Internal Finance versus Bank Debt: The Gains from Establishing a Debt History

Helmut Bester and Joris P.J.F. Scheepens [*†]

erschienen in **Kredit und Kapital 29, (1996), 565-591.**

Abstract

This paper considers a two-period model in which a firm needs outside financing in period 2. If a firm establishes a reputation with a bank already in the first period, it may reduce the cost and increase the availability of bank debt in the second period. To establish such a reputation, the firm must induce the bank to monitor in period 1. Bank monitoring effort is non-contractible, so the firm induces the bank to monitor by taking an unsecured bank loan. In period 1 a bank loan may then be preferable to internal finance. This contrasts with a result by Myers and Majluf (1984) where firms always prefer to finance profitable investments internally.

Keywords: Financing policy, bank monitoring, reputation acquisition

JEL Classification No.: G32, G21.

[*]Freie Universität Berlin, Germany; and ABN AMRO Bank, Amsterdam, The Netherlands; respectively. **Mailing address:** Helmut Bester, FU Berlin, Dept. of Economics, Boltzmannstr. 20, D-14195 Berlin

[†]This paper was written while the authors were affiliated with the Center for Economic Research, Tilburg University, Tilburg, The Netherlands. The paper benefited from comments by Arnoud Boot, Eric van Damme and Jac. Sijben. The views expressed here are our own, and not necessarily those of ABN AMRO Bank.

Zusammenfassung

Die Arbeit betrachtet ein Zwei-Perioden Modell, in dem Firmen in der zweiten Periode auf externe Finanzierung angewiesen sind. Die Firmen können ihre Kreditkosten senken und die Verfügbarkeit eines Kredits in der zweiten Periode erhöhen, indem sie bereits in der ersten Periode eine Reputation bei einer Bank etablieren. Dieser Reputationseffekt kommt dadurch zustande, daß die Bank in der ersten Periode Kontrollkosten aufwendet, wenn der Kredit nicht abgesichert ist. Aufgrund des Reputationseffektes kann ein Bankkredit attraktiver als interne Finanzierung in der ersten Periode sein. Diese Beobachtung steht im Widerspruch zu einem Ergebnis von Myers und Majluf (1984), nach dem Firmen interne Finanzierung gegenüber externer Finanzierung bevorzugen.

Introduction

Information asymmetries with outsiders will increase a firm's cost of external finance. According to Myers and Majluf's (1984) "pecking order" theory of financing, firms will therefore prefer to finance profitable investments internally, ahead of debt and outside equity (see also Myers (1984)). This paper will show that in a two-period model that conclusion may fail to hold. We develop a model featuring imperfect information about firm types. A low-risk firm may borrow from a bank, even if it does not need a loan, to build up a reputation as a good customer. Later on, when it needs outside finance to undertake a larger project, its reputation may allow the firm easier access to a relatively cheap loan. Thus, building up a reputation allows the firm to reap benefits of the type discussed first by Fama (1985).

To establish a reputation in the first period, the low-risk firm has to induce the bank to invest monitoring effort. The direct effect of bank monitoring is that it prevents the entrepreneur from taking the money and running away.[1] Monitoring ensures that the firm ties the borrowed funds up by investing them in the project. If the bank fails to monitor, by assumption the entrepreneur does not invest but diverts the funds. Suppose that firms of the good type have profitable projects and firms of the bad type do not. Then firm activity may be a signal of firm quality. A good firm may credibly signal its type to the bank by inducing the bank to monitor its activity. This enables the firm to obtain a loan at favorable conditions in the second period. The bank acquires information about the firm's type as a by-product of its monitoring the fact that the firm actually invests, as in Sharpe (1990).

If the bank could contractually commit to a given level of monitoring, the good firm could simply pay the bank a fee to monitor. But the more plausible case is when a bank cannot contractually commit to monitoring, as in Besanko and Kanatas (1993), Bester (1995) and Scheepens (1994). Then the bank monitors only if it faces the risk that the entrepreneur will abscond

[1]The assumption that any cash flows received by the firm can be diverted by the firm manager on a one-to-one basis is also made by Hart and Moore (1989) and Bolton and Scharfstein (1990). In Calomiris and Kahn (1991) the *banker* may abscond with a proportion of the bank's assets, which is prevented if *depositors* monitor. White (1984) indicates that diversion can be a problem in practice, and that this problem is more severe for liquid assets than for fixed assets.

with the bank's money. This is the case if the firm takes an unsecured bank loan. So if a firm wants to be monitored to establish a reputation with a bank, it may take a bank loan – even if it could do without the loan by financing internally. The moral hazard problem associated with bank monitoring increases reliance on bank debt, as opposed to a result by Besanko and Kanatas (1993). So "stockpiling" cash by raising more financing than needed for the first-period investment is a good signal, as it induces bank monitoring. In Thakor (1993), where outside equity does not induce any monitoring, stockpiling cash is a bad signal, because it indicates stock overvaluation if firm managers know more than investors.

Of course, a firm will consider establishing a reputation with a bank only if the bank allows the firm to profit from this reputation. Empirical evidence by Berger and Udell (1994), Petersen and Rajan (1994) and Slovin, Sushka and Polonchek (1993) justifies our assumption that this is the case. Borrowers with no debt histories, or shorter histories, generally face less favorable loan conditions than do borrowers with longer debt histories.

This paper's result that firms may prefer bank debt to internal finance reverses a prediction of the pecking order theory of financing. It is interesting also in the light of some recent empirical evidence. Ang and Jung (1993) find that for a sample of large South Korean firms, borrowing intermediate or longer term from banks is the preferred source, ahead of internal funds. This is the case even when there are high information asymmetries between firms and their lenders. De Haan, Koedijk and De Vrijer (1992) find that 49% of Dutch companies with short-term bank debt never use excess liquidity for early repayment of short-term bank debt, notwithstanding their finding that on average companies wanted to improve their solvency ratios.[2] Companies

[2]Answers 19 and 21 (p.145-6) in De Haan, Koedijk and De Vrijer (1992). This study, performed for the Dutch central bank, presents the results of a survey among 1828 Dutch companies about their liquidity holdings and financing behavior. 1810 companies had less than 100 employees. 729 companies held short-term bank debt as of year-end 1990. The general message of the study, which is also revealed in De Haan *et al.* (1994), is that the majority of Dutch firms behave in line with the pecking order theory of financing: 54% of the firms list internal finance as their first choice and 40% list debt as their second. However, 18% of firms list debt as their first choice. Our angle differs from De Haan *et al.* (1992, 1994) in that we are particularly interested in this significant minority of firms. The part of their survey about bank debt (answers 16-22 in Appendix III of De Haan *et*

with bank debt are reluctant to repay early because of, among other things, (a) resulting changes in future loan conditions (10.6% of companies mention future changes in interest rates, 11.3% of companies mention future changes in other loan conditions) and (b) resulting dependence on banks for new loans in the future (19.8% of companies). This suggests that firms which have (possibly superfluous) bank loans now, may have relatively easy access to relatively cheap bank loans in the future.

The result that a firm may choose to finance a project with bank debt instead of internal funds has implications for the theory of money demand. It implies that firms may hold larger cash balances than they need for their day-to-day transactions. Thus, firms' cash balances may be higher than can be explained by inventory-theoretic models of the transactions demand for money.[3] This is in accordance with empirical evidence by Sprenkle (1969), who finds that only a small proportion of actual cash balances held by corporations can be explained by a simple transactions model of the Baumol-Tobin type. There has not been much progress on this issue. Goodhart (1989, p.74f) notes:

> *Examination of the micro-economic determinants of the demand for money leaves us with an awkward conclusion. That is that it is not easy to explain or to account at the individual level for the amount of money balances held. Companies, and other corporate bodies such as local authorities, appear to hold much larger balances than inventory-theoretic transactions demand models show to be optimal. (..) There is, perhaps, something of a puzzle to explain why such large balances are held.*

This paper may provide an explanation.

The paper is related to the literature that attributes a special role to banks with regard to the provision of monitoring services (see e.g. Diamond (1984, 1991), James (1987)). As bank-borrower relationships evolve, agency costs associated with bank debt may decrease. The reason is that by its monitoring the bank gradually accumulates private information about the

al. (1992)) contains some very interesting clues about these firms' behavior.

[3] These models were developed by Baumol (1952) and Tobin (1956), and expanded by Miller and Orr (1966, 1968) to include uncertainties.

borrower's quality (see e.g. Fama (1985), Diamond (1989), Sharpe (1990), Rajan (1992)). Bank debt may thus involve decreasing agency costs in time.[4] Diamond (1991) and Rajan (1992) show that this may affect the firm's choice between bank loans and publicly placed debt. In our paper the prospect of decreasing agency costs in time may induce the firm to borrow from a bank even when it could finance internally.

The paper restricts itself to the rather narrow case of bank debt against internal finance. The ideas, however, might be applied to other financing choices as well, provided that different sources of funds induce different monitoring activities. For instance, suppose that a firm wants to induce financial markets to monitor its activities, in order to reduce the information asymmetry with potential shareholders. Already Donaldson (1961) indicates that outside equity financing generates publicity and attracts public attention for management decisions. Hansen and Torregrosa (1992) provide evidence suggesting that primary market participants monitor corporations when they seek equity capital. If outside equity induces more public monitoring than bank debt or internal funds, the firm seeking public monitoring may under certain conditions prefer outside equity. This would reverse another prediction of the pecking order model (see Section 5).

Despite competition in the credit market, banks may earn positive expected profit in equilibrium. This result holds even if the period 2 informational rent accrues completely to the firm. The reason is that the period 1 interest rate has to be high enough to keep bad firms from applying for a loan. This differs from Sharpe (1990), where banks earn negative period 1 profits in anticipation of positive informational rents in period 2.

The paper suggests that bank finance may increase with growth opportunities. Firms may take unnecessary bank debt now if they expect to need the bank in the future to finance larger investments. This is different from Jensen and Meckling (1976), Jensen (1986) and Stulz (1990). There, debt may solve agency problems in firms with much cash that lack growth opportunities,

[4]Thus, the paper is also related to a more general literature on reputation effects in dynamic games with incomplete information. In finance, contributions include John and Nachman (1985), on the underinvestment problem, and Chemmanur and Fulghieri (1994), on investment bank reputation.

as debt may reduce the agency problems associated with cash that cannot be profitably invested. Empirical evidence by De Haan *et al.* (1992) and Kester (1986) supports our hypothesis.[5] Kim and Sorensen (1986), Titman and Wessels (1988) and Chaplinsky and Niehaus (1990) present evidence in favor of the contrary prediction (see Harris and Raviv (1991)).

The organization of the paper is as follows. Section 1 presents the model. Section 2 studies the second period, in which firms realize the benefits of a good reputation. Section 3 derives the main result: low-risk firms may invest in reputation acquisition by taking an unnecessary bank loan instead of financing a project internally. Section 4 discusses robustness and extensions of the model. Section 5 concludes.

1 The model

Consider an economy with two periods. Each period will be referred to by its end date, so period i ($i = 1, 2$) starts at $t = i - 1$ and ends at $t = i$. Firms are endowed with liquid funds and have the opportunity to invest in projects of exogenously given size. Firms' funds are sufficient to finance the period 1 project internally. The main question is: Could bank debt still be useful in the first period? In the second period firms need outside funds to finance a larger project. Banks may supply loans in both periods. All economic agents are risk-neutral.

1.1 Firms

Firms are run and owned by entrepreneurs. We do not consider agency problems between firm managers and firm owners.

At the start of period 1 (t = 0) there are N_1 firms, each endowed with a publicly known amount $L > 0$ of liquid funds. At $t = 0$ these firms may invest in projects with exogenously given size I_1. At $t = 1$, a new generation of N_2 firms enters the market, also endowed with L. Both generations of firms may at $t = 1$ invest in projects of size I_2, with $I_1 < L < I_2$. I_1 and I_2 are publicly known. The assumption $I_1 < L$ implies that the firm is able to

[5] De Haan *et al.* (1992, p.147) find that investments/new projects are the most important factor in favor of an increase of bank debt.

choose between internal finance and bank debt at $t = 0$. Outsiders cannot directly observe whether a firm invests funds in a project. Banks, however, can obtain this information by investing a certain monitoring cost (see below). If undertaken at time $t \in \{0, 1\}$ projects at time $t+1$ yield return XI_t in case of success and zero in case of failure. The firm privately observes the project return.

There are two types of firms: good and bad. Firms know their type, but outsiders do not. A fraction $0 < q < 1$ of each generation is of the low-risk or good type, with success probability $p_g, 0 < p_g < 1$. Fraction $1 - q$ is of the high-risk or bad type with success probability $p_b, 0 < p_b < p_g$. The average success probability is given by $\bar{p} \equiv qp_g + (1 - q)p_b$. Only the good firm's project is profitable: $p_bX < 1 < p_gX$. The success probability of each firm is constant over time and return realizations in both periods are independent. If successful, at $t = 1$ the entrepreneur consumes all funds in excess of L that remain after debts, if any, have been repaid. At date $t = 2$ the entrepreneur consumes all remaining assets.

1.2 Banks and monitoring

Banks possess liquid funds that they may lend to firms. The credit market is characterized by Bertrand-competition among banks. Banks cannot observe the firms' types and cannot directly observe returns of the firms' investment projects. To cope with the latter informational asymmetry, the bank and the firm sign a standard debt contract with a liquidation clause, as in Diamond (1984) and Gale and Hellwig (1985). The bank commits to liquidate the firm's assets if the firm does not repay its debt. This acts as a repayment incentive for the successful firm.

The bank may invest some monitoring cost $\beta < 1$ per dollar of the loan I to observe whether the firm actually invests the loan in the investment project.[6] A bank can be sure whether the firm is active only by investing the

[6] The assumption that the cost of monitoring is proportional to the loan size I reflects the intuitive idea that large loans/projects are more difficult to oversee for the bank than are small loans/projects. Alternatively, one could assume that the monitoring cost takes some fixed value C, independent of I. This would not alter the qualitative results of the

monitoring cost βI. Once the money has been invested in physical assets, the entrepreneur cannot divert it any more, in line with White's (1984) suggestion that monitoring diversion is costlier for liquid assets than for physical assets. Thus, bank monitoring prevents the entrepreneur from taking the money and running away. Note that this type of monitoring is not available in Gale and Hellwig (1985), where the bank monitors only if the borrower reports default. This paper contains an extra incentive problem. If the bank would not invest the monitoring cost βI, by assumption the entrepreneur would divert the funds, reducing the liquidation value of the firm to zero.[7]

The bank's monitoring effort is non-contractible, as in Besanko and Kanatas (1993), Bester (1995) and Scheepens (1994). Therefore the bank will monitor only if it has an incentive to monitor. In the second period the bank loan cannot be secured as $I_2 > L$. The bank will always monitor if it has granted a loan in period 2, to prevent the entrepreneur from running away with the bank's money.

In period 1, the bank will not monitor if the firm finances the investment internally because then the bank does not have any money at stake. Neither will the bank monitor if the firm takes a loan I_1 and fully secures it with its liquid funds L (for instance by putting the funds on a fixed-term deposit expiring not before debt repayment is due at $t = 1$). Lending without bank monitoring does not provide the bank with better information about the firm than it would have if the firm resorted to internal finance. Therefore we assume that the firm prefers internal finance to a bank loan without monitoring. So in line with the pecking order theory of financing, secured lending is dominated by internal finance.

If the low-risk firm wants to be monitored in period 1 in order to profit from the bank-firm relation in period 2, it must make sure that its funds L do not secure the bank loan in period 1. If the bank loan is not fully secured, the bank's option to liquidate the firm's assets in case of default is valuable

paper. It would make the algebra more messy, however, as interest rates would then depend on the loan size I.

[7]The entrepreneur's myopic behavior would arise endogenously if the profit from stealing the bank's funds I_1 (and exclusion from credit markets later) exceeds the profit from investing in period 1 and repaying the bank.

only if the bank has monitored (otherwise the entrepreneur would have absconded with the money, leaving no assets behind). Only unsecured lending will induce bank monitoring in period 1. Therefore if a firm takes a loan in period 1, it is an unsecured loan. Banks know this, so only offer unsecured loans in period 1 (that is, loans with interest rates reflecting the monitoring cost βI).

The advantage of using unsecured debt in the first period is that it induces banks to monitor. This enables firms to establish a reputation. The disadvantage is that debt is a more expensive source of financing than is using internal funds, as it involves monitoring costs. These costs are ultimately paid by the firm, because banks have to break even.

Denote by $r_1 I_1$ a borrower's period 1 bank repayment obligation, which includes the net interest payment $(r_1 - 1)I_1$. For simplicity, assume that the borrower's period 1 debt $r_1 I_1$ does not exceed the firm's funds L for all $r_1 < X$:

$$X I_1 \leq L. \tag{1}$$

This implies that in period 1 a firm with bank debt is able to repay the debt even in case of project failure.

1.3 Deposits

If the firm wants to be monitored in period 1, it should not use its liquid funds L to secure the loan. The firm could put its funds on a *demand deposit* with the bank.[8] In that case without bank monitoring the entrepreneur could receive a loan, not invest, take the loan and the money on deposit before $t = 1$, so before debt repayment is due, and run. To prevent this, the bank will monitor. Thus, a demand deposit in combination with a bank loan gives the bank the incentive to monitor the firm. The maturity mismatch induces monitoring.[9]

[8] Any fixed-term deposit that expires before $t = 1$, thus before debt repayment is due, has the same effect on the bank's incentive to monitor. In the remainder of the paper, we define demand deposit to mean any period 1 deposit that is demandable before $t = 1$.

[9] Compare this to Calomiris and Kahn (1991), where the ability to make early withdrawals gives depositors an incentive to monitor the bank.

Putting the funds in a bank deposit account has an advantage relative to keeping the money outside the bank. It allows the bank to observe the firm's deposit balance, which may also contain valuable information (see Black (1975), Fama (1985) and Nakamura (1993)). Section 4 discusses an extension of the model in which checking accounts information plays an explicit role. Here we assume that in period 1 the borrowing firm puts its funds on a demand deposit. This is in line with the empirical evidence by Petersen and Rajan (1994), who report that sixty-four percent of firms have checking or savings deposits with their current lenders. Moreover, company funds often have shorter maturity than do company debts (see e.g. Van 't Hoenderdal and Scheepens (1993)).

1.4 Sequence of Events

1. At $t = 0$ banks compete and offer unsecured loans of size I_1 at gross interest rates $r_1 > 1$ to the firms of the first generation.[10] Debt contracts stipulate that the bank liquidates the borrower's remaining assets in case of default.

2. After banks have made their offers, firms may refuse all offers or accept one bank's offer. If a firm refuses all offers, it may choose either to invest I_1 from its own liquid funds, or not to invest at all. If a firm accepts a bank's offer, it wants to be monitored by the bank (see the previous discussion).

3. If a firm accepts a bank's offer and borrows I_1, the firm puts its funds L on a demand deposit so that the funds do not secure the loan. To prevent the entrepreneur from absconding with the loan, the bank invests the monitoring cost βI_1.[11] This ensures that the firm ties the borrowed funds up by investing them in the project.

4. If the firm has invested in a project at $t = 0$, the project expires at $t = 1$. Outsiders do not observe the project return. If a debt-financed

[10]For simplicity we rule out the possibility that the investment I_1 is only partly debt-financed. If partial debt finance were possible in period 1, the firm's cost of borrowing would be lower and the case for debt finance might be even stronger.

[11]Note that at this point monitoring is optimal for the bank as $\beta < 1 < r_1$.

project was successful, the entrepreneur pays his debt because otherwise the bank would liquidate the return X. Also, by assumption (1), the unsuccessful firm may repay the bank. It will do so, when this is more profitable than defaulting. In case of project success, the entrepreneur consumes all remaining funds in excess of L.[12] In case of project failure, he consumes nothing.

5. At $t = 1$, a firm can undertake a period 2 project I_2 only if it receives a bank loan. The firm that borrowed in period 1 and did not default bargains with its housebank about the second period loan. For simplicity, assume that bargaining takes the form of a take-it-or-leave-it offer by the firm to the housebank, stating the interest rate it is willing to pay.[13] N_2 new firms enter the market. Banks compete a-la-Bertrand for firms without a debt history.

6. If a firm receives a loan, the bank monitors that the investment takes place. Period 2 projects expire at $t = 2$. Banks do not observe project outcomes. The bank's commitment to liquidate firms if default is reported ensures that all firms repay their bank debts if they can; otherwise they are liquidated. Remaining assets of firms that are not liquidated are consumed by the respective firm owners. The economy ends.

2 Equilibrium in Period 2

In the prospective equilibrium, all good firms of the first generation establish a reputation with a bank in period 1; that is, banks find out their type. In the second period these firms borrow from their housebank at a low interest rate, because they have bargaining power. All other firms are pooled in

[12]The main reason for this simplifying assumption is to prevent that the amount of funds owned by a firm at the beginning of period 2 contains information about the firm's type. For a discussion of the information content of checking accounts, see Section 4.2.

[13]Thus, the firm with a debt history acquires the entire informational surplus. This scheme gives *all* bargaining power to the firm in period 2. We make this extreme assumption to stress the result of Proposition 2 that banks may earn positive profits even if the period 2 bank profit is zero. The qualitative results of the paper would still hold, however, if the firm would assume a smaller (but strictly positive) part of the informational rent. Other schemes that give ex-post bargaining power to the firm are duplicated monitoring, see Von Thadden (1991), or a reputation model, see Sharpe (1990).

period 2 at a higher interest rate. This Section derives the period 2 interest rates and firm payoffs, given that only good firms acquire a debt history in period 1.

2.1 Interest Rates

Define by r_g the interest rate such that the bank earns zero expected profit on a loan (of some size I) to a good borrower. If the loan is not fully secured, the bank invests monitoring effort to prevent the entrepreneur from taking the money and running. Zero bank profit then implies that the bank's expected return on the loan equals the monitoring cost. Therefore r_g satisfies $(p_g r_g - 1)I = \beta I$, or equivalently

$$r_g = (1 + \beta)/p_g. \tag{2}$$

Suppose that at the start of period 2 all firms with a debt history are of the low-risk type. These firms make a take-it-or-leave-it offer to their house-banks. Housebanks will accept any offer that yields positive profits. In the bargaining equilibrium, the bank is indifferent between accepting and rejecting the firm's offer but it always accepts.[14] Consequently, the firm proposes to pay the zero-bank-profit interest rate r_g as given by (2).

At $t = 1$, the pool of firms without a debt history consists of the $(1-q)N_1$ bad firms of the first generation that did not invest in period 1 ("old bad firms"), as well as the N_2 new firms that enter the market at $t = 1$. Banks cannot distinguish these firms from one another. Assuming that bad firms want to be active in period 2, which will be guaranteed by assumption (6) below, the zero-bank-profit interest rate r_2' depends on the proportion f of old bad firms in the pool of unknown firms.[15] It satisfies $f(p_b r_2' - 1) + (1 - f)(\bar{p} r_2' - 1) = \beta$, so that

$$r_2' = \frac{1 + \beta}{f p_b + (1 - f)\bar{p}}. \tag{3}$$

We assume that projects are sufficiently productive on average so that $r_2' < X$.

[14] For a discussion of bargaining solutions, see e.g. Osborne and Rubinstein (1990).

[15] If only low-risk firms take a bank loan in period 1, $f = (1 - q)N_1/[(1 - q)N_1 + N_2]$.

A comparison of (2) and (3) shows that $r_g < r_2'$. This implies that low-risk firms benefit in period 2 from having acquired a debt history in period 1.

2.2 Firms With a Debt History

Suppose that all firms with a debt history are of the low-risk type. In the second period the low-risk firm behaves in line with the standard pecking order theory of financing. It uses all of its own funds for the investment in period 2, and borrows only the excess amount. The reason is that debt is relatively expensive as it involves monitoring cost. This cost is ultimately paid by the firm, because banks have to break even.

Define by L_2 the amount of liquid funds owned by the firm at $t = 1$. If the period 1 project succeeded, $L_2 = L$. In Section 3.1 we will show that firms will use their funds L to pay their first period debt in the event of project failure. In this case $L_2 = L - r_1 I_1$. In the second period the low-risk firm with a debt history pays the interest rate r_g as given by (2). In case of project success it earns $X - r_g$ per unit of the debt-financed part $I_2 - L_2$ of the project, and X per unit of the amount L_2 financed internally. The low-risk firm's expected profit from the investment made at $t = 1$ equals

$$U_2(r_g; L_2) = p_g[(X - r_g)(I_2 - L_2) + XL_2] - L_2. \tag{4}$$

2.3 Firms Without a Debt History

In period 2 the high-risk firm wants to invest as little as possible of its own funds because its project is unprofitable. If "old" bad firms are inactive in period 1, these firms own an amount L of liquid funds at $t = 1$, just like the new generation of firms. So at $t = 1$ all firms without a housebank own liquid funds L.[16] Of this group, only bad firms would want to borrow more than $I_2 - L$ in period 2. Therefore the loan amount is determined by the

[16]This explains why in this model a bank's information from observing the firm's deposit balance does not give the bank sufficient information to distinguish good firms from bad ones. There are many other ways to model the notion that checking accounts information alone is insufficient to perfectly separate good firms from bad ones. Examples are schemes where a firm's initial endowment of liquid funds L is not publicly observable, or where a firm may receive money from other sources than the financed investment project (a wealthy firm owner, other banks, other investments, outsiders). Section 4 discusses the role of checking accounts.

good borrowers' demand $I_2 - L$. Bad firms face loan size rationing.

All firms without a debt history are pooled at interest rate r_2' as given by (3). The expected payoff of a good firm without a debt history is given by $U_2(r_2'; L)$. Given loan size rationing, the bad firm's expected period 2 payoff equals

$$V_2(r_2'; L) = p_b[(X - r_2')(I_2 - L) + XL] - L. \tag{5}$$

If bad firms would not want to be active in period 2, there would be no adverse selection problem in that period. Good firms would then have no reason to build up a reputation in period 1. This paper is concerned with the case in which good borrowers may want to establish a reputation with a bank in period 1. Therefore we will now introduce the assumption that being active in period 2 is profitable for the bad firm, even when borrowing at interest rate r_2' :

$$V_2(r_2'; L) \geq 0. \tag{6}$$

Condition (6) will hold if the amount of debt obtained in period 2 is sufficiently large relative to the amount of own liquid funds to be invested:

$$\frac{I_2 - L}{I_1} \geq \frac{(1 - p_b X)L}{p_b(X - r_2')I_1} \equiv Q. \tag{7}$$

2.4 Period 2 Equilibrium

The following Proposition summarizes the analysis.

Proposition 1: *Assume that only low-risk firms have acquired a debt history in period 1 and that (7) holds. Then the period* 2 *equilibrium can be characterized as follows:*
a) Firms with a debt history receive a period 2 *bank loan of size* $I_2 - L$ *in case of period* 1 *success, and of size* $I_2 - (L - r_1 I_1)$ *in case of period* 1 *failure. They earn positive expected profits and pay the zero-bank-profit interest rate* r_g.
b) Firms without a debt history receive a period 2 *bank loan of size* $I_2 - L$. *They earn nonnegative expected profits and pay the zero-bank-profit interest rate* $r_2' > r_g$.

The Proposition describes the period 2 equilibrium that goes with the period 1 separating equilibrium of the next Section. Banks use Bayesian updating to assess the success probability of borrowers who have established a credit history in period 1. In the following we derive conditions under which only low-risk firms finance their first-period investment through a bank loan. Under these conditions, the banks conclude that firms with a debt history are low risks. These firms benefit from their reputation in the second period by paying the rate r_g. Moreover, the Proposition shows that bad firms face loan size rationing. Firms without a debt history are unable to borrow more than the amount $I_2 - L$, even though bad firms would like to obtain larger loans.

3 The Period 1 Financing Decision

This Section studies the firm's financing choice at $t = 0$. It constructs a separating equilibrium in which low-risk firms prefer a bank loan to internal finance in period 1, and in which high-risk firms prefer to remain inactive. This equilibrium is interesting because for low-risk firms it reverses the pecking order theory of financing. Existence of the separating equilibrium requires that the bad firm is deterred from imitating the good firm's behavior. Imitating the good firm's behavior implies that the bad firm would take a bank loan in period 1, invest the money in the project and be monitored by the bank. As the bad firm's project is unprofitable, however, this strategy is costly. This firm will prefer to remain inactive if its expected loss from investing in period 1 is greater than the cost advantage of obtaining a bank loan in period 2 under favorable conditions.

3.1 Repayment Incentives

At the end of period 1, all debt-financed firms whose project have realized the return X will pay their debt. Indeed, default is not profitable because upon default the bank would appropriate the entire amount X by liquidating the project's assets. In case of project failure, the entrepreneur can decide to use his liquid funds L to pay $r_1 I_1$. This would enable him to get a second period loan from his housebank at the favourable rate r_g. We assume that banks are committed not to finance an entrepreneur in period 2 who has defaulted on his loan in period 1. Therefore, such an entrepreneur has to

turn to some other bank where he can get a loan at the rate r_2'.[17]

In what follows, we assume that the second period gain from acquiring a favorable repayment history is sufficiently high so that even the unsuccessful entrepreneur repays the amount $r_1 I_1$. This is the case if

$$U_2(r_g, L - r_1 I_1) - r_1 I_1 \geq U_2(r_2', L),\ V_2(r_g, L - r_1 I_1) - r_1 I_1 \geq V_2(r_2', L). \quad (8)$$

These conditions are equivalent to

$$r_1 \leq \frac{r_2' - r_g}{r_g} \frac{I_2 - L}{I_1} \equiv C. \quad (9)$$

3.2 The Low-Risk Firm

This subsection derives conditions under which the low-risk firm prefers to take a bank loan in period 1. In that case, the bank loan in period 1 must generate higher overall firm profit than either financing the project internally or remaining inactive in the first period.

Internal finance in period 1: Suppose that a low-risk firm finances its project internally at $t = 0$, and thus acquires no debt history. If the project has been successful in period 1, $L_2 = L$. If it has failed, $L_2 = L - I_1$. In the latter case the firm needs *more* than the offered loan amount $I_2 - L$ in the second period. As the bank offers only loans of size $I_2 - L$ to unknown borrowers in period 2, the firm is unable to finance the investment I_2. After failure of an internally financed project in the first period, the firm faces loan size rationing in period 2. As the investment level is exogenously given, loan size rationing forces the firm to remain inactive in the second period. In case of period 1 success, the period 2 payoff equals $U_2(r_2'; L_2)$. So the low-risk firm's overall expected profit in case of internally financing the period 1 project is given by

$$U_L(r_2') = p_g[X I_1 + U_2(r_2'; L)] - I_1. \quad (10)$$

Inactivity in period 1: If the low-risk firm would remain inactive in period 1, it would face the interest rate r_2' in period 2. The advantage of inactivity

[17] Again we here emphasize the assumption that a borrower's credit history is not public information.

relative to internal finance is that inactivity in period 1 prevents the risk of project failure in period 1; project failure would lead to rationing in period 2. The disadvantage is that the firm must forfeit the profitable period 1 investment opportunity. The firm's overall payoff in case of period 1 inactivity is equal to the expected period 2 payoff $U_2(r_2'; L)$.

Debt finance in period 1: If the firm takes an unsecured bank loan in period 1, the bank monitors the firm's activity. In case of project failure in period 1, $L_2 = L - r_1 I_1$. In case of period 1 success, $L_2 = L$. Since in period 2 the firm pays the interest rate r_g as given by (2), its expected two-period profit in case of debt financing in period 1 equals

$$U_D(r_1, r_g) = p_g[(X - r_1)I_1 + U_2(r_g; L)] + (1 - p_g)[-r_1 I_1 + U_2(r_g; L - r_1 I_1)]. \quad (11)$$

Debt financing in period 1 has two advantages. First, it results in a lower period 2 interest rate. Note that the second-period interest rate r_g depends not on success or failure in period 1, but rather on whether the bank has monitored that the firm did actually invest in period 1. Relative to internal financing, debt has the additional advantage that it prevents the risk of being rationed in period 2 in case of period 1 project failure. So debt may increase the future availability of a bank loan. These properties are in line with an empirical observation by De Haan *et al.* (1992) discussed in the introductory Section. The cost of first-period debt financing is a monitoring cost.

The low-risk firm prefers a bank loan in period 1 if the following two conditions hold:

$$U_D(r_1, r_g) \geq U_L(r_2'), \quad U_D(r_1, r_g) \geq U_2(r_2'; L). \quad (12)$$

The first condition is equivalent to

$$r_1 \leq \frac{U_2(r_g; L) - p_g U_2(r_2'; L) + I_1}{p_g[1 + (1 - p_g)r_g]I_1} \equiv A. \quad (13)$$

It is easily verified that $U_D(r_1, r_g) > U_2(r_g, L - r_1 I_1) - r_1 I_1$. Therefore, the second condition in (12) is automatically satisfied if (9) holds.

3.3 The High-Risk Firm

In the separating equilibrium, the high-risk firm prefers to remain inactive in period 1. It faces the same three options as the low-risk firm.

Internal finance in period 1: The high-risk firm would never finance the unprofitable period 1 project internally. In that case the bank would not monitor firm activity, so the bad firm would have no strategic motive to undertake the unprofitable project.

Inactivity in period 1: If the high-risk firm is inactive in period 1 while good firms acquire a debt history (that is, condition (12) holds), it faces the period 2 interest rate r_2' and owns an amount of own funds $L_2 = L$ at $t = 1$. In case of period 1 inactivity, the high-risk firm's overall payoff is equal to the expected period 2 payoff $V_2(r_2'; L)$ in (5).

Debt finance in period 1: At $t = 0$ the high-risk firm's alternative option is to be active, take a bank loan and put L on a demand deposit. The bank monitors firm activity in the first period. If the bank would take firm activity in period 1 as a signal of good firm quality, the high-risk firm would be able to borrow at a favorable interest rate r_g in period 2. Its expected profit over two periods would then equal:

$$V_D(r_1, r_g) = p_b[(X - r_1)I_1 + V_2(r_g; L)] + (1 - p_b)[-r_1 I_1 + V_2(r_g; L - r_1 I_1)]. \quad (14)$$

At $t = 0$, the high-risk firm will not deviate from the situation of period 1 inactivity if

$$V_D(r_1, r_g) \leq V_2(r_2'; L) \quad (15)$$

This is equivalent to

$$r_1 \geq \frac{r_2' - r_g}{1 + (1 - p_b)r_g} \frac{I_2 - L}{I_1} + \frac{X}{1 + (1 - p_b)r_g} \equiv B. \quad (16)$$

3.4 A Separating Equilibrium

Given that all first-generation firms have enough funds available at $t = 0$ to finance the period 1 project internally, consider the separating equilibrium with the following properties: (i) When a firm has received a bank loan at $t = 0$, by condition (9) it will repay its debt even in the case of project failure. (ii) Good firms attract an unsecured bank loan at $t = 0$ to induce the bank to monitor the firm; condition (13) ensures that this is the case. (iii) Bad firms remain inactive at $t = 0$, which is guaranteed by condition (16). (iv)

All firms invest at $t = 1$; as assumption (7) ensures nonnegative profit even for bad firms, it induces all firms to invest at $t = 1$.

In equilibrium bank competition drives down the period 1 equilibrium interest rate r_1^*. The period 1 rate satisfies two conditions. First, r_1^* must be such that banks earn nonnegative profits. As there is no default on first period loans, this requires $r_1^* \geq 1 + \beta$ so that the bank's monitoring cost is covered. Second, in equilibrium r_1^* must also satisfy the incentive restriction (16), to keep bad firms from applying for a loan. So if the separating equilibrium exists, the equilibrium interest rate r_1^* satisfies

$$r_1^* = \max[1 + \beta,\, B] \tag{17}$$

Given assumption (7) and given $r_1^* = \max[1+\beta,\, B]$, a separating equilibrium with properties (i)-(iv) exists only if conditions (9) and (13) hold. That is, a separating equilibrium exists if and only if

$$\max[1 + \beta,\, B] \leq \min[A,\, C]. \tag{18}$$

The monitoring cost of first-period debt financing increases with the size of the period 1 bank loan. The benefit of period 1 debt financing, a lower period 2 interest rate, increases with the size of the second-period bank loan. So given the other parameters of the model, the size of the period 2 bank loan relative to the size of the period 1 loan is important for each firm's decision whether or not to take a bank loan in the first period. We will therefore describe the equilibrium in terms of the ratio $G \equiv (I_2 - L)/I_1$, which is the ratio of the period 2 loan size to the period 1 loan size.

Proposition 2: *For G large enough, there exists a separating equilibrium with the following properties:*
a) High-risk firms remain inactive in period 1. *Low-risk firms prefer an unsecured period* 1 *bank loan of size I_1 to internal finance. The equilibrium outcome in period* 2 *is given by Proposition* 1.
b) The first-period equilibrium interest rate is given by $r_1^* = \max[1 + \beta, B]$. If $B > 1 + \beta$, banks earn strictly positive expected profits, even though the period 2 *informational rent is completely appropriated by the low-risk firm.*

Proof: Clearly (7) is satisfied for G large enough. It remains to show that also (18) is satisfied. Define

$$A^+ \equiv \frac{U_2(r_g; L) - U_2(r_2'; L) + I_1}{p_g[1 + (1 - p_g)r_g]I_1} = \frac{p_g(r_2' - r_g)(I_2 - L) + I_1}{p_g[1 + (1 - p_g)r_g]I_1}. \tag{19}$$

By (13), one has $A > A^+$. As A^+ and C increase linearly with $G \equiv (I_2 - L)/I_1$, one obtains for G large enough that $(1 + \beta) < \min[A^+, C] \leq \min[A, C]$.

It remains to show that $B < \min[A, C]$. Note that

$$\frac{\partial B}{\partial G} = \frac{r_2' - r_g}{1 + (1 - p_b)r_g} < \frac{r_2' - r_g}{1 + (1 - p_g)r_g} = \frac{\partial A^+}{\partial G}. \tag{20}$$

Therefore, for G large enough, one gets $B < A^+ < A$. Finally note that $r_g < 1 + (1 - p_b)r_g$, i.e. $p_b r_g < 1$, because $p_b r_g < p_b r_2' < p_b X < 1$. Thus

$$\frac{\partial B}{\partial G} < \frac{r_2' - r_g}{r_g} = \frac{\partial C}{\partial G}. \tag{21}$$

This proves $B < C$ for G large enough. Q.E.D.

The good firm signals its type by being active in period 1 and making sure that the bank monitors its activity. This is attractive for the good firm when there is a sufficiently large gain from getting a favourable loan in the second period. This is the case for large values of the parameter G. Under these conditions, the good firm induces the bank to monitor by taking an unsecured bank loan. The bad firm is deterred from taking a loan in the first period because its project is unprofitable. Since the bad firm's expected loss in period 1 is greater than the cost advantage of obtaining a bank loan in period 2 under favorable conditions, the bad firm prefers to remain inactive in the first period.

In the signaling equilibrium bank profit may be strictly positive, even though the bank's period 2 informational rent accrues totally to the good firm. The reason is that the period 1 interest rate r_1 may have to be raised above the zero-bank-profit interest rate $1 + \beta$, to keep bad firms from applying for a loan. This result contrasts with Sharpe (1990). In Sharpe's model if banks acquire an informational rent in period 2, competition in period 1 competes away this rent. Period 1 bank profit may thus be negative and

overall bank profit will always be zero. The crucial difference with our paper is that in Sharpe (1990) banks are unable to separate borrowers by type at the beginning of period 1.

With regard to the theory of money demand, Proposition 2 gives a new explanation of why firms hold cash balances. If a firm is in the process of building a reputation with a bank, it may increase its liabilities by taking a bank loan, to induce the bank to monitor. Its assets are increased as well, in the form of larger cash balances. The maturity mismatch induces the bank to monitor. Thus, the model may explain why firms sometimes hold larger cash balances than can be explained by existing micro-economic theories of money demand, as discussed in the introductory Section.

The prediction that reputational motives may explain the use of debt is related to Hirschleifer and Thakor (1989). They consider a managerial labor market which can only distinguish "success" versus "failure." The manager that wants to build a good reputation will choose to undertake the project with the highest success probability, even if a project with somewhat lower success probability would yield higher expected payoff. Thus, the manager acts in the interest of debtholders rather than equityholders. His firm may then be expected to make relatively extensive use of debt.

From the general perspective of the paper, the existence of the separating equilibrium of Proposition 2 is important, as it supports the reversed pecking order. Of course, existence of the separating equilibrium does not preclude the possibility that other equilibria emerge. There are parameter constellations that yield the standard pecking order result in which good firms prefer internal finance to debt finance. For instance, if the monitoring cost involved with debt financing is sufficiently high – so if condition (13) is violated – low-risk firms prefer internal finance to debt finance in period 1. Moreover, if bad firms would not want to be active in period 2 – so if condition (6) would be violated because the amount of own funds to be brought in would be too high – good firms would have no reason to build up a reputation in period 1. Also in this case good firms would prefer internal finance in period 1.

A separating equilibrium in which only the bad firm takes a bank loan in period 1 does not exist. If the bank's beliefs would specify that taking a

bank loan is a signal of bad quality, the bad firm would prefer not to take the loan. If the bank's beliefs would specify that taking a bank loan is a signal of good quality, the good firm would take a loan as well, thus destroying any equilibrium. So within the class of separating equilibria, the equilibrium derived in Proposition 2 is unique.

4 Robustness and Generalizations

4.1 The Bank's Monitoring Technology

In this paper the bank's monitoring technology allows the bank to monitor whether the firm really invests. The bank does not directly observe (a signal of) the firm's type, which accords with empirical evidence by Lummer and McConnell (1989). Several authors have presented models with stronger assumptions, in which the lending bank's private information about the borrower's type or the borrower's project return is better than the information banks have in this paper (see e.g. Hellwig (1990) for a discussion). If the bank would be able to directly observe a signal of the firm's type, the assumption that the bad firm's project has negative net present value ($p_b X < 1$) would no longer be necessary to deter bad firms from trying to obtain a good reputation in the first period.

4.2 Information From Observing Checking Accounts

A bank's access to checking accounts may be useful (see Black (1975), Fama (1985) and Nakamura (1993)). If information about checking accounts in itself would be sufficient for banks to distinguish successful firms from unsuccessful ones, bank monitoring would be unnecessary and so would bank lending. In that case the good firm would simply invest its own funds in the period 1 project and deposit the remaining funds with a bank. If the bank could conclude from a rising balance that the project was successful in period 1, it would pool all successful firms at a relatively low period 2 interest rate.

However, if banks would interpret a rising deposit balance as a good signal about a firm's quality, high-risk firms could be induced to mislead banks by manipulating their checking account balances. This would destroy any equilibrium without bank monitoring. This paper assumes that informa-

tion about checking accounts alone is insufficient for the bank. This accords with White (1993), who notes that if checking accounts would be the banks' most important source of information, in practice one would observe both banks making greater effort to obtain checking account exclusivity for their commercial and consumer borrowers than they actually do, and non-bank lenders making special effort to obtain this checking account information. But checking accounts information may still be valuable in combination with monitoring, as the following extension of the model illustrates.

Suppose that there exist good firms in two varieties. A fraction v of the good firms is "very good," with success probability p_v, and a fraction $1 - v$ is "moderately good", with success probability $p_m < p_v$ and $p_g = vp_v + (1 - v)p_m$. Moreover, assume that firms know whether they are bad or good, but that good firms do not know whether they are very good or moderately good. In the separating equilibrium in which all good firms take a period 1 bank loan and bad firms do not, checking account information at the end of the first period may be useful. The good firm that was successful in period 1 will own an amount of liquid funds L, whereas the good firm that failed in the first period will own only $L - r_1 I_1$ at the end of period 1. Both the firm and the bank will make a Bayesian update of their beliefs about the firm's type. The successful firm will be of the "very good" type with conditional probability

$$Q = vp_v/(vp_v + (1 - v)p_m) > v \tag{22}$$

The expected second period success probability of this firm will exceed the "average" success probability p_g for good firms. The zero-bank-profit period 2 interest rate r_v for this firm will be lower than the average zero-bank-profit interest rate r_g for good firms. Similarly, the firm that was unsuccessful in period 1 pays a higher interest rate.

This simple example illustrates that checking account information may be useful in conjunction with bank monitoring activity. Given that banks monitor borrowers' investment projects, higher checking account balances may point to borrower success. This may allow banks to make a Bayesian update of their beliefs about firms' types. The example illustrates the casual observation that an important link exists between checking accounts and commercial loans. This informational explanation is complementary to

"operational" economies of scope that may exist in offering the two products jointly (see Gendreau (1993) and Gilligan, Smirlock and Marshall (1984)).

Sprenkle (1969) concludes that the main reason for large corporate cash balances is the tradition in the US of holding compensating balances with banks to pay for banks' services (see also Goodhart (1989)). Our paper argues that firms may take bank loans in combination with demand deposits to induce banks to provide monitoring services.[18]

4.3 Internal Capital Markets

This paper considers only one source of outside funds: bank debt. Section 5 briefly discusses how the central idea of this paper might be applied to other sources of financing as well. Here we discuss one type of external funds that might dominate bank debt in a similar model, namely debt obtained from a firm that has related assets. Gertner, Scharfstein and Stein (1993) propose a model in which the only difference between bank financing and related-firm financing is that in case of liquidation, the related firm can redeploy the assets more effectively than the bank. Then bank financing is dominated by related-firm financing. In addition, if monitoring is easier when the related firm owns the financed firm, their model may explain the advantages of an "internal capital market." This internal capital market is different from the use of internal funds in our model, because the internal capital market still involves an agency problem between the internal financier and the project manager who uses the capital. Our model does not consider this agency problem.

A disadvantage of an internal capital market relative to bank financing which Gertner, Scharfstein and Stein (1993) do not consider, however, is that it may be harder to prevent collusion between the internal financier and the project manager than between an outside financier and the project manager.

[18]This may help to resolve the old dispute noted by Judd and Scadding (1982, p.1010) about the theoretical role of compensating balances in influencing the level of deposits held by corporations. Hodgman (1961) analyzed this issue under the assumption that banks are collusive and collectively force customers to hold greater deposit balances in the aggregate than they otherwise would hold. Davis and Guttentag (1963) argue that such collusion is improbable because rules for compensating balances would have to be well defined and publicized.

Tirole (1992) discusses collusion in organizations; Scheepens (1995) presents a model of collusion in financial intermediation.

5 Concluding Remarks

Suppose that a low-risk firm wants to build up a good reputation with a bank, in order to ensure favorable future loan conditions. Building up a reputation with a bank requires the bank to monitor firm activity. This paper argues that if bank monitoring effort is non-contractible (as in Besanko and Kanatas (1993), Bester (1995) and Scheepens (1994)), taking an unsecured bank loan may be an efficient way to induce the bank to monitor firm activity. Firms that want to build up a good reputation may then take bank loans even if they were able to finance projects internally. These firms' preference for bank loans ahead of internal funds challenges a prediction of Myers and Majluf's (1984) "pecking order theory" of financing. The model may explain empirical observations by Ang and Jung (1993) and De Haan *et al.* (1992), but additional empirical work is needed.

The focus of this paper is rather narrow, as it only considers internal finance against bank debt. An important topic for future research is to determine whether this paper's motivation why high-quality firms may take bank debt instead of internal funds (to induce monitoring and thus establish a good reputation) applies to other sources of finance as well. For instance, outside equity may have an advantage with regard to enabling a broader public to monitor the firm. Listings on stock exchanges induce investment bank monitoring and place companies more in the spotlight of equity analysts and financial journalists (see e.g. Donaldson (1961), Easterbrook (1984), Hansen and Torregrosa (1992), and Hansen, Kumar and Shome (1994)). Moreover, listed companies face stricter requirements on accounting and auditing and on the timely publishing of information that might affect stock prices.[19] Now suppose that some high-quality firm has a strategic interest in gaining public recognition, so in reducing the information asymmetry with potential fu-

[19]In the auditing literature, therefore, a company's issuance of new securities has been associated with higher demand for auditing services. E.g., Ettredge *et al.* (1994) show that the issuance of new securities significantly increases the likelihood that a company voluntarily purchases timely (quarter-end), rather than retroactive (year-end) reviews of their quarterly financial information.

ture shareholders, as this would make future external financing cheaper. If outside equity has an advantage with regard to inducing a broad public to monitor the firm, this firm prefer might prefer outside equity to, say, bank debt or internal finance. This would reverse another prediction of the pecking order theory. *The Economist* (October 8th, 1994) refers to empirical research by Jean Helwege and Nellie Liang at the Fed indicating that for high-growth firms equity is much more attractive than can be explained by current theory. The wish (or need) to be publicly monitored might explain this. If stockpiling cash by an equity issue would induce financial markets to monitor, future external financing might be obtained under symmetric (or less asymmetric) information. Thakor's (1993) result that under asymmetric information stockpiling cash by an equity issue is a bad signal, might then be reversed.

References:

Ang, J.S. and M. Jung, 1993, An alternate test of Myers' pecking order theory of capital structure: the case of South Korean firms, *Pacific-Basin Finance Journal* 1, 31-46.

Baumol, William J., 1952, The transactions demand for cash: An inventory theoretic approach, *Quarterly Journal of Economics* 66, 545-56.

Berger, Allen N. and Gregory F. Udell, 1994, Lines of credit and relationship lending in small firm finance, mimeo.

Besanko, David and George Kanatas, 1993, Credit market equilibrium with bank monitoring and moral hazard, *Review of Financial Studies* 6, no.1, 213-32.

Bester, Helmut, 1995, A bargaining model of financial intermediation, *European Economic Review*, 39, 211-228.

Black, Fischer, 1975, Bank funds management in an efficient market, *Journal of Financial Economics* 2, 323-39.

Bolton, Patrick and David Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, *American Economic Review* 80, 93-106.

Calomiris, C.W. and C.M. Kahn, 1991, The role of demandable debt in structuring optimal banking arrangements, *American Economic Review* 81, no. 3, 497-513.

Chaplinsky, Susan and Greg Niehaus, 1990, The determinants of inside ownership and leverage, Working paper, University of Michigan.

Chemmanur, Th.J. and P. Fulghieri, 1994, Investment bank reputation, information production, and financial intermediation, *Journal of Finance* 49, no. 1, 57-79.

Davis, Richard G. and Jack M. Guttentag, 1963, Balance requirements and deposit competition, *Journal of Political Economy* 71, 581-85.

De Haan, L., C.G. Koedijk and J.E.J. de Vrijer, 1992, De stijging van het liquiditeitsbezit in de jaren tachtig (The increase of corporate liquidity in the 1980s; in Dutch), *Monetaire Monografieën* 12, DNB/NIBE, Amsterdam.

De Haan, L., C.G. Koedijk and J.E.J. de Vrijer, 1994, Buffer stock money and pecking order financing: Results from an interview study among Dutch firms, *De Economist* 142, no.3, 287-305.

Diamond, Douglas W., 1984, Financial intermediation and delegated monitoring, *Review of Economic Studies* 51, 393-414.

Diamond, Douglas W., 1989, Reputation acquisition in debt markets, *Journal of Political Economy* 97, no.4, 828-862.

Diamond, Douglas W., 1991, Monitoring and reputation: the choice between bank loans and directly placed debt, *Journal of Political Economy* 99, 689-721.

Donaldson, G., 1961, *Corporate Debt Capacity,* Harvard University Press, Boston.

Easterbrook, F.H., 1984, Two agency cost explanations of dividends, *American Economic Review* 74, 650-59.

Ettredge, Mike, Dan Simon, David Smith and Mary Stone, 1994, Why do companies purchase timely quarterly reviews? *Journal of Accounting and Economics* 18, 131-55.

Fama, Eugene F., 1985, What's different about banks, *Journal of Monetary Economics* 15, 29-40.

Gale, Douglas and Martin Hellwig, 1985, Incentive-compatible debt contracts: the one-period problem, *Review of Economic Studies* 52, 647-663.

Gendreau, B., 1993, Comment, in: M. Klausner and L.J. White, eds., *Structural Change in Banking* (New York University Salomon Center, New York), 161-165.

Gertner, Robert H., David S. Scharfstein and Jeremy C. Stein, 1993, Internal versus external capital markets, mimeo, University of Chicago/MIT.

Gilligan, Th., M. Smirlock and W. Marshall, 1984, Scale and scope economies in the multi-product banking firm, *Journal of Monetary Economics* 13, 393-405.

Goodhart, Charles A.E., 1989, *Money, Information and Uncertainty,* Second edition (MacMillan, London).

Hansen, Robert S. and Paul Torregrosa, 1992, Underwriter compensation and corporate monitoring, *Journal of Finance* 47, no.4, 1537-55.

Hansen, R.S., R. Kumar and D.K. Shome, 1994, Dividend policy and corporate monitoring: Evidence from the regulated electric utility industry, *Financial Management* (Spring), 16-22.

Harris, Milton and Arthur Raviv, 1991, The theory of capital structure, *Journal of Finance* 46, no.1, 297-355.

Hart, Oliver and John Moore, 1989, Default and renegotiation: A dynamic model of debt, Discussion paper no. 520, MIT.

Hellwig, Martin, 1990, Banking, financial intermediation and corporate finance, in: A. Giovannini and C. Mayer, eds., *European Financial Integration* (Cambridge University Press, Cambridge).

Hirschleifer, D. and A.V. Thakor, 1989, Managerial reputation, project choice and debt, Working paper 14-89, Anderson Graduate School of Management at UCLA.

Hodgman, Donald R., 1961, The deposit relation and commercial bank investment behavior, *Review of Economics and Statistics* 43, no.3, 257-68.

James, Christopher, 1987, Some evidence on the uniqueness of bank loans, *Journal of Financial Economics* 19, 217-235.

Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review Papers and Proceedings* 76, no. 2, 323-329.

Jensen, Michael and William Meckling, 1976, Theory of the firm: managerial behavior, agency costs, and capital structure, *Journal of Financial Economics* 3, 305-60.

John, Kose and David C. Nachman, 1985, Risky debt, investment incentives and reputation in a sequential equilibrium, *Journal of Finance* 40, 863-80.

Judd, J.P. and J.L. Scadding, 1982, The search for a stable money demand function: A survey of the post-1973 literature, *Journal of Economic Literature* 20, 993-1023.

Kester, W. Carl, 1986, Capital and ownership structure: a comparison of US and Japanese manufacturing companies, *Financial Management* (Spring), 5-16.

Kim, Wi S. and Eric H. Sorensen, 1986, Evidence on the impact of agency costs of debt in corporate debt policy, *Journal of Financial and Quantitative Analysis* 21, 131-44.

Lummer, S. and J. McConnell, 1989, Further evidence on the uniqueness of bank loans, *Journal of Financial Economics* 19, 217-235.

Miller, Merton H. and Daniel Orr, 1966, A model of the demand for money by firms, *Quarterly Journal of Economics* 80, no. 3, 413-35.

Miller, Merton H. and Daniel Orr, 1968, The demand for money by firms: Extensions of analytic results, *Journal of Finance* 23, no. 5, 735-59.

Myers, S.C., 1984, The capital structure puzzle, *Journal of Finance* 39, no.3,

575-92.

Myers, S.C. and N.S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.

Nakamura, Leonard I., 1993, Commercial bank information: implications for the structure of banking, in: M. Klausner and L.J. White, eds., *Structural Change in Banking* (New York University Salomon Center, New York), 131-160.

Osborne, Martin J. and Ariel Rubinstein, 1990, *Bargaining and Markets* (Academic Press, New York).

Petersen, Michael E. and Raghuram G. Rajan, 1994, The benefits of lending relationships: evidence from small business data, *Journal of Finance* 49, 3-37.

Rajan, Raghuram G., 1992, Insiders and outsiders: the choice between informed and arm's-length debt, *Journal of Finance* 47, 1367-1400.

Scheepens, Joris P.J.F., 1994, Financial intermediation, bank failure and official assistance, CentER Discussion Paper 9497, Tilburg University.

Scheepens, Joris P.J.F., 1995, Collusion and hierarchy in banking, CentER Discussion Paper, Tilburg University.

Sharpe, Steven A., 1990, Asymmetric information, bank lending and implicit contracts: a stylized model of customer relationships, *Journal of Finance* 45, 1069-1087.

Slovin, Myron B.O, Marie E. Sushka and John A. Polonchek, 1993, The Value of Bank Durability: Borrowers as bank stakeholders, *Journal of Finance* 48, 247-266.

Sprenkle, Case M., 1969, The uselessness of transactions demand models, *Journal of Finance* 24, no.5, 835-847.

Stulz, Rene M., 1990, Managerial discretion and optimal financing policies, *Journal of Financial Economics* 26, 3-27.

Thakor, Anjan V., 1993, Information, investment horizon, and price reactions, *Journal of Financial and Quantitative Analysis* 28, no. 4, 459-82.

Tirole, Jean, 1992, Collusion and the theory of organizations, in: J.J. Laffont, ed., *Advances in Economic Theory, 6th World Congress,* Vol. II (Cambridge University Press, Cambridge).

Titman, Sheridan and Robert Wessels, 1988, The determinants of capital structure choice, *Journal of Finance* 43, 1-19.

Tobin, James, 1956, The interest-elasticity of transactions demand for cash, *Review of Economics and Statistics* 38, no. 3, 241-47.

Van 't Hoenderdal, A.M. and J.P.J.F. Scheepens, 1993, De rentegevoeligheid van het Nederlandse bedrijfsleven (Interest rate sensitivity of the Dutch corporate sector; in Dutch), *Economisch-Statistische Berichten* (27 oktober), 995-97.

Von Thadden, Ernst-Ludwig, 1991, Bank finance and long term investment, WWZ-Discussion Paper nr. 9010, Universität Basel.

White, L.J., 1993, Comment, in: M. Klausner and L.J. White, eds., *Structural Change in Banking* (New York University Salomon Center, New York), 169-171.

White, Michelle, 1984, Bankruptcy liquidation and reorganization, in: E. Logue, ed., *Handbook of Modern Finance* (Warren, Gorman and Lamont, Boston).