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Essays on Corporate Finance and Financial Intermediation

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Publication date
1999

[Link to publication](#)

Citation for published version (APA):

Schmeits, A. (1999). *Essays on Corporate Finance and Financial Intermediation*. [Thesis, externally prepared, Universiteit van Amsterdam]. Thela Thesis.

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CHAPTER 1

INTRODUCTION AND OUTLINE OF DISSERTATION

Abstract

In this chapter we present the research questions that are central in this dissertation, and motivate their theoretical and empirical relevance. In the first part, we emphasize the importance of the organization and structure of the financial sector in an economy for firms' investment and financing decisions and for the availability of capital. In particular, we describe two important recent developments in the financial sector that have affected the comparative economic advantages and the efficiency of different financing alternatives available to firms: the increase in competition from transaction-oriented financing in financial markets and the conglomeration and restructuring tendencies which have been taking place in banking sectors around the world. In the second part, we discuss our approach in addressing the research questions, and provide a brief introduction into the concepts and applicability of information economics, and especially game theory. We conclude with an extensive outline of the dissertation. In this part we present the main insights developed in the subsequent chapters of this dissertation and discuss our contribution to the financial intermediation and corporate finance literature.

1 Introduction and Motivation

This dissertation consists of four theoretical essays on the interface of corporate finance and financial intermediation. The dissertation explores an important and long-standing issue in finance research, namely: *how do corporations finance themselves and, in particular, how is this driven by the specific roles of different types of capital suppliers in the financial market?* This question will be addressed from two perspectives. We analyze the optimal funding source decision of a borrowing firm (demand-perspective) and the optimal organization and structure of financial intermediaries (supply-perspective). Our principal objective is to contribute to the modern corporate finance and financial intermediation literature by extending existing insights in the determinants of a firm's choice of financial contract and funding source, and by investigating the impact of (recent developments in) the organization and structure of the financial sector on the way firms are able to finance themselves and on their cost of capital.

The question of how corporations choose to finance themselves goes beyond their choice of an 'optimal' level of leverage, an issue which has been central in the large body of capital structure theories which have been developed since Modigliani and Miller (1958)¹. These theories essentially trade off the potential benefits and costs of the use of debt and equity financing under different assumptions about prevailing capital market imperfections². In this, by now, standard corporate finance literature the contract types used are exogenous to the analysis. Furthermore, this literature largely ignores the type of capital supplier who provides the debt and/or equity to a firm. The standard corporate finance literature therefore fails to address the richness and variety of financing options that are available to firms in practice.

These shortcomings have provided the foundation for the development of the modern financial intermediation and corporate finance literature. Recent contributions in this literature have shown that informational asymmetries between firms and financiers may lead to various types of investment distortions on the side of the firm, and may even

¹ For an overview of these theories, see e.g. Myers (1984), Ravid (1988) and Harris and Raviv (1991).

² For examples of 'tax theories', see e.g. Modigliani and Miller (1963), Miller (1977) and DeAngelo and Masulis (1980). Theories which address the costs of financial distress are e.g. Kraus and Litzenberger (1973), Haugen and Senbet (1978) and Titman (1984). Some examples of the extensive literature which addresses agency- and informational considerations are Jensen and Meckling (1976), Myers (1977), Ross (1977) and Stulz (1990).

frustrate a firm's access to outside financing³. Under these conditions the firm's funding source choice and its choice of contract type cannot be neglected, since both may affect the efficiency of corporate investment decisions (and thus the market value of a firm and its cost of capital). New theories on financial contracting and security design show that specific types of contracts and/or contractual features could be designed to mitigate specific informational problems and investment distortions⁴. Contributions to the financial intermediation literature focus on the informational roles of financial intermediaries (e.g. banks and venture capitalists) and analyze the comparative advantages of intermediated financing vis-à-vis financial market financing from this perspective⁵.

Both the theoretical and the empirical contributions in this field have offered valuable insights in the subtleties of firms' actual financing behavior⁶. The essays in this dissertation build on this new and interesting literature. We study strategic interactions between firms and different types of financiers in the financial market in the presence of informational problems, and consider their implications for the financing of corporations and corporate investment decisions. In doing so, we will not only focus on the perspective of the borrowing firm, but we will also consider the supply side of the financial market.

There are several reasons why it is important to understand the impact of the organization and structure of the financial sector on firms' investment and financing decisions. First, the design of the financial sector in an economy sets the boundary conditions for individual firms' financing choices⁷. Inefficiencies and frictions on the

³ For a more detailed description and a classification of these investment distortions, see Chapter 2.

⁴ The financial contracting and security design literature starts with Townsend (1979) and Gale and Hellwig (1985). Excellent reviews are given in Allen (1989), Allen and Gale (1995), Allen and Winton (1995), Boot, Milbourn and Thakor (1995) and Boot and Verheyen (1997).

⁵ The financial intermediation literature starts with Leland and Pyle (1977), Diamond (1984) and Ramakrishnan and Thakor (1984). Comprehensive overviews of this literature are given in Bhattacharya and Thakor (1993), Van Damme (1994), Greenbaum and Thakor (1995) and Freixas and Rochet (1997).

⁶ Some relevant theoretical contributions will be discussed in Chapter 2 and Chapter 5. Some examples of empirical contributions are James (1987), Hoshi, Kashyap and Scharfstein (1991), Petersen and Rajan (1994) and Gompers and Lerner (1998).

⁷ This is also one of the core issues in the rapidly emerging academic literature on financial system design, see e.g. Allen (1993), Allen and Gale (1997) and Boot and Thakor (1997). For an overview of the important questions and recent contributions in this field see Thakor (1996). A related strand of literature examines the relation between the design of a financial system and economic development for different countries. Some examples of contributions in this literature are Mayer (1988), Allen (1993) and Levine

supply side of the capital market may directly increase firms' funding costs, or may simply make financing for specific types of firms impossible. This adversely affects corporate investment decisions, and thus may result in inefficiencies in the allocation of capital in the economy. From both an academic and a policy-oriented point of view it is therefore important to identify potential shortcomings in existing financing forms and institutional arrangements, and to present and analyze possible solutions for these problems. Second, in the last few decades the financial landscape in which firms and capital suppliers operate has changed rapidly and dramatically. Recent developments in financial markets and in the banking sector have affected the comparative economic advantages and the efficiency of different financing sources, and have changed the financing alternatives available to firms. These developments also have an impact on the availability of financing to firms and firms' funding costs.

In the context of this dissertation two recent developments in the financial sector are particularly relevant⁸. First, in recent years banks have been confronted with an ever-increasing competition from non-banking financial institutions and the financial markets. Banks face fierce competition from mutual funds on their deposit side, and - more important for this study - see their traditional lending products challenged by commercial paper, medium-term notes and other financial market innovations. 'Traditional' relationship banking is under siege. The proliferation of financial innovations, contemporaneous advances in financial market microstructure and trading practices, advances in securitization and underwriting, and the ongoing revolution in information technology have pushed funding to the financial markets. This development raises questions with respect to the competitive position of banks vis-à-vis financial markets in the funding of corporations. For example, it has been argued that banks' traditional comparative advantages in relationship banking have been diluted by transaction-oriented financing available in the financial markets. Competition from financial markets may therefore destabilize durable bank-firm relationships and reduce the value of proprietary information to banks, thereby reducing the level of information acquisition and relationship-specific investments. As a result, banks may lose market share to financial markets, and information-problematic firms may face problems in obtaining external financing at reasonable terms. What would

(1998).

⁸ For a more elaborate discussion of these developments, see e.g. Berger, Kashyap and Scalise (1995), Boot and Greenbaum (1995), Thakor (1996) and Boot and Schmeits (1998).

be the optimal response of banks to these developments? What are the 'true' competitive advantages of bank financing vis-à-vis financial market funding to corporations? Could bank loans continue to be optimal financing instruments, even in a more competitive environment? And how does the attractiveness of bank loans to firms depend on the development and the quality of the banking sector in an economy?

A second important development is the restructuring and conglomeration activity which has been taking place in banking sectors around the world⁹. One of the consequences of this trend is that commercial banks, which traditionally focused on relationship-banking activities, increasingly combine transaction and relationship-based activities. Banks are becoming increasingly larger, and more diversified. The relationship/transaction dimension described above therefore also shows up *within* banks. Modern universal banks, for example, engage in bank lending (often relationship-based) but also in proprietary trading (purely transaction-oriented). The broad variety of activities in which banks engage reduces transparency, and hence may reduce the effectiveness of market discipline. This raises questions with respect to the optimal conglomeration of banking activities. For example, it could be argued that lack of transparency and the absence of market discipline may result in incentive problems (free-riding and cross-subsidization) between bank divisions, since each division does not fully internalize the consequences of its own actions. These incentive problems may elevate the bank's funding costs and the cost of capital for relationship-banking activities. As a result, banks may become less competitive in their relationship banking activities¹⁰. What are the determinants of the organizational structure of banking activities? Under what conditions would conglomeration be optimal? How does conglomeration affect the cost of capital faced by different activities within conglomerate banks? And how can the use of internal cost of capital allocation schemes within conglomerate banks increase the market discipline imposed on those activities?

In this dissertation we explicitly address these developments in the financial sector,

⁹ Recent examples of conglomeration in the financial sector in the United States are the mergers between Citicorp and Travelers (March 1998), and Bank of America and Nations Bank (March 1998). A recent European example is the merger between Fortis and Generale Bank (June 1998).

¹⁰ A recent example of free-riding (and cross-subsidization) was the Barings débâcle, where the costs of not inducing market discipline on the proprietary trading activities turned out to be almost prohibitive. Barings' (relationship oriented) corporate banking activities in the UK were effectively underwriting the risky proprietary trading activities in Singapore. Barings Singapore therefore faced an artificially low cost of capital and could free-ride on Barings UK. This example highlights the potential divergent incentives of different organizational units when combined in one institution (see also Chapter 4).

and derive implications for the optimal role and scope of financial intermediaries. The first essay focuses on the roles of different types of capital suppliers and financial contracts in attenuating informational problems between firms and (external) financiers. In the second essay, we analyze the comparative advantages of bank financing versus financial market financing in a competitive environment, and study the implications for firms' investment decisions and firms' contract and funding source choices. In the third essay, we consider the internal organization of banks, and analyze the optimal conglomeration of banking activities, and the internal allocation of cost of capital between different divisions in a conglomerate bank. The fourth essay focuses on the institutional design of the financial sector, in particular the market for venture capital, and analyzes frictions in the supply side of the capital market and their possible solutions.

2 Approach and Background

We address the above-mentioned issues by developing theoretical models which build on concepts of information economics, and specifically game theory. We use simple model structures as stylized (and tractable) abstractions from reality in order to formalize the main ideas, intuitions and tradeoffs in this dissertation and to convey our most important insights. The implications generated by these models can then be confronted with observed financing choices on the side of firms and with stylized facts with respect to developments in the financial sector.

The information-based approach taken in this dissertation appears to be particularly relevant for analyzing issues in corporate finance and financial intermediation. The assumption that information is asymmetrically distributed between a firm's management and its capital suppliers, or between different participants on the supply-side of the financial market, is plausible and well-accepted. Theoretical and empirical corporate finance contributions have proven that informational imperfections are crucially important in understanding the design of financial contracts and many facets of corporate financial policy, and furthermore can explain stock price reactions to various financial decisions. Contemporary contributions in theoretical and empirical financial intermediation research indicate that informational asymmetries are the *raison d'être* for the existence of financial intermediaries. Asymmetric information thus is at the heart of many observed financial

activities¹¹.

The recently developed literature on information economics provides a valuable framework for analyzing the consequences of the existence of asymmetric information between different contracting parties on their economic behavior. This literature starts with the important insight that asymmetric information may induce an informationally advantaged agent to exploit his informational advantage, and thus gives rise to strategic behavior. Major landmarks in the information economics literature have studied the potential adverse implications of this strategic behavior for the functioning of markets, and present mechanisms which mitigate the incentive problems and conflicts of interest that may be caused by informational asymmetries¹². Moreover, this literature has provided us with useful tools for analyzing informational problems. An application of these tools to finance research enables us to abstract from the Walrasian paradigm of frictionless markets which was central in the traditional neoclassical economic analysis, and thus allows us to address the link between an economic-theoretic analysis of firms' financing choices and the institutional setting in which firms seek financing¹³.

A specific set of tools which is particularly useful for a more formal analysis of strategic interactions between unequally informed agents has been offered by the modern (non-cooperative) game theory¹⁴. Game theory is concerned with the actions or strategies

¹¹ An overview of some of the insights that have been developed in these fields can be found in Thakor (1989), Harris and Raviv (1991), Bhattacharya and Thakor (1993) and Boot and Schmeits (1998). Another strand of literature in which informational asymmetries are very important is the theoretical and empirical literature on market microstructure (see e.g. O'Hara (1995)).

¹² This literature starts in the beginning of the seventies with the famous 'market failure'-argument of Akerlof (1970) and the job market signalling model by Spence (1973). These contributions mainly focused on the existence of *ex ante* (or pre-contracting) information asymmetries between economic agents. The contemporary contributions in principal-agent theory (see e.g. Ross (1973), Harris and Raviv (1979), Holmström (1979) and Grossman and Hart (1983)) considered the consequences of *ex post* (or post-contracting) information asymmetry. The first applications of information economics in finance research are the signalling models by Leland and Pyle (1977), Ross (1977) and Bhattacharya (1979).

¹³ The neoclassical analysis (which was dominant in the sixties and the beginning of the seventies) was preoccupied with the notion that markets are frictionless, and that the details of institutional design are relatively unimportant for the functioning of markets. This type of analysis considers both the firm and the market as a 'black box' and thus prevents a constructive analysis of the role of financial intermediaries. For an insightful exposition see e.g. Hellwig (1991).

¹⁴ The foundations for the modern game theory were provided by Von Neumann and Morgenstern (1944) and Nash (1950). Accessible introductions to game theory are Rasmusen (1989), Kreps (1990) and Gibbons (1992). Excellent survey articles are Thakor (1991), Gibbons (1997) and Allen and Morris (1998).

of economic agents who are conscious that their actions affect each other, and who thus rationally anticipate each other's behavior, given their beliefs with respect to each agent's information. The non-cooperative game theory analyzes interactions (or 'games') in which the different agents optimize their behavior from the perspective of self-interest and conflict. The main contributions in this literature have focused on the equilibrium concepts to use in order to predict plausible outcomes of such games. Dependent on the interaction that is studied (static or dynamic) and the informational structure of the game (complete or incomplete information) various refinements of the influential Nash equilibrium concept may need to be used to predict economic behavior¹⁵. The use of game theory allows us to study the implications of rationality, self-interest and equilibrium, both in market interactions that are modeled as games (such as where adverse selection, moral hazard and incomplete contracts are present) and in non-market interactions (such as between a regulator and a firm, a firm and a financial intermediary, a manager and a shareholder, and so on). As a consequence, this approach is very suitable for addressing the main issues of this study.

Since the end of the last decade, applications of game theory to finance have become very popular, in particular the analysis of static and dynamic games with incomplete information. This has improved our understanding of many market and institutional phenomena. The essays in this dissertation follow this trend and are also of a game-theoretic nature. In the first essay we present a simple, uniform model framework to illustrate some of the most important insights that can be derived from the modern corporate finance and banking literature. In the second essay we analyze long-term relationships between firms, banks and financial markets in a dynamic (two-period) game with incomplete information. The third essay considers strategic interactions and internal incentive problems between different divisions in a conglomerate bank in a static (one-period) setting. The fourth essay finally considers contractual and institutional solutions to 'market failure' caused by informational problems.

The first and the third specifically focus on the applications of game theory to finance.

¹⁵ The purpose of these refinements is to restrict the number of possible Nash equilibria in a game by eliminating those equilibria which are supported by implausible out-of-equilibrium beliefs. Examples of such refinements are the Bayesian Perfect Nash Equilibrium, Sequential Equilibrium, the Cho-Kreps Intuitive Criterion, Cho's Forward Induction Equilibrium and Universal Divinity. For an exposition of these equilibrium concepts in the context of finance, and for the original references, see the analysis in the Appendix of Chapter 3 of this dissertation and Thakor (1991).

3 Outline of the Dissertation

This dissertation consists of four additional chapters and a summary. Chapter 2 and the first part of Chapter 5 review the most relevant literature. These chapters provide a useful framework for analyzing the issues defined in this dissertation and allow us to position our contributions in the literature. Chapter 3, Chapter 4 and the second part of Chapter 5 contain new theoretical contributions. Each of these chapters presents a model which formalizes the main insights presented in these chapters. The outline of this dissertation is as follows.

Chapter 2 ('Information Asymmetry in Financial Markets: Implications for Financial Contracting and the Firm's Funding Source Choice') reviews the extensive modern theoretical corporate finance and financial intermediation literature which analyzes the consequences of informational asymmetries in financial markets for a firm's investment and financing decisions. In this chapter we discuss and illustrate potential investment distortions which may arise due to 'adverse selection' and/or 'moral hazard' problems, caused by the presence of *ex ante* respectively *ex post* information asymmetry between firms and financiers. We present solutions to these investment distortions in two dimensions: the choice of financial contract and the choice of (external) funding source. The financial contracting solutions address the choice of contract type (debt, equity or hybrid financing), the maturity and priority structure of financing arrangements, and other contractual features (e.g. collateral and covenants). The funding source solutions discuss the informational role and the comparative advantages of banks, financial markets and venture capitalists in the funding of corporations.

We design a simple, modular model structure in order to present the key insights that can be derived from the most important contributions in the literature. This allows us to illustrate the signalling and incentive effects associated with the proposed financing solutions in a *uniform* framework, and to establish conditions under which these solutions would be effective. We start with a one-period model with universal risk neutrality and asymmetric information, in which a firm seeks external (debt or equity) financing for an investment project which is characterized by a two-state probability distribution of returns. Such a basic model structure suffices to illustrate the standard investment distortions which may arise as a consequence of the existence of informational problems. This framework subsequently is enriched by: (i) extending the firm's set of investment opportunities (project (and effort) choices); (ii) extending the set of financing options available to the firm; (iii) extending the model's time horizon to two periods; and/or (iv) explicitly

incorporating the informational role of financial intermediaries and the financial market in financing the firm.

Both the financial contracting solutions and the (external) funding source choice then are linked to the type of firm seeking financing. This exercise allows us to draw conclusions with respect to the main determinants of a firm's financing choices. In addition, it points at the potential existence of certain frictions in the funding of specific types of corporations. Our main conclusion in this respect is that in particular small, new and information-problematic firms with highly specific (and potentially intangible) assets may face substantial problems in obtaining external financing, and thus are most subject to underinvestment problems and market failure.

The introductory exposition of the informational and incentive problems in Chapter 2 provides a useful starting point for our analysis in the remainder of this dissertation. Each of the subsequent chapters analyzes one (or a combination) of the informational problems discussed in this chapter. With respect to the firm's funding source choice, the focus in Chapter 2 is on external funding sources (banks, financial markets and venture capitalists). Although we briefly discuss the potential benefits of internal financing (mainly in the context of the analysis in Myers and Majluf (1984)), we do not explicitly emphasize the internal capital market as a potentially significant financing source. The merits and drawbacks of internal capital markets, however, are discussed separately and more extensively in Chapter 4. With respect to financial contracting issues, Chapter 2 does not explicitly address the distinction between complete and incomplete financial contracts, and focuses mainly on complete contracts. This distinction, however, is critical in Chapter 3, where we discuss the literature on incomplete contracts in more detail.

In Chapter 3 ('Discretion in Bank Contracts and the Firm's Funding Source Choice between Bank and Financial Market Financing') we examine the comparative advantages of bank financing versus financial market financing in a competitive capital market with asymmetric information. In this chapter we provide a rationale for the use of flexibility and discretion in bank contracts, and analyze a borrowing firm's funding source choice from this perspective. We develop a model structure in which a borrower seeks long-term debt financing by either going to a bank or by obtaining funding in the financial market. Banks invest in information production (i.e. monitoring) and during the course of lending receive non-verifiable (and thus non-contractible) information with respect to the borrowing firm's investment opportunities. With financial market financing such information production does not occur. In this setting we examine a firm's investment decisions

and its financing choices. We show that the use of incomplete contracts which deliberately leave the bank some flexibility and discretion in adjusting the contract terms during the lending process may enhance investment efficiency on the side of the borrower. This is in line with the important ongoing discussion in economic theory on rules versus discretion, where discretion allows for decision-making based on more subtle - potentially non-contractible - information. Since an optimal information flow is crucial for sustaining discretionary contracts, the benefits of discretion depend on the expected quality (or reputation) of the bank. Higher quality banks can be expected to receive better information from monitoring, and thus can make better decisions with respect to the contract terms that are imposed on the borrower. Our analysis establishes conditions under which flexibility is desired, with the reputation of the banking system as an important determinant. We show that better quality borrowers will prefer discretionary contracts offered by higher quality banks. Lower quality borrowers have no option other than to mimic higher quality borrowers' contract choices in pooling equilibria. On a more technical note, we show that the pooling equilibria derived in this chapter satisfy the strong game-theoretic equilibrium refinement of universal divinity (see Banks and Sobel (1987)). Our analysis has implications for the firm's choice of funding source and its choice of investment projects. We also emphasize an important link between the quality of a banking system, the types of contracts offered and, more importantly, the competitive position of banks vis-à-vis the financial market.

In **Chapter 4** ('Market Discipline and Incentive Problems in Conglomerate Banks') we shift our perspective to the supply side of the financial market, and analyze the optimal conglomeration of banking activities. In this chapter we focus on market discipline and internal incentives as key factors in determining the overall risk and decisions of financial institutions. We concentrate on internal incentives which arise from interactions between different divisions in a conglomerate bank in the absence of any synergies. In particular, we argue that internal incentives and also the effectiveness of market discipline differ depending on whether divisions operate stand alone or as part of a conglomerate. We develop a model structure in which we examine the risk (or monitoring) choices in two bank divisions which need external financing, and may either operate as stand-alone firms or may be integrated in a two-divisional bank. External financing is potentially subject to effective market discipline. The innovation in our model is in the way in which market discipline is incorporated. We introduce market discipline by providing a direct link between a division's (partially observable) risk choices and its funding costs. Since a

division at least partially bears the consequences of adverse risk choices, effective market discipline thus reduces its incentives to take excessive risk. In this framework we analyze the costs and benefits of conglomeration. On the positive side, conglomeration has diversification benefits, since the divisions in a conglomerate may co-insure each other. On the negative side, the pooled funding cost of the conglomerate only partially reflects each division's risk choices, and thus may invite cross-subsidization and free-riding, thereby reducing the effectiveness of market discipline. Our analysis identifies two determinants of the optimal organizational structure of banks: the degree of market discipline (or transparency) to which a division would be subject if it operates as a stand-alone firm, and the degree of competition in the market in which the division operates. We show that effective market discipline of stand-alone activities reduces the potential benefits of conglomeration. With ineffective market discipline of stand-alone activities conglomeration may be beneficial, even though conglomeration always reduces market discipline. This is the case if competitive rents are not too high. A more competitive environment thus may induce conglomeration. In an extension of our model we show that efficiently designed internal cost of capital allocation schemes may improve on the benefits of conglomeration. We also show that, due to pre-commitment problems, stand-alone divisions cannot mimic the incentives in a conglomerate through the use of incentive contracts. In the last part of the chapter we modify our analysis in order to analyze the potential conflict between transaction- and relationship-oriented banking. Here our emphasis is on the spillover effects that excess risk taking in proprietary trading activities may have on the conglomerate bank's cost of capital.

Our analysis in Chapter 4 sheds some light on the question of how the internal organization of financial intermediaries may affect the cost of capital for their relationship-oriented activities. In a competitive capital market, this also has consequences for a borrowing firm's funding costs. Although Chapter 4 focuses primarily on banking, the insights that can be derived from this chapter have a much wider applicability and transcend to issues concerning the optimal boundaries of firms, and conglomeration in general. This links the ideas in this chapter to the industrial economics literature. From an empirical point of view, our analysis helps to interpret recent studies on the diversification discount, to understand conglomeration and de-conglomeration tendencies in developing respectively developed economies, and to rationalize spinoffs and equity carve-outs. Our analysis of capital allocation mechanisms in a conglomerate bank finally has implications for capital allocation and capital budgeting processes in multi-divisional firms in general

(e.g. with respect to the application of EVA and RAROC).

In **Chapter 5** ('Issues in Venture Capital Financing') we focus on the market for venture capital as a financing source for entrepreneurial firms. In this chapter, we consider the institutional design of the venture capital market and discuss the distinct contractual features of venture capital arrangements, and the specific informational roles of venture capitalists as financial intermediaries. In addition, we examine the desirability and feasibility of public policy measures aimed at improving infant companies' access to outside financing. We start by indicating the main problems that entrepreneurial firms face when seeking external financing. These problems can be divided into informational problems between firms and financiers, and frictions in the supply of risk capital. In the first part of the chapter we review the scant theoretical literature that explores the form and function of venture capital financing in the presence of informational problems. In the second part, we concentrate on the supply side of the market for risk capital, and argue that shortcomings in financing forms and institutional arrangements may adversely affect the level of entrepreneurial activity in an economy. This may provide a rationale for government intervention in the capital market. We present a simple model structure in order to analyze the impact of different types of public policy measures on the supply of risk capital and entrepreneurial activity in the economy, and derive implications with respect to the optimal design of such measures. We consider an economy with a large number of entrepreneurs who need to exert (privately) costly search effort in order to find an attractive investment project. Each project needs to be financed externally in an imperfectly competitive capital market. Capital suppliers do not know the success probability of the projects found, but can learn about project quality (i.e. develop expertise) by investing in costly screening. Both the entrepreneur's and the capital supplier's effort choices are unobservable. In this framework we analyze the entrepreneur's effort and investment decision and the capital supplier's incentives to screen. We show that, due to moral hazard problems on the side of both the entrepreneur and the capital supplier, outside financing may result in too little entrepreneurial activity in this economy. We then analyze the impact of different measures of government intervention on the incentives of entrepreneurs and financiers. In the third part of this chapter we present and evaluate the most important Dutch measures of government intervention which have been designed to stimulate the supply of risk capital in the context of our model. Our main conclusion in this respect is that market-supported arrangements work best. That is, public intervention in the capital market is most effective if it induces substantial private sector

involvement, either through co-sharing of risk, or through the provision of matching financing by the private sector, since this imposes some market discipline.

Chapter 6 finally summarizes the main insights that have been developed in this dissertation, and discusses some further implications.

4 Concluding Remarks

Although the emphasis in this dissertation is theoretical, we explicitly discuss empirical implications of our analysis, and link the main insights derived in the respective chapters with empirical regularities and stylized facts. Furthermore, our contributions may have interesting policy implications with respect to the optimal organization and structure of the financial sector. For a more elaborate discussion of some of these issues, see for example Boot and Schmeits (1996) and Boot, Ligterink and Schmeits (1997). The first is a comprehensive study of public intervention in the Dutch capital market, whereas the latter focuses on institutional features of the Dutch bond market.