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Chapter 2
Why Finance Matters: From Capital Structure Theory to Corporate Governance

1 Introduction

Academic work in the area of corporate finance has increased considerably over the last three decades. By now, corporate finance has gained a distinctive position in the field of economics. The underlying question that the corporate finance literature focuses on is whether or not firms are confronted with serious impediments when they wish to obtain funds from investors. Modigliani and Miller (1958) provide one of the first rigorous contributions on this issue. They show that in a world with perfect financial markets, the financial policy of the firm is irrelevant. The firm cannot enhance its value or lower the total cost of capital through its financial decisions. The intuition behind this result is that with perfect capital markets, investors can undo or replicate any financial decision of the firm. The financial policy of the firm does not alter the investment opportunities of financiers. The total revenue of all securities that the firm issues is therefore independent of the way the cash flow rights are designed.

The irrelevance of financial policy of the firm brings about a separation of real and financial decisions within the firm and companies do not have to worry about financing their activities at the right terms. Although the argument is pervasive, it does not fit very well with reality. Firms do seem to care a lot about how they finance themselves. The research that followed therefore aimed at assessing the robustness of this ‘irrelevance result’ by taking into account market imperfections. The first step was to allow for the presence of taxes (corporate as well as personal) and bankruptcy costs. This strand of the literature recognized that interest payments and dividend payment are generally treated differently by the tax code and that bankruptcy is costly. Ultimately, this led to theories about the optimal capital structure of the firm.8

As Myers (1984) concludes, this research has not provided us with insights that are powerful enough to explain corporate financing patterns. Bankruptcy costs appear to be too

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8 See for example the contributions of Modigliani and Miller (1963). Miller (1977) DeAngelo and Masulis (1980a,b) and Haugen and Senbet (1978, 1988) for some early work. Berens and Cuny (1995) provide a more recent contribution to this literature.
small to prevent firms from taking on large amounts of debt relative to their equity, in order to profit from the associated tax benefits. Some authors even doubt the relevancy of these costs for capital structure choices because they can potentially be avoided through renegotiation (see Haugen and Senbet 1978, 1988).

From the 1970s on, the consequences of asymmetric information and agency problems became a topic of analysis. Most modern companies are to some extent financed by investors who are not engaged in running the firm. Firms are therefore managed by agents that at most hold an equity stake in the firm. This separation of finance and management leads to potential agency problems and informational frictions that may severely reduce the possibility of firms to finance themselves at the correct terms or even to obtain any funding at all. 9

In this paper we review the theoretical corporate finance literature that takes the separation of finance and control as a starting point for analyzing the corporate financing decision. Following the modern developments of this literature, we take a broader perspective on corporate financing than merely considering the choice between debt and equity. When a company seeks outside financing, it has to design and sell a financial contract that allocates cash flow rights and control rights over investors. In the presence of asymmetric information about the true value of these securities, the design problem primarily concerns the allocation of cash flow rights. Outside investors do not care about the extent to which the securities that they buy carry control rights that allow them to influence corporate policy. With agency problems, however, these control rights are crucial for their willingness to invest in the firm. Investors can use them to control corporate decisions and therefore to resolve conflicts of interests about them.

The literature has recognized these security design aspects of corporate financing and has become increasingly focussed on investigating the optimal design of cash flow rights and control rights when firms want to finance themselves. So, in stead of taking the set of securities from which a company can choose to finance itself as given, the so called security design literature endogenizes financial contracts by deriving the optimal contract in a setting where there is adverse selection or where there are agency problems. Endogenizing financial contracts is useful because it may provide a strong economic rationale for the observation that firms rely mostly on debt and equity when they have to finance themselves. Also, due to financial innovation, the menu of financing choices has expanded greatly in the last 25 years.

9 We use the term "separation of finance and control" to indicate that we focus on any form of external finance. Some authors, for example Shleifer and Vishny (1997), cast their analysis in terms of "separation of ownership and control". However, in the literature, ownership is often associated with residual control rights, i.e. the right to decide in situations where contracts do not specify the precise decisions to be taken (see for example Grossman and Hart 1986 and Hart 1995). According to this view, the shareholders of the firm are the owners, while some of the control rights are delegated to the board of directors.
Endogenizing the securities that a firm issues may enable us to explain the rapid pace in financial innovations.

This change in focus has taken the corporate finance literature away from the traditional capital structure approach and our survey displays this development. The organization of this chapter is as follows. In the next section, we will start with the more traditional approach as we introduce the agency and information problems that a separation of finance and control brings about. We then show that the capital structure of the firm or the choice for debt or equity influence the extent to which these agency and information problems manifest themselves. In Section 3, we move on to the so-called security design literature that analyzes the basic characteristics of optimal financial contracts under asymmetric information. The focus in that section is on the design of cash flows rights because these are essential for resolving adverse selection problems. In Section 4, we consider how the joint allocation of cash flow and control rights through financial contracts can be helpful in overcoming agency problems.

The analysis concerning the importance of control rights directs the attention towards corporate governance issues. Although financial contracts typically allocate control to investors and other parties, this does not mean that most corporate decisions will in fact be directly governed through detailed specifications in these financial contracts. There will be many corporate decisions about which contracts have little to say. This incomplete nature of (financial) contracts implies that there will be residual control rights that have to be allocated.

The corporate governance literature mainly looks at the arrangements that determine which party effectively controls decisions that are not directly governed through contracts. In Section 5, we will relate corporate governance to the previous sections of this survey, thereby stressing the intimate relationship between corporate finance and corporate governance.

The amount of theoretical and empirical work in this area of corporate is considerable. We will only focus on the theoretical contributions. Moreover, we narrow down the discussion somewhat further. We ignore the role of dividend policy under agency and information problems. Allen and Michaely (1995) summarize a large proportion of the relevant literature. We also suppress an analysis of the literature that studies the importance of financial contracting from the perspective of corporate takeovers. Harris and Raviv (1992) and Allen and Winton (1995) provide recent surveys on this topic. Finally, we largely ignore any special function of bank loans. We refer to Bhattacharya and Thakor (1993) and Ongena and Smith (1998) for an overview on this topic.
2 Asymmetric Information, Agency Problems and the Capital Structure of the Firm

At the heart of the relevance of information and agency problems for corporate finance is the separation of finance and control. We therefore start in Section 2.1 with a brief description of the nature of the separation of finance and control and the agency and information problems that it brings about. We then move on to discuss how the capital structure of the firm and the severity of agency and information problems are intimately related. Section 2.2 analyzes how the capital structure of the firm (or the choice for debt or equity) can help to overcome the hazards of asymmetric information. We also show that the firm may be able to credibly signal its value by properly arranging its financing strategy. Section 2.3 addresses the relation between agency problems and the capital structure of the firm.

2.1 Separation of Finance and Control, Asymmetric Information and Agency Problems

Separation of finance and control occurs whenever a firm relies on funds that are supplied by parties that do not run the firm from day-to-day. Almost all companies are characterized by some degree of separation of finance and control. For small firms, the separation is probably limited. The entrepreneur/manager presumably holds a significant equity stake in the firm. But even these firms tend to rely on some outside financing in the form of debt, which introduces some degree of separation of finance and control. For large companies, the separation is often complete. Management typically provides a negligible part of the funds that are needed but at the same time (potentially) controls many decisions that have to be made by the firm.

The separation between finance and control is valuable because firms can then be run by managers who are selected on the basis of their skills, instead of on the basis of their wealth. Moreover, it allows investors to diversify their funds across firms, which improves risk sharing and lowers the cost of capital. Such a separation, however, also creates potential costs because it gives rise to information frictions and agency problems that reduce the attractiveness of outside financing.\(^{10}\)

\(^{10}\) See Fama and Jensen (1983) for a more elaborate view on the nature of the separation of finance and control.
2.1.1 Asymmetric Information about the Value of the Firm

The situation that a firm is financed by some investors who are not involved in day to day decisions of the firm creates an informational advantage of management over these investors. Firms are complex organizations and managers are likely to have more precise information about the firm's actions, performance and positions in different product markets. The superior knowledge about the performance and prospects of the firm that managers have implies that they will also possess more precise information about the value of existing or newly issued securities than investors do. Whenever the firm wishes to obtain additional funding, it has to sell securities to investors who are aware that they are at an informational disadvantage concerning the value of the securities they are buying.

Such an unequal distribution of information gives rise to the classical 'lemons' problem and it is generally known that markets may not perform very well under these circumstances (Akerlof 1970). To see this, consider a situation where there is asymmetric information about the prospects of investment projects and where the firm needs new capital to finance this project. The project is economically beneficial in the sense that the true net present value, i.e. the net present value in absence of the asymmetric information, is positive. Assume that there is no information asymmetry about the future cash flows of the existing assets of a firm. If the project is relatively good compared to the market's assessment, the firm will have to issue securities (for example, debt or equity) that will be sold below their true value. The current security holders will therefore be subsidizing the new ones. If this subsidy is larger than the (true) net present value of the project, it is in the interests of the current security holders not to undertake the project. From the perspective of the firm, new capital is then too costly. On the other hand, if the project is of less quality than the market's assessment, the new security holders are subsidizing the old ones. In the latter case, projects that are economically inefficient might be undertaken. In both scenarios, the capital market functions sub-optimal in financing corporate activities.

2.1.2 Agency Problems

Another drawback of the separation of finance and control is that it introduces agency problems, i.e. conflicts of interest between investors and those in control. Management is delegated the decision power to act on behalf of the investors. At the same time, the objectives of management do not naturally coincide with those of investors. Management may prefer the firm to grow beyond the optimal size, merely because they obtain prestige from running a larger firm. Similarly, re-structuring the firm or replacing officers is often a painful
matter and management may choose to delay such decisions. Similarly, management may choose to stay on their jobs even if there are better candidates out there. These observations point at a rigidity that is rooted in managerial concerns about their careers and reputations.

Conflicts of interests may also arise between different security holders. Creditors and shareholders might disagree about the policy of the firm because they do not necessarily benefit equally from corporate decisions. If the firm is leveraged (e.g. if it has debt outstanding), more risk, ceteris paribus, might benefit shareholders at the expense of creditors. Similarly, continuation of the firm may be preferred by shareholders but not by creditors.

The source of all of these agency problems is the fact that under a separation of finance and control and/or a separation between different classes of security holders, corporate decisions have a potentially different impact on the involved parties. In general terms, a decline in the value of the securities of investors of one dollar does not necessarily make management one dollar worse off as well. These conflicts of interest that arise from external financing will be anticipated by investors at the time that they supply capital. Eventually then, they will adjust the price at which they are willing to participate in the firm accordingly and firms will be confronted with these agency costs when they turn to the capital market. The presence of agency problems therefore reduces the attractiveness of external financing and this undermines the efficiency of financial markets in allocating resources from investors to firms.

2.1.3 Concluding Remarks

In this subsection, we have argued that a separation of finance and management creates informational frictions and agency problems. In large firms, this separation is almost complete because. Why do we see so many firms run by managers that provide only a small fraction of the funds that the firm requires? The reason is that there are mechanisms at work that reduce the costs of this separation to levels where the benefits of separation probably dominate the costs, even at high degrees of separation. In the rest of this chapter, we show that the financial policy of the firm offers such a mechanism.
2.2 Asymmetric Information and the Debt-Equity Choice

2.2.1 Pecking Order Theory

If information about the prospects and quality of the firm is equally distributed among management and outsiders, there will be no disagreement about the true value of securities. The firm can finance itself at the correct cost of capital, which is determined using all the information that is available. In case of asymmetric information, investors have to provide capital based on a notion of the perceived "average quality" of the securities. This implies that the value of these securities might differ from their 'true' value, i.e. they might be mispriced. The pecking order theory stresses that this degree of mispricing will depend on the method of financing by the firm, suggesting that firms will prefer certain methods for financing to others.

To see how such a pecking order arises, consider a firm whose current value, i.e. the value of the assets-in-place, is privately known to management. The financial market does not know what the precise quality of the firm is. The firm has a positive net present value (NPV) project in which it can invest. The financial market knows the value of this project, so there is no information asymmetry with respect to this investment opportunity. Assume that the firm needs to rely on external financing to realize the project, and that project financing is impossible because the cash flows of the investment opportunity cannot be distinguished from the cash flows generated by the assets-in-place.

Myers and Majluf (1984) show that in such a setting, the financial policy of the firm becomes an important factor for whether or not the positive NPV project will be undertaken. Assume that the firm decides to issue equity to finance the project, and that the market prices the shares on the basis of the average quality of all firms in the economy. If the value of the assets-in-place is high relative to the value that the market assigns to them, the firm receives too little for its newly issued shares. Over time, as the cash flows are realized, the information asymmetry will be resolved and the value of shares will adjust towards its true value. The new shareholders will benefit from this. Therefore, at the time of the equity issue, the old shareholders are in fact subsidizing the new shareholders, which creates a wealth transfer from existing shareholders to new shareholders. Myers and Majluf show that if the transfer of wealth from old shareholders to new shareholders is larger than the value of the stake the old shareholders obtain in the project, it is not in their interest to undertake the investment. If

\[11\] We will implicitly assume in this sub-section that there are no moral hazard agency problems between different parties.
management acts in the interest of existing shareholders, the project requires a minimal positive NPV that is large enough to compensate current shareholders.

The above implies that when having to rely on equity finance, firms that are undervalued by the market may be reluctant to issue shares. The opposite applies to firms that are overvalued. For those firms, it is then in the interest of existing shareholders to issue shares, even if the proceeds can only be used to finance negative NPV projects. But rational investors will anticipate these incentives whenever the firm offers shares to them. Knowing that at least some undervalued firms will avoid equity financing and that overvalued firms prefer issuing shares at too high prices, investor will adjust their expectations regarding the quality of the issuing firm. Issuing equity then becomes a negative signal. The bottom line then is that the functioning of the equity market as a source for external finance may be seriously hampered by an adverse selection problem.

Myers and Majluf argue that the firm is better off if it issues debt in stead of equity. To see this, note that the origin of the asymmetric information problem is the sensitivity of the issued securities to the quality of the assets-in-place. In general, the less the value of the issued securities depends on the characteristics of the firm, the less relevant the asymmetric information is to the value of the security. The preference for debt then follows immediately because equity is a residual claim that receives payments after debt has been honored.

But even the value of debt will probably depend on the characteristics of the firm. Therefore, the adverse consequences of asymmetric information may still be present when the firm relies on debt financing, so that a potentially undervalued firm will still perceive that external financing is (too) costly. An alternative would be to direct the financial policy of the firm towards internal financing in order to avoid the need to rely on external financing. This can be done by retaining profits or by holding readily saleable real assets or securities. Note that the adverse selection problem is then completely avoided.

The above implies that there may be a pecking order for the method of financing. Firms will first try to rely on internal financing, avoiding the financial market as much as possible. Whenever external financing is necessary, they will issue the safest securities first. Hence the pecking order of securities runs from safe debt to risky debt and finally, as a last resort, equity. Note that this will also hold for firms whose securities are initially overvalued. Their incentive to issue equity is tempered by the rationality of investors. Anticipating that mostly overvalued firms prefer to issue equity, they will adjust the prices at which they are willing to invest. It may be better for these firms to rely on debt financing because this allows
them to mimic undervalued firms and to issue overvalued debt. The pecking order theory therefore suggests that most firms will prefer debt financing to equity financing.  

### 2.2.2 Signaling through the Financial Policy

The analysis above suggests that firms that are potentially undervalued by the market can benefit from communicating their intrinsic value. This is called signaling. In the approach outlined above, there was no explicit role for signaling through the financial policy, although equity issues were considered as bad news by investors. However, in a slightly enriched setting, signaling through the financial policy of the firm may be possible. The problem with signaling is that poor quality firms will try to mimic high quality ones, which torments signaling possibilities. In some settings, though, it may be possible to avoid such mimicking.

Ross (1977) and Leland and Pyle (1977) present some early work on the usefulness of financial contracts for signaling the value of the firm. In both contributions, the shareholders of undervalued firms are interested in communicating the true distribution of the firm's cash flows. In Ross (1977), this is done through the amount of debt in the capital structure in combination with an appropriate incentive schedule for the management, which has to set the debt level. Management is punished in case of default, for example through a loss of reputation on the labor market, but is rewarded for higher firm value. This allows firms of good quality (who anticipate a lower probability of punishment) to take on higher debt levels and to signal their cash flow distributions. In Leland and Pyle (1977), signaling is done through the willingness of management to obtain a stake in the firm. The better the prospects of the firm, the less reluctant the manager will be to invest his wealth in the shares of the firm. The debt level has an auxiliary role and is used to influence the risk and return characteristics of the stake of manager.

Brennan and Kraus (1987) allow firms to signal their types through more complex financing strategies. For example, firms of high quality may buy back debt at a price higher than the market value while at the same time issuing enough equity to finance the buy back and their investments. For firms of low quality this may be unattractive since it involves a larger transfer towards bondholders than it does so for high quality firms. More specifically, the transfer to bondholders for those firms may exceed the gains from selling overpriced equity. Hence undervalued firms may be able to separate themselves this way from the poor quality firms.

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12 There is quite some evidence that the pecking order theory has empirical content. Firms rely heavily on internal finance and appear to be reluctant to issue equity (see for example Mayer 1988). Announcements of
The results of Brennan and Kraus contrast strongly with the pecking order theory that was presented in the previous subsection. The reason for this rejection of the pecking order is that Brennan and Kraus allow the firm to construct a mix of financing methods, in stead of restricting the firm to choose from either debt or equity, as is done in Myers and Majluf. Noe (1988) also presents an analysis that suggests that the pecking order theory follows from the specific setting that Myers and Majluf consider. Noe allows for the existence of more than two types of firms. His analysis shows that some firm types may choose to issue equity, while others may prefer debt. More specifically, Noe shows that if there are three types of firms, mediocre firms might be able to signal their quality by issuing equity, while the other two types of firms prefer to issue debt.

To see why this might hold, assume that the market indeed believes that only mediocre firms issue equity. Consider the incentives of the highest quality firm, who now finances itself in a pool of firms of high and low quality. Because the value of debt is not so sensitive to the true value of the firm, the underpricing of the debt is rather limited. The alternative for this firm would be to issue equity. Its shares will then be sold at a price based on a mediocre firm. Noe shows that the underpricing of the debt may in fact be smaller for the high quality firm than the underpricing that it will suffer by issuing equity. Hence, it may be optimal for these high quality firms to issue debt. In turn, the lowest quality firm might also prefer to issue debt in stead of equity. In both cases the firm would be able to issue securities at a price that is above its true value. The subsidy on its debt may be larger than the subsidy it would receive by issuing equity against the conditions of a mediocre firm. The reason is that by issuing debt, it pools with firms of a higher quality than if it would issue equity.

Finally, the mediocre firm might be content with issuing equity at the true value. This will be the case if issuing debt would lead to underpricing. Noe shows that it is not unlikely that these conditions all hold simultaneously. His analysis therefore shows that the pecking order is not robust to extending the setting towards a framework where there are more than two firm types.

### 2.2.3 Conclusion

In this subsection we argued that asymmetric information between investors and corporate insider may seriously undermine the viability of external financing. As a reaction to this, firms may prefer to direct their financial policy towards internal financing. If these are insufficient, the firm will have to turn to the capital market and the financing method can be equity issues are generally accompanied by negative abnormal returns. See Harris and Raviv (1991) for an overview of the relevant empirical literature.
an important tool to control adverse selection problems. We also saw that it may be possible that a potentially undervalue firm is able to signal its quality by cleverly designing its financial policy.

### 2.3 Agency Problems and the Capital Structure of the Firm

#### 2.3.1 Introduction

In the previous subsection, we have abstracted from any conflicts of interests between parties such as investors and management. We implicitly assumed that management never takes a decision that is harmful for any of the current investors of the firm when it has to finance itself under asymmetric information. Earlier in this chapter we argued that a separation of finance and control not only gives rise to information asymmetries about the value of the firm, but also to agency problems. The finance literature has recognized that the capital structure of the firm and the existence of agency problems are interrelated. The relative amounts of debt and equity of the firm can both cause and ameliorate agency problems. In this section, we will focus on these relations between agency problems and the capital structure of the firm.

The capital structure literature has considered two classes of agency problems. The first one concerns the conflicts that arise when management acts only on behalf of the shareholders while the firm also has debt outstanding. In that case, the agency problem is between management/shareholders who control the firm (the agents) and the creditors who partially financed the firm (the principals). In Section 2.3.2, we will concentrate on these conflicts between creditors and shareholders as we focus on the so-called risk shifting problem and the debt overhang problem. We then turn to the second class of agency problems that the finance literature has recognized, namely those between management and investors. We discuss the role of the capital structure of the firm in controlling incentive problems of management, in particular with respect to the investments projects that management initiates.

The literature that we discuss in this subsection primarily concentrates on the role of the cash flow rights that are associated with debt and equity. That is, we focus on how the different pay off characteristics of debt and equity affect corporate decisions under agency problems. Such a traditional capital structure approach abstracts from the control aspects that are associated with debt and equity. These control aspects of financing are bypassed by the (implicit) assumption that control always resides with either shareholders or management. In section 4 of this chapter, we will discuss some contributions of the finance literature that explicitly focus on the relevance of control issues in the presence of agency problems.
2.3.2 Conflicts between Shareholders and Creditors: Risk Shifting

When a firm issues both debt and equity, each category of investors will hold different rights on the cash flows of the company. The cash flows that accrue to creditors are limited by the face value of the loans and the required interest repayments. As long as their debt is fully repaid, they do not profit from higher cash flows that the firm generates. In essence, equity holders are entitled to all the cash flows that are not paid out to creditors. Moreover, they are generally protected by limited liability, implying that shareholders are not required to repay the creditors fully if the firm has insufficient cash flows to repay all its debt. With such diverse pay-off patterns, these parties are likely to have different preferences over corporate policy. In principle, any action that increases the value of equity is preferred by the shareholders, even if it lowers the value of the debt outstanding.

One way in which such a wealth transfer may take place is through an increase in the risk of corporate activities. Loosely speaking, an increase in risk will make both good and bad performance more likely. As residual claimants, the shareholders fully benefit from higher cash flows realizations, i.e. from good performance, if these are sufficient to repay the debt. If bad performance implies default on the debt, the shareholders do not suffer from an increase in the probability of poor performance because the cash flows of the firm accrue to the creditors anyway. This asymmetry implies that shareholders are more likely to benefit from increases in risk than creditors. Shareholders therefore have an incentive to increase the risk to a level that will negatively affect total firm value but which will in fact increase the value of the equity. The creditors will suffer from such practices in terms of a lower value of their claims. In anticipation of these wealth transfers, they will adjust their required repayments when they supply loans to the firm. This lowers total firm value before the risk shifting takes place so that the shareholders themselves pay the price for their adverse incentives. The higher the debt level, the more likely it is that shareholders find it profitable to increase the risk of the activities of the company, so the higher these costs to shareholders. Jensen and Meckling (1975) where among the first to point at these potential costs of debt financing.

By virtue of this risk-shifting problem, which is also referred to as the asset substitution problem, shareholders might prefer the firm not to rely on too much debt in its capital structure. In addition, when the firm wants to issue debt, shareholders would like to commit not to engage in risk shifting. One way to do so would be to write a contract that specifies the degree of riskiness of corporate activities or the precise projects which firms are allowed. Creditors could then go to court whenever the firm dishonors this contract. Smith and Warner (1979) show that bonds generally do not include covenants with such extensive restrictions on the firm's production and investment policy. In other words, debt contracts are
generally incomplete with respect to the risk that companies are allowed to take on. There may be good reasons for this. Information problems may make such contracts prohibitively costly to design and enforce. Moreover, it may induce future inefficient behavior by constraining the possibilities to manage the firm.

There are however other contractual mechanisms through which risk shifting incentives of shareholders can be reduced. Green (1984) shows that these incentives are less pronounced when the firm adds warrants to the debt. Warrants are similar to options but they lead to the issuance of new equity when they are exercised. If warrants are exercised, the current shareholders no longer hold a 100% stake in the firm and they will have to share the cash flows of the company with these new shareholders. Moreover, these new shareholders will be able to buy these shares below market prices. Current shareholders therefore lose if warrants are exercised because their stake in the firm will be diluted by the issuance of new shares that are sold below market prices. Green shows that the convex payoff schedule of shareholders that provides the incentives to engage in risk shifting can be broken down this way. An increase the share price after risk shifting will induce that the warrants will be exercised, thus invoking the costs associated with the conversion of the warrants.

For similar reasons, convertible bonds, i.e. bonds that may be converted into shares at a predetermined exercise price, can attenuate risk shifting incentives as well (Barnea, Haugen and Senbet 1985). Shareholders can also commit to restrict risk-taking by issuing callable debt or by shortening the maturity of debt (Barnea, Haugen and Senbet 1980). These features create a situation where shareholders themselves benefit if the risk of corporate activities is not increased over time. A call provision allows the firm to buy back debt at a discount if risk shifting does not occur. Also, by issuing short-term debt in stead of long-term debt, the firm will have to refinance at unfavorable terms if it engages in risk shifting because the interest rates will reflect the new characteristics of the company.

Boot, Greenbaum and Thakor (1993) show that a loan commitment can reduce asset substitution incentives as well. Loan commitments cap the maximum future interest paid by the firm and this effectively lowers the claim of debt on total cash flows. The attenuation of the risk shifting incentives then follows because the higher the debt claim, the stronger these incentives.

A natural solution to the risk-shifting problem is provided by the additional presence of an agency problem between management and shareholders. So far we have assumed that shareholders are fully in control of the firm, or, equivalently, that management acts solely in the interest of shareholders. Williams (1987) and Hirshleifer and Thakor (1991) show that this assumption is crucial for the severity of the asset substitution problem. When management obtains private benefits from being in control, they are more concerned about bankruptcy than
shareholders are. Williams stresses that bankruptcy destroys possibilities for management to consume perks. Hirshleifer and Thakor point at the adverse consequences of bankruptcy for the prospects of the manager on the managerial labor market. Both these effects may therefore reduce risk-shifting incentives.¹³

2.3.3 Conflicts between Shareholders and Creditors: Debt Overhang

The conclusion from the above is that firms might like to avoid a large amount of debt in their capital structure. The higher the debt ratio, the more beneficial risk shifting can be. If shareholders cannot commit to abstain from such practices, creditors will only be willing to supply capital if they are sufficiently compensated for inefficiencies in the level of the risk of corporate activities. Shareholders will then in fact pay themselves for the potential of asset substitution and they will want to limit the amount of debt that the firm issues.

There is yet another reason why conflicts of interests between shareholders and creditors may make firms shy from taking on debt. This is the so-called debt overhang problem, which was first addressed by Myers (1977). The debt overhang problem arises when the firm wishes to obtain additional funding. Assume that the firm has debt outstanding and that the firm has an investment opportunity with a positive NPV. Consider what happens if the firm finances the investment with new equity. The debt holders are then better off as a consequence of the investment: the firm adds a positive NPV project to its operations and the debt holders do not supply any new funds to finance these. The value of the debt of the firm will therefore go up.

Part of the NPV will thus accrue to the creditors and this increase in the value of the debt is in fact a transfer of wealth from the current shareholders to creditors. The current shareholders will only agree with the investment if the NPV of the project is high enough to compensate them for this transfer. As a consequence, if firms finance their investments with equity, not all the positive NPV projects will be carried out. Only those that have a sufficiently high NPV will increase the value of the equity of the current shareholders. The higher the amount of debt in the capital structure, the larger the transfer is and the more severe this distortion will be.

At first sight, it seems that firms can easily bypass this problem by financing the project with debt in stead of equity. However, similar considerations can arise in that case as well. For example, it may be that existing debt contracts only allow the firm to issue junior

¹³ Diamond (1989) points at another non-contractual mechanism to reduce risk shifting incentives. By engaging in asset substitution, firms may ruin their reputation on the credit market. This leads to higher future costs for debt financing and therefore provides an incentive for shareholders to limit the riskiness of the firm’s cash flows.
debt, i.e. debt that will be paid off after the current creditors are repaid. Existing debt will then again increase in value when the investment is undertaken. Thus, shareholders will still lose a part of the NPV to the current creditors and perhaps even more than that.

Only if the firm can issue debt of equal or higher seniority, the shareholders will benefit from all positive NPV projects. Existing debt contracts may prohibit this. New debt of equal or higher seniority may effectively expropriate the existing creditors. To see this, assume that the firm is in financial difficulty and that it is worth just enough to pay off the current creditors so that equity is worth only little. Issuing senior debt may be easy, because these claims are likely to be repaid. The firm may use these funds to gamble for resurrection with a risky but negative NPV project. If the gamble fails, equity holders are not really worse off because their equity wasn’t worth much anyway. If it succeeds, shareholder may benefit considerably from the increase in the value of equity. The current creditors however suffer because they are now only paid of after the new creditors are fully repaid. If the gamble fails, their claims are worth less than before the gamble. If the gamble succeeds, they don’t gain because they would have been paid of anyway. Anticipating this, creditors may wish to protect themselves through debt covenants that include clauses that forbid the firm to issue senior debt.

Observe that these problems can be perfectly circumvented if all financiers, i.e. all the creditors and shareholders, could come together to work out a deal that divides the gains from the investment opportunity. Such a process is costly however, especially if ownership of debt and equity is dispersed. The crucial insight of Myers (1977) is therefore that debt in the capital structure can lead to future financing problems even if all parties agree that the firm has profitable investment opportunities show up. Debt thus potentially distorts investment decisions. The more debt the firm has in its capital structure, the more severe the under-investment problem is. The situation where the amount of existing debt seriously affects the investment policy of the firm this way is called ‘debt overhang’.

2.3.4 Managerial Incentive Problems, Insider Ownership and Capital Structure

Section 2.3.2 and 2.3.3 discussed how the capital structure of the firm affects the extent to which conflicts of interests arise between different security holders. The assumption maintained through most of the analysis was that management acts in the interest of shareholders. At the end of Section 2.3.3, we suggested that if management does not perfectly

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14 For example, wealth transfers through expropriation can be avoided if each individual investor funds the project pro rata her current capital contribution to the firm.
act in the interest of the shareholders, the conflicts between shareholders and creditors might be less immediate. Agency problems between management and investors can then help to overcome the hazards of having different classes of security holders.

This observation does not imply that agency problems between management and investors may not be costly. In a seminal contribution, Jensen and Meckling (1976) were the first to explicitly recognize these costs in a model that was designed to capture the agency problems that are associated with external financing. Their analysis revealed that the capital structure of the firm might be an important tool to control these agency costs.

Following Jensen and Meckling (1976), consider an entrepreneur who initially completely finances the firm herself. More specifically, the entrepreneur holds all the equity of the firm and the firm has no debt outstanding. Without any other claim holders, the entrepreneur's wealth will change dollar for dollar with the value of the firm. Assume now that the entrepreneur needs additional financing. One way to obtain additional funds is to sell a fraction of the shares, say \( \alpha \). Note that as a consequence, a drop in firm value of one now only represents a drop in personal wealth of \((1-\alpha)\). This may lead to more on the job consumption in terms of perks (business trips, office equipment, etc.) or lower levels of effort that is exerted by the entrepreneur. In short, selling of shares is bad for the incentives of the entrepreneur to maximize firm value, and therefore results in agency costs.\(^{15}\)

These agency costs can largely be avoided if the entrepreneur issues debt and retains all the equity of the firm. The entrepreneur then remains the sole claimant to the cash flows that are left after the creditors are paid of. This provides him with the incentives to maximize the value of the shares of the firm. If the firm is in a state where the debt can be fully repaid, the wealth of the entrepreneur will again change dollar for dollar with the value of the firm.

Note however that we are now in a situation that closely resembles the settings that we considered while discussing the risk shifting problem and the debt overhang problem. The shareholders and managers of the firm are one and the same and the conflicts of interests between the shareholders/entrepreneur and creditors might become relevant. The analysis in Jensen and Meckling therefore not only provides a rationale for the use of debt, which was missing in Sections 2.3.2 and 2.3.3, it also provides the ingredients for an optimal debt ratio that trades-off these cost and benefits of debt financing.

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\(^{15}\) The finance literature frequently phrases the agency problems in terms of a potential lack of effort by the agent. One should not take this too literally in terms of how hard the manager works. 'Effort' is a metaphor of the many ways in which the choices of management can differ in the degree in which they are sub-optimal from the perspective of the shareholders.
2.3.5 Conflicts between Management and Shareholders: The Over-investment Problem

The approach in Jensen and Meckling is most relevant to what is often referred to as entrepreneurial firms. In those firms, management can hold a significant fraction of the shares without investing a huge amount of wealth. In very large firms, this would be impossible. The idea that debt can be used to facilitate insider ownership seems less relevant for these firms. Still, debt might be valuable in controlling agency problems between management and shareholders in such firms because it can control the incentives of management to engage in empire building. The agency problem of empire building relates to the preference of management to run larger rather than smaller firms. There may be several reasons why management may have such preferences. For example, running a large firm may offer the manager more prestige. Alternatively, the manager may wish to initiate pet projects or may be able to divert more resources from the firm the larger the size of it. Also, overconfidence about their abilities to create value might induce them to engage extensively in mergers and acquisitions at unfavorable terms.

All these actions can be interpreted as a tendency of management to over-invest financial resources. How can the capital structure of the firm affect the acuteness of such agency problems? Jensen (1986) argues that it will be useful to have debt in the capital structure of the firm. Debt forces the firm to pay out cash and this lowers the amount of funds that are directly available to management. The firm then needs to fund projects directly in the market. This will improve disciplining because the market will be reluctant to supply the firm with capital if it suspects that management is over-investing.

Stulz (1998) has stressed that enforcing the firm to turn to finance itself through the market however is not costless because it violates the pecking order theory. The repayment of debt reduces the opportunities to internally finance good investment opportunities. The firm may therefore suffer from the adverse consequences of asymmetric information in the capital market valuable projects. Moreover, debt financing may also lead to the debt overhang problem that we just discussed. These costs and benefits of debt suggest that there might be an optimal amount of debt in the capital structure that balances them.

Hart and Moore (1995) also stress the importance of senior debt in reducing the possibilities of management to over-investment. They assume that it is impossible for the firm to unbundle the returns of the investment from the cash flows that are generated by the assets-in-place. This allows management to finance investments by borrowing against the future returns of the assets in place. If these assets are sufficiently valuable, management might be able to obtain financing to fund negative NPV projects. The existence of senior debt reduces
this possibility because it effectively mortgages the assets-in-place. The optimal financial structure of the firm may therefore include senior debt to reduce over-investment. However, senior debt in the capital structure can also be costly because the seniority aggravates the debt overhang problem. The expected returns for new junior claim holders are lower if there is senior debt in place. If the firm finances itself excessively with senior debt, it might be unable to finance viable projects. The analysis in Hart and Moore (1995) therefore suggests that there will exist an optimal amount of senior debt in the capital structure of the firm.

2.4 Conclusions

In this section, we have discussed some key insights from the literature that focuses on the relevance of corporate financing under asymmetric information and agency problems. Because of asymmetric information about the value of the firm, companies may prefer to finance their activities internally. If their internal funds are insufficient, they might prefer debt to equity because the value of the former is less affected by the information asymmetry. These observations suggest that there is a pecking order of corporate financing. However, we also saw that if firms are able to communicate their value to the capital market through signaling, this pecking order might be broken down.

The preference for debt over equity that is suggested by the pecking order theory is further weakened if we recognize the existence of conflicts of interests between creditors and shareholders. The more that firms rely on debt financing, the stronger the incentives of shareholders to increase the risk of corporate activities at the expense of the creditors. Moreover, new investors might be unwilling to supply fresh capital if the firm is already financed heavily with debt. Both these aspects of debt financing will be costly for shareholders, who would therefore like to avoid that the firm will issue too much debt.

When considering conflicts of interests between financiers and management, debt financing may again have some favorable consequences for firm value. It allows management to own a larger fraction of the shares for a given level of their wealth. This is good for their incentives. Also, because debt requires repayments, it forces management to pay out cash, which reduces their possibilities to make inefficient investments. Debt may therefore discipline management in their investment policy.
3 Design of Securities under Asymmetric Information

3.1 The Security Design Approach to Corporate Finance

The literature that we discussed in the previous section was mainly concerned about the choice between debt and equity that firms can make when they need to finance themselves. The different pay-off characteristics of these two securities then imply that one if preferred over the other. This approach fails to capture two important aspects of corporate financing that are highly relevant when studying the consequences of asymmetric information or agency problems for corporate financing. First of all, firms are in principle free to design and sell any type of security they want. They are not necessarily required to issue either debt or equity (or convertible debt for that matter). If we allow firms to design their own securities, will debt and equity indeed be the securities that firm will want to issue when they are faced with asymmetric information and agency problems? If not, how do optimal securities look like?

These observations about the design of securities bring us to a second important aspect of corporate financing that has been neglected so far in the analysis. If a firm issues a security, it in fact sells a financial contract that specifies the rights of the investors that buy this contract. Part of these rights concern the extent to which the investor is entitled to the cash flows of the company. However, securities also allocate control rights over investors. For example, in many countries, shareholders are allowed to appoint and dismiss management or to obstruct major investment decisions. Creditors rarely have such rights but are generally allowed to seize the assets of the firm if repayment requirements are not met. In the previous section, these control aspects of corporate financing were largely ignored.

The so-called security design approach explicitly recognizes that corporate financing involves the design of a financial contract that specifies the cash flow rights and the control rights of the investor that acquires this contract. In this section as well as in the next, we will discuss some key insights from the security design literature. In Section 4, we concentrate on the relevance of security design under agency problems. Because agency problems are rooted in conflicts of interests about corporate decisions, control rights play an important role in that section. In this section, we focus on the security design problem when there is asymmetric information about the value of the firm. The security design problem then primarily concerns the design of cash flow rights. The reason for this is that the literature that focuses on the consequences of asymmetric information generally assumes that the true value of the firm is independent of the decisions that are taken by the firm. Hence, the cash flow characteristics of the firm are exogenous and corporate policy is only relevant with respect to the financing
The control rights of the securities that the firm then issues are unimportant because there are no other decisions to make.

The security design approach doesn't always completely endogenize the securities that are optimal for the firm to issue. If the setting in which the security design problem is analyzed is rich, deriving the optimal security can be too complex. The security design problem is then restricted to the design of specific contractual features, taking the basic characteristics of the security as given. In the contributions that we will discuss in this section, both approaches will appear.

We start off with a somewhat brief discussion of the design of securities in settings that closely resemble the framework used by Myers and Majluf. The focus will mostly be on the design of debt contracts, in stead of on completely endogenizing the optimal securities. The literature that we discuss there is primarily concerned with explaining features such as the maturity and seniority structure of debt financing. In Section 3.3, we study the design of securities in a framework where outside investors can become informed about the quality of the firm. The information of these investors will be reflected in the prices of the securities of the firm and this brings in a role for the transmission of information through the price process. As we will see, the design of the securities will influence the degree to which such a transmission takes place. In the last part of this section, we will discuss the so-called costly state verification literature. The distinctive feature of the work in this area is that the information asymmetry about the quality of the firm arises ex post, i.e. after the cash flows have been realized. Investors cannot costlessly verify cash flows. The design of the financial contract will determine the severity of this verification problem.16

3.2 Optimal Debt Contracts under Asymmetric Information

One of the key observations of section 2.2 was that a firm that is potentially undervalued by the market might prefer to issue debt in stead of equity. This result was derived in a setting we restricted the firm's choice to debt or equity. The question that arises then is whether debt, or a debt-like contract, is the optimal security for a potentially undervalued firm if we allow the firm to design its own security. Nachman and Noe (1994) provide some support for this. Their analysis almost completely endogenizes the optimal securities. They show that if the design of securities is restricted to those securities for which the pay off to investors is not decreasing in the performance/cash flows of the firm, debt-like contracts are indeed optimal.

Most contributions of the security design literature in this area are less directed towards deriving the optimal securities in a setting where the firm has complete freedom to
design its securities. Assuming that firms will prefer to issue debt-like securities, the focus is mostly on the characteristics of optimal debt contracts in a dynamic setting, especially with to the maturity structure and the seniority structure of debt.

The relevance of the maturity structure of debt can be seen as follow. Consider a borrower whose debt will be underpriced by the market due to asymmetric information about the distribution of the cash flows. Assume that the asymmetric information is not so much about the short-term cash flows of the firm but more about its long-term cash flows. In addition, assume that this borrower expects that in the future the market will receive more precise information about the quality of the firms. As lenders receive this information over time, they will use it to update their expectations about future cash flows. The firm will then prefer to issue short-term debt. The reason is that when the short-term debt has to be refinanced, a high quality firm expects to be able to refinance at terms that are more close to their true characteristics. If the firm would only issue long-term debt, refinancing would not take place. Hence, by matching the maturity of the debt with the arrival of information, the firm expects to be able to issue new debt at better conditions.

This idea is worked out in a more general framework in Diamond (1991, 1993). He uses a framework where there are two types of firms. Good firms are worth financing while bad firms invest lender's money in negative NPV projects. At some intermediate date, before the cash flows of the firm is realized, a signal becomes public which is informative about the quality of the firm. This signal does not perfectly reveal the type of the firm. At the initial date of financing, the market assigns a credit rating to each firm. This credit rating can be interpreted as the probability that the firm is good. When the signal is received, the credit rating of the firm is updated. The likelihood of a favorite signal is higher for a good firm and for firms with high initial credit ratings.

Borrowers can issue long-term and short-term debt. Long-term debt matures at the date at which the cash flows are realized, while short-term debt has to be repaid at the intermediate date when the signal is received. Because there is no cash flows at the intermediate date, short-term debt needs to be refinanced by rolling it over. When the firm issues short-term debt, lenders decide whether to liquidate the firm or to roll over the debt. Liquidation is preferred by the short-term creditors if they have sufficient reason to believe that the firm is of bad quality. They are then better off with the cash flows that result from the liquidation than to wait and hope that the firms if actually of good quality. Because the signal about firm type is imperfect, good firms are not assured of getting refinanced and they run the risk of being erroneously liquidated.

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16 See Allen and Gale (1988, 1994) for a more comprehensive discussion of the security design literature.
Diamond (1991) shows that good firms will generally prefer to take on as much short-term debt as possible. However, because of the possibility that their credit ratings are (erroneously) adjusted downwards, only those firms with sufficiently high initial credit ratings will be willing to finance themselves with short-term debt.\footnote{Diamond thus implicitly assumes that short-term debt has the contractual feature that the creditor has the right to liquidate the firm if their debt is not fully repaid.} Shortening the maturity of debt is therefore not a panacea for adverse selection problems. Diamond (1993) extends this framework to show that when firms choose a mix of short-term and long-term debt, it is optimal to make short-term debt senior. The seniority reduces the incentives of the short-debtor to liquidate the firm. The seniority therefore allows undervalued firms to increase their reliance on future financing when there is more precise information about their true quality. Both the maturity and seniority structure then affect the extent to which potentially undervalued firms can issue debt at their true value and reduce the asymmetric information problem.

Goswami, Noe and Rebello (1995) provide a similar model, but they assume that cash flows are realized both at the intermediate date and at the final date. Liquidation is not possible in their model and there are no signals about the quality of the firm. The design of debt contracts is aimed at incorporating two features that we are by now quite familiar with. The first one is the matching of the maturity of debt with the date at which the information asymmetry will be reduced. The second one concerns role of the riskiness of the debt. The lower the riskiness of the securities that a potentially undervalued firm issues, the less the mispricing. Goswami et al (1995) show that if the information asymmetry is relatively large for short-term cash flows, it is optimal for high quality firms to issue only short-term debt. Without long-term debt, short-term debt has two advantages for high quality firms. First of all, by avoiding long-term debt, the firm maximizes the amount it has to refinance at the intermediate date. Second, in absence of long-term debt, the firm effectively pledges the long-term cash flows to the short-term debt. This reduces the riskiness of the short-term debt, and hence the mispricing.

Whenever the information asymmetry primarily concerns long-term cash flows, good firms wish to issue long-term debt. There is then little to gain from refinancing short-term debt because investors will not have much additional information. Pledging the short-term cash flows through a dividend covenant can then reduce the risk of the long-term debt. This works because there is little information asymmetry about these cash flows.

\footnote{This also holds for bad firms with high initial credit ratings. Otherwise they reveal their quality and won't be able to finance themselves at all.}
3.3 Security Design and the Production of Information

In all the previous work that we reviewed, the investors had equal information about the value of the firm among themselves. Boot and Thakor (1993b) consider a model where through costly information production, some of these investors can become perfectly informed about the quality of the firm. Recent insights from the market microstructure literature suggest that part of the information that these privately informed investors have will be reflected in the prices of the securities. To see how this works, consider what happens to the demand of securities if some investors are informed about the true value of securities. These informed investors would only demand a security if they have favorable information about its true value. In other words, the demand for a security will depend on whether or not the informed investors are in the market. A potentially overvalued firm can expect a low demand for its securities because informed investors will not acquire them. The opposite will apply for a potentially undervalued firm.

The demand for a security is therefore informative about the quality of the issuing firm. In a competitive market, the prices of securities will reflect this. The presence of informed investors on the capital market therefore drives prices towards their true value, reducing the adverse consequences of asymmetric information for a potentially undervalued firm. The higher the fraction of informed investors, the more informative demand is about whether or not these informed investors are in the market and the less the prices of securities will deviate from their true values. Note that this implies that (part of the) private information about the firm will be transmitted to all investors through the prices of securities.

Boot and Thakor (1993b) show that by cleverly designing its securities, a potentially undervalued firm can exploit this mechanism. Their analysis provides results that contrast strongly with the pecking order theory. They consider a firm that wants to sell securities and whose quality can be of two types: high or low quality. Obtaining precise knowledge about the type of the firm involves the production of information, which is costly for investors. Besides these investors that decide to produce information, there exists another group of investors, the so-called liquidity traders. These liquidity traders are not informed about the value of the firm and they trade for exogenous reasons. The exact amount of their demand is unknown to all participants.19

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19 These liquidity traders are crucial for the existence of a market in this setting. If their demand was perfectly predictable, one could always infer the presence of informed traders from total demand. Prices would then completely reflect the information of these informed investors. If information production is costly, no investor will decide to become informed because there is nothing to gain from being informed. This argument shows that with costly information, market prices can never reflect all information that is relevant to the value of securities (Grossman and Stiglitz 1980).
Prices for securities are set by market makers. These market makers are uninformed about the true quality of the firm. They can only observe the total demand for a security, which is the sum of the demand from liquidity traders and the demand from informed investors. As we argued earlier, the demand for a security is informative about the probability that informed investors are in the market. The higher the total demand, the more likely that these informed investors are in the market and the higher the market maker can set the price of the security.

Investors are only willing to become informed if they expect to recover the costs they incur when producing the information. This limits the maximum number of investors who will decide to produce information. If too many investors decide to become informed, the demand will be very informative about whether or not the informed traders are in the market. The prices of securities will then be too close to their true values and informed investors expect to lose from acquiring information. In equilibrium, the number of informed investors will be such that these expect to be exactly compensated for the information production costs that they incur.

Boot and Thakor (1993b) show that the design of the securities determines the willingness of investors to incur the costs to become informed. More precisely, the number of investors that decide to become informed will depend on the securities that the firm issues. To see this, assume that a high quality firm issues a single security that entitles the investor to all the cash flows of the firm. The pay-off of this security will of course be affected by the quality of the firm. However, even if the firm is of low quality, the value of this security is will still be positive. In other words, the true value of this security contains of two components: an information insensitive component and an information sensitive component. Informed investors only have an informational advantage over other investors with respect to the information sensitive component of the single security. By issuing a single security, the firm forces informed investors to invest their wealth in both components. Part of the wealth of the informed investor is thus invested in the information insensitive component.

Consider now what happens if the firm splits this security according to these separate components. Informed investors can now choose to invest all their wealth in a security whose value only depends on their own information. If the number of investors that decide to become informed would remain constant, the return on information production would go up after the split. With information production now being more profitable, the number of investors will not remain constant, but it will increase. Ultimately, prices will reflect this increase in the number of investors that produce information about the firm so that the high quality firm expects to gain by splitting its securities in the proposed way.
A high quality firm can thus stimulate investors to produce information about its quality by issuing securities that are maximally sensitive to the information that the investors can produce. Low quality firms, however, also need to split their cash flow rights in information sensitive and insensitive securities. Although this split lowers their expected revenue, they have to follow high quality firms to prevent revealing their identity to the market.

Note that allowing the market to engage in information acquisition yields conclusions that contrast with the pecking order for external finance. According to the pecking order theory, a potentially undervalued firm prefers debt to equity because the value of debt is less sensitive to the quality of the firm. In the analysis above, these firms would prefer to issue information sensitive securities such as equity.

### 3.4 Ex Post Information Asymmetry: Costly State Verification

The literature that we have considered so far concentrated on the existence of asymmetric information about the value of the firm when the company wants to finance itself. In the so-called costly verification literature, asymmetric information is not present at the time of financing. The focus there is on the consequences of information problems that arise after the firm has generated cash flows. The costly state verification literature recognizes that despite the presence of parties such as accountants, corporate insiders will generally have some freedom in announcing the cash flows of firm. Outsiders will have less precise information about the exact profits that are made by the firm. The unequal distribution of information over corporate insiders and outsiders thus results in an ex post information asymmetry about the value of the firm.

The costly state verification literature assumes that corporate insiders can consume cash flows that are not paid out to investors. This creates a potential agency problem. By underreporting cash flows, entrepreneurs can potentially reduce the amount that they have to repay to the investors. Anticipating this, investors can spend verification costs and check whether the cash flow realization reported by the insiders is truthful. The cash flows of the firm are therefore still contractible and a financial contract can allocate cash flow rights to the investors. The costly state verification literature analyzes how the optimal financial contracts look like in such an environment. Will they closely resemble existing securities such as debt or equity?

We start with a digression on the optimal securities in a setting where the only goal of the entrepreneur is to minimize the expected verification costs of outside investors. We then
extend this framework by analyzing the costly state verification problem in more general settings.

### 3.4.1 Costly State Verification and Optimal Securities: Basic Framework

Consider a risk neutral entrepreneur who seeks outside financing to start up a company. When investors supply funds, there is no asymmetric information about the distribution of the future cash flows of the firm. Once the firm has operated, the entrepreneur can costlessly observe the cash flows that it has generated. Investors however will have to incur costs to observe the status of the firm.

Repayment to the investors will be done according to a financial contract (e.g. a security) that specifies the following sequence of events. After the firm has generated the cash flows, the entrepreneur reports a cash flow realization to investors. For each cash flow that the entrepreneur can potentially report, the contract specifies whether or not the investors verify this report. Once verified, the investors are repaid according to what the contract specifies. Note that in that case, both the reported cash flow and the true cash flow of the firm can be 'used' by the contract. If the cash flows are not verified, the amount paid out to the investors is again determined by the contract in place, but it will now only be based on the cash flow reported by the entrepreneur.

Assume that all parties are risk neutral and that the entrepreneur will obtain funds from one single investor. The optimal contract will then have the following two properties. First, because of global risk neutrality, the security design problem is concerned with finding the financial contract that raises enough funds to start up the firm and that minimizes the expected verification costs. This holds because the entrepreneur only cares about minimizing the expected repayment to the investor. The only way the entrepreneur can influence this repayment is through the verification costs that the investor expects to make. Minimizing these costs is therefore optimal. Second, from the revelation principle (see Myerson 1977) we know that if we are able to find an incentive compatible contract, no other contract can improve on this contract (neglecting the verification costs that it brings about). In other words, the contract we are looking for is a contract that induces truthful reports from the entrepreneur and that minimizes the verification costs of outsiders. How does the optimal contract look like, then?

Consider the following contract (see Townsend 1979 and Gale and Hellwig 1985). Whenever the reported cash flow is below some level $F$, the investors verify and are paid out the total cash flow of the firm. If the entrepreneur reports a cash flow higher than $F$, the investors refrain from verifying and they are paid out cash flow $F$. Also, let the contract set
the value for $F$ such that investors exactly realize their required expected return from the contract, which reflects their expected verification costs.

It is easy to see that this contract satisfies the incentive compatibility requirement. The repayment requirement is never decreasing in the reported cash flows. The entrepreneur is therefore never better of if he over-reports the cash flows. Moreover, consider the benefits of underreporting when the cash flow realization is below $F$. A truthful report then yields a zero pay-off to the entrepreneur. Reporting a lower cash flow will result in an identical pay-off. Also, if the cash flow is larger than $F$, the contract implies that the entrepreneur can never gain from underreporting as well. If he reports a cash flow that is below $F$, the entrepreneur will be worse off while an underreport that does not trigger verification leaves the repayment to the investors unaffected. Hence, we derived that the entrepreneur can never gain from an untruthful report and that the proposed contract is incentive compatible.

These incentive compatibility features fail to explain why the optimal contract specifies that the entrepreneur pays out all the cash flows if investors verify. The reason is that paying out all the cash flows after verification minimizes the expected verification costs. To see this, assume that the entrepreneur is entitled to a part of the cash flows after verification. To ensure participation of the investors, $F$ would have to be raised. Such an increase in $F$ results in higher expected verification costs because the probability that cash flows are sufficient to pay out $F$ decreases. Consequently, the entrepreneur is better off if all the cash flows of the firm are paid out to the investors if these verify the cash flows.

The optimal contract thus specifies a required repayment to the investors that is independent of the performance of the firm. Whenever this repayment is met, investors will have no rights to ‘verify’ the actions of the firm. However, in case of default, investors can inspect the firm and they are entitled to the cash flows of the firm. This security strongly resembles debt. The costly state verification model therefore provides a rationale for the use of debt. The fixed repayment requirement provides an efficient solution to agency problems that occur if outsider cannot costlessly observe the cash flows of the company.

### 3.4.2 Costly State Verification and Security Design: Extensions

The analysis above is directed towards finding a contract that minimizes expected verification costs. This seems quite natural because rational investors will anticipate these costs and they will adjust the required rate of returns to be compensated for them. It is worthwhile to see whether optimal contracts will still look like debt contracts if we extend the analysis to an environment where minimizing the verification costs is not the sole objective of the entrepreneur. For example, assume that the entrepreneur is risk averse. The contract that we
specified above entitles the entrepreneur to the residual cash flows. The entrepreneur can thus be considered as the sole shareholder of the company. Under risk aversion, this pay off pattern might not be very attractive to the entrepreneur. He might be willing to increase the verification costs if this sufficiently improves risk sharing.

Winton (1995) shows that risk-sharing considerations need not break down the debt-like character of the optimal contract. It will still be optimal to have a left tailed verification interval. To accommodate risk sharing, the optimal contract will specify that the entrepreneur will receive some of the cash flows in case of verification. The optimality of debt-like securities is therefore not driven by the risk neutrality that we imposed in Section 3.3.1.

Winton also analyzes the consequences of having to rely on multiple investors to finance the firm. If these cannot perfectly coordinate their verification activities, the presence of multiple investors implies that there is a potential duplication of verification. The entrepreneur then does best to issue debt-like contracts that specify an absolute priority rule by which claims are honored. If the firm does not have enough cash to repay all the investors, the most senior claim holders do not have to verify as long as their claims are fully honored. Priority rules therefore limit the duplication when the entrepreneur defaults.\(^{20}\)

Several authors have analyzed whether debt-like contracts are still optimal if we allow for a stochastic verification of the cash flows. In the basic framework that we just discussed, we required that contracts specified that verification takes place deterministically: if the reported cash flow is below \(F\), verification occurs with probability one. Mookherjee and Png (1989) and Krasa and Villamil (1994) show that the entrepreneur can lower the expected verification costs by specifying in the contract that verification will only take place with a certain probability. If the verification probability is high enough, it will preserve the incentives of the entrepreneur to report truthfully. At the same time, verification costs will be lower because the investors will verify less frequently.

Stochastic verification is especially beneficial if the entrepreneur can be punished for false reports or rewarded for truthful reports. These types of contracts are less easy interpretable as debt contracts than the optimal contract derived Section 3.4.1. Such contracts not only specify the probability of verification but also punishments and rewards. Boyd and Smith (1994) present empirical evidence that the benefits from such complicated contracts may be small compared to standard debt contracts. They argue that the implementation costs are probably much higher than the reduction in the verification costs that these contracts can

\(^{20}\) Another contribution worth mentioning is Chang (1990), who shows that debt contracts may still be optimal in a multi-period setting. A crucial assumption in his analysis is that the cash flows of the firm are independent over time. Default in the first period triggers verification but has no consequences for the cash flows of the second period. This line of reasoning seems at odds with the notion that default on debt leads to renegotiation or bankruptcy.
establish, suggesting that the optimality of debt-like contracts does not critically depend on the deterministic verification that was imposed.

3.5 Conclusions

The contributions that we discussed in this section focused on the question of how to design the cash flow rights of securities when there is asymmetric information about the value of the firm. We showed how firms whose claims are potentially undervalued can optimally design the debt contracts. This provided a rationale for the use of dividend and seniority clauses in debt contract. Also, it revealed that the maturity structure of debt can be important in attenuating adverse selection problems.

The contribution in Section 3.3 seriously questioned the pecking order theory that we discussed in Section 2 of this chapter. If information production allows investors to become informed about the quality of the firm, a potentially undervalued firm is in fact better off by issuing claims whose value is the most sensitive to the private information of the firm. According to the pecking order theory, the firm prefers debt in stead of equity because the value of the debt will be less sensitive to the private information that the firm has.

Finally, we provided a rationale for the use of debt in situations where corporate insiders privately observe the cash flows of the firm. If these insiders can withhold the cash flows that are not paid out to investors, they have an incentive to underreport these cash flows. Debt-like securities are then efficient solutions for minimizing verification costs that the investors expect to make.

4 The Design of Securities and Control over the Company

4.1 Introduction

The problems of asymmetric information and verifiability that we treated in Section 3 were cast in a framework where there is no need or scope for investors to directly influence the behavior of the firm. Within the asymmetric information setting, investors are solely worried about financing at the right terms, but not about the operational decisions made by management. With costly state verification (i.e. with ex post information asymmetry about the value of the firm), the total cash flow of the firm is exogenous and cannot be influenced by either management or investors. As a result, there were no conflicts of interest between management and investors concerning the real decisions that have to be made within the firm.
The analysis in Section 3 therefore neglected any direct relation between the design of the financial contracts and control over corporate decisions.

In real life, shareholders do have formal control rights that allow them to interfere with management. Their shares generally carry voting rights and in most developed countries they can use these at the annual meeting to block proposals of management about major decisions (such as mergers and acquisitions) or to remove management. Creditors can often seize assets or liquidate the firm when their loans are not fully repaid. Their right to do so is explicitly written down in the debt contract. These control rights are not innocuous. When there are conflicts of interests between management and investors, the control rights of the latter potentially gives them the power to influence corporate decisions. Because the conflict of interest between managers and investors is about these decisions, control by investors can ameliorate agency problems. Control rights therefore affect the willingness of investors to provide funds. In fact, as we will see in this section, they can be vital for the feasibility of outside financing.

The relevance of the control rights of securities raises the question of how to allocate them over securities. In this section we will provide an overview of some key contributions in the literature that explicitly focus on the design of the control rights of securities. We first present some important insights from the literature that addresses the design of control rights when the cash flows of the firm are not verifiable for investors. The lack of verifiability implies that control over assets is required to force repayment to investors. This literature solely focuses on how control rights can help to induce corporate insiders to repay investors. Managerial decision making about corporate policy is largely absent because the only decision that these insiders have to make is about the repayment of investors. In section 4.3, we turn to studies where management and investors disagree about the real decisions that the firm should take.\(^{21}\)

\(^{21}\) A significant amount of the security design literature that focuses on control aspects of financial contracts is devoted to analyzing the design of securities in the anticipation of future corporate control contests. The aim of those contributions is to study how the outcomes of takeover battles are affected by the allocation of voting rights over shares. Within this context, the literature tries to provide a rationale for the prevalence of the one-share-one-vote rule. The major contributions in this field are Grossman and Hart (1988) and Harris and Raviv (1988, 1989). These studies generally find that the one-share-one-vote rule has the advantage that bidders whose private benefits of control are high refrain from taking over the firm unless they are able to do well in managing the firm. Under one-share-one-vote, the cash flow rights attached to their votes punishes them for taking over if their incentives to do so are mainly because of high private benefits of control. As we have done throughout this chapter, we will ignore the literature on takeovers in the remainder of this section.
4.2 Non-verifiability of Cash Flows and Liquidation Rights of Investors

In the previous section, we discussed the costly state verification literature. The starting point there was that corporate insiders can underreport the cash flows of the firm. The cash flows of the company could be verified which in turn implied that financial contracts could be written that explicitly stated how much of the cash flows of the firm should be paid out to investors. The approach that we discuss in this part of this section assumes that the cash flows of the company cannot be verified. The cash flows of the company are therefore not (directly) contractible. Hence, contrary to the costly state verification literature, the manager is now assumed to be able to steal the cash flows of the firm. The lack of verifiability implies that such a diversion of cash flows cannot be proven in court. A less fraudulent interpretation of the non-verifiability assumption is to think of a situation where management can use cash flows to consume perks on the job and where courts cannot judge whether these expenditures were necessary for properly running the firm.

The lack of verifiability of cash flows does not mean that financial contracts cannot be used to enforce payouts. Payments to investors will still be verifiable by courts.\(^\text{22}\) A financial contract can thus specify a repayment requirement and whether or not the company met this requirement can be verified by courts. Moreover, contracts can dictate that if the company defaults on the repayment requirement, control over the firm’s assets will be allocated to the investors. These can then seize the assets of the firm. Note that in that case, corporate insiders will still have the opportunity to divert the cash flows.\(^\text{23}\)

Together these observations suggest that financial contracts can be used to support external financing. By foreclosing the assets, investors will be able to obtain a return on their investments. Whether or not the company is able to finance the firm might then depend on the liquidation value of the assets. Following Hart (1995b), consider a situation where an entrepreneur who seeks financing to acquire assets that are productive within the firm for only one-period. Outside the firm, the assets will still have some value so that the liquidation value is positive at the end of the first period. Observe that in this setting, the entrepreneur will never pay out any of the cash flows that the firm generates. The threat to seize the assets will not enforce the entrepreneur to make repayments because they are no longer productive within the firm. Whether or not the investors are willing to fund the project then directly depends on the expected liquidation value of the assets. If this value is lower than the required return of the investors, the entrepreneur will be unable to fund the project.

\(^{22}\) More precisely, this holds if the legal system is not so impaired that courts cannot enforce contracts. In some countries, law enforcement is indeed so poor that this is in fact not the case (Shleifer and Vishny 1997).
In such a setting, the financing problem is not very interesting. For that, we need to consider a multi-period framework. Several authors have analyzed the security design aspects in such a setting. Their analyses revealed that corporate insiders might in fact 'voluntarily' make repayments to the investors in order to avoid that these take control over the assets of the firm. In addition, the entrepreneur might be best of by creating different classes of investors or even by issuing a security that does not carry liquidation rights. In the next three subsections, we will illustrate these points.

4.2.1 Liquidation Rights and Voluntary Repayment by the Entrepreneur

To understand why the entrepreneur might voluntarily repay investors, consider a setting where an entrepreneur can acquire assets that are productive for two periods. The liquidation value of these assets is zero after the final period but is positive at the intermediate date. Liquidation at that date however is inefficient because the expected cash flows from the assets will be higher than the liquidation value. Observe that investors will only be able to receive a repayment at the intermediate date. Assume that at the beginning of the first period, the expected liquidation value and the expected cash flows for the intermediate date are both positive.

Suppose that the entrepreneur finances the assets with a short-term security that (i) specifies a fixed repayment requirement and (ii) carries the right to liquidate the assets if the firm defaults upon this requirement. If at the intermediate date the cash flows are higher than the repayment requirement, the entrepreneur can repay the investors to avoid that the assets are liquidated. Because liquidation is inefficient, the entrepreneur will be better off by honoring the contract. If the cash flows are insufficient to repay the investors, the entrepreneur will then be best of if he pays out all the cash flows and let the investors to recoup the short fall by liquidating a fraction of the assets.

The contract that we specified above looks very much like a debt contract. These frequently specify a constant repayment requirement combined with the (control) right to foreclose the assets of the firm if default takes place. This threat to liquidate assets can enforce the entrepreneur to voluntarily make repayments, even if she could steal the cash flows without being punished for that. Hart and Moore (1998) show that such a contract is indeed the optimal one in this setting.24

23 Stated differently, corporate insiders can divert the cash flows before the investors take control over the firm, which will then solely consist of the assets.

24 See Hart and Moore (1989, 1994) for some additional work on the optimality of contracts in similar settings.
4.2.2 Liquidation Rights, Short-term Creditors and Long-term Creditors

In the analysis presented above, liquidation rights were crucial for the willingness of the investors to fund the firm because they can be used as a threat to enforce payouts. However, the right to liquidate assets may also distort the incentives of the entrepreneur to repay the investors. Berglöf and Von Thadden (1994) explore this issue. Their model includes three periods. All uncertainty is resolved when the cash flow of the first period is realized. Cash flows are observable but they are non-verifiable. The liquidation values at the end of the first two periods are positive. Berglöf and Von Thadden assume that liquidation at any intermediate date is inefficient because the cash flows that the assets can generate are always higher than the liquidation value.

In this setting, the entrepreneur may have the incentive to default on the repayment requirement even if the cash flows that were generated were high enough to make the repayment after the first period. In other words, the entrepreneur may strategically default on the repayment requirement. The reason is that investors might harm themselves when they liquidate (a fraction of) the assets after the first period. The assets are worth more within the firm than their liquidation value. Liquidation thus lowers the future cash flows of the firm by more than the proceeds that it generates. The net effect of a liquidation of assets after the first period therefore is that it essentially lowers the capacity of the entrepreneur to make repayments to the investors. This undermines the credibility of the liquidation threat that is required to enforce the entrepreneur to pay out cash flows. By threatening not to repay when cash flows are high enough, the entrepreneur can ask for a concession of the investors, which they are happy to give because it avoids them having to liquidate assets. The possibility of strategic default thus lowers the expected returns to investors. As a result, the entrepreneur may not be able to fund the firm.

Berglöf and Von Thadden show that by creating different classes of investors in an appropriate way, the incentive for the firm to strategically default is reduced. Essentially, the entrepreneur should focus on creating an investor class that, opposed to other classes of investors, mainly holds short-term liquidation rights without long-term cash flow rights. These investors will be less reluctant to liquidate after one period because they hold no claim on the cash flows that are generated in the second period. In stead of renegotiating with the entrepreneur if default occurs, they will simply liquidate some of the assets. The optimal securities that the firm can issue are therefore short-term debt and long-term debt, which should be held by different investors.
4.2.3 Non-verifiability and Outside Equity

The contributions that we just discussed all point at the usefulness of contracts that specify liquidation rights. It seems therefore that there is no place for outside equity because shares typically don’t specify the rights to liquidate if some repayment requirement is not met. With non-verifiable cash flows, it seems that there is not much room for outside equity. Fluck (1998) argues that this is not necessarily the case. The reason is that shareholders generally have the right to dismiss management. Being replaced is costly for management because it prevents them from diverting cash flows in the future. If shareholders will decide to dismiss management when the firm makes insufficient dividend payments, it will be in the interest of management itself to pay-out cash. The dismissal threat can thus be used to enforce insiders to make dividend payments even if shareholders cannot get their hands on corporate cash flows directly. 25

This observation does not imply that equity dominates debt in terms of efficiency. It may still be that debt is the optimal security to issue. Fluck however shows that whenever the liquidation value of the assets of the firm is too low to fund the firm with debt, equity financing may still be possible. The dismissal rights attached to equity may thus weaken the relationship between the liquidation value of the firm and the ability of the firm to finance itself. This suggests that equity financing may even be more viable than debt financing in this setting.

4.3 The Design of Securities and the Real Decisions of the Firm

We now turn to some insights from the financial contracting literature that deals explicitly with the allocation of control in situations where agency problems arise with respect to the operational decisions of the firm. The control rights associated with securities then allow investors to interfere with the firm and to re-direct corporate policy. Note that this approach deviates from the one we just discussed because investors in Section 4.2 only worried about the incentive of corporate insiders to consume cash flows in stead of paying them out. There was no disagreement about how the firm should be managed.

We subdivide the analysis into two parts. The first class of models that we discuss assumes that management is reluctant to liquidate assets or to reorganize the firm out of free

25 A crucial feature that is needed for this to work is that equity is of infinite life. Otherwise, management won’t make any dividend payments when the equity ‘matures’. By backward induction then, the argument will fall apart. One of the basic characteristics of equity, however, is that is indeed of infinite life.
will. The second class of models that we concentrate on deals with the incentives of management to inefficiently invest the cash flows of the firm.

4.3.1 Design of Securities and Intervention in the Policy of the Firm

The models that we consider in this section assume that in some states of the world, intervention in the current corporate policy is optimal from the perspective if firm value. Corporate insiders are presumed to dislike such reorganizations, implying that they need to be induced to initiate them. One way in which investors might achieve this would be to write a contract that dictates the reorganization decision. Contracts like that typically fail to exist. They would have to specify exactly what corporate insiders should do in each of the numerous states in which the firm might be. Such comprehensive contracts are prohibitively costly to write and enforce in a complex world. Even a contract that merely specifies that management should change corporate policy whenever this is optimal for the value of the firm is unlikely to be very powerful. It will be very hard to prove in court that management has violated such a contract.

The upshot of these observations is that contracts will be incomplete in the sense that they will not be able to directly enforce intervention. An alternative way to secure intervention would be to transfer the control over the firm from corporate insiders to investors in some states of the world. The analysis presented by Aghion and Bolton (1992) was one of the first contributions that explicitly recognized the virtues of such control transfers when contracts are incomplete. Aghion and Bolton consider an entrepreneur who seeks funding for a project. In some states of the world, the payoffs of the project can be improved by intervening in it. The entrepreneur however dislikes changing the current project. If the entrepreneur would always be in control of the firm, investors would have to compensate or ‘bribe’ the entrepreneur to induce intervention. These bribes will be reflected in the terms at which the investors are willing to supply capital. It may even be that the expected return would be too low for the investors because of this.

Aghion and Bolton show that in that case, the entrepreneur may still be able to finance the project. What is needed for this is a publicly observable and verifiable signal that is informative about whether or not intervention is optimal for the value of the project. The entrepreneur can then design a contract that allocates control to investors if intervention is optimal. This allows the investors to change the project without having to bribe the entrepreneur. Although intervention is not in the interest of the entrepreneur, without this transfer he will be unable to finance the project in the first place. Hence, it will be optimal for him to contractually allow control transfers.
Observe that such a contract has some debt-like features. In the states of the world in which intervention is beneficial, performance of the company is probably poor. Control over the company's assets is then shifted from the entrepreneur to the investors, just like debt contracts frequently specify. This resemblance is only vague, though. In the model of Aghion and Bolton, control transfers from entrepreneur to the outside investor are not triggered by defaults on repayment obligations. The important insight of the analysis, however, is that it describes a situation where the entrepreneur might not be able to finance her project without creating the possibility of a transfer of control over the firm.

Dewatripont and Tirole (1994) develop a model that uses a similar framework but they add an effort problem to their analysis. This implies that there is a double agency problem. These agency problems are not independent of each other. The higher managerial effort, the better the performance of the company and the less likely that intervention will be beneficial. The threat of intervention can therefore act as an incentive device for managerial effort. Because of this incentive effect, it may be optimal to have an overly aggressive intervention policy. In other words, firm value might be higher if in the future, intervention will take place in situations where this is not optimal for firm value at that time. Obviously, in an all equity firm, it will be impossible to accomplish this.

Dewatripont and Tirole show that by properly designing the cash flow rights and the control rights of securities, this overly aggressive intervention policy can indeed be implemented. By issuing a security that looks like short-term debt, the firm can create a class of investors who are eager to liquidate assets of the firm. These short-term creditors should be allocated control over the company if the intermediate cash flows of the firm are insufficient to fully repay their claims. Even if liquidation would not be optimal from the perspective of total firm value, these investors might be willing to intervene. If they can be fully repaid this way, they can only lose if they forego such interference.

Note that this implies that liquidation might take place when this is inefficient for firm value. As a consequence, the firm shouldn't issue too much short-term debt and there will be an optimal amount of short-term debt. Moreover, to avoid that inefficient intervention will take place too often, the residual claimants, i.e. the shareholders, should be in control of the firm whenever short-term creditors are fully repaid. The optimal design of cash flow rights and control rights therefore closely resembles those of debt and equity.

Berkovitch and Israel (1996) consider a situation where the intervention concerns the replacement of inadequate management. Managerial ability is unknown ex ante to all agents, including management itself. The cash flows of the firm are a function of both the effort that management supplies and their ability. The effort that management is willing to exert is increasing in the anticipated probability that they will be rehired another period. The threat of
replacement therefore negatively affects the incentives of management. At an intermediate date, managerial ability becomes public and the investor in control can decide whether or not to replace management.

First consider what would happen in an all-equity firm. Whenever the ability of management is below average, it would be in the interest of the shareholders to replace current management. This replacement policy will be optimal at the intermediate date but may be inefficient ex ante, i.e. at the initial date. The reason is that it ignores the effect that it has on the incentives of management. If effort is important for the value of the firm, the optimal replacement rule will promise management that it will be retained as long as their ability is not too far below average. For an all equity firm, it is impossible to commit to such a promise. Ex post, i.e. when managerial ability becomes known, this policy will be against the interests of the shareholders. In an all equity firm, the shareholders may thus be too aggressive in replacing management.

Berkovitch and Israel show that a less aggressive replacement rule can be implemented by creating a class of investors that hold a senior fixed claim on the firm’s cash flows. Control over the decision to replace management should then be allocated to these creditors. The creditors will retain management that is of below average ability, as long as their ability is not too low. By virtue of their fixed claim, creditors have little to gain from an improvement in managerial ability. At the same time, they run the risk of being confronted with a poor management if they replace them. Their cash flow rights therefore make them more lenient towards management.

The theory of Berkovitch and Israel suggests that creditors will generally control the appointment of management. This seems to contrast with observed practices that management is appointed and dismissed by the shareholder meeting. However, Berkovitch and Israel argue that creditors frequently influence the dismissal decision through debt covenants and board representation. Moreover, their model indicates that if managerial ability is relatively important for firm value, aggressive control over management may be optimal. In that case, the aggressive replacement rule can be implemented by allocating control to the shareholders.

4.3.2 The Design of Securities and the Investment Policy of the Firm

Zender (1991) provides a model in which it takes two investors to finance a project because none of the investors is wealthy enough. There are two periods in his model. At each point in time, only one of these investors can be in control of the company. The investor in control will be thus be managing the firm. At the beginning of each period, the investor in control will have to make a decision. At the initial date, effort has to be supplied. Exerting effort is
costly for the investors in control but it positively affects the cash flows of the firm. At the intermediate date, the firm generates cash flows and the investor that is in control at that point in time will have to decide whether these cash flows will be invested or paid out. Zender assumes that this decision is non-contractible. Contracts are thus incomplete in the sense that the investment decision cannot be controlled by contract that dictates what the investment should be in each state of the world.

Consider again an all equity firm where each of the investors holds a fraction of the shares. Assume that one of these investors, i.e. the entrepreneur, will remain in control of the firm in both periods. The investment decision of the entrepreneur will then be undistorted because any inefficiency in the investment decision will be costly for the entrepreneur in terms of a lower value of the equity. From the perspective of the investment decision, financing with equity is therefore good. From the perspective of the initial effort decision, it is not. The entrepreneur only holds a fraction of the shares and does not fully benefit from the effort that she exerts.

An alternative would be to issue debt to the investor who is not in control and to let the entrepreneur hold all the equity. This has the advantage that the entrepreneur will be less reluctant to supply effort. The improvement in the incentives at the initial date however will come at a cost of a distortion in the investment decision. The entrepreneur may decide to invest the funds while this is only in his own interests, thereby harming the other investor. In particular, when the firm is in a bad state, the entrepreneur will find it worthwhile to gamble for resurrection.

This distortion in the investment policy can be reduced if the creditor would be able to control the investment decisions in situations where the incentives of the entrepreneur to expropriate the creditor are relatively high. Such a shift in control can be achieved contractually. What is needed for this is a verifiable (and thus contractible) signal about the prospects of the investment opportunities of the firm. If the signal implies that investment opportunities are poor, control can than be shifted towards the creditor. Zender shows that in this setting, the optimal contract in this setting indeed allocates the cash flow rights and control rights in the manner that we just proposed.

Zender thus rationalized why shareholders are generally in control of the firm when the prospects of the firm are good. In those states of the world, they will have the proper incentives when making investment decisions because debt repayment is not endangered. However, when the conditions of the firm are poor, corporate decisions are crucial for the value of debt and equityholders have an incentive to expropriate the creditors. The value of debt than closely resembles a residual claim. It is therefore optimal to shift control to the creditors in those circumstances.
The analysis in Zender (1991) abstracts from agency problems between shareholders and managers. Such agency problems are indeed less acute in firms that are closely held. Chang (1993) addresses the problem of identifying the appropriate mechanisms by which equity holders enforce payouts without directly controlling the firm. He thus focuses on widely held firms. In his model, managers know the optimal pay out level but would like to retain funds to overinvest these. To influence the payout policy of management, shareholders can set the compensation of the manager as an increasing function of the pay out made to these equity holders. Asymmetric information concerning the optimal pay out level and managerial risk aversion however limit the possibilities of investors to enforce first-best operation of the firm through such compensation contracts.

Chang (1993) shows that this solution can be improved upon by cleverly designing the securities that are issued to investors. He argues that a security that specifies a non-contingent repayment requirement is particularly useful in this setting because at it has an informational role. If the repayment requirement is not too high, default suggests that business conditions are poor. The optimal financial structure of the firm therefore incorporates two securities. The first one is a debt contract that triggers bankruptcy in case pay out falls in a left-tailed interval. This contract specifies that control is transferred from management to the creditors, who can then decide on the investment policy. The second security is a residual claim. Because management is always in control and prefers to invest rather than to pay out cash flows to these residual claimants, a compensation scheme is needed to induce repayment of these investors if there is no default.

4.4 Concluding Remarks

In this section we have reviewed some important contributions on the design securities when there are conflicts between investors and corporate insiders. In the first part of this section, we concentrated on the literature that assumes that corporate insiders can divert the cash flows because these are not verifiable. In such a setting, the right to foreclose the assets of the firm presents a threat that might enforce the entrepreneur to pay back investors. The optimal contracts in this setting therefore not only specified a (fixed) repayment requirement but also that control over the assets will be allocated to the investors if the firm defaults. These contracts therefore look very much like debt contracts.

We then focused on the importance of control rights if cash flows of the firm are verifiable but where there are conflicts about the real decisions of the firm. We observed that in practice, contracts do not directly resolve these conflicts by simply dictating the actions
that corporate insiders should take. Contracts are incomplete in this sense. However, by cleverly designing the control rights of investors and corporate insiders, these conflicts could be partially resolved. An important role in this respect was the possibility to transfer control over the company from one party to the other.

5 The Intimate Relationship between Corporate Finance and Corporate Governance

Our analysis so far has taken us from a framework that concentrated on the capital structure of the firm (and which largely neglected control considerations), to situations where we focussed on the power of securities to reduce conflicts of interests through the proper design of control rights. These control rights were important because contracts are generally incomplete in the sense that they cannot directly resolve agency problems by dictating the decisions that the agent should make. In Section 4, we saw that in such an environment, the adverse consequences of the conflicts between investors and corporate can be reduced by optimally designing the control rights of securities.

The analysis in Section 4 therefore directly points at the relationship between control over corporate decisions and corporate finance. Despite this explicit attention, the approach in that section is still somewhat unsatisfactory with respect to this relationship. The reason is that while stressing the power of control rights to resolve agency problems, we have been silent about the limits of such contractual solutions. These limits naturally arise in an incomplete contracting environment because a contractual allocation of control rights doesn't mean that corporate decisions are now suddenly directly governed through these contracts.

To see this, consider the over-investment problem that we discussed in Section 2. The assumption we maintained throughout the analysis was that shareholders were unable to block investment proposals by management. Realizing that financial contracts can allocate control rights to overcome agency problems, one may argue that the analysis implicitly neglects the possibility of allowing shareholders to control the investment policy of the firm. In fact, in most countries, shareholders do have right to block major investment decisions by voting against these decisions on the shareholder meeting.

It is not very conceivable, however, that one can simply solve the over-investment problem by allocating control rights to shareholders. Shareholders may not have accurate information about whether or not the proposed investments are value destroying. Moreover, if the ownership of shares is very dispersed, the effect of an inefficient investment policy on

26 A similar argument can be found in Harris and Raviv (1990).
each individual shareholder's wealth is limited. If obtaining precise information about the quality of the investment decisions of management is costly, a small shareholder might easily expect to lose from his efforts to prevent inefficient investments. These observations suggest that the scope for effective control by shareholders over the investment policy of the firm might be rather limited.

So, although financial contracts can formally allocate control rights over investors, this does not imply that these contracts are very forceful in directing the decisions that are to be taken by the firm. Therefore, the adverse consequences of the incompleteness of contracts cannot be easily 'bypassed' through a contractual allocation of control rights; the decision power will be in the hands of those parties that are able to exercise effective control. The incomplete nature of contracts thus requires us to look at corporate financing from a broader perspective than the contracting framework that we used in the previous section.

Over the last 20 years, the corporate finance literature has exactly taken this step. A large part of the research nowadays tries to address the efficiency aspects of the way in which stakeholders of companies are able to control corporate decisions. These governance structures are especially relevant in large public companies. The potential for agency problems between corporate insiders and investors is large for these companies because they tend to rely extensively on external financing. Moreover, the ownership of securities, especially those of shares, is often dispersed. This dispersion creates free rider problems when there is scope for investors to exercise control. The monitoring incentives of small shareholders are limited because the improvement in firm performance accrues to all shareholders while the costs are born by those that monitor.

The corporate finance literature has therefore devoted much attention to corporate control issues. One of the most striking observations that the literature has come up with is the documentation of a large variation in the way companies are financed across different countries. These differences do not show up particularly strong if one looks at the capital structures of companies across countries (Borio 1990). To observe them, one needs to consider the concentration of share ownership across countries and the involvement of banks in financing companies. Share ownership of public companies in Continental European countries and in Japan is more concentrated than that of their counterparts in the US or the UK. In Germany and Japan, large banks are important financiers of public companies while in the US they are not.

To analyze the consequences of such differences, the attention of the research in corporate finance does not limit itself towards the ownership structure of the shares and debt claims that firms have outstanding. Aspects such as (supervisory) board composition, the accountability of management and shareholder activism are also on the research agenda of
research. The recognition of the relevance of corporate governance has therefore increased the scope of research in corporate finance considerably in comparison with the traditional capital structure approach that we started this chapter with.

6 Conclusion

We have reviewed a large part of the theoretical academic work on the relevance of asymmetric information and agency problems for corporate financing. The underlying question that all these contributions address is whether these frictions in the capital market seriously affect the terms at which firms can finance themselves and whether they have adverse consequences for the behavior of firms. If the answer to these questions is no, there is little need to study corporate financing from the perspective of the existence of agency and information problems. The analysis in this chapter revealed that this is not the case, however.

We started of with a discussion of the most important contributions of the traditional capital structure literature. The focus of this literature is primarily on analyzing the debt-equity choice under various settings. The difference in the pay off characteristics of these two securities implied that in the presence asymmetric information or agency problems, this choice determines the degree in which firms are confronted with the adverse consequences of these frictions. Whether debt or equity was preferred critically depended on the setting that we were considering.

We then turned towards the so-called security design literature. The approach of this literature is more fundamental than the traditional capital structure literature in the sense that it tries to address why firms predominantly rely on equity and debt when they finance themselves. Moreover, it recognizes that debt and equity typically carry control rights as well, and that these differ dramatically from each other. The security design literature therefore investigates whether the cash flow rights and control rights of optimal securities in different settings resemble the characteristics of debt and equity. In the context of this chapter, the optimal securities are those securities that most efficiently mitigate the adverse consequences of agency and information problems.

In Section 3 and 4, we saw that the security design approach has derived the optimality of 'debt-like' and 'equity-like' securities in various settings. We also learned that the design of securities can strongly affect the terms at which firms are able to fund themselves. In the presence of agency problems, the control rights of securities were of particular importance because they determine which party has the right to control corporate decisions. This observation brought the discussion within the realm of the corporate governance debate. Although securities can help to reduce the adverse consequences of agency problems by
specifying control rights, they are unlikely to be very restrictive in this respect. There will be many corporate decisions that are not directly governed through the control rights attached to securities. The corporate governance debate focuses on how the different stakeholders of the firm are able to control these decisions. Because the value of the claims that investors hold strongly depends on the decisions that are taken within the company, the governance of companies and corporate finance are closely related. As we argued in the Section 5 of this chapter, this relationship is far more comprehensive than simply a matter of the design of the control rights of securities.