DO FINANCIAL LAWS AFFECT INVESTMENT DETERMINANTS? SOME EUROPEAN EVIDENCE

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Abstract

Investment-cash flow sensitivities have been extensively analysed. One reason for the excess sensitivity between investment and internal resources is market imperfections. In this article, we try to determine whether this relationship is either affected by the nature of the financial system or associated to other firm-specific determinants such as size or industry. Results show that prudent banking regulation and creditor legal protection reduce investment-cash flow sensitivities, that is, alleviate the inefficiencies associated to asymmetric information and capital market frictions. However, firm characteristics still have a word to say when taking into account financial regulations.

Keywords: Investment, financial restrictions, investor protection and banking law

1 Introduction

Firm financial structure and its implications on investment decisions has been extensively analysed in economic and business literature. Modigliani and Miller (1958) show that provided that financial markets are perfect, capital structure does not affect investment decision making and therefore, the cost of capital does not depend on financing decisions. However, markets are imperfect and frictions are part of their functioning. Taking into account these frictions, several papers have analysed the determinants of investment decision making and the effects of asymmetric information, Donaldson (1961) and Stiglitz and Weiss (1981) among others. They prove that information asymmetries between creditors and borrowers increase the cost of external finance respect to internal funds. Besides, Myers and Majluf (1984) show that when there are information asymmetries and managers have better information than capital markets about investment opportunities, firms may pay additional costs for their financing. Therefore, investment projects of firms with information asymmetries are more sensitive to internal fund variance.

Empirical evidence, however, has shown that not all the countries present the same degree of sensitivity in corporate investment to cash flow variables (Bond et al. 2003), implying that there are differences in the determinants of investment financing between countries. Such differences suggest that the cash flow-investment relationship can not be understood unless institutional settings and national financial system are taken into account. One reason is that financial systems deal differently with the asymmetric information problem, (Hill, 1995). This financial system argument proposes that the arrangement of financial systems is responsible for the differences in the importance of broad lending channel relationships across countries. This in turn, results in differences in the estimated relationships between investment and cash flow (Mizen and Vermeulen, 2005). Furthermore, asymmetric information in capital markets makes it costly for lenders to evaluate the quality of firms' investment projects. Then, the cost of new debt or equity can be substantially higher than the opportunity costs of internal finance. As a consequence, for certain classes of firms, investment depends more importantly on financial factors such as the availability of internal finance and the access to new debt or equity finance. As far as banking and capital markets' norms regulate the intermediation function of banks and capital markets, they can ease the access to external finance. Therefore, they can have an impact on investment decisions.

Previous studies stress the importance of law in financial system configuration and development. Barth et al. (2001), claim that national regulations and recommendations from international organisations (e.g. BIS) conform the baseline for the development and structure of banking systems worldwide. La Porta et al. (1997), discuss how creditor and shareholder protection

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help to develop financial markets. Aoki (1994) and Williamson (1991) identify capital market features and banking systems respectively to be institutional factors of primary importance. Further, some papers find evidence that banking regulation and investor protection have significant effects on economic growth, Utrero-Gonzalez (2006) and leverage decisions Lopez-Iturriaga (2005). However, there is no evidence, as far as the authors know, on how these legal and institutional arrangements can affect investment decisions.

Actually, empirical analysis on investment decisions has focussed on the effects of availability of internal resources on the relationship between cash flow and investment[2]. In the same vein, international studies have mainly analysed the differences between market-oriented (UK and US) and relationship-oriented financial systems (Germany and Japan), paying less attention to the particular features of the members of the European Union. During the 90's decade, European financial landscape has suffered dramatic changes when preparing for the introduction of the single monetary union. Due to this evolution the Euro area financial structure has placed somewhat in between US and Japan, with financial institutions playing an important role, but with market based instruments developing further (Hartmann et al, 2003). Despite, this evolution towards an integrated financial market, differences still persist both in securities markets and banking because of differences in national legal provisions, corporate taxation and deposit insurance systems among other.

Following the above discussion, this paper tries to evaluate the relevance of national financial settings in cash flow investment relationships. In particular, we concentrate on the banking system and investor protection laws. Within this context, we take a closer look on European financial systems to evaluate the impact of differences in the investment-cash flow sensitivities previously discussed. By testing these effects, additional evidence on the investment cash-flow sensitivities debate is provided. This analysis is carried out for firms from Austria, Belgium, France, Germany, Italy, Portugal and Spain for the period 1990-1999 collected from BACH database.

The paper has the following structure: section 2 presents the background issues in the literature. Section 3 presents the data. The models to estimate are presented in section 4. Section 5 shows the main results. Finally, section 6 concludes and indicates possible extensions and future line of research.

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[2] Fazzari et al. (1988), Hoshi, Kashyap y Scharfstein (1991), Himmelberg and Petersen (1994), Hubbard, Kashyap and Whited (1995), Gilchrist and Himmelberg, (1998) and Cleary (1999) among others.

2   Literature

Financial regulations may affect investment decisions by providing easier access to external finance for firms with high growth potential. Creditor and shareholder protection have been proved to reduce asymmetric information problems and affect financing decisions (Giannetti (2003)). For instance, strict creditor protection leads to cheaper credit. Hence many valuable investment projects, which would not be funded because of moral hazard problems, may be financed. However, too demanding creditor rights may cause underinvestment problems instead (Manove et al, (2001)). Shareholder protection is then crucial to capital market development because it makes expropriation practices from insiders less efficient (Grossman and Hart, (1988)).

Related to banking sector, banking sector structure also affects firm-banking relationships. Regulatory intervention, that influences the competitive position of commercial banks, shapes banking structure. In particular, prudential regulation involves government intervention and monitoring of the banking system to ensure its safety and soundness, and reduce excessive competitive pressures (Matutes and Vives, 1995).

Despite the increasing interest on financial regulations, empirical literature on investment decisions has mainly concentrated in the analysis of firms' characteristics, especially in the case of more restricted firms (Fazzari et al. (1996)). It is shown how cash flow has an important impact on investment decisions, especially in financially restricted firms. Hoshi, Kashyap and Scharfstein (1991) illustrate that firms belonging to a Japanese keiretsu (industrial group) have easier access to external finance coming from the group banks or financial institutions. Therefore, financial restrictions are less severe for those firms included in such economic groups. Using an Euler equation approach, Whited (1992) finds a sustainable sensibility between cash flow and investment of more leveraged firms or firms with no qualified debt. Similarly, Bond and Meghir (1994) support the Fazzari et al. (1988) informational asymmetry argument. Himmelberg and Petersen (1994) find similar conclusions for a sample of high technology firms.

Kaplan and Zingales (1997), however, show that the least financially constrained firms present the greatest sensibility in the internal funds and investment relationship. They claim that the relationship between investment decisions and internal resources is not affected by financial restrictions. Cleary (1999) supports these results. The main idea of the work by Kaplan and Zingales and Cleary is that for firms under distress, cash flow sensitivity might be reduced, so that for severely

constrained firms the usual relationship found in the literature might be reversed. These studies have generally focused on samples of a single country, based on sample-splitting between constrained and unconstrained firms and therefore, fail to capture the effects of institutional differences on investment decisions.

More recently, Mairesse et al. (1999), Bond et al. (2003) and Mizen and Vermeulen (2005) perform international comparisons of investment decisions and find that investment cash flow sensibilities differ across countries. These papers claim that there are differences in the degree of sensibility across countries and that they may be ascribed to the nature of the lender-borrower relationship in the financial systems of those countries. With respect to the kind of financial system, market-oriented, where arms-length lenders offer funds through commercial paper, corporate bond and equity markets, are more likely to show greater sensitivity to cash flow. On the contrary, relationship-oriented systems are likely to foster closer and more transparent arrangements that allow them to exercise greater scrutiny over borrowers, and as a result investors will be less sensitive to internal sources of funds.

Previous papers that study the impact of financial system on the investment-cash flow relationship in an international context follow a common methodology. They usually make a comparison of the results obtained, for the sample of countries chosen, to draw conclusions about the convenience of certain financial arrangements. We take a completely different approach. We, instead, construct a sample of European countries and classify them according to their banking laws and investor protection, which are the main norms that conform the banking and capital markets respectively. We test how the investment cash flow relationship differs in the different types of countries.

3 Methodology

Mairesse et al. (1999), Bond et al. (2003) and Mizen and Vermeulen (2005) are recent cross-country investment studies that, following Bean (1981), model investment in a flexible error correction model[3]. This formulation has the advantage of retaining information in the levels of output and capital stock. Assuming that the change in the capital stock can be approximated by investment over previous capital stock less depreciation, this gives an empirical model of the form:

$$\frac{I_{ij,t}}{K_{ij,t-1}} = \gamma_1 \frac{I_{ij,t-1}}{K_{ij,t-2}} + \gamma_2 \Delta y_{ij,t} + \gamma_3 \Delta y_{ij,t-1} + \theta(k_{ij,t-2} - y_{ij,t-2}) + \phi_1 \frac{cf_{ij,t-1}}{K_{ij,t-2}} + d_t + \eta_i + \mu_j + v_{ij,t}$$

(1)

The introduction of adjustment costs reflects the sluggish adjustment of capital stock. This model allows testing the importance of financial constraints through the inclusion of cash flow scaled by capital, as a measure of the supply. We estimate the above equation using first-difference GMM (Arellano and Bond, 1991) since OLS does not control for the possibility of unobserved specific effects and may therefore result in upward-biased estimated of the autoregressive coefficients if specific effects are important. Further, within groups does not solve the problem either, since it is well known to result in downward-biased estimates in panels with a small number of periods (Bond et al. 2003). GMM first differences eliminate the specific effects by differencing the equations, and then uses lagged values of endogenous variables as instruments[4]. We use the Sargan-test of overidentifying restrictions as a joint test of model specification and instrument selection. We also report the m1 and m2 tests of serial correlation. Both m1 and m2 are asymptotically standard normal under the null of no serial correlation in $v_{ij,t}$. We estimate equation (1) taking into account different legal arrangements and in different subsamples to shed some light about the contribution of legal environment to previous results.

4 Data
4.1 The BACH database

The BACH database is assembled by the European Commission and is constructed through the aggregation of a large number of individual firm balance sheets and profit and loss accounts. Aggregated firm balance sheets and profit and loss accounts are provided for 3 size classes[5] and for 17 different industries. This gives 51 "representative firms" for each country. Usually, the number of firms used in the aggregation differs from year to year but in general it is quite large[6]. A unit of observation is defined by size, industry and country. Before the aggregation takes place, the accounting data is harmonised across countries in a single format. This

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[3] When estimating an Euler specification for data from a range of European countries, Bond et al. (2003) indicate that the model is "seriously mispecified" and offer a distinctly lukewarm discussion of its performance.

[4] If the error term in levels is serially uncorrelated, then the error term in first differences is MA(1), and instruments dated t-2 and earlier should be valid in the difference equation. If the error term is itself MA(1), then only instruments dated t-3 and earlier are valid.

[5] The three size classes: small firms (turnover small than 7 million euro), medium-sized firms (turnover between 7 and 40 millions) and large firms (turnover in excess of 40 million). U.S. presents only data on two classes; small-medium and large firms.

[6] For instance, this is about 19000 for Germany and 27000 for Italy

is the main advantage of the database, that financial data is comparable. Furthermore, the BACH database includes data from very small firms. For instance for Germany, the firms used for aggregation in the small size class have around 30 employees on average for the manufacturing sectors and around 12 employees for the services sectors. For the other countries, similar numbers hold. The inclusion of these firms allows us to test for a differential effect for the large and small firms. Firm size has been used as an indicator of access to external finance (Gertler and Gilchrist, 1994). Further, small firms are generally younger with higher levels of firm-specific risk, and less collateral, making them less likely to attract external finance. However, in the European context, bond markets and commercial paper markets are much less developed than in the US. Then, differences between large and small firms may be less marked, (Mizen and Vermeulen, 2005)).

In this paper we use information on Austria, Belgium, France, Germany, Italy, Portugal and Spain, because not all items are available for Finland and the Netherlands. Also the length of the sample differs across countries. It is the shortest for Portugal, covering from 1990 to 1999 and longest for Austria. In order to have the same period for all countries and due to institutional data availability, the period of study will be 1990-1999.

Previous empirical work has mostly relied on aggregated data or large firms, which have easier access to international capital markets and therefore, are less subject to the institutional constraints imposed by domestic markets. Instead, we use industry-level panel data. To the extent that agency problems vary systematically across industries[7], the institutional developments, on which we focus in this study, may affect investment levels differently in each industry. Besides, different papers use industry data to analyse investments (Vermeulen, 2002), performance and growth (Rajan and Zingales, 1998, among others). Therefore, we consider industry data appropriate for the purpose of our study. The main features of the data and the details of how the individual variables were constructed can be found in the Appendix.

Table 1 contains a brief description of the dataset. It compares both across size classes and across countries, the ratio of investment to capital, sales growth and the cash flow to capital ratio. The variability across sectors within each country and each size is very high, as the standard

deviation shows. It is interesting to remark that with the exception of Austria, small or medium-sized firms tend to invest more than large firms.

4.2 Institutional Variables

Following the contribution of La Porta et al. (1998), we introduce in the analysis several measures of the legal scenario that may affect capital structure decisions. La Porta et al. (1997, 1998) (LLSV henceforth) develop two measures for creditor and shareholder protection. Building on these measures, we first, complete LLSV indexes of shareholder and creditor protection[8] including the analysis of merger legislation. Second, we study banking prudential provisions. The method of construction is inspired in the works by LLSV (1998). Using national banking laws and legal literature, we define different categories which summarise public intervention in banking. For every country and each category we sum one unit when the feature is present and zero otherwise. Afterwards, we sum for each index and obtain the result for every country. Details of how the individual variables were constructed can be found in the Appendix. Table 2 presents the values of these variables**.** Higher values indicate higher investor protection or more prudent banking norms that restrict competition. Related to creditor and shareholder protection, there seems to be an inverse relationship. Those countries with higher protection to shareholder such as France present a weak creditor protection index and conversely, Germany and Belgium present a strong protection to creditors and weaker protection to shareholder.

5 Results

Table 3 reports GMM results for an error-correction model of the form outlined in equation (1). The instruments used were the lagged values of all right-side variables dated t-2, t-3 and t-4, which allow for contemporaneous correlation between these variables and shocks to the investment equation, as well as correlation with unobserved firm-specific effects. The Sargan p-value and the m1 and m2 statistics indicate that the model is well specified. Neither current nor lagged sales growth has a significant impact on investment. The error correction term is significant and has the right sign. Error-correcting behaviour requires that the coefficient is negative, so that a capital stock above its desired level is associated with lower future investments, and vice versa (Bond et al., 2003). Cash flow has a positive and

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[7] Rajan and Zingales (1998), for example, forcefully argue that different industries require different amounts of external finance, which may result in different degrees of severity of the conflicts between ownership and control.

[8] These indexes are derived from bankruptcy and company regulations.

significant effect on investment. Therefore, the sensitivity of investment spending to fluctuations in cash flow is significant in this sample.

One possibility outlined earlier and shown in the literature is that this sensitivity can be affected by different financial system arrangements. We classify countries according to the protection to creditors and shareholders and to the degree of prudential banking norms through dummy variables associated to the legal indicators (table 2) which group countries above and below the average[9]. We interact the dummy variable with the cash flow variable to facilitate the interpretation of the results.

Column 3, 4 and 5 collect the results introducing one interaction term at a time. The coefficient of the variable obtained by interacting the cash flow variable with a dummy variable that is equal to one if the banking regulation is above average, and zero otherwise, is negative and significant (column 3). Therefore, in those countries with more prudent banking regulation, the investment cash flow sensibility is significantly less relevant. Prudent banking regulation hinders competition because it prevents banking firms from taking excessive risks. Caminal and Matutes (1997) show that when banks have a certain degree of market power, this is likely to reduce the expected lending rate and extend credit since it increases the probability that loans will take the form of information based credit as opposed to transaction based credits. Accordingly, literature about relationship banking claim that long term financing relationships can help in solving problems of asymmetric information and encouraging information production and monitoring by the lender, guaranteeing uninterrupted access to funding (Boot, 2000)[10]. Therefore, provided that credit is extended, more firms have the possibility to access external funds to finance new investment projects, reducing cash flow sensibilities.

The second interaction term, introduces the degree of creditor protection. The coefficient is negative and significant. The negative interaction term indicates that strict protection of creditors relaxes the investment cash flow sensitivity as well. Since, the protection of creditor rights provides a measure of how easily creditors can take possession of collateral, strict protection enhances incentives to lend and firms can have more access to external finance lessening investment-cash flow sensitivy. Last column introduces the shareholder protection

interaction term. The coefficient is not significant. Hence, increasing shareholder protection does not alter the relationship between internal funds and investment. Therefore, the general conclusion is that those financial systems that are able to better resolve asymmetric information problems present less investment cash flow sensitivities. This result also helps to explain the systematic differences found in previous empirical studies (Bond et al., 2003 and Mizen and Vermeulen, 2005 among others).

5.1 Firm attributes and financial systems

Results just presented confirm the relevance of financial systems on determining cash flow sensibilities. However, there are complementary explanations for investment cash flow sensitivities. In particular, we focus on three features previously analysed in the literature: size, indebtedness and innovative investments. Our intention is to test the relevance of financial system model once controlled for these firm characteristics. The features of BACH database allow us to split the sample on the basis of size and indebtedness and maintain the comparability across countries.

5.1.1 Size

In order to examine larger and smaller firms separately, we need to classify firms according to some criteria. BACH database distinguish between large, medium and small firms according to turnover. We decide to reclassify firms to have two size levels: larger and smaller in order to obtain results comparable with previous empirical evidence. BACH classification criteria is based on turnover, however it may induce some errors since turnover is capturing size but also efficiency. Accordingly, two firms with the same level of assets and workers but, with a different turnover level would be classified differently. A second possibility is value added, that is clearly preferred to turnover. Yet, there are costs such as coordination costs, that determine firm size (Alchian and Demsetz (1972) and Jensen and Meckling (1976) among others), associated to the number of employees. Therefore, we decide to use the number of employees to classify firms. Such a measure has a long intellectual tradition (see Kumar et al. 2003). Further we also present the results for value added as a classification criterion[11].

Table 4 collects the results for the number of employees. We show that evidence presented for the whole sample is robust to sample splitting. The main difference is that the coefficient for cash flow in

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[9] Working with dummy variables is preferable because they facilitate the interpretation. Results with the value of the legal variables do not change significantly.

[10] In relationship banking, banks evaluate the profitability of investments through multiple interactions with the same customer over time and/or across products. In contrast transaction-oriented banking focuses on a single transaction with a customer.

[11] Results using turnover to classify firms are qualitatively similar. These results are not presented for brevity but are available from the authors upon request.

regression for large firm is positive but not significant. However, when the interaction terms are introduced, this coefficient is positive and significant again (table 4, column 2). Therefore, prudent banking regulation reduces investment sensitivity to cash flow with independence of firm size. Creditor protection, however, affects only large firms (column 3). Shareholder protection does not alter the investment cash flow sensitivity, although it seems to be more important to smaller firms, being the coefficient weakly significant[12]. Therefore it seems that financial system, in particular banking regulation, affects investment for both classes of firms while creditor protection reduce sensitivity only to less constrained firms.

Results for value added (table 5) are very similar with the only exception of creditor protection for smaller firms. In this case, the coefficient of the interaction term is positive and significant which means that strict protection to creditors enhances investment sensitivity to internal funds of more constrained firms. Therefore, more restricted firms are less willing to finance investment with external funds. When creditors are strictly protected, in case of default, lenders will have no incentives to allow their debtors to restructure financially although it may be efficient to keep assets in debtor hands (Bebchuck and Fried (1996)). The positive coefficient would suggest that this effect overcomes the information asymmetry reduction effect found for the complete sample.

Devereux and Schiantarelli (1990) using point estimates argue that although there is no statistical difference in cash flow sensitivity between large and small firms, it seems that cash flow plays a more important role for larger firms. Looking at point estimates, we instead find the opposite. Cash flow "appears" to be more relevant for smaller firms (table 4 and 5).

This evidence confirms partially that small firms are less likely to attract external finance due to higher levels of firm-specific risk and less collateral. However, we can not conclude that financial rules either help larger firms more than smaller firms or vice versa since point estimates are dependent on the classification criteria. This suggests that provided governments want to protect small firms to overcome their difficulties to access external finance, they should reinforce legal protection and development with specific measures designed for small firms. This is especially important to those countries with small or very small firms (such as Italy or Spain).

5.1.2 Leverage

We split the sample according to leverage level. In this case, the total debt to assets ratio is chosen as proxy for the degree of indebtedness. Results are presented in table 6.

Coefficients for cash flow variable confirm Whited (1992) findings that more leveraged firms present higher cash flow sensitivities. Actually, cash flow coefficient is not significant for firms with lower leverage ratios (column 5). This is also true for banking regulation. Banking rules affect more significantly more leveraged firms. In fact, more leveraged firms reduce their cash flow sensitivity under more prudential rules that may enhance long term relationships and incentive information-based credit. Creditor protection presents distinct results for more and less leveraged firms. More leveraged firms' coefficient is positive and significant and less leveraged coefficient is negative instead. Therefore, the stricter the creditor protection, the more (less) the investment sensibility of more (less) indebted firms. Since bankruptcy probability is increasing in the degree of indebtedness, when creditor protection is strict, high leveraged firms will prefer to finance new investment internally to prevent default situations.

5.1.3 R&D investment

Traditionally, high technology firms or firms investing heavily in R&D have been found to have first, more difficulties in accessing financial markets because of the absence of collateral and second, to present higher sensibility between investment and internal funds (Himmelberg and Petersen (1994)). The underlying argument is that financial constraints are also related to production process and output. Whether financial needs are different for R&D industrial sectors, financial rules may also affect in a diverse manner different sectors. As before, we rely on sample-splitting strategy to determine if industry structure is also affecting cash flow sensitivity. We split the sample in the basis of R&D investment. Table 7 collects the results. In this case more technologically intense sectors are more sensitive to cash flow availability coherent with previous empirical results. However, legal regulation is more relevant to less R&D intense sectors, in particular, banking regulation. Investor protection does not alter the cash flow sensitivity in high or low R&D sectors.

Therefore, the evidence just presented confirms the relevance of legal arrangements on cash flow sensitivities once controlled for different firm features; namely size, indebtedness and R&D investments.

6 Conclusions

The *law and finance* literature has shown to be very successful in helping to explain firm financing decisions and performance. This paper links this strand of the literature with the *investment* papers in order to go one step forward in the understanding of the investment cash-flow relationship.

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[12] The p-value is 0.141.

In particular, the empirical results presented in this paper show that cash flow is a significant variable that helps to explain the investment ratio behaviour for a group of European developed countries in the period 1990-1999. This paper introduces institutional variables in the estimation of an investment mode

l. With the inclusion of these variables, we can explain the role that legal arrangements of economic institutions can have in the evolution of the investment ratio, a crucial variable for national economies. The results obtained imply that prudent banking regulation induce a reduction in the investment dependence on internal resources. That is, regulations that help to overcome market inefficiencies associated to asymmetric information and to frictional capital markets reduce dependence on internal funds. Creditor protection also alleviates cash flow sensitivities when considering all firms together. However, shareholder protection has no effect on investment decisions.

Moreover, we test whether these effects are complementary to other explanations of investment cash flow sensitivities based on different firm features. Results confirm that firm features alone can not explain cash flow sensitivities and that the introduction of legal regulations help to understand differences previously found in the literature. Further, the laws analysed, that are general for all sectors, have different effects once controlled for firm features. Therefore, our results may be relevant in the debate about what structure should adopt economic regulations in order to promote economic activity and solve specific difficulties firms, especially those associated to size or R&D intense sectors. To the extent that investment decisions are affected by national creditor protection as well as banking rules, the adoption of an adequate legal environment may become a comparative advantage for national industries, especially for those sectors more externally dependent and when financial markets are small.

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A Appendix

A.1 Industry data source
The source of the data is the 2000 version of BACH database developed by the European Community.
A.2 List of industries used

211	Extraction of Metalliferous Ores Preliminary Processing Of Metal
212	Extraction Of Non-Metalliferous Ores And Manuf. Of Non-Metallic Mineral Products
213	Chemicals And Man-Made Fibres
221	Manufacture Of Metal Articles, Mechanical And Instrument Engineering
222	Electrical And Electronic Equipment Including Office And Computing Equipment
223	Manufacture Of Transport Equipment
231	Food, Drink And Tobacco
232	Textiles, Leather And Clothing
233	Timber And Paper Manufacture, Printing
234	Other Manufacturing Industries Not Elsewhere Specified
300	Building And Civil Engineering
410	Wholesale Trade, Recovery Services
420	Sale Of Motor Vehicles, Wholesale And Retail Trade
430	Retail Trade
440	Hotels And Restaurants
500	Transport And Communication
600	Other Services Not Elsewhere Specified

A.3 Construction of the industry variables

$Inv_{ij,t}$ Investment is measured by BACH item acquisition of tangible fixed assets minus sales and disposals.
$K_{ij,t}$: Capital is measured by fixed assets.
$CF_{ij,t}$: Cash flow is measured by BACH item cash flow

$\Delta y_{ij,t}$: Sales growth is computed as the difference between sales at *t* and sales at *t-1*.

$(k\text{-}y)_{ij,t\text{-}2}$: Adjustment cost measured as the difference between capital and sales

A.4 Definition and construction of the legal variables
Bank This variable accounts for the prudential standards of banking regulations. Different papers; Interbank Research Organization (1978) and Parejo et al. (1993) have analysed banking regulation through the analysis of different aspects or categories of the rules. Barth et al. (2001) have analysed different aspects of banking market structure and banking rules in a similar vein. Following these papers, we analyse different aspects of the law in order to account for degree of competition restriction in the banking sector. The nine categories (aspects) can be subdivided in 3 groups according to their main goal.
The first group refers to control of activity.
- need of license to establishment activity (charter)[13]
- necessity of warranted social benefit
- minimal skills and distinction of boards of directors,
- control on merger activities and branch openings.

The second group controls activity scope:
- separation of banking activities and other financial activities,
- control on participation in other firms (non financial and financial).
- Branching restrictions

The third group refers to risk control in a double sense:
- own share tenure restrictions
- control of large loans and their accumulation in one person.

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[13] Chartering requirements have been traditionally used to restrict entry and competition (Mishkin, 2000).

When a feature is present, we sum one unit to the index. We have revised the national banking laws that incorporated the Second European Banking Directive in the state members legal scenario in the first 1990´s. Moreiro (1992) and Parejo, et al. (1993) make a comparison between European banking norms and the conclusions are similar to us. The following table summarizes the differences found in banking laws.

Higher values imply tighter restrictions to competition.

Regulation Procedure	Lisen. grant.	Com. need.	Board capbty.	Merg. control	Separ actity.	Partic - restric.	Branch control	Own shar restr	Loan conce.	TOT.
Austria	1	0	1	1	0	1+1	0	1	1	7
Belgium	1	1	1	1	0	1+0	0	0	1	6
France	1	1	1	1	0	1+0	0	0	1	6
Germany	1	0	1	1	0	1+0	0	0	1	5
Italy	1	1	1	1	0	1+0	1	0	1	7
Portugal	1	0	1	1	0	1+0	0	0	0	4
Spain	1	0	1	1	0	0+0	0	1	1	5

Creditor and Shareholder protection: La Porta et al. (1998) creditor and investor protection indexes are developed from bankruptcy and company regulations. Both indexes, as the authors recognise, are not complete, such that other laws can affect directly the level of investor protection. We try to fill this gap by analysing merger laws. Higher values mean better protection.

Share: Extended shareholder protection index has 9 categories. These include the La Porta et al. ones: mail voting allowed for general meeting; no need to deposit the shares before voting, cumulative voting allowed, protection to small shareholders, preemptive right to buy new issues of stock and finally the required percentage to attend a shareholder meeting is inferior to 10%; and the new ones from merger law:
- equal treatment of shareholders
- control of directors
- forbidden manager protection practices (such as poison pills when they impose restrictions to shareholder rights). When these practices are forbidden, shareholders are better protected.

On merger law, we follow the analysis of Hawkins and Morton, (1990).

Cred: Extended creditor index ranges between 0 and 5, being the categories the four analysed by LLSV: "stay on assets" procedure allowed, no priority to other stakeholders (employees, government or public entities), managers not allowed to begin the reorganisation process without the consent of creditors, creditors have the right to impose an external administrator and the new one, explicit protection in merger procedures.

The following table summarises the differences

Regulation	Shareholder protection					Creditor protection		
	LLSV	Dir cont	Eq. treat	Def tacts	total	LLSV	merger	Total
Austria	2	0	1	1	4	3	0	3
Belgium	0	0	1	0	1	2	1	3
France	3	1	1	0	5	0	0	0
Germany	1	0	1	1	3	3	0	3
Italy	1	0	0	0	1	2	0	2
Portugal	3	1	1	0	5	1	0	1
Spain	4	0	1	0	5	2	0	2

Table 1. Summary statistics

Mean and standard deviations over time and across firms for the total sample and for each size class of : investment (*inv*), sales growth (*salesgrow*) and cash flow to capital ratio (*cf*)

	total		small		medium		large	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Austria								
Inv	0.024	0.233	-0.001	0.169	0.038	0.298	0.030	0.200
Salesgrow	0.009	0.176	0.022	0.161	-0.017	0.138	0.026	0.217
Cf	0.013	0.022			0.010	0.014	0.016	0.028
Belgium								
Inv	-0.012	0.148	0.005	0.200	-0.008	0.115	-0.032	0.109
Salesgrow	-0.048	0.447	-0.085	0.688	-0.005	0.127	-0.055	0.327
Cf	0.031	0.066	0.016	0.018	0.020	0.020	0.057	0.107
France								
Inv	0.015	0.148	0.025	0.187	0.011	0.104	0.008	0.144
Salesgrow	0.009	0.129	0.022	0.162	0.000	0.115	0.007	0.103
Cf	0.059	0.183	0.061	0.263	0.031	0.023	0.085	0.173
Germany								
Inv	-0.005	0.077	0.007	0.091	-0.003	0.070	-0.020	0.066
Salesgrow	-0.009	0.062	-0.012	0.066	-0.007	0.063	-0.009	0.056
Cf	0.021	0.020	0.018	0.014	0.016	0.013	0.028	0.027
Italy								
Inv	0.012	0.147	0.014	0.215	0.008	0.074	0.013	0.115
Salesgrow	-0.005	0.120	-0.014	0.171	-0.001	0.075	-0.001	0.090
Cf	0.022	0.022	0.009	0.007	0.018	0.015	0.030	0.026
Portugal								
Inv	0.011	0.172	0.016	0.114	0.015	0.167	0.002	0.226
Salesgrow	-0.006	0.427	0.002	0.249	0.008	0.237	-0.030	0.679
Cf	0.012	0.015	0.011	0.016	0.010	0.009	0.016	0.017
Spain								
Inv	0.010	0.115	0.017	0.111	0.017	0.118	-0.003	0.117
Salesgrow	0.008	0.141	-0.003	0.094	0.011	0.178	0.017	0.137
Cf	0.016	0.039	0.012	0.013	0.013	0.038	0.025	0.053

Source: Authors' calculations based on bach

Table 2. Institutional variables

1990-1999 averages. CRED ranges between 0 and 5, SHARE among 0 and 8. They capture creditor and shareholder protection respectively. Higher values are related to better protection. BANK captures banking regulation, Higher values are associated to stricter controls to banking activity.

	cred	share	bca
Austria	3	4	8
Belgium	3	1	6.7
Denmark	4	4	9
France	0	5	7
Germany	3	3	6
Italy	2	1	8
Portugal	1	5	5
Spain	2	5	6

Table 3. Estimation results. Total sample

The dependent variable, investment$_{i,j,k}$, is investment to capital ratio. *CF* accounts for cash flow. *Salesgr* is sales growth and *Adjcost* is adjustment costs. We include dummy variables associated to legal environment, namely banking law (dumbank), creditor protection (dumcred) and shareholder protection (dumshar).

	(1)	(2)	(3)	(4)
L.inv	-.3746*** (.1313)	-.3547*** (.1431)	-.3477** (.1431)	-.3535** (.1389)
L.cf	.6137* (.3768)	.6697** (.3142)	.7348** (.3107)	.3096* (.1607)
L.cf* dumbank		-.2581* (.1473)		
L.cf* dumcred			-.6978* (.4076)	
L.cf* dumshar				.0538 (.3353)
Salesgr	.0421 (.0703)	.0483 (.0758)	.0426 (.0708)	.0429 (.0666)
L.salesgr	-.0024 (.0416)	.0021 (.0469)	-.0006 (.0436)	.0037 (.0424)
Adjcost	-.0123*** (.0045)	-.0137*** (.0044)	-.0124*** (.0045)	-.0129*** (.0047)
*m*1	-2.15*	-2.18*	-2.07*	-2.14*
*m*2	-0.17	-0.08	0.03	-0.22
Sargan p-value	0.148	0.384	0.681	0.237

Standard errors are heteroskedasticity consistent. m1, m2 are first order and second order serial correlation tests, both are asymptotically N(0,1) *significant at 1%, **at 5% and *** at 10%.

Table 4. Estimation results. Size analysis (employees)

The dependent variable, investment$_{i,j,k}$, is investment to capital ratio. *CF* accounts for cash flow. *Salesgr* is sales growth and *Adjcost* is adjustment costs. We include dummy variables associated to legal environment, namely banking law (dumbank), creditor protection (dumcred) and shareholder protection (dumshar).

	Large				Small			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.inv	-.2205* (.1251)	-.2262* (.1296)	-.2909** (.1266)	-.2841** (.1311)	-.7929*** (.0786)	-.8100*** (.0711)	-.7915** (.0929)	-.7727*** (.0789)
L.cf	.1917 (.3371)	.8204** (.3434)	.8900** (.4260)	.2733** (.1326)	1.1320*** (.4313)	1.9234*** (.6198)	1.1033** (.4764)	2.847* (1.1224)
L.cf* dumbank		-.5592*** (.2045)				-.5321*** (.2089)		
L.cf* dumcred			-.9054* (.4807)				-.2708 (1.3724)	
L.cf* dumshar				-.0329 (.4188)				-1.8691 (1.2696)
salesgr	-.0242 (.0244)	-.0232 (.0280)	-.0260 (.0239)	-.0243 (.0244)	-.0106 (.0481)	-.0067 (.0401)	.0032 (.0640)	-.0025 (.0382)
L.salesgr	-.0037 (.0248)	.0004 (.0233)	-.0059 (.0224)	-.0050 (.0207)	-.0325 (.0572)	-.0181 (.0372)	-.0265 (.0713)	-.0180 (.0407)
Adjcost	-.0170** (.0065)	-.0170*** (.0054)	-.0182*** (.0063)	-.0166** (.0065)	-.0220** (.0042)	-.0220*** (.0038)	-.0217*** (.0045)	-.0212*** (.0041)
*m*1	-2.39*	-2.39*	-2.25**	-2.22*	-1.98**	-2.06*	-1.86*	-2.01**
*m*2	1.01	-1.12	0.89	0.77	-1.34	-1.48	-1.22	-1.28
Sargan p-value	0.436	0.389	0.327	0.381	0.436	0.389	0.06	0.381

Standard errors are heteroskedasticity consistent. m1, m2 are first order and second order serial correlation tests, both are asymptotically N(0,1) *significant at 1%, **at 5% and *** at 10%.

Table 5. Estimation results. Size analysis (value added)

The dependent variable, investment$_{i,j,k}$, is investment to capital ratio. *CF* accounts for cash flow. *Salesgr* is sales growth and *Adjcost* is adjustment costs. We include dummy variables associated to legal environment, namely banking law (dumbank), creditor protection (dumcred) and shareholder protection (dumshar).

	Large				Small				Standard errors are heteroskedasticity consistent. m1, m2 are first order and second order serial correlation tests, both are asymptotically N(0,1) *significant at 1%, **at 5% and *** at 10%.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
L.inv	-.2704* (.1607)	-.3094* (.1647)	-.2809* (.1692)	-.2928* (.1589)	-.6362*** (.1062)	-.6378*** (.1107)	-.6486*** (.1097)	-.6604** (.1122)	
L.cf	.2683 (.3913)	.5704* (.3212)	.5355** (.2490)	.4001** (.1557)	1.4183* (.8879)	3.112*** (.7922)	1.076 (.7973)	4.9278* (2.0106)	
L.cf* dumbank		-.3133** (.1283)				-1.7019*** (.3438)			
L.cf* dumcred			-.4833 (.3344)				4.1213* (2.2779)		
L.cf* dumshar				-.4053 (.6415)				-3.7393* (2.3013)	
salesgr	.0125 (.0640)	.0165 (.0658)	.0145 (.0632)	.0342 (.0727)	-.0198 (.0321)	-.0371 (.0241)	-.0254 (.0323)	-.0246 (.0329)	
L.salesgr	-.0524 (.0505)	-.0422 (.0542)	-.0464 (.0494)	-.0452 (.0593)	-.0242 (.0246)	-.0390* (.0228)	-.0429 (.0278)	-.04101 (.0283)	
Adjcost	.0195*** (.0049)	-.0195*** (.0051)	-.0184*** (.0053)	-.0200*** (.0064)	-.0126*** (.0045)	.0119*** (.0041)	-.0134*** (.0043)	-.0133*** (.0044)	
*m*1	-2.33**	-2.26**	-2.24**	-2.41**	-1.97**	-1.71**	-1.89*	-1.87*	
*m*2	0.51	0.31	-0.70	0.14	-1.65	1.63	-1.46	-1.48	
Sargan p-value	0.455	0.139	0.346	0.095	0.216	0.306	0.128	0.131	

Table 6. Estimation results. Indebtedness analysis

The dependent variable, investment$_{i,j,k}$, is investment to capital ratio. *CF* accounts for cash flow. *Salesgr* is sales growth and *Adjcost* is adjustment costs. We include dummy variables associated to legal environment, namely banking law (dumbank), creditor protection (dumcred) and shareholder protection (dumshar).

	Higher Leverage				Lower Leverage			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L.inv	-.7670*** (.0581)	-.7470*** (.0590)	-.8106*** (.0892)	-.7452*** (.0508)	-.1546 (.1288)	-.2180 (.1386)	-.1915 (.1254)	-.1801 (.1348)
L.cf	1.4414*** (.5320)	2.1071*** (.5973)	1.1727*** (.4608)	3.1199*** (1.5395)	.5851 (.4045)	.5303 (.5581)	.9230** (.3668)	.2385*** (.0858)
L.cf* dumbank		-.3263*** (.1097)				-.3102 (.5874)		
L.cf* dumcred			3.1778* (1.4685)				-.8452*** (.3134)	
L.cf* dumshar				-1.7965 (1.7239)				.2929 (.7671)
salesgr	.0521 (.0868)	.0074 (.0541)	-.0051 (.0375)	.0278 (.0824)	.0070 (.0455)	.0232 (.0530)	.0098 (.0450)	.0129 (.0443)
L.salesgr	-.0243 (.0679)	-.0412 (.0799)	-.0269 (.0620)	-.0170 (.0405)	-.0175 (.0193)	-.0022 (.0278)	-.0111 (.0196)	-.0046 (.0205)
Adjcost	-.0286*** (.0065)	-.0277*** (.0060)	-.0292*** (.0062)	-.0279*** (.0070)	-.0104*** (.0058)	-.0117** (.0054)	-.0091* (.0055)	-.0089 (.0062)
*m*1	-1.91*	-1.95*	-1.70*	-2.06**	-2.35**	-2.37**	-2.13**	-2.26**
*m*2	-0.30	-0.20	-0.36	-0.14	0.57	-0.08	0.62	-0.18
Sargan p-value	0.090	0.123	0.068	0.019	0.513	0.207	0.418	0.285

Standard errors are heteroskedasticity consistent.
m1, m2 are first order and second order serial correlation tests, both are asymptotically N(0,1)
*significant at 1%, **at 5% and *** at 10%.

Table 7. Estimation results. R&D analysis

The dependent variable, investment$_{i,j,k}$, is investment to capital ratio. *CF* accounts for cash flow. *Salesgr* is sales growth and *Adjcost* is adjustment costs. We include dummy variables associated to legal environment, namely banking law (dumbank), creditor protection (dumcred) and shareholder protection (dumshar).

		Higher R&D				Lower R&D		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.inv	-.4097 (.2539)	-.5055** (.2380)	-.4514** (.2172)	-.4241* (.2337)	-.6213*** (.1290)	-.6003** (.1092)	-.6420*** (.1189)	-.6031*** (.1188)
L.cf	1.5788** (.7097)	1.0146 (.8775)	1.4883** (.6414)	3.8798 (4.4755)	.3469 (.5218)	.8800** (.3999)	.7600* (.4081)	.5317*** (.1146)
L.cf* dumbank		.3681 (.4105)				-.4242** (.2043)		
L.cf* dumcred			3.4643 (3.8502)				-.5046 (.4435)	
L.cf* dumshar				-2.3020 (4.5711)				-.4850 (.6717)
salesgr	-.0988 (.1656)	.1234 (.1620)	.1074 (.1727)	.0943 (.1670)	-.0303* (.0177)	-.0270 (.0206)	-.0200 (.0211)	-.0217 (.0329)
L.salesgr	-.0547 (.1654)	-.0051 (.1740)	-.0371 (.1614)	-.0511 (.1575)	-.0486* (.0262)	-.0469* (.0284)	-.0425 (.0302)	-.0322 (.0276)
Adjcost	-.0238*** (.0074)	-.0265*** (.0063)	-.0235*** (.0061)	-.0230*** (.0058)	-.0144* (.0082)	-.0151** (.0076)	-.0163* (.0084)	-.0148* (.0086)
	947	947	947	947	1181	1181	1181	1181
*m*1	-1.73*	-1.65*	-1.76*	-1.74*	-1.33	-1.43	-1.29	-1.51
*m*2	0.21	0.06	0.06	0.12	-0.86	-0.55	-0.72	-0.56
Sargan p-value	0.441	0.313	0.124	0.253	0.208	0.075	0.292	0.114