DO BANKS INFLUENCE THE CAPITAL STRUCTURE CHOICES OF FIRMS?

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Abstract

This paper investigates three capital structure decisions – leverage, debt maturity and the source of debt – in a simultaneous setting. Moreover, we investigate whether these choices are influenced by the involvement of banks in a firm. Our results based on a panel of Dutch firms show that bank relationships, measured by interlocking board memberships and equity ownership, have a significant impact on the relations among the three capital structure choices. First, less bank involvement strengthens the positive impact of leverage on maturity. This is consistent with the liquidity risk theory, because involved banks help firms to mitigate liquidity risk. Second, bank debt negatively effects leverage in firms with bank interlocks, while this relation is absent in firms without such bank involvement. This result suggests that banks maximize the value of their loans by reducing overall leverage. Third, we find a strong trade-off between bank debt and maturity, which is independent of the degree of bank involvement.

1. Introduction

The involvement of banks in non-financial firms is a large and important area of scientific research. A large number of theoretical and empirical studies on firm-bank relationships investigate the effects of these relations on bank loans and firm performance (see Boot (2000) and Ongena and Smith (2000) for recent reviews). Studies on the firm-bank relations show that banks provide many different services to firms. Through this multitude of services banks obtain information about the firm, which is not available to outsiders. Banks develop relations with firms, based on repeated services and their information advantage. On the one hand, bank relations may be beneficial to the firms because the bank, as a delegated monitor, bridges information problems between borrowers and lenders. On the other hand, banks may (ab)use their information advantage and the channels of their relations, for example to reduce leverage, because this increases the value of bank debt.

The most important firm-bank relation is borrowing and lending. Banks as a source of debt are studied in several empirical studies (see, *e.g.*, Houston and James (1996)). From the perspective of firms, decisions about bank debt are part of the capital structure choice, together with the choice of leverage and debt maturity. In a wide range of empirical papers leverage is explained from proxies for tax, bankruptcy and agency theories (see, *e.g.*, Rajan and Zingales (1995)). Other studies investigate the determinants of debt maturity choice (see Barclay and Smith (1995)). Most recently, the notion that several capital structure decisions are interdependent has emerged in the literature. For example, Barclay *et al.* (2002) and Johnson (2003) study maturity and leverage and Johnson (1997) measures the relation between maturity and the source of debt.

Our study investigates the role of bank involvement in a capital structure setting. The question we address is whether bank involvement is related to capital structure choices. However, a firm's capital structure involves a complex set of decisions, which at least include the debt-equity choice and choices of the maturity and sources of debt. Therefore, in a first instance we simultaneously model these three capital structure decisions. This approach contributes to the empirical literature because the simultaneous model involves three decisions, while existing studies focus on a single decision or, at best, two decisions. The three-decision model is initially tested for the full sample of firms. Our main hypothesis, however, is that bank

involvement is related to capital structure choices. Therefore, we expect that the outcomes of our three-decision model are different for sets of firms with varying degree of bank involvement. Next to debt financing, banks have additional channels to influence firms. One opportunity is through a bank's shareholdings in a firm and another is through interlocking directorates. In the second part of the paper we explore the effects of differing degrees of bank involvement and we divide our sample on the basis of non-debt bank influence. We measure bank influence as equity ownership and interlocking directorates and we distinguish four groups: no bank involvement, banks own equity, banks have interlocks, and banks have both equity and interlocks. For each of these groups we estimate our three-equation model and we compare the results across sub-samples. This analysis is a contribution to the literature on firm-bank relations as it describes how bank relations are linked to the firms' capital structure choices. So far, the banking literature has considered the terms of banks debt, without investigating other capital structure choices.

We test the relation between bank involvement and capital structure choices for a sample of Dutch firms. The Netherlands provides an excellent arena to study the impact of banks on firms, because Dutch banks have a strong position and many relations with non-financial firms.[1] The concentration of the five largest banks in the Netherlands was over 80% in the period between 1998 and 2000, which illustrates the power of these five banks (European Central Bank (2002)). Dutch banks also hold shares of their customers. However, due to the weak position of shareholders in Dutch firms, a sole shareholding of a bank in a firm might not be enough to exercise influence over its capital structure. The undeveloped public debt market strengthens the position of banks, because alternatives for bank debt are limited. Finally, we expect that banks ensure strong positions in firms through a representation on the board, *i.e.* interlocking directorates.[2] In several other countries a bank-based system prevails, in which large and powerful banks pay a prominent role in the financing of firms. For example, the ECB (2002) reports that in Germany loans from *Hausbanken*,

[1] A typical example is Getronics. The large Dutch banks ING and ABN Amro provided loans to this computer firm when financial troubles arose. Foreign banks were not eager to help the firm, but the many relations of the Dutch banks saved the firm. ING provided loans, owns large amount of preferred shares and some common shares, has a vice-chair of the supervisory board who is chair of the supervisory board in Getronics, and advises the firm. Most likely ING is a customer and ING's investment funds held convertibles. Not surprisingly, the initial restructuring proposal, advised by ING, was at the expense of the regular bondholders and shareholders (*Het Financieele Dagblad*, February 3, 2003).

[2] Two observations illustrate the relevance of bank interlocks. The president of the Dutch central bank recently mentioned: "We do not argue that a manager of a large firm should never be on the board of its house bank. But in case there is a situation where the relation between a bank and a firm develops such that conflicting interests arise, yes we pay attention and we have intervened in the past (…) I can assure you: we intervened more than once." (*NRC Handelsblad*, June 12, 2003). The second observation is that Danisevska *et al.* (2003) report that the presence of bankers on the board is critical for removing an underperforming chairman from the managerial board in the Netherlands.

which have close relationships with firms, represent the most important external financing source.

We find that the outcomes of the three-equation capital structure model differ between sub-samples with different degrees of bank involvement. Thus, bank involvement co-determines capital structure choices. These results emphasize the importance of firm-bank relationships in capital structure choices. We find strong indications that bank influence in the Netherlands goes beyond providing debt. For example, firms with bank interlocks exhibit a negative effect of bank debt on leverage, while this relation is absent in firms without this bank involvement. The result suggests that banks maximize the value of their loans by reducing overall leverage, which is consistent with the preference of banks for low risk customers (Carey et al. (1998)). Further, we find that the absence of bank relations increases the positive effect of leverage on maturity, which is consistent with Diamond's (1991) liquidity risk theory. The results indicate that banks mitigate liquidity risk. The findings in this study illuminate the importance of our set-up because banks appear to influence capital structure choices through other channels than bank debt. Finally, we find a strong trade-off between bank debt and maturity, which is independent of the degree of bank involvement.

The remainder of this paper is organized as follows. In Section 2 we describe the theoretical model and we define our hypotheses. Section 3 contains the description of the sample and the definitions. The full-sample results for the model are in Section 4, while in Section 5 we investigate the role of bank involvement. Section 6 concludes.

2. Model, theory and hypotheses

This paper investigates the role of banks in capital structure decisions of firms. Consequently, we first need to construct a model for a firm's capital structure choice, before we can incorporate the role of banks. However, capital structure choice is a complex issue involving multiple decisions. In order to have a sufficiently broad perspective on capital structure, we model leverage, debt maturity and the source of debt. In this section we first define a general empirical model for these three capital structure choices and their determinants (2.1). We state explicit hypotheses based on a set of theories: tax effects and bankruptcy costs (2.2), moral hazard (2.3), adverse

selection (2.4) and specialization in the lending market (2.5). This is a necessary foundation for our later refinements on the role of banks in capital structure choice. The section ends with a review of empirical studies about relations among capital structure decisions (2.6).

2.1 A general model for three capital structure choices

Theoretical models propose a wide variety of determinants of leverage (*LEV*), debt maturity (*DEBMAT*) and source of debt (*BANKD*). Moreover, theory also suggests that the three choices might be determined jointly. The transformation of theory into an empirical model requires three, partly overlapping, sets of exogenous variables affecting the three endogenous variables. We denote the vector containing these variables by x_1, x_2, and x_3, respectively. We consider the following structural form of the simultaneous equations model:

$$\begin{aligned} LEV_{it} &= x_{1,it}^{/}\beta_1 + \gamma_{12} DEBMAT_{it} + \gamma_{13} BANKD_{it} + \varepsilon_{1,it} \\ DEBMAT_{it} &= x_{2,it}^{/}\beta_2 + \gamma_{21} LEV_{it} + \gamma_{23} BANKD_{it} + \varepsilon_{2,it} \\ BANKD_{it} &= x_{3,it}^{/}\beta_3 + \gamma_{31} LEV_{it} + \gamma_{32} DEBMAT_{it} + \varepsilon_{3,it}, \end{aligned} \qquad (1)$$

where *i* indexes firms, and *t* indexes years. As we model three capital structure choices, our model contains a large set of explanatory variables. Identification of the three individual equations requires that the sets of variables included in each equation are "sufficiently different." That is, exclusion restrictions should hold for each equation such that sufficient instruments can be obtained within the system to estimate the parameters of interest. Therefore, in the remainder of this section we review theoretical models concerning leverage, debt maturity and bank debt decisions, and discuss the corresponding explanatory variables. We focus on the most relevant theories modeling the relations between the above-mentioned capital structure choices. An overview of theories, determinants and the hypothesized effects is provided in Table 1.

[Insert Table 1 here]

2.2 Tax effects and bankruptcy costs

The optimal leverage of a firm is determined by a trade-off between benefits and costs of debt. The tax advantage of debt depends on the tax deductibility of interest payments and is positively related to the firm's marginal tax rate (Modigliani and Miller (1963)) (see hypothesis L1 in Table 1). DeAngelo and Masulis (1980) show that this advantage of debt can be crowded out by alternative non-debt tax shields, such as depreciation or investment tax credits (L2). The optimal debt ratio is also negatively related to the expected bankruptcy costs, which decrease with a firm's collateral value of assets (L3) and increase with the probability of bankruptcy (L4).

The next set of models reveals the complexity of relationships between leverage, debt maturity and some determinants of optimal leverage. Brick and Ravid (1985) keep leverage constant and model the effects of the term structure of interest rates on optimal debt maturity in the presence of taxes. When the term structure of interest rates is upward sloping, it is optimal to choose long-term debt because the present value of the tax shelter will be highest (M1 and M2a).[3] Lewis (1990) on the other hand determines leverage and debt maturity simultaneously and derives that taxes are irrelevant for the debt maturity decision (M2b). Kane, Marcus and McDonald (1985) extend the tax-bankruptcy trade off by considering the costs of issuing debt. In this framework the tax advantage of debt is positively related to leverage (L1), but negatively affects debt maturity (M2a), because the decrease in the tax advantage of debt requires longer debt maturity in order to amortize floatation costs. Further, debt maturity will optimally decrease with increasing asset value volatility due to a higher probability of bankruptcy and the need to rebalance the capital structure more frequently (M3a). Wiggins (1990) finds a positive effect of asset risk on debt maturity in a model without transaction costs, treating tax shelters in case of default in a different way than Kane *et al.* (1985) (M3b).

Based on these theories we expect for leverage a positive relation with the marginal tax rate and the collateral value of assets and a negative relation with non-debt tax shields and the probability of bankruptcy. Debt maturity should be positively related to the term structure of interest rates, while the effects of the marginal tax rate and asset risk remain ambiguous. These theories do not provide clear predictions concerning the relationship between debt maturity and leverage.

[3] Later, interest rate uncertainty is introduced, resulting in long-term debt being optimal also for flat or even decreasing term structures (Brick and Ravid (1991)).

2.3 Moral hazard

Moral hazard problems between stakeholders lead to agency costs of debt and equity. The choice of the level and type of debt can influence agency problems. Overinvestment is the problem that managers of firms with low growth opportunities tend to allocate free cash flows to projects with negative net present value (Jensen (1986)). In this situation debt plays a positive role by forcing managers to pay out free cash flows on fixed debt obligations. Debt reduces free cash flow directly and an additional effect is the disciplining through the threat of bankruptcy in case of bad investments (L5).

High leverage can lead to the rejection of positive net present value projects for firms with ample growth opportunities (Myers (1977)). Shortening debt maturity (the debt matures before the investment option is exercised) is a way to reduce this underinvestment problem. Myers also derives a motive for matching the maturities of a firm's assets and liabilities: the value of short-term debt is less sensitive to shifts in the variation of the project's cash flows than long-term debt. Barnea *et al.* (1980) argue that this property of short-term debt eliminates the incentives of shareholders to increase their payoffs by increasing the project risk - the asset substitution problem. Therefore, we expect a negative relationship between a firm's growth opportunities with both leverage (L6) and debt maturity (M4). Another empirical implication is a negative relationship between leverage and debt maturity (L7a and M6a). Finally, the maturity of assets is expected to positively affect debt maturity (M5).

Adjustments in the debt ratios and maturities are not the only remedies for moral hazard problems. There is a vast literature exploring the role of banks in contracting, monitoring and providing proper incentive structures to borrowers that are expected to be susceptible to underinvestment and asset substitution problems. Myers (1977) describes the benefits of monitoring by the lender and the possibility to renegotiate the contract for the reduction of sub-optimal investment decisions (L8a). Delegated monitoring by a financial intermediary has lower monitoring costs as opposed to a group of individual borrowers and avoids the free rider problem (Diamond (1984)). However, according to Rajan and Winton (1995) banks have a natural preference for providing short-term loans as their liabilities contain a significant proportion of short-term liquid deposits (B3 and M7a). Smith and Warner (1979) describe the role of private debt with covenants in decreasing the agency costs of debt. Finally, according to Diamond (1991b) bank monitoring has two purposes:

screening serves to eliminate borrowers with risky projects and to provide incentives to engage in safe projects. Therefore we expect that firms with high growth opportunities and high leverage, which are more likely to face shareholder-bondholder conflicts, have a higher proportion of bank debt in their capital structure (B1a and B2a). Accordingly, we expect bank debt to have shorter maturities.

While the benefits of debt provided by banks are well documented, the disadvantages of close bank relationships are less clear. Rajan (1992) suggests that the benefits of bank monitoring can be lost when the bank creates information monopolies. Borrowers with large information asymmetries might find themselves unable to switch the lender can face excessive rent extraction and incentive distortion, unless they possess a strong bargaining position vis-à-vis the bank. Gaining access to the public debt market can also eliminate the bank's information monopoly. The empirical implication is that borrowers with high growth opportunities and a weak bargaining position (*e.g.* due to bank shareholdings or no access to public debt market) will rely less on bank debt (B1b and B5).

2.4 Adverse selection

The central theme of adverse selection models is the presence of information asymmetry between parties prior to contracting, which is costly because the actual price differs from the price under equal information. In capital structure theory, asymmetric information is reflected in the superior information that a firm's management has as opposed to their lenders. Flannery (1986) and Kale and Noe (1990) describe how firms with favorable private information can signal this news by issuing short-term debt (M8). However, according to Diamond (1991a) issuing short-term debt increases the liquidity risk, *i.e.* the risk of sub-optimal liquidation when lenders refuse to refinance illiquid, though solvent borrowers.[4] Johnson (2003) argues that increasing liquidity risk by issuing short-term debt can be compared to increasing expected bankruptcy costs, which have a negative effect on optimal leverage (L7b and M6b). This effect is likely to be stronger for firms that have limited possibility to issue long-term debt such as firms without access to public debt market or firms without close bank relationships. Diamond (1991a) further predicts that the trade off between benefits and costs of short-term debt will result in a nonlinear relationship

[4] The excessive incentive of lenders to liquidate borrowers is caused by their inability to recognize and accrue all the future control rents that are assigned to borrowers in a state without liquidation.

between the firm's debt maturity and its credit quality. The firms with the best and worst rating issue short-term debt, while other debtors borrow long-term funds (M9).

Several studies argue that private lenders have an information advantage about borrowers in comparison with public bondholders.[5] Firms with large information asymmetries are thus expected to obtain loans from banks in order to decrease adverse selection costs of debt (B4). Fama (1985) suggests that the closeness of the relationship between the bank and its customer and the additional information that the bank is able to collect about the firm from its current/deposit accounts is especially valuable in providing short-term loans (M7b and B3).

2.5 Specialization in corporate lending market

Several models derive that firms with low credit quality or a higher probability of financial distress seek to obtain debt monitoring by banks (B6 and B7) (see Berlin and Loeys (1988), Berlin and Mester (1992) and Chemmanur and Fulghieri (1994)). Public debt is less beneficial for this type of borrowers as it does not allow easy renegotiation, and liquidation decisions are not likely to be efficient. Furthermore, in Berlin and Loeys (1988), firms face a choice between unmonitored loans with covenants (public debt) and monitored loans (bank debt). They argue that firms with high proportions of intangible or firm-specific assets cannot benefit from close monitoring, because even early liquidation will raise only low liquidation values (B8). In addition, firms whose interim financial indicators provide noisy signals about their credit health attach a high value to the option to renegotiate the debt provided by banks (B9). Chemmanur and Fulghieri (1994) emphasize the ambition of banks to develop a reputation for being financially flexible, *i.e.* making the correct renegotiation versus liquidation choice. This desire gives banks an incentive to commit more funds to the evaluation of borrowers in financial distress. Firms with higher probabilities of distress thus have a preference for bank debt over public debt, in contrast to less risky firms that do not wish to be pooled with such borrowers.

However, in the empirical study of Carey *et al.* (1998) the banks' reputation (or regulation) effect leads to a specialization in providing funds to low-risk customers. They find that both banks and other private lenders supply loans to firms with unobservable ex-ante risk. The distinction between the two types of lenders arises

[5] See, e.g. Leland and Pyle (1977), Ramakrishnan and Thakor (1984), Fama (1985) and Boyd and Prescott (1986).

when the observable risks of borrowers (such as leverage) are considered. Banks have two reasons for their preference to lend to firms with low leverage (B2b). First, regulation of banks relates capital requirements to the risk of their assets and thus motivates banks to provide loans to relatively safe borrowers. Second, banks wish to develop a reputation for being reasonable when the terms of the contract must be renegotiated. Being known for not using these situations to extract maximum rents is a valuable asset for banks, which can be lost in case frequent liquidations of borrowers are observed. Therefore, we expect a positive effect of a firm's liquidation value and the probability of financial distress on the proportion of bank debt in the capital structure. However, the relationship between the observable risks, credit quality and the precision of interim indications and the bank debt preference is likely to be negative.

Finally, Blackwell and Kidwell (1988) compare transaction costs of public and private debt issues, which include flotation, agency and searching costs, and conclude that a firm selects the debt market that minimises these costs. Flotation costs of public debt issues have a large fixed part that makes private debt preferable for small firms or firms with small average debt issue volume (B10).

2.6 Prior empirical evidence

While this study simultaneously analyses three capital structure decisions and their interactions, empirical models in the current literature incorporate up to two decisions. A substantial number of papers investigate the relationship between leverage and debt maturity, while a small number of studies examine maturity and the source of debt. Finally, several papers consider leverage and the source of debt simultaneously.

There are several empirical studies exploring the link between debt maturity and leverage. Barclay and Smith (1995) find a positive correlation between leverage and debt maturity. Stohs and Mauer (1996) explain the positive coefficient for leverage in their debt maturity equation by Diamond's (1991) liquidity risk effects of short-term debt. A similar conclusion is drawn in Antoniou *et al.* (2002) for the UK, Germany and France. In recent papers, such as Barclay *et al.* (2003) and Johnson (2003), simultaneous equations for leverage and maturity are modeled. Barclay *et al.* (2003) find a negative effect of leverage on debt maturity and a positive effect of debt maturity on leverage. While the first result is attributed to the substitution of leverage and debt maturity in mitigating moral hazard problems, the latter is mentioned to be

puzzling. The main question of Johnson (2003) is whether short-term debt alleviates the negative effect of growth opportunities on leverage. Johnson reports a mutually positive relationship between leverage and debt maturity, which is again explained by the liquidity risk impact of short-term debt on leverage.

Two studies have analyzed the relation between maturity and the source of debt. Johnson (1997) reports that the estimated coefficients of the determinants of the ratio of long-term bank debt to total long-term debt remain unchanged when the same determinants are used to explain residuals from regression of long-term bank debt on total long-term debt. Denis and Mihov (2003) estimate a two-stage model where first the maturity of new debt issues is predicted. The predicted value is then used as an explanatory variable in a logit analysis of debt source. Although the first-stage regression has substantial explanatory power, predicted maturity in the second stage does not appear to affect the source of debt. Thus, the scarce empirical evidence favors the independence of the two capital structure decisions.

The empirical literature on the relationship between the source of debt and leverage mainly focuses on the determinants of the lender identity (bank, private non-bank or public) in case of new loans. The only exception is Johnson (1997), who analyzes the effects of firm characteristics on the corporate debt ownership structure. He finds that leverage is positively related to the proportion of bank debt in firms' debt structure and argued that this is consistent with the demand of highly leveraged firms for close monitoring by banks. The results for the effects of leverage on the marginal lender choice are limited and inconclusive. Carey *et al.* (1998) show that banks specialize in loans for firms with low observable risk, as proxied by leverage. The evidence of Denis and Mihov (2003) on the other hand does not find any impact of leverage on the choice between bank and private non-bank debt. The probability of issuing public debt is however positively related to leverage. Finally, in Hadlock and James (2002) the likelihood of a bank loan announcement is positively related to leverage.

3. Sample and definitions

Our sample consists of all non-financial firms listed for at least one full calendar year on the Amsterdam Exchanges during the ten-year period between 1992 and 2001. We

eliminate firm-years with missing observations for any of the variables defined in this section. The final sample thus includes 205 firms and 1205 firm-year observations.

This analysis combines three data sources. First, balance sheet, profit and loss account, and some stock market related data are obtained from the Reach database. Second, the *Gids bij de Officiële Prijscourant van de Amsterdamse Effectenbeurs* (an annual overview of securities listed at the Amsterdam Exchanges) reports publicly-listed debt instruments. Third, ownership structure data is obtained from the leading Dutch financial newspaper, *Het Financieele Dagblad.* Their list of owners of exchange-listed firms is formed according to the compulsory notifications for *Wet Melding Zeggenschap* (the Law on disclosure of shareholdings).

The main aim of this study is an empirical analysis of the simultaneous relationships among three capital structure decisions. A firm's capital structure is described by its *leverage*, which we define as total debt over the book value of total assets. Firms can obtain debt in a variety of forms, maturities, priority structures, from different sources and with various covenants. Although these are all important characteristics of debt that our investigation should ideally address, we limit ourselves to two of them, mainly due to data availability. First, *debt maturity*, which we measure as the ratio of long-term debt to total debt. Long-term debt is debt that matures in a period longer than one year.[6] Second, we are interested in the *source of debt*. The empirical literature makes a broad distinction between three debt providers – investors in public debt issues, banks and other non-depository financial institutions.[7] We define bank debt as the ratio of both short and long-term bank debt to total debt. While the Reach database enables us to precisely identify the amount of bank debt, it is impossible to make an accurate distinction between the other two debt providers.[8]

In addition to the capital structure measures, our model includes several explanatory variables. We proxy the *marginal tax rate* by the ratio of taxes paid to

[6] The one-year cut-off between short and long-term debt reflects the accounting definition used in balance sheets, which are our source of data. Alternatively, Stohs and Mauer (1996) construct a weighted average maturity of all firm's liabilities. Even after consulting firms' annual reports we were not able to obtain data for a similar measure of debt maturity.

[7] See, e.g. Carey *et al.* (1998), Johnson (1997), Denis and Mihov (2003).

[8] *Gids bij de Officiële Prijscourant* annually publishes a list of firms with outstanding public debt and its characteristics. There are two reasons why we prefer to refrain from using the amounts of debt listed in this overview as a measure of outstanding public debt for our purposes. Firstly and most importantly, the date of collection of information by the *Gids* does not match the balance sheet dates. Secondly, accounting procedures for bookkeeping of debt may cause that the amount on the balance sheet does

pretax income. Titman and Wessels (1988) define *non-debt tax shields* as operating income less interest and taxes paid over the corporate tax rate, relative to the book value of total assets. We use fixed tangible assets and inventory scaled by total assets as a proxy for *collateral value of assets*. It is likely that this measure is also related to the firm's *liquidation value*. The standard deviation of the return on assets, measured over the preceding five-year period, approximates the *asset value volatility*. Further the volatility of asset returns is often used as a proxy for the *probability of bankruptcy*. Next to it, we expect this volatility to be negatively related to the *informativeness of the interim financial ratios,* as for firms with volatile returns these indicators are likely to provide noisy signals about their credit health. We include Tobin's Q as a proxy for a firm's *growth opportunities*. Tobin's Q is the market value of the firm divided by the replacement value of the assets.[9] *Free cash flows* are defined as a ratio of operating income, minus taxes, interest expenditures, and dividends, over total assets (Lehn and Poulsen (1989)).

To measure the *term premium* for a given year, we follow Barclay and Smith (1995) by using the difference between the monthly yield on 10-year government bonds and the monthly interbank 6-month rate (there are no short-term government bonds in the Netherlands). To test the hypothesis that firms match *the maturity of assets* and liabilities, we estimate asset maturity similar to Stohs and Mauer (1996) as the book value weighted average of the maturities of current assets and net property, plant and equipment. The maturity of current assets is calculated as the ratio of current assets to cost of goods sold. In estimating of the maturity of net property, plant and equipment we assume straight-line depreciation and calculate a ratio of net property, plant and equipment to annual depreciation expense. We use future abnormal earnings, defined as earnings per share in year *t+1* less earnings per share in year *t* divided by the end of year *t* share price, as a proxy for the *insiders' private knowledge,* similar to, *e.g.,* Barclay and Smith (1995) and Stohs and Mauer (1996)). Diamond (1991a) predicts a non-linear relationship between the firm's credit rating and debt maturity. Given the lack of credit ratings for a large number of firms in our sample we follow Johnson (2003) and proxy *liquidity risk* by a measure of firm size (book value of total assets) and its square.

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not equal the outstanding amount published by the *Gids*. The limited disclosure of debt providers other than banks in annual reports does not help to solve this issue either.

[9] We estimate the replacement value as described in Perfect and Wiles (1994). See De Jong (2002, p. 39) for a discussion of estimating the replacement value of assets of Dutch firms.

Borrowers with *information problems* are likely to be small firms, as defined by the asset size, and firms with growth opportunities (Carey *et al.* (1998), Johnson (1997)). The extent of the hold-up problem (Rajan (1992)) that the informational problematic borrowers face should also depend on their *bargaining power* vis-à-vis the bank. The extent of a firm's reliance on a single bank is hypothesized to depend on whether the firm has multiple bank relationships or excess to the public debt market. The lack of access to the public debt market is measured by a dummy variable, which equals one for firms without outstanding public debt and zero otherwise. Furthermore, we have information on two potential proxies that are likely to be negatively related to the firm's bargaining position. First is the equity stakes of banks in the firm and second, a dummy variable that equals one if there is a banker on the firm's supervisory (*i.e.* non-executive) board. Finally, we use profitability, defined as the ratio of operating income to total assets, as a measure of credit quality that we expect to be negatively related to the demand for bank debt.

In Table 2 we present summary statistics for our sample of Dutch listed firms in the period between 1992 and 2001.

[Insert Table 2 here]

The capital structure of the firms shows that on average the assets are financed with 25.8% of debt. The average firm has 57.2% of its total debt maturing in more than one year and 58.6% of the debt is provided by banks. Almost a quarter (24.1%) of the firms have outstanding public debt. Less than half of the firms (41%) have at least one banker on the supervisory board and there is on average less than one banker on the board. The bank shareholdings are on average 7.4%.

4. Results: the capital structure choices model

This section presents the results of our three-equation model explaining leverage, debt maturity and bank debt. We test the hypotheses from Table 1 with model (1). Because our model contains endogenous explanatory variables, applying ordinary least squares to estimate the coefficients of this model would generate biased and inconsistent estimators. Therefore, we use the instrumental variable approach, where the list of predetermined variables (instruments) is based on the reduced-form solution of the

structural model. The model is estimated by applying two-stage least squares with Newey-West heteroskedasticity-and-autocorrelation-consistent standard errors. Table 3 presents the results of the simultaneous equations model with the three endogenous variables, *i.e.* leverage, debt maturity, and bank debt. Figure 1 provides an overview of the estimated relationships among leverage, debt maturity and bank debt.

[Insert Table 3 here]
[Insert Figure 1 here]

First we focus on the discussion of the results concerning the relationships among the three capital structure characteristics. In the leverage equation, debt maturity and bank debt have significantly negative coefficients of -0.544, and -0.408 respectively, at the 5% significance level. The coefficients of leverage and bank debt in the debt maturity equations are both significant at the 1% level. While leverage has a positive effect on the debt maturity, bank debt is negatively related to the debt maturity. Finally, in the bank debt equation we find that the coefficient of leverage is not significantly different from zero and debt maturity has a significantly negative impact (-0.736) on bank debt. These results suggest that leverage has a positive impact on the debt maturity, while debt maturity negatively affects leverage. The former finding is consistent with Diamond (1991a) where firms with high leverage optimally issue long-term debt in order to avoid sub-optimal liquidations (M6b). The positive effect of leverage on debt maturity is also documented in the empirical literature.[10] The significantly negative coefficient of debt maturity in the leverage equation implies that decreasing the debt maturity increases optimal leverage, which is consistent with Myers' (1977) mitigation of underinvestment problems by shortening debt maturity (L7a).[11]

The negative relationship between debt maturity and the ratio of bank debt is consistent with the specialization of banks in providing short-term loans (M7a,b and

[10] Stohs and Mauer (1996), Antoniou *et al.* (2002), and Johnson (2003) report a positive significant coefficient of leverage in the debt maturity equation. Barclay and Smith (1995) find a positive correlation between leverage and debt maturity.

[11] While the hypotheses L7a and M6b are confirmed, it implies a rejection of Diamond's (1991a) liquidity risk story in the leverage equation (L7b) and Myers' (1977) underinvestment problem mitigation in the debt maturity equation (M6a). The inability to fully support one of the two theories and the two competing signs in the relationship between leverage and debt maturity might be also contributed to a misspecification of our model. See a similar problem in Barclay *et al.* (2003). We explore this possibility and provide some reconciliation in the next section.

B3).[12] Firms demanding short-term debt are likely to be satisfied by banks that have the informational advantage necessary for providing this type of debt in comparison to other alternative sources of debt (Fama (1985)). Also according to Rajan and Winton (1995), banks have a natural preference for providing short-term loans in order to match the maturity of their assets with liabilities, which contain a significant proportion of deposits on demand.[13]

Finally, the significantly negative effect of bank debt on leverage confirms the prediction of Carey *et al.* (1998) that banks prefer to provide loans to low risk borrowers either for reputational or regulatory reasons (L8b).[14] The negative impact of bank debt on leverage and insignificant effect of leverage on bank debt are not consistent with the hypothesized role of banks in the mitigation of moral hazard problems (L8a and B2a). The summary statistics in Table 1 revealed that banks, besides being important debt providers to listed Dutch firms, also hold positions on the supervisory boards and own equity stakes in the firms. These additional channels of influence might provide banks with easier ways to control debt policies of their borrowers. In the next section we set out to explore this idea in more depth.

The results for the control variables in the leverage equation in Table 3 provide mixed evidence for the tax and bankruptcy hypotheses. The coefficient of collateral is significantly positive suggesting that firms with lower bankruptcy costs have higher leverage (L3). We also find evidence for the crowding-out of tax advantages of debt by non-debt tax shields (L2). The non-debt tax shields proxy has a significantly (at the 1% level) negative impact on leverage. However, the negative sign on the taxation measure is opposite to the prediction (L1). Furthermore, asset volatility, approximating the probability of bankruptcy, does not appear to influence leverage (L4). Next, we focus on the variables controlling for potential moral hazard problems. We find no evidence that a firm's growth opportunities have impact on its leverage as the coefficient of Tobin's Q is not significantly different from zero (L6). On the other hand, free cash flows have a significantly positive coefficient. This is consistent with

[12] This result might be partially driven by an institutional feature, as Dutch firms do not issue public debt with maturities under one year. However, public debt use is relatively small.

[13] An interview in the Dutch financial press supports this conclusion. The chief syndicated loans at ABN Amro, mentioned so-called bridge loans that are provided by banks. For banks large long-term loans are unattractive due to the low interest rates and banks do not have to maintain required capital. In case firms need fast financing, for example because of an acquisition, banks provide a loan that has to be repaid within a year (*Het Financieele Dagblad*, January 26, 2000).

[14] However, the statistically insignificant coefficient of leverage in the debt maturity equation suggest that this effect is not reciprocal as we do not find that firm with lower leverage have more bank debt (rejection of B2b).

Jensen's (1986) overinvestment problem, where in the presence of free cash flow debt plays a disciplinary role (L5). Firm size does not appear to have a significant impact on leverage.

Similar to all studies exploring the determinants of debt maturity, we find strong evidence that firms match the maturity of their assets with the liabilities (M5).[15] The coefficient on the proxy for the asset maturity is positive and significant at the 1% level. Our results provide only limited support for the taxation and bankruptcy hypotheses. The insignificant coefficient on taxation suggests that taxes do not affect optimal debt maturity (M2b) as predicted by Lewis (1990).[16] The coefficients on asset volatility (M3), and term premium (M1) are not significantly different from zero. Like in the leverage equation, the proxy for growth opportunities has no significant impact on debt maturity suggesting that debt maturity does not serve to mitigate moral hazard problems (M4). The statistically insignificant proxies for credit quality (firm size and its square) provide no evidence on Diamond's (1991a) prediction that both the best and the worst creditors rely on short-term debt (M9). Finally, firms in our sample do not seem to signal favorable private news by shortening their debt maturity given the insignificant measure of abnormal future earnings (M8).[17]

In the equation explaining the proportion of bank debt in a firm's capital structure we find a significantly positive effect of the collateral. This result suggests that banks prefer to extend loans to borrowers that are able to provide collateral to secure the bank debt. According to Berlin and Loeys (1988), firms with higher liquidation values benefit from borrowing from banks that ensure efficient liquidation (B8). On the other hand, we find no support for their hypothesis that firms with noisy interim indicators (B9) or higher probability of financial distress (B7), as proxied by the asset value volatility, or firms with low credit quality (B6) rely more on bank debt. The statistically insignificant coefficients on firm size (B4) and growth opportunities (B1a) do not confirm the expectation that bank debt decreases costs of informational problematic borrowers. [18] However, we also do not find any evidence that firms with

[15] See, *e.g.* Barclay and Smith (1995), Stohs and Mauer (1996), Barclay *et al.* (2003), and Johnson (2003).

[16] The estimated coefficient on marginal tax rate in the debt maturity equation does not suggest that that the tax advantage of debt negatively effect debt maturity (M2a).

[17] Because theory suggests that signaling requires both positive private news and information asymmetry between the lender and the borrower, as a robustness check we have interacted the abnormal future earnings with some potential proxies of asymmetric information (such as firm size and dummy for a presence of the banker on the board), but the result remained qualitatively unchanged.

[18] The insignificant coefficient on firm size also does not provide support for the B10 hypothesis that the larger fixed part of public debt flotation costs makes bank debt more preferable for small firms.

high growth opportunities and weak bargaining power rely less on bank debt in order to avoid potential hold up problem (Rajan (1992)) (B1b and B5). All interactions between the growth dummy, which equals one if a firm's Q is above the sample year median and zero otherwise, and three proxies for the firm's strength vis-à-vis the bank yield insignificant results. The dummy approximating the lack of public debt market access is significantly positive and shows that firms without access to the public debt market rely significantly more on bank debt than other firms even after controlling for leverage. Finally, the stand-alone measures for the presence of a banker on the board and bank shareholdings are included in the bank-debt equation to diagnose whether firms with close relationships with banks have easier access to the bank. This hypothesis is rejected. The coefficient on bank shareholding is not significantly different from zero and the presence of a banker on the board even has a negative impact on the proportion of bank debt in a firm's capital structure.

In the model of this, section bankers on the board and bank shareholdings were included as explanatory variables for bank debt. However, as argued before, bank involvement through boards and equity holdings may go beyond influencing bank debt. In the next section we explore the effects of differing bank involvement in the firm on its capital structure.

5. Results: the role of banks in the capital structure choices

We begin the analysis of the role of banks in firms' financing choices by splitting our sample into four sub-samples. These sub-samples differ in the potential influence that a bank has over the firm's decision making besides providing debt financing. In particular, the distinction between the sub-samples is made according to the presence of bank shareholding and representation on the supervisory board. The first group consists of firm-years when the firm has no banker on the board and no banks among its shareholders. We refer to this group containing 358 firm-year observations as *NOB* (no-bank) group. In the second group, there are also no bankers on the board, but the bank shareholding is non-zero. We call this group (351 firm-years) the *BEQ* (bank equity) group. Firms in the third group have a bank representative on the board, but there are no bank shareholders. We name this group *BOB* (banker on the board) group and it has 192 firm-years. Finally, the fourth sub-sample consists of firms with both bank shareholding and banker on the board. This sub-sample with 304 observations is

labeled as *BOBEQ* (banker on the board and equity). Table 4 provides comparison of the average firm characteristics for the four sub-samples.

[Insert Table 4 here]

The results of the equality of mean tests among the four groups presented in Table 4 reveal significant differences in their capital structures and other firm characteristics. The average NOB firm has a leverage, debt maturity and a bank debt ratio that is relatively close to the overall sample means (see Table 2). For this sub-sample it is typical that it includes small, growth firms with volatile asset returns and a lack of public debt financing. The BEQ group is characterized by the highest leverage (0.295) and reliance on bank debt (73% of total debt) and the lowest overall debt maturity. The only resemblance between BEQ and NOB firms lies in their small size and limited public debt issuance. Otherwise, BEQ firms have a high proportion of tangible assets (0.590) in their capital structure and low growth opportunities, suggesting that they are involved in capital-intensive operations. Firms with a banker on the board and without bank shareholdings (BOB) are described by the lowest indebtedness (0.217) and lowest proportion of bank debt (43% of the total debt). The fact that over 60% of their debt has maturity longer than one year is likely to be contributed to their higher reliance on public debt (about a quarter of the firms). While it is not surprising that these are large firms, their average Tobin's Q of 1.616 is also among the highest in our sample. The reported means for the fourth sub-sample (BOBEQ) with firms with maximum bank involvement reveal that these firms are very similar to BOB firms in terms of their capital structure characteristics and size. Nevertheless, the BOBEQ sub-sample contains the most mature firms given the additional evidence of lowest asset value volatility (0.021) and low future growth opportunities (1.343).[19]

In the remainder of this section we explore to what extent the relationships between leverage, maturity and the source of debt are influenced by the strength of the ties with banks. To do so, we re-estimate the system of equations in model (1), while we allow the γ's to vary with the individual sub-samples. As a first step, we estimate a separate specification for each sub-sample. Next, for each characteristic we

[19] In an unreported comparison of bank debt maturity (long-term bank debt over total bank debt) among the four groups, we find that bank debt of BOB and BOBEQ firms is almost exclusively short-term (median of 0 and 0.107, respectively) in comparison to NOB and BEQ groups (median of 0.370 and 0.333, respectively).

perform a Wald-test on the hypothesis that the impact of a particular variable is identical across the four sub-samples. In each case that the null hypothesis of parameter homogeneity is not rejected at the 10% significance level, we impose that the four sub-samples have identical coefficients for the corresponding explanatory variable.[20] This way, we prevent ending up with a specification with a large number of relatively inaccurately estimated coefficients. The result of this exercise is a simultaneous equations model where a subset of the coefficients, including those for the endogenous variables and excluding year and industry dummies, varies across sub-samples. In estimation, all instruments were interacted with dummies indicating sub-samples, which is consistent with an unrestricted specification for the reduced form equations.

Table 5 shows the estimation results of the system of equations, taking into account the different ties with banks among the four sub-samples. In Panel A we report the coefficients and t-values for our three endogenous variables. For the sake of clarity we also present the estimated relationships graphically in Figure 2.

[Insert Table 5 here]
[Insert Figure 2 here]

In general, the links among the capital structure characteristics remain fairly similar to those revealed in Table 3 and Figure 1. Nevertheless, controlling for the different types of bank involvement provides interesting additional insights. First, the results provide a clearer picture on the relationships between leverage and debt maturity. The coefficient on leverage in the debt maturity equation is the largest (with a value of 0.709) and significant at the 1% level for firms that lack close relationships with banks. With an increasing degree of bank involvement, the value of the coefficient steadily decreases. The debt maturity for the sub-sample of firms with strongest bank ties does not depend on leverage. The positive effect of leverage on debt maturity is consistent with the hypothesis that short-term debt increases liquidity risk, because firms with high leverage issue long-term debt to avoid sub-optimal liquidation (Diamond (1991a)) (M6b). Johnson (2003) suggests that this effect is the strongest for firms with low credit quality and limited possibility to obtain long-term debt. This is

[20] Estimation results for the four sub-samples, and the results of the Wald-tests for parameter homogeneity are available from the authors upon request.

consistent with the different effects that leverage has on debt maturity in our sample in Figure 2. NOB and BEQ firms are rather small firms, largely dependent on bank debt financing, which tends to be short term. Therefore, firms with higher leverage should have more long-term debt as additional short-term debt would increase the likelihood of sub-optimal liquidation and the lack of close bank and public debt market relationships limits the possibility to promptly adjust the maturity structure of debt if needed. Although the other two groups of firms (BOB and BOBEQ) are probably higher quality borrowers, as they are more mature larger firms with less volatile returns, only about a quarter of them has access to the public debt market, which provides long term debt. In these groups the effects of leverage on debt maturity are less positive, because if liquidity risk becomes relevant the access to the debt market or the strong link to the bank enables the firm to easily extend its debt maturity structure.

Our results do not provide any evidence that the choice of debt maturity has influence on the leverage decision (L7), as the coefficient on debt maturity in the leverage equation is not significantly different from zero for any of the sub-samples. The overall results strongly suggest that firms (excluding firms with the closest bonds to banks) first determine their total debt level and subsequently optimize the maturity of the debt. The lack of easy access to various debt sources results in a positive impact of leverage on debt maturity, because short-term debt as opposed to long-term debt raises the likelihood of premature liquidation for firms with high leverage.

Another interesting result concerns the effects of bank debt on leverage. For the overall sample, we observe a significantly negative impact. A more detailed investigation in Panel A of Table 5 suggests that this result is driven by the two groups of firms with bankers on the board. This suggests that a seat on the board enables banks to exercise control over a firm's indebtedness. This evidence is consistent with the preference of banks for low risk customers (Carey *et al.* (1998)) (L8b).[21] The missing significant relationship between bank debt and leverage for NOB and BEQ firms suggests that without a bank representation on the board, the bank can only influence a firm's financing policy by granting or refusing to grant a

[21] In 2000, Dutch telecom firm KPN showed details of a credit facility to the Dutch Minister of Finance. Because the state owns shares and according to law all shareholders have the right to equal information, KPN had to publish the conditions of the bank loan, which would otherwise never been revealed. The conditions concern maximum debt amounts, minimum profits and minimum interest coverage, which improve over time. Also dividends are forbidden and divestitures and investments

loan, but cannot affect the overall debt level. It also provides an additional confirmation of the weak position of the shareholders of Dutch firms. More specifically, one would expect that banks would have the largest motivation to oversee the debt policy of firms in which they have a relatively large stake. A potential candidate for such supervision would be BEQ firms that on average have the highest leverage and almost three quarters of their debt originates from banks. Although the average bank shareholding in this type of firms is the highest (of 14%) compared to the rest of the sample, we see no relationships between the leverage and bank debt for this sub-sample. This is consistent with the findings of Danisevska *et al.* (2003) that in the Netherlands a supervisory board is effective in the influencing a firm's management, not shareholders.

Finally, the results for the relationship between the source of debt and its maturity are practically unchanged compared to those in Table 3. The effects of bank debt in the debt maturity equation are significantly negative for all groups. In the bank debt equation, debt maturity has a negative impact on bank debt and this effect is significantly different from zero in three out of four sub-samples. In the fourth (BOB) sub-sample the coefficient of debt maturity is negative with a *t*-value of -1.025. This provides very strong evidence for both the banks' specialization in providing short-term debt and for banks as the exclusive short-term debt source for Dutch firms (M7 and B3).

Table 5, Panel B shows results for the control variables in our simultaneous equations system that are generally consistent with those reported in Table 3 and discussed in the Section 4. In addition, we find that in the sub-sample of firms with the strongest ties to banks, future growth opportunities have a significantly positive effect on leverage. Given that these firms are rather large mature firms with low growth opportunities, it seems that they are prone to overinvestment problems, but they avoid disciplining role of the debt. This finding is consistent with the empirical finding of De Jong (2002), who shows that Dutch firms that are likely to overinvest do not increase their leverage in order to self-restrain themselves. However, we also find that free cash flows positively affect leverage, which contrasts with the debt avoidance hypothesis. The significantly positive coefficient on firm size is consistent with the positive effect of the bankruptcy costs reduction on the optimal leverage. It

limited (*Het Financieele Dagblad*, December 4, 2001). This example clearly shows that banks aim to reduce future leverage.

suggests that large firms, which might be less likely to go bankrupt (*e.g.* due to better diversification), have more debt in the capital structure.

In the debt maturity equation the asset maturity (M5) remains the most prominent determinant of the maturity of debt (controlling for the total level and source of debt). In addition, we find that in the sub-sample of firms with a bank representation on the board, future growth opportunities have a negative effect on the debt maturity that is significant at the 10% level. This is consistent with Myers' (1977) mitigation of underinvestment problems by shortening debt maturity (M4). Furthermore, in the bank debt equation BOB firms with lower asset value volatility have significantly more bank debt, which further confirms Carey *et al.* (1998) hypothesis that banks prefer to provide loans to low risk customers. The significantly negative coefficient on the firm size provides some support that banks can reduce the costs of informational problematic borrowers that small firms might be (B4). It is also in line with the flotation cost hypothesis, where large firms can afford the large fixed part of it and thus rely less on the bank debt (B10). An additional piece of evidence on the positive role of a banker on the board comes from the fact that firms with high growth opportunities and bankers on the boards have more debt monitored by banks.

6. Conclusion

We model the relations among three distinct capital structure choices: leverage, debt maturity and the source of debt. Furthermore, we test whether bank involvement influences capital structure decisions. We approximate the degree of involvement of a bank by the bank's shareholdings in a firm and its representation on the board. Our results emphasize the importance of bank involvement in the capital structure choice. We find that bank debt has a negative effect on leverage in firms with bankers on the board, while this relation is absent in the firms without bank involvement. This result suggests that banks maximize the value of their loans by reducing overall leverage. The finding is also consistent with the preference of banks for low risk loans (Carey *et al.* (1998)). We confirm Diamond's (1991) liquidity risk theory because the absence of bank relations increases the effect of leverage on maturity. Bank involvement reduces liquidity risk. We find a strong trade-off between bank debt and maturity, which is independent of bank involvement.

The results in this study stress the costs and benefits of firm-bank relations. We study these phenomena in the Dutch setting because we expect that the strong position of banks in this country magnify the issues. Potentially, any firm-bank relation can be expected to show the mechanisms we have revealed in our study. However, in other bank-based systems, such as Germany, we expect the documented relations to be most important.

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Table 1: Theories and determinants

Theories	Determinants	Hypotheses
Panel A: Leverage		
Tax effects		
	Marginal tax rate	L1 (+)
	Non-debt tax shields	L2 (-)
Bankruptcy costs		
	Collateral value of assets	L3 (+)
	Probability of bankruptcy	L4 (-)
Moral hazard		
	Free cash flow	L5 (+)
	Growth opportunities	L6 (-)
	Debt maturity	L7a (-)
	Bank debt	L8a (+)
Adverse selection		
	Debt maturity	L7b (+)
Specialization in corporate lending market		
	Bank debt	L8b (-)
Panel B: Debt maturity		
Tax effects		
	Term structure of interest rates	M1 (+)
	Marginal tax rate	M2a (-), M2b (0)
Asset risk		
	Asset value volatility	M3a (-), M3b (+)
Moral hazard		
	Growth opportunities	M4 (-)
	Asset maturity	M5 (+)
	Leverage	M6a (-)
	Bank debt	M7a (-)
Adverse selection		
	Insider information about firm quality	M8 (-)
	Risk of liquidation	M9 (non-lin)
	Leverage	M6b (+)
	Bank debt	M7b (-)
Panel C: Bank debt		
Moral hazard		
	Growth opportunities	B1a (+)
	Leverage	B2a (+)
	Debt maturity	B3 (-)
Adverse selection		
	Information asymmetry	B4 (+)
	Debt maturity	B3 (-)
Hold-up problem		
	Growth opportunities	B1b (-)
	Firm's bargaining power	B5 (+)
Specialization in corporate lending market		
	Credit quality	B6 (-)
	Probability of financial distress	B7 (+)
	Liquidation value	B8 (+)
	Interim indicator informativeness	B9 (-)
	Leverage	B2b (-)
Flotation costs		
	Firm size	B10 (-)

Table 2: Summary statistics

Summary statistics for the full sample of firms. The total number of observations is 1205 firm-years for 205 firms over 1992-2001. The sources of data are annual reports, REACH, Het Financieele Dagblad, and Gids bij de Officiële Prijscourant van de Amsterdamse Effectenbeurs. Leverage is ratio of total debt (excluding current liabilities) to the book value total assets. Debt maturity is defined as long-term debt over total debt. Bank debt is included as long-term and short-term bank debt over the book value of total assets. Firm size is the log of the book value of total assets in thousands of Euros. Collateral is ratio of fixed tangible assets and inventory to total assets. Taxation is taxes paid over pre-tax income. Non-debt tax shields are defined as operating income, less interest payments and tax payments relative to total assets. Volatility in year *t* is standard deviation of ratio of operating income to total assets over the period *t-1* to *t-5*. Tobin's Q is market value over replacement value of total assets. Free cash flow is operating income, minus taxes, interest expenditures, and dividends over total assets. Term premium is the difference between the Dutch IR swap 10 year rate and the Dutch interbank 6 month rate. Asset maturity is measured as the book value weighted average of the maturities of current assets and net property, plant and equipment, where the maturity of current assets is current assets of cost of goods sold and the maturity of fixed tangible assets is measured over annual depreciation expense. Abnormal future earnings in year *t* are defined as the earnings per share in year *t+1* less the earnings per share in year *t* divided by the end of year *t* share price. Profitability is ratio of operating income to book value of total assets. Convertible debt dummy equals one if the firm had in year t outstanding convertible debt according to Gids bij de Officiële Prijscourant van de Amsterdamse Effectenbeurs, and zero otherwise. Public debt dummy equals one if the firm had in year t outstanding public debt (other than convertible) according to Gids bij de Officiële Prijscourant van de Amsterdamse Effectenbeurs, and zero otherwise. Bank equity includes stakes above 5%. The number of bankers on the board is the number of interlocking directorates between firms in our sample and Dutch banks. Banker on the board dummy equals to one, if there is at least one banker on the board and zero otherwise.

	Mean	Median	Standard deviation
Leverage	0.258	0.242	0.162
Debt maturity	0.572	0.611	0.295
Bank debt	0.586	0.673	0.347
Firm size	12.355	12.292	1.937
Collateral	0.537	0.573	0.218
Taxation	0.285	0.305	0.275
Non-debt tax shields	0.034	0.045	0.117
Volatility	0.036	0.022	0.048
Tobin's Q	1.521	1.213	1.024
Free cash flow	0.014	0.025	0.113
Term premium	1.44	1.805	1.134
Asset maturity	7.284	2.560	74.241
Abnormal future earnings	0.011	0.011	0.281
Profitability	0.077	0.087	0.124
Convertible debt dummy	0.160	0.000	0.360
Public debt dummy	0.120	0.000	0.320
Bank equity	7.394	5.040	10.271
Banker on the board dummy	0.410	0.000	0.490
No of bankers on the board	0.750	0.000	1.130

Table 3: Simultaneity in capital structure - leverage, maturity and bank debt

Simultaneous equations model, where the endogenous variables are leverage, debt maturity, and bank debt. The model is estimated using two stage least squares with Newey-West HAC standard errors and covariances. A constant and fourteen industry dummies are included, though not reported. No public debt market access is dummy equals one if the firm does not have any public debt outstanding, zero otherwise. High TQ is dummy that equals one if in the given year TQ is larger than the sample median. Other variables are defined in Table 1. The total number of observations is 1205. The symbol '***' denotes that the estimated coefficient is significant at the 1% level; '**' at the 5% level; '*' at the 10% level.

	Leverage	**Debt maturity**	**Bank debt**
	Coefficient (t-value)	**Coefficient (t-value)**	**Coefficient (t-value)**
Leverage	-	0.521*** (3.936)	0.071 (0.379)
Debt maturity	-0.544** (-1.985)	-	-0.736*** (-3.796)
Bank debt	-0.408** (-2.457)	-0.418*** (-5.918)	-
Firm size	0.009 (1.131)	0.049 (0.683)	-0.009 (-0.965)
Tobin's Q	0.007 (0.586)	0.005 (0.364)	0.005 (0.747)
Asset volatility	0.001 (0.004)	-0.044 (-0.188)	-0.200 (-0.704)
Collateral	0.469*** (4.008)	-	0.323*** (2.866)
Taxation	-0.046** (-1.972)	-0.010 (-0.337)	-
Non-debt tax shields	-1.966*** (-2.669)	-	-
Free cash flows	1.774** (2.359)	-	-
Term premium	-	-0.005 (-0.869)	-
Asset maturity	-	0.0003*** (4.101)	-
Abnormal future earnings	-	0.002 (0.967)	-
Firm size squared	-	-0.002 (-0.633)	-
Profitability	-	-	-0.075 (-0.852)
No public debt market access	-	-	0.202*** (3.975)
(High TQ)* no public debt	-	-	-0.025 (-0.652)
Banker on the board dummy	-	-	-0.086** (-2.167)
(High TQ)* banker dummy	-	-	0.066 (1.569)
Bank shareholding	-	-	0.002 (1.581)
(High TQ)* bank shareholding	-	-	-0.0002 (-0.159)

Figure 1: The estimated relationships between leverage, debt maturity and bank debt

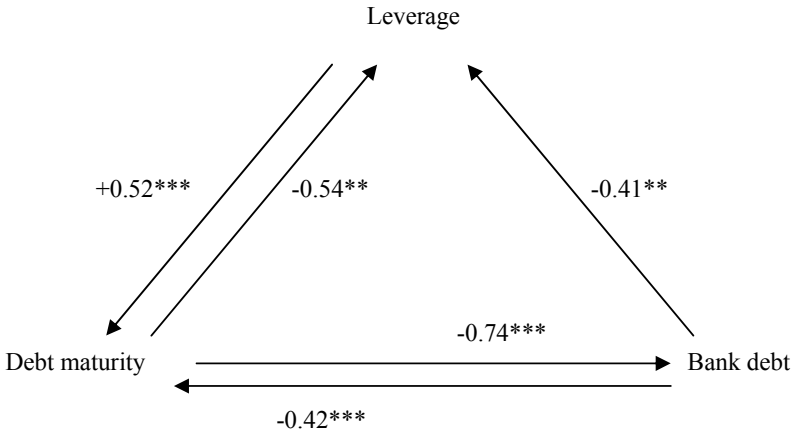


Table 4: The comparison of means between the four groups based on the extent of bank involvement

Group 1 consists of 358 firm-year observations with no bank equity and no banker on the board. Group 2 consists of 351 firm year observation with bank equity, but no banker on the board. Group 3 has 192 firm-year observations with no bank equity, only banker on the board. Group 4 includes 304 firm-year observations with both bank equity and banker on the board. All variables are defined in Table 1. The first four columns show means per group. The last six columns provide probabilities of the equal mean test between two groups. The results for Tobin's Q are year independent. N.a. in case of mean test denotes that the test statistic could not be computed because the standard deviation within both groups is 0.

	Mean per group				Significances of the equal mean test					
	1	2	3	4	1 vs 2	1 vs 3	1 vs 4	2 vs 3	2 vs 4	3 vs 4
Bank equity	0.000	14.155	0.000	12.963	**0.000**	n.a.	**0.000**	**0.000**	0.146	**0.000**
No of bankers on the board	0.000	0.000	1.830	1.800	n.a.	**0.000**	**0.000**	**0.000**	**0.000**	0.708
Leverage	0.246	0.295	0.217	0.257	**0.000**	**0.051**	0.372	**0.000**	**0.002**	**0.004**
Debt maturity	0.556	0.481	0.643	0.652	**0.002**	**0.001**	**0.000**	**0.000**	**0.000**	0.702
Bank debt	0.626	0.730	0.438	0.468	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	0.328
Firm size	11.397	11.553	13.729	13.540	0.186	**0.000**	**0.000**	**0.000**	**0.000**	0.229
Collateral	0.516	0.590	0.543	0.499	**0.000**	0.191	0.364	**0.006**	**0.000**	**0.023**
Taxation	0.273	0.280	0.280	0.309	0.745	0.799	0.141	0.995	0.120	0.184
Non-debt tax shields	0.012	0.039	0.047	0.047	**0.015**	**0.018**	**0.003**	0.144	**0.059**	0.963
Volatility	0.056	0.035	0.026	0.021	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.024**
Tobin's Q	1.760	1.381	1.616	1.343	**0.000**	0.204	**0.000**	**0.003**	0.512	**0.000**
Free cash flow	-0.007	0.021	0.025	0.024	**0.011**	**0.027**	**0.007**	0.358	0.357	0.772
Asset maturity	13.865	5.691	3.725	3.620	0.261	0.299	0.187	**0.077**	**0.022**	0.784
Abnormal future earnings	0.011	0.011	0.029	0.000	0.990	0.485	0.559	0.511	0.600	**0.024**
Profitability	0.054	0.084	0.088	0.091	**0.010**	**0.024**	**0.002**	0.535	0.784	0.628
Convertible debt dummy	0.092	0.130	0.160	0.260	**0.079**	**0.025**	**0.000**	0.476	**0.000**	**0.007**
Public debt dummy	0.031	0.026	0.240	0.250	0.683	**0.000**	**0.000**	**0.000**	**0.000**	0.832

Table 5: The effects of differing bank involvement on the simultaneity in capital structure choices

Simultaneous equations model, where the endogenous variables are leverage, debt maturity, and bank debt. The model is estimated using two stage least squares with Newey-West HAC standard errors and covariances. A constant and fourteen industry dummies are included, though not reported. D_NOB equals to one if firm neither has bank equity nor banker on the board, zero otherwise. D_ BEQ equals to one if firm has bank equity, but no banker on the board, zero otherwise. D_ BOB equals to one if firm has no bank equity, only banker(s) on the board, zero otherwise. D_ BOBEQ equals to one if firm has both bank equity and banker(s) on the board, zero otherwise. Variables are defined in Table 1 and Table 2. The total number of observations is 1205. The symbol '***' denotes that the estimated coefficient is significant at the 1% level; '**' at the 5% level; '*' at the 10% level.

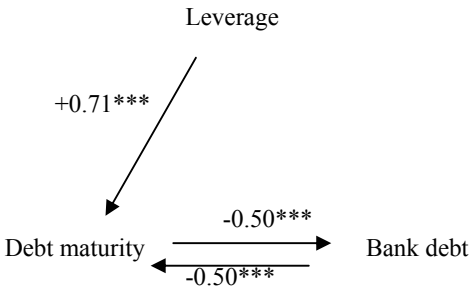
	Leverage	**Debt maturity**	**Bank debt**
	Coefficient (t-value)	**Coefficient (t-value)**	**Coefficient (t-value)**
Panel A: Endogenous variables			
Leverage * d_NOB	-	0.709*** (3.498)	0.007 (0.021)
Leverage * d_BEQ	-	0.570*** (3.724)	0.185 (0.861)
Leverage * d_BOB	-	0.386** (2.154)	-0.351 (-1.144)
Leverage * d_BOBEQ	-	0.141 (0.884)	0.114 (0.384)
Debt maturity * d_ NOB	-0.093 (-1.004)	-	-0.499*** (-3.443)
Debt maturity * d_ BEQ	0.135 (1.368)	-	-0.365** (-2.088)
Debt maturity * d_ BOB	-0.016 (-0.171)	-	-0.245 (-1.025)
Debt maturity * d_ BOBEQ	-0.040 (-0.395)	-	-0.541** (-2.183)
Bank debt * d_ NOB	-0.0004 (-0.005)	-0.500*** (-5.005)	-
Bank debt * d_ BEQ	-0.107 (-1.394)	-0.566*** (-6.048)	-
Bank debt * d_ BOB	-0.184*** (-3.011)	-0.219** (-2.250)	-
Bank debt * d_ BOBEQ	-0.158** (-2.244)	-0.390*** (-4.580)	-

Table 5: The effects of differing bank involvement on the simultaneity in capital structure choices (continued)

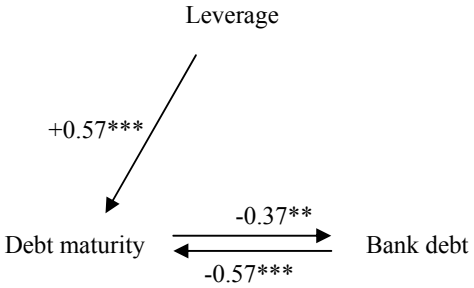
	Leverage	Debt maturity	Bank debt
	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
Panel B: Control variables			
Firm size	0.011** (2.128)	0.036 (0.482)	-0.017* (-1.831)
Tobin's Q	0.002 (0.227)	-0.004 (-0.306)	0.004 (0.284)
*Tobin's Q * d_ BEQ*	0.015 (0.705)	0.026 (1.238)	-
*Tobin's Q * d_ BOB*	0.020 (1.327)	-0.038* (-1.761)	-
*Tobin's Q * d_ BOBEQ*	0.110*** (4.155)	0.052 (1.250)	-
Asset volatility	0.066 (0.490)	0.008 (0.035)	-0.041 (-0.117)
*Asset volatility * d_ BEQ*	-	-	0.553 (0.864)
*Asset volatility * d_ BOB*	-	-	-2.636** (-2.455)
*Asset volatility * d_ BOBEQ*	-	-	0.022 (0.014)
Collateral	0.281*** (5.231)	-	0.367** (2.400)
*Collateral * d_ BEQ*	-	-	-0.149 (-0.860)
*Collateral * d_ BOB*	-	-	-0.349 (-1.322)
*Collateral * d_ BOBEQ*	-	-	-0.190 (-1.001)
Taxation	-0.033 (-1.563)	-0.017 (-0.540)	-
Non-debt tax shields	-0.994** (-2.340)	-	-
*Non-debt tax shields * d_ BEQ*	-2.583*** (-3.231)	-	-
*Non-debt tax shields * d_ BOB*	-1.748 (-1.602)	-	-
*Non-debt tax shields * d_ BOBEQ*	-1.971*** (-2.591)	-	-
Free cash flows	0.890** (2.058)	-	-
*Free cash flows * d_ BEQ*	2.380** (2.504)	-	-
*Free cash flows * d_ BOB*	1.271 (1.080)	-	-
*Free cash flows * d_ BOBEQ*	0.160 (0.220)	-	-
Term premium	-	-0.008 (-1.211)	-
Asset maturity	-	0.0003*** (6.193)	-
*Asset maturity * d_ BEQ*	-	0.003 (1.291)	-
*Asset maturity * d_ BOB*	-	0.005 (0.659)	-
*Asset maturity * d_ BOBEQ*	-	0.007*** (2.837)	-
Abnormal future earnings	-	-0.008 (-0.194)	-
Firm size squared	-	-0.001 (-0.463)	-
Profitability	-	-	-0.052 (-0.562)
No public debt market access	-	-	0.249*** (5.761)
(High TQ)* no public debt	-	-	-0.043 (-1.216)
Banker on the board dummy	-	-	0.070 (0.531)
(High TQ)* banker dummy	-	-	0.069* (1.707)
Bank shareholding	-	-	0.0007 (0.517)
(High TQ)* bank shareholding	-	-	-0.0003 (-0.209)

Figure 2: The estimated relationships between leverage, debt maturity and bank debt in the four groups depending on the extent of the bank involvement

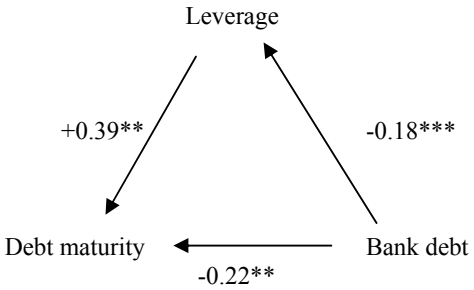
No bank equity, no banker on the board



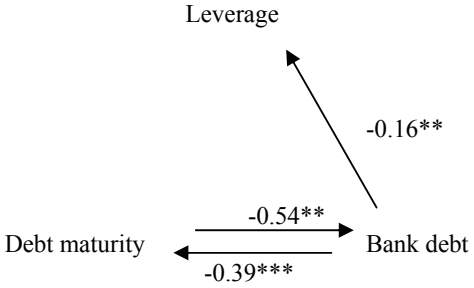
Bank equity, but no banker on the board



No bank equity, but banker on the board



Both bank equity and banker on the board



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