# BANK INFORMATION MONOPOLIES: EVIDENCE FROM TUNISIA

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## Abstract

The purpose of this paper is to examine the problem of bank information monopoly using detailed information on the debt structure of 47 Tunisian non-financial firms over the 1998-2003 period. We find that bank debt is negatively related to agency costs of moral hazard and adverse selection. We argue that there is a potential hold-up problem leading firms that are exposed to information asymmetry to limit bank financing in order to avoid rent extraction from banks. Further, our results suggest that this hold-up problem can be resolved either by issuing public debt or by bank equity participation.

**Keywords:** Asymmetric information; Debt structure; Financial intermediation; Agency costs; Hold-up problem

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## 1. Introduction

Since the beginning of the eighties, an important literature has examined the determinants of the choice between private and public (arm's length) debt.[1] Although private debt involves higher financing costs than public debt (Blackwell and Kidwell, 1988), the theory of financial intermediation recognizes that financial intermediaries, and particularly banks, are able to produce information and to ensure a better monitoring of firms (Diamond, 1984; Boyd and Prescott, 1986).

The theory of financial intermediation focuses also on the influence of banks when they have long-term relationship with their customers. In fact, a repeated relationship between bank and borrower is like an implicit agreement by which the bank can better control the borrower and penalize it if its reports are bad (Haubrich, 1989). However, in the absence of competition between banks, such relationships can have disadvantages. Indeed, the "inside bank" (that already has a lending relationship with the firm) is generally more informed than the other banks and can be incited to benefit from its privileged information in order to expropriate the borrower. For example, the informed bank may charge high interest rates or require more guarantees from the borrowing firm. This problem of information monopoly, called the hold-up problem, is analysed by Sharpe (1990) and Rajan (1992).

Several empirical studies try to identify the determinants of the choice between bank debt and public debt or other non-bank private debt (see, among others, Johnson, 1997; Krishnaswami, Spindt and Subramaniam, 1999; Nékhili, 1999; Antoniou, Guney and Paudyal, 2004; Denis and Mihov, 2003). However, these studies did not investigate the problem of bank information monopoly.

Houston and James (1996) are the first to examine the hold-up problem by investigating the determinants of the reliance on bank debt in the U.S. The authors confirm empirically the results of Sharpe (1990) and Rajan (1992). They show that a single bank lender may obtain an information monopoly that adversely affects investment incentives and that this problem can be mitigated by the diversification of financing sources (i.e. having multiple banking relationships or borrowing from public markets).

In Tunisia, despite reforms and measurements taken by authorities to encourage new financial instruments and organisms (such as investment funds and venture capital), firms remain reluctant to have new partners. Indeed, most of firms in Tunisia are family-held with CEOs often being the principal shareholder. These CEOs generally avoid any equity participation by outside investors and prefer banking debt because it allows them to maintain their power and control over their firms.

Tunisian firms rely rarely on public debt and this for two reasons: First, according to the regulation, a minimum paid-up capital of one million dinar is required to allow firms to issue bonds. However, given that most of Tunisian companies are small and medium sized firms they are usually unable to meet this requirement. Second, to issue public debt, firms must disclose information to the public. But certain

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[1] Researchers often oppose public debt to private debt. The first one refers to the debt issued in the bond market and the second one is debt granted by banks and other financial institutions.

companies are reluctant to do so because of the concern that such practice may benefit their competitors, and thus prefer resorting to their bank. Moreover, when issuing public debt, the financial market council allows companies to offer a guarantee provided by a bank. Firms offering this guarantee are more likely to be allowed to issue public debt. However, in certain cases, banks refuse to grant these guarantees in order to oblige firms to choose bank debt rather than public debt. All these factors imply that banks are the main partner and the most informed stakeholder of Tunisian companies. Hence, banks may acquire a bargaining power and privileged information allowing them to extract profits from firms. Thus, the hold-up problem is likely to be important in Tunisia.

In the present paper, we try to examine if Tunisian banks use their private information to mitigate information asymmetry or to expropriate borrowers. We analyse the importance of bank information monopolies in determining a firm's reliance on bank debt, and we suggest solutions to this problem.

Besides the two solutions suggested by Houston and James (1996), we investigate whether bank shareholding mitigates information monopolies. Mahrt-Smith (2006) proposes bank equity participation as a solution to the hold-up problem. He shows that the negative effect of bank profit extraction can be significantly reduced when the bank holds a mix of debt and equity as opposed to pure debt. Mahrt-Smith argues that his conclusions best apply to economies where public financial markets are not well developed and information about firms is opaque. Given that such characteristics best describe the Tunisian context, examining bank shareholding as a solution to the hold-up problem in the Tunisian context presents an opportunity to empirical test Mahrt-Smith's (2006) proposition[2]. To the best of our knowledge, the present paper is the first to empirically investigate Mahrt-Smith's (2006) proposition. To do so we have collected detailed information on the debt structure for 47 non-financial firms involved in public debt issuance over the 1998-2003 period. Twenty of these firms are listed in the stock exchange of Tunis, BVMT. Data is collected from prospectus, activity reports, documents and financial statements provided by the financial market council and by the stock exchange of Tunis.

We find a negative and statistically significant relation between the reliance on bank debt and the importance of agency costs (moral hazard and adverse selection). This result is inconsistent with the hypothesis that firms with larger information asymmetries rely more on bank financing. It is, however, consistent with the hypothesis of

information monopoly. Indeed, firms which undergo more agency and information asymmetry problems, limit their financing by banks to avoid any possibility of rent extraction from the informed bank.

The three solutions suggested by the financial literature have been tested. We find that multiple banking relationships are not a solution to the hold-up problem. In fact, firms with multiple banking relationships adopt the same behaviour of indebtedness than those with a single banking relationship. The relation between agency costs and bank debt remains negative and the information monopoly problem persists. One interpretation of this result is that, even if they are numerous, inside banks collude against outside ones in order to extract rents. Hence, their bargaining power is not mitigated by the increase of banking relationships.

In contrast, we find that public debt provides a mechanism to reduce hold-up problems. Indeed, firms issuing public debt rely more on bank debt when they have greater information asymmetries. As pointed out by Diamond (1993) using public or "arm's length" debt may reduce bank information monopolies. Thus, Tunisian companies should not be reluctant to information disclosure in the public debt market and authorities must instigate the bond market and allow small and medium sized firms to issue public debt.

In the same way, for firms having some banks as shareholders, we find a positive relation between banking debt and agency costs of moral hazard. Therefore, bank shareholding serves also to mitigate the hold-up problem. This is consistent with the argument of Mahrt-Smith (2006) suggesting that bank equity participation significantly changes the bargaining power of the bank and reduces the propensity of the bank to extract extra profits.

The remainder of this paper is organized as follows. Section 2 presents a literature review and our testable hypotheses. Section 3 describes data, variables and the model. Section 4 provides regression results. Section 5 proposes possible solutions to bank information monopoly while Section 6 concludes the paper.

## 2. Literature review and research hypotheses

Theoretical developments dealing with the role of banks in corporate governance focus on information production and control functions of financial intermediaries. Diamond (1984) was the first to offer a coherent explanation to the monitoring role of banks in case of moral hazard. He focuses on the importance of the delegation of monitoring to a single lender and shows that the bank is well placed to be this lender. Indeed, banks are able to specialize in control, to diversify their borrowers and so, they can minimize their risk. Consequently, the problem of "monitoring

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[2] While U.S. banks are prohibited from holding equity in their client firms (under normal circumstance), Tunisian banks are allowed to own up to 30% of their client firms' equity.

costs duplication", "free riding"[3] and "monitoring the monitor" could be potentially eliminated.

Boyd and Prescott (1986) consider that an information asymmetry occurs prior to contracting and investing resulting in an adverse selection problem. They show that financial intermediaries, presented in the form of coalitions of agents, can produce information, ex-ante, about potential investments.

Overall, the literature suggests that public debt has higher agency costs relative to private debt (duplication of monitoring costs, free rider problems, information asymmetry, etc.). But it should be noted that other type of costs are higher when borrowing from private lenders (financing costs, agency costs of delegated monitoring, etc.).

Thus, the choice of debt depends on potential information asymmetries between lenders and borrowers and on agency costs of debt. When agency costs of moral hazard and adverse selection are high, bank financing would be preferred since its advantages overshadow its potential costs. However, if problems of moral hazard and adverse selection are not very severe, the firm may choose to borrow in public debt markets since the later imposes lower costs of financing and delegated monitoring.

Then, a first hypothesis can be proposed:

> **Hypothesis 1**: *Firms that are more exposed to problems of moral hazard and adverse selection prefer borrowing from banks.*

Financial intermediation theory also suggests that repeated and long term relationships between banks and borrowers increase contracting flexibility and improve control through implicit contracts enforced by concerns about reputation and future rents. Through these contracts, banks are able to produce information and to control their borrowers more easily than direct monitoring (Haubrich, 1989). But such a long-term interaction involves some drawbacks. Indeed, in certain cases the inside bank, being more informed about its borrower's credit quality than "outside banks" (banks that do not have a relationship with the firm), can be incited to benefit from its privileged information and to hold-up the borrower. Sharpe (1990) examines this problem of information monopoly especially at the re-financing stage. He shows that when the firm needs further credits, outside investors may be reluctant to extend financing or may offer higher rates since they face a "winner's curse". Thus, the inside bank can charge higher rates, allowing it to earn informational rents on good firms. The monopoly and bargaining power of this bank may distort borrowers' incentives and lead to inefficient investment by the firm. In the same way, Rajan (1992) analyses competition between an inside and an outside bank and finds that when information

asymmetry is high, the inside bank can extract more rents and have a greater bargaining power.

Several empirical studies provide direct evidence on the benefits and the drawbacks of lending relationships between banks and their customers in different contexts. But the results of these studies are inconclusive. Petersen and Rajan (1994, 1995) show that small U.S. firms with close and long-term relationships with banks benefit from increased credit availability. In addition, Berger and Udell (1995) find that companies with longer relationships with their banks pay lower interest rates and are less likely to pledge collateral.

Other researchers find contrary results. For instance, Angelini, de Salvo and Ferri (1998) find that small Italian companies with longer and stronger relationships endure higher interest rates. Degryse and Van Cayseele (2000) come to the same conclusion for small Belgium firms. Moreover, Ginés and Pedro (2006) show that, in Spain, firms with a single banking relationship or that maintain longer-term relationships with their banks are more likely to be required to provide loan guarantees. A similar result is reported by Machauer and Weber (1998), Lehmann and Neuberger (2001) and Lehmann, Neuberger and Räthke (2004) for German small and medium sized firms. More recently, Ogawa, Sterken and Tokutsu (2007) show that Japanese firms with fewer bank relations are more likely to pledge personal guarantees to their main bank and pay higher interest rates.

The above findings suggest that the hold-up problem is more pronounced in bank-based financial systems. In this paper, we propose to analyse bank information monopolies in Tunisia, an emerging country with a bank-based financial system where information asymmetry between lenders and borrowers is particularly important[4].

The theory of financial intermediation proposes certain solutions to this exploitative behaviour of banks. The first solution consists in the diversification of financing by the recourse to the public debt (Diamond, 1993). In fact, the competition between public and private debt limits the monopoly of the bank and mitigates rent extraction. A study undertaken by Santos and Winton (2008) shows that, during the economic recessions, banks impose high interest rates on firms which have less access to the

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[3] The free riding problem consists in the fact that several lenders benefit from the control effort exerted by some other lenders to take the lending decision.

[4] Banks in Tunisia play a paramount role in firms' financing. They hold around 90% of financial sector assets. According to Tunisian central bank the debt provided by financial institutions in 2006 accounts for 87.75% of the interior debt whereas that on the capital markets accounts only for 12.25%. Moreover, it is important to note that 91.84% of financing on the bond markets serves to finance government bonds and only 8.16% serves to finance companies. Consequently, firms financing on the bond markets represents only 1% of the interior debt.

bond market. This study confirms that public debt attenuates the hold-up problem.

The diversification of financing sources is also possible through multiplication of the number of banking relationships which constitutes the second solution to the hold-up problem. Von Thadden (1994) suggest that one way to limit ex post rent extraction from the inside bank consists in establishing a second relationship. Detragiache, Garella and Guiso (2000) present a theoretical model in which multiple banking relationships can reduce the likelihood of early liquidation of firms. These authors point out that in some cases adverse selection is so severe that the firm is unable to refinance its projects from outside investors. Under these circumstances, establishing multiple banking relationships increases the probability that at least one inside bank refinance the projects. Jean-Baptiste (2005) argues that multiple relationships potentially induce competition among informed insiders and limit informational rents that accrue to any single bank. Several empirical studies confirm these theoretical predictions and show that firms should opt for multiple bank relationships in order to reduce the hold-up effect (see, among others, Foglia, Laviola and Reedtz, 1998; Farinha and Santos, 2002; Howorth, Peel and Wilson, 2003; Yasuda, 2007; Ogawa et al., 2007; Neuberger and Räthke, 2007).[5]

The third solution to the problem of information monopoly is bank equity participation. Mahrt-Smith (2006) shows that if the inside bank is a creditor and also a shareholder each debt provided by an outside bank is senior to the inside bank equity claim and then it is less risky and less sensitive to the information. Even a small minority equity stake significantly changes the bargaining power of the bank and reduces the propensity of the bank to extract extra profits. Besides, Berlin, John and Saunders (1996) point out that bank's shareholding mitigates the collusion between the bank and the firm on behalf of the other stakeholders.

This literature review leads us to suggest a second research hypothesis:

> **Hypothesis 2**: *Hold-up problems are less severe when firms can borrow from capital markets, have multiple banking relationships, and/or have lenders who are also shareholders.*

## 3. Data and variables

### 3.1. Sample description

Our sample consists of 47 non–financial firms involved in public debt issuance over the 1998-2003 period. Twenty of these firms are listed in the stock exchange of Tunis, BVMT. All firms of our sample are large and are active in many industries (manufacturing, chemical, food processing,

construction and service). On average, total assets are about 68.6 million dinar and the mean age is about 27 years. Data is hand collected from the following sources:

- Prospectus, activity reports and documents available in the financial market council.
- Financial statements provided by the financial market council and by the stock exchange of Tunis.

We consider an unbalanced panel sample comprising 254 observations instead of 282 since some variables were not available for the whole period. Moreover, after calculation of model variables, we eliminate some values considered as being aberrant to lead to a better quality of the estimations.

Debt structure of firms in our sample is composed by bank debt, public debt, trade credits and other private debt. From descriptive statistics we observe that bank debt is the most important source of debt financing. On average, it represents 47% of the total debt. Trade credits also play an important role in the financing of the companies of our sample. The mean and median proportions of trade credits are 26.1% and 18%, respectively.

The reliance on public debt is not very frequent for the firms of our sample (the mean is 7.1% of total debt). Moreover, for more than 75% of observations (firms-years), the ratio of public debt to total debt is equal to zero. For observations with public debt outstanding (representing 24% of total observations), the proportion of public debt to total debt is about 30% on average. For these observations, the mean proportion of banking debt to the total debt outstanding is about 41%, that of trade credit to total debt is about 19% and the leverage (defined as the ratio of total debt to total assets) is 66% (the mean value of this ratio for the entire sample is 55%). We conclude that firms with public debt outstanding are the most leveraged. This result can be explained when referring to the pecking order theory developed by Myers (1984) and Myers and Majluf (1984). These authors show that under asymmetric information, firms undertaking new investment opportunities prefer issuing internal over external financing. If external financing is required, firms issue the safest security first. That is, they start with debt then possibly hybrid securities such as convertible bonds and as a last resort, they issue equity. When classifying debt according to risk level, short-term debt financing through banks or trade credits should rank before long-term debt financing through banks and bank loans should rank before public debt. Thus, Tunisian firms rely on bank debt and trade credits before issuing public debt.

Furthermore, we note that the majority of the companies have multiple banking relationships (less than 13% of firms have a single banking relationship) and the average number of bank relationships is 4.5. This number varies according to the firm size. Indeed, we have divided our sample into two sub-samples

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[5] See also Boot (2000) for a survey.

(companies whose total assets are lower than the median and those whose total assets are higher than the median) and we carried out group mean comparison tests. The results show that the average number of bank relationships is about 3.77 for small firms and 5.24 for large firms and that the difference is significant at the 1% level. We can conclude that banking relationships increase when financing needs are higher.

Moreover, banks are shareholders in 40% of the firms and the average shareholding of all banks in one firm is 14.6%. This bank shareholding is about 5.2% for small firms and 24% for large firms (the difference is significant at the 1% level). Thus, managers of small companies are reluctant to bank equity participation to avoid any pressure from new shareholders. Although banks are allowed to hold until 30% of non-financial firms' equities, we note that in 60% of companies banks are not shareholders. This can be explained either by the fact that companies are reluctant to accept new shareholders or by the fact that banks avoid taking additional risks in order to benefit from their information monopoly.

## 3.2. Variables definition

### 3.2.1. The dependent variable
The dependant variable is the ratio of bank debt to total debt: $BD = \dfrac{\text{Bank debt}}{\text{Total debt}}$.

### 3.2.2. Explanatory variables
#### *Variables measuring agency costs due to moral hazard*
The two major agency problems of moral hazard are asset substitution (Jensen and Meckling, 1976) and underinvestment (Myers, 1977). The asset substitution problem implies a wealth transfer from creditors to shareholders when these shareholders use debt to undertake projects that are riskier than those fixed by the initial contact. The problem of underinvestment results from the fact that shareholders may be incited to forego some positive net present value projects from whom only creditors profit. Myers (1977) shows that shareholders can refuse projects allowing solely the repayment of debt without generating a surplus for them.

These agency costs of debt are higher for firms with more investment opportunities or growth options because the conflicts and information asymmetries between shareholders and bondholders are, in this case, more important. Indeed, shareholders of high growth firms can more easily substitute riskier projects for less risky ones and are also more susceptible to foregoing profitable projects (Krishnaswami et al., 1999). In situation of information asymmetry, bank debt is preferred to public debt since it implies a better revelation of information and mitigates problems of underinvestment and asset substitution (Berlin and

Loyes, 1988; Yosha, 1995). Mackie-Mason (1990) shows that firms with intensive research and development avoid public debt to limit information asymmetries between managers and outside investors.

Based on previous studies, we expect to see a positive relation between growth opportunities and bank debt. The empirical study of Houston and James (1996) suggests a rather negative relation between growth opportunities and banking debt. The authors argue that their result is consistent with the argument that firms with greater growth opportunities (i.e. which undergo more asymmetric information) are more likely to limit their use of bank financing due to potential hold-up problems.

To measure growth opportunities, Houston and James (1996) use the market-to-book ratio (The ratio of the market value of firm's assets to its book value).[6] Unfortunately, this ratio cannot be used in our study since 27 firms of the sample are not listed on the stock exchange and, hence, do not have a market price. Barclay and Smith (1995) and Krishnaswami et al. (1999) use another proxy for growth options. It is the depreciation ratio which is calculated as follows:

$$DEP = \frac{\text{Depreciation expenses}}{\text{Market value of shares} + \text{Book value of debt}}$$

These authors suggest that firms with higher depreciation ratios have relatively more tangible assets and relatively fewer growth options in their investment opportunity sets. Therefore, the relation expected between the depreciation ratio and the proportion of banking debt is opposed to that expected between the market-to-book ratio and the bank debt ratio. Since it is not possible to compute the market value of shares for the entire sample, we consider the book value. Consequently, the variable that will be considered is:

$$DEP = \frac{\text{Depreciation expenses}}{\text{Total assets}}$$

Besides these measures of growth opportunities, some researchers, such as Denis and Mihov (2003) consider also employee growth and sales growth. We retain sales growth as it leads to satisfying results.

$$SG = \frac{\text{Sales (t)} - \text{Sales (t-1)}}{\text{Sales (t-1)}}$$

#### *Variables measuring agency costs due to adverse selection*
Two variables proxy for adverse selection:

#### - Earnings volatility
Forecasting earnings is particularly difficult when their volatility is high. Demsetz and Lehn (1985)

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[6] This ratio is also used by Barclay and Smith (1995), Johnson (1997), Krishnaswami et al. (1999), Antoniou et al. (2004) and Denis and Mihov (2003) among others.

argue that it is more difficult for outsiders to value firms operating in uncertain environments. Mackie-Mason (1990) shows that, when earnings are volatile, managers are likely to have advantageous hidden information. In this case, bank debt is preferred to public debt since banks are able to reveal information and require a lower premium. Thus, a positive relation between earnings volatility and banking debt is expected. Earnings volatility is measured by the variable *VOL*:

$$VOL = \frac{\text{Earnings (t)} - \text{Earnings (t-1)}}{\text{Earnings (t-1)}} - \text{the average of earnings growth of the whole period.}$$

**- Dividend ratio**

It is generally recognized that dividend policy reveals information about the firm's quality. Consequently, non-dividend paying firms endure more problems of hidden information. These firms are then more likely to issue bank debt and to avoid issuing public debt (Antoniou et al., 2004). Thus, we anticipate a negative relation between bank debt and the dividend ratio.

This one is defined by: $DIV = \dfrac{\text{Dividends}}{\text{Net earnings}}$.

## *Control variables*
**- Firm quality**

According to the reputation theory proposed by Diamond (1991), high quality firms have generally a good reputation and are able to issue more public debt than low quality firms. The latter prefer, however, the banking debt. Moreover, Blackwell and Kidwell (1988) show that high quality firms rely less heavily on bank borrowing. Consequently, bank debt ratio should be negatively related to the firm quality measured by the interest coverage ratio:

$$ICR = \frac{\text{Earnings before interests, taxes and depreciation (EBITD)}}{\text{Interest expenses}}$$

**- Leverage**

Firms with a higher leverage are more likely to exhibit financial distress and risk. These firms prefer bank debt to public debt in order to avoid inefficient liquidations (Chemmanur and Fulghieri, 1994; Cantillo, 1998; Bolton and Freixas, 2000). Furthermore, Gorton and Haubrich (1987) and Fama (1985) show that financing by banks generates a public good that reduces the costs of public debt and encourages suppliers to lend to the firm. Therefore, firms borrowing heavily from banks may have high leverage due to the complementary effect of bank debt on the other types of dispersed debt. Thus, we expect to find a positive relation between bank debt ratio and leverage measured by the variable**:**

$$LEV = \frac{\text{Total debt}}{\text{Total assets}} \text{.}$$

**- Size**

Krishnaswami et al. (1999) suggest that larger firms are more likely to issue public debt. In fact, Blackwell and Kidwell (1988) and Carey et al. (1993) show that flotation costs (legal fees, transaction costs, accountants' fees and trustees' fees) are higher in

public issues than in private placements and that public issues are associated with greater economies of scale. Therefore, small firms will find the public debt markets to be cost ineffective and will choose private financing options. In addition, Diamond (1991) predicts that larger firms tend to have better reputation leading them to support less costs when issuing public debt. Moreover, small firms rely more on the bank financing because they have higher risk of financial distress and of information asymmetries (Fama, 1985). Thus, a negative relation is anticipated between the ratio of bank debt and the firm size:

$SIZE$ = Natural logarithm of sales .

**- Guarantees**

Since bank debt is generally secured while public debt are rarely secured, firms with potential collateral are more likely to issue bank debt (Antoniou et al., 2004). Consequently, the relation between guarantees and bank debt is expected to be positive. The majority of empirical analyses use the ratio of fixed assets as a proxy for asset collateral value. Following Nékhili (1997), this ratio is calculated as follows:

$$GARAN = \frac{\text{Net tangible illiquid assets}}{\text{Total assets}}$$

**- Managerial ownership**

Denis and Mihov (2003) show that managers with higher equity ownership stakes are more likely to issue bank debt. Because of their concentrated holdings and their access to information, banks have the ability to exert much greater influence and pressure on management than public creditors. As a result, managers with low equity ownership stakes seek to avoid this pressure by issuing public debt. However, those with high equity ownership stakes are more likely to choose bank debt and this for two reasons: First, their ownership stake gives them the incentive to choose the security that maximizes value. Second, they have an important control power that insulates them from pressures of creditors (Denis and Mihov, 2003). Then, we expect a positive relation between managerial ownership and bank debt.

Managerial ownership is measured by the ownership stake of all directors. In fact, we assume that debt structure decision is undertaken by the board of directors and not by the executive director alone.

$MANAG$ = Ownership stake of directors

### 3.3. Model specification

Our model is specified for firm *i* (*i =1,…, N*) at time *t* (*t=1,…,T*) as follows:

$$BD_{it} = \alpha_0 + \alpha_1 DEP_{it} + \alpha_2 VOL_{it} + \alpha_3 DIV_{it} + \alpha_4 ICR_{it} + \alpha_5 LEV_{it} + \alpha_6 SIZE_{it} + \alpha_7 GARAN_{it} + \alpha_8 MANAG_{it} + \varepsilon_{it}$$
(1)

This model is also estimated by replacing *DEP* by *SG* (Sales growth).

$$BD_{it} = \alpha_0 + \alpha_1 SG_{it} + \alpha_2 VOL_{it} + \alpha_3 DIV_{it} + \alpha_4 ICR_{it} + \alpha_5 LEV_{it} + \alpha_6 SIZE_{it} + \alpha_7 GARAN_{it} + \alpha_8 MANAG_{it} + \varepsilon_{it}$$
(2)

Multicollinearity tests show that correlations between explanatory variables are relatively weak (they are all lower than 0.5), hence our results are not likely to suffer from multicollinearity problem.

To deal with panel data, we must take into account behaviours heterogeneity between firms. The first test of homogeneity (Fisher test) confirms the existence of individual specific effects. The best linear unbiased estimator in the fixed effects models is the "Within" estimator. Based on the second test of homogeneity (variance analysis test), we conclude that there is random effects. The most adapted estimator in case of random effects is the Quasi-Generalized Least Squares (QGLS) estimator. But this estimator is effective only when explanatory variables are exogenous. If these variables are endogenous, QGLS estimator becomes biased and the "Within" estimator remains unbiased and convergent. The application of Haussman test rejects the QGLS estimator. Consequently, we will retain regression results of fixed effects models using the "Within" estimator.

## 4. Regression results

In this section, we test the first research hypothesis suggesting that firms undergoing more agency costs of moral hazard and adverse selection rely more on bank financing. Table 1 presents the results of the regression relating bank debt to agency costs of moral hazard and adverse selection.

### 4.1. Results concerning agency costs of moral hazard

Growth opportunities seem to have a negative influence on bank debt. Indeed, the variable *DEP* has a positive and significant coefficient at the 1% level. Moreover, in the second model, the variable *SG* has a negative and significant coefficient at the level of 10%. We conclude that firms with greater agency costs of moral hazard (concretized by the importance of growth opportunities) are more likely to limit their use of bank financing. This result is consistent with the hypothesis of information monopoly: Firms which undergo more problems of information asymmetry limit their bank borrowing in order to avoid any possibility of rent extraction from the informed banks. Another explanation can be advanced when analysing from the supply side: Tunisian banks do not accept to take risky positions and choose to lend to companies having more tangible assets.

### 4.2. Results concerning agency costs of adverse selection

The relationship between the proportion of bank debt and earnings volatility is negative in the first model and positive in the second one. But this relationship is not significant in the two cases. Consequently,

referring to this variable, we can not conclude on the adverse selection hypothesis.

The dividend ratio (*DIV*) records a positive and significant coefficient. This result indicates that companies undergoing more problems of hidden information are less likely to use banking debt. This behaviour can be explained by the presence of a hold-up problem: Firms incurring agency costs due to adverse selection seek other means of financing to avoid rent extraction from banks.

### 4.3. Results relating to control variables
**- Firm quality**
The interest coverage ratio (*ICR*) is negatively related to bank debt in the two models (it is significant at the level of 5% in the first model and at the 10% level in the second model). This result is consistent with the reputation hypothesis of Diamond (1991). Indeed, high quality firms issue less bank debt since they have better reputation allowing them to issue cost-effective public debt or to rely more on trade credits.

**- Financial leverage**
The relation between financial leverage and banking debt is positive and significant at the level of 1% (for the two models). This finding corroborates the liquidation and renegotiation hypothesis suggested by Chemmanur and Fulghieri (1994): Firms undergoing more credit risk and financial distress prefer bank financing to avoid inefficient liquidations. Moreover, this result corroborates the analysis of Gorton and Haubrich (1987) and Fama (1985) suggesting that bank financing generates a public good which encourages the other creditors to lend to the company. This effect of complementary leads to an increase in the financial leverage.

**- Firm size**
The coefficient associated to the variable *SIZE* is negative and significant at the 1% (for the two models). This result confirms the hypothesis of reputation suggested by Diamond (1991) and the predictions of Krishnaswami et al. (1999) and Fama (1985). Indeed, small firms are generally riskier, less reputed and less likely to issue public debt.

**- Guarantees**
There is a positive and statistically significant relationship (at the 1% level) between the variable *GARAN* and the proportion of bank debt. This is consistent with the argument that firms offering important guarantees choose the banking debt.

**- Managerial ownership**
The parameter related to variable *MANAG* is positive (as predicted) but not statistically significant. It seems that the influence of directors' ownership on the choice of debt structure is not very important. We argue that banks do not exert a great pressure on the managers of Tunisian companies.

**Table 1.** Regression results relating bank debt to agency costs of moral hazard and adverse selection

The regression is based on a panel sample of 47 non-financial Tunisian firms for the 1998-2003 period. The dependant variable is the ratio of bank debt to total debt. DEP is the ratio of depreciation expenses to total assets. SG denotes sales growth. VOL equals earnings growth minus the average of earnings growth of the whole period. DIV is the ratio of dividends to Net earnings. ICR denotes the interest coverage ratio. LEV is the ratio of book value of total debt to book value of total assets. SIZE is the natural logarithm of sales. GARAN equals net tangible illiquid assets divided by total assets. MANAG is the ownership stake of directors. Regressions are carried out on fixed effect models using the "Within" estimator. p-values are in parentheses.

| | Model (1) | Model (2) |
|---|---|---|
| Number | 170 | 169 |
| Intercept | 1.44 (0.04)** | 1.794 (0.004)*** |
| DEP | 1.738 (0.002)*** | |
| SG | | -0.079 (0.089)* |
| VOL | -0.005 (0.373) | 0.002 (0.720) |
| DIV | 0.108 (0.088)* | 0.124 (0.057)* |
| ICR | -0.003 (0.032)** | -0.002 (0.070)* |
| LEV | 0.414 (0.003)*** | 0.37 (0.010)*** |
| SIZE | -0.096 (0.000)*** | -0.117 (0.001)*** |
| GARAN | 0.562 (0.001)*** | 0.627 (0.001)*** |
| MANAG | 0.069 (0.780) | 0.21 (0.4) |
| $R^2$ | 0.34 | 0.33 |

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

## 5. The solutions of bank information monopoly problem

Our results reveal that bank debt does not mitigate neither agency problems of moral hazard, nor those of adverse selection. These results are consistent with those of Houston and James (1996). Indeed, these two authors report a negative relation between investment opportunities and bank debt and explain their result by the presence of a hold-up problem. However, this relation changes and becomes positive when firms have multiple banking relationships or when they borrow in public debt markets. The authors conclude that this problem is attenuated by the diversification of financing sources.

The present paper examines the two solutions suggested by Houston and James, as well as the one proposed by Mahrt-Smith (2006) consisting of bank shareholding. To the best of our knowledge, this role of bank shareholding in mitigating hold-up problems has never been examined empirically.

In order to test the three solutions of the hold-up problem, we construct 3 dummy variables:

- Multiple: equals to 1 if the firm has loans outstanding from more than one bank, and zero otherwise.
- Public: equals to 1 if the firm has public debt outstanding, and zero otherwise.
- Share: equals to 1 if the firm has a bank equity holding, and zero otherwise.

Then, interactive variables are constructed by the multiplication of these dummy variables by those measuring agency costs of moral hazard: *DEP* and *SG*. These interactive variables will be introduced in the initial models as explanatory variables. If multiple banking relationships, public debt outstanding or bank shareholding serve to mitigate hold-up problems, we expect that coefficients associated to interactive variables carry signs opposed to those obtained in the initial models.

For all models tested, the first homogeneity test (Fisher) confirms the existence of individual specific effects. The Hausmann test rejects the QGLS estimator. Consequently, all regressions will be carried out on fixed effect models using the "Within" estimator.

## 5.1. The role of multiple banking relationships in the resolution of hold-up problems

Multicollinearity tests between the explanatory variables reveal that the variables *DEP* and *Multiple\*DEP* are strongly correlated. Therefore, we eliminate the variable *DEP* in the first model and retain only the variable *Multiple\*DEP*.

The same problem arises in the second model. The variables *SG* and *Multiple\*SG* are strongly correlated. Consequently, the variable *SG* is eliminated and only *Multiple\*SG* is considered. Thus, we estimate the two following models:

$$BD_{it} = \alpha_0 + \alpha_1 Multiple \cdot DEP_{it} + \alpha_2 VOL_{it} + \alpha_3 DIV_{it} + \alpha_4 ICR_{it} + \alpha_5 LEV_{it} + \alpha_6 SIZE_{it} + \alpha_7 GARAN_{it} + \alpha_8 MANAG_{it} + \varepsilon_{it}$$

(3)

$$BD_{it} = \alpha_0 + \alpha_1 Multiple \cdot SG_{it} + \alpha_2 VOL_{it} + \alpha_3 DIV_{it} + \alpha_4 ICR_{it} + \alpha_5 LEV_{it} + \alpha_6 SIZE_{it} + \alpha_7 GARAN_{it} + \alpha_8 MANAG_{it} + \varepsilon_{it}$$

(4)

The results of Table 2 are similar to those obtained for the two first models. The relation between the reliance on bank debt and the variable *Multiple\*DEP* is positive and statistically significant at the 1% level. Variable *Multiple\*SG* is negatively related to bank debt (at the 10% level). Hence, firms with multiple banking relationships adopt the same behaviour than those with a single banking relationship. The relation between growth opportunities and bank borrowing remains negative and the information monopoly problem persists.

Therefore, our finding is not consistent with that of Houston and James (1996) since the increase of banking relationships does not mitigate potential hold-up problems. One interpretation of these results is that inside banks, even if they are numerous, are more informed than outside ones and are able to extract extra profits on behalf of the borrower and the other creditors. Generally speaking, the task of monitoring and information production is conferred to the senior and majority bank. Firms, fearing this information monopoly of banks, seek other financing sources.

**Table 2.** Regression results of the impact of multiple banking relationships on the hold-up problem

The regression is based on a panel sample of 47 non-financial Tunisian firms for the 1998-2003 period. The dependant variable is the ratio of bank debt to total debt. DEP is the ratio of depreciation expenses to total assets. SG denotes sales growth. Multiple is a dummy variable that equals one if the firm has multiple banking relationships. VOL equals earnings growth minus the average of earnings growth of the whole period. DIV is the ratio of dividends to Net earnings. ICR denotes the interest coverage ratio. LEV is the ratio of book value of total debt to book value of total assets. SIZE is the natural logarithm of sales. GARAN equals net tangible illiquid assets divided by total assets. MANAG is the ownership stake of directors. Regressions are carried out on fixed effect models using the "Within" estimator. p-values are in parentheses.

| | Model (3) | Model (4) |
|---|---|---|
| Number | 170 | 169 |
| Intercept | 1.25 (0.07)* | 1.62 (0.05)** |
| Multiple*DEP | 2.21 (0.000)*** | |
| Multiple*SG | | -0.072 (0.087)* |
| VOL | -0.006 (0.309) | 0.002 (0.726) |
| DIV | 0.102 (0.101) | 0.123 (0.06)* |
| ICR | -0.004 (0.007)*** | -0.003 (0.063)* |
| LEV | 0.366 (0.006)*** | 0.37 (0.009)*** |
| SIZE | -0.082 (0.000)*** | -0.106 (0.001)*** |
| GARAN | 0.583 (0.001)*** | 0.622 (0.001)*** |
| MANAG | 0.042 (0.863) | 0.209 (0.402) |
| $R^2$ | 0.36 | 0.34 |

\* Significant at the 10% level
\*\* Significant at the 5% level
 \*\*\* Significant at the 1% level

This finding is corroborated by the results of table 3 which provides group mean comparison tests of firms' characteristics and debt structure according to the number of bank relationships. This table shows that firms with a single banking relationship are smaller, older, less levered and of higher quality. In addition, they pay more dividend and offer less guaranties. Hence, they have a better reputation and do not have an important financing need. Although they are able to increase bank relationships, these

companies choose to rely on a single bank. They diversify financing sources by relying more on trade credits rather than public debt. In fact, these companies do not resort to the bond market in order to avoid information disclosure and since they have a good reputation and a high quality, they can easily obtain trade credits. Thus, our results suggest that in Tunisia, there is collusion between banks so that the increase of banking relationships does not mitigate banks' bargaining power.

**Table 3.** Group mean comparison tests of characteristics and debt structure for firms sorted by whether they have multiple banking relationships

The sample includes 254 observations (47 non-financial Tunisian firms for the 1998-2003 period). LEV is the ratio of book value of total debt to book value of total assets. ICR denotes the interest coverage ratio. DEP is the ratio of depreciation expenses to total assets. SG denotes sales growth. DIV is the ratio of dividends to Net earnings. GARAN equals net tangible illiquid assets divided by total assets. MANAG is the ownership stake of directors.

|  | *Firms with a single bank relationship* | *Firms with multiple banking relationships* |
|---|---|---|
| Total assets (in million dinars) | 19.8 | 75.7* |
| Total assets (in million US$) | 17 | 64.83* |
| Age (years since incorporated) | 36.75 | 25.58*** |
| LEV | 0.33 | 0.58*** |
| Bank debt/Total debt | 0.235 | 0.505*** |
| Public debt/Total debt | 0 | 0.08*** |
| Trade credits/Total debt | 0.36 | 0.24*** |
| ICR | 12.99 | 7.31** |
| DEP | 0.052 | 0.059 |
| SG | -0.044 | 0.077 |
| DIV | 0.49 | 0.31*** |
| GARAN | 0.26 | 0.46*** |
| MANAG | 0.54 | 0.74*** |
| Number | 32 | 222 |

\* Significantly different from the single bank group at the 10% level
\*\* Significantly different from the single bank group at the 5% level
\*\*\* Significantly different from the single bank group at the 1% level

## 5.2. The impact of issuing public debt on the resolution of hold-up problems

Our summary statistics suggest that there is no problem of multicolinearity. Consequently, we do not eliminate any variable, and use the following model specifications:

$$BD_{it} = \alpha_0 + \alpha_1 DEP_{it} + \alpha_2 Public * DEP_{it} + \alpha_3 VOL_{it} + \alpha_4 DIV_{it} + \alpha_5 ICR_{it} + \alpha_6 LEV_{it} + \alpha_7 SIZE_{it} + \alpha_8 GARAN_{it} + \alpha_9 MANAG_{it} + \varepsilon_{it}$$
(5)

$$BD_{it} = \alpha_0 + \alpha_1 SG_{it} + \alpha_2 Public * SG_{it} + \alpha_3 VOL_{it} + \alpha_4 DIV_{it} + \alpha_5 ICR_{it} + \alpha_6 LEV_{it} + \alpha_7 SIZE_{it} + \alpha_8 GARAN_{it} + \alpha_9 MANAG_{it} + \varepsilon_{it}$$
(6)

When we multiply variables *DEP* and *SG* by the dummy variable Public, the relation between bank borrowing and growth opportunities changes. The coefficient of the variable *Public*DEP* is negative and significant at a level of 1% and the coefficient of *Public*SG* is positive but not significant.

Thus, for firms issuing public debt, growth opportunities are positively related to bank debt. In these firms, banks use their private information to reduce agency costs of moral hazard since their information monopoly is attenuated. Consequently, as in the study of Houston and James (1996), public debt provides a mechanism to reduce hold-up problems.

This finding shows that Tunisian companies should not be reluctant to information disclosure in the public debt market. Even if this information disclosure benefits competitors, it serves to reduce bank bargaining power. Moreover, Tunisian authorities must instigate the bond market and allow small and medium sized firms to issue public debt.

## 5.3. The role of bank shareholding in the resolution of hold-up problems

The introduction of interactive variables related to bank shareholding does not create any problem of multicolinearity. Then, we estimate the following two models:

$$BD_{it} = \alpha_0 + \alpha_1 DEP_{it} + \alpha_2 Share * DEP_{it} + \alpha_3 VOL_{it} + \alpha_4 DIV_{it} + \alpha_5 ICR_{it} + \alpha_6 LEV_{it} + \alpha_7 SIZE_{it} + \alpha_8 GARAN_{it} + \alpha_9 MANAG_{it} + \varepsilon_{it}$$
(7)

$$BD_{it} = \alpha_0 + \alpha_1 SG_{it} + \alpha_2 Share * SG_{it} + \alpha_3 VOL_{it} + \alpha_4 DIV_{it} + \alpha_5 ICR_{it} + \alpha_6 LEV_{it} + \alpha_7 SIZE_{it} + \alpha_8 GARAN_{it} + \alpha_9 MANAG_{it} + \varepsilon_{it}$$
(8)

It seems that bank shareholding serves to mitigate the hold-up problem. Indeed, when banks have a stake in the firm's equity, the signs of coefficients associated to variables *DEP* and *SG* change: The variable *Share*DEP* presents a negative and significant coefficient and the variable *Share*SG* records a positive but not significant coefficient.

**Table 4.** Regression results of the impact of issuing public debt on the hold-up problem

The regression is based on a panel sample of 47 non-financial Tunisian firms for the 1998-2003 period. The dependant variable is the ratio of bank debt to total debt. DEP is the ratio of depreciation expenses to total assets. SG denotes sales growth. Public is a dummy variable that equals one if the firm has public debt outstanding. VOL equals earnings growth minus the average of earnings growth of the whole period. DIV is the ratio of dividends to Net earnings. ICR denotes the interest coverage ratio. LEV is the ratio of book value of total debt to book value of total assets. SIZE is the natural logarithm of sales. GARAN equals net tangible illiquid assets divided by total assets. MANAG is the ownership stake of directors. Regressions are carried out on fixed effect models using the "Within" estimator. p-values are in parentheses.

| | Model (5) | Model (6) |
|---|---|---|
| Number | 170 | 169 |
| Intercept | 0.588 (0.198) | 1.708 (0.005)*** |
| DEP | 1.624 (0.001)*** | |
| Public*DEP | -2.991 (0.000)*** | |
| SG | | -0.058 (0.064)* |
| Public*SG | | 0.042 (0.150) |
| VOL | -0.001 (0.792) | 0.001 (0.815) |
| DIV | 0.113 (0.044)** | 0.125 (0.055)* |
| ICR | -0.003 (0.005)*** | -0.002 (0.076)* |
| LEV | 0.350 (0.004)*** | 0.376 (0.008)*** |
| SIZE | -0.036 (0.135) | -0.112 (0.001)*** |
| GARAN | 0.582 (0.000)*** | 0.621 (0.001)*** |
| MANAG | 0.011 (0.957) | 0.216 (0.388) |
| $R^2$ | 0.42 | 0.34 |

* Significant at the 10% level
** Significant at the 5% level
*** Significant at the 1% level

We can conclude that, if banks are at the same time shareholders and creditors, the conflicts of interests between shareholders and creditors decrease and the problems of information monopoly are attenuated. Companies, exhibiting more agency problems of moral hazard, rely more on bank debt. According to Mahrt-Smith (2006), bank information monopoly is reduced when the bank holds a mix of debt and equity as opposed to pure debt. The author notes that his results apply to firms where outside investors are not well informed about firm quality (i.e. in economies where financial markets are not well developed and information asymmetries are important). Thus, Tunisian firms should seek to increase bank equity holdings in order to mitigate banks' bargaining power and consequently to resolve the hold-up problem.

## 6. Conclusion

The theoretical literature suggests that bank financing serves to mitigate problems of information asymmetry and consequently reduces agency costs of moral hazard and adverse selection. However, some researchers show that information monopoly of banks enables them to extract rents against the interests of the borrowers and the other uninformed creditors, a practice labelled the hold-up problem. Financial intermediation theory proposes three solutions to this hold-up problem: Issuing public debt, multiplying banking relationships and bank shareholding.

To examine these issues, we have collected detailed information on the determinants of bank debt for a panel sample of 47 non financial Tunisian firms over the 1998-2003 period.

**Table 5.** Regression results of the impact of bank shareholding on the hold-up problem

The regression is based on a panel sample of 47 non-financial Tunisian firms for the 1998-2003 period. The dependant variable is the ratio of bank debt to total debt. DEP is the ratio of depreciation expenses to total assets. SG denotes sales growth. Share is a dummy variable that equals one if the firm has a bank equity holding. VOL equals earnings growth minus the average of earnings growth of the whole period. DIV is the ratio of dividends to Net earnings. ICR denotes the interest coverage ratio. LEV is the ratio of book value of total debt to book value of total assets. SIZE is the natural logarithm of sales. GARAN equals net tangible illiquid assets divided by total assets. MANAG is the ownership stake of directors. Regressions are carried out on fixed effect models using the "Within" estimator. p-values are in parentheses.

| | Modèle (7) | Modèle (8) |
|---|---|---|
| Number | 170 | 169 |
| Intercept | 1.498 (0.02)** | 1.807 (0.004)*** |
| DEP | 2.628 (0.000)*** | |
| Share*DEP | -1.860 (0.063)* | |
| SG | | -0.110 (0.044)** |
| Share*SG | | 0.094 (0.270) |
| VOL | -0.005 (0.379) | 0.002 (0.702) |
| DIV | 0.114 (0.069)* | 0.124 (0.056)* |
| ICR | -0.003 (0.020)** | -0.002 (0.078)* |
| LEV | 0.408 (0.003)*** | 0.376 (0.008)*** |
| SIZE | -0.096 (0.000)*** | -0.118 (0.001)*** |
| GARAN | 0.577 (0.001)*** | 0.633 (0.001)*** |
| MANAG | -0.001 (0.995) | 0.212 (0.395) |
| $R^2$ | 0.31 | 0.33 |

* Significant at the 10% level
** Significant at the 5% level
*** Significant at the 1% level

Our empirical study highlights two principal results: First, the reliance on bank borrowing does not attenuate the problems of moral hazard and adverse selection. This finding predicts that banks use their private information not to resolve information asymmetry problems but to expropriate borrowers and that there is a hold-up problem. Indeed, companies that undergo more problems of information asymmetry are likely to avoid bank borrowing because they fear rent extraction from inside banks. Second, to mitigate this information monopoly problem, firms have to seek solutions to reduce information monopoly of banks. Two solutions are effective in Tunisia: financing through public debt market and bank equity participation.

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