Three Essays on Investor Protection

Vitaly Terekhov

A Thesis
In the Department of Economics

Presented in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy (Economics) at

Concordia University
Montreal, Quebec, Canada

December 2011

CONCORDIA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

This is to certify that the thesis prepared

By: **Vitaly Terekhov**

Entitled: **Three Essays on Investor Protection**

and submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY (Economics)

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final examining committee:

____ Chair

Dr. V. Penhune

____ External Examiner

Dr. L. Xue

____ External to Program

Dr. C. Nikolenyi

____ Examiner

Dr. M. Li

____ Examiner

Dr. D. Majumdar

____ Thesis Supervisor

Dr. E. Diamantoudi

Approved by ____________________________________

Dr. E. Diamantoudi, Graduate Program Director

December 7, 2011 Dr. B. Lewis, Dean

Faculty of Arts and Science

ABSTRACT

Three Essays on Investor Protection

Vitaly Terekhov, Ph.D.
Concordia University, 2012

This dissertation examines the main question of corporate governance: how shareholders of public companies elect and control directors. How do shareholders, being suppliers of capital and legal owners of public companies, ensure themselves that directors and managers do not waste or steal the capital? To investigate this question, we focus on corporate elections. In the first chapter, we analyze specific voting rules, straight and cumulative voting, and examine which type of voting would result in the social optimum. We model the election as a game in which dissatisfied shareholders form a coalition that challenges the incumbent directors and attempts to gain representation on the board. We show that corporate elections may bring about socially suboptimal outcomes when inefficient shareholders take over corporate boards and the main cause of such outcomes is private benefits of control. Thus, in order to improve outcomes of corporate elections, we call for policies that would limit powers of boards of directors and make them more accountable to shareholders. We also show that straight voting is superior to cumulative. In the second chapter, we ask why shareholders have different rights in different countries. We attempt to explain this phenomenon using asymmetric information when one side has informational advantage over the other: corporate directors are supposed to act in the best interests of shareholders but shareholders do not witness directors' efforts and cannot make sure that directors are serving their interests. This problem, known in the literature as the agency problem, is resolved by investor protection that gives shareholders the power to oust directors when firms' results are unsuccessful. The third chapter extends our analysis of investor protection and brings new insights. We find that investor protection serves two main objectives. First, it motivates directors to exert greater efforts. Second, it allows shareholders to save on directors' compensation. This feature of investor protection may encourage shareholders to fire directors more often than they would if they did not save on directors' compensation. The third chapter strengthens asymmetric information as the main cause of investor protection.

Acknowledgements

I thank Professor Diamantoudi for unwavering support, encouragement, for teaching me how to think critically and how to overcome challenges!

I also thank Professor Gospodinov for his support, willingness to help and professionalism!

Table of contents

List of Figures

List of Tables

Introduction

How are public companies run? This simple question has become the centerpiece of academic research and public debate on the future of corporations and the corporate governance as a whole. Discussion about who actually manage corporations and whose interests they serve is of extreme importance especially these days, in the aftermath of the global recession of 2008-2009, which revealed excessive risk-taking, poor management and even corruption in many large companies around the world. Problems of corporate governance are currently debated not only among researchers but also policymakers, shareholder activists, union leaders and ordinary citizens. As for academia, the field of corporate governance has become diverse and really interdisciplinary while involving research efforts of economists, legal scholars, management experts, accountants, and psychologists.

This question, who actually manage firms, was initially examined by Berle and Means in their seminal work *The Modern Corporation and Private Property* (1932). They claimed that a modern corporation, with a great number of dispersed individual shareholders, has separated ownership from control: "The property owner who invests in a modern corporation so far surrenders his wealth to those in control of the corporation... [The property owners] have surrendered the right that the corporation should be operated in their sole interest"[1].

Separation of ownership and control, however, generates the agency problem: shareholders provide firms with the capital but have very little control over how that capital is actually used. Firms are actually run by managers and directors who might as well waste or simply steal the money. The key question of corporate governance is, therefore, the following one: how can shareholders control directors? How can they make sure that directors serve shareholder interests and do not simply appropriate firms' assets? One solution to this problem is to endow shareholder with various rights and to have those rights enforced and protected by courts and other institutions (what is called investor protection).

The most important right of a shareholder is to vote against directors during corporate elections. In the extreme case, shareholders, who are dissatisfied with the incumbent board, may organize themselves in a coalition, nominate their own

[1] Berle and Means (1932), p.355.

candidates and fight for seats on the board of directors. Contested elections are called proxy fights. In the first chapter of this thesis, we study the way shareholders vote during a proxy contest. The most important study of proxy fights was done by Dodd and Warner (1983) who examined proxy contests from 1962 to 1978 and showed that proxy fights usually result in increased share prices (for each firm, they tracked share prices over the period, comprised of 150-day period prior to the contest to the 150-day period following the contest). They concluded that proxy contests are beneficial for corporations. This result was later confirmed by Nesbitt (1994) and Brav et al. (2006). Other studies, however, claim the opposite. Ikenberry and Lakonishok (1993) analyzed 97 proxy contests that took place from 1968 to 1988 and found that those proxy contests damaged shareholder value (they considered the period stretching from 5 years prior to the contest to 5 years after). Romano (2001) studied 118 contests over 1986-1998 that used confidential voting (when management does not know how individual shareholders voted) and found that contests had little or no effect on firms' performance.

In the first chapter, we attempt to examine corporate elections from a theoretical point of view. In particular, we examine two types of voting, common in corporate elections, straight voting and cumulative voting. Theoretical research in this area is very scarce. Gerstenberg (1910) and Cole (1950) derived a few formulas for cumulative voting which are still in use today despite the fact that they often yield inaccurate results, as was shown by Mills (1968) and Glazer et al. (1984). To correct those formulas, Glasser (1959) approached corporate elections from a game-theoretic perspective. He viewed an election as a zero-sum game and derived the minimax strategies for competing shareholder factions. Our study builds on his approach by modelling not only the problem of casting votes but the whole election. We model a corporate election as a game in which dissatisfied shareholders form a coalition, oppose the incumbent, accept new members and cast votes. We analyze the equilibrium outcomes of corporate elections in order to see the source of possible inefficiency. We show that the main cause of inefficiency is private benefits of control. Private benefits of control are the benefits that those in control (directors and top executives) extract from firms they manage. Such benefits include director compensation, access to inside information, benefits from self-dealing, use of corporate funds for personal gains, etc. Private benefits of control were introduced into academic research by Grossman and Hart (1980) and have become the cornerstone of most research on corporate governance[2]. We add to this body of research by showing that such benefits lead to inefficiency in corporate elections.

The second and the third chapters of this thesis examine shareholder rights (investor protection) more broadly. It has been noted in the economic literature that shareholder rights vary significantly across countries. La Porta et al. (1998) explains these differences by differences in the legal system. La Porta et al. (1998) have found strong correlation between investor protection and the legal system (a common-law system or a civil-law system). Other explanations were also put forward. Perotti and von Thadden (2006) explain this phenomenon by changes in the distribution of financial wealth while Pagano and Volpin (2005) argue that differences in investor protection stem from differences in electoral systems. All of these theories approach the problem of investor protection as a legal one or a political one. They assume that politicians set certain shareholder rights and then various courts of law enforce them. Ordinary shareholders play no part in the decision-making (aside from electing those politicians in the first place). Our approach is different. We argue that investor protection is set by individual shareholders during shareholder meetings of public companies. It is shareholders who push (or do not) for certain rights; laws, written by politicians, only reflect what has happened in public companies already. Thus, in order to understand investor protection, we must first understand actions of individual shareholders. We show that the main reason for the existence of investor protection is asymmetric information. Shareholders cannot observe, verify or control the efforts of the directors; thus, they need to set a certain level of investor protection to limit directors' powers and encourage them to work in interests of shareholders. Our thesis is the only attempt, by far, to examine investor protection from the perspective of asymmetric information.

[2]Grossman and Hart (1988), Harris and Raviv (1988), Barclay and Holderness (1989), Dyck and Zingales (2004).

Chapter 1.

Voting in Corporate Elections

1.1 Introduction

Corporate elections are crucial moments for any public company. When shareholders elect a board of directors, they exercise their only opportunity to determine the direction of the company in which they have monetary stakes. The board of directors ultimately has the power to make or break the firm. Directors hire managers, then supervise and guide them in order to make sure that they act in the best interests of the shareholders. Such at least is the theory. In practice, directors often act as mere rubber-stampers for managers – they fail to provide any noticeable oversight although they receive hefty compensation for their supposed work. Investigations into recent catastrophic corporate failures brought light to many of the flaws existing in corporate governance as a whole. The corporate scandals of 2000 and 2001 (e.g. Enron, WorldCom, etc.) along with the economic crisis of 2008 have clearly shown that directors are often unable, or unwilling, to supervise managers; such directors allowed, and in some cases took part in, accounting fraud, misrepresentation of the earnings, excessive and unreasonable risk-taking and in extreme cases, outright stealing of the company's assets. The corporate scandals of 2000-2001 resulted in the Sarbanes-Oxley legislation which strengthened accounting requirements and clarified directors' accountability to shareholders; the economic crisis of 2008 has already resulted in the financial reform of 2010 (also known as the Dodd-Frank Act) and will likely bring about further changes to corporate governance: for example, the *Securities and Exchange Commission* (SEC), the main market regulator in the USA, is currently considering a comprehensive reform in the way shareholders elect directors[3].

Shareholders, in the meantime, do not wait for new laws and currently demand a greater role in the affairs of companies in which they have stakes. Not willing to wait for legislators to make up their minds, shareholders are now putting pressure on

[3]Press Release No.2010-122 from July 14, 2010, available at http://www.sec.gov.

companies to adopt changes – specifically, to eliminate staggered boards[4] (McGraw-Hill, Alaska Air), to reform pay practices (Pfizer, Exxon Mobil, Chevron), to change voting rules (Intel, Boeing, Citigroup) among others[5]. In Canada, the *Canadian Coalition for Good Governance* forced 30 out of the 60 largest corporations operating in Canada to adopt a policy requiring directors to resign if they did not receive approval by the majority of shareholders. This trend is likely to continue and, with or without help of legislators, power will be shifting from directors towards shareholders.

But how exactly do shareholders elect directors? Each year, public companies hold shareholder meetings. Before the meeting, the existing board of directors sets the agenda and nominates candidates for the new board[6]. If some shareholders (referred to as "dissidents" or "insurgents") are not satisfied with the way the board runs the company, they may form a coalition and nominate their own slate of candidates for the board. Each side – the current directors and the dissidents – runs a campaign, much like a political campaign, that is aimed at convincing the remaining shareholders that this particular faction should be allowed to form the board and run the company. During this campaign, shareholders submit their votes to their preferred factions (the board or the dissident coalition) through proxies. The annual shareholder meeting takes place; the board, the dissident group and shareholders, present at the meeting, cast their votes. The new board forms. This process is called a proxy contest or proxy fight[7].

Whether proxy contests are beneficial has long been the subject of much debate. Shareholder activism faces fierce opposition not only from self-interest board members but also from policy makers and researchers (see Bainbridge (2006) and Strine (2006)) who argue that shareholders must not interfere in activities of directors and managers. They view this separation of managers and owners as the genius of modern capitalism. This notion was first stated by Berle and Means (1933) in their, now classical, book *The Modern Corporation and Private Property* and remains more-or-less unchallenged ever since. Berle and Means did not regard proxy fights favourably. They viewed proxy fights as mere battles between financial tycoons that destroy shareholder

[4] A staggered board is a board in which only a fraction (usually a third) is elected each year.

[5] Annual Corporate Governance Review, 2005 from Georgeson Shareholder and 2006 Postseason Report from ISS.

[6] In practice, there may be a meeting without an election if it is an extraordinary shareholder meeting called to resolve a specific issue. In this paper, we only consider annual shareholder meetings at which corporate elections take place.

[7] Aranow and Einhorn (1968) is an excellent treatise on proxy contests.

value. Modern opponents of shareholder activism claim that giving shareholders more power would disrupt the delicate balance between managers and owners and would likely impede the speed and efficiency with which modern managers make good-faith business decisions. Yet, shareholder activism shows no signs of abating: 2009 was a record-high year for proxy fights with 133 contests initiated in the United States alone (compare it with an average of 61 during 2001-2005[8]). For the first time in over 20 years, activist shareholders won (gained at least one board seat) more often than incumbent boards[9], including proxy contests in companies such as General Motors, Heinz, Wendy's, Home Depot. Shareholder activism is on the rise not only in the US but also in Europe[10] and Japan[11].

In this paper, we ask the following questions: are proxy contests mere fights between financial tycoons or might they actually improve shareholder value? More specifically, which voting rules are crucial to allow shareholders to replace inefficient directors?

To answer these questions, we will examine in more detail how shareholders vote in corporate elections. There are two methods of voting: cumulative and straight (or direct)[12]. In cumulative voting, every shareholder is endowed with a number of votes equal to the number of shares she holds multiplied by the number of directors to be elected (for example, if somebody owns 2 shares in a corporation and there are 5 seats on the board, then she is endowed with 10 votes). The shareholder is allowed to distribute her votes among the candidates any way she likes: she can cast all her votes for one candidate, distribute them equally among all nominees, split among two candidates, etc. At the shareholders' meeting, designated tabulators count the votes and rank the nominees in descending order. If k directors are to be elected, then the highest-ranked k candidates become the new directors.

The more conventional, straight voting system treats each director seat as a separate election: shareholders vote Yes or No against each candidate, then the numbers of Yes votes are multiplied by the number of shares of corresponding voters and the

[8] According to FactSet Research Systems Inc. and Nathan and Craythorn (2008).

[9] According to 2009 Annual Corporate Governance Review by Georgeson Inc., p. 8., available at www.georgeson.com

[10] Cziraki et al (2009).

[11] Seki (2005).

[12] As for voting in general, there are many more voting systems. However, this paper focuses on corporate elections and we only consider straight and cumulative voting since they are most commonly used in corporate elections around the world.

resulting values are tabulated (while No votes are ignored). Again, candidates are ranked in descending order and the required number of directors gets elected based on this ranking.

To see how these voting rules work in practice, consider a simple example taken from Glasser (1959):

There are two factions, A and B, holding 70 and 30 shares, respectively. Suppose they are the only voters and there are 3 directors to be elected. Under straight voting, A wins all three seats since it casts 70 against 30 votes of B. Under cumulative voting, however, A gets 210 votes and B gets 90 votes. Now B can win one position, if it casts all 90 votes for its preferred candidate. Faction A cannot stop B from winning this seat: if A tries to nominate 3 candidates, they are unable to cast 90 votes for all three of them; therefore, B will elect one director.

The main difference between these two types of voting systems is that cumulative voting allows minority groups to gain some representation on the board while straight voting prevents them from electing any directors (since only a majority of votes can ensure election of any single candidate).

Voting rules received very little attention in the academic literature. Most often, problems of corporate voting are analyzed by legal scholars rather than economists (see Williams (1951), Easterbrook (1983), Bhagat (1984) among others). Amazingly, there have been no economic studies exploring straight voting in the context of corporate governance. As for cumulative voting, the earliest attempts to analyze it were done by Gerstenberg (1910) who derived a set of formulas for various aspects of casting votes. The most important one was the formula for calculating the number of shares necessary to elect a certain number of directors: if there are b number of seats on the board and a shareholder group wishes to elect c number of directors, it must control x number of shares:

$$x = \frac{ac}{b+1} + 1,$$

where a is the total number of shares. This and other formulas of Gerstenberg are often attributed to Cole who discussed them in his paper in 1950; however, it was Gerstenberg who derived them first. The Gerstenberg/Cole formulas have become the most quoted in discussions of cumulative voting despite the fact that they sometimes produce erroneous results as was shown by Mills (1968) and Glazer et al. (1984). The correct formula was given by Glasser (1959) as he was the first researcher who applied game theory to corporate elections. He approached an election as a zero-sum game and derived the minimax strategy of casting votes by a shareholder group. He, and later Glazer et al. (1984), showed that if a shareholder group D wishes to elect k_D directors regardless of what another group, I, does, it must ensure that the following inequality holds:

$$\text{integer}\,\frac{kS_D}{k_D} > \text{integer}\,\frac{kS_I}{k+1-k_D},$$

where k is the total number of directors, S_I and S_D are the number of shares I and D control respectively, and the operator integer drops any fractional part.

Proxy contests in general have received very little interest in economic literature; most research has been empirical and the results have been mixed.

Dodd and Warner (1983), for example, documented positive share performance following the proxy contests. They studied 96 contests between 1962 and 1978, and found that shares of those companies exhibited abnormally positive returns even in cases when dissidents failed to obtain control. They concluded that proxy contests were to the benefit of shareholders. Further evidence is provided by Nesbitt (1994) who studied CalPERS, one of the most influential pension funds in the USA, which finds underperforming companies, buys their shares and pressures them to make changes. Nesbitt analyzed 42 firms targeted by CalPERS and found that they outperformed S&P 500 by an average of 41% over five years following the CalPERS intervention. Similarly, Brav et al. (2006) examined shareholder activism of 131 hedge funds between 2001 and 2005 and found that hedge fund activism resulted in both positive returns and improved operating performance of target firms. Hedge fund interventions, Brav concluded, constitute an effective monitoring tool of public companies. Another study that supports shareholder activism is one done by Brown and Caylor (2009). They have found that firms which give more power to shareholders are on average more profitable, more valuable and pay out higher dividends. However, there are other studies that do not support shareholder activism. Ikenberry and Lakonishok (1993) examined 97 proxy contests over the period of 1968-1988 and for each firm, they tracked share prices from 5 years prior to the contest to 5 years after. They found that firms in which dissidents obtained one or more board seats experienced abnormally negative returns afterwards, while firms in which the incumbent boards retained control did not decline. Similar results are in Romano (2001) who studied 118 contests over 1986-1998 (she only considered contests with confidential voting when directors will not know how individual shareholders voted) and found that contests had little or no effect on firms' performance. It seems that the empirical literature points out that dissident interventions may damage shareholder value but, in some cases, may improve it.

In this paper, we attempt to find which type of voting would allow shareholders to oust underperforming directors, elect a new board and boost shareholder value. We also examine the opposite situation when elections are won by incompetent shareholders and we will discuss what can be done to prevent such outcomes. To analyze these problems, we build a model in which two shareholder groups fight for control, the winner forms the board and enjoys private benefits of control (directors' compensation, corporate perks, profits from self-dealing and, in extreme cases of corruption, outright stealing of the company's resources).

Our main conclusions are as follows.

- Straight voting is more likely to deliver the social optimum than cumulative voting.
- Suboptimal outcomes, however, may occur under both types of voting. The main cause of suboptimal outcomes is private benefits of control.
- In order to prevent suboptimal outcomes, we recommend use of straight voting and reduction of private benefits of control.

Our main insight is that private benefits of control make suboptimal outcomes possible. Private benefits of control create the incentive for shareholders to contest an election, win seats on the board and appropriate such benefits. If we compare straight and cumulative voting, we will see that the latter makes it easier for shareholders, who are less able than incumbent durectors, to contest and win elections – and to damage shareholder value along the way. Our analysis calls for measures that would limit private benefits of control and for adoption of straight voting as the main voting mechanism in corporate elections.

The existing literature on corporate elections has two major branches: legal scholars debate which type of voting is superior[13] while economists study how to cast votes under cumulative voting[14]. This paper contributes to both branches of research. To the former branch, it adds an economic perspective. As for the latter branch, our study goes beyond the problem of casting votes. While other researchers assume, often implicitly, that each shareholder group strives to win as many directorships as possible, our paper studies how many directorships a shareholder group would *want* to elect. We show that it is not always the case that dissident shareholders wish to take over the entire board – oftentimes, they are content winning just a fraction of the seats.

The paper is organized as follows. Section 1.2 introduces the basic model. Section 1.3 analyzes a proxy contest from the point of social welfare. Section 1.4 analyzes equilibrium outcomes for straight voting and cumulative voting. Section 1.5 concludes.

1.2 The Model

We consider a public company with highly dispersed ownership: shares of such a company are owned by many individual shareholders and there is no one major controlling shareholder. For simplicity, we assume that each shareholder owns one share[15]. Thus, our study is most applicable to countries with dispersed ownership (such as the US, the UK, Canada, Australia) and less applicable to countries with concentrated ownership (such as Germany, Italy, Japan)[16].

Let S denote the total number of shares issued by the firm. The election starts with the existing board of directors nominating the official slate of candidates for the new board. The existing board is controlled by the incumbent coalition, denoted by I, – it is the coalition of shareholders that nominated and elected the current board of directors during the previous shareholder meeting.

After I makes the announcement, dissatisfied shareholders decide if they should contest the election.

[13] Williams (1951), Easterbrook (1983), Bebchuk (1990), Bainbridge (2006), Strine (2006).

[14] Cole (1950), Glasser (1959), Mills (1968), Glazer et al. (1984).

[15] The results of the paper would be valid for more general cases when shareholders hold uneven numbers of shares so long as there is no one controlling shareholder.

[16] See La Porta et al. (1999).

If they do, they form a coalition D; coalitions I and D choose their sizes: at this stage, some of the existing members may leave and new members may join until the coalitions decide to stop accepting new members. Here we assume that I and D do not overlap[17]: obviously, no coalition would nominate members of the opposing group; and if a director defects to the dissidents, D will nominate him while I will not.

The choice of the coalition size involves the tradeoff: a larger coalition would bring in more votes but would have to share rent among more members. Let us denote the size of I as S_I and the size of D as S_D (note that S_I and S_D represent how many members I and D have and hence, how many shares they control)[18]. Obviously, $S_I + S_D \leq S$ since some shareholders may stay outside of the coalitions.

The dissident coalition nominates its own slate of candidates for the board[19].

The voting is held. Shareholders who are members of D or I submit their votes through proxies to their respective coalitions so that D accumulates S_D votes and I accumulates S_I votes. Here, we assume that, first of all, shareholders-members of I or D do not vote themselves – they only submit proxies to their respective coalitions which vote on their behalf; and, second, shareholders who do not belong to either I or D do not vote at all. In reality, a shareholder has the legal right to attend the shareholder meeting and cast votes herself; however, the most common practice is for a shareholder, to submit her votes to the board or a dissident group – or to abstain from voting altogether[20].

During the voting, I and D cast their votes; votes are calculated according to specific voting rules (straight or cumulative). Naturally, the candidates which have received most votes become directors and the new board is thus created[21].

The newly elected board earns the firm value. The firm value depends on the composition of the board: $B \equiv B(k_I, k_D)$, where k_I is the number of directors nominated by I, k_D is the number of directors nominated by D, $k_I \in [0, k]$, $k_D \in [0, k]$ and k is the

[17] We assume that if there were dissatisfied directors, they left I before the announcement.

[18] In other words, S_D is the cardinality of D and S_I is the cardinality of I.

[19] This assumption that I and D nominate a full slate each is indeed the most common practice presently while it was, for many years, the only one (the SEC used to require dissidents to nominate a full slate of candidates until 1992).

[20] This assumption that only I and D cast votes is common in the literature: see Cole (1950), Mills (1968), Glasser (1959), Glazer et al. (1984).

[21] For the next election, the new incumbent will be those shareholders who nominated and elected the current directors: if only I forms the board, I remains the incumbent for the next election; if only D, it becomes the new incumbent; if both I and D form the new board, the new incumbent is the union of I and D.

total number of directors (k is exogenously given. Usually the number of seats on the board is stipulated in the corporate by-law). Since $k_I + k_D = k$, we will drop k_I in the argument of the firm value so that the firm value will be denoted as $B(k_D)$. We assume that function $B(k_D)$ may be increasing or decreasing in k_D: if it's increasing in k_D, D improves the firm value; if decreasing, D damages it[22]. We assume that function $B(k_D)$ is always positive and is common knowledge because modern shareholders have access to a lot of information available on the government websites as well as on corporate and research websites; it is reasonable to assume that shareholders are able to obtain relevant information, process it and form valid expectations.

After the firm earns value $B(k_D)$, directors appropriate rent – they enjoy private benefits of control. Those benefits are assumed to be passed by directors on to their respective coalitions, I or D. In other words, directors are not considered independent players in this model: since they are mere representatives of shareholder factions, it is those factions, I and D that are true recipients of private benefits of control. Since these coalitions consist of individual shareholders, all of the coalitions' benefits are passed on to their respective members.

The timing of the game is as follows.

1) The incumbent board nominates candidates for directorships.

2) Dissatisfied shareholders decide if they should form a dissident coalition D.

3) Coalitions I and D choose their sizes, S_I and S_D.

4) The dissident coalition nominates its own candidates for the board. I and D cast their votes; candidates that received most votes become directors.

5) The firm earns its new value $B(k_D)$. The directors appropriate rent – the portion λ ($\lambda \in (0,1)$, exogenously determined) of the firm value for their respective coalitions and then they pay the balance out to shareholders as dividends. Thus, D receives $\frac{k_D}{k}\lambda B(k_D)$ and I receives $\frac{k-k_D}{k}\lambda B(k_D)$. D and I distribute the rent among its members so that a member of D receives the payoff u_i:

$$u_i = \frac{1}{S_D}\frac{k_D}{k}\lambda B(k_D) + \frac{1}{S}(1-\lambda)B(k_D) \quad i \in D, \quad (1)$$

where the first term is i's share in D's rent and the second is the amount of dividends i receives.

[22] A more general case would be the case when $B(k_D)$ does not have to be monotone and may achieve its maximum at $k_D^* < k$ or minimum at $k_D^* > 0$. We discuss possible implications of non-monotonicity in Section 1.4.

Similarly, a member of I receives the payoff u_j:

$$u_j = \frac{1}{S_I}\frac{k_I}{k}\lambda B(k_D) + \frac{1}{S}(1-\lambda)B(k_D) \quad j \in I. \qquad (2)$$

Finally, the payoff of an ordinary shareholder (the one who does not belong to either of these coalitions) is simply the amount of dividends she receives:

$$u_l = \frac{1}{S}(1-\lambda)B(k_D) \quad l \notin \{I \cup D\} \qquad (3)$$

1.3. Social Welfare Analysis

We first lay out a benchmark – a socially optimal outcome for all shareholders. This will allow us to compare the outcomes of straight versus cumulative voting to see what type of voting is better. Let us define the social welfare function as a summation of utilities of all agents, i.e. those shareholders who belong to the coalitions, I or D, as well as those who do not:

$$W = \sum_i u_i.$$

After substituting (1), (2) and (3), the social welfare function becomes

$$\begin{aligned} W &= \sum_{i \in D}\left(\frac{1}{S_D}\frac{k_D}{k}\lambda B(k_D) + \frac{1}{S}(1-\lambda)B(k_D)\right) \\ &+ \sum_{j \in I}\left(\frac{1}{S_I}\frac{k_I}{k}\lambda B(k_D) + \frac{1}{S}(1-\lambda)B(k_D)\right) \\ &+ \sum_{l \notin \{D \cup I\}} \frac{1}{S}(1-\lambda)B(k_D) \\ &= B(k_D) \end{aligned}$$

Therefore, from the social point of view, D should win all directorships $(k_D^* = k)$ if D improves the firm value; D should not form at all $(k_D^* = 0)$ if D does not improve the firm value. Let us call the dissident coalition *efficient* if $B(k_D)$ is an increasing function in k_D and *inefficient* otherwise.

1.4. Equilibrium strategies

The purpose of this section is to find the equilibrium strategies for each type of voting, straight and cumulative, and to compare them with the social benchmark. We will show here that the outcome of straight voting is the closest to the social optimum when efficient dissidents form a coalition leading to the formation of a new board and ultimately boosting the shareholder value; cumulative voting tends to deliver socially suboptimal outcomes. We also discuss what can be done to prevent inefficient shareholders from taking part in the election process.

1.4.1 Straight Voting

In this section, we will solve the game for the straight type of voting. In particular, we will explore a few choices that the dissidents and the incumbent have to make:

- whether or not the dissidents decide to contest the election,
- if they do, whether the incumbent opposes the dissidents,
- what sizes the coalitions choose and finally, how they cast their votes.

We are looking for the Subgame Perfect Nash Equilibrium (SPNE) which is the pair of the coalition sizes (S_D^*, S_I^*) from which no coalition wants to deviate (become larger or smaller). We will also look at possible outcomes of the game (formation of the board of directors).

Let us begin with the problem of casting votes.

Recall that under straight voting, the number of votes of a shareholder is equal to the number of shares she owns. Therefore, I has S_I votes and D has S_D votes. A coalition must cast Yes and No votes for each candidate on the ballot.

The equilibrium strategy of the voting subgame is that each faction votes Yes for their candidates and No for the candidates of the opposing group. The reason for this is simple: it allows D to maximize k_D and I to maximize k_I; any deviation from this strategy (voting Yes for candidates of another group) will not bring about any benefit to the shareholder faction while it may reduce chances of their own candidates to being elected. As a result, each nominee of D receives S_D votes and each nominee of I receives S_I votes. The equilibrium outcome of this voting subgame will be as follows: if dissidents cast more votes, the board will consist only of D's candidates; if the incumbent casts more votes, the board will only include I's candidates. In case of a tie, let us assume, for simplicity, that they divide the board[23]. Formally, the number of directors won by D is as follows:

[23] In reality, cases with a tie usually end up in a court of law; there is no established practice yet how to solve such cases; see footnote 1 of Glasser (1959) and Mills (1968), pp. 38-42.

$$
\begin{aligned}
k_D &= k \text{ if } S_D > S_I,\\
&= \tfrac{k}{2} \text{ (the integer of it) if } S_D = S_I,\\
&= 0 \text{ if } S_D < S_I. \qquad (4)
\end{aligned}
$$

Then the payoff of a member of D, given by (1), becomes

$$
\begin{aligned}
u(S_D) &= \tfrac{1}{S_D}\lambda B(k) + \tfrac{1}{S}(1-\lambda)B(k) \text{ if } S_D > S_I,\\
&= \tfrac{1}{2S_D}\lambda B(\tfrac{k}{2}) + \tfrac{1}{S}(1-\lambda)B(\tfrac{k}{2}) \text{ if } S_D = S_I,\\
&= \tfrac{1}{S}(1-\lambda)B(0) \text{ if } S_D < S_I. \qquad (5)
\end{aligned}
$$

Now let us examine how coalitions choose their sizes if they engage in a proxy fight.

Lemma 1.

In equilibrium, coalitions I and D would take half of the shareholder population:

$$S_I^* = S_D^* = 0.5S.$$

Proof. First, notice that no coalition would like to have less members than the opponent (a coalition with less members loses the election). Therefore, each coalition would strive to have as many members as possible and since in our simple model, accepting new members is free, equilibrium coalition sizes must be equal.

Our next argument is that each coalition would take half of S. Suppose that I and D take less than half of the population:

$$S_I^* = S_D^* < S.$$

Suppose D is efficient. Then if D accepts one new member and I keeps its size S_I^*, $S_D > S_I^*$, D wins the election and forms the board. To prevent that, I should accept one new member as well. Obviously, only if each coalition takes half of the shareholder population and cannot accept any more members, the equilibrium takes place. Similarly, if D is inefficient, I would wish to accept one more member and D would do the same and in the equilibrium, they take half[24] of S. QED

Thus, in a proxy fight, the coalitions take on equal sizes, cast the same number of votes and there is tie. The outcome is $k_D = \frac{k}{2}$ (the integer of it) and $k_I = k - k_D$.

[24] In case S is an odd number (half of S is a fraction), we interpret this as some shareholders submitting proxies on fractional shares which is a legitimate practice.

Now let us analyze the choice that the dissidents and incumbent face at the onset of the game: the dissidents must decide if they contest an election, after which the incumbent must decide if they oppose the dissidents.

Consider the incumbent.

If the dissidents contest the election, members of I have a choice: to fight or to dissolve and let the dissidents take over the board. The incumbent decides to fight if the individual payoff of a member exceeds what she would get if I dissolved:

$$\frac{\lambda}{S_I k} k_I B(k_D) + \frac{1}{S}(1-\lambda)B(k_D) > \frac{1}{S}(1-\lambda)B(k). \quad (6)$$

Since $S_I^* = 0.5S$ and $k_D = \frac{k}{2}$, (6) can be re-written as

$$\frac{\lambda}{0.5Sk}\frac{k}{2}B(\tfrac{k}{2})) > \frac{1-\lambda}{S}(B(k) - B(\tfrac{k}{2}))$$

and simplified further as

$$B(\tfrac{k}{2}) > (1-\lambda)B(k). \quad (7)$$

The left-hand side of (7) represents the firm value that will result if the incumbent opposes D. The right-hand side represents what would be left of the firm value if I dissolved, D formed the board and appropriated rent. In other words, the incumbent decides to fight the dissidents if the resulting firm value exceeds the amount that would be available to shareholders under D's rule. Apparently, the only factors that affect the incumbent decision are efficiency of D (values of $B(\frac{k}{2})$ and $B(k)$) and the value of rent (λ).

Let us now examine if the dissidents would contest the election in the first place.

They contest the elecion if the individual payoff is greater than the payoff that she would get if D did not form and I ran the firm unabaited:

$$\frac{1}{S_D}\frac{k_D}{k}\lambda B(k_D) + \frac{1}{S}(1-\lambda)B(k_D) > \frac{1}{S}(1-\lambda)B(0). \quad (8)$$

The left-hand side represents her payoff as a member of D (her share of rent plus dividends) and the right-hand side is her payoff if D did not form in which case $k_D = 0$ and she would only receive dividends.

Let us re-write (8) as

$$\frac{\lambda}{S_D k} k_D B(k_D) > \frac{1-\lambda}{S}(B(0) - B(k_D)). \quad (9)$$

Consider two cases: dissidents are efficient and dissidents are inefficient.

Suppose, dissidents are efficient. They contest the election and form a coalition if (9) holds.

For efficient dissidents, the right-hand side of (9) is negative while the left-hand side is positive for $k_D \geq 1$ since $B(k_D)$ is increasing in k_D. Hence, (9) holds which means that efficient dissidents always contest the election and form a coalition.

The question then becomes "will the incumbent fight D or it will concede the election?". The incumbent would fight if (7) holds.

When (7) does not hold, it means that the dissidents are so efficient that it is better for the incumbent to concede power and benefit from the new firm value (even reduced by rent) than to fight and divide the board. In this case, members of I do not fight the dissidents, I dissolves and D wins. In this case, D would have the minimal size (one shareholder) because D does not need to attract votes and the minimal size of the coalition would maximize the individual share in rent[25]. The SPNE in this case is $S_D^* = 1, S_I^* = 0$; the equilibrium outcome is that D forms the entire board of directors, $k_D = k$.

When (7) holds, it means that the dissidents are only marginally efficient and/or rent is so high that it is worth for I to oppose the dissidents. I and D engage in a proxy fight; the SPNE is $S_I^* = S_D^* = 0.5S$ and the outcome is $k_D = \frac{k}{2}$.

Let us now consider the case of inefficient dissidents. This case is the opposite of the previous one: I, being more efficient, will always want to win the election. To see this, notice that (7) can be re-written as

$$\lambda B(k) > B(k) - B(\tfrac{k}{2}),$$

in which the right-hand side is negative while the left-hand side is positive; (7) holds and I decides to fight D. But will the inefficient dissidents form D knowing that the incumbent will fight them?

The dissidents contest the election and form D only if (9) holds (if the expected gain of private benefits exceeds the loss of dividends).

Since I fights D, $S_I^* = 0.5S$ and $k_D = \frac{k}{2}$, (9) becomes

$$B(\tfrac{k}{2}) > (1 - \lambda)B(0). \qquad (10)$$

[25] Note that such a shareholder would be indeed elected because I dissolved and there is no competition.

The inefficient dissidents contest the election if the resulting firm value, $B(\frac{k}{2})$, exceeds the amount that would be available to shareholders under sole I's rule, $(1-\lambda)B(0)$.

If (10) does not hold (the dissidents are extremely inefficient), the SPNE is that D does not form ($S_D^*= 0$) and the incumbent keeps its original size, denoted by $\underline{S}$, so that $S_I^*= \underline{S}$ (note that in this situation, any shareholder would want to be a member of I to be entitled to rent. Therefore, no current member of I would wish to leave the coalition[26]; on the other hand, I has no need of accepting new members since the election goes uncontested). The outcome of the game is that I forms the board, $k_D= 0$.

If (10) holds (the dissidents are marginally inefficient and/or rent is high), D forms, I and D engage in a proxy fight; the SPNE is $S_D^*= S_I^*= 0.5S$ and the outcome is $k_D=\frac{k}{2}$.

Let us summarize this discussion in the following lemma.

Lemma 2.

- If the dissidents are efficient, they always contest the election and form a coalition.
- If the dissidents are inefficient, the incumbent never dissolves.

All possible equilibrium outcomes are summarized in the following proposition.

Proposition.

- If the dissidents are efficient ($B(k_D)$ is increasing in k_D) and $B(\frac{k}{2}) > (1-\lambda)B(k)$, coalitions I and D take half of the shareholder population each and divide the board:

$$S_D^*= S_I^*= 0.5S \text{ and } k_D= \frac{k}{2}.$$

- If the dissidents are efficient and $B(\frac{k}{2}) \leq (1-\lambda)B(k)$, the incumbent dissolves, the dissident coalition consists of one member and forms the entire board:

$$S_D^*= 1,\ S_I^*= 0 \text{ and } k_D= k.$$

[26] Note that in our model, there is no procedure for excluding existing members from a coalition so that I can either get larger or keep its orginal size.

- If the dissidents are inefficient $\left(B(k_D)\right.$ is decreasing in $\left.k_D\right)$ and $B(\frac{k}{2}) > (1-\lambda)B(0)$, coalitions I and D take half of the shareholder population each and divide the board:

$$S_D^* = S_I^* = 0.5S \text{ and } k_D = \frac{k}{2}.$$

- If the dissidents are inefficient and $B(\frac{k}{2}) \leq (1-\lambda)B(0)$, the dissidents do not form a coalition and the incumbent forms the entire board:

$$S_D^* = 0,\ S_I^* = \underline{S} \text{ and } k_D = 0.$$

Are these equilibrium outcomes socially optimal? From the point of social welfare, it is optimal if efficient dissidents win all seats on the board and inefficient ones do not contest the election. This social optimum is achieved when dissidents are efficient and the incumbent dissolves; similarly, it is achieved when dissidents are inefficient and decide not to contest the election. In all other cases, however, the outcome of the election is suboptimal. Specifically, if dissidents are efficient and the incumbent fights, they can only form half of the board. Alternatively, if they are inefficient, they may still contest the election and win half of directorships. How can these two situations be prevented? It would be socially optimal if the incumbent did not oppose the efficient dissidents (for that, we need (7) to fail); it would also be optimal if the inefficient dissidents abstained from forming D (for that, we need (10) to fail):

$$B(\tfrac{k}{2}) \leq (1-\lambda)B(k). \qquad (11)$$

for efficient dissidents and

$$B(\tfrac{k}{2}) \leq (1-\lambda)B(0). \qquad (12)$$

for inefficient ones.

As (11) and (12) show, rent (private benefits of control) plays crucial role here. In order to see this role, consider two extreme cases. First, suppose, the board does not appropriate any rent $(\lambda = 0)$ and allocates the whole firm value to shareholders. In this case, (11) and (12) would always hold true and the outcome would be socially optimal. Consider the opposite case when the incumbent appropriates the whole firm value $(\lambda = 1)$ and leaves nothing to shareholders. Then (11) and (12) would never hold true[27] and the outcome of the game would never be socially optimal. The real-world rent is most likely in between these two extremes. Private benefits of control are always present and they cause distortions. It is rent that creates the opportunity (and the incentive) for inefficient shareholders to enter the election and may result in inefficient directors running the company. Similarly, it is rent that motivates the incumbent to oppose efficient dissidents and prevent them from taking over the company. The obvious policy recommendation is to make every effort to reduce private benefits of control. What we need is to make directors more accountable to shareholders and to give shareholders greater say on directors' compensation. In this light, we may consider the heavily-criticized Sarbanes-Oxley Act and the Dodd-Frank Act as steps in the right direction: these legislative acts have strengthened accounting controls, enhanced transparency of corporate finances, and charged directors with more accountability[28]. Also, we support proposals to boost shareholders' influence on directors' compensation[29].

1.4.2 Cumulative Voting

In this section, we will study the three choices that the dissidents and incumbent face under cumulative voting:

- whether or not the dissidents decide to contest the election,
- if they do, whether or not the incumbent opposes the dissidents,
- what sizes D and I choose and
- how D and I cast their votes.

We are looking for the Subgame Perfect Nash Equilibrium, the pair of optimal coalition sizes S_D^* and S_I^*.

Solving these problems backwards, we start with the problem of casting votes.

Recall that under cumulative voting, a shareholder (or a coalition of shareholders) has as many votes as the number of shares multiplied by the number of directorships.

[27] Recall that we assumed that $B(k_D)$ is positive for any k_D.

[28] See Coates (2007) and the discussion of the issue in Journal of Accounting and Economics (2007), Vol. 44, pp. 74 - 165.

[29] See Bebchuk (2005) for the in-depth discussion.

Thus, if I accumulated S_I shares and D accumulated S_D shares, I has kS_I votes and D has kS_D votes. At the shareholder meeting, I and D cast their votes, votes are tabulated and the new board of directors is formed. The problem of how to cast votes was solved by Glasser (1959) and Glazer et al. (1984): if the shareholder group D controls S_D shares and I controls S_I shares, D will elect the largest value of k_D for which the following inequality holds:

$$\text{integer}\frac{kS_D}{k_D} > \text{integer}\frac{kS_I}{k+1-k_D} \qquad (13)$$

Let us briefly review how Glasser arrived at this result. First, note that D has kS_D votes and I has kS_I votes. Suppose D wishes to elect k_D directors and distributes its votes among k_D candidates more or less equally (up to an integer). I intends to prevent that, i.e. I wishes to elect $k - k_D+1$ directors (or more). If (13) holds, every one of k_D candidates receives more votes than I can possibly cast for its candidates. Thus, I cannot stop D from electing k_D directors and D wins k_D directorships.

Let us denote the number of directors that D wins according to (13) as $k_D(S_D)$, the function of D's size. Apparently, I wins $k - k_D(S_D)$ directorships since I cannot get more and there is no gain from electing less.

Notice that a dissident team would find it extremely difficult to win all director positions. According to (13), D gains the number of directorships roughly proportionate to the number of shares D has. Therefore, if D wishes to win all k seats, D has to include all shareholders in the coalition – an impossible task given that some shareholders belong to I. Only if I includes a very small number of members, D would be able, theoretically, to elect all of the directors. Whether D would seek to do it, is another question that is discussed below.

The fact that dissidents do not usually replace the board entirely, is a welcome fact if dissidents are inefficient: they may gain some representation on the board and damage the firm value but they will not take over the firm entirely. However this outcome is less welcome if dissidents are efficient.

Let us analyze the equilibrium outcomes formally. If I and D engage in a proxy fight, they must choose coalition sizes S_I and S_D. These problems can be represented as the following maximization problems:

$$max_{S_I \in [\underline{S}, S-S_D]} \frac{1}{S_I}\frac{k-k_D(S_D)}{k}\lambda B(k_D(S_D)) + \frac{1}{S}(1-\lambda)B(k_D(S_D)) \quad (14)$$

$$\text{and } max_{S_D \in [1, S-S_I]} \frac{1}{S_D}\frac{k_D(S_D)}{k}\lambda B(k_D(S_D)) + \frac{1}{S}(1-\lambda)B(k_D(S_D)). \quad (15)$$

(14) and (15) show that I and D are choosing coalition sizes S_I and S_D to maximize individual payoffs given by (1) and (2). Let us denote S_I and S_D that solve (14) and (15) as $\widetilde{S_I}$ and $\widetilde{S_D}$.

The incumbent opposes the dissidents if

$$\frac{1}{\widetilde{S_I}}\frac{k-k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) + \frac{1}{S}(1-\lambda)B(k_D(\widetilde{S_D})) > \frac{1}{S}(1-\lambda)B(k).$$

In other words, the incumbent opposes D if the expected payoff of a member exceeds what she would get if I dissolved and D formed the entire board. This condition can be re-written as

$$\frac{1}{\widetilde{S_I}}\frac{k-k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) > \frac{1-\lambda}{S}(B(k) - B(k_D(\widetilde{S_D}))). \quad (16)$$

Now consider the dissidents. They contest the election and form a coalition if they expect to receive a payoff higher than otherwise: the payoff of a member of D should be greater than the payoff that she would get if D did not form at all and I continued to manage the firm:

$$\frac{1}{\widetilde{S_D}}\frac{k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) + \frac{1}{S}(1-\lambda)B(k_D(\widetilde{S_D})) > \frac{1}{S}(1-\lambda)B(0).$$

This condition can be re-written as

$$\frac{1}{\widetilde{S_D}}\frac{k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) > \frac{1-\lambda}{S}(B(0) - B(k_D(\widetilde{S_D}))). \quad (17)$$

Notice that if the dissidents are efficient ($B(k_D)$ is increasing in k_D), the right-hand side of (17) is negative while the left-hand side is positive for $k_D \geq 1$; hence, (17) holds true. Therefore, we conclude that if the dissidents are efficient, they always contest the election and form D. Similarly, if the dissidents are inefficient, (16) holds true and the incumbent always opposes them.

Let us summarize this discussion in the following lemma.

Lemma 3.

- If the dissidents are efficient, they always contest the election and form a coalition.
- If the dissidents are inefficient, the incumbent never dissolves.

Let us see what the equilibrium outcomes are. The dissidents contest the election and form D only if (17) holds true. If (17) does not hold true, $S_D^*= 0$, $S_I^*= \underline{S}$ and $k_D = 0$. Otherwise, D forms and the incumbent will oppose D only if (16) holds true. Hence, if (16) fails, I will dissolve and D will win all k seats on the board. The size of D in this case will be minimal, $S_D^*= 1$, $S_I^*= 0$ and $k_D^*= k$. Such a case may occur when the dissidents are so efficient that no private benefits can possibly compensate I for the loss of dividends. However if the dissidents are not that efficient, (16) holds true, I will oppose D, in which case the equilibrium outcome will be as follows: $S_D^*= \widetilde{S_D}$, $S_I^*=\widetilde{S_I}$, $k_D^*= k_D(\widetilde{S_D})$ and $k_I^*= k - k_D(\widetilde{S_D})$.

Lemma 4.

- If the dissidents are efficient and the incumbent does not expect to compensate the loss of dividends by rent, the incumbent dissolves, the dissident coalition consists of one member and forms the board.

Formally, if $B(k_D)$ is increasing in k_D and

$$\frac{1}{\widetilde{S_I}} \frac{k-k_D(\widetilde{S_D})}{k} \lambda B(k_D(\widetilde{S_D})) \leq \frac{1-\lambda}{S}(B(k) - B(k_D(\widetilde{S_D}))).$$

then $S_D^*= 1$, $S_I^*= 0$ and $k_D= k$.

- If the dissidents are inefficient and do not expect to compensate the loss of dividends by rent, D does not form and the incumbent forms the board.

Formally, if $B(k_D)$ is decreasing in k_D and

$$\frac{1}{\widetilde{S_D}} \frac{k_D(\widetilde{S_D})}{k} \lambda B(k_D(\widetilde{S_D})) \leq \frac{1-\lambda}{S}(B(0) - B(k_D(\widetilde{S_D})), \text{ then}$$

$S_D^*= 0$, $S_I^*= \underline{S}$ and $k_D= 0$.

This lemma leaves open the question how I and D choose $\widetilde{S_I}$ and $\widetilde{S_D}$ when they engage in a proxy fight. Coalition sizes $\widetilde{S_I}$ and $\widetilde{S_D}$ solve the maximization problems (14) and (15) and we cannot solve these problems analytically because function $k_D(S_D)$, given by (13), is not differentiable. Instead, we can use numerical simulations to predict most likely strategies of the dissidents and the incumbent. Here, we will present the results of simulations for three types of firms: small, medium and large. These firms will be represented by three investment indices that measure small-, mid- and large-cap public companies in the USA, the Russel 2000 Index, the Russel Midcap Index and the Russel 1000 Index, respectively. For values of S, k and $\underline{S}$, we use the median numbers of shares, directorships and the incumbent ownership[30] for the top 10 firms in each index (see Appendix). For rent, we use $\lambda = 0.14$, which is the average value of private benefits of control estimated by Dyck and Zingales (2004). To model the relationship between the firm value B and dissident representation k_D, we assume that

$$B(k_D) = k_D^{\alpha} + 1,$$

where parameter α takes values 0.5, 1 and 2 to allow for possible non-linearity of the relationship: $\alpha = 0.5$ will simulate the case when gains from efficient directors are diminishing ($B(k_D)$ is concave); $\alpha = 1$ will simulate the linear case and $\alpha = 2$ will model the case when efficient directors boost the firm value at the increasing rate ($B(k_D)$ is convex). Notice that in all cases, $B(k_D)$ is increasing in k_D and hence, the dissidents are efficient.

Equilibrium outcomes are as follows:

Table 1.1

Equilibrium outcomes if dissidents are efficient: the concave case ($\alpha = 0.5$)

	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	1.95%	33% (3 out of 9 seats)
The medium firm	1.90%	0.81%	22% (3 out of 9)
The large firm	0.15%	0.05%	27% (3 out of 11)

Table 1.2

Equilibrium outcomes if dissidents are efficient: the linear case ($\alpha = 1$)

	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	6.83%	67% (6 out of 9 seats)
The medium firm	1.90%	1.90%	56% (5 out of 9)
The large firm	0.15%	0.15%	55% (6 out of 11)

[30] For data on incumbent ownership, we use ownership by companies' directors and executives, available on the SEC's website, www.sec.gov.

Table 1.3

Equilibrium outcomes if dissidents are efficient: the convex case ($\alpha = 2$)

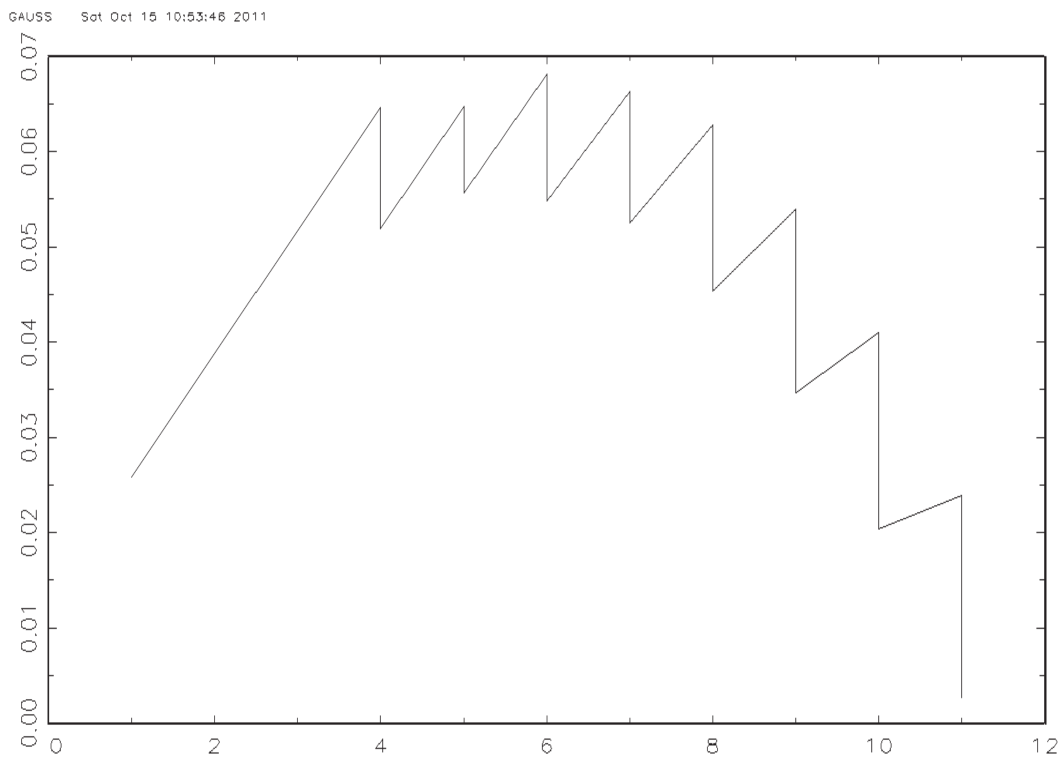
	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	18.20%	89% (8 out of 9 seats)
The medium firm	1.90%	4.43%	78% (7 out of 9)
The large firm	0.15%	0.30%	73% (8 out of 11)

These results point to an important observation: efficient dissidents do not usually attempt to win the entire board. They certainly are able of doing so, especially in medium and large firms, due to small numbers of shares held by incumbents, but they decide not to do it. They leave the remaining seats to the incumbent. This result is specific to cumulative voting since under straight voting, dissidents would win all or half or none of the seats. It would be socially optimal if efficient dissidents won all directorships, however under cumulative voting, it does not happen. The outcome closest to the optimum is when efficient dissidents win the majority of seats and as simulations show, this outcome is most likely to happen in small firms. As firms get bigger (S gets larger and ownership gets less concentrated), outcomes of elections get worse (efficient dissidents gain less of representation). Large firms are likely to have the worst outcomes possible when efficient dissidents win the least number of seats.

Our simulations point to another observation: the incumbent coalition tends to keep its original size. Members of I could have accepted new members, collected more votes and won more seats but if they did so, they would have to share private benefits of control among more members. Thus, the incumbent coalition finds it more beneficial to let dissidents win a few seats but hold onto the remaining seats.

The same considerations prevent D from getting larger and electing more directors. Figure 1.1 shows the dissident's payoff as the function of the number of directorships gained by D for a large firm (the objective function in (15)) in the linear case. This function achieves its maximum at $k_D = 6$ and falls dramatically thereafter: although a larger coalition might win more directorships and hence, gain higher rent, it would also have to divide this rent among more members, thus, reducing individual payoffs. As a result, the dissidents would have an incentive to keep D small.

Figure 1.1 Individual payoff of a member of D as a function of directorships won by D (D is efficient).



Let us now consider the outcome involving inefficient dissidents. Let us model this inefficiency by assuming that the firm value takes the following form:

$$B(k_D) = -ak_D^{\alpha}+1,$$

where $a > 0$.

As Lemma 3 states, the incumbent will not concede power. The dissidents are likely to form D if (17) holds true. The right-hand side of (17) is the amount of dividend losses resulting from inefficient dissidents winning representation on the board. The left-hand side is the amount of private benefits that dissidents receive if elected. Thus, inefficient dissidents form a coalition only if private benefits exceed the loss of dividends. This condition may or may not hold true in practice. For our data set, simulations show that if the coefficient a is below -0.08 (dissidents are very inefficient), D does not form; however if it is between -0.08 and 0 (dissidents are marginally inefficient), they form a coalition and contest the election. For example, for $B(k_D) = -0.05k_D^{\alpha}+1$, equilibrium outcomes are as follows:

Table 1.4

Equilibrium outcomes if dissidents are inefficient: the convex case ($\alpha = 0.5$)

	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	0.51%	11% (1 out of 9 seats)
The medium firm	1.9%	0.21%	11% (1 out of 9)
The large firm	0.15%	0.01%	9% (1 out of 11)

Table 1.5

Equilibrium outcomes if dissidents are inefficient: the linear case ($\alpha = 1$)

	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	0.51%	11% (1 out of 9 seats)
The medium firm	1.9%	0.21%	11% (1 out of 9)
The large firm	0.15%	0.01%	9% (1 out of 11)

Table 1.6

Equilibrium outcomes if dissidents are inefficient: the concave case ($\alpha = 2$)

	S_I^*(% of S)	S_D^*(% of S)	Dissidents win
The small firm	4.55%	0	0
The medium firm	1.9%	0	0
The large firm	0.15%	0	0

Table 1.4 represents the case when dissidents damage the firm value at increasing rate. In such a case, the loss of dividends proves to be larger than private benefits of control and D does not form. In other cases, when dissidents affect B at linear or diminishing rate, the interesting result is that inefficient dissidents would form a small coalition in order to win just one seat. The following figure shows how the individual payoff would change if D won more than one directorship (for a large firm with $B(k_D) = -0.05k_D+1$).

Figure 1.2. Individual payoff of a member of D as a function of directorships won by D (D is inefficient).

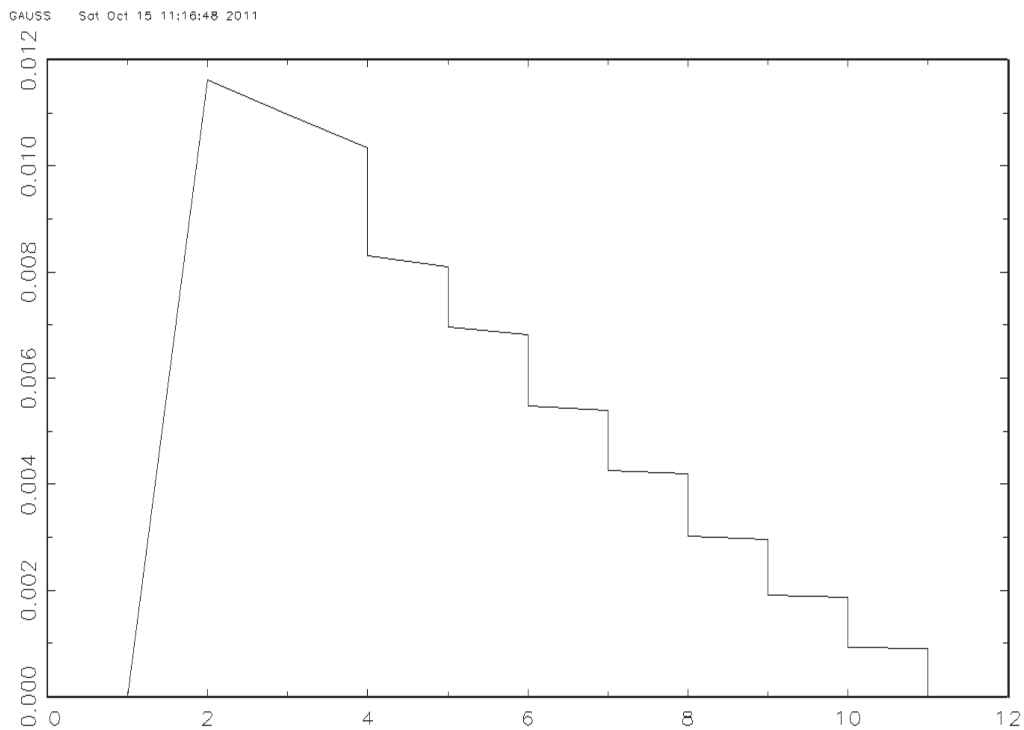


Figure 1.2 shows that the individual payoff gets a boost if D wins one seat and gains its share of rent. However if D gets larger and wins more seats, two effects come into play: first, inefficient dissidents damage the firm value (hence, the amount of dividends) and second, they have to share rent among more members. These two forces lower individual payoffs. Thus, it is best for D to elect one director, but not more.

Also note that in the equilibrium, I maintains its original size and D is just big enough to win one seat. The reason for I maintaining its original size is the same as before: members of I seek to keep their coalition small so that they would not have to share rent with new members. On the other hand, I cannot decrease in size because no existing member of I would leave the coalition (he does not want to lose his share of rent). Similar considerations keep D small as well.

Let us now discuss social implications of cumulative voting. Recall that it is socially optimal if efficient dissidents win all directorships and inefficient ones do not win any. This optimum is hard to achieve under cumulative voting. If dissidents are efficient, they will most likely win just a few seats on the board, and if they are inefficient, they are still capable of electing a director. The reason for suboptimal outcomes is rent. First, observe that the social optimum would occur under the following conditions:

- If dissidents are efficient, the incumbent dissolves (condition (16) does not hold) and
- If dissidents are inefficient, they do not contest the election (condition (17) does not hold).

Formally,

$$\frac{1}{\widetilde{S_I}}\frac{k-k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) \leq \frac{1-\lambda}{S}(B(k) - B(k_D(\widetilde{S_D}))). \qquad (18)$$

if dissidents are efficient and

$$\frac{1}{\widetilde{S_D}}\frac{k_D(\widetilde{S_D})}{k}\lambda B(k_D(\widetilde{S_D})) \leq \frac{1-\lambda}{S}(B(0) - B(k_D(\widetilde{S_D})) \qquad (19)$$

if dissidents are inefficient.

If there were no rent, $(\lambda = 0)$, (18) and (19) would always hold true and the outcome would be socially optimal. In contrast, if rent was 100% of firm value $(\lambda = 1)$, (18) and (19) would never hold true and the outcome would always be suboptimal.

In the real life, rent (private benefits of control) is likely between 0 and 100%; hence, outcomes of corporate elections may be sometimes beneficial, sometimes inferior for shareholders. Rent creates a powerful incentive for dissidents to win representation on the board while damaging firm value along the way. Rent prevents efficient dissidents from forming a large coalition that would take over the board and improve firm value. Thus, we have arrived at the same policy recommendation as earlier: the reduction of private benefits for those in control. If policymakers and shareholders push for policies that reduce private benefits of control, inefficient shareholders will be less likely to launch proxy fights and efficient shareholders will be more likely to replace underperforming directors.

Another policy implication arises if we look at conditions (18) and (19) and the role that S, the total number of shares, plays. The smaller the value of S, the more likely (18) and (19) hold true for given $\widetilde{S_D}$. With small S, dividend losses are larger and an inefficient coalition (I or D) would find it less beneficial to contest the election. Large values of S, on the other hand, make the loss of dividends insignificant and hence, entering the election becomes more attractive. Simulations also point out that with small S, efficient dissidents form larger coalitions and win more seats as a percentage of the total number of seats.

We, thus, observe that small values of S are more beneficial for the society. In terms of our model and our assumption that all shareholders own one share each, small values of S imply a more concentrated ownership. Thus, for the case of cumulative voting, we favour concentrated ownership over dispersed ones. Whether dispersed or concentrated ownership is more efficient has been the topic of much debate[31]. Our study adds to this debate by showing that dispersed ownership may result in inefficient shareholders seizing control of a company while concentrated ownership serves as a natural barrier against such raiders. In reality, shareholder ownership used to be very dispersed in the early 20th century but, as La Porta et al. (1999) showed, it has gotten more concentrated over time. As our analysis suggests, this trend may be a positive development that should be encouraged.

1.4.3 Comparison

In this section, we attempt to compare straight and cumulative voting from the social point of view. We do it by calculating the amount of rent that would result in the socially optimal outcome. Specifically, for the social optimum to occur, rent must be low enough to discourage inefficient dissidents from entering the contest; it must also be low enough to encourage incumbents to dissolve when dissidents are efficient.

Under straight voting, the social optimum takes place if (11) holds for efficient dissidents and (12) for inefficient ones. Similarly, under cumulative voting, rent must satisfy (18) for efficient dissidents and (19) for inefficient dissidents.

Let us fix an efficiency level of the dissidents and derive values of rent that satisfy (11), (12), (18) and (19). Suppose, the dissidents are efficient and firm value is

$$B(k_D) = k_D + 1.$$

Then we can derive restrictions on rent which would deliver the socially optimal outcome. We present those conditions in the table below.

[31] See Shleifer and Vishny (1997) for the literature review.

Table 1.7

Values of rent that would facilitate the socially optimal outcome when dissidents are efficient

	Straight voting	Cumulative voting
The small firm	Rent cannot exceed 40%	Rent cannot exceed 4%
The medium firm	Rent cannot exceed 40%	Rent cannot exceed 2%
The large firm	Rent cannot exceed 42%	Rent cannot exceed 0.1%

Table 1.7 shows that under cumulative voting, rent must be extremely low, almost 0%, for the social optimum to take place. Real-life rent is arguably greater than such low values of 0.1%, 2% and 4% (Dyck and Zingales (2004) estimate it to be 14%) which means that cumulative voting would likely result in inefficient incumbents holding onto corporate boards. In contrast, straight voting may facilitate incumbents to yield to efficient dissidents; thus, straight voting makes occurrence of the social optimum much more likely.

Consider now inefficient dissidents and suppose that firm value is

$$B(k_D) = -0.05k_D + 1.$$

Then the following values of rent would bring about the social optimum.

Table 1.8

Values of rent that would facilitate the socially optimal outcome when dissidents are inefficient

	Straight voting	Cumulative voting
The small firm	Rent cannot exceed 25%	Rent cannot exceed 3.6%
The medium firm	Rent cannot exceed 25%	Rent cannot exceed 1.7%
The large firm	Rent cannot exceed 30%	Rent cannot exceed 0.3%

Cumulative voting would most likely allow inefficient shareholders to contest an election and win directorships while straight voting would discourage them from doing so. Similarly to the previous case, straight voting looks superior to cumulative voting.

We would like to qualify this result by the following. Our result is based on the assumption that function $B(k_D)$ is monotone (increasing if dissidents are efficient and decreasing otherwise). If we were to consider a function that had a maximum at $0 < k_D^* < k$, then cumulative voting might be more preferred since it would allow the dissidents to win a certain number of seats rather than all or none of them. In this chapter, we have focused on the simple case when dissidents either improve or damage shareholder value. We view this setup as most realistic because the newly elected board will ultimately improve or damage the firm performance. However one might argue that in some cases, it would be socially optimal when a dissident group gains some representation on the board but not the whole board. It might be the case with the "special interest" shareholder groups such as environmental activists, unions, pension plans, hedge funds, etc. Thus, results of this chapter are most applicable to public companies whose shareholders are homogenous and do not have any specific interests other than earning dividends and receiving private benefits of control.

1.5 Conclusion

In this paper, we have modeled two types of voting in corporate elections, straight and cumulative. This approach can help us understand rising shareholder activism and predict most likely outcomes of proxy contests. It can also help us suggest specific policies that would discourage inefficient shareholders from contesting elections. The main insight of our study is this:

- in order to improve outcomes of corporate elections, authorities and shareholders should make every effort to reduce private benefits of control;
- corporate elections should be conducted under straight voting rules; our study cautions against use of cumulative voting.

We have shown that private benefits of control is the main cause of inefficiency in corporate elections. If there were no such benefits, corporate elections would always result in the socially optimal outcomes: efficient dissidents would be elected as new directors while inefficient ones would not contest the elections. But in reality, private benefits of control exist and result in suboptimal outcomes. The higher the private benefits of control, the less efficient corporate elections. To reduce private benefits of control, policymakers and shareholders should push for policies that give shareholders a greater say on directors compensation and make boards more transparent and accountable.

Our second insight is that straight voting seems to be superior to cumulative one (with qualifications discussed in the previous section). Under the straight voting system, efficient shareholders are more likely to replace underperforming directors and improve shareholder value – the outcome is socially optimal. In contrast, cumulative voting allows inefficient shareholders to contest an election, win representation on the board (one director seat as our simulations suggest) and to gain their share of private benefits of control. Intuitively, the main difference between two types of voting is that cumulative voting allows for minority representation on the board while straight voting employs "the winner takes all" approach. Thus, cumulative voting can be used by dissident shareholders to fight for their share of "a corporate pie" while straight voting demands them to fight for the whole board and it turns out that efficient shareholders are more likely to engage in such a fight than inefficient ones.

Cumulative voting is not allowed in many advanced countries (the UK, Australia, France, Germany, Ireland) but is allowed in Canada, US, Japan[32]. In the US, cumulative voting becomes less and less common: if in the past, nearly half of the American states required companies to use cumulative voting in the board elections, currently most states leave it up to companies and most companies have eliminated the possibility of cumulative voting from their by-laws. Nevertheless, it is not uncommon for the US and Canada when dissident shareholders press the companies to adopt cumulative voting (such proposals rarely receive shareholder support). Our study suggests that this less frequent use of cumulative voting is a healthy development.

However if cumulative voting remains common in corporate practice, we argue in favour of moderately concentrated ownership of public companies. This argument goes against the classical view of Berle and Means (1933) that claims that highly dispersed ownership is necessary for separation of ownership from management. We have shown that in companies with dispersed ownership, it is easier for inefficient shareholder groups to win the election, appropriate the firm's resources and ultimately damage shareholder value. A more concentrated ownership would provide a natural barrier against such raidings.

[32] See Table 2 in La Porta et al. (1998).

In Chapter 1, we studied shareholders' right to form a coalition and to challenge the current board of directors. In the next chapter, we consider shareholder rights in a broader context. We ask the question why shareholder rights differ so much across the countries.

Chapter 2.

Why investor protection differs across the countries

Why do shareholders have different rights in different countries? In the UK, for example, shareholders are allowed to vote by mail, they have the first opportunity to buy newly issued shares, their shares are not blocked before a shareholder meeting, etc.[33]. In Belgium, shareholders have none of such rights. In Japan and Taiwan, for example, shareholders can call an extraordinary shareholder meeting with as little as 3% of share capital while in Mexico, they must have at least 33%. Researchers have noted that strong investor protection is associated with more developed equity markets[34] and better firm performance[35] which begs the question: why would not all countries have strong investor protection?

In the majority of modern corporations, ownership and control are separated[36]. Shareholders, who are legal owners of corporations, supply funds to firms and elect directors, directors hire managers and managers run firms on a daily basis. This separation of ownership and control creates the major problem of corporate governance: how do shareholders "assure themselves ... of getting anything back" (Shleifer and Vishny (1997))? In order to make sure that investors receive return on their investment and directors do not just steal their money, a complicated system of legal rules and public institutions was put in place in most countries. This system (known as investor protection) gives shareholders certain rights to hold directors accountable and to replace them, if necessary. There are, however, stark differences in the degree of investor protection across countries. Why is it the case? Why do some countries have specific laws and public institutions designed for the protection of shareholders while other countries give shareholders only nominal powers and minimal legal protection? More importantly, why can't investors in countries with the little amount of protection challenge the situation and demand more rights? And why today, in the globalized world, being a shareholder in Belgium is still quite different from being a shareholder in the UK?

These are the questions we investigate in this paper.

[33] La Porta et al (1998).
[34] La Porta et al (2000).
[35] Brown and Caylor (2009).
[36] See the classical work by Berle and Means (1933) on this topic.

The most accepted view is that differences in corporate governance result from differences in the origin of the legal system (proposed by La Porta et al. (1998), hereafter La Porta). La Porta has found strong correlation between investor protection and the legal system: countries with a common-law system tend to have strong investor protection while the civil-law countries have a weak one. While this view is one of the most accepted, it has recently come under criticism. Lamoreaux and Rosenthal (2005) showed that in the 19th century, it was France, rather than the US, that had the best investor protection and the most developed equity market. Rajan and Zingales (2003) showed that in the early 20th century, financial systems were quite similar across many countries and only after World War II, the US and UK moved to enhance shareholder rights while the European countries did not follow the suit. Rajan and Zingales called this phenomenon "the great reversal". Perotti and von Thadden (2006) attempt to explain "the great reversal" by changes in the distribution of financial wealth. In countries that experienced sudden high inflation (as was the case in Austria and Germany in the 1920s), savings of the middle class were wiped out which led to the median voter favouring a strong role for banks or large investors. In such countries, investor protection has remained weak. In contrast, in countries with low inflation (as was the case in the US and the UK), financial wealth was becoming increasingly dispersed and the median voter (whose financial stakes were growing over time) supported greater investor protection.

Second point of criticism of La Porta's theory, put forward by Pagano and Volpin (2005), is that corporate rules, laws and customs are not set for good; they may change over time and we need to understand how and why these rules change. Pagano and Volpin (2005) explain differences in investor protection by differences in electoral systems. They argue that countries with proportional electoral system have weaker investor protection than countries with majoritarian system. The problem with this approach is that countries with the English legal origin tend to have the majoritarian electoral system rather than the proportional one; therefore, it is possible that Pagano and Volpin observed a different aspect of the same phenomenon that La Porta observed. To illustrate this, we replicate data from Pagano and Volpin (2005) in Table 2.1 on proportionality of the electoral system and English legal origin. The correlation coefficient is -0.6362, significant at 1% level.

In the table below, proportionality index ranges from 3 for countries in which all seats of the parliament are assigned according to a proportional rule to 0 for countries in which no seats are assigned by this rule. The data are from Pagano and Volpin (2005). English legal origin is a dummy variable: it equals 1 if the origin of the legal system is the English law and 0 if it is French, German or Scandinavian, based on La Porta.

Table 2.1 Electoral Rules and English Legal Origin

Country	**Proportionality**	**English legal origin**
Australia	1	1
Austria	3	0
Belgium	3	0
Canada	0	1
Denmark	3	0
Finland	3	0
France	1	0
Germany	2	0
Greece	2	0
Ireland	3	1
Italy	3	0
Japan	0	0
Netherlands	3	0
New Zealand	0	1
Norway	3	0
Portugal	3	0
Spain	2	0
Sweden	3	0
Switzerland	2	0
UK	0	1
US	0	1

A different explanation was proposed by Bebchuk and Neeman (2010) who viewed investor protection as a result of the lobbying game when interest groups compete for influence over politicians. These groups (corporate insiders, institutional investors and entrepreneurs) make campaign contributions to politicians in order to lobby their interests. As Bebchuk and Neeman (2010) showed, this game may result in inefficiently low levels of investor protection.

All of these points of view study investor protection from the perspective of the political economy. They assume that it is politicians who decide on a level of investor protection, while ordinary shareholders have no initiative in this process (aside from electing those politicians or making monetary contributions to their campaigns). Our approach is different. We argue that behind each political decision, there are economic interests of individual shareholders and directors. Rules set by politicians reflect, rather than define, economic reality. Most shareholder-related issues are resolved at the level of an individual firm. They are addressed by corporate bylaws, charters and resolutions of shareholder meetings. Even when laws prescribe certain rules, shareholders are most often capable of changing or even opting out of them. Consider, for example, the United States which is said to have the strongest investor protection[37]. In the US, cumulative voting is allowed by state laws but most corporate charters ban it; companies are allowed to issue shares with different voting rights, however most companies adopt "one share-one vote" rule; the state laws allow shareholders with 10% of share capital to call an extraordinary shareholder meeting but some companies raise this threshold above 10%, etc. On the other hand, if a country has low investor protection, companies are still able to give shareholders greater rights. Thus, standards for investor protection are effectively at the discretion of shareholder meetings of public firms. That is why we believe that in order to understand investor protection, one must first understand what drives individual shareholders.

We approach the problem of investor protection as a traditional agency problem. The idea of the agency problem is the separation of control and ownership. Shareholders provide public firms with capital meaning they are rightful owners of these companies. However, once they part with their money, they have a limited amount of control over the firms' decisions. The only opportunity for them to exercise control takes place during an annual shareholder meeting when they elect the board of directors. The directors are supposed to act in the interests of shareholders. They are supposed to hire professional managers, supervise and guide them to ensure that shareholders' interests are well taken care of; however there is asymmetric informa-

[37] See Table 2 at La Porta et al. (1998); also Figure 2 at Pagano and Volpin (2005).

tion. Shareholders cannot observe the decisions that directors are making. "Boards have traditionally been described as ineffective rubber- stampers controlled by, rather than controlling, management" (Tirole (2006), p.30). While directors know if they act in shareholders' interests, shareholders have no way of potentially knowing. All information they receive pertains to the amount of accounting earnings of the firm. Although earnings might point out to quality of directors' efforts, they may also be the product of economic conditions, changes in demand or sheer luck. To keep directors in check, shareholders need investor protection. Investor protection means having rights when it comes to limiting the power of directors.

We model the choice of investor protection as a variation of the agency problem when the principal (shareholders) contracts the agent (directors) to perform some type of work on behalf of the principal. Shareholders cannot observe, verify or control the efforts of the directors. Shareholders have to choose the degree of investor protection; higher investor protection makes directors more accountable to shareholders and therefore, motivates them to exert proficient efforts.

We model investor protection as the probability that shareholders vote a director out if the firm's results are poor. The rational behind it is that shareholders' rights are meaningful only if shareholders are able to oust the incumbent directors and elect new ones. As La Porta pointed out, "shareholders receive dividends *because* they can vote out the directors who do not pay them". Therefore, all various rights of investors can be summarized by a single, all-important right to vote directors out. In countries with strong investor protection, directors of underperforming firms are more likely to lose their jobs while in countries with weak protection, they are likely to stay. We can assume that it is insufficient dividends which trigger ousting of directors and the assumption is consistent with the empirical research. De Angelo (1989) and Pound (1988) show that low earnings often result in investor activism[38].

Establishing investor protection means sacrifice. If a company enhances shareholder rights, it will inevitably bear expenses. If, for example, a firm allows its shareholders to vote by proxy, they are obligated to hire a team of lawyers and independent tabulators. If dissatisfied shareholders are allowed to sell their shares to the firm (the "oppressed minorities mechanism"), the firm must have enough cash to spend. If shareholders are allowed to call an extraordinary shareholder meeting, the

[38] Surprisingly, falling stock prices don't trigger investors activism.

firm will incur the cost of the meeting. The cost of investor protection has to be paid out of dividends, thus, reducing shareholders' payoffs. One can see that the choice of investor protection involves a tradeoff: greater investor protection will motivate directors to work harder but it reduces payoffs of shareholders.

Notice the difference between our approach and the traditional agency problem[39]. In the agency problem, a principal sets wage for an agent and then the agent carries out a certain effort. In our model, shareholders choose a level of investor protection and then directors carry out certain efforts. The difference between these two approaches (shareholders set investor protection rather than directors' wages) reflects the reality. In the real life, shareholders cannot set or even influence directors' compensation. In some cases, shareholders had the power to push for an advisory vote on directors' and executives' compensation (a so-called "say on pay") but such votes are mere recommendations and have no binding power (with the exception of Netherlands). Research shows that even when such advisory votes were passed by shareholders, they had no significant impact on the corporate pay levels (see Karpoff, Malatesta, and Walkling (1996), Gillan and Starks (2000)). All that shareholders can do is to make an attempt to oust unsatisfactory directors. Unfortunately, this "ousting" is not a sure thing. The process of electing directors is riddled with restrictions, complex procedures, legal battles and even if the majority of shareholders want to replace directors, it may, or may not, happen. Thus, if shareholders wish to make ousting directors easier to do, they should fight for their rights and strengthen those institutions that protect them – in other words, they should strengthen investor protection.

Our analysis yields two main results. The first result is that investor protection exists because of asymmetric information. We consider two cases: the case of perfect information and the case of asymmetric information, showing that if there were perfect information, shareholders would not set any investor protection. If shareholders had the option of demanding certain actions from the directors, they would not need a costly investor protection. An example would be a venture capitalist who finances a startup of an entrepreneur. The capitalist usually signs a contract with the entrepreneur in which she explicitly demands a certain level of effort (for example, specifying

[39]Ross (1973), Harris and Raviv (1978), Shavell (1979); see also Macho-Stadler and Perez-Castrillo (2001) for literature review.

a number of working hours is not uncommon in such contracts). Then the capitalist monitors closely the entrepreneur and if he does not deliver the specified effort, she discontinues the funding. In this case, the capitalist does not need an intricate system of investor protection since she is able to observe and control the agent closely. In contrast, if there is asymmetric information, shareholders cannot observe or control the directors. An example would be a public company with many small shareholders. Once investors bought shares and elected directors, their job is done and the elected directors would have the option of shirking work or even stealing company's resources. Therefore, shareholders need investor protection so that they are able to punish underperforming directors.

The second result of our study is that there is negative correlation between investor protection and directors' compensation. Investor protection and directors' compensation both serve to facilitate greater directors' efforts. In a sense, they substitute each other. If directors are well paid, they will naturally work harder, in which case there is no need for strong investor protection. If directors' compensation is not proficient, shareholders need a greater level of investor protection to punish the unsuccessful directors more often. Data confirms this negative correlation between a degree of investor protection and directors' compensation.

The paper is organized as follows. Section 2.1 introduces the basic model, section 2.2 discusses what would happen if there were perfect information and section 2.3 analyzes equilibrium outcomes for the case of asymmetric information. Section 2.4 presents the specific (linear) case which illustrates the equilibrium outcome in greater detail. Section 2.5 offers concluding remarks.

2.1 The Model

Consider the representative firm with two types of agents: investors and directors. Investors own the firm and directors run the firm on behalf of investors.

We can assume that all investors and directors are homogenous. Therefore, in the analysis that follows, we will only be considering the single representative investor and the single representative director.

The timing of the game is as follows:

1) The investor chooses a degree of investor protection $\theta, \theta \in [0,1]$ which is an amount of shareholders' rights, set both by official laws and existing customs of corporate governance. In our study, investor protection is modelled as the probability that shareholders vote a director out if the firm's dividends are low.

Investor protection has the cost $c(\theta)$ which is paid out of the firm's dividends. We assume that $c(0) = 0$ and also the cost of investor protection is an increasing function and the marginal cost is also increasing:

$$c'(\theta) > 0, \;\; c''(\theta) > 0.$$

2) The director chooses a level of effort e. Effort is costly for the director: he finds it difficult to exert greater efforts. This cost is represented by function $v(e)$, disutility of effort. We assume that this disutility is increasing; the marginal disutility is increasing as well:

$$v'(e) > 0, \;\; v''(e) > 0.$$

3) Nature determines the firm's dividends, high or low, denoted by d^H and d^L. Dividends depend on the effort of the director and the value of a random variable (luck); the investor and director are assumed to have the same information on the distribution of this random component. Since the firm's dividends depend on the random variable, it is also a random variable. $p(e)$ denotes the probability of high dividends if the director exerts a certain effort e: $p(e) \equiv \Pr(d = d^H|e)$. Obviously, $\Pr(d = d^L|e) = 1 - p(e)$. There is the increasing monotone relationship between e and this probability of high dividends: the higher the effort, the more likely the firm earns high dividends d^H. We assume that the function $p(e)$ is concave in effort (it is an analog of the director's productivity and as such, has diminishing returns):

$$p'(e) > 0, \;\; p''(e) < 0.$$

We also assume that $p(e) > 0$ for any e: any effort can result in high or low dividends. Hence, the investor cannot deduce the level of effort simply by looking at dividends.

4) If the firm's dividends are high, agents receive their payoffs and the game ends. The director receives the wage w (exogenously determined) minus disutility of effort $v(e)$; the investor receives the dividends after paying the cost of investor protection.

If dividends are low, the investor votes and the director loses his job with probability θ, in which case, he does not receive his wage; his only payoff being the disutility of effort. The investor's payoff is the dividends minus the cost of investor protection. If the director does not lose his job (with probability $1-\theta$), he receives his wage w. His payoff in this case is w minus the disutility of effort. The investor's payoff is the amount of dividends after deducting the cost of investor protection.

Formally, the director's expected utility function is

$$E(u_{dir}(\theta, e)) = p(e)(w - v(e)) + (1 - p(e))(\theta(-v(e)) + (1 - \theta)(w - v(e))) \qquad (1)$$

and the investor's expected utility function is

$$E(u_{inv}(\theta, e)) = p(e)(d^H - c(\theta)) + (1 - p(e))(d^L - c(\theta)) \qquad (2)$$

Note that these utility functions are linear in money. In other words, we assume that both participants are risk-neutral. A more general case would be the one when participants may be risk-neutral or risk-averse in monetary payoffs d and w; however since w is exogenous and d is determined by nature, it does not really matter if the players are risk-averse or neutral. The main focus of this paper is to explore how asymmetric information explains the level of investor protection θ and we abstract away from these additional issues of risk aversion.

Utility functions (1) and (2) show the conflict of interests between the director and investor. The investor is interested in receiving high dividends however it is the director who exerts effort and earns them. The director, on the other hand, has no interest in earning high dividends; in fact, he has an incentive to exert low effort since efforts make him suffer. What reconciles these opposing objectives is the degree of investor protection. Note that the utility function of the investor is decreasing in θ (it costs money to put investor protection in place), hence, she would like to choose $\theta = 0$. However if θ was equal to zero, the director would exert no effort at all, $e = 0$. The directors would not exert any effort since they cannot be fired. Only if $\theta > 0$, would the director have the incentive to put in a positive level of effort ($e > 0$) in order to have a higher chance of keeping his position. Investor protection makes it possible for shareholders to punish the director who earned low dividends, hence, creating an incentive for him to exert greater efforts. Investor protection is not free for the investor; she must fund it out of her earnings. Thus, the investor faces a tradeoff and she must strike the correct balance between the costs and benefits of investor protection.

Before we solve this game for the investor and director, let us simplify their utility functions (1) and (2).

The director's expected utility (1) can be simplified as

$$E(u_{dir}(\theta, e)) = w - v(e) - \theta w + p(e)\theta w \qquad (3)$$

and re-written as

$$E(u_{dir}(\theta, e)) = -v(e) + w(1 - \theta(1 - p(e))),$$

which shows that the director's payoff is basically the disutility of effort adjusted for the possibility of still getting paid even when dividends are low.

Similar, the investor's expected utility (2) can be simplified as

$$E(u_{inv}(\theta, e)) = p(e)d^H - p(e)d^L + d^L - c(\theta) \quad (4)$$

or equivalently,

$$E(u_{inv}(\theta, e)) = p(e)d^H + (1 - p(e))d^L - c(\theta).$$

We can see that the investor's payoff equals to the expected dividends conditional on the director's effort minus the cost of investor protection.

It is interesting to take a look at what the social optimum would be. The social welfare function would be the summation of individual utilities of the players:

$$E(U(e, \theta)) = p(e)d^H - p(e)d^L + d^L - c(\theta) + w - v(e) - \theta w(1 - p(e))$$

This function is decreasing in θ, hence, the optimal $\theta^*= 0$. It is socially optimal to have no investor protection at all. The socially optimal effort e^* can be found from the first-order condition[40]:

$$p'(e^*)(d^H - d^L) = v'(e^*).$$

Such an effort would balance the director's marginal cost and the investor's marginal benefit. However in reality, the directors have the incentive to shirk work and to hide their true efforts from the shareholders. In sections 2.2 and 2.3, we solve this game for two cases, cases of symmetric and asymmetric information, in order to study how asymmetric information would define the outcome. We start with the case of symmetric perfect information.

[40] The second-order condition holds since $p''(e) < 0$ and $v''(e) > 0$.

2.2 **The Perfect Information Analog**

Assume perfect information when the investor is able to observe the effort of the director. The investor chooses both e and θ: she must set a level of investor protection θ and decide what effort e she demands of the director. Not only does she choose θ, she is also capable of extracting a certain effort from the director (if shareholders had necessary information on the directors, they, being the rightful owners of public companies, would ensure that directors serve shareholders well).

The investor chooses e and θ to maximize her utility:

$$max_{\theta\in[0,1],e}\ E(u_{inv}(\theta,e)).$$

Plugging (4) into this maximization problem yields

$$max_{\theta\in[0,1],e}\ p(e)d^H - p(e)d^L + d^L - c(\theta). \qquad (5)$$

Note that the objective function is decreasing in θ. Therefore, the optimal θ^* is zero and the maximization problem (5) becomes

$$max_e\ p(e)d^H + (1-p(e))d^L.$$

The objective function is the expected dividend of the investor, conditional on e, and, obviously, is increasing in e. Therefore, the investor will demand the highest effort possible from the director. Let us denote this level as e_{max}.

We obtained the solution for the case of perfect information:

$$\theta^* = 0,\ e^* = e_{max}. \qquad (6)$$

The result is, if there was perfect information (shareholders were able to observe directors' efforts and make sure that directors exert satisfactory efforts), there would be no investor protection. Shareholders would not need investor protection since they would have all of the information necessary and the means to demand the greatest effort possible from the directors.

2.3 **The Case with the Hidden Effort**

This section analyzes the situation when the investor is able to observe the result (the amount of dividends) but cannot observe the director's effort. Therefore, the investor cannot demand any particular effort from the director and solution (6) cannot be applied to this problem. Even if the investor tried to implement (6), the director would be free to choose any other effort and obviously, he would choose an effort that is beneficial to him. In fact, under (6), there would be no investor protection in place ($\theta = 0$) and the director would choose $e = 0$ since he has no interest in exerting any effort at all, as was discussed in section 2.1. Therefore, some level of investor protection should be set ($\theta > 0$) in order to ensure a positive effort from the director. Let us find the optimal θ^* and e^* for the case of asymmetric information. We do it by solving the game backwards to find the subgame perfect Nash equilibrium.

We, first, look at the problem of the director. He chooses a level of effort to maximize his utility (3):

$$\max_e w - v(e) - \theta w + p(e)\theta w. \qquad (7)$$

The optimal effort is the solution to the first-order condition:

$$p'(e)\theta w = v'(e) \qquad (8)$$

The second-order condition

$$-v''(e) + p''(e)\theta w < 0$$

is satisfied since $v''(e) \geq 0$ and $p''(e) < 0$.

The right-hand side of (8) represents the marginal cost (the marginal disutility) of effort and the left-hand side represents the marginal benefit (the director's wage weighted by the probability θ and the marginal probability of effort). Effort that solves (8) is the optimal effort chosen by the director given θ. If we solve (8) for different levels of investor protection, $\theta \in [0, 1]$, we will get the relationship between the optimal effort and investor protection. Let us denote this relationship as function $e(\theta)$.

Lemma

The optimal effort of the director is increasing in the degree of investor protection: if $e(\theta) = \arg\max_e(w - v(e) - \theta w + p(e)\theta w)$ for $\theta \in [0,1]$, then $e'(\theta) > 0$.

Proof:

Suppose it is not true and there exists $\theta \in [0,1]$ such that $e'(\theta) \leq 0$.

Consider $\theta + \varepsilon$ $(\varepsilon > 0)$. By definition, $e(\theta)$ maximizes

$$w - v(e) - \theta w + p(e)\theta w$$

and therefore, solves the first-order condition

$$p'(e(\theta))\theta w = v'(e(\theta)). \quad (9)$$

Similarly, for $\theta + \varepsilon$, $e(\theta + \varepsilon)$ maximizes

$$w - v(e) - (\theta + \varepsilon)w + p(e)(\theta + \varepsilon)w$$

and solves the first-order condition

$$p'(e(\theta + \varepsilon))(\theta + \varepsilon)w = v'(e(\theta + \varepsilon)). \quad (10)$$

Since $e'(\theta) \leq 0$, function $e(\bullet)$ does not increase as θ increases: $e(\theta + \varepsilon) \leq e(\theta)$. Note that $v'(e(\theta + \varepsilon)) \leq v'(e(\theta))$ since $v''(e) \geq 0$ and $p'(e(\theta + \varepsilon)) > p'(e(\theta))$ since $p''(e) < 0$. Then if (9) is true, (10) cannot be true: the left-hand side of (10) is larger than that of (9) while the right-hand side of (10) is not larger than that of (9).

We received a contradiction; therefore, our suggestion that $e'(\theta) \leq 0$ is false. QED

As shown in section 2.1, the director exerts no effort at all if there is no investor protection. In our notation, $e(0) = 0$. Lemma shows that any $\theta > 0$ forces the director to exert a positive effort. It is our first insight that under asymmetric information, shareholders need investor protection to ensure that directors exert some positive level of effort.

We will now consider the investor's problem. She must choose a level of investor protection, θ, knowing that the director chooses effort given by function $e(\theta)$. The investor must solve the following problem:

$$\max_\theta p(e(\theta))(d^H - d^L) + d^L - c(\theta). \quad (11)$$

The first-order condition is as follows:

$$p'(e)e'(\theta)(d^H - d^L) = c'(\theta). \qquad (12)$$

Let us denote the solution of (12) as θ^*.

θ^* that satisfies (12) is a maximum if the second-order condition

$$(p''(e)(e'(\theta))^2 + p'(e)e''(\theta))(d^H - d^L) < c''(\theta) \qquad (13)$$

holds. Note that it always holds if $e''(\theta^*) \leq 0$ (the right-hand side of (13) is positive while the left-hand side is either negative or equal to zero). If $e''(\theta^*) > 0$, (13) may or may not hold. If it does not hold, θ^* derived from (12) is, in fact, a minimum and (11) has a corner solution, 0 or 1. To see which value θ^* takes, we must compare

$$p(e(0))(d^H - d^L) + d^L - c(0) \text{ and } p(e(1))(d^H - d^L) + d^L - c(1)$$

or, since $c(0) = 0$ and $e(0) = 0$,

$$p(0)(d^H - d^L) + d^L \text{ and } p(e(1))(d^H - d^L) + d^L - c(1).$$

We can describe the equilibrium level of investor protection as the following:

- If $e''(\theta^*) \leq 0$, the optimal level of investor protection is the one that solves (12);
- If $e''(\theta^*) > 0$ and $(p''(e)(e'(\theta))^2 + p'(e)e''(\theta))(d^H - d^L) < c''(\theta)$, the optimal level of investor protection is the one that solves (12);
- If $e''(\theta^*) > 0$, $(p''(e)(e'(\theta))^2 + p'(e)e''(\theta))(d^H - d^L) \geq c''(\theta)$ and $c(1) \geq (p(e(1)) - p(0))(d^H - d^L)$, the optimal level of investor protection is equal to 0;
- If $e''(\theta^*) > 0$, $(p''(e)(e'(\theta))^2 + p'(e)e''(\theta))(d^H - d^L) \geq c''(\theta)$ and $c(1) < (p(e(1)) - p(0))(d^H - d^L)$, the optimal level of investor protection is equal to 1.

We can see that it is possible for θ^* to be equal to 0 which is the same outcome as in the case of perfect information (recall that the director would choose $e(0) = 0$ in this case). Such an outcome occurs when the cost of investor protection is extremely high. For example, if a country lacks a well developed legal system, establishing any level of investor protection may prove prohibitively costly. In all other cases, the equilibrium level of investor protection will be positive. We can conclude that it is the presence of hidden effort that brings investor protection into existence.

2.4 The Special Case of the Model

In this section, we will assign specific functional forms to $v(e)$, $p(e)$, $c(\theta)$ in order to obtain closed-form solutions for cases of perfect and asymmetric information. We compare these solutions and see how information asymmetry alters the outcome of the game. Although simple, this special case will allow us to see the results of the previous section in a more vivid and clear way.

We, first, assume that $v(e)$, the director's disutility of effort, is linear: $v(e) = e$. We also assume that $p(e)$ and $c(\theta)$ are as follows:

$$p(e) = \frac{e}{1+e},$$
$$c(\theta) = \frac{1}{4}\theta^2.$$

In section 2.2, we obtained the solution for the case of perfect information:

$$\theta^* = 0 \text{ and } e^* = e_{max}.$$

Under perfect information, there is no need for investor protection and the director puts in a maximum effort.

Let us see how asymmetric information will change the outcome. The director chooses a level of effort to maximize his utility:

$$\max_e w - e - \theta w + \frac{e}{1+e}\theta w.$$

Note that the first derivative of the director's utility is nonpositive for any e if $\theta w \leq 1$:

$$\frac{\theta w}{(1+e)^2} - 1 \leq 0 \text{ since}$$
$$\theta w \leq 1 \text{ and } (1+e)^2 \geq 1.$$

Therefore, the optimal effort, in this case, is zero. In our notation, $e(\theta) = 0$ for any θ.

However, if $\theta w > 1$, the first-order condition is

$$\frac{\theta w}{(1+e)^2} = 1$$

and the optimal effort is

$$e(\theta) = \sqrt{\theta w} - 1. \quad (14)$$

The second-order condition

$$-2\theta w(1+e)^{-3}< 0$$

obviously holds and the optimum found in (14) is the maximum.

Notice that $e'(\theta) > 0$ and $e''(\theta) < 0$: investor protection does stimulate greater efforts but at a decreasing rate.

Another interesting result is that the director puts in some positive effort only if $\theta w > 1$. The term θw is the probability of the director's being fired if dividends are low, multiplied by the director's wage. This term represents the potential loss for the director if he fails to earn high dividends. It is the incentive for him to exert greater efforts in order to earn high dividends and keep his job. This result tells us that investor protection and directors' compensation must be high enough to encourage directors to work sufficiently.

Let us now consider the investor's problem. She must choose a degree of investor protection θ while knowing that the director will exert effort $e(\theta)$:

$$\max_\theta p(e(\theta))(d^H - d^L) + d^L - \tfrac{1}{4}\theta^2.$$

For $e(\theta) = 0$, the optimal investor protection is, apparently, zero, $\theta^*= 0$.

For $e(\theta) =\sqrt{\theta w}-1$, the investor's problem becomes

$$\max_\theta \tfrac{\sqrt{\theta w}-1}{\sqrt{\theta w}}(d^H - d^L) + d^L - \tfrac{1}{4}\theta^2.$$

The first-order condition

$$\tfrac{1}{2}\theta^{-1.5}w^{-0.5}\ (d^H - d^L) = \tfrac{1}{2}\theta$$

yields the optimal investor protection:

$$\theta^*= w^{-0.2}\ (d^H - d^L)^{0.4}. \quad (15)$$

Substituting the above into (14), we get the optimal effort:

$$e^*= w^{0.4}\ (d^H - d^L)^{0.2}-1. \quad (16)$$

Two results are worth mentioning here.

First, note that $e^{*\prime}(w) > 0$ and $e^{*\prime\prime}(w) < 0$. The director's effort is a function, increasing in wage. Higher director's compensation brings about a greater effort; however this effect of wages is diminishing.

Second, as (15) shows, investor protection is a function, decreasing in the director's wage. It turns out that investor protection and directors' compensation are inversely related. They serve as substitutes when it comes to stimulating directors' effort. When wages are low, directors are not interested in working hard and shareholders need investor protection in order to punish underperforming directors more often. When wages are high, directors have a natural incentive to perform well, in which case investor protection can be small (but not zero). This result suggests that there should be a negative correlation between directors' compensation and investor protection: countries with low directors' compensation should have strong investor protection and vice versa. Data seems to confirm our hypothesis. In Table 2.2, we present data on investor protection and directors' compensation across countries. For investor protection, we use the index of antidirector rights as designed by La Porta. This indicator sums up six basic rights of shareholders and ranges from 0 for Belgium to 5 for Canada, for example[41]. For directors' compensation, we use private benefits of control as estimated by Dyck and Zingales (2004). We find it important to measure directors' compensation as private benefits of control (the benefits that directors obtain for themselves and not for shareholders). Examples of such benefits are directors' compensation, corporate perks, profits from self-dealing etc. As Dyck and Zingales (2004) point out, the idea of private benefits of control, first pioneered by Grossman and Hart (1980), "has become a centerpiece of the recent literature in corporate finance, both theoretical and empirical". They measure private benefits of control as the premium that an acquirer pays for the controlling block of a company. They argue that this premium (the difference between the price per share paid by an acquirer and the market price of a share) reflects benefits that a controlling party enjoys and ordinary shareholders do not.

[41] See Table 1 (La Porta et al (1998)) for detailed description of anti-director rights and Table 2 (La Porta et al (1998)) for data.

Table 2.2 Block Premium and Antidirector Rights

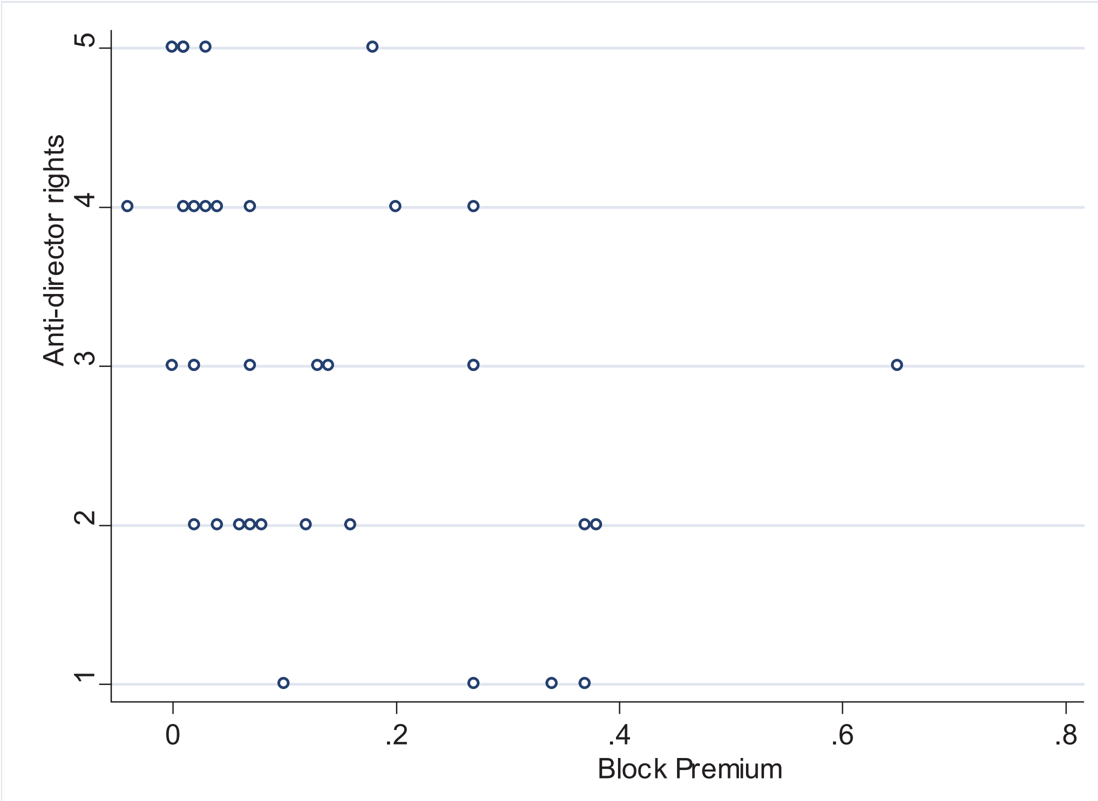
Country	Block Premium	Antidirector Rights
Argentina	0.27	4
Australia	0.02	4
Austria	0.38	2
Brazil	0.65	3
Canada	0.01	5
Chile	0.18	5
Colombia	0.27	3
Denmark	0.08	2
Egypt	0.04	2
Finland	0.02	3
France	0.02	3
Germany	0.10	1
Hong Kong	0.00	5
Indonesia	0.07	2
Israel	0.27	3
Italy	0.37	1
Japan	-0.04	4
Malaysia	0.07	4
Mexico	0.34	1

Table 2.2 – Continued

Country	**Block Premium**	**Antidirector Rights**
Netherlands	0.02	2
New Zealand	0.03	4
Norway	0.01	4
Peru	0.14	3
Philippines	0.13	3
Singapore	0.20	4
South Africa	0.03	5
South Korea	0.16	2
Spain	0.04	4
Sweden	0.07	3
Switzerland	0.06	2
Taiwan	0.00	3
Thailand	0.12	2
Turkey	0.37	2
UK	0.01	5
US	0.01	5
Venezuela	0.27	1
Mean	**0.13**	**3.08**
Median	**0.07**	**3**
Standard deviation	**0.15**	**1.27**

The correlation coefficient is -0.4118, significant at 1% level. Thus, investor protection seems to be inversely related to directors' compensation as our model predicted. Figure 2.1 illustrates this negative correlation on a scatter plot.

Figure 2.1 Block Premium and Antidirector Rights



2.5 Conclusion

In this paper, we offer a new explanation of investor protection. Our main insight is that it is asymmetric information that causes investor protection. When shareholders cannot observe (cannot control or verify) directors' efforts, they need investor protection. Shareholders need legal rights to solve the agency problem to ensure that directors work in shareholders' interests and do not appropriate the money. As for the main question of our paper we conclude that differences in investor protection result from differences in informational asymmetry. Investor protection must be the strongest in countries with dispersed ownership (the UK, the US, Canada, Australia) and weak in countries with concentrated ownership (Germany and Italy, for example). Empirical studies support this result (La Porta et al. (1998, 1999, 2000)).

Our second observation is that investor protection is negatively correlated with private benefits of control (the higher the private benefits of control, the less investor protection and vice versa). Based on this observation, we make a prediction that the current trend in the US when both variables seem to be increasing is not going to last for long. Eventually, either directors' compensation will eventually drop or shareholder rights will be curbed.

Our study complements other work that seeks to examine investor protection. Unlike other studies, our focus revolves around how investor protection is chosen at a micro-level, in a representative firm. Other researchers consider investor protection only as a political issue (as something that must be decided by politicians, legal experts and judges); once set, it must be obeyed by individual firms. In contrast, we observe that most issues of corporate governance are resolved not by legislators but by shareholders of public companies. It is individual shareholders who ultimately decide on a level of investor protection and we must understand how this choice is made.

In the next chapter, we continue our analysis of investor protection and employ the same approach we used in Chapter 2. We use the same model, with a few modifications. We ask: How would the results change if shareholders could benefit from ousting the underperforming directors? And also, how would the results change if a director was given an opportunity to accept or reject a seat on the board?

Chapter 3.

Investor protection and directors' compensation

This paper asks the same question as the second chapter of this thesis: Why does investor protection vary across the countries? In the previous chapter, we found that the main cause of investor protection was asymmetric information; we also touched on a possible role that directors' compensation plays in corporate governance. In this paper, we explore these issues in greater detail. We use the same basic model as the one in the previous chapter in which shareholders set a level of investor protection and directors choose a level of effort. Like in the previous chapter, we consider the shareholder right to oust directors as their most important right[42] and in this light, we model investor protection as the probability that shareholders vote a director out if the firm's results are poor.

We added two improvements to the model. The first one is the idea of the contract. The investor offers the director a contract which he accepts or rejects. The main features of the contract are the director's wage (exogenously determined) and the level of investor protection (set by the investor). By adding this feature to the model, we follow the traditional approach of the contract theory to the agency problem in which a principal offers an agent a contract and the agent either accepts or rejects it. In our previous model, the director did not have to accept his position formally; in other words, the model implied that the contract was always beneficial to the director. That was a reasonable assumption because in reality, directors set their compensation themselves, with very little regard for shareholders' opinion. It was, therefore, natural to assume that directors would set their wages at least equal to their opportunity costs which means that a potential director would always accept the contract. However this logic may be challenged by arguing that directors might find themselves under public pressure or under direct government intervention that would limit their compensation. For example, in the aftermath of the recession of 2008-2009, there was a public anger against high executives' bonuses and responding to public demands, the governments stepped up their influence on corporations. In the US, for example, the TARP program[43] capped executive pays in companies-recipients

[42] La Porta et al. (1998), Shleifer and Vishny (1997).

[43] The Troubled Asset Relief Program, launched in October 2008 with the goal of strengthening the US financial sector.

of the bailout money. Thus, our modification that a candidate might reject a director position may also be justified.

The second improvement is the following. We assume that if the firm's results are unsatisfactory and directors are fired, the firm withholds their wages, the profit increases and shareholders benefit from it. This feature was absent in the second chapter. In our previous model, wages of the fired directors did not benefit investors because the investors were only entitled to dividends, not profits. In this paper, we change this approach by assuming that such wages stay with the firm and benefit the investors. Both of these approaches can be justified. The approach of the second chapter seems reasonable because of the fact that real-life shareholders do not necessarily benefit from firing underperforming directors (at least, directly). When directors are ousted, they lose their compensation and the firm saves some money; however the money saved is at the full discretion of the remaining directors. It is possible that the money will be distributed among shareholders as dividends but it is also possible, and even more likely, that that money will be spent for new investment projects, day-to-day business or even appropriated by the remaining directors. Thus, the assumption that shareholders do not benefit, in monetary terms, from firing directors was reasonable. However this assumption can be countered by the argument that when bad directors are ousted, the firm does not have to pay them wages which must ultimately benefit owners of the firm (shareholders). Money saved on wages may, for example, result in higher accounting earnings which would boost stock prices or future dividends. Therefore, one might argue, shareholders must ultimately benefit, one way or another, from firing underperforming directors. To accommodate this argument, we assume that shareholders (who are the rightful owners of corporations) are entitled to profits (rather than just dividends as in the previous model) and therefore, every time a director is ousted, shareholder payoffs increase accordingly[44].

We analyze the problem of investor protection in two steps. First, we solve the game for the case of perfect information when shareholders are able to observe directors' efforts. With that information in hand, they are able to demand certain efforts from directors. An example of perfect information would be a small business in which

[44] In practice, when a director is ousted, he still gets his compensation; however he apparently loses compensation for future years along with private benefits of control (access to inside information, profits from self-dealing, etc). Thus, our assumption that firms withhold compensation of ousted directors seems realistic.

the owner works closely with her associates. She witnesses the way they work and is able to ensure that they perform in a satisfactory manner (for example, if they don't perform well, she can just fire them or reduce their pay). We solve the game for such a case to see what levels of investor protection and director's effort would emerge.

In the second step, we consider the case of asymmetric information when shareholders cannot directly observe directors' efforts. In this case, the directors can shirk work, waste the firm's resources or even steal the firm's assets. An example would be a public company with a great number of small shareholders and no controlling shareholder. We solve the game for asymmetric information (we derive investor protection and director's effort) and compare the outcome to that of perfect information.

Our main results are as follows.

- Investor protection is higher under asymmetric information than under perfect information.
- Directors' efforts are higher under asymmetric information than under perfect information.
- Investor protection serves two purposes. First, it encourages the directors to exert greater efforts. Second, it lets shareholders save money on directors' compensation.

We have already explored the first purpose of investor protection (stimulating greater efforts) in the previous chapter in which we claimed that investor protection exists because of hidden efforts. By establishing a certain level of investor protection, shareholders solve the agency problem. In this paper, we find another aspect of investor protection. By firing underperforming directors, shareholders save money on their compensation and this fact creates an additional incentive for shareholders to fire directors. If we compare this approach to our previous model, we find that shareholders fire directors more often under the present assumptions than in the previous model.

Our approach is a variation of the principal-agent model. Like the principal-agent model, our model studies the relationship between the principal and the agent (shareholders and directors). However our model differs from the principal-agent model in the sense that the principal cannot include wage in the contract. Wage (director's compensation) is set by directors themselves rather than shareholders. That is why results of the principal-agent model cannot be applied to the shareholders-directors relationship. The only way shareholders can exercise their power is to attempt to fire underperforming directors which relates to investor protection and is the topic of this study.

The paper is organized as follows. Section 3.1 introduces the basic model, section 3.2 discusses what would happen if there were perfect information and section 3.3 analyzes equilibrium outcomes for the case of asymmetric information. Section 3.4 concludes.

3.1 The Model

In this section, we model the choice of investor protection. We consider the representative firm with two types of agents: investors and directors. Investors are owners of the firm and directors, who are elected representatives of investors, run the firm. All investors and directors are assumed to be homogenous. Therefore, we will only be considering the single representative investor and the single representative director.

The timing of the game is as follows:

1) The investor chooses a degree of investor protection $\theta, \theta \in [0,1]$. In our model, investor protection is the probability that a shareholder votes a director out if the firm's profit is low.

Investor protection has the cost $c(\theta)$

$$c(\theta) = \frac{1}{2}\theta^2,$$

which is paid out of the firm's profits.

2) The investor offers the director the contract which stipulates his compensation w (exogenously determined) and the level of investor protection θ. The director accepts or rejects the contract.

3) The director supplies effort e. Effort is costly for the director: he finds it difficult to exert greater efforts. This cost is represented by function $v(e)$, disutility of effort. We assume that this disutility is a linear function of effort:

$$v(e) = e.$$

4) Nature determines the firm's profit, high or low, denoted by π^H and π^L. Profit depends on the effort of the director and the value of a random variable (luck); obviously, the firm's profit is a random variable too. $p(e)$ denotes the probability of high profit if the director exerts effort e:

$$p(e) \equiv \Pr(\pi = \pi^H | e).$$

Obviously,

$$\Pr(\pi = \pi^L | e) = 1 - p(e).$$

We assume the following functional form for $p(e)$:

$$p(e) = \tfrac{e}{1+e}.$$

Note that $p(e) > 0$ for any $e > 0$ which means that any positive effort can result in high profit and the investor cannot deduce the level of effort simply by looking at profit.

5) If the firm's profit is high, agents receive their payoffs and the game ends. The director receives the wage w minus disutility of effort $v(e)$; the investor receives the profit minus the cost of investor protection and the director's wage.

If the profit is low, the investor votes and the director loses his job with the probability θ, in which case, he does not receive his wage; his only payoff being the disutility of effort. The investor's payoff is the profit minus the cost of investor protection. If the director does not lose his job (with probability $1-\theta$), he receives his wage w. The director's payoff in this case is w minus the disutility of effort. The investor's payoff is the profit after deducting the cost of investor protection and the wage.

Formally, the director's expected utility function is

$$E(u_{dir}(\theta, e)) = \tfrac{e}{1+e}(w - e) + (1 - \tfrac{e}{1+e})(\theta(-e) + (1-\theta)(w - e)) \qquad (1)$$

and the investor's expected utility function is

$$E(u_{inv}(\theta, e)) = \tfrac{e}{1+e}(\pi^H - w - \tfrac{1}{2}\theta^2)$$
$$+(1 - \tfrac{e}{1+e})(\theta(\pi^L - \tfrac{1}{2}\theta^2) + (1-\theta)(\pi^L - w - \tfrac{1}{2}\theta^2))) \qquad (2)$$

Utility functions (1) and (2) show the conflict of interests between the director and investor. Wage w is the director's payoff while it is an expense for the investor. There are also conflicting interests when it comes to profit. The investor wishes to get high profits however it is the director who exerts effort and earns profits. The director, on the other hand, has no interest in earning high profits; in fact, he wishes to exert the lowest effort possible to reduce his suffering. What reconciles the opposing interests of the agents is the degree of investor protection. A positive level of θ makes it possible for shareholders to fire underperforming directors, therefore, θ creates an incentive for them to exert greater efforts. Investor protection is not free; the investor must fund it out of her earnings. When she chooses θ, she must strike the correct balance between the costs and benefits of investor protection.

Let us re-write (1) and (2) as the following:

$$E(u_{dir}(\theta, e)) = w - e - \theta w + \tfrac{e}{1+e}\theta w \qquad (3)$$

$$E(u_{inv}(\theta, e)) = \tfrac{e}{1+e}(\pi^H - \pi^L) + \pi^L - w - \tfrac{1}{2}\theta^2 + \theta w - \tfrac{e}{1+e}\theta w \quad (4)$$

Notice the common component in these two functions:

$$\theta w - \tfrac{e}{1+e}\theta w.$$

It enters the director's utility with the negative sign and the investor's utility with the positive sign. This component, which can be re-written as

$$\theta w(1 - \tfrac{e}{1+e}),$$

is a product of two probabilities, $1 - p(e)$ and θ, multiplied by w. It shows the expected gain of the investor (the expected loss of the director) if profits are low and the director is fired.

To see the intuition behind the payoff functions, let us re-write (3) and (4) as follows:

$$E(u_{dir}(\theta, e)) = -e + w - \theta w(1 - \tfrac{e}{1+e}), \quad (5)$$

$$E(u_{inv}(\theta, e)) = \tfrac{e}{1+e}\pi^H + (1 - \tfrac{e}{1+e})\pi^L - w - \tfrac{1}{2}\theta^2 + \theta w(1 - \tfrac{e}{1+e}). \quad (6)$$

The director's utility, given by (5), is the difference between his wage and disutility of effort adjusted for the possibility of getting fired. The investor's utility, given by (6), equals to the expected profit, conditional on the director's effort, minus wage and the cost of investor protection, plus the possible gain from firing the director.

In the next two sections, we solve this game for two cases (symmetric and asymmetric information) and see how asymmetric information would change the outcome. We start with the case of symmetric perfect information.

3.2 The Perfect Information Analog

In this section, we solve the game for the case of perfect information. Assume that the investor is able to observe the level of the director's effort. Having had this information, the investor, being the rightful owner of the company, is able to decide on both e and θ. She must choose a level of investor protection θ and decide what effort e she demands of the director. Her choice can be modelled as the following maximization problem:

$$max_{\theta\in[0,1],e}\ E(u_{inv}(\theta,e))$$
$$\text{s.t. } E(u_{dir}(\theta,e)) \geq U, \qquad (7)$$

where U is the reservation utility of the director (the value of the alternative). Plugging (3) and (4) into this maximization problem yields

$$max_{\theta\in[0,1],e}\ \tfrac{e}{1+e}(\pi^H-\pi^L)+\pi^L-w-\tfrac{1}{2}\theta^2+\theta w-\tfrac{e}{1+e}\theta w$$
$$\text{s.t. } w-e-\theta w+\tfrac{e}{1+e}\theta w \geq U.$$

We can re-write this problem as the following:

$$max_{\theta\in[0,1],e}\ \tfrac{e}{1+e}(\pi^H-\pi^L)+\pi^L-w-\tfrac{1}{2}\theta^2+\tfrac{\theta w}{1+e}$$
$$\text{s.t. } w-e-\tfrac{\theta w}{1+e} \geq U. \qquad (8)$$

Let e^* and θ^* denote the solution to (8) (notice that this solution is Pareto efficient).

The problem (8) has good properties: both the objective function and the constraint are concave in e and θ. Therefore, the Kuhn-Tucker conditions are both necessary and sufficient for the global solution to (8). Therefore, if e^* and θ^* are the global maximum, they must satisfy the Kuhn-Tucker conditions:

$$-\theta+\tfrac{w}{1+e}-\lambda\tfrac{w}{1+e}=0,$$
$$\tfrac{1}{(1+e)^2}(\pi^H-\pi^L-\theta w)+\lambda(-1+\tfrac{\theta w}{(1+e)^2})=0$$

and

$$\lambda(w - e - \tfrac{\theta w}{1+e} - U) = 0,\ \lambda \geq 0.$$

Two cases are possible here: the constraint is binding ($\lambda > 0$) or non-binding ($\lambda = 0$). If it is binding, the solution will be given by the following equalities:

$$\tfrac{w-\theta^*-e^*\theta^*}{w} = \tfrac{\pi^H - \pi^L - \theta^* w}{(1+e^*)^2 - \theta^* w}, \qquad (9)$$
$$w - e^* - \tfrac{\theta^* w}{1+e^*} = U.$$

If the constraint is non-binding, the efficient e^* and θ^* must solve the first-order conditions:

$$-\theta^* + w - \tfrac{e^*}{1+e^*}w = 0 \text{ and}$$
$$\tfrac{1}{(1+e^*)^2}(\pi^H - \pi^L - \theta^* w) = 0.$$

Therefore,

$$\theta^* = \tfrac{\pi^H - \pi^L}{w} \text{ and} \qquad (10)$$
$$e^* = \tfrac{w^2}{\pi^H - \pi^L} - 1.$$

Lemma. Under perfect information, there is a positive level of investor protection:

$$\theta^* > 0.$$

Proof. In case the constraint is non-binding, the optimal level of investor protection is given by (10) which is obviously positive.

In case the constraint is binding, the optimal e^* and θ^* solve the equalities, given by (9). Suppose that $\theta^* = 0$. Then $e^* = w - U$. These θ^* and e^* maximize the utility function of the investor:

$$u_{inv}(\theta^*, e^*) = \tfrac{e^*}{1+e^*}(\pi^H - \pi^L) + \pi^L - w.$$

Consider $\theta = \tfrac{w}{1+e^*}$. Due to our assumption that $\theta^* = 0$, this particular value of θ is not optimal and the utility function at $\theta = \tfrac{w}{1+e^*}$ cannot be greater than $u_{inv}(\theta^*, e^*)$:

$$\tfrac{e^*}{1+e^*}(\pi^H - \pi^L) + \pi^L - w \geq \tfrac{e^*}{1+e^*}(\pi^H - \pi^L) + \pi^L - w - \tfrac{1}{2}\theta^2 + \tfrac{\theta w}{1+e^*}.$$

Then

$$0 \geq -\frac{1}{2}\theta^2 + \frac{\theta w}{1+e^*}.$$

Substituting $\theta = \frac{w}{1+e^*}$ yields

$$\frac{1}{2}(\frac{w}{1+e^*})^2 \geq (\frac{w}{1+e^*})^2 \text{ and}$$
$$\frac{1}{2} \geq 1,$$

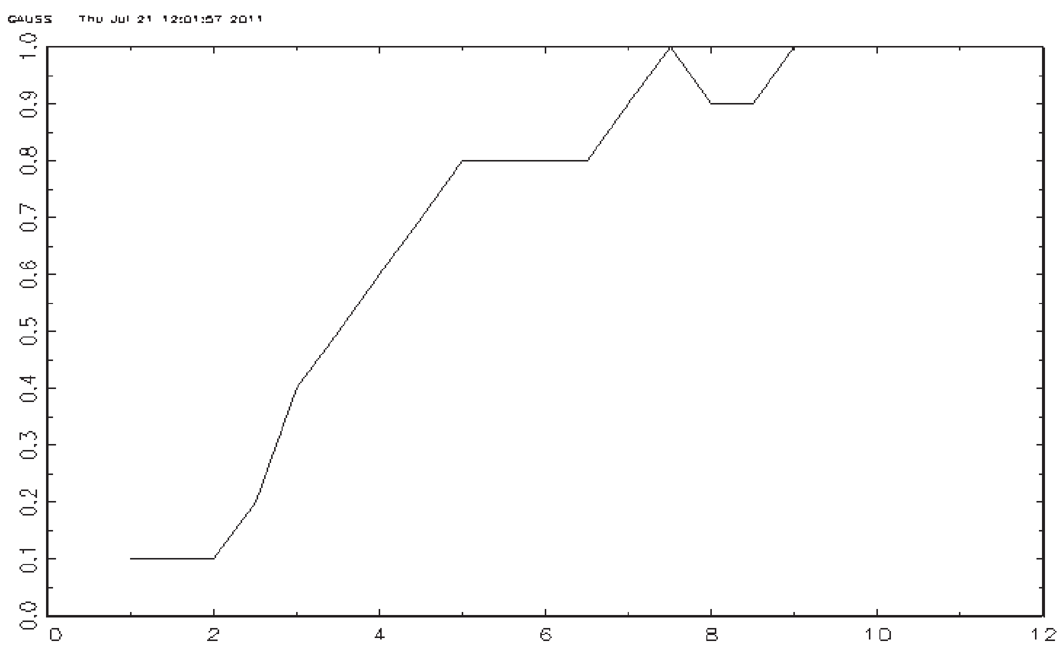
which is obviously wrong. Therefore, our assumption that $\theta^*= 0$ is wrong. QED

This lemma yields a different result than the one of the previous chapter when θ^* was equal to zero under perfect information. Before, we have argued that investor protection has the sole purpose which is to encourage directors to work harder for shareholders. Hence, if shareholders were able to demand certain efforts from directors, they would not need any investor protection. But in our present model, we find that the level of investor protection can be positive even if shareholders could demand efforts from directors. This result points out the second function of investor protection: it saves money on director compensation. In our previous model, investors were not supposed to benefit, in monetary terms, from ousting directors. In the present model, they save on wages and therefore, benefit from firing directors. Money saved on directors' wages increase payoffs of shareholders (for example, through higher profits and ensuing increases in stock prices). This result that θ^* is positive highlights an aspect of investor protection that was not explored in the previous chapter: if shareholders benefit from ousting directors, they have an incentive to fire directors not only to punish them for unsatisfactory results but also to save money. We may expect that this property of investor protection (saving on directors' wages) would get stronger as director compensation increases which is indeed the case as will be shown below.

The Pareto efficient e^* and θ^* depend on the parameters of the model, w, π^H, π^L and U. In this study, we would like to see how directors compensation affects investor protection. In terms of our model, we are most interested in the effects that w and U (the actual and the potential compensation of the director) have on θ. We want to examine how director's compensation (w) and his alternative utility (U) change the level of investor protection. To see these effects, we ran numerical simulations and we present the results in Figures 3.1 and 3.2.

Figure 3.1 Investor protection and director's compensation.

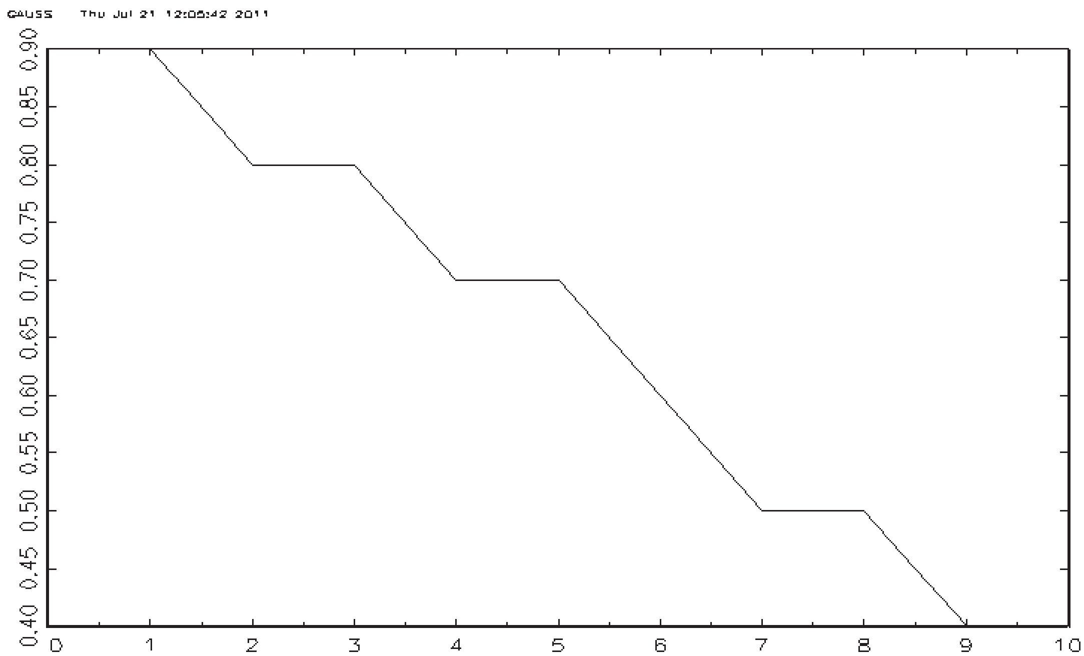
Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. Investor protection is on the vertical axis and the director's compensation is on the horizontal axis[45].



[45]The simulations were ran for $\pi^H - \pi^L = 1$ and $u = 2$.

Figure 3.2 Investor protection and the director's alternative compensation.

Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. Investor protection is on the vertical axis and the director's alternative compensation is on the horizontal axis[46].



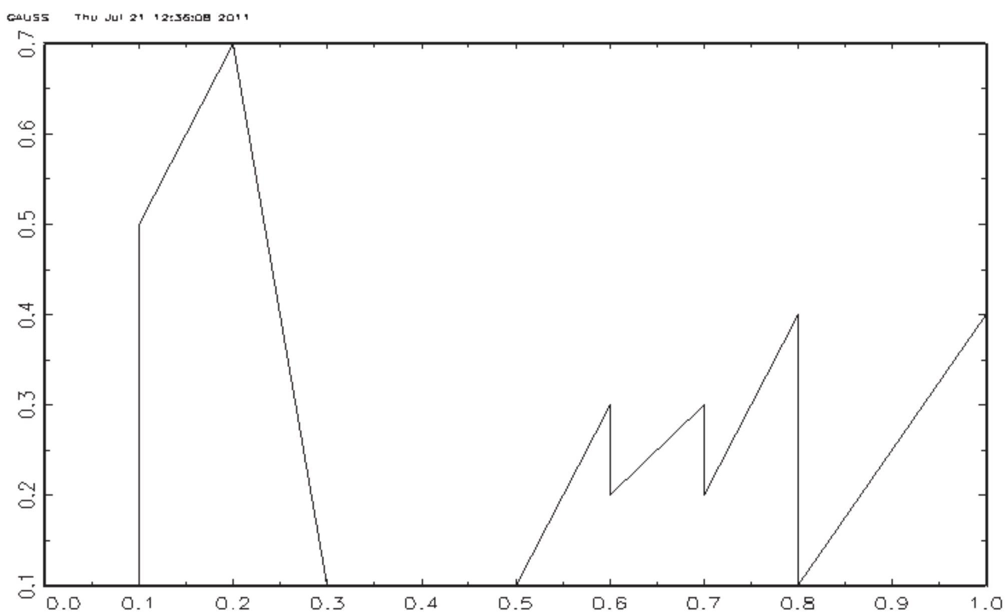
As Figure 3.1 illustrates, the level of investor protection increases as the director's wage increases. As we discussed above, there is an incentive for shareholders to fire directors and, consequently, to save on directors' compensation. As directors' wages increase, this incentive gets stronger and shareholders set investor protection higher. There is a counter-force to this trend. It's the director's alternative compensation. Figure 3.2 shows that as directors' alternative wages go up, investor protection falls. If a director can walk away from his job (he rejects the contract proposed by the investor), shareholders cannot set investor protection too high. This alternative compensation serves as a cushion against the shareholders' desire to expand their rights and to fire directors more often. In reality, corporate directors usually have full-time jobs in other companies so that this alternative compensation U may prove significant and therefore, would limit investor protection. Indeed, opponents to investor activism often raise the concern that greater shareholders rights along with greater scrutiny of directors would repeal qualified managers from serving on boards.

[46]The simulations were ran for $\pi^H - \pi^L = 1$ and $w = 4$.

It is also interesting to plot investor protection against the director's effort, e^* and θ^*, to see if there is a possible causal relationship. Figure 3.3 plots investor protection (on the horizontal axis) and effort (on the vertical axis).

Figure 3.3 Investor protection and the director's effort.

Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. The director's effort is on the vertical axis and investor protection is on the horizontal axis[47].



As Figure 3.3 shows, there is no definite relationship between e^* and θ^* under perfect information. The reason is simple. If the investor can witness the director's efforts, she is capable of commanding him to carry a certain effort in which case she does not need investor protection to ensure that that level of effort is carried. The only purpose that investor protection plays in these circumstances is to save money on the director's wage. Therefore, there is a positive relationship between w and θ^* and there is no relationship between e^* and θ^*.

[47] The simulations were run for $\pi^H - \pi^L = 1$ and $u = 4$.

3.3 The Case with the Hidden Effort

Assume that the director's effort is hidden: the investor is only able to observe the result (the level of profit) but not the director's effort. Therefore, the investor cannot demand any particular effort from the director and the solutions described in the section 3.2 are no longer valid. Let us solve the game of investor protection for the case of hidden effort.

We start with the problem of the director. He must choose a level of effort to maximize his utility:

$$\max_e w - e - \frac{\theta w}{1+e}. \quad (11)$$

Let us denote the solution to (11) by $e(\theta)$ to stress the fact that the optimal effort depends on a given level of investor protection.

Note that if $\theta w \leq 1$ for any θ, the first derivative of the objective function is non-positive:

$$\frac{\theta w}{(1+e)^2} - 1 \leq 0 \text{ since}$$
$$\theta w \leq 1 \text{ and } (1+e)^2 \geq 1.$$

In this case, the objective function is decreasing in e and the optimal effort equals zero, $e(\theta) = 0$ for any θ.

If $\theta w > 1$, the first-order condition is

$$\frac{\theta w}{(1+e)^2} = 1$$

and the optimal effort is

$$e(\theta) = \sqrt{\theta w} - 1. \quad (12)$$

The second-order condition

$$-2\theta w (1+e)^{-3} < 0$$

obviously holds and the optimum found in (12) is the maximum.

Then the optimal level of effort is as follows:

$$e(\theta) = \sqrt{\theta w} - 1 \text{ if } \theta w > 1 \text{ and}$$
$$= 0 \text{ otherwise.}$$

The director accepts the contract if

$$w - e(\theta) - \theta w + \frac{e(\theta)}{1+e(\theta)}\theta w \geq U$$

and rejects it otherwise.

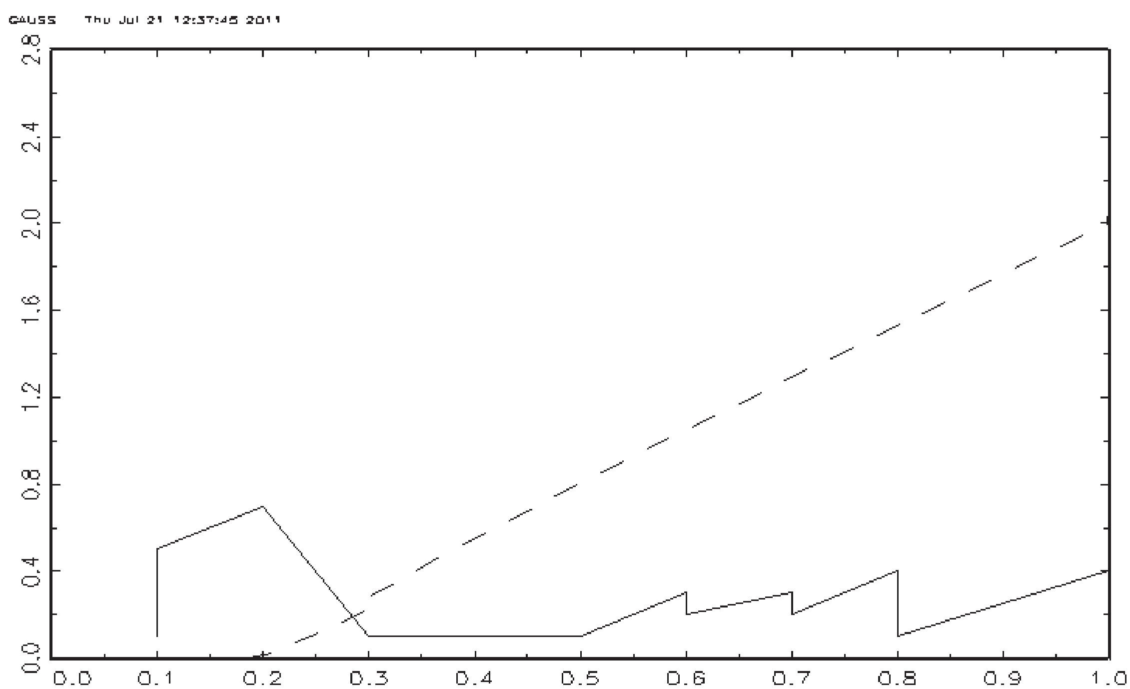
Let us now consider the investor's problem. She must choose a degree of investor protection θ while knowing that the director will then exert effort $e(\theta)$:

$$\max_\theta \frac{e(\theta)}{1+e(\theta)}(\pi^H - \pi^L) + \pi^L - w - \frac{1}{2}\theta^2 + \frac{\theta w}{1+e(\theta)}$$
$$\text{s.t. } w - e(\theta) - \theta w + \frac{e(\theta)}{1+e(\theta)}\theta w \geq U$$

It is difficult to obtain the closed-form solution to this problem but we can use numerical simulations to characterize the optimal θ^* and e^*. In Figure 3.4, we plot e^* and θ^*; we also repeat the graph from Figure 3.3 to show the difference.

Figure 3.4 Investor protection and the director's effort.

Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. The director's effort is on the vertical axis and investor protection is on the horizontal axis[48].



——— the relationship between θ^* and e^* under perfect information;

[48] The simulations were run for $\pi^H - \pi^L = 1$ and $u = 4$.

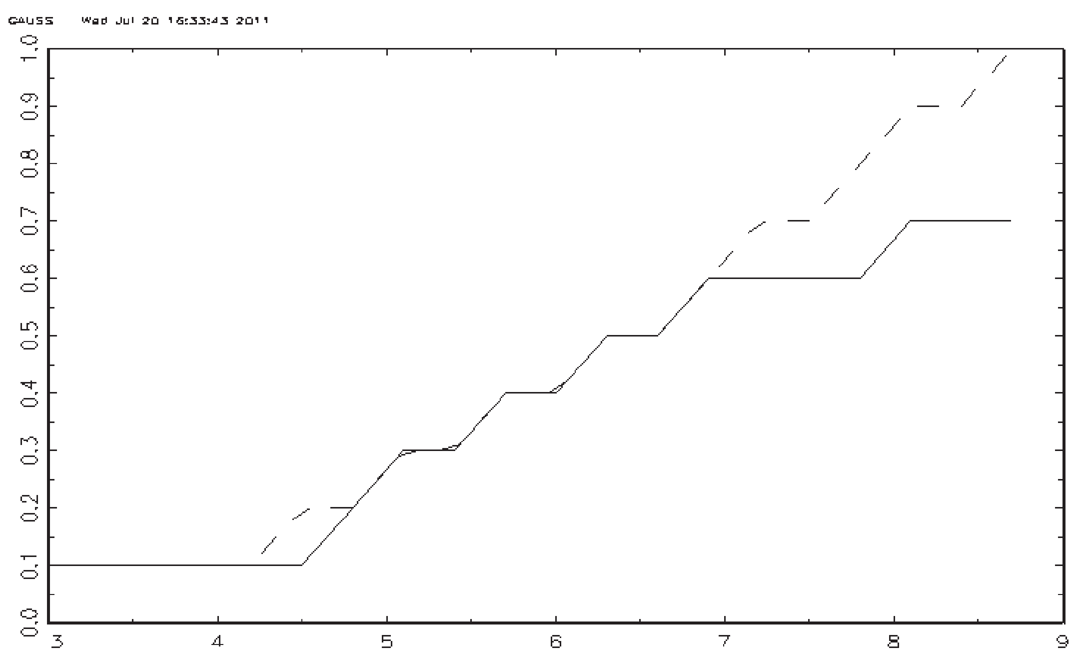
- - - - the relationship between θ^* and e^* under asymmetric information.

The dashed line shows that there is no relationship between e^* and θ^* under perfect information (as discussed in the previous section). The situation changes under asymmetric information. The dotted line shows that there is a clear positive relationship between e^* and θ^*. Simply put, investor protection forces the director to exert greater efforts.

Next, we examine how the director's compensation, the current one and the alternative one, w and U, affect investor protection θ^* and effort e^*. Figures 3.5 and 3.6 show the effects of the director's wage w on θ^* and e^*.

Figure 3.5 Investor protection and director's compensation.

Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. Investor protection is on the vertical axis and the director's compensation is on the horizontal axis[49].



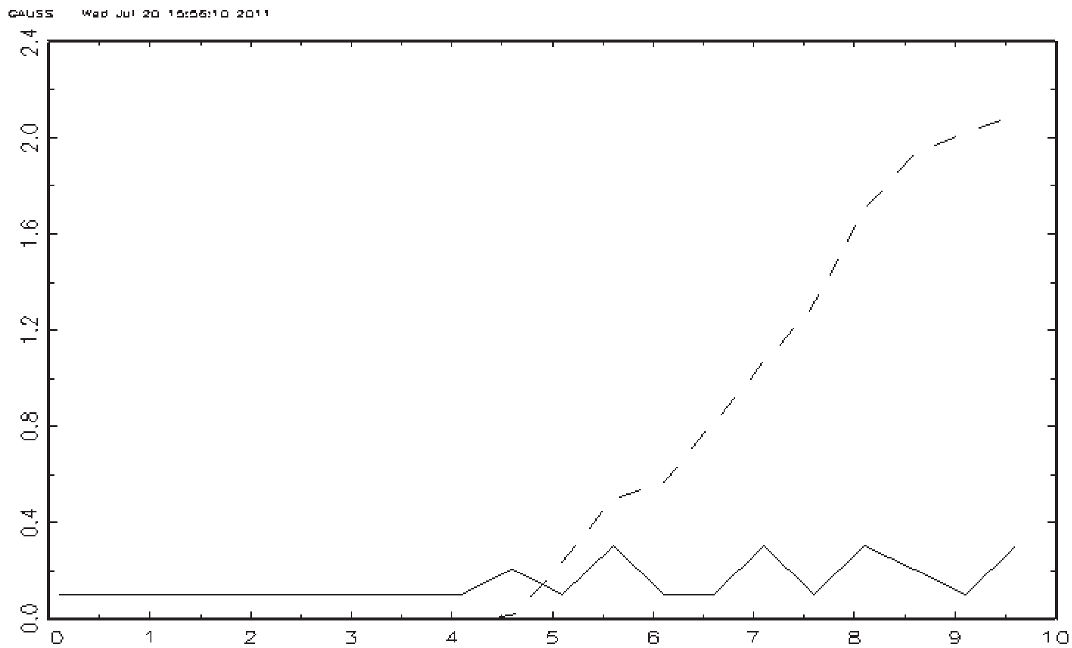
——— the relationship between θ^* and w under perfect information;

- - - - the relationship between θ^* and w under asymmetric information.

[49]The simulations were ran for $\pi^H - \pi^L = 1$ and $u = 4$.

Figure 3.6 The director's effort and compensation.

The director's optimal effort is on the vertical axis and the director's compensation is on the horizontal axis[50].



——— the relationship between e^* and w under perfect information;

- - - - the relationship between e^* and w under asymmetric information.

Figure 3.5 shows that investor protection of asymmetric information is equal to or greater than the one of perfect information. In the latter case, θ^* has only one purpose which is to save money on directors' compensation. Under asymmetric information, however, θ^* serves an additional purpose: it's supposed to stimulate greater efforts on the directors' part. These two objectives result in a higher level of investor protection under asymmetric information than under perfect information.

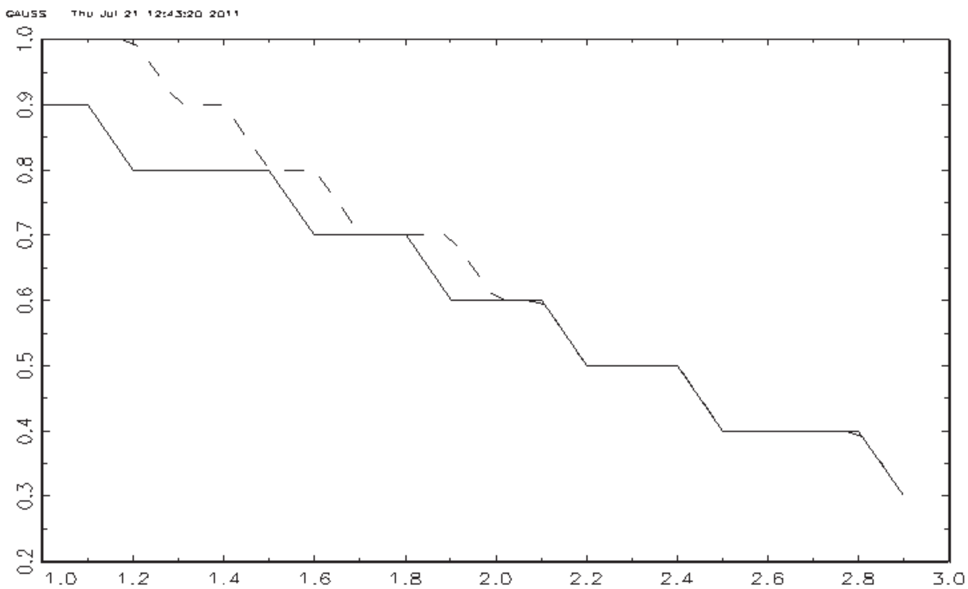
With respect to effort, Figure 3.6 shows that under perfect information, effort seems to be independent of wage. This is because it is the investor who chooses e^* and she does so in order to maximize her utility. Director's wage is not an important factor for her. The case of asymmetric information is different. In this case, the director gets to choose e^* and for him, w is one of the most important factors. The result is hardly surprising: the higher the wage, the greater the effort.

Figures 3.7 and 3.8 show how alternative compensation (U) affects the optimal investor protection θ^* and effort e^*.

[50] The simulations were ran for $\pi^H - \pi^L = 1$ and $u = 4$.

Figure 3.7. Investor protection and the director's alternative compensation.

Investor protection is modelled as the probability that shareholders fire a director if the firm earned low profit. Investor protection is on the vertical axis and the director's alternative compensation is on the horizontal axis[51].



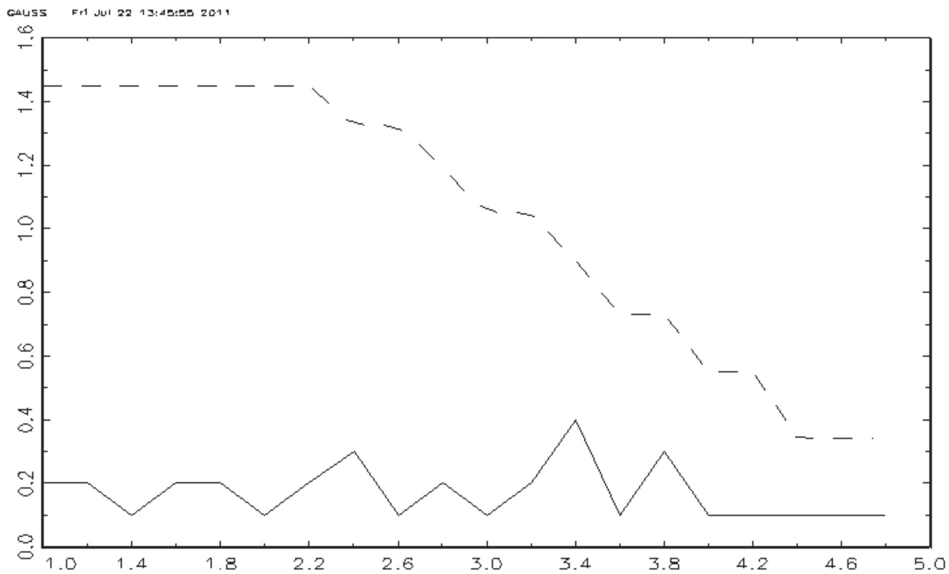
——— the relationship between θ^* and U under perfect information;

- - - - the relationship between θ^* and U under asymmetric information.

[51]The simulations were ran for $\pi^H - \pi^L = 1$ and $w = 4$.

Figure 3.8 The director's effort and alternative compensation.

The director's optimal effort is on the vertical axis and the director's alternative compensation is on the horizontal axis[52].



——— the relationship between e^* and U under perfect information;

- - - - the relationship between e^* and U under asymmetric information.

Results are similar to those of Figures 3.5 and 3.6. Similar to Figure 3.5, Figure 3.7 shows that investor protection is higher under asymmetric information than under perfect information. It is also clear that the director's alternative compensation U puts a limit on investor protection. In both cases, the director's alternative compensation limits how far shareholders can go enhancing their rights. The better the directors' alternatives, the lesser rights shareholders can demand.

With respect to effort, there seems to be no relationship between e^* and U under perfect information (since it is the investor who decides on e^*). The relationship becomes clear under asymmetric information: the better the director's alternative options, the lesser effort he puts in.

In this paper, we considered the case when shareholders fire underperforming directors and withhold their pay. The opposite situation, however, may also be true when the outgoing directors are *awarded* with generous bonuses, the practice known as "golden parachute". When the board of *Home Depot* ousted Robert Nardelli in January of 2007, he was awarded \$210 million of severence package; when Kenneth

[52] The simulations were ran for $\pi^H - \pi^L = 1$ and $w = 4$.

Lewis retired from the *Bank of America* in 2009, he pocketed $125 million in retirement benefits, to name just two examples. We modify the payoff functions of directors and shareholders in (3) and (4) for the case of "golden parachutes" as follows:

$$E(u_{dir}(\theta, e)) = w - e + \theta w(1 - \tfrac{e}{1+e}),$$
$$E(u_{inv}(\theta, e)) = \tfrac{e}{1+e}(\pi^H - \pi^L) + \pi^L - w - \tfrac{1}{2}\theta^2 - \theta w(1 - \tfrac{e}{1+e}).$$

Then it is obvious that the shareholder would set no investor protection at all, $\theta^*= 0$ (since her objective function is decreasing in θ) under perfect or asymmetric information. The director would always choose to exert no effort, $e^*= 0$ in order to minimize his disutility of effort and to increase his chances of getting fired (and rewarded for poor effort). Our above-mentioned examples seem to confirm this result: Robert Nardelli was fired after six years of destroying shareholder value and alienating customers, employees and shareholders of *Home Depot*; Kenneth Lewis was pressured to retire after bringing the *Bank of America* to near bankruptcy and forcing it to buy *Merril Lynch*, with all its toxic assets. We argue that the current practice in the US companies to reward ousted directors and executives destroys shareholder value and we commend on the UK which effectively reduced severance pays after the Cadbury and Hampel reform of the 1990s.

3.4 Conclusion

This paper, although similar to the previous chapter of this thesis, brought about a different result on the relationship between investor protection and directors' compensation. In our previous study, there was negative correlation between them while in the present paper, there is positive correlation. The difference stems from differences in the game. In the previous chapter, we assumed that shareholders do not benefit from ousting directors while in the present paper, they do. In the latter case, they have an additional incentive to boost investor protection. Not only does it punish underperforming directors but also saves money on the directors' pay. That is why there is a positive relationship between investor protection and directors' wages: the higher the wage, the stronger the incentive to fire them and to take away their pay. Which result is more realistic depends on a firm. In the second chapter, we found a strong negative correlation between directors' compensation (measured as private benefits of control) and investor protection (measured as block premium in a takeover) which means that on average, the model of the second chapter is more realistic and shareholders rarely benefit, in monetary terms, from voting directors out.

In this paper, we strengthened asymmetric information (the fact that directors' efforts are hidden) as the primary cause of investor protection. By setting some level of investor protection in place, shareholders (and by extension, the society as a whole) solve the agency problem of corporate governance. Investor protection is supposed to motivate directors' efforts and prevent them from stealing shareholder money. This approach seems especially novel since most studies on investor protection were done from the perspective of political economy while we offer the information approach.

References

2006 Postseason Report, Institutional Shareholder Services, available at www.issproxy.com

Aranow, A., Einhorn, H., (1968) Proxy contests for corporate control (Columbia University Press, New York).

Barclay, M., Holderness, C., (1989) Private benefits of control of public corporations, *Journal of Financial Economics* 25, 371-395.

Bainbridge, S., (2006) Director primacy and shareholder disempowerment, *Harvard Law Review* 119, 1784-1813.

Bebchuk, L., (2005) Pay without performance: overview of issues, *Journal of Applied Corporate Finance* 17, 8-22.

Bebchuk, L., Kahan, M., (1990) A framework for analyzing legal policy towards proxy contests, *California Law Review* 78, 1071-1135.

Bebchuk, L. A., Neeman, Z., (2010) Investor protection and interest group politics, *Review of Financial Studies* 23, 1089-1119.

Becht, M., Franks, J., Mayer, C., Rossi, S., (2006) Returns to shareholder activism: evidence from a clinical study of the Hermes UK Focus Fund, Working Paper, London School of Business.

Berle, A., Means, G., (1933) The Modern corporation and private property (New York: Macmillan).

Bhagat, S., Brickley, J. A., (1984) Cumulative voting: the value of minority shareholder voting rights, *Journal of Law and Economics* 27, 339-365.

Black, B., (1998) Shareholder activism and corporate governance in the United States, in Peter Newman, ed., *The New Palgrave Dictionary of Economics and the Law*.

Brown, L., Caylor, M., (2009) Corporate governance and firm operating performance, *Review of Quantitative Finance and Accounting* 32, 129-144.

Coates IV, John., C., (2007) The goals and promise of the Sarbanes-Oxley Act, *Journal of Economic Perspectives* 21, pp.91-116.

Cole, A., (1950) Legal and mathematical aspects of cumulative voting, *South Carolina Law Quaterly* 3, 225 - 244.

Cziraki, P., Renneboog, L., Szilagyi, P. G., (2009) Shareholder activism through proxy proposals: the European perspective, *TILEC Discussion Paper N 2009-019*.

De Angelo, H. L., de Angelo, (1989) Proxy contests and the governance of publicly held corporations, *Journal of Financial Economics* 23: 29-59.

Dodd, P., Warner, J., (1983) On corporate governance. A study of proxy contests, *Journal of Financial Economics* 11, 401-438.

Dyck, A., Zingales, L., (2004) Private benefits of control: an international comparison, *Journal of Finance* LIX, 537-600.

Easterbrook, F. H., Fischel, D. R., (1983) Voting in Corporate Law, *Journal of Law and Economics* 26, 395-427.

Gerstenberg, C., (1910) The mathematics of cumulative voting, *The Journal of Accountancy* IX, 177-188.

Gillan S., Starks L.T., (2000) Corporate governance proposals and shareholder activism: the role of institutional investors, *Journal of Financial Economics* 57, 275-305.

Glasser, G., (1959) Game theory and cumulative voting for corporate directors, *Management Science* 5, 151-156.

Glazer, A., Glazer D. G., Grofman, B., (1984) Cumulative voting in corporate elections: introducing strategy into the equation, *South Carolina Law Review* 35, 295-309.

Grossman, S. J., Hart O. D., (1980) Takeover bids, the free rider problem, and the theory of corporation, *Bell Journal of Economics* 11, 42-69.

Grossman, S. J., Hart O. D., (1988) One share- one vote and the market for corporate control, *Journal of Financial Economics* 20, 175-202.

Ikenberry, D., Lakonishok, J., (1993) Corporate governance through the proxy contest: evidence and implications, *Journal of Business* 66, 405-435.

Karpoff, J., Malatesta, P. H., Walkling R. A., (1996) Corporate governance and shareholder initiatives: empirical evidence, *Journal of Financial Economics* 42, 365-396.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R. W., (1998) Law and Finance, *Journal of Political Economy* 106, 1113 - 55.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., (1999) Corporate Ownership around the World, *Journal of Finance* 54, 471-517.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny R. W., (2000) Investor protection and corporate governance, *Journal of Financial Economics* 58, 3-27.

Lamoreaux N. R., Rosenthal J., (2005) Legal regime and contractual flexibility: a comparison of business's organizational choices in France and the United States during the era of industrialization, *American Law and Economics Review* 7, 28-61.

Harris, M., Raviv, A., (1978) Some results on incentive contracts with applications to education and employment, health insurance and law enforcement, *American Economic Review* 68, 20-30.

Harris, M., Raviv, A., (1988) Corporate governance: voting rights and majority rules, *Journal of Financial Economics* 20, 203-235.

Hermalin, B. E., Weisbach M. S., (2003) Boards of directors as an endogenously determined institution: a survey on the economic literature. *FRBNY Economic Policy Review* 9, 7-26

Macho-Stadler, I, Perez-Castrillo, J. D., (2001) An introduction to the economics of information (Oxford University Press).

Matvos, M., Ostrovsky, G., (2010) Heterogeneity and peer effects in mutual funds proxy voting, *Journal of Financial Economics* 98, 90-112.

Mills, L. R., (1968) The Mathematics of cumulative voting, *Duke Law Journal* 1, 28-43.

Nathan, C., Craythorn, D., (2008) The 2009 proxy season and the year of investment anger, *New York Law Journal*, November 17.

Nesbitt, S., (1994) Long-term rewards from shareholder activism: a study of the CALPERS effect, *Journal of Applied Corporate Finance* 6, 75-80.

Pagano, M., Volpin, P. F., (2005) The political economy of corporate governance, *The American Economic Review* 95, 1005-1030.

Perotti, E. C., von Thadden, E-L., (2006) The political economy of corporate control and labor rents, *The Journal of Political Economy* 114: 145-174.

Pound, J., (1988) Proxy contest and the efficiency of shareholder oversight, *Journal of Financial Economics* 20: 237-265.

Romano, R., (2001) Less is more: making institutional investor activism a valuable mechanism for corporate governance, *Yale Journal of Regulation* 18, 174-251.

Ross, S. A., (1973) The economic theory of agency: the principal's problem, *American Economic Review* 63, 134-139.

Seki, T., (2005) Legal reform and shareholder activism by institutional investors in Japan, *Corporate Governance: An International Review* 13, 377-385.

Shavell, S, (1979) Risk sharing and incentives in the principal and agent relationship, *Bell Journal of Economics* 10, 55-73.

Shleifer, A., Vishny, R. W., (1997) A survey of corporate governance, *The Journal of Finance* LII, 737-783.

Strine, L., (2006) Toward a true corporate republic: a traditionalist response to Bebchuk's solution for improving corporate America, *Harvard Law Review* 119, 1759-1783.

Williams, C. H., (1951) Cumulative voting for directors, Boston, Graduate School of Business Administration, Harvard University.

Tirole, J., (2006) The Theory of Corporate Finance, Princeton University Press.

Appendix

Table A1

Shares outstanding and a number of directorships in small-cap companies

(top 10 holdings of Russell 2000® Index)[53]

Top 10 holdings	**Shares (millions)**	**Directorships**	Ownership by directors and executive officers as a group
Riverbed Technology Inc	150.90	9	14.3%
Tibco Software Inc	164.57	6	10.97%
Brigham Exploration	116.88	7	3.14%
Verifone Systems	87.52	9	4%
Rackspace Hosting Inc	127.82	7	24.1%
Nordson Corp	34.11	10	5.4%
Solutia Inc	121.89	9	2.5%
Deckers Outdoor Corp	38.55	8	2.7%
Finisar Corp	89.63	9	3.97%
Amerigroup Corp	49.5	9	5.1%
Median	**103.26**	**9**	**4.55%**
Standard deviation	**46.18**	**1.25**	**6.96%**

[53] For tables A1, A2 and A3, data for the Russell indices is from www.russell.com; top 10 holdings are as of March 1, 2011; data on shares, directorships and ownership is from companies' fillings at the SEC, made during 2010-2011, available at www.sec.gov.

Table A2

Shares outstanding and a number of directorships in mid-cap companies

(top 10 holdings of Russell Midcap® Index)

Top 10 holdings	**Shares (millions)**	**Directorships**	Ownership by directors and executive officers as a group
Cummins Inc	195.70	9	0.7%
Priceline.Com Inc	47.43	8	2%
NetApp Inc	350.92	9	3.1%
Eaton Corp	340.40	11	1.6%
Weatherford International	745.92	7	1.8%
T Rowe Price Group	258.99	10	4.69%
Peabody Energy Corp	270.56	11	0.66%
Spectra Energy	648.62	11	0.26%
Coach Inc	295.77	7	3.5%
Noble Energy	175.75	9	2.6%
Median	**283.17**	**9**	**1.9%**
Standard deviation	**212.49**	**1.55**	**1.40%**

Table A3

Shares outstanding and a number of directorships in large-cap companies (top 10 holdings of Russell 1000® Index)

Top 10 holdings	**Shares (millions)**	**Directorships**	Ownership by directors and executive officers as a group
Exxon Mobil Corp	4,960	11	0.09%
Apple Inc	921,280	7	0%
General Electric Corp	10,620	16	0.18%
Microsoft Corp	8,400	9	12.07%
IBM Corp	1,220	12	0.07%
Chevron Inc	2,010	16	0.26%
Procter & Gamble	2,800	11	0.28%
JPMorgan Chase & Co	3,910	11	0.83%
Johnson & Johnson	2,740	11	0.04%
AT&T Inc	5,910	13	0.11%
Median	**4,435**	**11**	**0.15%**
Standard deviation	**289853.4**	**2.79**	**3.76%**