, i.e., $\alpha = p$.*

Proof The expected payoff for the receiver who received signal F , given beliefs p , is:¹⁸

$$\begin{aligned} E[U_r] &= p[-(\alpha(\frac{G}{2} - \frac{FC}{G}) + (1 - \alpha)(\frac{B}{2} - \frac{FC}{B}) - (\frac{G}{2} - \frac{FC}{G}))^2] \\ &\quad + (1 - p)[-(\alpha(\frac{G}{2} - \frac{FC}{G}) + (1 - \alpha)(\frac{B}{2} - \frac{FC}{B}) - (\frac{B}{2} - \frac{FC}{B}))^2], \\ &= -p \left[\alpha \left((\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right) - \left((\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right) \right]^2 \\ &\quad - (1 - p) \left[\alpha \left((\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right) \right]^2, \\ &= -p \left[\left((\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right)^2 - 2\alpha \left((\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right)^2 \right] \\ &\quad - \alpha^2 \left[(\frac{G}{2} - \frac{FC}{G}) - (\frac{B}{2} - \frac{FC}{B}) \right]^2. \end{aligned}$$

¹⁸Note that the beliefs depend on the signal F . However, for ease of notation, we will write p instead of $p(F)$ throughout the paper.

Using the first-order condition with respect to α , we have

$$2p \left[\left(\frac{G}{2} - \frac{FC}{G} \right) - \left(\frac{B}{2} - \frac{FC}{B} \right) \right]^2 - 2\alpha \left[\left(\frac{G}{2} - \frac{FC}{G} \right) - \left(\frac{B}{2} - \frac{FC}{B} \right) \right]^2 = 0,$$

which is obviously satisfied for:

$$\alpha = p. \tag{4.6}$$

■

This completes the proof that it is always optimal for the receiver (the market) to value the firm according to its beliefs, expressing the underlying competitive process on the capital market. Hence, setting $\alpha = p$ satisfies Signalling Requirement 2r. For the remainder of the chapter the reader should bear in mind that equation (4.6) always holds in equilibrium.

In the game described in Figure 4-1, we have two types and, hence, we can distinguish between two possible equilibria:

- Separating equilibrium (Section 4.3.1),
- Pooling equilibrium (Section 4.3.2).

4.3.1 Separating Equilibrium

In a separating equilibrium, both types signal the value of their firm by issuing a different amount of debt. We denote the equilibrium debt levels for good and bad firms by F_G^* and F_B^* , respectively. According to Signalling Requirement 3, the receiver must have a belief, consistent with Bayes' rule, about the type that sent the message. Hence, if such an equilibrium exists, then the market believes that a firm is of type G after receiving a signal F_G^* (*i.e.*, $p = 1$) and believes that a firm is of type B after receiving a signal F_B^* (*i.e.*, $p = 0$). For other signals F , the belief p can be freely chosen.

Before we describe the sustainable separating equilibria in Lemma 2, we note that these equilibria can only hold with $F_B^* = 0$, because otherwise the manager of a bad firm will always have an incentive to deviate. The proof goes by contradiction. If a bad manager signals his equilibrium value $F_B^* > 0$, the market will value him as a bad firm. If he deviates

to signalling $F_B^* = 0$, then the worst thing that can happen is that his firm is still valued as a bad firm, but at least he would not incur the expected value of the bankruptcy costs.

Lemma 2 *Given an appropriate set of beliefs, there exist multiple separating Perfect Bayesian Equilibria of the form $(F_G^*, 0)$, $(\alpha = p)$. The bold line in Figure 4-2 shows that all possible equilibrium values for F_G^* are located on the interval $[F_{G,\min}^*, F_{G,\max}^*]$. These values are calculated in the indicated equation numbers. A last condition for such an equilibrium to hold is $F_G^* \leq G$.*

Figure 4-2: Possible values for F_G^* in a separating PBE.

Proof *See the Appendix.*

The intuition for Lemma 2 is as follows. A bad manager will not have the incentive to imitate a good manager if the latter chooses a signal $F_G^* \geq F_{G,\min}^*$, because the increase in expected bankruptcy costs in the second period would be greater than or equal to the increase in his compensation in the first period due to the higher valuation of the firm by the market. The good manager will not have the incentive to imitate the bad manager if F_G^* does not exceed $F_{G,\max}^*$, because the gain from issuing less debt and, hence, incurring less expected bankruptcy costs would be lower than or equal to the decrease in salary due the lower valuation of the firm by the market. Moreover, deviations off the equilibrium path will not be profitable for both managers if we impose $p = 0$ in those cases.

This is the equilibrium that Ross (1977) implicitly focussed on. The manager of the good firm can afford to signal F_G^* to the market to distinguish himself as being good. The manager of the bad firm does not have an incentive to give a false signal, because the expected value of the penalty he incurs is too high.

We will now characterize the set of pooling equilibria of the game, an issue that Ross was not able to take up due to lack of formalization of his model.

4.3.2 Pooling Equilibrium

In a pooling equilibrium, both types signal the value of their firm with the same debt level (F^*). The belief of the market that the firm is good, consistent with Bayes' rule, after this signal F^* is θ . Following our discussion in Section 4.2, this implies that a firm signalling F^* will be valued at $\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})$. Whether such an equilibrium can sustain or not critically depends on the belief p of the receiver if a manager deviates. Because a deviation will always be off the equilibrium path, this belief can be freely chosen.

Lemma 3 *Given an appropriate set of beliefs, there exist multiple pooling Perfect Bayesian Equilibria of the form $(F^*, F^*), (\alpha = p)$. The bold line in Figure 4-3 shows that all possible values for F^* are located on the interval $[0, F_{\max}^*]$. The value for $F_{\max}^*$ is calculated in the indicated equation number. A last condition for such an equilibrium to hold is $F^* \leq G$.*

Figure 4-3: Possible values for F^* in a pooling PBE.

Proof *See the Appendix.*

The intuition for Lemma 3 is straightforward. If $F^* \leq F_{\max}^*$, neither manager will have the incentive to deviate with $F < F^*$ by imposing $p = 0$, because the loss in period 1 due to a lower valuation of the firm would be greater than or equal to the decrease in expected bankruptcy costs in period 2. In contrast, if $F^* > F_{\max}^*$, the manager of the bad firm would have the incentive to deviate to $F = 0$, even if the market will value him as bad ($p = 0$). Finally, by imposing $p = 0$, neither manager will have the incentive to deviate to $F > F^*$, because this would result both in a lower valuation of the firm in period 1, and higher expected bankruptcy costs in period 2.

4.4 The Intuitive Criterion

In Section 4.3 we have seen that the concept of a Perfect Bayesian Equilibrium is not strong enough to end up with a unique equilibrium. Given an appropriate set of beliefs,

there are many separating and pooling equilibria that survive. In order to exclude the unreasonable equilibria, game theorists have come up with stronger equilibrium concepts, putting stronger restrictions on the strategies and the beliefs of the players.¹⁹

In this section we apply the ‘intuitive criterion’ of Cho and Kreps (1987) to our game. This leads to a unique equilibrium, with one restriction on the size of the bankruptcy costs. Before we can turn to the definition of a PBE that survives this intuitive criterion, we have to define the notion of a message which is equilibrium-dominated.

Definition Given a PBE in a signalling game, the message F is equilibrium-dominated for type $t_i \in T$ if t_i ’s equilibrium payoff, denoted $U_s^*(t_i)$, is higher than t_i ’s highest possible payoff from F . Formally: $U_s^*(t_i) > \max \alpha U_s(t_i, F, \alpha)$.

Definition A Perfect Bayesian Equilibrium survives the intuitive criterion if the following condition is satisfied: If the information set following F_j is off the equilibrium path and F_j is equilibrium-dominated for type t_i , then the belief $p(t_i | F_j)$ should be zero, provided that this is possible, which is the case if F_j is not equilibrium-dominated for all types in T .

If F_j is equilibrium-dominated for all types in T , then the beliefs can again be freely chosen, for setting them all to zero would violate Signalling Requirement 1. Hence, the equilibria that survive the intuitive criterion form a subset of the Perfect Bayesian Equilibria. The following lemma shows how this intuitive criterion works out for our game.

Lemma 4 *Imposing the intuitive criterion on the PBE,*

1. *if $C > C^*$, there are no pooling equilibria that survive. If $C \leq C^*$, there are multiple pooling equilibria that survive.*
2. *if $C \geq C^*$, of all the separating equilibria, only $F_{G,\min}^*$ survives. If $C < C^*$, there are no separating equilibria that survive.*

Here,

$$C^* = \frac{\gamma_0(\frac{G}{2} - \frac{B}{2})}{\gamma_0 + \gamma_1 \frac{G}{B}}. \quad (4.7)$$

¹⁹For a short and intuitive introduction on this development in game theory, applied to finance, see Thakor (1991).

Proof See the Appendix.

The intuition for Lemma 4 is as follows. We start with the pooling equilibria (Lemma 4-1). Given a pooling equilibrium with F^* , we can always find an $\tilde{F} > F^*$ which is equilibrium-dominated for the manager of the bad firm and not for the manager of the good firm. The reason for this is that the expected bankruptcy costs for the bad firm increase faster than for the good firm. Hence, after a deviation to $\tilde{F}$ (or more precisely, to $\tilde{F} + \varepsilon$, where ε is arbitrarily small), the intuitive criterion imposes belief $p = 1$. It turns out that, if $C > C^*$, this deviation is both feasible, i.e., smaller than or equal to G , and profitable for the manager of the good firm. A pooling equilibrium can therefore not survive the intuitive criterion. However, if $C \leq C^*$, the deviation $\tilde{F}$ is not feasible for some pooling equilibria (typically for the highest F^*), and multiple pooling equilibria survive.

For the separating equilibrium (Lemma 4-2) note that, by definition, all values of $F > F_{G,\min}^*$ are equilibrium-dominated for the bad firm (see the first paragraph following Lemma 2). Therefore, a separating equilibrium with $F_G^* > F_{G,\min}^*$ can never survive, because the manager of the good firm could always deviate to $F_{G,\min}^*$ (or more precisely $F_{G,\min}^* + \varepsilon$), holding constant his period 1 value as perceived by the market and lowering his expected bankruptcy costs in period 2. We have $F_{G,\min}^* \leq G$ if and only if $C \geq C^*$.

Hence, applying the intuitive criterion to our game leaves us with a unique separating equilibrium, a result that was already indicated by Thakor (1991). However, Thakor did not formally specify the whole game, because the only purpose of his paper was to demonstrate the different equilibrium concepts that have been developed in game theory. By formalizing the game we were able to derive the exact conditions under which this equilibrium holds. More specifically, our analysis shows that this result critically depends on the value of the bankruptcy costs, i.e., C should be strictly greater than C^* .

This condition on the bankruptcy costs is perfectly intuitive. As we mentioned in the beginning of Section 4.2, a key idea of signalling games is that communication can occur if one type of the informed player is willing to send a signal that would be too expensive for another type to send. In our model a signal is expensive because of expected bankruptcy costs. These bankruptcy costs should therefore be sufficiently high to make a separating equilibrium, and thus communication, feasible.

4.5 Concluding Remarks

In this chapter we have developed and analyzed a signalling game in which managers can signal the value of their firm, which is private information to them, by choosing the debt level of the firm. If managers are compensated in proportion to the value of their firm, and if there are positive bankruptcy costs, then managers of good firms will have an incentive to signal the higher value of their firm by choosing a higher debt level than the managers of a bad firm. The reason is that managers of good firms have a lower risk of going bankrupt and incurring part of the bankruptcy costs.

We have explored the Perfect Bayesian Equilibria of the game which satisfy the intuitive criterion of Cho and Kreps (1987). This concept leads us to the economically intuitive prediction that managers of good firms can only distinguish themselves from bad firms by means of their debt level as long as it is too expensive for the bad firms, in terms of expected bankruptcy costs, to imitate the good ones.

It is important to note that we assume that management anticipates a formal bankruptcy in case of a default. Haugen and Senbet (1978, 1988) claim that bankruptcy costs are irrelevant to the optimal capital structure and the liquidation decision, because any inefficiency due to unnecessary bankruptcy costs would be arbitrated away in an efficient capital market. In other words, given the *a priori* beliefs about the distribution of good and bad firms that enter into a default, creditors can calculate the expected value of their claims both under an informal reorganization (workout) and under a bankruptcy. If the former value is higher, a firm will not be declared bankrupt.

However, allowing for the possibility of an informal reorganization implies, *ceteris paribus*, that the expected bankruptcy costs decrease. Our model then indicates that this may influence the signalling equilibrium. But this, in turn, would influence the *a priori* beliefs about the distribution of firms that enter into default. And this, in turn, may have an impact on the probability of a successful workout. Future research can address the interesting relation between our model and this workout literature.²⁰

²⁰For this workout literature see, for example, Giammarino (1989), Gertner and Scharfstein (1991), and Franks and Torous (1994).

Appendix

Proof of Lemma 2

To show the existence of this set of equilibria, we need to check whether Signalling Requirements 2r and 2s are satisfied. Since Lemma 1 shows that Signalling Requirement 2r is satisfied, we continue with Signalling Requirement 2s. We have to check that neither type can improve by giving a different signal. When we calculate the payoff of a type from deviating, we have to make a distinction between a deviation to the equilibrium signal of the other type and a deviation to a signal that would never occur in equilibrium. In the former case the beliefs p are determined as follows: $p = 1$ if a bad type deviates to $F = F_G^*$, and $p = 0$ if a good type deviates to $F = F_B^* = 0$. In the latter case, Signalling Requirement 3 imposes no further restrictions on the beliefs.

We start by checking possible deviations for the bad firm. If the bad firm signals its equilibrium value $F_B^* = 0$, the market has belief $p = 0$, and the expected payoff of the bad firm is: $\gamma_0 \frac{B}{2} + \gamma_1 \frac{B}{2}$. If it deviates to $F = F_G^*$, the market will have belief $p = 1$, and the expected payoff for the bad firm will be: $\gamma_0(\frac{G}{2} - \frac{F_G^* C}{G}) + \gamma_1(\frac{B}{2} - \frac{F_G^* C}{B})$. Therefore, a bad firm will not deviate to $F = F_G^*$ if: $\gamma_0(\frac{G}{2} - \frac{F_G^* C}{G}) + \gamma_1(\frac{B}{2} - \frac{F_G^* C}{B}) \leq \gamma_0 \frac{B}{2} + \gamma_1 \frac{B}{2}$, or if:

$$\gamma_0(\frac{G}{2} - \frac{F_G^* C}{G} - \frac{B}{2}) \leq \gamma_1 \frac{F_G^* C}{B}. \quad (4.A.1)$$

If the bad firm deviates to $F \neq F_G^*$, the market can have any belief p , and the expected payoff for the bad firm will be: $\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B})) + \gamma_1(\frac{B}{2} - \frac{FC}{B})$. Therefore, the bad firm will not deviate to $F \neq F_G^*$ if: $\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B})) + \gamma_1(\frac{B}{2} - \frac{FC}{B}) \leq \gamma_0 \frac{B}{2} + \gamma_1 \frac{B}{2}$, or if:

$$\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B}) - \frac{B}{2}) \leq \gamma_1 \frac{FC}{B}. \quad (4.A.2)$$

Both inequality (4.A.1) and (4.A.2) have to be satisfied. Note that (4.A.2) can always be satisfied by imposing $p = 0$. However, (4.A.1) will not be satisfied for very low values of F_G^* , because the left-hand side (*LHS*) is decreasing in F_G^* , and the right-hand side (*RHS*) increasing. We can therefore calculate the lower bound $F_{G,\min}^*$ on F_G^* by equalizing the

LHS and *RHS* of (4.A.1), and rearranging. Hence, $\gamma_0(\frac{G}{2} - \frac{F_G^*C}{G} - \frac{B}{2}) = \gamma_1 \frac{F_G^*C}{B}$, or:

$$F_{G,\min}^* = \frac{\gamma_0(\frac{G}{2} - \frac{B}{2})}{\gamma_0 \frac{C}{G} + \gamma_1 \frac{C}{B}}. \quad (4.A.3)$$

Now consider the good firm. The good firm will not deviate to $F = F_B^* = 0$ if: $\gamma_0 \frac{B}{2} + \gamma_1 \frac{G}{2} \leq \gamma_0(\frac{G}{2} - \frac{F_G^*C}{G}) + \gamma_1(\frac{G}{2} - \frac{F_G^*C}{G})$, or if:

$$\gamma_0(\frac{G}{2} - \frac{F_G^*C}{G} - \frac{B}{2}) \geq \gamma_1 \frac{F_G^*C}{G}. \quad (4.A.4)$$

The good firm will not deviate to $F \neq F_B^* = 0$ if: $\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B})) + \gamma_1(\frac{G}{2} - \frac{FC}{G}) \leq \gamma_0(\frac{G}{2} - \frac{F_G^*C}{G}) + \gamma_1(\frac{G}{2} - \frac{F_G^*C}{G})$, or if:

$$\gamma_0(\frac{G}{2} - \frac{F_G^*C}{G} - (p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B}))) \geq \gamma_1 \frac{(F_G^* - F)C}{G}. \quad (4.A.5)$$

Again, both inequality (4.A.4) and (4.A.5) have to be satisfied. From (4.A.4) we see that this will not hold for sufficiently high values of F_G^* , because the *LHS* is decreasing in F_G^* , and the *RHS* increasing. Therefore, we can calculate an upper bound $F_{G,\max}^*$ on F_G^* by equalizing the *LHS* and *RHS* of (4.A.4), and rearranging. Hence, $\gamma_0(\frac{G}{2} - \frac{F_G^*C}{G} - \frac{B}{2}) = \gamma_1 \frac{F_G^*C}{G}$, or:

$$F_{G,\max}^* = \frac{\gamma_0(\frac{G}{2} - \frac{B}{2})}{\gamma_0 \frac{C}{G} + \gamma_1 \frac{C}{G}}. \quad (4.A.6)$$

Moreover, if (4.A.4) is satisfied, (4.A.5) can also be satisfied by imposing $p = 0$. Note that, for deviations off the equilibrium path, we use the same belief $p = 0$ for both the bad and the good firms.

Finally, as mentioned in Footnote 11, any equilibrium debt level has to be smaller than or equal to G .

Proof of Lemma 3

In Lemma 1 we have already seen that $\alpha = p$ is always optimal for the receiver. This leaves us to prove that neither type of the sender can profitably deviate. The calculations are more or less similar to those of the proof of Lemma 2.

A manager of a bad firm will not deviate if: $\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1-p)(\frac{B}{2} - \frac{FC}{B})) + \gamma_1(\frac{B}{2} -$

$\frac{FC}{B}) \leq \gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) + \gamma_1(\frac{B}{2} - \frac{F^*C}{B})$, or if:

$$\gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) - p(\frac{G}{2} - \frac{FC}{G}) - (1 - p)(\frac{B}{2} - \frac{FC}{B}) \geq \gamma_1 \frac{(F^* - F)C}{B}. \quad (4.A.7)$$

Note that (4.A.7) will not be satisfied for sufficiently high values of F^* , because the *LHS* is decreasing in F^* , while the *RHS* is increasing in F^* . An upper bound on F^* can be calculated by equalizing the *LHS* and *RHS* of (4.A.7) for $p = 0$ and $F = 0$, and rearranging. If F^* is greater than this, the manager of the bad firm will always deviate to $F = 0$, even for belief $p = 0$. Moreover, if (4.A.7) is satisfied for $F = 0$, it will *a fortiori* be satisfied for $F > 0$, again by imposing $p = 0$. Hence, $\gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B}) - \frac{B}{2}) = \gamma_1 \frac{F^*C}{B}$, or:

$$F_{\max}^* = \frac{\gamma_0 \theta (\frac{G}{2} - \frac{B}{2})}{\gamma_0 (\theta \frac{C}{G} + (1 - \theta) \frac{C}{B}) + \gamma_1 \frac{C}{B}}. \quad (4.A.8)$$

A manager of a good firm will not deviate if: $\gamma_0(p(\frac{G}{2} - \frac{FC}{G}) + (1 - p)(\frac{B}{2} - \frac{FC}{B})) + \gamma_1(\frac{G}{2} - \frac{FC}{G}) \leq \gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) + \gamma_1(\frac{G}{2} - \frac{F^*C}{G})$, or if:

$$\gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) - p(\frac{G}{2} - \frac{FC}{G}) - (1 - p)(\frac{B}{2} - \frac{FC}{B}) \geq \gamma_1 \frac{(F^* - F)C}{G}. \quad (4.A.9)$$

For all deviations $F < F^*$, (4.A.9) is always satisfied if (4.A.7) is satisfied. Moreover, for deviations $F > F^*$, (4.A.9) can always be satisfied by imposing $p = 0$.

Again note that, for deviations off the equilibrium path, we use the same belief $p = 0$ for both the bad and the good firms.

Finally, as mentioned in Footnote 11, any equilibrium debt level has to be smaller than or equal to G .

Proof of Lemma 4

We start by proving that no pooling equilibrium can survive the intuitive criterion if C is sufficiently high. Given a pooling equilibrium with F^* , we can always find an $F > F^*$ which is equilibrium-dominated for the manager of the bad firm and not for the manager of the good firm, as follows. In any pooling equilibrium, the equilibrium payoff for the manager of the bad firm is: $\gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) + \gamma_1(\frac{B}{2} - \frac{F^*C}{B})$. If he deviates to F , the best that can happen to him is that the receiver has a belief that he is a

good type ($p = 1$), which would result in an expected payoff of: $\gamma_0(\frac{G}{2} - \frac{FC}{G}) + \gamma_1(\frac{B}{2} - \frac{FC}{B})$. A deviation F for the manager of the bad firm is, therefore, equilibrium-dominated if: $\gamma_0(\frac{G}{2} - \frac{FC}{G}) + \gamma_1(\frac{B}{2} - \frac{FC}{B}) < \gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B})) + \gamma_1(\frac{B}{2} - \frac{F^*C}{B})$, or if:

$$\gamma_0(\theta(\frac{G}{2} - \frac{F^*C}{G}) + (1 - \theta)(\frac{B}{2} - \frac{F^*C}{B}) - (\frac{G}{2} - \frac{FC}{G})) > \gamma_1 \frac{(F^* - F)C}{B}. \quad (4.A.10)$$

If $\tilde{F}$ is the value of F for which the two sides of (4.A.10) are equal, the signal $\tilde{F} + \varepsilon$ is equilibrium-dominated for the bad manager. Using the intuitive criterion, this implies that the market must have belief $p = 1$ after signal $\tilde{F} + \varepsilon$. The reader will notice that (4.A.10), apart from the inequality sign, is the same as (4.A.7) with $p = 1$. Comparing (4.A.7) and (4.A.9), we know that after signal $\tilde{F} + \varepsilon$, (4.A.9) will not be satisfied for $p = 1$, because $B < G$. This implies that the pooling equilibria cannot survive the intuitive criterion, because the manager of the good firm can always gain from deviating to $\tilde{F} + \varepsilon$.

By rearranging (4.A.10) with equality, we obtain:

$$\tilde{F} = \frac{F^* (\gamma_0(\theta \frac{G}{G} + (1 - \theta) \frac{G}{B}) + \gamma_1 \frac{G}{B}) + \gamma_0(1 - \theta)(\frac{G}{2} - \frac{B}{2})}{\gamma_0 \frac{G}{G} + \gamma_1 \frac{G}{B}}, \quad (4.A.11)$$

which typically depends on F^* .

We should verify, however, whether an F slightly larger than $\tilde{F}$ is feasible, i.e., if $\tilde{F} < G$. We will check this for the highest possible value of F^* , $F_{\max}^*$, because from the positive relation between $\tilde{F}$ and F^* in (4.A.11) it is clear that if $\tilde{F} < G$ for $F_{\max}^*$, it will hold for all feasible F^* .

Define $\tilde{F}_{\max}$ as the $\tilde{F}$ which results from (4.A.11) with $F^* = F_{\max}^*$. Substituting (4.A.8) into (4.A.11), and rearranging, we have:

$$\tilde{F}_{\max} = \frac{\gamma_0(\frac{G}{2} - \frac{B}{2})}{\gamma_0 \frac{G}{G} + \gamma_1 \frac{G}{B}}. \quad (4.A.12)$$

From (4.A.12) we can calculate a C^* such that if $C > C^*$, $\tilde{F}_{\max} < G$. This gives:

$$C^* = \frac{\gamma_0(\frac{G}{2} - \frac{B}{2})}{\gamma_0 + \gamma_1 \frac{G}{B}}, \quad (4.A.13)$$

which is equal to equation (4.7) in the text.

Hence, if $C > C^*$, there are no pooling equilibria that can survive the intuitive criterion. It is straightforward to check that if $C \leq C^*$, there will be a continuum of pooling equilibria that will survive the intuitive criterion, from some value for F^* up to $F_{\max}^*$.

It remains to prove that if $C \geq C^*$, the unique value for F_G^* in a separating equilibrium is $F_{G,\min}^*$. Note that $F_{G,\min}^*$ is the minimum value for F_G^* to prevent the manager of the bad firm from imitating the good one, which was already shown in the derivation of (4.A.1). This means that all $F > F_{G,\min}^*$ are equilibrium-dominated for the manager of the bad firm. But that directly implies that any separating equilibrium with $F_G^* > F_{G,\min}^*$ will never survive, because the manager of the good firm could always deviate to $F_{G,\min}^*$ (or more precisely $F_{G,\min}^* + \varepsilon$), holding constant his period 1 value as perceived by the market and lowering his expected bankruptcy costs in period 2.

Although we now know that $F_{G,\min}^*$ is the only value for F_G^* that can survive the intuitive criterion, we still have to check when this value is feasible, i.e., smaller than or equal to G . Since $F_{G,\min}^*$ is equal to $\tilde{F}_{\max}$, we know that a separating equilibrium can only survive if C is greater than or equal to C^* . Otherwise, no separating equilibrium can survive.

Chapter 5

The Option to Fire A Manager

5.1 Introduction

Most developed countries nowadays have a corporate system in which the employees enjoy some form of employment protection, i.e., they cannot be fired without a good reason. This employment protection is a comforting instrument from the point of view of the employees, but it also is an efficient mechanism from the point of view of the firm. If there was no employment protection, employees would probably demand a higher salary, in order to compensate them for the potential firing costs they incur when they are fired. These firing costs can be thought of as a non-recurrent expense to find a new job or to move to another place.

However, if the increase in the value of the firm due to firing an incumbent employee and hiring a new one offsets the compensation for the firing costs, the firm might prefer a system with less or no employment protection. This is what we observe in practice for managers at the top of the hierarchy, because their capability largely influences firm value. In this chapter we will therefore focus on the fact that firms may need different types of managers at different times. Even if the incumbent manager does the best he can, the shareholder may still want to have the possibility to fire him, because at some moment in time another manager, with other characteristics, might simply be better suited for the firm. The shareholder takes account of this by means of a contract which allows him to

fire the incumbent manager at any moment in time.¹

We consider a simple setting in which a shareholder has to hire a manager in order for his firm to generate a profit. For simplicity we assume that the value of the firm entirely depends on the 'profit capacity' of the incumbent manager. The option to fire the incumbent manager is valuable for the shareholder, because it allows him to hire an alternative manager who has a higher profit capacity than the incumbent. The cost of this option is caused by the fact that the manager will incur personal firing costs if he is fired, and needs to be compensated for them. It is important to note that the compensation for these firing costs is an irreversible cost for the shareholder. In other words, once the shareholder has fired the incumbent manager, he can never reverse this decision and recover the compensation for the firing costs. We assume that the firing costs are stochastic. The stochastic character of the firing costs is a natural assumption since, at the moment when the contract is written, the manager's job market position when he is fired is uncertain.

Casual observation from practice shows that the compensation for the expected firing costs can take two extreme forms. In the first system, which we define as *ex-ante* compensation, the manager receives a compensation in each period that he is still employed, e.g., by means of a higher salary. In the second system, which we define as *ex-post* compensation, the manager receives a severance payment at the moment he is fired.

In this chapter we show that, with the system of *ex-ante* compensation, the shareholder has a commitment problem, as follows. If the compensation takes place by means of a higher salary, the shareholder has the incentive to fire the incumbent manager relatively often, resulting in high expected firing costs. Since the manager will anticipate this, he will require a large compensation. The shareholder would like to promise the manager to fire him in fewer cases, i.e., to fire him only for a higher value of the profit capacity of the alternative manager. In that case, the positive effect of the lower expected firing costs would more than outweigh the negative effect of the limited possibilities to fire the manager.

¹Most of the literature on the relationship between shareholders and managers (or, more generally, the principal-agent literature) is concerned with the motivational aspects of the contract. See, for example, Ross (1973), Holmstrom (1979), Grossman and Hart (1983), and Holmstrom and Milgrom (1987). For empirical evidence on incentive contracts, see, for example, Jensen and Murphy (1990) and Garen (1994).

However, the shareholder has no credible means to commit himself, because once the (lower) compensation has been settled in a contract, he would still have the incentive to fire the manager for a lower value of the profit capacity of the alternative manager than promised. Specifying the value of the profit capacity of the alternative manager for which the incumbent manager can be fired will not solve the problem, because this profit capacity is an unverifiable variable. That is, any conflict about the actual value of the profit capacity of the alternative manager cannot be solved in a court of law. For example, the court may lack the information or the skills to properly estimate this value.

An important result of this chapter is that the system of ex-post compensation partly solves this commitment problem. The intuition is as follows. If the compensation takes place by means of a severance payment at the moment that the manager is fired, the cost of firing the manager becomes larger. This will have the effect that the shareholder fires the manager in fewer cases, i.e., alternative managers have to be better before the incumbent manager is fired. Hence, the severance payment serves as a credible commitment device for the shareholder to fire the manager in fewer cases, thereby diminishing the commitment problem. This provides a rationale for the severance payment, which is often surrounded by a large amount of negative publicity.

Although the system of ex-post compensation outperforms the system of ex-ante compensation, it turns out that it still does not result in the first best solution. In the first best solution, the shareholder has no commitment problem, i.e., the profit capacity of the alternative manager is a verifiable variable which can be specified in a contract. However, we will show that by using a combination of both ex-post and ex-ante compensation, the shareholder can always design a contract that imitates the first best solution.²

Both the type of business in which the firm operates and the labor market conditions will determine whether there exists a positive or negative correlation between the profit capacity of alternative managers on the market and the firing costs of the incumbent manager. Positive correlation is likely if, for example, a large difference in the profit

²A possible extension of our model could be to take notice of the fact that when the shareholder fires the incumbent manager and hires a new one, he not only receives the profit capacity of this new manager, but also the option to fire him and hire a new one. Modeling this repetitive character of the option to fire a manager would increase the option value, but would not qualitatively change our results.

capacity of the alternative and the incumbent manager is caused by the fact that the skills of the latter have become unsuited for most jobs. In that case he may incur high search costs, or he may need some costly retraining. A negative correlation is expected if, for example, a large difference in the profit capacity of the alternative and the incumbent manager occurs at moments of a highly dynamic labor market in which many firms are looking for a change in management style. In that case, the fired manager will encounter relatively few problems in finding a new job.

An important result with respect to this correlation is that the expected firing costs are positively related to the correlation. The intuition for this is as follows. Firing takes place as soon as the profit capacity of the alternative manager reaches some (relatively high) value. If there is a positive correlation between the profit capacity of the alternative manager and the firing costs of the incumbent manager, then this firing will take place, on average, for high realizations of these firing costs. A concomitant result is that the option value for the shareholder will decrease for increasing correlation, a result which holds for the first best solution as well as for the systems of ex-ante and ex-post compensation.

A related branch of literature starts with the seminal work of Oi (1962), who shows that labor is a quasi-fixed factor of production. Follow-up papers almost invariably take up the question of how hiring and firing costs affect the firms' optimal employment policies, and look at the consequences for long-run employment [e.g., Bentolila and Bertola (1990), Bertola (1990), and Peeters (1997)]. However, in contrast to our model, the firing (and hiring) costs are non-stochastic in these papers, and alternative mechanisms to compensate for the expected firing costs are not considered. Two other papers that have explicitly modeled the option to fire a manager are Acharya (1992), and Cremer (1995). In both papers, the threat of firing forms an integral part of the package of incentives. Our model abstracts from incentive considerations. The resulting relatively simple structure allows us to focus on the relation between the nature of the firing costs of the manager and the optimal way in which the shareholder should compensate the manager for his expected firing costs.

The remainder of this chapter is as follows. Section 5.2 presents the basic model. In Section 5.3 we derive some general results that will hold throughout the chapter. The first

best solution is derived in Section 5.4. In Sections 5.5 and 5.6 we develop the systems of ex-ante and ex-post compensation, respectively. Section 5.7 then compares the two systems, and Section 5.8 shows that the first best solution can be obtained by a combination of the two. Finally, Section 5.9 concludes.

5.2 The Basic Model

A shareholder needs a manager to run his firm. For simplicity, we assume that the value of the firm only depends on the capabilities of the incumbent manager.³ We model this idea by letting the value of the firm be equal to the profit capacity (capability) of the incumbent manager. Without loss of generality, we assume that both the shareholder and the manager are risk neutral.

There is a labor market where the profit capacity of an alternative manager for the firm, V , evolves stochastically over time. We assume that V follows a geometric Brownian motion, with drift parameter μ_v and variance parameter σ_v^2 :

$$dV = \mu_v V dt + \sigma_v V dz_v, \quad (5.1)$$

where dz_v is the increment of a Wiener process. The profit capacity of the incumbent manager could of course be subject to changes as well, but since we are only interested in the difference between the profit capacity of alternative managers and the incumbent manager, we assume for simplicity that the profit capacity of the latter remains constant at V_0 .

When the shareholder hires a manager for his firm (with profit capacity V_0), they have to agree upon a contract. The contract between the shareholder and the manager stipulates that the latter can be fired at any moment in time. Hence, the shareholder (or the firm) has the *option* to fire the manager. The value of this option is denoted by $F(V)$. We assume that if a manager is fired, he will be able to obtain his reservation wage, which is set equal to zero for simplicity, somewhere else. Moreover, the new manager will also

³The option value $F(V)$ as discussed below in this section is not included in this value of the firm.

receive his reservation wage of zero.⁴ However, if a manager is fired, he incurs personal firing costs C . Since it is the manager who bears these personal firing costs, he needs to be compensated for them.

This compensation can take two extreme forms. The first possibility is that the manager receives a compensation in each period that he is still employed (ex-ante compensation). The second possibility is that the manager receives a severance payment P at the moment he is fired (ex-post compensation). In both cases the manager will only agree to participate if the expected value of the promised payments equals or exceeds the expected firing costs.

The firing costs C also follow a geometric Brownian motion, with drift parameter μ_c and variance parameter σ_c^2 :

$$dC = \mu_c C dt + \sigma_c C dz_c. \quad (5.2)$$

The processes of both V and C are common knowledge. However, the realizations of both variables are non-verifiable. This implies that no feasible contract can be written which is based on either of the two variables. The correlation between dz_v and dz_c is denoted by ρ .

The cost of exercising the option, i.e., the exercise price, is denoted by I . It is important to distinguish this cost of exercising the option from the compensation that the manager receives from the shareholder for his expected firing costs. As stated above, the manager somehow has to be compensated for his expected firing costs, but this compensation does not necessarily come at the moment of firing. In fact, it turns out that the optimal exercise pattern of the option and, hence, its value, crucially depends on the way the manager is compensated for his firing costs.

5.3 Preliminary Results

This section provides a short introduction to real option theory, and derives some general formulas that will be used later in the chapter.

⁴One way to justify the fact that new managers (with $V > V_0$) also receive the zero reservation wage is that the firm has all the bargaining power after the ‘match’ between the firm and the new manager [see, e.g., Diamond (1982)].

5.3.1 Option Value, Critical Value, and Expected Time of Firing

The firing option can be seen as a non-dividend paying asset. Therefore, as long as it is not exercised, its total expected return over a short interval of time equals its expected capital appreciation. This gives us the following Bellman equation:

$$\lambda F(V)dt = E[dF(V)], \quad (5.3)$$

where λ is the discount rate. Using a second-order Taylor expansion, we can express $dF(V)$ as:

$$dF(V) = F'(V)dV + \frac{1}{2}F''(V)(dV)^2. \quad (5.4)$$

Combining (5.1), (5.3) and (5.4), and rearranging, gives us the following second-order homogeneous Cauchy-Euler differential equation:

$$\frac{1}{2}\sigma_v^2 V^2 F''(V) + \mu_v V F'(V) - \lambda F(V) = 0. \quad (5.5)$$

In addition, we have the usual value-matching and smooth-pasting conditions:

$$F(V^*) = V^* - I, \quad (5.6)$$

$$F'(V^*) = 1, \quad (5.7)$$

where V^* is the critical value, which is defined as the optimal value V to exercise the option to fire the incumbent manager with profit capacity V_0 , and hire a new manager with profit capacity V^* .

Using the conditions in (5.6) and (5.7), the solution to equation (5.5) can be expressed as [e.g. McDonald and Siegel (1986)]:

$$F(V) = \left(\frac{V}{V^*}\right)^B (V^* - I), \quad (5.8)$$

where $B = \frac{1}{2} - \frac{\mu_v}{\sigma_v^2} + \sqrt{\left(\frac{\mu_v}{\sigma_v^2} - \frac{1}{2}\right)^2 + \frac{2\lambda}{\sigma_v^2}} > 1$. In expression (5.8), $(V^* - I)$ is the payoff at the moment of exercising, and $\left(\frac{V}{V^*}\right)^B$ can be interpreted as a discount factor.

Using the two boundary conditions in (5.6) and (5.7), we can also solve for the critical

value V^* :

$$V^* = \frac{B}{B-1} I. \quad (5.9)$$

We have $B > 1$, which implies that the simple NPV rule for firing does not hold in this context.⁵ The intuition for this is as follows. Exercising the option to fire the incumbent manager as soon as $V > I$ implies an immediate gain to the shareholder. However, the shareholder can do better by keeping his option alive. This enables him to take advantage of a possible increase in the profit capacity of the potential manager. To be sure, this profit capacity can also decrease, but this is of less importance to the shareholder, since he will not exercise his option in those cases.

Finally, we can establish the expected time T at which the manager is fired. Note that by applying Ito's lemma, (5.1) can be rewritten as:

$$d \ln V = \tilde{\mu}_v dt + \sigma_v dz_v, \quad (5.10)$$

where $\tilde{\mu}_v = \mu_v - \frac{1}{2}\sigma_v^2$. Taking expectations in (5.10) and rearranging, we have:

$$E[T] = \frac{\ln V^* - \ln V_0}{\tilde{\mu}_v}. \quad (5.11)$$

5.3.2 Expected Firing Costs

The expected firing costs for the manager can be defined as:

$$E[C] \equiv E[e^{-\lambda T} C_T], \quad (5.12)$$

where T is the first moment at which $V = V^*$, and C_T is the realization of the stochastic firing costs at the moment of firing. Hence, T is the first passage of time of a Brownian motion hitting a constant barrier. In the Appendix, we proof the following lemma:

⁵This is a standard result which can be found in any textbook on real option theory. For an intuitive introduction to real option theory, see e.g. Dixit and Pindyck (1994).

Lemma 1 *The expected firing costs for the manager can be expressed as:*

$$E[C] \equiv E[e^{-\lambda T} C_T] = C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \quad (5.13)$$

where $\tilde{\lambda} = \lambda + \rho \frac{\sigma_c}{\sigma_v} \tilde{\mu}_v + \frac{1}{2} \sigma_c^2 \rho^2$.

Lemma 2 *The expected firing costs are decreasing in the critical value V^* .*

Proof We need to show that the partial derivative of the expected firing costs with respect to the critical value is negative. This partial derivative can be calculated as:

$$\frac{\partial}{\partial V^*} E[e^{-\lambda T} C_T] = \left(\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2} \right) C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2} - 1},$$

which is negative if $\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}$ is negative, or if $\rho \frac{\sigma_c}{\sigma_v} < \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}$. By multiplying both sides by σ_v^2 , adding $\tilde{\mu}_v$, and squaring, we get the following inequality: $\rho^2 \sigma_c^2 \sigma_v^2 + \tilde{\mu}_v^2 + 2\rho \sigma_c \sigma_v \tilde{\mu}_v < \tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2$. Substituting $\tilde{\lambda} = \lambda + \rho \frac{\sigma_c}{\sigma_v} \tilde{\mu}_v + \frac{1}{2} \sigma_c^2 \rho^2$ and eliminating, we get the condition $2\lambda\sigma_v^2 > 0$, which is obviously satisfied. ■

The intuition for Lemma 2 is as follows. Note that the expected firing costs are the expected realization of the firing costs at the moment of firing, discounted back to the period when the contract between the shareholder and the manager is signed. If the critical value increases, the expected moment of firing increases, which implies that the (discounted) expected firing costs decrease.

5.4 The First Best

The contract between the shareholder and the manager cannot make use of a critical value which specifies when the manager is fired. The reason for this is that V is unverifiable, which implies that the manager cannot rely on the contract. In other words, whenever the shareholder has a profitable opportunity to deviate from the specified critical value in the contract, he will do so. In fact, given any contract, the manager can deduce at which critical value he will be fired. We will define this as the equilibrium critical value. It is this

equilibrium critical value that the manager will use in his calculations for his compensation for his expected firing costs.

A commitment problem for the shareholder arises whenever the equilibrium critical value is lower than the optimal critical value. In those cases the shareholder would like to commit himself to fire the manager at a higher critical value than the equilibrium critical value, in order to reduce the expected firing costs (see Lemma 2). However, this contract is not feasible, because of the verifiability problem.

A first best solution is obtained if a contract between the shareholder and the manager does not suffer from this commitment problem. In other words, the shareholder can choose a critical value that optimizes his option value in (5.8) net of the compensation for the expected firing costs in (5.13). The optimization program for the shareholder is then as follows:

$$\max_{V^*} F(V)_{fb} - E[C]_{fb}, \quad (5.14)$$

where *fb* stands for first best.

Numerical results for the program in (5.14) are presented in Section 5.7. Figure 5-1 shows a graphical solution to the first best problem for the parameter values mentioned below the figure.⁶

Figure 5-1: Graphical representation of the first best solution, for the following parameter values: $C_0 = 50$, $V_0 = 100$, $\mu_v = 0.04$, $\sigma_c = 0.2$, $\sigma_v = 0.2$, $\lambda = 0.1$, $\rho = -1$.

⁶ All the numerical results that are presented in this chapter are robust to changes in the parameter values.

First consider the option value. The cost of exercising the option is the profit capacity of the incumbent manager, in this example 100. Therefore, the option value will only be positive for critical values greater than 100. Increasing the critical value then first increases the option value. The maximum is attained at a critical value of 226. The fact that $226 > 100$ illustrates the standard result of real option theory as explained in Section 5.3. Secondly, as mentioned in Lemma 2, the expected firing costs decrease with an increasing critical value. Finally, the net option value is simply the difference between the option value and the expected firing costs, and its maximum in this example is attained at a critical value of 287.

5.5 Ex-Ante Compensation

Under the system of ex-ante compensation, the shareholder does not have to pay an additional amount to the manager at the moment of firing. Hence, the only relevant cost of firing is the profit capacity of the incumbent manager:

$$I_{ea} = V_0, \quad (5.15)$$

where ea stands for ex ante.

Using (5.8), (5.9), and (5.11), we can establish the option value, the critical value, and the moment of firing under ex-ante compensation, respectively, as:

$$F(V)_{ea} = \left(\frac{V}{V_{ea}^*} \right)^B (V_{ea}^* - I_{ea}), \quad (5.16)$$

$$V_{ea}^* = \frac{B}{B-1} I_{ea}, \quad (5.17)$$

and

$$E[T]_{ea} = \frac{\ln V_{ea}^* - \ln V_0}{\bar{\mu}_v}. \quad (5.18)$$

5.5.1 Expected Firing Costs

The calculations for the expected firing costs were undertaken in Section 5.3.2. Using Lemma (1), we have:

$$E[C]_{ea} \equiv E[e^{-\lambda T} C_T]_{ea} = C_0 \left(\frac{V_{ea}^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\bar{\mu}_v^2 + 2\lambda\sigma_v^2} - \bar{\mu}_v}{\sigma_v^2}}. \quad (5.19)$$

In Lemma 3 we claim that the expected firing costs and the option value do not change if the manager receives a lump sum payment L at the start of the contract instead of a compensation in each period that he is still employed. Therefore, we can truly speak of ex-ante compensation.

Lemma 3 *The expected firing costs under the system of a compensation in each period that the manager is still employed are exactly the same as under the system of a lump sum payment at the start of the contract.*

Proof Suppose each period lasts for τ years. The expected firing costs are:

$$E[e^{-\lambda T} C; 0 < T < \tau] + E[e^{-\lambda T} C; \tau < T < 2\tau] + \dots,$$

where $E[Z; A] = \int_A Z dA$. This reduces to:

$$E[e^{-\lambda T} C; 0 < T < \infty],$$

which is equal to (5.12).

Because there is no extra payment to the manager at the moment of firing, I is still calculated according to (5.15). This implies that the option value and the critical value as calculated according to (5.16) and (5.17), respectively, do not change. ■

Lemma 4 *The expected firing costs under ex-ante compensation are increasing in the correlation ρ .*

Proof We need to show that the partial derivative of (5.19) with respect to ρ is positive. This partial derivative can be calculated as:

$$\frac{\partial}{\partial \rho} E[C]_{ea} = E[C]_{ea} \ln \left(\frac{V_{ea}^*}{V_0} \right) \left(\frac{\sigma_c}{\sigma_v} - \frac{2\sigma_v^2 \left(\frac{\sigma_c \bar{\mu}_v}{\sigma_v} + 2\sigma_c^2 \rho \right)}{2\sigma_v^2 \sqrt{\bar{\mu}_v^2 + 2\lambda\sigma_v^2}} \right),$$

$$= E[C]_{ca} \ln \left(\frac{V_{ca}^*}{V_0} \right) \frac{\sigma_c}{\sigma_v} \left(1 - \frac{\tilde{\mu}_v + \rho \sigma_c \sigma_v}{\sqrt{\tilde{\mu}_v^2 + 2\lambda \sigma_v^2}} \right),$$

which is positive as long as $(\tilde{\mu}_v + \rho \sigma_c \sigma_v)^2 < \tilde{\mu}_v^2 + 2\lambda \sigma_v^2$, or $2\tilde{\mu}_v \rho \sigma_c \sigma_v + \rho^2 \sigma_c^2 \sigma_v^2 < 2\tilde{\lambda} \sigma_v^2$. By substituting $\tilde{\lambda} = \lambda + \rho \frac{\sigma_c}{\sigma_v} \tilde{\mu}_v + \frac{1}{2} \sigma_c^2 \rho^2$, we get the condition $2\lambda \sigma_v^2 > 0$, which is obviously satisfied. $\blacksquare$

The intuition for Lemma 4 is straightforward. Firing takes place as soon as the profit capacity of the potential manager, V , hits the barrier V^* . This happens without taking notice of the realization of the firing costs. Positive correlation between the firing costs and the profit capacity of the potential manager implies that firing takes place, on average, at high realizations of the firing costs.

Finally, combining Lemma 3 and equation (5.19), we have the following participation constraint for the manager under ex-ante compensation:

$$L \geq C_0 \left(\frac{V_{ca}^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\lambda \sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \quad (5.20)$$

5.5.2 The Optimal Ex-Ante Contract

The shareholder wants to optimize his option value net of the compensation for the expected firing costs he has to pay to the manager for accepting the contract. Under the system of ex-ante compensation, this is a rather straightforward optimization problem. Using (5.20), we have the following optimization program for the shareholder:

$$\begin{aligned} & \max_L F(V)_{ca} - L \\ & s.t. \\ & L \geq C_0 \left(\frac{V_{ca}^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\lambda \sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \end{aligned} \quad (5.21)$$

Taking a closer look at (5.15), (5.16) and (5.17), we see that the optimal critical value and option value do not depend on the amount of the compensation for the expected firing costs. This simply implies that the optimum for (5.21) is always attained by setting the

lump sum payment equal to the expected firing costs:

$$L^* = C_0 \left(\frac{V_{oa}^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\hat{\mu}_0^2 + 2\lambda\sigma_0^2} - \hat{\mu}_v}{\sigma_0^2}} \quad (5.22)$$

Numerical results for the program in (5.21) are presented in Section 5.7.

5.6 Ex-Post Compensation

Under ex-post compensation, the manager receives a severance payment P at the moment he is fired. This implies that the cost of firing for the shareholder is now the profit capacity of the incumbent manager, plus the severance payment that the incumbent manager receives if he is fired:

$$I_{ep} = V_0 + P, \quad (5.23)$$

where ep stands for ex post.

The option value, critical value, and expected time of firing are again established according to (5.8), (5.9), and (5.11), respectively:

$$F(V)_{ep} = \left(\frac{V_0}{V_{ep}^*} \right)^B (V_{ep}^* - I_{ep}), \quad (5.24)$$

$$V_{ep}^* = \frac{B}{B-1} I_{ep}, \quad (5.25)$$

and

$$E[T]_{ep} = \frac{\ln V_{ep}^* - \ln V_0}{\hat{\mu}_v}. \quad (5.26)$$

5.6.1 Expected Firing Costs

Under the system of ex-ante compensation, the manager received a lump sum payment at the start of the contract as a compensation for the expected firing costs. This participation constraint was given in (5.20). Under the system of ex-post compensation, the compensation for the expected firing costs comes in the form of a severance payment at the moment that the manager is fired. The fact that the firing costs are non-verifiable implies that the

Figure 5-2: Graphical representation of the expected firing costs and the expected severance payment as a function of the severance payment, for the following parameter values: $C_0 = 50$, $V_0 = 100$, $\mu_v = 0.04$, $\sigma_c = 0.2$, $\sigma_v = 0.2$, $\lambda = 0.1$, $\rho = -1$.

severance payment cannot be made dependent on them, i.e., it has to be established at the start of the contract. The participation constraint for the manager therefore becomes:

$$E[e^{-\lambda T}]P \geq E[e^{-\lambda T}C_T]_{ep}. \quad (5.27)$$

Using Lemma (1), we have:

$$E[C]_{ep} \equiv E[e^{-\lambda T}C_T]_{ep} = C_0 \left(\frac{V_{ep}}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \quad (5.28)$$

Using (5.A.4) (with $\tilde{\lambda} = \lambda$), we have:

$$E[P]_{ep} \equiv E[e^{-\lambda T}]P = P \left(\frac{V_{ep}}{V_0} \right)^{-\frac{\sqrt{\tilde{\mu}_v^2 + 2\lambda\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \quad (5.29)$$

Both (5.28) and (5.29) depend on the severance payment P . Figure 5-2 shows the general pattern of these two equations. Firstly, we observe that the expected firing costs are a decreasing function of the severance payment. The reason for this is straightforward. Increasing the severance payment increases the cost of firing (5.23), and therefore the critical value (5.25). The effect of an increasing critical value has already been stated in Lemma 2.

For the expected severance payment we observe the following.⁷ Increasing the severance payment has the following two effects. The first (direct) effect is that the manager receives a larger payment when he is fired, which increases the expected severance payment. However, the second (indirect) effect is that it increases the critical value, and hence, increases the expected moment in time at which the manager is fired. This second effect reduces the expected severance payment. We have therefore two opposing effects, and we see from Figure 5-2 that for small values of the severance payment the former effect dominates, but for high values it is the latter effect that dominates.

Lemma 5 *The ex-post option value is decreasing in the severance payment.*

Proof We need to show that the partial derivative of the option value in (5.24) with respect to the severance payment is negative. This partial derivative can be calculated as:

$$\begin{aligned}\frac{\partial}{\partial P} F(V)_{ep} &= \left(\frac{V_0}{V_{ep}^*} \right)^B \left(\frac{B}{B-1} - 1 \right) - (V_{ep}^* - I_{ep}) \left(B \left(\frac{V_0}{V_{ep}^*} \right)^{B-1} \frac{V_0}{(V_{ep}^*)^2} \frac{B}{B-1} \right), \\ &= \left(\frac{V_0}{V_{ep}^*} \right)^B \left(\frac{1}{B-1} - \frac{(V_{ep}^* - I_{ep})}{V_{ep}^*} \frac{B^2}{B-1} \right),\end{aligned}$$

which is negative as long as $V^* < (V_{ep}^* - I_{ep})B^2$. By substituting $V^* = \frac{B}{B-1}I_{ep}$, we get the condition $\frac{B}{B-1}I_{ep} < \left(\frac{B}{B-1} - 1 \right) I_{ep}B^2$, or $\frac{B}{B-1} < \frac{B^2}{B-1}$, which is obviously satisfied since we have $B > 1$. ■

Lemma 5 states that the option value under the system of ex-post compensation is decreasing in the severance payment. This is a standard result from option theory: the option value falls with the exercise price.

Note from Figure 5-2 that the participation constraint for the manager is satisfied for firing premia at or to the right of the point of intersection of the two curves. Using Lemma 5, the optimal severance payment is established at the point of intersection. Using (5.28) and (5.29), the optimal severance payment is given by:

$$P^* = C_0 \left(\frac{V_{ep}^*}{V_0} \right)^{\frac{\rho\sigma_v}{\sigma_v} + \frac{1}{\sigma_v^2}} \left[\sqrt{\tilde{\mu}_v^2 + 2\lambda\sigma_v^2} - \sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} \right]. \quad (5.30)$$

⁷Note that the word expected in expected severance payment only refers to the expectation of the moment in time at which the manager is fired, because the severance payment itself is a fixed amount, settled in the contract.

Finally, we can establish the effect of an increasing correlation on the optimal severance payment. Using Lemma 4, we know that, for every value of P , the expected firing costs will increase with correlation. This implies that the curve of the expected firing costs in Figure 5-2 shifts upwards with increasing correlation. From (5.29) it follows that the curve for the expected severance payment in Figure 5-2 does not depend on the correlation. Hence, an increasing correlation will shift the point of intersection in Figure 5-2 to the right, which implies that the optimal severance payment is positively related to the correlation. This is formally stated in Lemma 6.

Lemma 6 *The optimal severance payment is increasing in the correlation ρ .*

Proof We need to show that the partial derivative of the optimal severance payment in (5.30) with respect to ρ is positive. This partial derivative can be calculated as:

$$\begin{aligned} \frac{\partial}{\partial \rho} P^* &= P^* \ln \left(\frac{V_{ep}^*}{V_0} \right) \left(\frac{\sigma_c}{\sigma_v} - \frac{2\sigma_v^2 \left(\frac{\sigma_c \tilde{\mu}_v}{\sigma_v} + 2\sigma_c^2 \rho \right)}{2\sigma_v^2 \sqrt{\tilde{\mu}_v^2 + 2\lambda\sigma_v^2}} \right), \\ &= P^* \ln \left(\frac{V_{ep}^*}{V_0} \right) \frac{\sigma_c}{\sigma_v} \left\{ 1 - \frac{\tilde{\mu}_v + \rho\sigma_c\sigma_v}{\sqrt{\tilde{\mu}_v^2 + 2\lambda\sigma_v^2}} \right\}, \end{aligned}$$

which is positive as long as $(\tilde{\mu}_v + \rho\sigma_c\sigma_v)^2 < \tilde{\mu}_v^2 + 2\lambda\sigma_v^2$, or $2\tilde{\mu}_v\rho\sigma_c\sigma_v + \rho^2\sigma_c^2\sigma_v^2 < 2\lambda\sigma_v^2$. By substituting $\tilde{\lambda} = \lambda + \rho\frac{\sigma_c}{\sigma_v}\tilde{\mu}_v + \frac{1}{2}\sigma_c^2\rho^2$, we get the condition $2\lambda\sigma_v^2 > 0$, which is obviously satisfied. ■

5.6.2 The Optimal Ex-Post Contract

Similar to the system of ex-ante compensation, the shareholder wants to optimize his option value net of the compensation for the expected firing costs. However, this compensation now comes in the form of a severance payment at the moment of firing, and is already discounted in the option value in (5.24). Therefore, we have the following optimization program:

$$\begin{aligned} &\max_P F(V)_{ep} \\ &s.t. \\ &E[e^{-\lambda T}]P \geq E[e^{-\lambda T}C_T]_{ep}. \end{aligned} \tag{5.31}$$

Numerical results for the program in (5.31) are presented in Section 5.7. The analytical expression for the optimal severance payment has already been established in (5.30).

5.7 Comparing Ex-Ante and Ex-Post Compensation

Table 5.1 contains numerical results for the first best solution, ex-ante compensation, and ex-post compensation, respectively, for five different values of ρ . The first best results show that the optimal critical value increases for an increasing correlation. This is an intuitive result, which follows from Lemmas 2 and 4. An increasing correlation increases the expected firing costs for every critical value, resulting in a higher optimal critical value. Finally, the net option value decreases for increasing correlation.

ρ	first best				ex ante				ex post			
	V^*	$E[C]$	$F[V]$	net	V^*	$E[C]$	$F[V]$	net	P	V^*	$E[C]$	$F[V]$
-1.0	288	2.6	28.3	25.7	226	5.1	29.3	24.1	18.6	269	3.2	25.6
-0.5	312	3.9	27.6	23.7	226	8.1	29.3	21.2	30.9	296	4.4	23.6
0.0	340	5.6	26.8	21.2	226	11.6	29.3	17.7	50.0	340	5.6	21.2
0.5	370	7.5	25.9	18.4	226	15.3	29.3	14.0	81.0	410	6.5	18.3
1.0	399	9.6	25.1	15.5	226	18.9	29.3	10.4	136.5	535	6.8	14.8

Table 5.1: Numerical results for the first best solution, ex ante compensation, and ex post compensation, for the following parameter values: $C_0=50$, $V_0=100$, $\mu_v=0.04$, $\sigma_c=0.2$, $\sigma_v=0.2$, $\lambda=0.1$.

The ex-ante results show that the critical value is unchanged by the correlation. Moreover, the critical value is always lower than the first best critical value. The shareholder would like to commit himself to use the first best critical value. In that manner the decrease in the expected firing costs would more than offset the decrease in the option value. We observe from the table that this commitment problem becomes more severe the larger the correlation.

The ex-post results show that the optimal critical value increases for an increasing correlation. This occurs because the compensation for the expected firing costs takes place by means of a severance payment. From Lemma 6 we know that the optimal severance payment increases with the correlation. From (5.23) and (5.25) it then follows that the critical value also increases for an increasing correlation.

Comparing the systems of ex-ante and ex-post compensation, we observe that the optimal critical value under the latter system is always higher. From (5.18) and (5.26) we know this implies that the expected moment of firing is later in time for ex-post compensation than for ex-ante compensation.

From Table 5.1 it also becomes clear that the ex-post compensation system is always better than the ex-ante compensation system. We can say that the ex-post compensation system partly solves the commitment problem. However, although the (net) option value is always higher than with ex-ante compensation, we see that, except for zero correlation, the system of ex-post compensation is still dominated by the first best solution. This needs further explanation.

For negative correlation, it appears that the ex-post critical value is always too low. Hence, the shareholder would like to commit himself to fire the manager in less cases. From (5.23) and (5.25) we know that the only credible way to achieve this is by means of a higher severance payment. However, since the option value is decreasing in the severance payment (see Lemma 5), the shareholder can definitely not attain the first best solution by increasing the severance payment.

We can also show why, under the system of ex-post compensation, the shareholder cannot promise to fire the manager at the first best critical value for negative correlation. Take the case of correlation -1 from Table 5.1. If the shareholder could commit to a critical value of 288, the expected firing costs would be 2.61. The severance payment that is needed to compensate the manager for these expected firing costs is 17. In other words, if the shareholder could promise the manager to fire him at a critical value of 288, with a severance payment of 17, the first best solution would be obtained. However, given a severance payment of 17, the optimal ex-post critical value would be 265. Figure 5-3 shows that at a critical value of 265, the expected firing costs would be higher than the expected severance payment, which violates the participation constraint of the manager.

For positive correlation, it appears that the ex-post critical value is always too high. Hence, the shareholder would like to fire the manager more often. Again, from (5.23) and (5.25) we know that this can only be achieved by lowering the severance payment. However, this would violate the participation constraint for the manager, since we have

Figure 5-3: Graphical illustration of why the first best hurdle cannot be obtained under the system of ex post compensation, for the following parameter values: $C_0 = 50$, $V_0 = 100$, $\mu_v = 0.04$, $\sigma_c = 0.2$, $\sigma_v = 0.2$, $\lambda = 0.1$, $\rho = -1$.

seen in Section 5.6 that the optimal severance payment made the participation constraint for the manager binding.

We can also show why, under the system of ex-post compensation, the shareholder cannot promise to fire the manager at the first best critical value for positive correlation. Take the case of correlation 1 from Table 5.1. Imagine that the shareholder would promise to fire the manager at the first best critical value of 399. Given that critical value, the expected firing costs would be 9.60. The severance payment that is needed to compensate the manager for these expected firing costs is 114. In other words, if the shareholder could commit himself to a critical value of 399, the first best solution could be obtained with a severance payment of 114. However, given a severance payment of 114, the optimal ex-post critical value would be 486. Figure 5-4 shows that at this critical value of 486, the expected firing costs are again higher than the expected severance payment, which violates the participation constraint.

5.8 The Second Best

The question remains whether it is possible to obtain the first best solution by means of a feasible contract. An obvious extension of the systems of ex-ante compensation and ex-post compensation is a combination of the two. In fact, we will show that this combination will always result in the first best solution.

Figure 5-4: Graphical illustration of why the first best hurdle cannot be obtained under the system of ex post compensation, for the following parameter values: $C_0 = 50, V_0 = 100, \mu_v = 0.04, \sigma_c = 0.2, \sigma_v = 0.2, \lambda = 0.1, \rho = 1$.

We have seen that in the system of ex-ante compensation the shareholder was not able to credibly commit himself to increase the critical value. The result was that the optimal critical value was always higher than the ex-ante critical value. In the system of ex-post compensation, this critical value was credibly increased by means of the severance payment. However, it appeared that in some cases the optimal critical value was higher than the ex-post critical value (typically for low correlations), and in some cases the optimal critical value was lower than the ex-post critical value (typically for high correlations).

When the ex-post critical value is too low, the shareholder cannot profitably increase the critical value by means of a higher severance payment, because the increased severance payment will simply be too expensive, i.e., the expected severance payment will be higher than the expected firing costs. On the other hand, when the ex-post critical value is too high, the shareholder cannot profitably decrease the critical value by means of a lower severance payment, because that will violate the participation constraint for the manager, i.e., the expected severance payment will be lower than the expected firing costs.

However, if the system of ex-post compensation is combined with the system of ex-ante compensation, any difference between the expected severance payment and the expected firing costs can be settled with a lump sum transfer. In other words, the manager will receive a lump sum payment if the expected firing costs are higher than the expected severance payment, and the manager would pay a lump sum if the expected firing costs are lower than the expected severance payment. Of course, using Lemma 3, any difference

could also be settled by means of a compensation in each period that the manager is still employed instead of a lump sum payment.

The optimization problem of the shareholder now becomes:

$$\begin{aligned} &\max_{P,L} F(V)_{sb} \\ &s.t. \\ &E[e^{-\lambda T}]P + L \geq E[e^{-\lambda T}C_T]_{sb}, \end{aligned}$$

(5.32)

where *sb* stands for second best.

In Table 5.2 we compare the numerical results of the second best problem to those of the first best problem. We see that the results are similar, as we claimed above.

ρ	second best							first best			
	P	V^*	$E[C]$	$E[P]$	L	$F(V)$	net	V^*	$E[C]$	$F(V)$	net
-1.0	27.1	288	2.6	4.1	-1.5	24.2	25.7	288	2.6	28.3	25.7
-0.5	37.7	312	3.9	4.9	-1.0	22.7	23.7	312	3.9	27.6	23.7
0.0	50.0	340	5.6	5.6	0.0	21.2	21.2	340	5.6	26.8	21.2
0.5	63.3	370	7.5	6.1	1.4	19.8	18.4	370	7.5	25.9	18.4
1.0	76.2	399	9.6	6.4	3.2	18.7	15.5	399	9.6	25.1	15.5

Table 5.2: Numerical results for the second best and first best solution, for the following parameter values: $C_0=50$, $V_0=100$, $\mu_v=0.04$, $\sigma_c=0.2$, $\sigma_v=0.2$, $\lambda=0.1$.

Although this contract perfectly imitates the first best solution, it has one obvious drawback. That is, in practice we do not observe that managers pay a lump sum amount (or accept a lower salary) in order to receive a higher severance payment. Hence, for practical purposes it may be more realistic to impose that the lump sum transfer be positive. This is done in Table 5.3.

From Table 5.3 we observe that only for low (negative) correlations the shareholder still has a commitment problem, i.e., the second best critical value is lower than the first best critical value. The reason for this is straightforward. Low (negative) correlations correspond to relatively low expected firing costs. It is in those situations that the shareholder does not want to credibly commit himself to a higher critical value by means of a higher severance payment, because it is simply too expensive relatively to the expected firing costs.

ρ	second best							first best			
	P	V^*	$E[C]$	$E[P]$	L	$F(V)$	net	V^*	$E[C]$	$F(V)$	net
-1.0	18.6	269	3.2	4.1	0.0	25.6	25.6	288	2.6	28.3	25.7
-0.5	30.9	296	4.4	4.9	0.0	23.6	23.6	312	3.9	27.6	23.7
0.0	50.0	340	5.6	5.6	0.0	21.2	21.2	340	5.6	26.8	21.2
0.5	63.3	370	7.5	6.1	1.4	19.8	18.4	370	7.5	25.9	18.4
1.0	76.2	399	9.6	6.4	3.2	18.7	15.5	399	9.6	25.1	15.5

Table 5.3: Numerical results for the second best and first best solution, with a non-negative restriction on L , for the following parameter values: $C_0=50$, $V_0=100$, $\mu_v=0.04$, $\sigma_c=0.2$, $\sigma_v=0.2$, $\lambda=0.1$.

5.9 Concluding Remarks

We have seen that the severance payment is an important means to credibly promise to the manager not to fire him too often. Moreover, there is a positive relation between the correlation between the profit capacity of the potential manager and the firing costs of the incumbent manager on the one hand, and the size of the severance payment on the other hand. This gives us the testable hypothesis that we can expect relatively large severance payments to exist in industries where skills of managers easily become obsolete, e.g., in industries with rapidly changing technologies, like the information technology sector. On the other hand, we can expect relatively low severance payment to exist in industries where managers frequently rotate to other firms, for example because of changing management styles, like in the consumer goods industry.

Appendix

Proof of Lemma 1

Since C_T and V_T are two correlated geometric Brownian motions, $\ln(C_T)$ and $\ln(V_T)$ are bivariate normal:

$$\begin{bmatrix} \ln(C_T) \\ \ln(V_T) \end{bmatrix} \sim N \left[\begin{pmatrix} \ln(C_0) - \frac{1}{2}\sigma_c^2 T \\ \ln(V_0) + (\tilde{\mu}_v)T \end{pmatrix}, \begin{pmatrix} \sigma_c^2 T & \rho\sigma_c\sigma_v T \\ \rho\sigma_c\sigma_v T & \sigma_v^2 T \end{pmatrix} \right].$$

Furthermore, the conditional distribution $\ln(C_T) \mid \ln(V_T)$ is normal with expectation $\ln(C_0) - \frac{1}{2}\sigma_c^2 T + \rho\frac{\sigma_c}{\sigma_v}(\ln(V_T) - \ln(V_0) - (\tilde{\mu}_v)T)$ and variance $\sigma_c^2(1 - \rho^2)T$.

Developing (5.12), we have:

$$\begin{aligned}
 E[e^{-\lambda T} C_T] &= E_T[E[e^{-\lambda T} C_T \mid V_T]], \\
 &= E_T[e^{-\lambda T} E[C_T \mid V_T]], \\
 &= E_T[e^{-\lambda T} E[e^{\ln(C_T)} \mid V_T]], \\
 &= E_T[e^{-\lambda T} E[e^{\ln(C_T)} \mid \ln V_T]], \\
 &= E_T[e^{-\lambda T} E[e^{\ln(C_T) \mid \ln V_T}]].
 \end{aligned} \tag{5.A.1}$$

The inner expectation in (5.A.1) can be calculated as:

$$\begin{aligned}
 E[e^{\ln(C_T) \mid \ln V_T}] &= C_0 e^{\rho \frac{\sigma_c}{\sigma_v} (\ln(V_T) - \ln(V_0) - (\tilde{\mu}_v)T) - \frac{1}{2} \sigma_c^2 \rho^2 T}, \\
 &= C_0 \left(\frac{V_T}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v}} e^{-\{\rho \frac{\sigma_c}{\sigma_v} (\tilde{\mu}_v) + \frac{1}{2} \sigma_c^2 \rho^2\} T}, \\
 &= C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v}} e^{-\{\rho \frac{\sigma_c}{\sigma_v} (\tilde{\mu}_v) + \frac{1}{2} \sigma_c^2 \rho^2\} T}.
 \end{aligned} \tag{5.A.2}$$

The last step in (5.A.2) follows from the fact that T is the first moment at which $V = V^*$. Hence, combining (5.A.1) and (5.A.2), we have:

$$\begin{aligned}
 E[e^{-\lambda T} C_T] &= C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v}} E \left[e^{-\lambda T} e^{-\{\rho \frac{\sigma_c}{\sigma_v} (\tilde{\mu}_v) + \frac{1}{2} \sigma_c^2 \rho^2\} T} \right], \\
 &= C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v}} E \left[e^{-\tilde{\lambda} T} \right],
 \end{aligned} \tag{5.A.3}$$

where $\tilde{\lambda} = \lambda + \rho \frac{\sigma_c}{\sigma_v} \tilde{\mu}_v + \frac{1}{2} \sigma_c^2 \rho^2$.

The expectation in (5.A.3) can be calculated as [e.g. Harrison (1985)]:

$$E \left[e^{-\tilde{\lambda} T} \right] = \left(\frac{V^*}{V_0} \right)^{-\frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \tag{5.A.4}$$

Hence, combining (5.A.3) and (5.A.4), the expected firing costs are:

$$E[C] \equiv E[e^{-\lambda T} C_T] = C_0 \left(\frac{V^*}{V_0} \right)^{\rho \frac{\sigma_c}{\sigma_v} - \frac{\sqrt{\tilde{\mu}_v^2 + 2\tilde{\lambda}\sigma_v^2} - \tilde{\mu}_v}{\sigma_v^2}}. \tag{5.A.5}$$

which is equal to equation (5.13) in the text.

Bibliography

- ACHARYA, SANKARSHAN (1992), Maximizing the Market Value of a Firm to Choose Dynamic Policies for Managerial Hiring, Compensation, Firing and Tenuring, *International Economic Review*, **33**(2), 373–397.
- AKERLOF, GEORGE A. (1970), The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism, *Quarterly Journal of Economics*, **84**(3), 488–500.
- ALBERT, MICHEL (1991), *Capitalism against Capitalism (in French)*, Editions du Seuil, Paris.
- BARON, D. AND D. BESANKO (1984), Regulation, Asymmetric Information and Auditing, *Rand Journal of Economics*, **15**, 447–470.
- BENTOLILA, SAMUEL AND GIUSEPPE BERTOLA (1990), Firing Costs and Labour Demand: How Bad is Euroclerosis?, *Review of Economic Studies*, **57**, 381–402.
- BERLE, ADOLPH A. AND GARDINER C. MEANS (1932), *The Modern Corporation and Private Property*, MacMillan, New York.
- BERTOLA, GIUSEPPE (1990), Job Security, Employment and Wages, *European Economic Review*, **34-II**(4), 851–886.
- BHATTACHARYA, SUDIPTO (1979), Imperfect Information, Dividend Policy, and ‘The Bird in the Hand’ Fallacy, *Bell Journal of Economics*, **10**, 259–270.
- BHIDE, AMAR (1993), The Hidden Costs of Stock Market Liquidity, *Journal of Financial Economics*, **34**, 31–51.
- BOOT, ARNOUD W.A. (1994), *The Financing of Business Activity: between the ‘Stru-
tuurregime’ and the Financial Sector (in Dutch)*, Amsterdam University Press, Amsterdam.

- BRANDER, JAMES A. AND TRACY R. LEWIS (1986), Oligopoly and Financial Structure: The Limited Liability Effect, *American Economic Review*, **76**(5), 956-970.
- BYRD, JOHN W. AND KENT A. HICKMAN (1992a), Do Outside Directors Monitor Managers?, *Journal of Financial Economics*, **32**, 195-221.
- BYRD, JOHN W. AND KENT A. HICKMAN (1992b), The Case for Independent Outside Directors, *Journal of Applied Corporate Finance*, **5**(3), 78-82.
- CHARKHAM, J. (1994), *Keeping Good Company; A Study of Corporate Governance in Five Countries*, Clarendon Press, Oxford.
- CHO, IN-KOO AND DAVID KREPS (1987), Signaling Games and Stable Equilibria, *Quarterly Journal of Economics*, **102**(2), 179-221.
- COASE, RONALD H. (1937), The Nature of the Firm, *Economica*, **4**, 386-405.
- COMMITTEE ON CORPORATE GOVERNANCE (1997), *Corporate Governance in the Netherlands - Forty Recommendations*, Amsterdam Exchanges Association, Amsterdam.
- CONYON, MARTIN, PAUL GREGG, AND STEPHEN MACHIN (1995), Taking Care of Business: Executive Compensation in the United Kingdom, *Economic Journal*, **105**(May), 704-714.
- COOLS, KEES (1993), *Capital Structure Choice: Confronting (Meta)theory, Empirical Tests and Executive Opinion*, PhD thesis, Tilburg University, The Netherlands.
- CREMER, JACQUES (1995), Arm's Length Relationships, *Quarterly Journal of Economics*, **110**(2), 275-295.
- DIAMOND, PETER A. (1982), Wage Determination and Efficiency in Search Equilibrium, *Review of Economic Studies*, **49**, 217-227.
- DIXIT, AVINASH K. AND ROBERT S. PINDYCK (1994), *Investment under Uncertainty*, Princeton University Press, Princeton, New Jersey.
- DONALDSON, GORDON (1994), The Corporate Restructuring of the 1980s - And Its Import for the 1990s, *Journal of Applied Corporate Finance*, **6**(4), 55-69.
- ECONOMIST, THE (1995a), Executive Pay: Random Numbers, **335**(June 3rd-9th), 74-77.
- ECONOMIST, THE (1995b), Fat Cats and Their Cream, **336**(July 22nd-28th), 15.

- FAMA, EUGENE F. (1980), Agency Problems and the Theory of the Firm, *Journal of Political Economy*, **88**(2), 288–307.
- FAMA, EUGENE F. AND MICHAEL C. JENSEN (1983a), Separation of Ownership and Control, *Journal of Law and Economics*, **26**(2), 301–325.
- FAMA, EUGENE F. AND MICHAEL C. JENSEN (1983b), Agency Problems and Residual Claims, *Journal of Law and Economics*, **26**(2), 327–349.
- FRANKS, JULIAN R. AND WALTER N. TOROUS (1994), A Comparison of Financial Recontracting in Distressed Exchanges and Chapter 11 Reorganizations, *Journal of Financial Economics*, **35**, 349–370.
- GAREN, JOHN E. (1994), Executive Compensation and Principal-Agent Theory, *Journal of Political Economy*, **102-II**, 1175–1199.
- GERTNER, ROBERT AND DAVID SCHARFSTEIN (1991), A Theory of Workouts and the Effects of Reorganization Law, *Journal of Finance*, **46-II**(4), 1189–1222.
- GIAMMARINO, RONALD M. (1989), The Resolution of Financial Distress, *Review of Financial Studies*, **2**(1), 25–47.
- GIBBONS, ROBERT (1992), *A Primer in Game Theory*, Harvester Wheatsheaf, New York.
- GROSSMAN, SANFORD J. AND OLIVER D. HART (1980), Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation, *Bell Journal of Economics*, **11**, 42–64.
- GROSSMAN, SANFORD J. AND OLIVER D. HART (1983), An Analysis of the Principal-Agent Problem, *Econometrica*, **51**(1), 7–45.
- GRUNDFEST, JOSEPH A. (1990), Subordination of American Capital, *Journal of Financial Economics*, **27**, 89–114.
- HARRIS, MILTON AND ARTHUR RAVIV (1990), Capital Structure and the Informational Role of Debt, *Journal of Finance*, **45-I**(2), 321–349.
- HARRISON, J.M. (1985), *Brownian Motion and Stochastic Flow Systems*, Wiley, New York.
- HART, OLIVER (1995), *Firms, Contracts, and Financial Structure*, Oxford University Press, Oxford.

- HAUGEN, ROBERT A. AND LEMMA W. SENBET (1978), The Insignificance of Bankruptcy Costs to the Theory of Optimal Capital Structure, *Journal of Finance*, **33-I**(2), 383–393.
- HAUGEN, ROBERT A. AND LEMMA W. SENBET (1988), Bankruptcy and Agency Costs: Their Significance to the Theory of Optimal Capital Structure, *Journal of Financial and Quantitative Analysis*, **23**, 27–38.
- HAZE WINKELMAN DE, R.A.E. (1994), Importance of a New Structuurregime for the Institutional and Private Investor (in Dutch), in I.W. Wildenberg and F.J.M. Zwetsloot, (eds.), *Towards a New Balance of Power in the Dutch Corporation: About the Relation Between Shareholders, Directors, Management, and Employees in the Dutch Corporation*, Kluwer, Deventer.
- HERST, ARTHUR AND EUGÈNE REBERS (1996), Stock Repurchases in the Netherlands (in Dutch), *Tijdschrift voor Bedrijfsadministratie*, **1190**, 174–180.
- HOLMSTROM, BENGT (1979), Moral Hazard and Observability, *Bell Journal of Economics*, **10**(1), 74–91.
- HOLMSTROM, BENGT AND PAUL R. MILGROM (1987), Aggregation and Linearity in the Provision of Intertemporal Incentives, *Econometrica*, **55**, 302–328.
- JENSEN, MICHAEL C. (1986), Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers, *American Economic Review (Papers and Proceedings)*, **76**, 323–329.
- JENSEN, MICHAEL C. (1989), Eclipse of the Public Corporation, *Harvard Business Review*, (Sept.-Oct.), 61–74.
- JENSEN, MICHAEL C. AND WILLIAM H. MECKLING (1976), Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics*, **3**, 305–360.
- JENSEN, MICHAEL C. AND KEVIN J. MURPHY (1990), Performance Pay and Top-Management Incentives, *Journal of Political Economy*, **98-I**, 225–264.
- JENSEN, MICHAEL C. AND RICHARD S. RUBACK (1983), The Market for Corporate Control: The Empirical Evidence, *Journal of Financial Economics*, **11**, 5–50.

- KIM, HAN E. (1978), A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt Capacity, *Journal of Finance*, **33**, 45–64.
- KOFMAN, FRED AND JACQUES LAWARREE (1993), Collusion in Hierarchical Agency, *Econometrica*, **61-I(3)**, 629–656.
- KOFMAN, FRED AND JACQUES LAWARREE (1996), On the Optimality of Allowing Collusion, *Journal of Public Economics*, **61**, 383–407.
- KRAUS, ALAN AND ROBERT H. LITZENBERGER (1973), A State-Preference Model of Optimal Financial Leverage, *Journal of Finance*, **28-II(4)**, 911–922.
- LELAND, HAYNE E. AND DAVID H. PYLE (1977), Information Asymmetries, Financial Structure, and Financial Intermediation, *Journal of Finance*, **32-I(2)**, 371–388.
- MAKSIMOVIC, VOJISLAV (1988), Capital Structure in Repeated Oligopolies, *Rand Journal of Economics*, **19(3)**, 389–407.
- MAKSIMOVIC, VOJISLAV AND SHERIDAN TITMAN (1991), Financial Policy and Reputation for Product Quality, *Review of Financial Studies*, **4**, 175–200.
- MANNE, HENRY G. (1965), Mergers and The Market for Corporate Control, *Journal of Political Economy*, **73(2)**, 110–120.
- MCDONALD, R. AND D. SIEGEL (1986), The Value of Waiting to Invest, *Quarterly Journal of Economics*, **101(4)**, 707–728.
- MILES, DAVID (1993), Testing for Short Termism in the UK Stock Market, *Economic Journal*, **103**(November), 1379–1396.
- MILES, DAVID (1995), Testing for Short Termism in the UK Stock Market: A Reply, *Economic Journal*, **105**(September), 1224–1227.
- MODIGLIANI, FRANCO AND MERTON H. MILLER (1958), The Cost of Capital, Corporation Finance, and the Theory of Investment, *American Economic Review*, **48(3)**, 261–297.
- MODIGLIANI, FRANCO AND MERTON H. MILLER (1963), Corporate Income Taxes and the Cost of Capital: a Correction, *American Economic Review*, **53-II(3)**, 433–443.

- MOERLAND, PIETER W. (1989), The Market for Takeovers: Theory, Empirics, and Legislation (in Dutch), *Maandblad voor Accountancy en Bedrijfseconomie*, **63**, 143–161.
- MOERLAND, PIETER W. (1995), Alternative Disciplinary Mechanisms in Different Corporate Systems, *Journal of Economic Behavior and Organization*, **26**, 17–34.
- MORCK, RANDALL, ANDREI SHLEIFER, AND ROBERT W. VISHNY (1989), Alternative Mechanisms for Corporate Control, *American Economic Review*, **79-II**, 842–852.
- MYERS, STEWART C. (1977), Determinants of Corporate Borrowing, *Journal of Financial Economics*, **5**, 147–175.
- OI, WALTER Y. (1962), Labor as a Quasi-Fixed Factor, *Journal of Political Economy*, **70**(6), 538–555.
- PEETERS, ANNELEEN (1997), *How Hiring and Firing Costs Affect Labour Demand in a Model of Uncertainty*, Mimeo, Catholic University of Leuven.
- PEREA Y MONSUWE, ANDRES, MATHIJS JANSEN, AND HANS PETERS (1997), Consistency of Assessments in Infinite Signaling Games, *Journal of Mathematical Economics*, **27**, 425–449.
- PRAHALAD, C.K. (1994), Corporate Governance or Corporate Value Added?: Rethinking the Primacy of Shareholder Value, *Journal of Applied Corporate Finance*, **6**(4), 40–50.
- REBERS, EUGENE (1996), *Incentive Compensation and Bankruptcy*, LIFE Working Paper, No. 96-40, Maastricht University.
- REBERS, EUGENE (1997), Corporate Governance in the Netherlands: The Structuurregime and Independent Directors (in Dutch), *Bedrijfskunde*, (4), 28–34.
- REBERS, EUGENE, ROEL BEETSMA AND HANS PETERS (1997), *When to Fire Bad Managers: The Role of Collusion Between Management and Board of Directors*, Center Discussion Paper, No. 9769, Tilburg University.
- RIETKERK, G. (1984), Insider Trading (in Dutch), *De Naamlouze Vennootschap*, **62**(5), 179–184.
- RINNOOY KAN, A.H.G. (1994), Modification ‘Structuurregime’ not in Order (in Dutch), in I.W. Wildenberg and F.J.M. Zwetsloot, (eds.), *Towards a New Balance of Power*

- in the Dutch Corporation - About the Relation Between Shareholders, Directors, Management, and Employees in the Dutch Corporation*, Kluwer, Deventer.
- ROE, MARK J. (1990), Political and Legal Restraints on Ownership and Control of Public Companies, *Journal of Financial Economics*, **27**, 7-41.
- ROSS, STEPHEN A. (1973), The Economic Theory of Agency: The Principal's Problem, *American Economic Review (Papers and Proceedings)*, **63**(2), 134-139.
- ROSS, STEPHEN A. (1977), The Determination of Financial Structure: The Incentive-Signalling Approach, *Bell Journal of Economics*, **8**, 23-40.
- SATCHELL, S.E. AND D.C. DAMANT (1995), Testing for Short Termism in the UK Stock Market: A Comment, *Economic Journal*, **105**(September), 1218-1223.
- SCOTT JR., JAMES H. (1976), A Theory of Optimal Capital Structure, *Bell Journal of Economics*, **7**, 33-54.
- SHLEIFER, ANDREI AND ROBERT W. VISHNY (1997), A Survey of Corporate Governance, *Journal of Finance*, **52-I**(2), 737-783.
- SPENCE, MICHAEL (1973), Job Market Signaling, *Quarterly Journal of Economics*, **87**(3), 355-374.
- THAKOR, ANJAN V. (1991), Game Theory in Finance, *Financial Management*, 71-94.
- TIROLE, JEAN (1986), Hierarchies and Bureaucracies: On the Role of Collusion in Organizations, *Journal of Law, Economics, and Organization*, **2**(2), 181-214.
- TIROLE, JEAN (1992), Collusion and the Theory of Organizations, in J. J. Laffont, (ed.), *Advances in Economic Theory (Econometrics Society Monographs No. 21)*, Cambridge University Press, Cambridge, 151-206.
- TIROLE, JEAN (1994), *Incomplete Contracts: Where Do We Stand?*, Mimeo, IDEI, University of Toulouse.
- TITMAN, SHERIDAN (1984), The Effect of Capital Structure on a Firm's Liquidation Decision, *Journal of Financial Economics*, **13**, 137-151.
- WILDENBERG, I.W. (1990), *Revolt of the Capital Market (in Dutch)*, Academic Service, Schoonhoven.

- WILLIAMSON, OLIVER E. (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, Free Press, New York.

Nederlandse Samenvatting

Dit proefschrift bundelt vier essays (hoofdstukken 2 t/m 5) over Corporate Governance. Een goede vertaling van het begrip 'Corporate Governance' in het Nederlands is niet voorhanden, dus we volstaan hier met een omschrijving. Corporate Governance behelst het bestuur van de moderne vennootschap, alsmede het toezicht op dit bestuur. Onder moderne vennootschap verstaan we in dit proefschrift voornamelijk de grote, beursgenoteerde onderneming. Het besturen van een onderneming dient erop gericht te zijn de ondernemingsdoelstellingen te verwezenlijken, zodanig dat alle belanghebbenden in de onderneming tevreden kunnen worden gesteld. Te denken valt aan klanten die goede produkten of diensten willen ontvangen, leveranciers die op tijd betaald willen worden, werknemers die onder goede voorwaarden aangenaam en uitdagend werk willen verrichten, de Staat die haar graantje meepikt in de vorm van belastingen, en de aandeelhouders die uiteindelijk de winst kunnen verdelen die resteert nadat aan alle andere verplichtingen is voldaan. In dit proefschrift concentreren we ons op drie groepen van belanghebbenden die een centrale rol vervullen bij het bestuur van de onderneming en de controle hierop, te weten het management, de Raad van Commissarissen, en de aandeelhouders.

Het management van de onderneming is verantwoordelijk voor het dagelijks bestuur van de onderneming, en zet de grote lijnen uit. Zij is verantwoording verschuldigd aan de aandeelhouders, voornamelijk wanneer deze laatste verenigd zijn in de Algemene vergadering van Aandeelhouders. De toezichthoudende taak van de aandeelhouders wordt echter vaak in meerdere of mindere mate gedelegeerd aan een Raad van Commissarissen, een

kleine groep personen met voor het toezicht relevante kennis of ervaring. Deze delegatie heeft als belangrijk voordeel dat communicatie en coördinatie gemakkelijker tot stand komen binnen een kleine groep van gespecialiseerde personen dan binnen een vaak nogal heterogene aandeelhoudersgroep. Een belangrijk nadeel van de delegatie is de noodzaak van het nemen van extra maatregelen om ervoor te zorgen dat de Raad van Commissarissen haar toezichthoudende taak ook daadwerkelijk adequaat uitvoert.

In **hoofdstuk 2** van dit proefschrift bespreken we een belangrijk element van het Nederlandse systeem van Corporate Governance, te weten het Structuurregime. Dit in 1971 ingevoerde systeem betekende een aanzienlijke versterking van de positie van de Raad van Commissarissen binnen de moderne vennootschap. Het heeft een aantal belangrijke bevoegdheden, zoals benoeming en ontslag van het management en de goedkeuring van een aantal belangrijke ondernemingsbeslissingen zoals fusies en belangrijke investeringen, van de Algemene vergadering van Aandeelhouders naar de Raad van Commissarissen overgeheveld. Bovendien werd besloten tot een systeem van coöptatie, hetgeen betekent dat de Raad van Commissarissen zelf haar nieuwe leden benoemt. In hoofdstuk 2 beargumenteren we dat het Structuurregime als belangrijk voordeel heeft dat de Raad van Commissarissen volledig onafhankelijk van zowel het management als van welke belangengroep dan ook haar toezichthoudende taak kan vervullen, hetgeen ex ante in het belang kan zijn van iedere belangengroep. Bovendien is het voor het management eenvoudiger om de voor het toezicht benodigde, vaak vertrouwelijke informatie te verschaffen aan een kleine groep personen die vooral geselecteerd zijn op basis van hun capaciteiten in plaats van hun specifieke belangen. Wel is het zo dat er verbetering kan komen in de wijze waarop de Raad van Commissarissen verantwoording aflegt aan de Algemene vergadering van Aandeelhouders. Hiertoe dient allereerst de rapportage van de Raad van Commissarissen in het jaarverslag, en aansluitend op de Algemene vergadering van Aandeelhouders, sterk uitgebreid te worden. Op die manier kunnen aandeelhouders zich een beter beeld vormen van het functioneren van de Raad van Commissarissen, kunnen ze een meer zinvolle discussie aangaan in de Algemene

vergadering van Aandeelhouders, en hebben ze uiteindelijk meer aanknopingspunten voor de rechter indien ze een slecht functionerende commissaris zouden willen ontslaan. Onze mening is dat het Structuurregime, met enige aanpassingen, dient te worden gehandhaafd, hetgeen in overeenstemming is met de relevante passages uit het rapport van de Commissie Peters inzake Corporate Governance.

Een sterke positie voor de Raad van Commissarissen wordt vaak bekritiseerd uit angst voor heimelijke samenwerking (collusie) tussen de Raad van Commissarissen en het management, ten koste van de aandeelhouders. Deze collusie is mogelijk omdat aandeelhouders niet altijd over de relevante informatie beschikken die nodig is om op de juiste momenten in te grijpen. In **hoofdstuk 3** ontwikkelen we een model waarin zulke collusie juist in het belang kan zijn van de aandeelhouders. In dit model delegeert een aandeelhouder de beslissing om een manager wel of niet te ontslaan aan een commissaris. De manager zal bij ontslag onzekere kosten oplopen, en moet daar dus (ex ante) voor gecompenseerd worden. We bestuderen de optimale beloningsstructuur voor de commissaris, waarbij we rekening houden met de mogelijkheid dat de manager een steekpenning aan de commissaris kan aanbieden om zijn ontslagbeslissing te beïnvloeden. Indien de aandeelhouder collusie verhindert, zal de commissaris een slechte manager altijd ontslaan, zelfs indien de ontslagkosten extreem hoog blijken te zijn. Met andere woorden, zonder collusie zal de commissaris de ontslagkosten op geen enkele wijze internaliseren, en zal de manager dus een hoge vergoeding eisen voor zijn hoge verwachte ontslagkosten. Collusie kan gunstig zijn voor de aandeelhouder, omdat hij de manager dan niet (ex ante) hoeft te compenseren voor hele hoge realisaties van de ontslagkosten. De reden hiervoor is dat precies in deze gevallen de collusie zal slagen. In de Angelsaksische landen heeft de Raad van Commissarissen een zwakkere positie dan in de Continentaal-Europese landen. Hoewel dit dus collusie met het management kan bemoeilijken, kan het ook een verklaring bieden voor het feit dat managers een hoger salaris eisen.

Hoofdstuk 4 handelt over *adverse selection*. Een voorbeeld van *adverse selection*

ontstaat wanneer managers van een onderneming informatie over de werkelijke waarde van hun onderneming hebben (bijvoorbeeld, goed of slecht) die beleggers niet hebben. Met andere woorden, indien beleggers een (aandeel van een) onderneming kopen, lopen zij het risico dat zij een slechte onderneming kopen. Zolang beleggers geen aanvullende informatie krijgen, zullen zij (de markt) de waarde van een onderneming inschatten als een gewogen gemiddelde van de waarde van alle ondernemingen. Ross (1977) heeft een beloningsschema voor de manager ontwikkeld om deze aan te sporen de juiste waarde van zijn onderneming aan de markt te signaleren. In dit hoofdstuk hebben wij het model van Ross geformaliseerd, waarbij we de persoonlijke boete van managers afhankelijk hebben gemaakt van de faillissementskosten. Het model werkt als volgt. Managers worden naar rato van de waarde van hun onderneming beloond, en signaleren die waarde met behulp van hun schuldniveau. Door meer schuld op zich te nemen, krijgen managers te maken met de volgende *trade-off*. In eerste instantie zullen zij meer verdienen, omdat de markt de waarde van de onderneming hoger zal inschatten als gevolg van de hogere schuld. In tweede instantie zal hun verwachte beloning echter afnemen, als gevolg van een vergroot risico op faillissement. We onderzoeken de exacte condities waaronder het competitieve evenwicht van Ross stand houdt. In dit evenwicht zullen managers van goede ondernemingen als zodanig herkend worden, omdat ze een schuldniveau zullen aanhouden dat te duur is voor managers van slechte ondernemingen (vanwege de hogere verwachte faillissementskosten). In dit geval zal de *adverse selection* dus zijn opgeheven.

In **hoofdstuk 5** ten slotte ontwikkelen we een model waarin een aandeelhouder de optie heeft om een manager op ieder gewenst moment te ontslaan. De manager heeft wederom onzekere ontslagkosten op het moment dat hij wordt ontslagen, en dient daarvoor gecompenseerd te worden. Dit kan bereikt worden door de manager een hoger salaris te betalen in iedere periode dat hij nog steeds in dienst is, of door hem een ontslagvergoeding (gouden handdruk) te beloven op het moment dat hij daadwerkelijk wordt ontslagen. We bestuderen de optimale beloningsstructuur voor de manager, en ook hoe deze zich verhoudt

met de aard van ontslagkosten. We tonen aan dat met het systeem van een hoger salaris de aandeelhouder de neiging heeft om de manager relatief snel te ontslaan, hetgeen resulteert in hoge verwachte ontslagkosten voor de manager. Aangezien de manager dit anticipeert, zal hij hiervoor ook een hoge vergoeding eisen. Het probleem is dat, als het hogere salaris eenmaal is vastgesteld, de aandeelhouder geen additionele kosten meer heeft bij het ontslaan van zijn manager, ofwel, de ex post marginale kosten van ontslag zijn nihil. Een belangrijk resultaat van het hoofdstuk is dat dit probleem gedeeltelijk wordt opgelost met het systeem van een ontslagvergoeding achteraf, omdat dit systeem juist wel additionele kosten voor de aandeelhouder impliceert. De implicatie hiervan is dat de ontslagvergoeding een efficiënt mechanisme is voor de aandeelhouder om zich te committeren de manager niet te vroeg te ontslaan. De negatieve publiciteit die de ontslagvergoeding vaak vergezelt dient ons inziens daarom gekwalificeerd te worden.

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Curriculum Vitae

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