EconomiX

http://economix.u-paris10.fr/

Document de Travail

Working Paper

2009-14

Why do firms borrow on a short-term basis? Evidence from European countries

Valérie Oheix et Dorothée Rivaud-Danset

UMR 7166 CNRS

Université Université de Paris Ouest Nanterre La Défense
(bâtiments K et G)
200, Avenue de la République
92001 NANTERRE CEDEX

Tél et Fax : 33.(0)1.40.97.59.07
Email : secretariat-economix@u-paris10.fr

Université Paris X Nanterre

Why do firms borrow on a short-term basis?
Evidence from European countries[*]

Valérie OHEIX† and Dorothée RIVAUD-DANSET‡

March 2009

[*] The authors are grateful to Pierre Blanchard, Jean-Bernard Chatelain, Claude Mathieu, Patrick Sevestre and to participants at the 24th Symposium on Money, Banking and Finance 2007 and at the seminars of EconomiX and the ERUDITE for useful comments and suggestions.

† EconomiX, Université Paris Ouest – Nanterre La Défense and CNRS, Bâtiment G, 200 avenue de la République, 92001 Nanterre Cedex, France (e-mail: valerie.oheix@u-paris10.fr).

‡ ERUDITE, Université Paris XII, Val de Marne, France (e-mail: rivaud-danset@univ-paris12.fr).

Abstract

This paper investigates empirically the use of short-term bank loans by firms. We face two analytical frameworks. According to the corporate finance theory, short-term and long-term debts are substitutes, while in the credit channel literature they are distinct and complementary vehicles. We estimate a model that explains the level of short-term bank debt, using panel data from the BACH database for six European countries (1989-2003). Our results indicate that the two types of bank loans are complements. They show that short-term bank debt should be analysed as a specific vehicle that finances current assets, as in the credit channel literature.

Résumé

Ce papier examine empiriquement l'utilisation de crédits bancaires à court terme par les entreprises. Nous confrontons deux cadres analytiques. Selon la théorie de la finance d'entreprise, les dettes à court terme et à long terme sont des substituts, tandis que dans la littérature sur le canal du crédit elles sont des instruments distincts et complémentaires. Nous estimons un modèle qui explique le niveau de dette bancaire à court terme, en utilisant des données de panel de la base de données BACH pour six pays européens (1989-2003). Nos résultats indiquent que les deux types de prêts bancaires sont des compléments. Ils montrent que la dette bancaire de court terme devrait être analysée comme un instrument spécifique de financement des actifs courants, comme dans la littérature sur le canal du crédit.

JEL Classification: G32, E51.

Keywords: corporate short-term debt, debt maturity structure, credit channel

I. Introduction

Firms' debt maturity is an issue in two different strands of the literature that largely ignore each other. On the one hand, the corporate finance literature has typically viewed the debt maturity issue from the perspective of firms that choose the optimal debt ratio. Short-term and long-term debts are analysed as substitutes driven by investment policy. Due to costs of agency or informational problems, firms and investors may prefer shorter maturity (Myers (1977), Flannery (1986), Diamond (1991)).

On the other hand, the literature on the transmission channels of monetary policy has come to deal with the debt maturity issue in order to assess the existence of a credit channel. When monetary policy is involved, it is the financing of current business which matters because of its role in downturns, and short-term debt is associated with the financing of current business. Due to credit and financial market imperfections, liquidity flows to large enterprises at the early stages of downturns and, in the case of small firms, the amount of short-term debt is reduced during tight money periods (Gertler and Gilchrist, 1994). Following the bank lending channel and the flight to quality hypothesis, banks do not prefer short-term loans.

We aim to confront these two distinct analytical frameworks: the corporate finance and the monetary policy channels. The theory on corporate debt maturity structure focuses on the financing of investment; short-term and long-term debts are substitutes, short-term debt being a vehicle used to finance any kind of assets, and debt maturity is a matter of optimal choice. In the literature on the credit channel, the subject of short-term finance is the (mis)matching of cash inflows and outflows during operating activities; short- and long-term debts are distinct vehicles that may be complementary, and this view does not put forward an optimal maturity for new debt issues.

We estimate a model that explains the short-term debt rate, defined as the rate of short-term bank loans to total assets, using panel data from the BACH database of corporate accounts for six Continental European countries in the period 1989-2003. Our results indicate that the two sources of bank debt are complements rather than substitutes. Our findings allow us to conclude that corporate short-term bank debt should be better analysed as a specific vehicle that finances current assets and can be influenced by banks' own constraints, in line with the literature on monetary transmission mechanisms, than as a vehicle used to finance any kind of assets, in line with the corporate finance literature.

The organisation of the paper is as follows. Section 2 recalls that the corporate debt maturity literature considers that short- and long-term debts are substitutes. The literature on the credit channel of monetary transmission raises doubts on the hypothesis of substitution. Section 3 sets out the model which investigates the ratio of short-term debt by firms in order to determine if it is better analysed by the corporate finance view or by the credit channel view. Section 4 presents the data set. Section 5 deals with estimation methods and displays the estimated results. Section 6 concludes.

II. What do we learn from the literature on the demand and supply of short-term debt?

What do we learn from the literature on debt maturity issue in corporate finance?

The theoretical literature on the maturity of corporate debt issues deals with the optimal investment policy. Some firms prefer borrowing on a short-term basis as a way of reducing agency conflicts and/or asymmetry of information effects.

The scope of this research is largely inspired by Myers's (1977) question: why do firms borrow short-term to finance long-term projects? His answer is based on the agency cost hypothesis, also called the contracting-cost hypothesis. Managers acting on behalf of equityholders may fail to exercise profitable investment options. They will not realise projects with positive net value when debt captures an excessive portion of equityholders' benefit[1]. The conflict between debtholders who capture the benefit and managers may have negative consequences for firms with a large set of growth opportunities. Myers considers that shortening the debt maturity structure or, to be more accurate, "a policy of rolling over short maturity debt claims" gives flexibility and, therefore, is one way of preventing firms with more growth opportunities from adopting suboptimal investment policies[2]. Firms with more growth opportunities and, as a consequence, more potential agency conflicts should prefer shorter maturity in order to become less dependent on monitors.

[1]Outstanding debt may change the firm's investment decision only when the debt matures after the firm's investment option expires. From the shareholders' viewpoint, the option is worth exercising only if the value of the newly acquired asset in a revealed state of nature (Vs) exceeds the sum of the required outlay (I) and the promised payment to the firm's creditors (P) (Myers, 1977, p. 153). If $V(s) - I < P$, although $V(s) - I > 0$, the option is not exercised.

[2]"*Borrowing short does not, in itself, reduce monitoring cost. What it does offer is the setting for continuous renegotiation, in which the firm can in principle shift at any time back to all-equity financing or to another source of debt capital. This seems to be a good solution, but there are costs of maintaining such a continuous, intimate and flexible relationship*" (Myers, 1977, p. 159).

Informational asymmetry causes firms that are less likely than other firms to have problems rolling over their debt to borrow on short-term basis. In Flannery's model (1986), firms with favourable private information about future prospects balance between the advantages of sending a signal of quality, if they choose a short maturity, and the expected costs in rolling over short-term debt, due to transaction costs and higher interest rates if they are downgraded. In Diamond's model (1991), firms with a sufficiently good credit rating balance between the advantages of being refinanced at lower cost when good news arrive and the risk that sound projects may not be refinanced, both being associated with the use of short-term debt. Flannery's model predicts a positive correlation between debt maturity and underlying asset risk. In Diamond's model debt maturity is a nonmonotonic function of the risk rating because low rated firms have no choice but to borrow on a short-term basis so that issuing longer term debt is preferred only by firms with a medium rating. Shortening maturities increases the sensitivity of the financing cost to new information. This type of "bridge financing" allows investors to refinance at higher (lower) cost in times of bad (good) news and, even, to refuse to refinance.

To sum up, in the corporate finance literature, greater information asymmetries and/or agency conflicts are associated with shorter maturity by both parties. Firms with more growth opportunities and/or lower risk than other firms should prefer shorter maturity.

Are banks' and bondholders' preferences similar?

In the theoretical models and most of the empirical literature, the firm borrows from the market and not from the bank, although the implications of the models are supposed to be the same in both contexts. However, why should banks' and bondholders' behaviours be similar? Among the empirical research on corporate debt maturity, one study allows a discussion of the generally accepted assumption that bondholders and banks preferences are similar. Berger *et al.* (2005) test the implications of the theoretical models of Flannery (1986) and Diamond (1991)[3] . The data cover more than 6,000 individual loans to small businesses granted in 1997 by a sample of U.S. banks, and the measure of risk is based on bank credit scoring. Their results are consistent with the predictions of both Flannery's and Diamond's models for low-risk firms. *Ceteris paribus*, these firms tend to have significantly shorter maturities than other firms. For high-risk firms, the evidence conflicts with Flannery's and Diamond's models and

[3] Berger et al. performed two different tests. Test 1 examines whether the effect of risk rating on maturity is predicted by Flannery's versus Diamond's model and test 2 examines the effects of reduced asymmetric information on debt maturity

many of the prior empirical studies[4]. These firms do not have significantly different maturities than intermediate-risk firms.

Their conclusions shed light on the banks versus market preferences for shortening maturity when information asymmetries increase[5]. Informational asymmetries which favour shorter maturity are smaller for banks than for bondholders and the reactions of banks and markets to risky debt are not similar. Confronted with a risky firm, the bank would prefer rationing the amount of debt to reducing the debt maturity[6]. Banks may be better able than public markets to use tools other than short-term maturities for solving agency and informational asymmetries problems for high-risk firms. Bank monitoring of high-risk firms is associated with long-term loans. Short-term debt contracts are not sophisticated, the typical short-term debt contract does not include covenants which would limit those managers' actions harmful to lenders.

The predictions of theoretical models are not easily verifiable

The theoretical literature deals with the fact that firms with long-term projects often decide to borrow on shorter term basis. Long term is debt floated at date 0 that matures at date 2, with no refinancing at date 1. Short term is debt financed at date 0 that matures at date 1. Hence, in some empirical studies, short-term debt can be rather long (less than 20 years for one of the first empirical researches, Mitchell, 1991). Even if Barclay and Smith (1995) use a slightly more refined measure of debt maturity - less than 3 years -, short-term debt is not defined as current debt, i.e. repayable within one year (Appendix A).

Models deal with the maturity of new debt issues at the time of origination, not the remaining time on the stock of contracts (Berger *et al*., 2005) so the use of maturity structure creates potential problems. Predictions of some models are not easily verifiable for supplementary reasons. For instance, under conditions of asymmetric information, empirical studies of maturity must measure a mixture of two effects – the effect of information asymmetries interacts with risk rating – and in Flannery's model, the risk rating is based in part on the revelation of private information by firm maturity choice. Because risk rating is public, most empirical studies favour public debt. Hence, they mostly consider large firms

[4]See for instance, Barclay and Smith (1995), Stohs and Mauer (1996), Scherr and Hulburt (2001), Ortiz-Molina and Penas (2006).

[5]Bondholders may have public information on the risk of failure that determines the investment-grade rating and the rate of interest, banks have private information on the risk of failure that may determine the firm credit scoring and the supply conditions (price and quantity), while firms have private information on future prospects that does not influence directly the actual risk rating.

[6]This is not a case of pure credit rationing, as lenders classify borrowers into groups of distinct quality (Jaffee and Stiglitz, 1990).

although it is crucial that the data include small and private firms, in order to test for the effects of risk rating and informational asymmetries (Berger et al., 2005).

We are aware of the potential problems of empirical studies in this field. We use a balance sheet approach - the average maturity of outstanding debt – and do not use an incremental approach – the maturity of new debt. But we do not want to test the predictions of any particular theoretical model. We consider that these models share one common hypothesis and one prediction that can be tested with a balance sheet approach. They are the twofold:

i) short- and long-term debts are substitutes, short-term debt being analysed as a subset of long-term debt issued for the financing of long-term investment and growth opportunities[7].

ii) the choice of maturity can reduce costs and create value. Several costs can be reduced: the financing cost at the time of debt origination, the expected refinancing cost and implicit costs (opportunity, monitoring…).

These two features shape what will be called in this paper the framework of short-term debt analysis in corporate finance. It is the capacity of this framework to explain the observed structure of the balance sheet which is at stake in our research.

What do we learn from the credit channel literature?

The credit channel literature displays another analytical framework in which banks' behaviour matters and the short-term debt is analysed as the mode of financing short-term assets. According to the bank lending channel, changes in monetary policy affect, via the supply of bank loans, especially bank-dependent borrowers who face informational problems (Bernanke and Blinder, 1988). In tight money periods, while bank behaviour is pro-cyclical, the corporate demand of short-term credit is not. Due to an increase in interest rate and its negative effect on interest-sensitive demand, inventories should be larger and require additional cash. Findings from U.S. data show that this reaction is only observed for large firms (Gertler and Gilchrist, 1993 and 1994). In the case of large firms, the demand for short-term bank loans and commercial paper increases in the early stages of downturns to cover the increase in current assets, while this is not the case for small firms. The latter do not demand additional short-term debt because the amount and timing of the cash flow gap are more uncertain, and they face higher informational frictions than their larger counterparts. Using a

[7]Long and Malitz's (1985) consider that firms make short-term borrowing decisions independent of long-term investment requirements. Their findings do not corroborate the predictions of Myers' model as agency problems are not resolved by shortening the debt maturity.

variant of a costly-state verification model, Gertler and Gilchrist (1993)[8] demonstrate that "*it is optimal to impose a kind of credit ceiling which fixes the ratio of debt to output*". Following a tight money shock, in the wake of declining cash flows, small firms contract their debt demand and inventories, in order to keep the ratio of debt to output in line. In Gertler and Gilchrist's model, managers choose an optimal rate; short-term debt is independent of long-term debt as short-term bank loans finance current business and is not an advantageous vehicle in downturns, as it may increase the default risk.

Our empirical research does not attempt to assess the impact of a tighter monetary policy on the firms' debt policy. However, a brief presentation of some empirical works on that topic highlights the contribution of this theory to the debt maturity issue. Empirical work on the existence of a bank lending channel is plagued by an identification problem: does a change in bank loans result from a shift in loan demand or a shift in loan supply? In an attempt to limit this identification problem, empirical studies test for a likely substitution effect among sources of short-term debt[9]. Kashyap *et al.* (1993) find that tighter monetary policy leads to a shift in firms' mix of external financing: firms issue more commercial paper while bank loans fall. Oliner and Rudebusch (1996) interpret these results differently and show that there is no substitution effect from bank to non-bank credit (commercial paper and trade credit) in periods of tight money but evidence of a flight to quality phenomenon for all types of credit from small to large firms testifying for the broad credit channel. The broad credit channel, or balance sheet channel, (Bernanke and Gertler, 1995) posits that the external finance premium of all forms of debt increases after a monetary contraction. This flight to quality phenomenon leads to a shift of credit flows towards the less risky borrowers, i.e. those with high net worth. Consequently, it mainly affects small firms. Morgan (1998) shows that commercial bank loans without a commitment slow after a tight money period, while loans under commitment accelerate or remain unchanged. Nilsen (2002) finds that during monetary contractions large firms without a bond rating, which account for a large part of overall large firms, and small firms increase their use of trade credit, although it is an unattractive alternative to bank loans. This switch identifies the cause of the loan reduction as a supply phenomenon, supporting the bank lending channel view. Following Nilsen, the "kind of credit ceiling" faced at times of

[8]Gertler and Gilchrist (1993) provide a theoretical background to their empirical results (Gerther and Gilchrist, 1993 and 1994). The data drawn from the *Quarterly Financial Report for Manufacturing Corporations* (QFR) are not firm-level. In a latter work, Bernanke, Gertler and Gilchrist (1996) use newly available firm level QFR data. Overall, their results confirm earlier findings that there are substantial cross-sectional differences between borrowers potentially subject to agency costs and those less subject to agency costs (p. 13). Using bank-dependency as a criterion for these costs, they find that the behaviour of bank-dependent firms' inventories and short-term debt is strongly procyclical.

[9]Appendix A displays a list of the substitutes of short-term bank loans.

tight monetary policy is no longer a target chosen by small firms but rather a constraint imposed by banks. It is the contraction of banks' loan supply that induces a decline in small and sometimes large firms' bank debt.

Although, all the studies on the credit channel do not converge, they tend to corroborate the core of the credit channel: during tight money periods, either borrowers' or investors' preferences lead to additional short-term credit being allocated to some "happy few", i.e. large firms with a bond rating or loan commitments; as a consequence, short-term credit is counter-cyclical for these firms, while it is pro-cyclical for the bulk of other firms[10].

The two strands of the literature surveyed in this section allow to distinguish two analytical frameworks: i) according to the corporate finance view, the corporate debt maturity is a matter of choice, short- and long-term debts being analysed as substitutes which finance investment projects, ii) according to the credit channel view, short- and long-term debts are distinct vehicles which may be complementary and influenced by banks' own characteristics. Putting together these two strands of the literature brings two issues up. Firstly, the question is raised of a possible substitution or complementary effect between the two sources of debt. Secondly, is short-term debt devoted or not to finance current assets? Additional issues are raised by the credit channel theory: have banks' own characteristics an effect on the observed rate of short-term debt during a long period?

III. The Model

In order to test which of these two frameworks is most appropriate to explain the variation of short-term bank debt, we estimate the following econometric model:

$$
\begin{aligned}
ST\_BANK\_DEBT_{i,j,k,t} = {} & \alpha + \beta_1\, LT\_BANK\_DEBT_{i,j,k,t} + \beta_2\, CURRENT\_ASSETS_{i,j,k,t} \\
& + \beta_3\, SPREAD_{i,t} + \beta_4\, FC\_TO\_CF_{i,j,k,t} + \beta_5\, INTERM\_MARGIN_{i,t} + \beta_6\, BANK\_SOLV_{i,t} \\
& + \sum_{i=1}^{5} \gamma_i\, DUM\_COUNT_i + \sum_{j=1}^{2} \delta_j\, DUM\_SIZ_j + \sum_{k=1}^{5} \lambda_k\, DUM\_SECT_k \\
& + \sum_{t=2}^{T} \mu_t\, DUM\_YEAR_t + \varepsilon_{i,j,k,t}
\end{aligned}
$$

[10]Recently, Bougheas et al. (2006) find that firms' characteristics - size and risk - and prevailing monetary conditions are important determinants of access to short-term credit. Kashyap et al. (1993), Oliner and Rudebusch (1996), Morgan (1998) and Nilsen (2002) use U.S. data, while Bougheas et al. (2006) use U.K. data.

The dependent variable and the explanatory variables from the BACH database (Appendix B) are disaggregated by country (*i*), industry (*k*), firm size (*j*) and year (*t*). The other variables are drawn from Eurostat and OECD's financial accounts databases (Appendix C).

In this model, the rate of short-term bank debt as a percentage of total assets (*ST_BANK_DEBT*) is explained by the six following factors (see the list of variables in Appendix C). The two first variables – the rate of long-term bank debt and of current assets – are critical to deal with the question raised by the two conflicting analytical frameworks. The other explanatory variables are proxies of factors which are expected to have an impact either in one analytical framework or in the other.

The long-term debt rate

As explained in the previous section, following Myers (1977), Flannery (1985) and Diamond (1991), the debt maturity is determined by managers in order to minimize the agency problems or to minimize costs in the presence of asymmetric information. Short-term debt being analysed as a substitute for long-term debt, the long-term debt rate is likely to be endogenous and the expected sign of the parameter negative[11]. According to the credit channel theory, the long-term debt is not a substitute and may be complementary to short-term debt, hence the long-term debt rate is expected to have a positive impact[12]. The variable *LT_BANK_DEBT* denotes the ratio of long-term bank debt over total assets.

The current assets

In most of the corporate finance models, short-term debt is issued to finance long-term projects, independently of the assets' maturity. Choosing between short- and long-term debts according to the asset-liability maturity matching principle conflicts with the models which introduce informational asymmetries, but not with the models that explore the role of agency problems. Myers (1977) argues that maturity matching can reduce agency conflicts between equityholders and debtholders by ensuring that debt repayments are scheduled in accordance with the decline in the value of assets in place. In the credit channel literature, short-term debt is issued to fund inventory shocks. Although our model is not designed to test the reaction to

[11]The methodological problem raised by introducing an endogenous variable among the explanatory variables is displayed in the next section.

[12]Apart from monetary tightenings, the short- and long-term debts should be analysed as complementary resources, both increasing as the amount of fixed and current assets grow with the output. But our model being expressed in debt-to-total liabilities or total asset ratios, this complementary effect is lessened.

an inventory shock, finding that changes in the rate of current assets affect the short-term debt rate would be congruent with this theory. The selected variable is the level of current assets and the expected sign of the parameter is positive. The variable *CURRENT_ASSETS* denotes the ratio of current assets over total assets.

The interest rate spread

In the models that explore the role of asymmetric information in debt maturity choices, low-risk firms choose shorter maturities to reduce the financing costs. In line with this theory, borrowers' choice should be influenced by the current financing costs. Substitution between sources of finance should be sensitive to changes in relative prices, firms choosing between short- and long-term debts in an effort to time market interest rates, and the preference for borrowing on a short-term basis should rise when short rates are lower as compared to long ones. When debt maturity structure is used to test this relationship, the short-term debt rate should increase along with the spread that measures the term premium. The selected variable is the *SPREAD* - long-term rate minus short-term rate - and the expected sign of the parameter is positive. While this strand of the literature predicts a positive influence of the spread, in the credit channel literature it is controversial. Proponents of the bank lending channel, for example Bernanke and Blinder (1988), assert that firms' debt policy can be explained by banks' lending decisions, independently of the cost of capital. Finding that the spread does not play a role would support this expectation.

The risk of default

In the literature with imperfect information, the choice of corporate debt maturity depends on borrowers' private information about their future credit rating and, in Diamond's model (1991), on the actual credit rating. In this last model, the third risk class – the lower rated firms – has less choice than the two others: those firms borrow through banks and bank loans are of relatively short term. In our database, the rate of debt issued directly to investors is close to zero, and, as a consequence, the rate of short-term debt should increase along with the risk of default. To test this relationship, the selected variable is the ratio of financial charges to cash flow, commonly used in bank credit scoring as a proxy of the default risk, and denoted *FC_TO_CF* [13].

[13]This ratio relates interest paid on financial debts to gross operating profit. In our database, interest paid on financial debts includes interest paid on other financial debt (i.e. public debt and debt with group and associated companies).

In the credit channel literature, because of the flight-to-quality effect, in the early stages of downturns, riskier firms borrowing on a short-term basis would face higher credit constraints than other firms. We can infer from banks' behaviour during monetary contractions that, even in the other stages of the economic cycle, banks do not prefer shorter maturity for riskier firms and, if the default risk increases, firms would face higher costs of financing and/or credit constraints. Hence, the expected sign of the proxy of the default risk is negative.

The intermediation margin and the overall bank risk management

In the 'corporate finance' literature, the rate of corporate short-term debt is analysed as the consequence of borrowers' choices and explained by demand-side variables. In the credit channel literature, the rate of short-term debt clearly depends on banks' behaviour. Hence, two supply-side variables are introduced in our model as control variables to determine the effect of banks' policy.

The first variable tests the likely effect of banks' credit strategy. In most European countries, the banking industry has been shifting away from its traditional activity of loan making toward new activities linked with financial markets. The reliance on interest-based income – called the intermediation margin[14] – decreases, while new activities generate fee-based revenues. During the last decades, as European banks have become relatively less involved in loan activities, firms may have faced higher credit constraints. Such credit constraints would not be due to monetary policy but to banks' strategy. If this hypothesis is validated, then the intermediation margin should contribute to explain the rate of corporate short-term bank debt. A significant and positive value of the parameter would indicate the determinant role of this supply factor in explaining the rate of short-term corporate debt. The variable is denoted *INTERM_MARGIN*.

Banks constraints also affect the credit policy and borrowers' behaviour, in line with the credit channel literature[15]. The implementation of the Basle regulation has imposed a minimum equity requirement on banks. As a second supply-side variable, we introduce the ratio of equity to bank loans that can be considered as an implicit Cooke ratio and a proxy of bank solvability. A higher ratio means that the level of equity is less binding and banks are more ready to increase their loan supply. So we expect a positive relationship. This ratio is denoted *BANK_SOLV*.

[14]This ratio relates the net interest income to the net banking income. This variable has two components: net interest income and non-interest income.

[15]A growing subset of the credit channel literature emphasizes bank capital as a relevant constraint.

Dummy variables

The model also includes dummy variables as they may pick up an influence that is not already captured by our other explanatory variables. We include four types of dummy variables in order to take into account the size, the country, the industry sector and the year.

Summary of empirical predictions

If short-term debt is used in order to solve agency or informational problems, then a negative impact of long-term debt ratio is expected while the spread and the ratio of financial charges to cash flow are supposed to have a positive effect on the demand of short-term bank debt. In accordance with the credit channel theory, short-term debt should increase as the level of current assets increases and the two variables that characterize banks' activity – the intermediation margin ratio and the proxy for bank solvability – should have a positive effect on corporate short-term debt. Table 4 (infra) summarizes these predictions.

IV. Data Presentation

The data

The data used to test our model come from three sources. The source of firm data is the BACH database which provides comparable data on the annual accounts of non-financial companies in European countries, broken down by major activity sector and by size (see Appendix B) [16]. Accounts are harmonized through a common layout based on the Fourth Council Directive of 1978. All the variables are expressed as a percentage of the total balance sheet. Having selected countries for which all observations of our variables were available, our sample includes six countries (Austria, Belgium, France, Germany, Italy and Spain), three sizes and six industries (manufacturing; electricity, gas and water supply; construction; wholesale and retail trade; hotels and restaurants; transport, storage and communication)[17].

[16]The BACH database is the result of a co-operation between the European Commission and the European Committee of Central Balance-sheet data offices. The coverage of the sample firms of the BACH database is assessed by Cobham (2004), it is exhaustive for Belgium. BACH also includes U.S. and Japan data, but their comparability with European data is more limited.

[17]Small Austrian firms are excluded from our sample because of the poor quality of the data.

Our empirical study covers the period 1989 through 2003 [18] and our "firm" database has 1,285 observations.

Most of the firm-level databases that cover several countries are limited to listed firms. Panel data such as Compustat typically restrict attention to publicly listed firms, and therefore under-represent small firms. This is not the case of the BACH database as basic data are collected from official national institutions with a department akin to a central balance-sheet data office in order to provide a reasonably good coverage rate, notably for small firms. The database does not provide individual data but semi-aggregated data. The use of semi-aggregated data instead of individual data has its advantages and disadvantages. It induces a loss of information but an improvement in the data quality. It is more congruent with the use in our model of aggregated data to characterize the credit supply.

Descriptive statistics

Table 1 displays the lower and higher values of the short-term bank debt rate at the beginning and the end of the period.

TABLE 1

Short-term debt rate by firm size

	1989		*2003*	
	lower rate (country)	*higher rate*	*lower rate*	*higher rate*
Small	5.2 (France)	19.2 (Italy)	3.1 (France)	18.1 (Italy)
Medium	8.0 (France)	19.3 (Italy)	4.1 (France)	17.0 (Italy)
Large	3.1 (Germany)	17.4 (Italy)	1.1 (Spain)	9.7 (Italy)

Notes: The table displays the lower and the higher value of the short-term debt rate for manufacturing firms by size in 1989 and 2003, respectively the beginning and the end of the period under review. The country in which these lower and higher values are observed is in brackets. Data are from the BACH database. All values are expressed as a percentage of total assets.

In 2003, the end of the period under review, using the BACH database, for manufacturing firms, the lowest rate of short-term bank debt over total assets was observed for the large Spanish firms (1.1%), while the highest rate was reached by the Italian small firms (18.1%)[19].

[18] In the case of medium-sized Austrian firms and large Belgian firms, the number of years for which data are available is smaller, with respectively 11 and 9 years.

[19] In the BACH database, ratios are computed with semi-aggregated items hence they are ratios of average and not averaged ratios. As a consequence, descriptive statistics have to be calculated by size, industry and country; for this reason, only data from manufacturing firms are reported in Table 1 and Appendices D and E.

Mean values for the overall period, in the case of manufacturing firms, rank from 2.8% for the large German firms to 19.1% for the small Italian firms (Appendix D).

The statistical analysis of our sample is displayed in Appendix D (Tables D1 and D2 display statistics of BACH variables and Table D3 displays statistics on aggregated variables). Descriptive elements are given in the following paragraphs. They are limited to the case of the manufacturing firms.

Small and medium-sized firms(SMEs) rely more than their larger counterparts on short-term debt but, as this hierarchy is also observed with long-term debt (Appendix E), the ratio short-term debt over long-term debt is higher for SMEs than for large ones in only three countries. The level of current assets is high, especially for SMEs. Whatever the size and the country, the standard deviation of this variable is low, while the standard deviation of the variable financial charges to cash flow is high.

The ratio of short-term bank debt has declined during the period under review, but in the case of the Italian SMEs. At the beginning of the period, in all the countries, the spread was negative or close to zero. This relatively infrequent negative sign was the consequence of the monetary policy which aimed at reducing the rate of inflation as a condition for preparing the European Monetary Union (EMU). In the 2000s, the spread has become positive and displays similar values of around 2% in all the countries as they are members of the EMU. In all the sample countries except Germany, the intermediation margin as a percentage of net banking income (NBI) has decreased during the selected period. In France, interest-based revenues which reached 80% of NBI in 1990 are no longer the main source of banking income. In the other countries, the decline is noticeable even if not so dramatic. The ratio that relates the bank capital and reserves to bank loans, and assesses the bank solvability, has increased during the period under review in all the countries but Spain.

V. Estimation methods and results

Methodological issues

We address a classical econometric problem. The estimators of the regression coefficients can have omitted variable bias. Recall that, in the BACH database, observational unit or entity has three dimensions (country, industry, size) and is observed at several years. In our regressions, the introduction of dummy variables allows us to control for omitted variables that are

constant over three of the four dimensions. At this first step, the estimated model is a regression model written in terms of an intercept and four sets of binary variables or dummies[20]. The least-squares dummy variable (LSDV) estimator yields the within or fixed effect estimator for β[21].

We address a second econometric problem. Recall that, in accordance with the corporate finance analytical framework, firms are expected to co-determine their ratios of short- and long-term debts, so the long-term debt rate is likely to be endogenous. In accordance with the credit channel analytical framework, the rate of current assets is expected to be sensitive to a monetary policy change. It follows that these two explanatory variables are expected to correlate with the error term $\varepsilon_{i,j,k,t}$. If so, estimation by Ordinary Least Squares (OLS) is not consistent for the regressors of these variables but this problem can be solved by introducing instrumental variables (IV) that allow for estimating the parameters of the endogenous regressors[22]. In order to be valid, IV must not be correlated with the error term and must be correlated with the endogenous explanatory variable. The instruments in the estimation of our model are lagged variables, which are commonly used as IV as they plausibly satisfy the two conditions of validity.

However, this choice triggers a third econometric problem. We know that the LSDV estimator of β turns out to equal the within or fixed effects estimator. This last estimator measures the association between individual-specific deviations of regressors from their time-averaged values and individual-specific deviations of the dependent variable from its time-averaged value. As a consequence, lagged IV would also correlate with the error term and the IV estimator would not be consistent. The number of years being not large, the model has to be estimated in another way. We control for the possible endogeneity of the regressors and solve this third problem by using a first difference GMM approach.

The equation to be estimated, in matrix notation, takes the general following form:

$$y_{i,j,k,t} - y_{i,j,k,t-1} = (x_{i,j,k,t} - x_{i,j,k,t-1})' \beta + z_t' \gamma + (\varepsilon_{i,j,k,t} - \varepsilon_{i,j,k,t-1}),$$

where *y* denotes the dependent variable, *x* the vector of explanatory variables and *z* the vector of dummy variables.

[20]For a given set of dummies, we must drop one binary variable to avoid the well known *dummy variable trap*, otherwise one of the regressors would be a perfect linear combination of the other regressors. This is the reason why the summation for each set of dummy variables runs up to *n-1*.

[21] This is a special case of the so-called Frisch-Waugh theorem.

[22]As we use an IV method, the parameters are Two Stage Least Squares (2SLS) estimates obtained as follows: in a first step, we regress the endogenous variable on all exogenous variables by OLS; in a second step, we estimate by a Least Squares method the parameters of the regression after replacing the endogenous variable by the estimate from the first step.

Estimation Results

Firstly, regressions are performed on the original dataset, observations having four dimensions (size, industry, country, time). Table 2 reports the relationship between the rate of short-term bank debt and their explanatory variables for firms in the original dataset. Regression is run with all the variables of the model (column 1), then insignificant variables are dropped (columns 2 and 3). Seven lagged variables of one, two or three periods are used as instruments. Their validity can be tested through a Sargan test of overidentification which measures whether the instruments are orthogonal to the error term[23]. The Sargan statistic (0.58) is much lower than the critical value of a χ^2 distribution with 5 degrees of freedom (11.07). To be valid, an instrument also has to be relevant[24]. Two methods are used to check the relevance. Correlation with the endogenous regressors is assessed by an examination of the significance of the excluded instruments in the first-stage regression. We report the p-value of the overall F-statistic from the first-stage regression. The low values indicate that the models of the first-stage regression are always significant.

The 2SLS estimates yield two similar results: the rate of long-term bank debt and the rate of current assets have always a positive and highly significant impact on the rate of short-term bank debt. There is no evidence of a substitution effect between short- and long-term debts. Our results are in line with the credit channel literature which posits that short-term debt increases along with the current assets and that long-term debt may be a complementary resource. The OLS estimates yield quite distinct results. Large differences between OLS and 2SLS estimates can be interpreted as evidence of endogeneity.

Secondly, in order to test the robustness of our results, the original dataset is reconfigured as a classical panel structure, observations only having two dimensions (i,t) (i aggregates three of the four dimensions, i.e. size, industry and country). Using a first-difference approach allows to control firm-specific and time-invariant effects, and the possible endogeneity of the regressors. Table 3 reports the relationship between the rate of short-term bank debt and their explanatory variables for firms in the panel dataset. The same tests are used to know if the instruments are both valid and relevant. The Sargan test for overidentifying restriction has a p-

[23]The Sargan test is a specification test used to assess the validity of instruments included in models estimated by instrumental variables (IV), as the instruments must not correlate with the error term. The model is overidentified with seven instruments and two likely endogenous variables. Degrees of freedom are equal to the number of instruments less the number of endogenous variables.

[24] There is no well established formal test of weak instruments, especially in the case of multiple regressors with more than one endogenous variable (Baum et al., 2003).

value much higher than 0.05. The p-values of the overall F-statistic validate the first-stage regression models.

TABLE 2

First-differences GMM-IV estimator, original dataset with four dimensions (i,j,k,t)

	1		2		3	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
LT_BANK_DEBT	-0.106***	0.394***	-0.104***	0.394***	-0.107***	0.444***
	(0.022)	(0.146)	(0.022)	(0.143)	(0.022)	(0.166)
CURRENT_ASSETS	0.015	0.352***	0.015	0.353***	0.023	0.348***
	(0.018)	(0.099)	(0.018)	(0.098)	(0.017)	(0.087)
SPREAD	0.231***	0.298**	0.243***	0.300**	0.093	0.105
	(0.104)	(0.142)	(0.103)	(0.141)	(0.094)	(0.131)
FC_TO_CF	0.001	0.000				
	(0.002)	(0.002)				
INTERM_MARGIN	1.635	0.240				
	(1.617)	(2.236)				
BANK_SOLV	12.555	20.410	13.484	20.553		
	(9.624)	(13.206)	(9.565)	(13.099)		
Number of observations	839	839	839	839	925	925
Sargan		0.58		0.58		0.76
		$\chi^2(5)_{0.05}$ = 11.07		$\chi^2(5)_{0.05}$ = 11.07		$\chi^2(5)_{0.05}$ = 11.07
p-values of the F-statistic						
LT_BANK_DEBT		<0.0001		<0.0001		<0.0001
CURRENT_ASSETS		0.0002		<0.0001		<0.0001

The dependent variable is the short-term debt rate. The table reports the OLS and 2SLS estimates of regressors in first-difference estimator (proc model under SAS). The variables *LT_BANK_DEBT* and *CURRENT_ASSETS* are endogenous. Instruments include the following variables in first-difference: $LT\_BANK\_DEBT_{i,t-3}$, $LT\_BANK\_DEBT_{i,t-4}$, $CURRENT\_ASSETS_{i,t-2}$, $CURRENT\_ASSETS_{i,t-3}$, $CURRENT\_ASSETS_{i,t-4}$, $SPREAD_{i,t-1}$, $SPREAD_{i,t-2}$, $SPREAD_{i,t-3}$, exogenous variables and country, industry, size and time dummies. Estimates of country, industry, size and time dummies are not reported. Standard errors are in brackets. Significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

Column 1 of Table 3 presents regression results with all the explanatory variables which is not the case of the remaining columns. Results are qualitatively the same for the two variables of interest than previous results reported in Table 2. The ratios of current assets and of long-term bank debt contribute significantly to the explanation of short-term debt, with a positive

sign. There is no evidence of a substitution effect while the impact of current assets is robust[25].

TABLE 3

First-differences GMM-IV estimator, panel data (*i*,*t*)

	1	2	3	4
LT_BANK_DEBT	0.622***	0.624***	0.615***	0.594***
	(0.260)	(0.260)	(0.267)	(0.274)
CURRENT_ASSETS	0.393***	0.394***	0.386***	0.394***
	(0.139)	(0.140)	(0.146)	(0.123)
SPREAD	0.198	0.195		-0.043
	(0.162)	(0.162)		(0.138)
FC_TO_CF	0.001			
	(0.003)			
INTERM_MARGIN	2.813	2.786		
	(2.307)	(2.305)		
BANK_SOLV	33.419***	33.442***	28.464***	
	(15.420)	(15.432)	(14.477)	
Number of observations				
	837	837	837	921
Number of groups	90	90	90	90
Sargan	1.83	1.83	1.56	2.91
	$\chi^2(5)_{0.05} = 11.07$	$\chi^2(5)_{0.05} = 11.07$	$\chi^2(3)_{0.05} = 7.81$	$\chi^2(5)_{0.05} = 11.07$
p-values of the F-statistic				
LT_BANK_DEBT	0.0089	0.0079	0.0025	0.0089
CURRENT_ASSETS	0.0000	0.0000	0.0000	0.0000

The dependent variable is the short-term debt rate. All specifications are estimated using the Andersen-Hsiao first-difference estimator (xtivreg under Stata). The variables *LT_BANK_DEBT* and *CURRENT_ASSETS* are endogenous. Instruments include the following variables in first-difference: $LT\_BANK\_DEBT_{i,t-2}$, $LT\_BANK\_DEBT_{i,t-3}$, $CURRENT\_ASSETS_{i,t-1}$, $CURRENT\_ASSETS_{i,t-2}$, $CURRENT\_ASSETS_{i,t-3}$, $SPREAD_{i,t-2}$, $SPREAD_{i,t-3}$, exogenous variables and time dummies. Estimates of time dummies are not reported. Standard errors are in brackets. Significance at the 10%, 5% and 1% levels is denoted by *, **, and ***, respectively.

The proxy of the risk of default, i.e. the ratio of financial charges to cash flow (*FC_TO_CF*), is never significant. For the other explanatory variables, results from the two estimation techniques, reported in Tables 2 and 3 respectively, are not similar. Firms' behaviour is influenced by the current financing costs – the interest rate spread – but this

[25] The model was also estimated on the original dataset and level observations, these two variables were significant with a positive coefficient.

result is only obtained with the original dataset and is not robust[26]. Supply variables have been introduced as control variables to capture the likely effect of banks' lending decisions. As indicated in Tables 2 and 3, the estimated coefficients of the two variables of interest are not modified when the supply variables are dropped. When the model is tested on the original dataset, supply variables are never significant. When it is tested on panel data, results reported in Table 3 show that the variable used as a proxy for bank's solvability (*BANK_SOLV*) has, as expected, a highly significant and positive effect while the coefficient of the interest rate spread (*SPREAD*) is never significant. These last results deserve interest. We expect the sensitivity of short-term bank debt use to differ with the size, smaller firms facing higher informational problems than larger ones. Although the effect of informational problems cannot be directly observed, it was controlled by using size dummies in the regressions run with the original data set (Table 2). In the regressions performed on panel data, the size effect, along with the industry and the country, is no more controlled by dummies and is not controlled by the estimation method when this effect is time-varying. The positive impact of bank solvability becomes significant and this supply variable dominates the impact of relative prices which ceases to be significant with the new specifications.

TABLE 4

Predictions and empirical results

Rate of short-term bank debt	Corporate finance theory	Credit channel theory	Empirical results
Rate of long-term bank debt	-	+	+
Rate of current assets	n. i.	+	+
Interest spread	+	+ or n. i.	+ or n. s.
Risk of default	+	-	n. s.
Intermediation margin	n. i.	+	n. s.
Bank solvability	n. i.	+	+ or n. s.

n. i.: no impact.

To sum up, our most important empirical results are the following: the corporate short-term debt ratio is sensitive to current business and is not a substitute to the long-term debt ratio, in accordance with the credit channel theory. They do not validate the analytical framework of the corporate finance theory which assumes that when funding investment projects, corporate managers choose between these two financial resources, as if they were substitutes. Table 4 summarizes predictions and results.

[26] When the variable indicating banks solvability is dropped, the variable spread becomes insignificant (Table 2, column 3).

VI. Conclusion

In this paper we aim to confront two distinct analytical frameworks – the corporate finance theory and the monetary policy transmission literature – to investigate the short-term bank debt determinants.

We estimate a model that explains the short-term debt rate, measured as the rate of short-term bank loans as a percentage of total assets, using semi-aggregated data from the BACH database of corporate accounts for six Continental European countries in the period 1989-2003. We first estimate our model using a GMM estimator in first-differences on the original four-dimension dataset and then on classical panel data. In our model, two explanatory variables are critical: the long-term bank debt and current assets. In the corporate finance theory short-term and long-term debts would be substitutes, short-term debt being a vehicle able to finance any kind of assets. The credit view considers short- and long-term debts as distinct vehicles that may be complementary, and the former should be devoted to finance current assets. Hence long-term bank debt and current assets are likely to be endogenous.

Our findings lead to the conclusion that short-term bank debt should be better analysed as a specific vehicle that finances current assets, especially inventories, as is the case in the literature on monetary policy transmission than as a target chosen by managers who minimise explicit costs and/or agency and information costs. Yet, the corporate finance theory predictions cannot be easily tested. Indeed, short- and long-term are subjective concepts, short-term debt is analysed as a subset of long-term debt and the duration of the loan is left undefined, while in our study short-term debt is empirically defined as bank debt with maturity under one year.

Appendix A: what does short-term mean?

Short-term credit includes the following three items:
(i) loan commitments and lines of credits granted by commercial banks to borrowers; it is one of the primary sources of short-term financing for small businesses;
(ii) commercial paper is the only publicly traded short-term debt. It is used by large corporations and mostly by financial companies;
(iii) trade credit is a non-financial source of short-term credit, provided by suppliers. It is an important source of short-term financing at the individual firm level.

The maturity of short-term debt depends on the instrument. The maturity of commercial paper is often lower than one month, although it can be extended to nine months. Bank loans under one year are short term.

Definitions of the meaning of short-term are subjective.

- In the empirical literature, corporate short-term debt is often public and, hence, does not include bank debt, while it may include public bonds with maturity under five years.
- In the case of European firms, credit granted by banks is by far the major source of financial debt. In our empirical research, corporate short-term debt is limited to bank debt and debt with maturity under one year is labelled short-term. Should our study focus on public debt including bonds with maturity under five years, then we can assume that our results would be different. But this focus would be of little interest in the case of continental European non-financial firms as public debt is a very limited source of financing.
- The empirical question of the debt maturity is outside the realm of theoretical models. In the theoretical literature, debt maturity is associated with the issue of the length of the relationship between the borrower and the lender. Short term means one period, long term two or more periods. In these models, the advantage of one loan (one period) is compared with the advantage of a series of tacitly renewable loans (two or more periods).

Appendix B: presentation of the BACH database

Bank for the Accounts of Companies Harmonised (BACH) is a database set up in 1987 containing harmonised annual accounts statistics of non-financial enterprises for 11 European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden), Japan and the United States. The present analysis takes into account 6 countries: Austria, Belgium, France, Germany, Italy and Spain. The other countries have been excluded for different reasons: Finland, Sweden and Denmark owing to missing data, the Netherlands owing to consolidated data, Portugal owing to the lack of data broken down according to the common size criterion between 1991 and 1995, the United States and Japan because the degree of data harmonization is still low.

Size

A distinction is made between three categories of firms:

- Size 1: Small firms with a turnover of less than 10 million Euros;
- Size 2: Medium-sized companies with a turnover between 10 million and 50 million Euros;
- Size 3: Large companies with a turnover in excess of 50 million Euros.

Industry sectors

Data have been grouped together according to NACE classification. The sectors included in our sample are the following: Sector D = Manufacturing industry; Sector E = Electricity, gas and water supply; Sector F = Construction. Sector G = Wholesale and retail trade; Sector H = Hotels and restaurants

Accounting data

The BACH accounting layout comprises a balance sheet and a profit and loss account. Assets and liabilities are given as a percentage of the total balance sheet. Profit and loss account items and statements of investment and depreciation are presented as a percentage of the turnover. In addition, the total balance sheet, the value added and the turnover are given in national currency units. The financial statements are not consolidated for the six selected countries.

Appendix C: list and definition of the variables used

Variables drawn from the BACH database

The BACH measurement of balance sheet variables is made on a book-value basis.

ST_BANK_DEBT
The dependent variable is the rate of short-term bank debt as a percentage of total assets. Short-term bank debt corresponds to the category of debt "*owed to credit institutions becoming due and payable within one year*" which includes long-term debt maturing within one year, except for French firms.

LT_BANK_DEBT
The rate of long-term bank debt as a percentage of total assets.

These two ratios do not cover all financial debt as they do not include commercial paper and bonds issued on financial market, both being a very limited source of funding non-financial companies in European countries, as public debt is usually issued by financial companies in Europe.

CURRENT_ASSETS
The rate of current assets as a percentage of total assets. Current assets are either cash or assets that could be converted into cash within one year. This category includes cash and other marketable securities, accounts receivable and inventories.

Variable drawn from Eurostat database

SPREAD
The long-term debt rate of interest less the short-term debt rate of interest. This variable is calculated as the difference between two time series, the 10 years Treasury bond interest rate and the three-month rate.

Variables drawn from OECD's financial account database

These bank data are aggregated at the country level.

INTERM_MARGIN

The rate of net interest-based income as a percentage of total net banking income.

BANK_SOLV

A proxy of banks solvability, measured by the rate of equity as a percentage of total loans.

Appendix D: Descriptive statistics

TABLE D1

Summary statistics of BACH variables, manufacturing firms

Size class	*Observations*	*Variable*	*Min*	*Max*	*Mean*	*Std. Dev.*
		Austria				
Medium	14	*ST_BANK_DEBT*	12.40	16.08	15.04	1.10
		LT_BANK_DEBT	8.95	12.14	10.85	0.91
		CURRENT_ASSETS	52.75	62.90	56.46	2.67
		FC_TO_CF	9.80	27.84	17.19	5.78
Large	15	*ST_BANK_DEBT*	7.58	10.78	9.54	0.97
		LT_BANK_DEBT	6.63	8.89	7.76	0.76
		CURRENT_ASSETS	45.07	58.79	50.79	3.48
		FC_TO_CF	9.92	27.12	16.44	4.96
		Belgium				
Small	11	*ST_BANK_DEBT*	5.35	6.04	5.69	0.23
		LT_BANK_DEBT	10.41	12.77	11.54	0.67
		CURRENT_ASSETS	52.95	57.69	54.96	1.70
		FC_TO_CF	21.63	31.22	25.81	2.86
Medium	11	*ST_BANK_DEBT*	5.43	8.30	7.06	0.98
		LT_BANK_DEBT	5.85	8.02	7.07	0.70
		CURRENT_ASSETS	54.34	58.58	56.24	1.59
		FC_TO_CF	23.33	31.91	27.57	2.77
Large	9	*ST_BANK_DEBT*	2.93	4.47	3.67	0.47
		LT_BANK_DEBT	2.62	5.59	4.54	0.98
		CURRENT_ASSETS	29.94	41.15	38.04	3.55
		FC_TO_CF	26.33	39.39	32.17	5.23
		France				
Small	15	*ST_BANK_DEBT*	3.11	5.76	4.32	0.91
		LT_BANK_DEBT	7.89	11.18	8.94	1.07
		CURRENT_ASSETS	67.17	73.81	71.62	2.41
		FC_TO_CF	12.63	33.47	20.23	7.40
Medium	15	*ST_BANK_DEBT*	4.06	8.08	5.80	1.36
		LT_BANK_DEBT	6.10	9.30	7.52	1.14
		CURRENT_ASSETS	68.31	73.09	70.32	1.20
		FC_TO_CF	12.72	28.86	19.40	5.13
Large	15	*ST_BANK_DEBT*	1.61	6.05	3.75	1.24
		LT_BANK_DEBT	3.04	6.05	4.09	1.09
		CURRENT_ASSETS	53.86	60.24	56.40	1.76
		FC_TO_CF	14.56	33.94	23.25	5.92

Notes: The table presents the Min, Max, mean and standard deviation of dependent and independent variables for French firms and large Austrian firms for the period 1989-2003; for medium-sized Austrian firms for the period 1990-2003; for Belgian firms for the period 1993- or 1995-2003. Min, Max and mean values are expressed as a percentage of total assets. Data are for manufacturing firms and from the BACH database. The variables are defined as follows. *ST_BANK_DEBT* is the ratio of short-term bank debt to total assets; *LT_BANK_DEBT* is the ratio of long-term bank debt to total assets; *CURRENT_ASSETS* is the ratio of current assets to total assets, and *FC_TO_CF* is the ratio of financial charges to cash flow.

TABLE D2

Summary statistics of BACH variables, manufacturing firms

Size class	*Observations*	*Variable*	*Min*	*Max*	*Mean*	*Std. Dev.*
		Germany				
Small	15	*ST_BANK_DEBT*	11.29	16.66	13.68	1.37
		LT_BANK_DEBT	11.94	16.56	14.50	1.51
		CURRENT_ASSETS	64.19	71.03	66.25	2.20
		FC_TO_CF	21.78	41.41	28.28	5.44
Medium	15	*ST_BANK_DEBT*	9.53	12.91	10.87	0.92
		LT_BANK_DEBT	8.19	9.83	9.08	0.53
		CURRENT_ASSETS	63.01	68.06	64.72	1.60
		FC_TO_CF	23.78	45.52	32.41	6.21
Large	15	*ST_BANK_DEBT*	1.87	3.61	2.84	0.53
		LT_BANK_DEBT	1.95	3.04	2.48	0.37
		CURRENT_ASSETS	48.65	61.65	54.43	3.69
		FC_TO_CF	21.43	61.65	39.33	12.42
		Italy				
Small	15	*ST_BANK_DEBT*	17.27	21.12	19.14	1.23
		LT_BANK_DEBT	5.55	7.30	6.39	0.47
		CURRENT_ASSETS	64.79	70.62	68.12	1.35
		FC_TO_CF	23.89	61.56	39.28	12.87
Medium	15	*ST_BANK_DEBT*	16.97	20.36	18.80	1.05
		LT_BANK_DEBT	5.85	7.37	6.62	0.45
		CURRENT_ASSETS	67.64	73.27	69.70	1.43
		FC_TO_CF	18.15	52.24	30.94	10.96
Large	15	*ST_BANK_DEBT*	9.72	15.43	12.66	1.77
		LT_BANK_DEBT	6.23	8.59	7.24	0.87
		CURRENT_ASSETS	57.82	67.71	61.24	2.78
		FC_TO_CF	18.30	54.97	32.28	11.12
		Spain				
Small	15	*ST_BANK_DEBT*	12.74	17.61	14.85	1.71
		LT_BANK_DEBT	5.42	9.34	7.56	1.35
		CURRENT_ASSETS	59.55	67.10	63.55	2.31
		FC_TO_CF	15.64	59.14	30.76	12.84
Medium	15	*ST_BANK_DEBT*	10.81	17.51	13.90	2.47
		LT_BANK_DEBT	4.72	8.01	6.06	0.94
		CURRENT_ASSETS	55.92	63.51	60.25	2.21
		FC_TO_CF	16.92	58.07	30.79	13.39
Large	15	*ST_BANK_DEBT*	4.16	11.56	7.15	2.74
		LT_BANK_DEBT	4.41	9.11	5.98	1.58
		CURRENT_ASSETS	45.86	52.07	49.11	2.02
		FC_TO_CF	14.05	122.79	36.40	29.36

Notes: The table presents the Min, Max, mean and standard deviation of dependent and independent variables for German, Italian and Spanish manufacturing firms for the period 1989-2003. Min, Max and mean values are expressed as a percentage of total assets. Data are from the BACH database. The variables are defined as follows. *ST_BANK_DEBT* is the ratio of short-term bank debt to total assets; *LT_BANK_DEBT* is the ratio of long-term bank debt to total assets; *CURRENT_ASSETS* is the ratio of current assets to total assets, and *FC_TO_CF* is the ratio of financial charges to cash flow.

TABLE D3

Summary statistics of aggregate variables

Variable	*Observations*	*Min*	*Max*	*Mean*	*Std. Dev.*
		Austria			
INTERM_MARGIN	15	49.84	72.15	60.03	8.99
BANK_SOLV	15	8.51	10.50	9.38	0.56
SPREAD	15	-1.15	2.98	1.11	1.24
		Belgium			
INTERM_MARGIN	15	49.51	81.58	66.99	10.27
BANK_SOLV	15	7.62	11.35	9.36	1.26
SPREAD	15	-0.84	3.31	1.22	1.25
		France			
INTERM_MARGIN	15	36.93	79.98	54.65	14.42
BANK_SOLV	15	7.84	13.56	11.22	1.71
SPREAD	15	-1.79	2.38	0.72	1.34
		Germany			
INTERM_MARGIN	15	64.15	80.773	72.95	5.67
BANK_SOLV	15	6.83	9.373	7.84	0.80
SPREAD	15	-1.61	2.95	0.96	1.28
		Italy			
INTERM_MARGIN	15	63.15	83.03	73.35	6.12
BANK_SOLV	15	12.65	16.80	15.22	1.20
SPREAD	15	-0.74	2.15	1.07	0.86
		Spain			
INTERM_MARGIN	15	64.24	82.40	74.06	5.70
BANK_SOLV	15	15.09	22.04	18.58	2.36
SPREAD	15	-1.65	1.99	0.63	1.33

Notes: The table presents the Min, Max, mean and standard deviation of independent variables for the six selected European countries for the period 1989-2003. *INTERM_MARGIN* denotes the intermediation margin measured as net interest income on net banking income; *BANK_SOLV* is a proxy for banks' profitability that corresponds to banks' equity on bank loans, and the *SPREAD* is the difference between the 10 years Treasury bond interest rate and the three-month interest rate. The variables *INTERM_MARGIN* and *BANK_SOLV* are from OECD's financial account database; the variable *SPREAD* is from Eurostat database. Min, Max and mean values of the two first variables are expressed as a percentage.

Appendix E: long-term debt in manufacturing industries as a % of total assets

Table D1

Long-term debt rate by firm size

	1989		*2003*	
	lower rate (country)	*higher rate*	*lower rate*	*higher rate*
Small	5.4 % (Spain)	12.3 % (Germany)	7.3 % (Italy)	13.3 % (Germany)
Medium	5.3 % (Spain)	9.1 % (France)	5.9 % (Belgium)	10.6 % (Austria)
Large	3.0 % (Germany)	8.3 % (Italy)	2.0 % (Germany)	9.6 % (Spain)

Notes: The table displays the lower and the higher value of the long-term debt rate for manufacturing firms by size in 1989 and 2003, respectively the beginning and the end of the period under review. The country in which these lower and higher values are observed is in brackets. Data are from the BACH database. All values are expressed as a percentage of total assets.

References

Barclay, M. J. and Smith, C. W. (1995). 'The maturity structure of corporate debt', *Journal of Finance*, Vol. 50, pp. 609-631.

Baum, C. F., Schaffer, M. E. and Stillman, S. (2003). Instrumental variables and GMM: Estimation and Testing, Boston College Working Paper n° 545.

Berger, A. N., Espinosa-Vega, M. A., Frame, W. S. and Miller, N. H. (2005). 'Debt maturity, risk, and asymmetric information', *Journal of Finance*, Vol. 60, pp. 2895-2923.

Bernanke, B. S. and Blinder, A. S. (1988). 'Credit, money, and aggregate demand', *American Economic Review*, Vol. 78, pp. 435-439.

Bernanke, B. S. and Gertler, M. (1995). 'Inside the black box: the credit channel of monetary policy transmission', *Journal of Economic Perspectives*, Vol. 9, pp. 27-48.

Bernanke, B. S., Gertler, M. and Gilchrist, S. (1996). 'The financial accelerator and the flight to quality', *Review of Economics and Statistics*, Vol. 78, pp. 1-15.

Bougheas, S., Mize, P. and Yalcin, C. (2006). 'Access to external finance: theory and evidence on the impact of monetary policy and firm-specific characteristics', *Journal of Banking and Finance*, Vol. 30, pp. 199-227.

Cobham, A. (2004). *Source of Finance for European Investments*, EIFC (INTECH-UNU), Working Paper Series No. 04-41.

Diamond, D. W. (1991). 'Debt maturity structure and liquidity risk', *Quarterly Journal of Economics*, Vol. 106, pp. 709-737.

Flannery, M. J. (1986). 'Asymmetric information and risky debt maturity choice', *Journal of Finance*, Vol. 41, pp. 19-37.

Gertler, M. and Gilchrist, S. (1993). 'The cyclical behaviour of short-term business lending, implications for financial propagation mechanisms', *European Economic Review*, Vol. 37, pp. 623-631.

Gertler, M. and Gilchrist, S. (1994). 'Monetary policy, business cycles, and the behavior of small manufacturing firms', *Quarterly Journal of Economics*, Vol. 109, pp. 309-340.

Jaffee, D. and Stiglitz, J. (1990). 'Credit rationing', in Friedman B. M. and Hahn F. H. (eds), *Handbook of Monetary Economics* [2000], North-Holland, Amsterdam, Vol. 2, pp. 837-888.

Kashyap, A. K., Stein, J. C. and Wilcox, D. W. (1993). 'Monetary policy and credit constraints: evidence from the composition of external finance', *American Economic Review*, Vol. 83, pp. 78-98.

Long, M. S. and Malitz, I. B. (1985). 'Investment patterns and financial leverage', in Friedman B. M. (ed), *Corporate Capital Structure in the United States*, The University of Chicago Press, Chicago.

Mitchell, K. (1991). 'The call, sinking fund, and term-to-maturity features of corporate bonds: an empirical investigation', *Journal of Financial and quantitative Analysis*, Vol. 26, pp. 201-223.

Morgan, D. P. (1998). 'The credit effects of monetary policy: evidence using loan commitments', *Journal of Money, Credit and Banking*, Vol. 30, pp. 102-118.

Myers, S. C. (1977). 'Determinants of corporate borrowing', *Journal of Financial Economics*, Vol. 5, pp. 147-175.

Nilsen, J. H. (2002). 'Trade credit and the bank lending channel', *Journal of Money, Credit and Banking*, Vol. 34, pp. 226-253.

Oliner, S. D. and Rudebusch, G. D. (1996). 'Monetary policy and credit constraints: evidence from the composition of external finance: comment', *American Economic Review*, Vol. 86, pp. 300-309.

Ortiz-Molina, H. and Penas, M. F. (2006). *Lending to Small Businesses: The Role of Loan Maturity in Addressing Information Problems*, Tilburg University Working paper.

Scherr, C. and Hulburt, H. M. (2001). 'The debt maturity structure of small firms', *Financial Management*, Vol. 30, pp. 85-111.

Stohs, M. H. and Mauer, D. C. (1996). 'The determinants of corporate debt maturity structure', *Journal of Business*, Vol. 69, pp. 279-312.