THE ROLE OF MACROECONOMIC FACTORS IN THE CAPITAL STRUCTURE OF EUROPEAN FIRMS: HOW INFLUENTIAL IS BANK DEBT?

Valentín Azofra [a]
Universidad de Valladolid

Juan Antonio Rodríguez-Sanz [b]
Universidad de Valladolid
juanantonio.rodriguez@uva.es

Pilar Velasco [c]
Universidad Autónoma de Madrid
p.velasco@uam.es

[a] Universidad de Valladolid. *In memoriam*.

[b] Universidad de Valladolid, Department of Financial Economics and Accounting, Faculty of Economics and Business, Avenida Valle de Esgueva, 6 – 47011 Valladolid (SPAIN).

[c] Universidad Autónoma de Madrid, Department of Finance and Marketing, Faculty of Economics and Business, Cantoblanco Campus – 28049 Madrid (SPAIN).

Acknowledgements
Sadly, one of the co-authors (our mentor Professor Valentín Azofra) passed away before this project was completed. This article is now dedicated to his memory in recognition not only of his enduring mentoring legacy of several generations of researchers but also his exemplary human values, both as a scholar and a personal friend. All of his former PhD students, for whom he was a mentor to emulate and a person to admire, miss him deeply. The authors gratefully acknowledge the valuable comments of Brian Lucey (the editor), the referees, Celia Álvarez-Botas, Pablo de Andrés, Gabriel de la Fuente, Philip Jaggs, Patrycja Klusak, Philip Molyneux, Pedro Vega, and participants at the Banca March Workshop in Madrid (2019), the ACEDE Conference in La Coruña (2019), and the Wolpertinger Conference in Venice (2019). Research funding was provided by the Spanish Ministry of Economy and Competitiveness (grants ECO2014-56102-P and ECO2017-84864-P), the University of Valladolid (GIR in Finance and Accounting) and the Autonoma University of Madrid (research travel grant).

THE ROLE OF MACROECONOMIC FACTORS IN THE CAPITAL STRUCTURE OF EUROPEAN FIRMS: HOW INFLUENTIAL IS BANK DEBT?

Abstract

Based on a partial target adjustment model and the trade-off theory, this paper investigates whether the influence of macroeconomic variables of monetary policy on corporate leverage is shaped by the nature of borrowing, and more specifically by the presence of bank debt. Given the importance of banking institutions as transmitters of monetary policy, we argue that this source of debt might play a critical role in capital structure behaviour. In addition, as banking relationships are more informative and flexible, bank debt is likely to soften the effects of the economic cycle. Using a sample of European countries from 2004-2015, our evidence reveals that bank debt modifies the impact which macroeconomic variables of monetary policy have on a firm's leverage. By comparing crisis and non-crisis periods, our results also show a more stable influence of said variables over the business cycle on bank debt than on non-bank debt.

JEL classification: G30, G32, D22, C23.

Keywords: capital structure, trade-off theory, macroeconomic factors, bank debt, GMM.

1. INTRODUCTION

Since as early as Modigliani and Miller's (1958) seminal paper, capital structure has become a central topic in finance research.[1] Based on the trade-off theory, our study explores what role macroeconomic variables play in configuring corporate capital structure. We focus on macroeconomic variables of monetary policy and add to previous research by acknowledging the idiosyncrasy of bank debt, since financial intermediaries are regarded as transmitters of monetary policy (Beck, Colciago and Pfajfar, 2014; Ippolito, Ozdagli and Perez-Orive, 2018),

Although there is mounting evidence of firm- and industry-level drivers of corporate financing policies, the majority of studies over the years have tended to understate the importance of the macroeconomic context. One emerging trend in the literature has highlighted this research gap and has underlined the close linkage between corporate leverage and the economic cycle (Korajczyk and Levy, 2003; Cook and Tang, 2010; Hanousek and Shamshur, 2011; Azofra-Palenzuela and Rodriguez-Sanz, 2012; Halling, Yu and Zechner, 2016; Daskalakis, Balios and Dalla, 2017; Chang, Chen and Dasgupta, 2019; Pindado, Requejo and Rivera, 2020). Drobetz, Schilling and Schröder (2015) identify both the supply-driven and demand-driven effects of the business cycle on firms' financing behaviour. The former arises due to a shortage in the aggregate capital supply in the economy, which makes gaining access to financing increasingly difficult. On the demand-side, previous research has discussed the adverse selection effect caused by default risk and by informational asymmetries becoming more pronounced during economic downturns, thereby increasing external financing costs.

[1] See Harris and Raviv (1991) or Frank and Goyal (2008) for surveys.

There is empirical evidence to support the association between leverage and the economic cycle. For example, Caglayan and Rashid (2014) recognize that the macroeconomic volatility of economic downturns affects borrowers' collateralizable net worth as well as their risk premium for external funds, which may discourage companies from using debt. In contrast, other studies such as Hanousek and Shamshur (2011) attach far less importance to the economic environment since they find that around 60% of capital structure variance stems from the firm-specific time-invariant component.

Taken as a whole, this puzzling and still limited evidence calls for a better understanding of what role macroeconomic conditions play in financing decisions. We consider a set of macroeconomic factors integrated into the transmission mechanism of monetary policy and which might play a part in lending behaviour: namely, credit supply, inflation, and interest rates. The goal of this paper is to investigate to what extent the influence of said variables on corporate leverage depends on the type of debt. As such, our paper complements Daskalakis *et al.* (2017), who explore the relative importance of firm-specific factors compared to the aforementioned macroeconomic factors in a firm's leverage, differentiating by debt maturity. The distinguishing feature of our study is that it considers whether the type of borrowing involved (specifically, the relative presence of bank debt) actually matters. Our focus on bank debt is motivated by its importance as the main source of funding in many European countries and its close connection with monetary policy transmission and economic stability (Jordà, Schularick and Taylor, 2011; Jiménez *et al*., 2012; Ippolito *et al.*, 2018). Our paper deals with two main issues: (i) how bank debt might shape the impact that macroeconomic variables of monetary policy have on financing decisions, and (ii) how the particular characteristics of bank debt (e.g. greater flexibility of banking relationships) might determine the general exposure of a firm's capital structure to economic shocks such as the latest financial crisis.

We argue that the relative presence of bank debt might change the influence that macroeconomic factors exert on corporate capital structure. The argument that might explain this is the credit channel, which previous evidence points to as a possible transmission mechanism of monetary policy (Bernanke and Gertler, 1995; Bernanke, Gertler and Gilchrist, 1996; Nilsen, 2002; Huang, 2003; Leroy, 2014). This channel can influence economic activity by changing both the availability and the terms of bank loans (Hernando and Martínez-Pagés, 2001) as well as by driving endogenous changes in the external finance premium and net worth of potential borrowers (Bernanke and Gertler, 1995; Hernando and Martínez-Pagés, 2001). In addition, we exploit data from the recent financial crisis to examine whether the effect of macroeconomic variables on corporate leverage shows a different degree of persistence for bank debt and non-bank debt. As a result of the more informative and flexible nature of banking relationships, we expect bank debt to soften the effects of the economic cycle.

Our methodological framework is based on the Flannery and Rangan (2006) target-adjustment model. We draw on the two-step GMM system estimator to mitigate potential endogeneity concerns. For a sample of five European countries over the period 2004 to 2015, our results provide robust evidence that bank debt significantly shapes the effect of credit supply and interest rates on leverage. Overall, the contribution of macroeconomic variables to explaining leverage proves to be higher in those companies which are more dependent on bank financing. By comparing crisis and non-crisis periods, our findings reveal a steadier influence of those variables over the business cycle on bank debt than non-bank debt. A shift in the business cycle phase changes the influence of macroeconomic variables to a greater extent in the case of non-bank debt.

This paper makes a twofold contribution to the literature. First, it answers calls from recent studies for a more in-depth study of the role played by the economic cycle in capital structure decisions. We move research forward by delving into the particular nature of bank lending relationships, which are seen to play a key role in determining how macroeconomic variables affect capital structure decisions. Our evidence shows that bank debt exhibits a more stable link to macroeconomic variables of monetary policy over the business cycle, thereby mitigating potential recessionary conditions. When the difference in monetary policy variables across different macroeconomic states proves significant, their variation is lower in bank debt. As do Halling *et al.* (2016) and Daskalakis *et al.* (2017), we exploit the recent financial crisis to show the firm-level impact of monetary policy decisions made during said period.

Second, our paper is the first we are aware of that addresses how the source of financing (bank debt versus non-bank debt) affects a firm's capital structure response to changes in macroeconomic variables of monetary policy. We show that considering the type of debt involved is crucial vis-à-vis gaining a more accurate assessment of capital structure behaviour. In this regard, we complement recent studies such as Daskalakis *et al*. (2017), who assess debt maturity but not the source of debt. Our evidence is also relevant for prior literature which evaluates capital structure's sensitiveness to variations in monetary policies, depending on a firm's access to external financing. This might determine a firm's ability to time equity/debt issues depending on market conditions. Some examples are Leary (2009), who uses the degree of public market access as a proxy for bank dependence, and Korajczyk and Levy (2003), who distinguish between financially constrained and unconstrained firms. Hence, beyond supply conditions, a further contribution our study makes is to rationalize capital structure dynamics based on the idiosyncratic characteristics of bank debt and its link to the various channels of monetary transmission. Moreover, whereas most studies draw on

U.S. data (Korajczyk and Levy; 2003; Leary, 2009; Cook and Tang, 2010), we use a sample of European countries, which brings greater heterogeneity into the analysis by including alternative types of financial systems (market-based and bank-based systems). Our choosing the European context also seems particularly appropriate given that bank debt is the most important source of financing in many European companies.

The remainder of the paper is organized as follows. Section 2 sets out the theoretical background and our hypotheses. The following section explains our model and estimation methodology. Section 4 describes our data and variables. Section 5 presents our main summary statistics, empirical evidence and robustness analyses. Finally, section 6 summarizes and concludes.

2. THEORETICAL BACKGROUND AND HYPOTHESES

2.1.The trade-off theory, business cycle and leverage

Our research is based on the trade-off theory, under which companies are seen to balance the benefits of debt (interest tax shields) and its costs (bankruptcy costs). Such a trade-off establishes an optimal debt ratio which firms adjust to in order to maximize value, whilst following a multi-period pattern of partial adjustment due to market frictions (Flannery and Rangan, 2006). Mainstream research has devoted much attention to analysing the speed of adjustment towards optimal debt ratio and the determinants of such a target. Regarding the former, traditional analyses such as Fama and French (2002) or Flannery and Rangan (2006) assume a constant speed of adjustment, although recent papers have put forward evidence of asymmetries in the target adjustment process (Korajczyk and Levy, 2003; Antoniou, Guney and Paudyal, 2008; Öztekin and Flannery, 2012).

As far as the drivers of a firm's target debt ratio are concerned, the literature primarily emphasizes firm factors such as size, profitability, growth opportunities or asset tangibility (Rajan and Zingales, 1995; Miguel and Pindado, 2001; Fama and French, 2002; Frank and Goyal, 2009). Gungoraydinoglu and Öztekin (2011) attribute about two thirds of total variance in capital structure to firm-specific effects. Another group of studies underscores the institutional setting, which can alter the relative importance of the benefits of debt versus its costs (Rajan and Zingales, 1995; González and González, 2008; Antoniou *et al.*, 2008; Gungoraydinoglu and Öztekin, 2011; Öztekin and Flannery 2012; Pour and Lasfer, 2019). For example, González and González (2008) note that bank concentration and a stronger protection of creditor rights promote better access to financing and greater leverage. Gungoraydinoglu and Öztekin (2011) estimate that firm-level and sectorial variables explain two thirds of leverage variation in a sample of 37 countries between 1991 and 2006, with the country-level covariates related to institutional quality accounting for the remaining 34% variation. Most research is mainly concerned with understanding the different firm characteristics that explain how firms build and reconfigure their capital structures over time, or at most extend their analysis to the institutional context.

Surprisingly, macroeconomic factors have received comparatively little attention. Korajczyk and Levy (2003) and Hackbarth, Miao and Morellec (2006) show the countercyclicality of leverage ratios. Both the tax benefits of debt and bankruptcy costs depend on the level of cash flows and probability of default, which in turn vary across different economic states. Halling *et al.* (2016) distinguish two channels through which the business cycle can influence a firm's leverage: a direct effect, captured by the estimates of macroeconomic variables on leverage, versus an indirect, but no less important, effect. Such an indirect effect comprises the economic cycle shocks on both the firm characteristics (e.g. profitability) and the strength of their impact on corporate leverage. Many of the firm-specific

variables normally analysed in capital structure (e.g. size, growth opportunities) are influenced by macroeconomic variables such as GDP. They acknowledge that the relation between firm leverage determinants and corporate debt can vary over the business cycle as a result of supply and demand effects. For instance, the influence of tangible assets on a firm's leverage is likely to be more relevant during recessions due to the relative advantage granted by tangibility in a credit constrained context (Halling *et al.*, 2016).

Another stream of evidence supports the idea that the response of corporate leverage to the business cycle depends on firm-level factors, thereby causing a heterogeneous effect across companies (Drobetz *et al.*, 2015). Korajczyk and Levy (2003) and Levy and Hennessy (2007) show that financially unconstrained firms are more sensitive to macroeconomic conditions, and so change leverage counter-cyclically in order to time their debt issue choices, whereas constrained firms adjust procyclically.

2.2. The role of bank debt in how the macroeconomic context influences leverage

Prior literature acknowledges the primary role banks play as transmitters of monetary policy (e.g. Beck *et al.*, 2014; Ciccarelli, Maddaloni and Peydró, 2015; Ippolito *et al.*, 2018). The credit channel is divided into two channels of monetary policy transmission: the balance-sheet channel and the bank lending channel (Mishkin, 1995). The balance-sheet channel focuses on how monetary policy can impact borrowers' balance sheets and income statements, which in turn affects access to funding (Bernanke and Gertler, 1995; Bernanke *et al.*, 1996). Depending on the economic situation, a firm's net worth, which serves as collateral for loans, may easily deteriorate. This might exacerbate the adverse selection and moral hazard problems between banks and borrowers, thereby hindering access to bank loans (Bernanke and Gertler, 1995; Mishkin, 1995). For its part, the bank lending channel focuses on the balance-sheet composition (loans versus deposits) of banks as lending institutions.

This channel captures the impact of monetary policy on the supply of loans by banks. A contractionary monetary policy restricts the lending capability of banks and increases the external finance premium for companies who depend on this source of financing (Bernanke and Gertler, 1995; Jiménez *et al.*, 2012).

More recent studies have recognised an additional channel of monetary policy for banks; namely the risk-taking channel. This channel assumes that interest rate policy determines not only the amount of bank credit but also its quality (Beck *et al.*, 2014; Dell'Ariccia, Laeven and Suarez, 2017). In this regard, Dell'Ariccia and Marquez (2013) show that low interest rates can encourage bank risk-taking and lower lending standards, which can result in weaker bank portfolios. Consistent with this idea, Dell'Ariccia *et al.* (2017) provide empirical evidence of an inverse relationship between bank risk-taking and short-term interest rates.

We argue that the relative importance of bank debt on a firm's capital structure might change the influence of monetary policy variables on a firm's leverage. We focus on three macroeconomic variables related to monetary policy which are likely to play a part in lending behaviour: credit supply, inflation, and interest rates.[2] With regard to credit supply, the availability of bank credit to firms enables them to increase corporate leverage. Korajczyk and Levy (2003) and Jordà *et al.* (2011) confirm the systematic peaks in leverage ratios that occur during economic downturns and their strong association with high growth rates in bank credit.

Higher bank-dependent borrowers are seen to be more at risk of bankruptcy and, as a result, are likely to suffer constraints in accessing more bank credit (Guariglia and Mateut,

[2] Prior works have included different macroeconomic variables in capital structure models. We follow Daskalakis *et al.* (2017) and consider those three variables which are a good reflection of the monetary policy implemented by central banks since the onset of the most recent financial crisis and its spillover to corporate investment and financing decisions. Moreover, our choice allows for better comparability of our results with Daskalakis *et al.*'s (2017) evidence focusing on debt maturity.

2010). In the same vein, Lang and Nakamura (1995) emphasize that riskier and lower net worth borrowers are more dependent on bank lending than are less risky borrowers. Bernanke *et al.* (1996) explain that the credit channel of monetary policy transmission might mean that borrowers subject to more intense agency costs experience greater difficulty in accessing credit compared to other borrowers due to the flight-to-quality phenomenon. As a result, these more credit-constrained borrowers are forced to reduce spending, investment and production sooner ('the financial accelerator effect'), thereby lessening the positive effect of credit supply on corporate leverage:

H_1: *The relative presence of bank debt within a firm weakens the influence of credit supply on a firm's capital structure.*

As far as inflation is concerned, there is no unanimous evidence concerning this variable. On the one hand, managers are considered to be more inclined to issue debt when inflation is expected to be higher in relation to current interest cost (Frank and Goyal, 2009; Öztekin, 2015; Zhou, Tan, Faff and Zhu, 2016). On the other hand, another stream of works reports a negative relationship between inflation and debt as a result of inflation uncertainty that increases business risk (Aggarwal and Kyaw, 2006). In a similar vein, inflation reduces growth by reducing investment and productivity growth (Fischer, 1993), which can result in less need for leverage. We hypothesize that the impact of this variable might be stronger in the presence of higher levels of bank debt due to the balance-sheet channel, which is likely to intensify the effects from inflation by deteriorating a firm's collateral value for bank loans:

H_2: *The relative presence of bank debt within a firm strengthens the influence of inflation on a firm's capital structure.*

Similarly, we posit that bank debt might also amplify the effect of interest rates on corporate leverage. The conventional channel of monetary policy transmission is the interest

rate channel.[3] By means of this channel, restrictive policies based on short-term interest rates are transmitted across the term structure of interest rates and cause a decline in levels of investment, consumption, gross domestic product, and employment. Such transmission occurs with a certain lag and loss of efficiency, although there are some multiplicative mechanisms that help to amplify the effects of monetary policy (Reinhard and Li, 2008). Ciccarrelli *et al.* (2015) find evidence that the transmission is higher and more effective for corporate loans through bank lending and the borrower's balance sheet. Moreover, one distinctive feature of most bank debt lies in its floating-rate nature, as opposed to the fixed rate nature of nonbank debt (Ippolito *et al.*, 2018). As a result, bank debt is likely to be of major importance vis-à-vis intensifying the transmission of monetary policy through the floating-rate channel. Beyond the constraints for accessing external funds, this channel can also cause an internal cash shortfall through the interest rate expenses of existing loans rather than through the supply of new loans (Ippolito *et al.*, 2018). All of the previous arguments underline the importance of banking institutions as transmitters and amplifiers of interest rate variations. Therefore, we expect that the degree to which firms depend on bank financing is likely to further the extent to which interest rates affect a firm's financing decisions. Thus, we hypothesize:

H_3: *The relative presence of bank debt within a firm strengthens the influence of interest rates on a firm's capital structure.*

2.3. The effect of the business cycle on the link between leverage and macroeconomic conditions

[3] During the recent financial crisis, interest rates came close to the zero-limit bound, leading to a distortion in traditional monetary policy based on interest rates. As a result, central banks often complement these policies with unconventional monetary policy measures (e.g. quantitative easing), mostly consisting of large-scale purchases of securities of long-term bonds in order to provide the real economy with liquidity and improve credit growth.

Prior literature has revealed time-varying asymmetries in corporate leverage depending on the state of the economy (Drobetz *et al.*, 2015; Daskalakis *et al.*, 2017; Chang *et al.*, 2019). Using data on Greek companies, Daskalakis *et al*. (2017) document evidence that the contribution of macroeconomic variables to average corporate leverage changes across different macroeconomic states, and becomes more important during a crisis. Said authors take into account debt maturity but do not consider the source of debt.

This prior evidence suggests a dynamic behaviour of macroeconomic variables over the business cycle and constitutes the starting point for our last hypothesis. Should the effect of macroeconomic factors on total debt vary depending on the state of the economy, it might be interesting to go one step further and explore whether the source of debt makes a difference. We expect that the extent to which the state of the economy alters the impact of macroeconomic factors on debt ratios might differ for the case of bank and non-bank debt, since informational asymmetries and access to financing also differ. David, O'Brien and Yoshikawa (2008) explain that these two types of debt use different forms of governance: while bank debt is similar to hierarchical governance, non-bank debt represents market governance. Non-bank debt is considered transitional debt, characterized by monitoring objective performance criteria, rigid contractual terms and a fixed time horizon. In contrast, bank debt is categorized as relational debt since it implies a lending relationship extended over time and relies on monitoring subjective performance criteria and administrative controls.

The unique features of bank financing could alleviate the dynamics of the business cycle. First, banks enjoy a more advantageous position to accumulate proprietary information beyond what is publicly available concerning their borrowers and so can monitor them more closely (Boot, 2000). Such an advantage is furthered if they establish a long-term lending

relationship (Chemmanur and Fulghieri, 1994) or provide numerous financial services (Boot, 2000). Moreover, these close bank-firm ties can lead to the appointment of bank directors by the corporate boards of borrowing firms, particularly when there is poor stock market performance and loss of earnings (Kaplan and Minton, 1994). As a result of these multiple interactions with borrowers, banks can gather extra information beyond what is publicly available. This can mitigate potential inefficiencies such as informational asymmetry problems (Diamond, 1991; Boot, 2000) or potential insolvency costs (Antoniou *et al.,* 2008).

Second, as a result of the hierarchical governance that bank debt provides, this form of debt can offer greater flexibility and discretion when renegotiating contract terms due to more incentives to closely monitor companies and a greater ability to gain access to subjective information about them (Boot, 2000; David *et al.*, 2008; O'Brien *et al.*, 2014; De Fiore and Uhlig, 2015). In addition, banks tend to exercise forbearance since they are more committed to their borrowers through long-term and multiple-product relationships (David *et al.*, 2008), and are also more concerned than bondholders about gaining a reputation for financial flexibility in order to attract new clients (Chemmanur and Fulghieri, 1994). As a consequence, they devote more resources to evaluating firms in financial distress in order to improve decision-making about renegotiation versus liquidation (Chemmanur and Fulghieri, 1994).

Previous empirical evidence also leads us to the idea that bank debt might lessen the impact of a change in the macroeconomic state. For instance, Drobetz *et al.* (2015) find that the adjustment speed to target leverage slows down during recessions compared to expansions, with the influence of the economic cycle being less pronounced in bank-based economies. They attribute this more stable behaviour of the adjustment speed of bank debt to the benefits of banking relationships, which can play a part in alleviating the supply-side

effects of recessionary periods. Consistent with this evidence, Antoniou *et al.* (2008) document that companies have more access to financing when they have close ties with their lenders such as in bank-oriented economies. This is also consistent with Halling *et al.* (2016) who suggest a counter-cyclical behaviour in leverage, and argue that the specific effect of greater anticipated indebtedness during recessions is attenuated when bank debt is the main source of financing in the economy.

Following on from these arguments, we expect macroeconomic factors to be less sensitive to a change in the state of the economy in the case of bank debt. Bank lenders are more and better informed than markets about their borrowers and, as a result, might be in a better position to deal with agency problems arising from information asymmetries (moral hazard and adverse selection) and the threat of bankruptcy. The following hypothesis is thus posited:

H₄: *The effect of macroeconomic factors on corporate leverage remains more stable over the economic cycle for bank debt than for non-bank debt.*

3. MODEL AND ESTIMATION METHOD

3.1. Model specification

The trade-off theory acknowledges that companies cannot adjust to their target leverage immediately, but rather follow a partial adjustment process over time due to the existence of market frictions. We follow the standard partial adjustment model applied in previous research (e.g. Flannery and Rangan, 2006; Cook and Tang, 2010; Öztekin and Flannery, 2012; Daskalakis *et al*, 2017), specifying it in two stages. First, we model target debt ratio as a function of a set of firm characteristics and macroeconomic factors at the end of the previous period:

$$D^*_{i,t} = \alpha^* + \beta^* X_{i,t-1} + \gamma^* M_{i,t-1} \quad [1]$$

where i represents each firm, t indicates the year of observation, $X_{i,t-1}$ is a set of firm specific variables, and $M_{i,t-1}$ is a vector of macroeconomic variables.

At a second stage, we formalize the conventional partial adjustment model as follows:

$$D_{i,t} - D_{i,t-1} = \lambda^* \left(D^*_{i,t} - D_{i,t-1}\right) + \eta_i + \varepsilon_{i,t} \quad [2]$$

where $D_{i,t}$ and $D_{i,t-1}$ denote each firm's leverage ratio at the end of year t and t-1, respectively, $D^*_{i,t}$ represents the target leverage ratio, η_i is the individual effect, and ϵ_{it} is the random disturbance. λ^* measures the speed of adjustment toward the target leverage, namely which proportion of leverage deviation from the optimal leverage is closed by firms between year t and t-1 (Cook and Tang, 2010). By substituting equation [1] into equation [2], we merge them into a single integrated model:

$$D_{i,t} = \lambda^*\alpha^* + (1 - \lambda^*)D_{i,t-1} + (\lambda^*\beta^*)X_{i,t-1} + (\lambda^*\gamma^*)M_{i,t-1} + \eta_i + \varepsilon_{i,t}$$

We rename the coefficients in order to simplify the specification of the model and define its final expression as follows:

$$D_{i,t} = \alpha + \lambda D_{i,t-1} + \beta X_{i,t-1} + \gamma M_{i,t-1} + \eta_i + \varepsilon_{i,t} \quad [3]$$

where $\alpha=\lambda^*\alpha^*$, $\lambda=1-\lambda^*$, $\beta=\lambda^*\beta^*$ and $\gamma=\lambda^*\gamma$. This last integrated partial adjustment model constitutes the baseline equation of our empirical analyses. Macroeconomic variables also control for the time effect as suggested by previous works such as Daskalakis *et al.* (2017). In this way, we avoid including additional year dummies which may cause overfitting problems. As robustness analyses, we add country fixed effects to control for the institutional setting and other characteristics at the country level which might also partly drive capital structure decisions (González and González, 2008; Antoniou *et al.*, 2008; Öztekin and Flannery 2012).

Given our interest in testing whether the level of bank debt moderates the influence of macroeconomic variables on a firm's capital structure, we extend equation [3] by incorporating the interaction effects of the macroeconomic variables with the relative weight of bank debt in each company (*DBANK*):

$$D_{i,t} = \alpha + \lambda D_{i,t-1} + \beta X_{i,t-1} + \gamma M_{i,t-1} + \gamma' M_{i,t-1} \times DBANK_{i,t-1} + \eta_i + \varepsilon_{i,t} \qquad [4]$$

DBANK is an indicator variable which captures whether a firm's level of bank debt is above or below the yearly sample median, equalling 1 and 0, respectively.[4] The influence of macroeconomic factors on debt ratio is thus captured by γ for companies with low levels of bank debt, and by γ+ γ' for those with high bank debt. In line with Hypotheses 1 to 3, we expect the effect of macroeconomic variables to differ between the two groups.

In order to test Hypothesis 4, we need to examine the persistence of macroeconomic variables over the economic cycle. Similar to Daskalakis *et al.* (2017), we extend our basic model [3] by interacting all the regressors with the variable *CRISIS*:

$$D_{i,t} = \alpha + \lambda D_{i,t-1} + \lambda^C D_{i,t-1} \times CRISIS_t + \beta X_{i,t-1} + \beta^C X_{i,t-1} \times CRISIS_t + \gamma M_{i,t-1} + \gamma^C M_{i,t-1} \times CRISIS_t + \delta CRISIS_t + \eta_i + \varepsilon_{i,t} \qquad [5]$$

CRISIS is a dummy variable which equals 1 if the observation belongs to the crisis period (2008 and subsequent years), and is zero otherwise. This model is estimated for total debt, bank debt and non-bank debt, separately. The coefficients associated with the interaction terms (λ^c, β^c and γ^c) capture the potentially differing effect of each set of regressors between non-crisis and crisis periods. We need to test both the individual and the joint significance of these coefficients. Due to the more flexible and hierarchical nature attributed to bank debt and the close relationship between lenders and borrowers, we expect

[4] Additional robustness analyses are performed by using a continuous measure of bank debt relevance.

the effect of macroeconomic variables to remain more stable over the business cycle for bank debt and, therefore, γ^c to display a lower joint statistical significance.

3.2. Estimation methodology

Our equations are estimated using panel data methodology. This method presents two main advantages for our research purposes. First, it allows us to control for unobserved individual heterogeneity (η_i). This represents a range of unobservable time-constant firm-specific characteristics which can also play a part in determining a firm's capital structure, such as corporate culture (e.g. familiness). The presence of such unobserved heterogeneity causes the OLS estimator to be downward biased, should regressors display a high correlation with the fixed effects of the model (Pindado, Requejo and Rivera, 2017). Second, our method enables us to control for the endogeneity problem arising from the correlation between the explanatory variables and the error term (Pindado *et al.*, 2017). This correlation is unavoidable in dynamic models such as our case since the lagged variable of leverage will also be correlated with the error term in t-1. The remaining explanatory variables of a firm's leverage are usually simultaneously determined with the leveraging decision. As a result, endogeneity can also stem from reverse causality between the variables.

To deal with these econometric concerns, we apply the Blundell and Bond (1998) two-step GMM system estimator. This methodology has been widely used in prior literature related to capital structure, such as in Miguel and Pindado (2001), Antoniou *et al*. (2008), Lemmon, Roberts and Zechner (2008), Öztekin and Flannery (2012), Daskalakis *et al.* (2017), or Fuente and Velasco (2020). The system GMM overcomes the weak instrument problem associated with the standard first-difference GMM estimator (Alonso-Borrego and Arellano, 1999) and improves the accuracy of its estimates by exploiting additional moment conditions in a system of first-difference and levels equations. By using Monte Carlo

simulations, Blundell and Bond (1998) attribute a better performance to the system GMM estimator than to the first-difference one when variables are persistent over time, as is the case with leverage. In addition, the system GMM does not impose the need to identify external instruments (since it draws on lagged values of the explanatory variables) and results in more efficient estimations (Arellano and Bond, 1991).

At the bottom of the tables, we report several tests to check potential misspecification problems in our models. First, the Wald statistic confirms the joint significance of the explanatory variables. In some cases, we compute this test for the set of firm variables and macroeconomic variables separately. Second, the m_2 statistic evaluates the lack of second-order serial correlation in the first-difference residuals (Arellano and Bond, 1991). This test supports the consistency of our GMM estimates. Finally, the Hansen J-statistic of over-identifying restrictions tests the exogeneity assumption (Hansen, 1982). If the null hypothesis is not rejected, this implies the lack of correlation between the instruments and the random disturbance, thereby confirming the validity of the former.

4. DATA AND VARIABLES

4.1. Data

Our sample comprises listed firms from five European countries (France, Germany, Italy, Spain, and the UK) covered in the ORBIS database. Although our initial dataset commences in 2003, the sample period of our analyses spans from 2004 to 2015 as a result of using lagged variables in the right-hand side of our partial adjustment model.

Data are obtained from different databases. We use OSIRIS and ORBIS corporate information on annual financial and market data. Macroeconomic data on variables of monetary policy are drawn from multiple sources. Information on credit supply to enterprises

and households and the consumer price index is extracted from the *International Financial Statistics* of the International Monetary Fund database. Data on interest rates of loans of up to one year to nonfinancial corporations and interest rates of loans of over five years are taken from the European Central Bank, except for the UK, which are taken from the Bank of England.

Following previous studies, we have removed firms belonging to the financial, insurance and real estate sectors due to the particular regulation and idiosyncrasy of such industries, and which might affect capital structure decisions (Rajan and Zingales, 1995; Flannery and Rangan, 2006; Cook and Tang, 2010; Daskalakis *et al.*, 2017). Moreover, the debt liabilities of financial firms are not fully comparable to their non-financial firm counterparts (Rajan and Zingales, 1995). We drop firm-year observations with negative common equity and/or missing data for any of our variables used in our estimation models. In order to be included in the sample, we also restrict our sample to firms with data available for at least five consecutive years so as to test for the lack of second-order residual serial correlation. This criterion is imposed by our estimation methodology, the generalized method of moments (GMM).

All of these filters result in a final unbalanced panel sample of 8,465 firm-year observations, representing 959 listed firms. Prior works such as Munjal, Requejo and Kundu (2019) consider the use of an unbalanced panel as an appropriate strategy to alleviate potential survivorship bias. To mitigate the possible influence of extreme values, all variables are winsorized at the 1% level (Flannery and Rangan, 2006). Table 1 summarizes the distribution of the firm-year observations across countries. The most represented countries are the UK (28.17% of observations) and Germany (27.78%), while Italy and Spain account for a lower proportion of observations (12.24% and 9.23%, respectively).

[TABLE 1 ABOUT HERE]

4.2. Variables

The definitions of our main variables are shown in Table 2.

[TABLE 2 ABOUT HERE]

Dependent variable

Our basic dependent variable is a firm's leverage (*FINDEBT_ASSETS*), which is approximated by the ratio of long-term and short-term financial debt to the book value of assets (Rajan and Zingales, 1995; Frank and Goyal, 2009). In equation [5], we also perform separate regressions for the different types of debt, namely bank debt and non-bank debt. Bank debt (*BANK_ASSETS*) is measured by the ratio of bank debt to book value of assets (González, 2016). Non-bank debt (*NONBANK_ASSETS*) is calculated as the difference between total financial debt and bank debt. We then take the ratio of this difference to the total book value of assets.

Independent variables[5]: bank debt

Bank debt is a key variable in our study since we test its moderating effects in the influence of macroeconomic factors on a firm's leverage. We proxy the relevance of bank debt in a firm's capital structure by using the dummy *dumBANK_ASSETS*, which equals 1 if *BANK_ASSETS* is above the yearly sample median, and which is null otherwise. We also examine the robustness of our results by using the ratio of bank debt to financial debt (*BANK_FINDEBT*) in order to categorize levels of bank debt. We define *dumBANK_FINDEBT*, which takes the value of 1 if *BANK_FINDEBT* is above the yearly sample median and 0 otherwise.

[5] In our model, we consider the first lag of each explanatory variable. In the output of our regression estimates, lagged regressors are denoted by adding "L." before the name of the corresponding variable (e.g. *L.FINDEBT_ASSETS*).

Independent variables: firm-specific factors

We classify the remaining independent variables into two categories: firm-specific factors versus macroeconomic factors. As regards the former group, we control for a firm's asset structure, size, growth, profitability, non-debt tax shields, risk, trade credit, cash and financial expenses. These firm-specific characteristics are traditionally seen as determinants of leverage (e.g. Titman and Wessels, 1988; Rajan and Zingales, 1995; Flannery and Rangan, 2006; González and González, 2008; Daskalakis *et al*., 2017). The sign of the expected association of some of them with a firm's leverage remains open to dispute.

A firm's asset structure (*ASSETS*) is measured by the ratio of tangible assets to total assets. A greater degree of tangibility of assets offers superior collateral and has a greater liquidation value, thereby favouring a firm's debt capacity (Titman and Wessels, 1988; Rajan and Zingales, 1995; Flannery and Rangan, 2006). A firm's size (*SIZE*) is calculated as the natural logarithm of total assets. Larger companies are usually more diversified and have lower cash flow volatility and default risk, which makes it easier for them to access debt financing (Titman and Wessels, 1988; Rajan and Zingales, 1995; Flannery and Rangan, 2006). However, an inverse relationship between size and leverage can be explained by the pecking order theory. The less opacity and higher informativeness of larger firms may increase their preference for equity over debt (Rajan and Zingales, 1995; Frank and Goyal, 2009).

A firm's growth (*GROWTH*) is calculated as the annual rate of change in total sales. Myers (1977) predicts an inverse relationship between growth opportunities and leverage as a result of the debt overhang effect. However, a positive association is also plausible from the pecking order theory. As companies that are growing undertake more investments, their need for external financing increases (Frank and Goyal, 2009). A firm's profitability

(*PROFITABILITY*) is measured by the ratio of earnings before interest and taxes to total assets. The pecking order theory states that more profitable firms operate with lower leverage. They generate higher retained earnings and so draw on internal financial resources to a greater extent. However, prior studies such as Flannery and Rangan (2006) pose a positive association between profitability and leverage if the former improves a firm's ability to make debt payments. The agency approach also confirms this positive relationship by considering that debt disciplines managers' discretional behaviour if the firm generates free cash flow (Jensen, 1986).

Non-debt tax shields (*NDTS*) reflects the ratio of depreciation to total assets. These tax deductions might substitute interest tax shields (Titman and Wessels, 1988; Flannery and Rangan, 2006). The higher the depreciation expenses, the lower the need to issue debt in order to benefit from tax deductions from interest payments. However, Bradley, Jarrell and Kim (1984) report a positive relationship, since depreciation can stem from greater investments in tangible assets, which increase leverage. To measure risk (*RISK*), we take a three-year rolling window of the standard deviation of the ratio of earnings before interest and taxes to total assets (Daskalakis *et al*., 2017). Riskier firms are expected to have lower leverage as a result of more constrained access to debt financing.

Net trade-credit is given by the ratio of the difference between trade receivables and trade payables to total assets (*NTCA*). Once again, there is conflicting evidence concerning the expected sign of this variable. In recessionary periods, evidence reveals that trade credit serves as a complement rather than a substitute of debt financing (Daskalakis *et al.*, 2017). Other studies use a similar measure as a proxy for liquidity (Öztekin and Flannery, 2012) and posit a negative association with leverage as a result of generating more internal funds. The ratio of cash to total assets (*CASHTA*) is expected to be negatively associated with leverage

since, according to the pecking order theory, cash richer firms prefer internal financing. Finally, we control for interest burden by the ratio of financial expenses to total assets (*FINEXP*). Daskalakis *et al.* (2017) expect a negative relation between this financial burden and leverage. Rubio and Sogorb (2011) agree with such an interpretation, yet point out that this variable might also be mechanically positively related to greater amounts of debt.

Independent variables: macroeconomic factors

We control for three macroeconomic variables of monetary policy which are likely to influence lending behaviour: credit supply, inflation, and interest rates (Daskalakis *et al.*, 2017). Credit supply (*CRED*) is proxied by the annual growth rate of credit expansion to the private sector. As bank debt is a major source of funding in most of the countries in our sample, this variable is likely to be of greater importance to explain leverage with an expected positive sign. Before the financial crisis, the monetary policy of low interest rates coupled with the banking system's over-eagerness to grant credit promoted investment and artificially stimulated the use of external financing. The inflation rate (*INFL*) is defined as the annual rate of change in the consumer price index. However, its expected association with leverage proves controversial. Some research finds a positive relationship, while other works suggest a negative association on the grounds that inflationary contexts promote business risk (Aggarwal and Kyaw, 2006) and reduce investment and productivity growth (Fischer, 1993).

Finally, the interest rate of total debt (*INTR*) is calculated as the average of the interest of short-term debt (loans of up to one year to nonfinancial corporations) and the interest of long-term debt (loans of over five years to nonfinancial corporations). A negative association between leverage and interest rate is expected since firms are more likely to increase their debt when financial costs are lower (Halling *et al.*, 2016). However, this relationship might also reverse its sign when monetary authorities reduce interest rates during recessionary

periods, since companies tend to reduce their excess leverage while at the same time equity values continue to decrease. Another stream of works, such as Davis and Stone (2004), also suggests that interest rates are positively related with debt as a result of firms' greater obligations when interest rates rise and firms have floating debt.

5. EMPIRICAL ANALYSES

5.1. Summary statistics

Table 3 summarizes the main descriptive statistics of our variables. On average, bank debt represents about 78.26% of total financial debt. Similarly, we see the greater use of bank debt than non-bank debt by observing its weight over a firm's assets: on average, 19.28% (*BANK_ASSETS*) and 5.60% (*NONBANK_ASSETS*) of total assets, respectively. The greater presence of bank debt is also accompanied by a greater variation than non-bank debt across companies.

[TABLE 3 ABOUT HERE]

Table 4 presents some descriptive statistics for leverage disaggregated by country and by non-crisis/crisis period. Italy and Spain have the most indebted companies in relative terms. On average, financial debt represents about 30% of the book value of assets. In contrast, companies from France, Germany, and the UK account for a lower proportion of financial debt in their capital structures, ranging on average from 22.88% to 24.22% of total assets. During the crisis period, certain deleveraging is noticeable in firms from the latter two countries. However, France, Italy, and particularly Spain, follow the opposite tendency. These two latter countries also stand out due to their greater levels of bank debt, which represents over 86% of all financial debt.

[TABLE 4 ABOUT HERE]

Figure 1 represents the evolution of the macroeconomic variables over time for the different countries. Both *CRED* and *INTR* display a clear decreasing tendency over time, reflecting the consequences of the financial crisis. Countries such as Spain or the UK evidence a sharper reduction in *CRED*. *INFL* is more volatile over the sample period, peaking at the start of the financial crisis and again in 2011, particularly in Italy, Spain, and the UK.

[FIGURE 1 ABOUT HERE]

5.2. Baseline analyses

As a starting point for our empirical analyses, we estimate the model of partial adjustment specified in equation [3]. Columns (1) and (2) in Table 5 contain these baseline regression estimates. The coefficient of the lagged leverage ranges between 0.8411-0.8616 (1-λ), implying a speed of adjustment of about 13.84-15.89% (λ^*). Consistent with previous literature such as Lemmon *et al.* (2008) or Daskalakis *et al.* (2017), leverage is mostly explained by its lagged value, thereby confirming the persistence of leverage over time.

[TABLE 5 ABOUT HERE]

The signs of the coefficients for all the control variables are consistent with prior empirical evidence. The coefficient of *L.SIZE* is positive and statistically significant when excluding country fixed effects. This finding fits in with the lower cash flow volatility and default risk attributed to larger companies. We report a positive sign for the coefficient of *L.NDTS*, which is statistically significant. Consistent with Bradley *et al*. (1984), this result could be attributed to greater corporate investment activity. *L.GROWTH* and *L.PROFITABILITY* variables present a positive and significant sign. As explained earlier, there are alternative theories for such signs. Finally, it is also worth mentioning the variable *L.NTCA*, which presented a null associated coefficient in Daskalakis *et al*. (2017). In our case, *L.NTCA* shows both economic and statistical significance (p-value=0.000). As regards

L.CASH, richer cash firms are less likely to resort to debt, as predicted by the pecking order theory. Finally, macroeconomic variables display the expected signs. An expansion in *L.CRED* fosters higher levels of corporate leverage, although this variable is not statistically significant in these regressions. A higher *L.INFL* impacts leverage negatively, which is consistent with prior evidence such as Aggarwal and Kyaw (2006) and Daskalakis *et al.* (2017) – although in this latter work the negative coefficient of inflation displays no statistical significance. *L.INTR* has a positive impact on leverage, probably as a result of the major presence of bank debt in our sample of firms, which is mainly characterised by its floating-rate nature (Ippolito *et al*., 2018). This result is also in line with the positive influence of interest rate on bank lending obtained by David and Stone (2014) as a result of the increased obligations for firms when interest rates rise.

5.3. The moderating role of bank debt on the influence of macroeconomic conditions

To test Hypotheses 1 to 3, which predict that bank debt influences the extent to which macroeconomic factors affect corporate leverage, we estimate equation [4], which extends the previous baseline model by adding the moderating effect of the relevance of bank debt. Columns (3) and (4) in Table 5 present the estimation results. The moderating effects of bank debt relevance are computed by applying a dichotomous variable (*L.dumBANK_ASSETS*).[6] The Wald test confirms the joint significance of the three multiplicative variables. Hence, this result reveals that the source of debt financing alters the joint effect of macroeconomic factors on corporate leverage.[7]

[6] We do not include bank debt relevance individually (other than in the interaction terms with the macroeconomic variables) due to the high correlation between *L.BANK_ASSETS* and *L.FINDEBT_ASSETS* (about 0.8048), which is likely to cause multicollinearity problems.

[7] Results also hold when we control for the degree of development of the bond market in each country, as measured by the ratio of the corporate bond issuance volume to GPD. Data are extracted from the World Bank database. Results are available upon request.

As regards credit supply, the positive sign of this variable confirms its positive association with the availability of corporate financing. This finding agrees with existing literature which underlines that the degree of availability of credit supply positively influences leverage (Faulkender and Petersen, 2006; Leary, 2009; Voutsinas and Werner, 2011). In view of our findings, one part of this effect of credit supply also depends on the relative amount of bank debt a firm holds, which negatively moderates the relationship between credit supply and leverage. This result provides support for Hypothesis 1 since a greater presence of bank debt lessens the economic impact of this variable and reverses the sign of its effect on debt leverage. For example, a one standard deviation increase in credit supply increases a firm's debt ratio by 0.29 percentage points in below-median bank-dependent firms, while reducing it by 0.15 percentage points in above-median bank-dependent firms. As regards inflation, the interaction term *L.INFL*×*L.dumBANK_ASSETS* is not statistically significant. Therefore, Hypothesis 2 is not supported and the influence of inflation on corporate debt ratios does not differ between firms with high and low levels of bank debt.

As for interest rates, *L.INTR* displays a positive impact on a firm's leverage. This evidence concurs with prior works such as David and Stone (2004). Interest rate reinforces its influence on leverage in more bank-dependent companies. As predicted by Hypothesis 3, *L.INTR*×*L.dumBANK_ASSETS* exhibits a positive coefficient, which helps to increase the magnitude of the effect of *L.INTR* as bank debt becomes more prevalent in a firm's capital structure. Our finding ties in with previous works such as Ciccarelli *et al*. (2015) who report that monetary policy shocks are amplified through bank lending.

At the bottom of columns (3) and (4), in which we categorize companies in a dichotomous manner depending on the relative weight of bank financing

(*L.dumBANK_ASSETS*), $\sum_j$ coefficients denote the linear combined effect of each macroeconomic variable plus the interaction effect of bank debt on the macroeconomic factor. As a result, the impact of the interest rate for companies with below median levels of bank debt will be given by the estimated coefficient of *L.INTR*, while in the case of highly bank financed firms the effect of such a macroeconomic factor is represented by $\sum_{L.INTR}$ (the linear combination of *L.INTR* + *L.INTR*×*L.dumBANK_ASSETS*). As shown in column (4), a one standard deviation rise in *L.INTR* leads to an increase in debt ratios of 0.53 percentage points in low bank debt financed companies, while the same change increases debt ratios by 0.84 percentage points in high bank debt financed firms.

Overall, *L.CRED* and *L.INTR* impact differently on leverage depending on the relative amount of bank debt, thereby confirming Hypotheses 1 and 3. Our main results remain unchanged when we use *BANK_ASSETS, BANK_FINDEBT* and *dumBANK_FINDEBT* as alternative proxies for the relevance of bank debt[8]. Our results confirm the close link between interest rates and the bank lending channel. The relative weight of bank debt in each company helps to shape the impact of credit and interest rates on corporate leverage. However, in the case of credit supply, bank debt lessens the impact of this variable and reverses its effect on corporate leverage rather than amplifying its magnitude. One possible explanation might be found in the flight-to-quality phenomenon, which refers to a shift of credit flows in favour of higher-quality borrowers (Bernanke *et al.*, 1996). Our result is in line with other works such as Lang and Nakamura (1995) who show that this 'flight-to-quality' leads to an increase in high quality new loans and that banks are more likely to reduce the amount of lending to more bank-dependent borrowers, who are usually riskier and lower net worth borrowers.

5.4. Additional robustness checks

[8] Results are available upon request.

In this section, we present a number of robustness analyses. First, we evaluate the contributions of macroeconomic variables at the sample mean of the leverage ratios. We draw on Daskalakis *et al.*'s (2017) analyses across macroeconomic states, although in our case we test the contributions of macroeconomic variables and compare them across the subsamples of firms with below median and above median levels of bank debt. These three hypotheses are therefore tested:

- Test I.-Significance of the contribution to the mean leverage ratio of macroeconomic variables for the subsample of firms with below median levels of bank debt (subsample (1): *DBANK*=0):

$$H_0: \sum_{j=1}^{J} \gamma_j \overline{M_j^{(1)}} = 0$$

- Test II.-Significance of the contribution to the mean leverage ratio of macroeconomic variables for the subsample of firms with above median levels of bank debt (subsample (2): *DBANK*=1):

$$H_0: \sum_{j=1}^{J} (\gamma_j + \gamma'_j)\overline{M_j^{(2)}} = 0$$

- Test III.-Difference in the contribution of macroeconomic variables to the mean leverage ratio across firms with above median and below median levels of bank debt:

$$H_0: \sum_{j=1}^{J} \gamma_j \overline{M_j^{(1)}} = \sum_{j=1}^{J} (\gamma_j + \gamma'_j)\overline{M_j^{(2)}}$$

Table 6 shows the results of these tests. Panel A draws on *L.dumBANK_ASSETS* to classify companies as high or low bank debt financed, whereas Panel B is based on *L.dumBANK_FINDEBT*. As regards Tests I and II, macroeconomic variables significantly contribute to explaining debt ratios in firms with below-median levels of bank debt when

accounting for country fixed effects. In more bank-dependent companies, the contribution of this group of variables is significant across all the alternative specifications. More importantly, the results of Test III reveal a dissimilar contribution of macroeconomic factors depending on the relevance of bank debt in a firm's capital structure, thereby supporting the moderating role played by bank debt. This evidence extends that reported by Daskalakis *et al.* (2017), who report that the contribution of macroeconomic factors to explain corporate leverage differs across macroeconomic states of growth and recession.

[TABLE 6 ABOUT HERE]

In addition, we evaluate the relative contribution of each set of regressors (lag of leverage, firm-specific variable and macroeconomic variables) to the average debt ratio. We follow a similar procedure to Daskalakis *et al.* (2007) and perform a mean decomposition analysis of the sample mean debt ratio using subsamples of different levels of bank debt financing. This enables us to evaluate whether macroeconomic factors play a more important role in explaining leverage in firms in which bank debt proves more relevant. We compute the average of the true values of *FINDEBT_ASSETS* and the average of its fitted values from equation [3], denoted by $\overline{FINDEBT\_ASSETS}_t$ and $\overline{\widehat{FINDEBT\_ASSETS}}_t$ respectively. We then assess the contribution of each subset of explanatory variables to the fitted leverage ratio. We decompose the average fitted leverage ratio ($\overline{\widehat{FINDEBT\_ASSETS}}_t$) into the average contribution of the lagged leverage ratio ($\overline{\widehat{FINDEBT\_ASSETS}}_{t,L}$), the average contribution of the firm-level regressors ($\overline{\widehat{FINDEBT\_ASSETS}}_{t,F}$), and the average contribution of the macroeconomic regressors ($\overline{\widehat{FINDEBT\_ASSETS}}_{t,M}$).[9]

[9] In the table, we also report the value of the intercept of the regression so that the sum of the different components ($\widehat{FINDEBT\_ASSETS}_{t,L}$, $\widehat{FINDEBT\_ASSETS}_{t,F}$, $\widehat{FINDEBT\_ASSETS}_{t,M}$ and the intercept of the regression) equals $\overline{\widehat{FINDEBT\_ASSETS}}_t$.

Table 7 summarizes the mean decomposition analysis. Panel A presents the results by subsamples of companies with low and high bank debt as categorized by *dumBANK_ASSETS*. The last row of each panel displays the results for the full sample. The contribution of all subsets of regressors to the average *FINDEBT_ASSETS* is positive. The lagged leverage concentrates the highest contribution to the average *FINDEBT_ASSETS*. Consistent with Hypotheses 1 to 3, macroeconomic factors contribute differently depending on the main source of debt in capital structure, with this contribution proving to be greater under a strong presence of bank debt. Panel B provides additional robustness analyses by splitting the full sample into quartiles depending on the level of bank financing. Again, our evidence reveals that the more relevant bank debt is in capital structure, the greater the contribution of macroeconomic factors to average corporate leverage. The greatest contribution is observed in the top quartiles of bank debt. Firm-specific variables exhibit a more stable influence across quartiles.

[TABLE 7 ABOUT HERE]

5.5. The influence of macroeconomic factors on leverage over the business cycle by source of debt

Next, we test Hypothesis 4 and assess whether the influence of macroeconomic factors remains stable when macroeconomic conditions change for the different types of debt depending on its source. We estimate equation [5] to compute the effects of all explanatory variables before and during the crisis years. Table 8 reports the estimates.[10]

[TABLE 8 ABOUT HERE]

[10] Table 8 presents the estimated coefficients λ, β and γ for the period 2005-2007 (columns (1), (4) and (7)), $\lambda+\lambda^C$, $\beta+\beta^C$ and $\gamma+\gamma^C$ for the period 2008-2015 (columns (2), (5) and (8)), and λ^C, β^C and γ^C the differences between the two periods.

First, in line with previous studies such as Cook and Tang (2010), our results suggest that movement towards the target leverage slows down during the crisis in all types of debt, except for total debt, for which the difference of the coefficients of *L.FINDEBT_ASSETS* between the crisis and non-crisis periods is not significant. Second, when the difference between the coefficient estimations of firm variables for the crisis and non-crisis period does prove to be significant, said difference is greater for bank debt, as can be seen in the case of *L.GROWTH* and *L.PROFITABILITY*. We observe that the coefficients of these two variables increase during the crisis, thus reinforcing their economic impact. This result can be explained by the growing importance of a firm's growth opportunities and profitability as collateral for bank lenders and the more decisive role they play in accessing bank financing.

As regards the analysis of macroeconomic explanatory variables, our evidence reveals that when the difference in the coefficient estimates across different macroeconomic states displays statistical significance, the size of the change is more noticeable in non-bank debt. It is also worth pointing out that the macroeconomic factors which exert a significant influence on corporate leverage during the crisis differ depending on the source of debt. While all macroeconomic variables play a part in explaining bank debt leverage, *L.INFLATION* is the only macroeconomic factor which exerts a significant influence on non-bank debt. More importantly, the Wald tests at the bottom of the table support Hypothesis 4. The statistic of joint statistical significance of the set of multiplicative dummies associated with macroeconomic regressors (γ^c) is non-significant for bank debt (p-value=0.1014), while it is statistically significant for non-bank debt (p-value=0.0274).

As a whole, the influence of macroeconomic factors on corporate leverage is less affected and remains more stable across the economic cycle for the case of bank debt. We also expand existing evidence on time-varying asymmetries in leverage depending on the

business cycle (Drobetz *et al.*, 2015; Daskalakis *et al.*, 2017; Chang *et al.*, 2019), although in our case we also show that the nature of non-bank debt and bank debt can lead such asymmetries to become more or less salient, respectively.

6. CONCLUSIONS

This research explores the role played by macroeconomic factors (more specifically, the macroeconomic variables of monetary policy) in capital structure decision for a sample of five European countries during the 2004-2015 period. We provide evidence on the crucial importance of considering the source of debt and, in particular, bank debt when assessing how macroeconomic factors of monetary policy shape a firm's capital structure. Our evidence reveals that bank debt shapes the impact of those macroeconomic variables on corporate leverage. The influence of credit supply and interest rate on corporate leverage is more sensitive to the source of debt. Our results also bring to light that how expansions and recessions reconfigure the influence of macroeconomic factors on corporate leverage tends to vary depending on the source of debt. The more flexible nature of bank-based financing might play a part in macroeconomic factors remaining more stable over the economic cycle in the case of bank debt.

This research provides several policy implications. Economic and monetary policies are transmitted differently to non-financial companies depending on the composition of their source of financing. The response of a firm's leverage to credit availability and interest rates has proved to be strongly dependent on its bancarization level. A more comprehensive knowledge of which macroeconomic variables prove to be most influential in corporations' financial behaviour should be a priority for policy-makers, thus enabling them to better adapt their policies to their target companies and, thereby, increase their efficiency. For

practitioners, this research reveals the importance of the supplier of debt financing to better understand how different measures of economic and monetary policy can affect their potential financial decisions. Each phase of the business cycle involves different central bank monetary policies aimed at either stimulating or containing economic activity. Therefore, anticipating these and being able to adapt a firm's capital structure to exploit the flexible and more informative relationships with bank suppliers will become a critical competitive advantage.

Our study is not without limitations. It would be interesting to evaluate the source and maturity of debt simultaneously in the analyses, as well as other additional features of bank lending relationships (e.g. time length), which might play a part in capital structure behaviour when macroeconomic conditions change. Complementarily, following the latest works on debt diversification (Jadiyappa *et al.*, 2020), future research could investigate whether the combination of multiple debt sources might help to mitigate the business cycle effects in corporate capital structures. It may also prove worthwhile to examine how the characteristics of the financial system (bank-based versus market-based) affect the influence of the nature of borrowing and the macroeconomic context on corporate capital structure decisions. Furthermore, a deeper analysis could be carried out on the influence of the source of debt in the speed of adjustment in order to shed more light on its heterogeneity across companies. In addition, a broader spectrum of variables from the macroeconomic context, such as interest rate spread or narrow versus broad money, could be explored in further research.

REFERENCES

Aggarwal, R., & Kyaw, N. (2006). Transparency and capital structure: Evidence of firm, industry, and national institutional influences. In Oxelheim, L. (Ed.), *Corporate and*

institutional transparency for economic growth in Europe, chapter 12 (pp. 335-370), Elsevier.

Alonso-Borrego, C., & Arellano, M. (1999). Symmetrically normalized instrumental-variable estimation using panel data. *Journal of Business & Economic Statistics,* 17(1), 36–49. doi: 10.2307/1392237

Antoniou, A., Guney, Y., & Paudyal, K. (2008). The determinants of capital structure: Capital market-oriented versus bank-oriented institutions. *The Journal of Financial and Quantitative Analysis,* 43(1), 59-92. doi: 10.1017/S0022109000002751

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies,* 58(2), 277-297. doi: 10.2307/2297968

Azofra-Palenzuela, V., & Rodríguez-Sanz, J.A. (2012). El endeudamiento de la empresa española: teorías y realidades ['The indebtedness of Spanish firms: theories and realities']. *Papeles de Economía Española,* 132, 37-62.

Beck, T., Colciago, A., & Pfajfar, D. (2014). The role of financial intermediaries in monetary policy transmission. *Journal of Economic Dynamics & Control,* 43, 1-11. doi: 10.1016/j.jedc.2014.04.010

Bernanke, B., & Gertler, M. (1995). Inside the black box: The credit channel of monetary policy. *The Journal of Economic Perspectives,* 9(4), 27-48. doi: 10.1257/jep.9.4.27

Bernanke, B., Gertler, M., & Gilchrist, S. (1996). The financial accelerator and the flight to quality. *The Review of Economics and Statistics,* 78(1), 1-15. doi: 10.2307/2109844

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics,* 87(1), 115-143. doi: 10.1016/S0304-4076(98)00009-8

Boot, A. (2000). Relationship banking: What do we know? *Journal of Financial Intermediation,* 9(1), 7-25. doi: 10.1006/jfin.2000.0282

Bradley, M., Jarrell, G., & Kim, H. (1984). On the existence of an optimal capital structure: Theory and evidence. *The Journal of Finance,* 39(3), 857-878. doi: 10.1111/j.1540-6261.1984.tb03680.x

Caglayan, M., & Rashid, A. (2014). The response of firms' leverage to risk: Evidence from UK public versus nonpublic manufacturing firms. *Economic Inquiry,* 52(1), 341-363. doi: 10.1111/ecin.12042

Chang, X., Chen, Y., & Dasgupta, S. (2019). Macroeconomic conditions, financial constraints, and firms' financing decisions. *Journal of Banking & Finance,* 101, 242-255. doi: 10.1016/j.jbankfin.2018.10.016

Chemmanur, T., & Fulghieri, P. (1994). Renegotiation, and the choice between bank loans and publicly traded debt. *The Review of Financial Studies,* 7(3), 475-506. doi: 10.1093/rfs/7.3.475

Ciccarelli, M., Maddaloni, A., & Peydró, J. L. (2015). Trusting the bankers: A new look at the credit channel of monetary policy. *Review of Economic Dynamics,* 18(4), 979-1002. doi: 10.1016/j.red.2014.11.002

Cook, D., & Tang, T. (2010). Macroeconomic conditions and capital structure adjustment speed. *Journal of Corporate Finance,* 16(1), 73-87. doi: 10.1016/j.jcorpfin.2009.02.003

Daskalakis, N., Balios, D., & Dalla, V. (2017). The behaviour of SMEs' capital structure determinants in different macroeconomic states. *Journal of Corporate Finance,* 46, 248-260. doi: 10.1016/j.jcorpfin.2017.07.005

David, P., O'Brien, J., & Yoshikawa, T. (2008). The implications of debt heterogeneity for R&D investment and firm performance. *Academy of Management Journal,* 51(1), 165-181. doi: 10.5465/amj.2008.30772877

Davis, P., & Stone, M. (2004). Corporate financial structure and financial stability. *Journal of Financial Stability,* 1(1), 65-91. doi: 10.1016/j.jfs.2004.06.003

De Fiore, F., & Uhlig, H. (2015). Corporate debt structure and the financial crisis. *Journal of Money, Credit and Banking.* 47(8). 1571-1598. doi: 10.1111/jmcb.12284

Dell'Ariccia, G., Laeven, L., & Suarez, G. (2017). Bank leverage and monetary policy's risk-taking channel: Evidence from the United States. *The Journal of Finance,* 72(2), 613-654. doi: 10.1111/jofi.12467

Dell'Ariccia, G., & Marquez, R. (2013). Interest rates and the bank risk-taking channel. *Annual Review of Financial Economics,* 5, 123-141. doi: 10.1146/annurev-financial-110112-121021

Diamond, D. (1991). Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy,* 99(4), 689-721.

Drobetz, W., Schilling, D.C., & Schröder, H. (2015). Heterogeneity in the speed of capital structure adjustment across countries and over the business cycle. *European Financial Management,* 21(5), 936-973. doi: 10.1111/eufm.12048

Fama, E., & French, K. (2002). Testing the trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies,* 15(1), 1-33. doi: 10.1093/rfs/15.1.1

Faulkender M., & Petersen, M. (2006). Does the source of capital affect capital structure? *The Review of Financial Studies,* 19(1), 45-79. doi: 10.1093/rfs/hhj003

Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics,* 32(3), 485-512. doi: 10.1016/0304-3932(93)90027-D

Flannery, M., & Rangan, K. (2006). Partial adjustment toward target capital structures. *Journal of Financial Economics,* 79(3), 469-506. doi: 10.1016/j.jfineco.2005.03.004

Frank, M., & Goyal, V. (2008). Trade-off and pecking order theories of debt. *Handbook of Empirical Corporate Finance,* 2, 135-202. doi: 10.1016/B978-0-444-53265-7.50004-4

Frank, M., & Goyal, V. (2009). Capital structure decisions: Which factors are reliably important? *Financial Management,* 38(1), 1-37. doi: 10.1111/j.1755-053X.2009.01026.x

Fuente, G., & Velasco, P. (2020). Capital structure and corporate diversification: Is debt a panacea for the diversification discount? *Journal of Banking & Finance,* 111, 105728. doi: 10.1016/j.jbankfin.2019.105728

González, V., & González, F. (2008). Influence of bank concentration and institutions on capital structure: New international evidence. *Journal of Corporate Finance,* 14(4), 363-375. doi: 10.1016/j.jcorpfin.2008.03.010

González, F. (2016). Creditor rights, bank competition, and corporate investment during the global financial crisis. *Journal of Corporate Finance,* 37, 249-270. doi: 10.1016/j.jcorpfin.2016.01.001

Guariglia, A., & Mateut, S. (2010). Inventory investment, global engagement, and financial constraints in the UK: Evidence from micro data. *Journal of Macroeconomics,* 32(1), 239-250. doi: 10.1016/j.jmacro.2009.03.001

Gungoraydinoglu, A., & Öztekin, Ö. (2011). Firm- and country-level determinants of corporate leverage: Some new international evidence. *Journal of Corporate Finance,* 17(5), 1457-1474. doi: 10.1016/j.jcorpfin.2011.08.004

Hackbarth, D., Miao, J., & Morellec, E. (2006). Capital structure, credit risk and macroeconomic conditions. *Journal of Financial Economics,* 82(3), 519-550. doi: 10.1016/j.jfineco.2005.10.003

Halling, M., Yu, J., & Zechner, J. (2016). Leverage dynamics over the business cycle. *Journal of Financial Economics,* 122(1), 21-41. doi: 10.1016/j.jfineco.2016.07.001

Hanousek, J., & Shamshur, A. (2011). A stubborn persistence: Is the stability of leverage ratios determined by the stability of the economy? *Journal of Corporate Finance,* 17(5), 1360-1376. doi: 10.1016/j.jcorpfin.2011.07.004

Hansen, L.P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica,* 50(4), 1029-1054. doi: 10.2307/1912775

Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance,* 46(1), 297-355. doi: 10.1111/j.1540-6261.1991.tb03753.x

Hernando, I., & Martínez-Pagés, J. (2001). Is there a bank lending channel of monetary policy in Spain? *European Central Bank Working Paper Series* no. 99. https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp099.pdf?c96e711279de69a1355c6cbe27093a91 [Accessed 27 May 2020].

Huang, Z. (2003). Evidence of a bank lending channel in the UK. *Journal of Banking & Finance,* 27(3), 491-510. doi: 10.1016/S0378-4266(02)00388-6

Ippolito, F., Ozdagli, A., & Perez-Orive, A. (2018). The transmission of monetary policy through bank lending: The floating rate channel. *Journal of Monetary Economics,* 95, 49.71. doi: 10.1016/j.jmoneco.2018.02.001

Jadiyappa, N., Hickman, E., Jyothi, P., Vunyale, N., & Sireesha, B. (2020). Does debt diversification impact firm value? Evidence from India. *International Review of Economics and Finance,* 67, 362-377. doi: 10.1016/j.iref.2020.02.002

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review,* 76(2), 323-329.

Jiménez, G., Ongena, S., Peydró, J.L., & Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *The American Economic Review,* 102(5), 2301-2326. doi: 10.1257/aer.102.5.2301

Jordà, O., Schularick, M., & Taylor, A. (2011). When credit bites back: Leverage, business cycles, and crises. *NBER Working Paper* no. 17621. http://www.nber.org/papers/w17621 [Accessed 27 May 2020].

Kaplan, S., & Minton, B. (1994). Appointments of outsiders to Japanese boards: Determinants and implications for managers. *Journal of Financial Economics,* 36(2), 225-258. doi: 10.1016/0304-405X(94)90025-6

Korajczyk, R., & Levy, A. (2003). Capital structure choice: Macroeconomic conditions and financial constraints. *Journal of Financial Economics,* 68(1), 75-109. doi: 10.1016/S0304-405X(02)00249-0

Lang, W., & Nakamura, L. I. (1995). 'Flight to quality' in banking and economic activity. *Journal of Monetary Economics,* 36(1), 145-164. doi: 10.1016/0304-3932(95)01204-9

Leary, M. (2009). Bank loan supply, lender choice, and corporate capital structure. *The Journal of Finance,* 64(3), 1143-1185. doi: 10.1111/j.1540-6261.2009.01461.x

Lemmon, M. L., Roberts, M. R., & Zender, J. F. (2008). Back to the beginning: persistence and the cross-section of corporate capital structure. *The Journal of Finance,* 63(4), 1575-1608. doi: 10.1111/j.1540-6261.2008.01369.x

Leroy, A. (2014). Competition and the bank lending channel in Eurozone. *Journal of International Financial Markets, Institutions & Money,* 31, 296-314. doi: 10.1016/j.intfin.2014.04.003

Levy, A., & Hennessy, C. (2007). Why does capital structure choice vary with macroeconomic conditions? *Journal of Monetary Economics,* 54(6), 1545-1564. doi: 10.1016/j.jmoneco.2006.04.005

Miguel, A., & Pindado, J. (2001). Determinants of capital structure: New evidence from Spanish panel data. *Journal of Corporate Finance,* 7(1), 77-99. doi: 10.1016/S0929-1199(00)00020-1

Mishkin, F. (1995). Symposium on the monetary transmission mechanism. *The Journal of Economic Perspectives,* 9(4), 3-10. doi: 10.1257/jep.9.4.3

Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review,* 48(3), 261-297.

Munjal, S., Requejo, I., & Kundu, S. (2019). Offshore outsourcing and firm performance: Moderating effects of size, growth and slack resources. *Journal of Business Research,* 103, 484-494. doi: 10.1016/j.jbusres.2018.01.014

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics,* 5(2), 147-175. doi: 10.1016/0304-405X(77)90015-0

Nilsen, J. (2002). Trade credit and the bank lending channel. *Journal of Money, Credit and Banking,* 34(1), 226-253.

O'Brien, J., David, P., Yoshikawa, T., & Delios, A. (2014). How capital structure influences diversification performance: A transaction cost perspective. *Strategic Management Journal,* 35(7), 1013-1031. doi: 10.1002/smj.2144

Öztekin, Ö. (2015). Capital structure decisions around the world: which factors are reliably important? *Journal of Financial and Quantitative Analysis,* 50(3), 301-323. doi: 10.1017/S0022109014000660

Öztekin, Ö., & Flannery, M. (2012). Institutional determinants of capital structure adjustment speeds. *Journal of Financial Economics,* 103(1), 88-112. doi: 10.1016/j.jfineco.2011.08.014

Pindado, J., Requejo, I., & Rivera, J. C. (2017). Economic forecast and corporate leverage choices: The role of the institutional environment. *International Review of Economics and Finance,* 51, 121-144. doi: 10.1016/j.iref.2017.05.006

Pindado, J., Requejo, I., & Rivera, J.C. (2020). Does money supply shape corporate capital structure? International evidence from a panel data analysis. *The European Journal of Finance,* 26(6), 554-584. doi: 10.1080/1351847X.2019.1695645

Pour, E.K., & Lasfer, M. (2019). Taxes, governance, and debt maturity structure: International evidence. *Journal of International Financial Markets, Institutions & Money,* 58, 136-161. doi: 10.1016/j.intfin.2018.09.011

Rajan, R., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *The Journal of Finance,* 50(5), 1421-1460. doi: 10.1111/j.1540-6261.1995.tb05184.x

Reinhard, L.F.M., & Li, S. (2008). The influence of economic fluctuations on corporate financing decisions: South African evidence. *Afro-Asian Journal of Finance and Accounting,* 1(2), 107-128. doi: 10.1504/AAJFA.2008.021069

Rubio, G., & Sogorb, F. (2011). The adjustment to target leverage of Spanish public firms: Macroeconomic conditions and distance from target. *Revista de Economía Aplicada,* 19(57), 35-63.

Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance,* 43(1), 1-19. doi: 10.1111/j.1540-6261.1988.tb02585.x

Voutsinas, K., & Werner, R. (2011). Credit supply and corporate capital structure: Evidence from Japan. *International Review of Financial Analysis,* 20, 320-334. doi: 10.1016/j.irfa.2011.05.002

Zhou, Q., Tan, K., Faff, R., & Zhu, Y. (2016). Deviation from target capital structure, cost of equity and speed of adjustment. *Journal of Corporate Finance,* 39, 99-120. doi: 10.1016/j.jcorpfin.2016.06.002

Table 1
Distribution of firm-year observations across countries

	FRANCE	GERMANY	ITALY	SPAIN	The UK	Total firm-year obs.
Firm-year observations	1,911	2,352	1,036	781	2,385	8,465
% Firm-year observations	22.58%	27.78%	12.24%	9.23%	28.17%	100%

This table displays the distribution of firm-year observations by country. The final sample comprises 8,465 firm-year observations belonging to 959 listed firms over the period 2004 to 2015.

Table 2
Variable definitions

Variable	Description	Label
Dependent variable		
Leverage	The ratio of long-term and short-term financial debt to the book value of assets (Rajan and Zingales, 1995; Frank and Goyal, 2009).	FINDEBT_ASSETS
Bank debt	The ratio of bank debt to the book value of assets (González, 2016).	BANK_ASSETS
	The ratio of bank debt to financial debt.	BANK_FINDEBT
Non-bank debt	The ratio of the difference between total financial debt and bank debt to the total book value of assets.	NONBANK_ASSETS
Bank debt relevance	Coded 1 if *BANK_ASSETS* is above the yearly sample median, and 0 otherwise.	dumBANK_ASSETS
	Coded 1 if *BANK_FINDEBT* is above the yearly sample median, and 0 otherwise.	dumBANK_FINDEBT
Firm-specific variables		
Firm's assets structure	The ratio of tangible assets to total assets.	ASSETS
Firm's size	The natural logarithm of total assets.	SIZE
Firm's growth	The annual rate of change in total sales.	GROWTH
Firm's profitability	The ratio of earnings before interest and taxes to total assets.	PROFITABILITY
Firm's non-debt tax shields	The ratio of depreciation to total assets.	NDTS
Firm's risk	The three-year rolling window of the standard deviation of the ratio of earnings before interest and taxes to total assets.	RISK
Firm's net trade credit	The ratio of the difference between trade receivables and trade payables to total assets.	NTCA
Firm's cash	The ratio of cash to total assets.	CASHTA
Firm's financial expenses	The ratio of financial expenses to total assets.	FINEXP
Macroeconomic variables		
Credit supply	The annual growth rate of credit expansion to the private sector.	CRED
Inflation	The annual rate of change in the consumer price index.	INFL
Interest rate	The average of the interest of short-term debt (loans of up to one year to nonfinancial corporations) and the interest of long-term debt (loans of over five years to nonfinancial corporations).	INTR
CRISIS	Coded 1 if the observation belongs to the crisis period (2008 and subsequent years), and 0 otherwise.	CRISIS

Table 3
Descriptive statistics

	Mean	Median	STD	Min.	Max.	1st quartile	3rd quartile
Panel A: Leverage measures							
FINDEBT_ASSETS	0.2501	0.2377	0.1491	0.0000	0.6912	0.1344	0.3426
BANK_ASSETS	0.1928	0.1689	0.1399	0	0.6232	0.0777	0.2828
BANK_FINDEBT	0.7826	0.9430	0.2910	0.0015	1	0.6349	0.9997
NONBANK_ASSETS	0.0560	0.0112	0.0869	0	0.3973	0.0001	0.0808
Panel B: Firm-level variables							
ASSETS	0.2607	0.2119	0.2152	0	0.8834	0.0881	0.3740
SIZE	13.4406	13.2144	2.1973	7.3830	18.3413	11.7861	14.9735
GROWTH	0.0767	0.0340	0.3524	-0.8270	4.8994	-0.0689	0.1551
PROFITABILITY	0.0505	0.0565	0.0929	-1.1345	0.3780	0.0247	0.0905
NDTS	0.0319	0.0263	0.0259	0	0.1691	0.0143	0.0417
RISK	0.0387	0.0236	0.0511	0.0012	0.9350	0.0116	0.0459
NTCA	0.0523	0.0417	0.1048	-0.2613	0.4714	-0.0063	0.0988
CASHTA	0.0853	0.0617	0.0825	0.0002	0.8720	0.0299	0.1138
FINEXP	0.0168	0.0138	0.0132	0	0.0912	0.0077	0.0223
Panel C: Macroeconomic-level variables							
CRED	0.0237	0.0061	0.0649	-0.0982	0.2647	-0.0188	0.0417
INFL	0.0185	0.0199	0.0111	-0.0050	0.0448	0.0110	0.0255
INTR	0.0412	0.0399	0.0113	0.0221	0.0713	0.0329	0.0476

This table summarizes the descriptive statistics for the different variables of our study. Panel A reports descriptive statistics for the different leverage measures: *FINDEBT_ASSETS* is the ratio of long-term and short-term financial debt to the book value of assets; *BANK_ASSETS* is the ratio of bank debt to book value of assets; *BANK_FINDEBT* is the ratio of bank debt to financial debt; and *NONBANK_ASSETS* is the ratio of non-bank debt (calculated as the difference between total financial debt and bank debt) to total book value of assets. Panel B contains the descriptive statistics for the firm-level control variables: *ASSETS* is the ratio of tangible assets to total assets; *SIZE* is the natural logarithm of total assets; *GROWTH* is the annual rate change in total sales; *PROFITABILITY* is the ratio of earnings before interest and taxed to total assets; *NDTS* is the ratio of depreciation to total assets; *RISK* is the three-year rolling window of the standard deviation of the ratio of earnings before interest and taxes to total assets*; NTCA* is the ratio of the difference between trade receivables and trade payables to total assets; *CASHTA* is the ratio of cash to total assets; *FINEXP* is the ratio of financial expenses to total assets. Panel C shows the descriptive statistics for the macroeconomic variables: *CRED* is the annual growth rate of credit expansion to the private sector; *INFL* is the annual change in consumer price index; *INTR* is the average of the interest of short-term debt (loans up to one year to nonfinancial corporations) and the interest of long-term debt (loans of over five years to nonfinancial corporations). All variables are winsorized at the top and bottom one-percentile of their distribution to mitigate the influence of potential outlying observations.

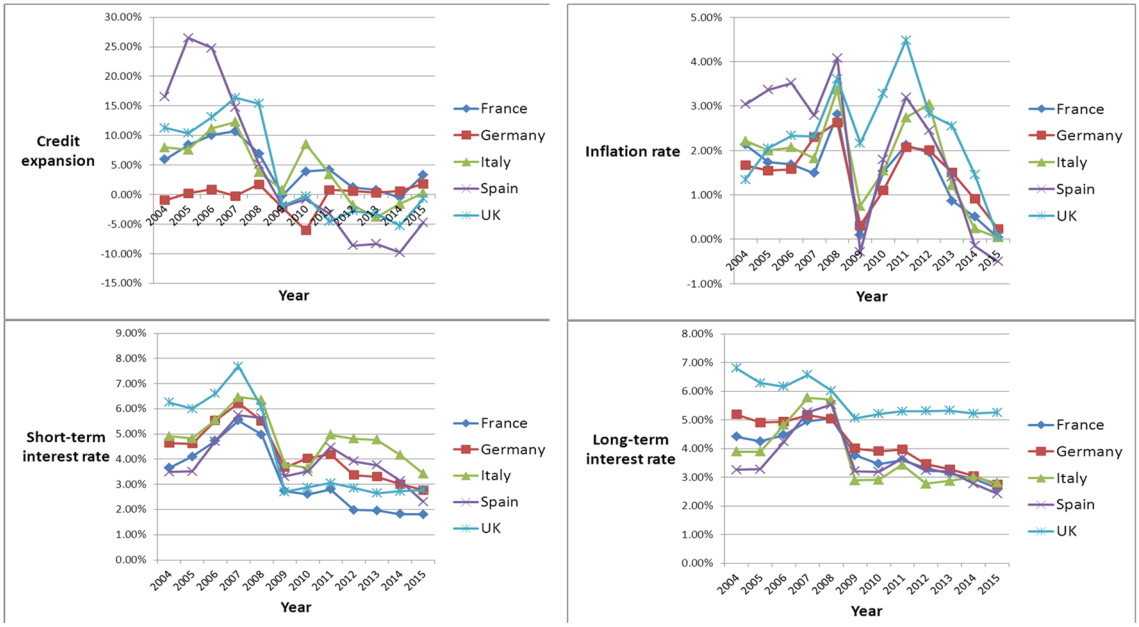
Table 4
Descriptive statistics for leverage by country and state of the economy

	FRANCE			GERMANY			ITALY			SPAIN			The UK		
	NON-CRISIS	CRISIS	ALL PERIOD	NON-CRISIS	CRISIS	ALL PERIOD	NON-CRISIS	CRISIS	ALL PERIOD	NON-CRISIS	CRISIS	ALL PERIOD	NON-CRISIS	CRISIS	ALL PERIOD
FINDEBT_ASSETS	0.2242	0.2354	0.2327	0.2481	0.2403	0.2422	0.2886	0.2986	0.2958	0.3078	0.3268	0.3212	0.2410	0.2254	0.2288
	(0.1340)	(0.1384)	(0.1374)	(0.1517)	(0.1518)	(0.1518)	(0.1363)	(0.1405)	(0.1393)	(0.1594)	(0.1574)	(0.1581)	(0.2410)	(0.1469)	(0.1456)
BANK_ASSETS	0.1636	0.1796	0.1757	0.1833	0.1737	0.1760	0.2545	0.2586	0.2574	0.2673	0.2842	0.2792	0.1853	0.1619	0.1669
	(0.1196)	(0.1315)	(0.1288)	(0.1465)	(0.1413)	(0.1426)	(0.1272)	(0.1313)	(0.1301)	(0.1473)	(0.1546)	(0.1526)	(0.1223)	(0.1259)	(0.1255)
BANK_FINDEBT	0.7436	0.7717	0.7649	0.7225	0.7271	0.7261	0.9019	0.8824	0.8879	0.8697	0.8575	0.8611	0.8049	0.7744	0.7810
	(0.2832)	(0.2743)	(0.2767)	(0.3014)	(0.3272)	(0.3212)	(0.1827)	(0.1900)	(0.1881)	(0.1946)	(0.2061)	(0.2027)	(0.2776)	(0.3233)	(0.3142)
NONBANK_ASSETS	0.0612	0.0558	0.0572	0.0612	0.0635	0.0629	0.0324	0.0399	0.0377	0.0451	0.0444	0.0446	0.0549	0.0616	0.0601
	(0.0846)	(0.0789)	(0.0803)	(0.0742)	(0.0882)	(0.0851)	(0.0665)	(0.0714)	(0.0701)	(0.0731)	(0.0642)	(0.0669)	(0.0960)	(0.1052)	(0.1033)

This table provides the mean values (standard deviations in parentheses) for our different measures of leverage by country and state of the economy (non-crisis versus crisis period). *FINDEBT_ASSETS* is the ratio of long-term and short-term financial debt to the book value of assets; *BANK_ASSETS* is the ratio of bank debt to book value of assets; *BANK_FINDEBT* is the ratio of bank debt to financial debt; and *NONBANK_ASSETS* is the ratio of non-bank debt (calculated as the difference between total financial debt and bank debt) to total book value of assets. All variables are winsorized at the top and bottom one-percentile of their distribution to mitigate the influence of potential outlying observations.

Figure 1

Evolution of macroeconomic determinants of leverage over time and across countries



This Figure depicts the evolution of macroeconomic variables for the five countries in our sample (France, Germany, Italy, Spain, and the UK) over the period 2004 to 2015.

Table 5
Baseline model of partial adjustment and the moderating effect of bank debt on macroeconomic variables

	Dependent variable: FINDEBT_ASSETS			
	(1)	**(2)**	**(3)**	**(4)**
Intercept	-0.0407	-0.0298	-0.0544***	-0.0469***
	(0.0338)	(0.0336)	(0.0190)	(0.0141)
L.FINDEBT_ASSETS	0.8616***	0.8411***	0.8726***	0.8281***
	(0.0268)	(0.0268)	(0.0201)	(0.0129)
Firm variables				
L.ASSETS	0.0277	0.0253	0.0141	0.0472***
	(0.0221)	(0.0216)	(0.0146)	(0.0097)
L.SIZE	0.0049**	0.0023	0.0055***	0.0041***
	(0.0025)	(0.0024)	(0.0013)	(0.0010)
L.GROWTH	0.0318***	0.0388***	0.0307***	0.0259***
	(0.0083)	(0.0074)	(0.0047)	(0.0029)
L.PROFITABILITY	0.1037***	0.1251***	0.0544***	0.0643***
	(0.0333)	(0.0312)	(0.0188)	(0.0127)
L.NDTS	0.2154	0.2690**	0.2801***	0.0083
	(0.1356)	(0.1283)	(0.0934)	(0.0571)
L.RISK	0.0738***	0.0860***	0.0787***	0.0775***
	(0.0273)	(0.0265)	(0.0190)	(0.0131)
L.NTCA	-0.1205***	-0.1471***	-0.1246***	-0.1172***
	(0.0429)	(0.0409)	(0.0282)	(0.0201)
L.CASHTA	-0.1139***	-0.0987**	-0.0303	-0.1243***
	(0.0444)	(0.0423)	(0.0314)	(0.0195)
L.FINEXP	-0.5642**	-0.4995*	-0.6107***	-0.3943***
	(0.2850)	(0.2717)	(0.1559)	(0.0974)
Macroeconomic variables				
L.CRED	0.0219	0.0190	0.1072***	0.0441**
	(0.0151)	(0.0153)	(0.0274)	(0.0200)
L.INFL	-0.2470***	-0.1672**	-0.0763	-0.0389
	(0.0767)	(0.0709)	(0.1152)	(0.0714)
L.INTR	0.2791**	0.5640***	0.0866	0.4651***
	(0.1187)	(0.1150)	(0.1120)	(0.0840)
Interaction effects				
L.CRED × dumBANK_ASSETS			-0.1327***	-0.0665**
			(0.0398)	(0.0276)
L.INFL× dumBANK_ASSETS			-0.1667	-0.0768
			(0.1956)	(0.1227)
L.INTR× dumBANK_ASSETS			0.3561**	0.2819***
			(0.1553)	(0.1047)
Country fixed effects	NO	YES	NO	YES
$\sum_{l..CRED}$			-0.0254	-0.0224*
			(0.0187)	(0.0128)
$\sum_{l..INFL}$			-0.2430**	-0.1157
			(0.1067)	(0.0721)
$\sum_{l..INTR}$			0.4428***	0.7470***
			(0.1127)	(0.0814)
No. of obs.	8,465	8,465	8,465	8,465
Wald test	3058.94***	3551.70***	52584.53***	20959.28***

Wald test for joint significance of multiplicative macro dummies			16.12***	12.73***
m1 statistic	-14.12***	-14.20***	-14.80***	-14.90***
m2 statistic	-1.62	-1.62	-1.58	-1.50
p-value m2 statistic	0.105	0.105	0.114	0.133
Hansen test	123.71	144.88	333.18	517.78
p-value Hansen test	0.390	0.371	0.196	0.119

Columns (1) and (2) of this table contain the two-step GMM system estimation results of equation [3], which is the baseline model of partial adjustment of leverage based on Daskalakis *et al*. (2017). Columns (3) and (4) report the two-step GMM system estimation results of equation [4], which is the model of partial adjustment of leverage including the moderating role of bank debt on macroeconomic conditions. Corporate leverage is regressed on lagged leverage, lagged firm-level variables and lagged macroeconomic variables. Leverage is proxied by *FINDEBT_ASSETS* (the ratio of long-term and short-term financial debt to the book value of assets). Firm-level variables are *ASSETS* (the ratio of tangible assets to total assets), *SIZE* (the natural logarithm of total assets), *GROWTH* (the annual rate change in total sales), *PROFITABILITY* (the ratio of earnings before interest and taxed to total assets), *NDTS* (the ratio of depreciation to total assets), *RISK* is the three-year rolling window of the standard deviation of the ratio of earnings before interest and taxes to total assets*; NTCA* (the ratio of the difference between trade receivables and trade payables to total assets), *CASHTA* (the ratio of cash to total assets), and *FINEXP* (the ratio of financial expenses to total assets). Macroeconomic variables are *CRED* (the annual growth rate of credit expansion to the private sector), *INFL* (the annual change in consumer price index), and *INTR* (the average of the interest of short-term debt (loans up to one year to nonfinancial corporations) and the interest of long-term debt (loans of over five years to nonfinancial corporations). In columns (3) and (4), the relevance of bank debt in a firm's capital structure is approximated by *dumBANK_ASSETS* (a dummy which equals 1 if *BANK_ASSETS* is above the yearly sample median, and which is null otherwise). $\sum_j$ coefficients denote the linear combined effect of each macroeconomic variable plus its interaction effect with the relevance of bank debt. All variables are winsorized at the top and bottom one-percentile of their distribution. The Wald test contrasts the null hypothesis of no joint significance of the explanatory variables. m_1 and m_2 contrast the lack of first-order and second-order serial correlation in the first-difference residuals. The Hansen test is the test of over-identifying restrictions under the null hypothesis of no correlation between the instruments and the error term. Standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 6
Significance of macroeconomic variable contribution to corporate leverage by bank debt relevance

Dependent variable: FINDEBT_ASSETS					
PANEL A:					
Proxy for bank debt (*dumBANK_ASSETS*)					
Below median bank debt	**Above median bank debt**	**Difference**	**Below median bank debt**	**Above median bank debt**	**Difference**
1.52	10.02***	2.81*	43.25***	92.65***	7.19***
(0.2171)	(0.0015)	(0.0936)	(0.0000)	(0.0000)	(0.0073)
Country fixed effects: NO			Country fixed effects: YES		
PANEL B:					
Proxy for bank debt (*dumBANK_FINDEBT*)					
Below median bank debt	**Above median bank debt**	**Difference**	**Below median bank debt**	**Above median bank debt**	**Difference**
3.23*	19.50***	8.21***	48.65***	67.64***	3.17*
(0.0721)	(0.0000)	(0.0042)	(0.0000)	(0.0000)	(0.0751)
Country fixed effects: NO			Country fixed effects: YES		

This table presents the Wald statistic for restrictions by bank debt relevance. To group firm-year observations depending on bank debt relevance, Panel A uses the variable *dumBANK_ASSETS* (a dummy which equals 1 if *BANK_ASSETS* is above the yearly sample median, and which is 0 otherwise), and Panel B draws on the variable *dumBANK_FINDEBT* (a dummy which equals 1 if *BANK_FINDEBT* is above the yearly sample median, and which is 0 otherwise). P-values are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7
Mean decomposition analysis of leverage by bank debt relevance

	$\overline{FINDEBT\_ASSETS_t}$	$\overline{\widehat{FINDEBT\_ASSETS_t}}$	$\overline{\widehat{FINDEBT\_ASSETS}_{t,L}}$	$\overline{\widehat{FINDEBT\_ASSETS}_{t,F}}$	$\overline{\widehat{FINDEBT\_ASSETS}_{t,M}}$	Intercept
Panel A: By subsamples of firm-year observations with *BANK_ASSETS* above and below the yearly sample median						
Low bank debt (dumBANK_ASSETS=0)	0.1654	0.1634	0.1360	0.0765	0.0053	-0.0544
High bank debt (dumBANK_ASSETS=1)	0.3346	0.3352	0.3012	0.0749	0.0135	-0.0544
Full sample	0.2501	0.2494	0.2187	0.0757	0.0094	-0.0544
Panel B: By subsamples of firm-year observations grouped by quartiles of *BANK_ASSETS*						
Low bank debt (4th quartile)	0.1349	0.1337	0.1049	0.0786	0.0046	-0.0544
3rd quartile	0.1959	0.1933	0.1668	0.0747	0.0062	-0.0544
2nd quartile	0.2683	0.2714	0.2380	0.0745	0.0133	-0.0544
High bank debt (1st quartile)	0.4013	0.3992	0.3651	0.0751	0.0134	-0.0544

This Table displays the results of the mean decomposition analysis of leverage approximated by *FINDEBT_ASSETS* (the ratio of long-term and short-term financial debt to the book value of assets). Panel A presents the results by subsamples of firm-year observations with below median and above median levels of bank debt relevance, based on *dumBANK_ASSETS* (a dummy which equals 1 if *BANK_ASSETS* is above the yearly sample median, and which is 0 otherwise). Panel B reports the robustness analyses by subsamples of firm-year observations grouped by quartiles of *BANK_ASSETS*. $\overline{FINDEBT\_ASSETS_t}$ is the average of the true values of *FINDEBT_ASSETS*. $\overline{\widehat{FINDEBT\_ASSETS_t}}$ is the average of the fitted values of *FINDEBT_ASSETS* from equation [3]. The average fitted leverage ratio ($\overline{\widehat{FINDEBT\_ASSETS_t}}$) is decomposed into the average contribution of the lagged leverage ratio ($\overline{\widehat{FINDEBT\_ASSETS}_{t,L}}$), the average contribution of firm-level regressors ($\overline{\widehat{FINDEBT\_ASSETS}_{t,F}}$), the average contribution of the macroeconomic regressors ($\overline{\widehat{FINDEBT\_ASSETS}_{t,M}}$) and the intercept of the regression.

Table 8
Leverage adjustment model by type of debt and state of the business cycle

	Dependent variable: FINDEBT_ASSETS			Dependent variable: BANK_ASSETS			Dependent variable: NONBANK_ASSETS		
	(1) Non-crisis	(2) Crisis	(3) Difference	(4) Non-crisis	(5) Crisis	(6) Difference	(7) Non-crisis	(8) Crisis	(9) Difference
Intercept	-2.7742**	-2.7742**		0.0241	0.0241		-0.0325***	-0.0325***	
	(1.1554)	(1.1554)		(0.0829)	(0.0829)		(0.0071)	(0.0071)	
L.FINDEBT_ASSETS	0.6304*	0.5580***	-0.0724						
	(0.3457)	(0.0410)	(0.3477)						
L.BANK_ASSETS				0.6590***	0.8558***	0.1968**			
				(0.0830)	(0.0140)	(0.0835)			
L.NONBANK_ASSETS							0.7705***	0.8907***	0.1202***
							(0.0120)	(0.0032)	(0.0113)
Firm variables									
L.ASSETS	-0.5078	0.0425	0.5503	-0.0326	0.0081	0.0407	0.0123***	0.0069***	-0.0054**
	(1.3384)	(0.0564)	(1.3378)	(0.0672)	(0.0110)	(0.0686)	(0.0025)	(0.0013)	(0.0024)
L.SIZE	0.1185**	0.0246**	-0.0939	0.0048	-0.0064***	-0.0112*	0.0022***	0.0025***	0.0003*
	(0.0579)	(0.0102)	(0.0580)	(0.0059)	(0.0012)	(0.0061)	(0.0004)	(0.0001)	(0.0004)
L.GROWTH	0.2065	0.0315***	-0.1750	-0.0124	0.0499***	0.0623***	0.0044***	-0.0044***	-0.0088***
	(0.1459)	(0.0071)	(0.1470)	(0.0167)	(0.0056)	(0.0186)	(0.0011)	(0.0006)	(0.0013)
L.PROFITABILITY	-1.8610**	0.1036**	1.9646**	-0.0027	0.1167***	0.1194**	-0.0066	-0.0229***	-0.0163***
	(0.8548)	(0.0458)	(0.8568)	(0.1329)	(0.0199)	(0.1331)	(0.0058)	(0.0023)	(0.0058)
L.NDTS	16.8181**	0.1659	-16.6522**	-0.5780	0.2128***	0.7908*	-0.1195***	-0.0232***	0.0963**
	(7.8048)	(0.2335)	(7.8085)	(0.4171)	(0.0802)	(0.4142)	(0.0219)	(0.0089)	(0.0216)
L.RISK	2.6388	0.2448***	-2.3940	0.1078	0.0453*	-0.0625	0.0032	-0.0023	-0.0055
	(1.6766)	(0.0762)	(1.6731)	(0.0987)	(0.0244)	(0.1016)	(0.0093)	(0.0026)	(0.00930)
L.NTCA	0.0723	-0.3143***	-0.3866	-0.2816**	-0.0563***	0.2253*	0.0029	0.0033	0.0004
	(3.6313)	(0.0732)	(3.6269)	(0.1327)	(0.0184)	(0.1327)	(0.0063)	(0.0023)	(0.0061)
L.CASHTA	3.0845	-0.0859	-3.1704	-0.0800	-0.0596**	0.0204	0.0144***	0.0061**	-0.0083
	(3.3521)	(0.0659)	(3.3540)	(0.1010)	(0.0239)	(0.1049)	(0.0056)	(0.0026)	(0.0051)
L.FINEXP	1.3642	-0.5547**	-1.9189	2.0216*	-0.1998	-2.2214**	0.0908**	0.1726***	0.0818*
	(4.9936)	(0.2490)	(5.0148)	(1.1284)	(0.1352)	(1.1358)	(0.0455)	(0.0187)	(0.0441)
Macroeconomic variables									

L.CRED	0.9123* (0.5041)	0.0313 (0.0276)	-0.8810* (0.5159)	0.1653*** (0.0558)	0.0336* (0.0183)	-0.1317** (0.0595)	-0.0107 (0.0129)	-0.0015 (0.0028)	0.0092 (0.0130)
L.INFL	4.4132 (5.0260)	-0.1525** (0.0718)	-4.5657 (5.0158)	-0.7317 (0.6256)	-0.2732*** (0.0668)	0.4585 (0.6288)	0.1679 (0.1769)	0.1250*** (0.0122)	-0.0429 (0.1768)
L.INTR	7.1546 (7.0689)	0.8612*** (0.1668)	-6.2933 (7.1068)	-0.1154 (0.4123)	0.3450*** (0.1140)	0.4604 (0.4243)	0.1519*** (0.0505)	0.0187 (0.0183)	- 0.1332*** (0.0517)
CRISIS	2.5061** (1.1601)	2.5061** (1.1601)		.0578 (.0851)	0.0578 (0.0851)		-0.0035 (0.0072)	-0.0035 (0.0072)	
Country fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
No. of obs.		8,465			8,465			7,506	
Wald test		879.69***			10207.18***			141302.88***	
Joint significance of multiplicative firm dummies		20.81**			41.59***			130.95***	
Joint significance of multiplicative macro dummies		8.52**			6.22			9.15**	
Joint significance of multiplicative firm and macro dummies		24.76**			46.64***			159.71***	
m1 statistic		-2.78***			-13.90***			-7.87***	
m2 statistic		-1.21			-0.05			1.02	
p-value m2 statistic		0.228			0.958			0.310	
Hansen test		177.64			285.32			584.16	
p-value Hansen test		0.676			0.250			0.353	

This table reports the two-step GMM system estimation results of equation [5], which is the model of partial adjustment of leverage including the moderating role of the business cycle. The final estimated coefficients for each business cycle state are reported as well as the difference between them. *CRISIS* is a dummy variable which equals 1 if the observation corresponds to the year 2008 or subsequent years, and which is null otherwise. Columns (1) to (3) report the results for total leverage, approximated by *FINDEBT_ASSETS* (the ratio of long-term and short-term financial debt to the book value of assets). Columns (4) to (6) present the results for bank debt, measured by *BANK_ASSETS* (the ratio of bank debt to book value of assets). Columns (7) to (9) show the results for non-bank debt, captured by *NONBANK_ASSETS* (the ratio of non-bank debt to book value of assets). Firm-level variables are *ASSETS* (the ratio of tangible assets to total assets), *SIZE* (the natural logarithm of total assets), *GROWTH* (the annual rate change in total sales), *PROFITABILITY* (the ratio of earnings before interest and taxed to total assets), *NDTS* (the ratio of depreciation to total assets), *RISK* is the

three-year rolling window of the standard deviation of the ratio of earnings before interest and taxes to total assets*; NTCA* (the ratio of the difference between trade receivables and trade payables to total assets), *CASHTA* (the ratio of cash to total assets), and *FINEXP* (the ratio of financial expenses to total assets). Macroeconomic variables are *CRED* (the annual growth rate of credit expansion to the private sector), *INFL* (the annual change in consumer price index), and *INTR* (the average of the interest of short-term debt (loans up to one year to nonfinancial corporations) and the interest of long-term debt (loans of over five years to nonfinancial corporations). All variables are winsorized at the top and bottom one-percentile of their distribution. The Wald test contrasts the null hypothesis of no joint significance of the explanatory variables. m_1 and m_2 contrast the lack of first-order and second-order serial correlation in the first-difference residuals. The Hansen test is the test of over-identifying restrictions under the null hypothesis of no correlation between the instruments and the error term. Standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level, respectively.