THE IMPACT OF FIRMS' FINANCIAL POSITION ON FIXED INVESTMENT AND EMPLOYMENT. AN ANALYSIS FOR SPAIN

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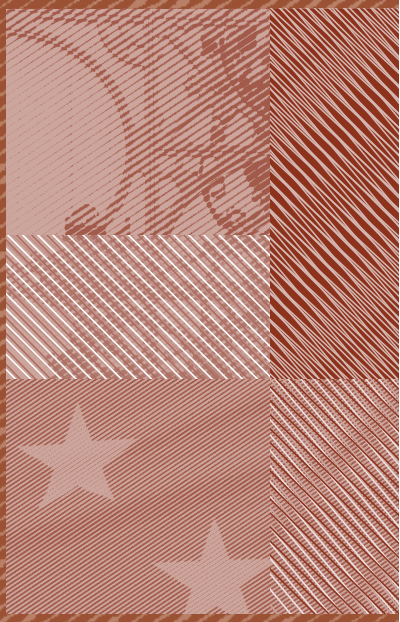

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THE IMPACT OF FIRMS' FINANCIAL POSITION ON FIXED INVESTMENT AND EMPLOYMENT. AN ANALYSIS FOR SPAIN (*)

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Abstract

Using a large sample of Spanish companies, this paper investigates the impact that firms' financial health has on their investment and employment decisions. The results indicate that firms' financial position is important for explaining firms' capital expenditures and their employment levels, since cash flow, indebtedness and the debt burden appear to be relevant for explaining investment and employment dynamics. Likewise, the results obtained point to a non-linear impact of financial position on these decisions, this being larger for companies in a less sound financial situation, and suggest that the role of financial factors in explaining investment and employment dynamics is likely to be greater in recessionary periods.

Keywords: financial position, investment, employment, panel data.

JEL Classification: C33, E22, E24, E44, G32, J23.

Resumen

Utilizando una muestra de gran tamaño de empresas no financieras españolas, este trabajo analiza el impacto que la situación financiera de las sociedades tiene sobre sus decisiones de inversión y contratación de empleados. Los resultados indican que la posición patrimonial de las empresas es relevante a la hora de explicar la inversión empresarial y los niveles de empleo, ya que el flujo de caja, el endeudamiento y la carga financiera son relevantes a la hora de explicar la evolución de ambas variables. Asimismo, los resultados obtenidos revelan que el impacto de la posición financiera de las sociedades sobre estas variables es no lineal, siendo más acusado para aquellas empresas que presentan una posición financiera menos saneada. También sugieren que el papel que desempeñan los factores financieros a la hora de explicar la evolución de la inversión y del empleo es mayor en períodos recesivos.

Palabras clave: posición financiera, inversión, empleo, datos de panel.

Códigos JEL: C33, E22, E24, E44, G32, J23.

1 Introduction

The recent economic and financial crisis led to a substantial drop in corporate investment and employment levels in Spain (investment level was in 2013 almost 40% below that in 2007, and employment fell by almost 20% in the same period). Although many factors such as the change in the housing market cycle, the decline in demand and in growth prospects and the increase in uncertainty have played a large role in explaining this collapse, it is undisputed that financial factors, such as the tightening of financing conditions (and, more generally, a more restrictive supply of credit) and the worsening in private sector balance sheets have also conditioned these dynamics.

The recent crisis has hence shown the relevance of taking into account financial factors in order to make an optimal design of monetary policy and an adequate assessment of the macroeconomic outlook. Our paper adds to the existing literature in this area by focussing, first, on the potential existence of non-linearities in the impact of firm' financial position on their spending decisions, and, second, on the existence of differences in this impact over the business cycle, (it is likely to be larger during recessionary periods than during expansionary ones)[1]. The analysis focusses on the impact of firm' financial pressure on capital expenditures and employment, which are probably two of the most important adjustment channels by firms in response to changes in financial conditions.

For this purpose, a large sample of Spanish firms, the Central Balance Sheet Data Office Survey (CBI) is used. This large sample, which includes, on average, data for 450,000 firms per year whose gross value added accounts for a large share of total value added generated by the Spanish companies[2], has the advantage of being representative of the Spanish corporate sector, with a good coverage of small and medium-sized companies. It includes not only the data reported to the Annual Survey (CBA) carried out by the Central Balance Sheet Data Office (which mainly includes large corporations) but also those from the accounts filed with the mercantile registries (CBB). Since the impact of financial pressure on firm real decisions is likely to be non-linear (more acute when it surpasses a certain threshold), the availability of micro data becomes critical for the analysis. Likewise, the prevalence of micro and small companies in the database used, which apart from being those that prevail in the corporate sector are also those more affected by financial constraints, becomes also crucial in order to make a proper evaluation of the impact of financial factors on corporate decisions.

Applying panel data techniques to this large database, our results confirm that financial position is an important determinant of firms' demand of productive factors, and the existence of a stronger impact of financial pressure on capital expenditures and employment demand once financial pressure surpasses a certain threshold. Likewise, the results point towards a more intense impact of financial pressure on these two variables during the recent crisis, something that suggests that the role of financial factors in explaining investment and employment dynamics is likely to be larger in recessionary periods.

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1. The first one of these issues is also assessed in in Hernando and Martinez-Carrascal (2008), who also analyze the existence of thresholds in the impact of financial factors on investment and employment, but with two important differences. First, the database used here is much more representative of the Spanish corporate sector (the database used in Hernando and Martinez-Carrascal (2008) was biased towards large companies,) and, second, their sample period does not cover the recent crisis period.

2. See section 3 for a more detailed description of the database used.

The rest of the paper is organized as follows. After briefly summarizing the existing literature on the link between firms' financial position and their demand of productive factors in Section 2, Section 3 provides a preliminary look at the data, and investigates whether at a simple bivariate and descriptive level this relationship seems to exist. Section 4 describes the baseline specifications for fixed investment and employment, summarizes the estimation methods and presents the estimation results. In this section it is also analysed whether the impact of financial factors on investment and employment becomes more intense when financial pressure exceed certain thresholds, and whether it changed during the recent recessionary period. Finally, Section 5 summarizes the main findings.

2 Literature review

A large number of theoretical and empirical studies have analyzed the impact of firms' financial position on real corporate decisions. Given the existence of capital market imperfections such as asymmetric information and agency problems, the extent to which these frictions affect capital expenditures and labour demand is likely to depend on the firm' balance sheet structure, its debt burden and profitability, which determine its credit worthiness. In this line, there is ample evidence that firms' financial position has a significant effect on their investment and employment decisions.

Starting from the seminal work by Fazzari et al. (1988), many papers have tested the sensitivity of corporate investment to firms' internal funds. In this paper, the sensitivity of investment to internal sources was taken as evidence for the presence of financing restrictions (see also Fazzari et al., 2000, and Carpenter and Petersen, 2002). However, several studies criticised afterwards the empirical test based on the cash flow sensitivity as a meaningful evidence in favour of the existence of financing constraints (see Kaplan and Zingales, 1997 and 2000, amongst others), arguing that the significance of cash flow in investment equations can be the consequence of measurement errors in the usual proxy for investment opportunities, Tobin's Q. In any case, empirical evidence widely supports the positive link between cash flow and investment (Alti, 2003; Guariglia, 2008; Hernando and Martínez-Carrascal, 2008; Almeida et al., 2009, amongst others).

Other variables determining creditworthiness, such as leverage level and debt-servicing payments, have also been found to be relevant in explaining firms' investment decisions. Using a sample of UK company panel data, Bond and Meghir (1994) highlight the influence of firm indebtedness position on its investment behavior, through its impact on the borrowing cost that firms face. Following the same approach, Estrada and Vallés (1998) find the same results, using a sample of Spanish manufacturing firms. Likewise, Lang et al. (1996), Hennessy (2004), Hennessy *et al.* (2007) and Kalemli-Özcan et al. (2015) also find evidence of a negative link between investment and leverage, while Aivazianan *et al* (2005) show that the negative link between leverage and investment is significantly stronger for firms with low growth opportunities than those with high growth opportunities. Similarly, Cleary (1999) finds that investment decisions of firms with high credit worthiness (according to traditional financial ratios) are more sensitive to the availability of internal funds that firms that are less creditworthy, while, instead, Whited (1992) finds that firms' investment-cash flow sensitivity is higher for those with higher leverage and higher interest expense to cash flow ratios. She also finds that financial variables appear to be relevant in determining investment for constrained firms, but not for the unconstrained ones. Also results in Benito and Hernando (2007), Hernando and Martínez-Carrascal (2008) or Martínez-Carrascal and Ferrando (2008) point towards a significant impact of indebtedness and debt burden on investment by Spanish firms. In addition, Hernando and Martínez-Carrascal (2008) provide evidence of a non-linear effect of financial position on investment (it becomes larger when financial pressure exceeds a certain threshold).

Marchica and Mura (2010) study the link between financial flexibility (defined as debt levels 'permanently' below what would be expected ex-ante) and investment ability. They find that financial flexibility allows firms to take advantage of unexpected investment opportunities and, as a result, the level of external debt influences a company's ability to invest. In addition,

they also find that these financially flexible firms invest more and show higher levels of profitability than firms that lack such flexibility, which might have to pass on profitable investment opportunities.

Although less extensive, there is also empirical evidence on the link between firms' financial health and employment decisions. For example, Nickell and Nicolitsas (1999) and Benito and Hernando (2008) find a significant contractive impact of a high debt burden on employment, and Benmelech et al. (2011) find that firms with higher financial leverage show higher sensitivity of employment to cash flow. In addition, Benito and Hernando (2008) find that the demand for flexible (temporary) labour is more sensitive (and reacts sooner) to changes in financial factors than permanent employment, something that leads the authors to conclude that where an adjustment in terms of employee numbers is required, the burden of such adjustment is borne disproportionately by those with temporary contracts. In this respect, Caggese and Cuñat (2008) develop a model that, once calibrated, shows that financially constrained firms use fixed-term workers more intensely and make them absorb a larger fraction of the total employment volatility than financially unconstrained firms do, a hypothesis that is tested and confirmed using a sample of manufacturing Italian firms. Hernando and Martínez Carrascal (2008) find evidence that the impact of financial factors on firms' employment is non-linear and increases when financial pressure exceeds certain thresholds, in line with the evidence they find on the impact of financial factors on investment.

In the opposite causality direction, Agrawal and Matsa (2013) study, using a large sample of US firms, the impact of worker unemployment cost on corporate financing decisions, and find that higher employment protection is related to increases in firm leverage and interest coverage ratios. Finally, there is also some recent literature that argues that a weak financial position may have a negative impact on labour supply. For example, Brown and Matsa (2015) find that the deterioration of firms' financial position has a negative effect on their ability to attract and retain workers. They argue that the reductions in job applicants are related at least partly related to the desire by job seekers to reduce exposure to unemployment risk, since applications from workers with greater protection provided by state unemployment insurance are less sensitive to changes in firms' financial situation[3].

Spaliara (2009) analyzes the complementariness between labour and capital, and concludes that firm-specific characteristics such as leverage, collateral, cash flow and interest burden are important determinants of firms' capital to labour ratio. More specifically, this ratio is found to be negatively associated with the interest burden and leverage, especially for more financially constrained firms; cash flow also exerts a negative impact on this ratio for constrained firms.

In the last years, many studies have focussed on the financial crisis period, trying to assess how firms' financial pressure has conditioned investment and employment decisions during these years and whether the link between them has changed with respect to the previous expansionary period. Using a large panel of unquoted euro-area firms over the period 2003-2011, Fernandes et al. (2014) find evidence of a negative impact of financial pressure on employment, and find that this link was stronger during the 2007-2009 period, especially for SMEs and firms in periphery countries. Similarly, Farinha and Prego (2013) find evidence of a larger impact of firms' financial standing on investment for Portuguese firms during the period of the sovereign debt crisis in the euro area. Likewise,

3. Other papers, such as Benmelech *et al* (2012), Klassa, *et al* (2009) or Matsa (2010) focus on the impact of firm financial pressure on wage bargaining, rather than on the employment level itself.

Almeida et al. (2009) point out the importance of maturity debt structure for corporate financial flexibility in the context of the 2007 credit crisis. They find that firms with a large fraction of their long-term debt maturing at the time of the crisis showed lower investment rates in the post-crisis period than similar firms with different long-term maturity debt schedule. More recently, Chodorow-Reich (2014) and Bentolila et al. (2015) have studied the impact of credit supply shocks on firm-level employment using data for the US and Spain, respectively. Both articles exploit the differences in lender health at the onset of the Great Recession, and find evidence that firms attached to weaker banks destroyed more jobs than very similar firms working with healthier ones. While for the US the contractive impact on employment is concentrated on SME firms, the paper by Bentolila et al. (2015) points towards a sizable effect also for large firms (results in Hernando and Villanueva, 2014, point, however, to a limited impact of the deterioration of banks' capital position on the supply of loans to Spanish non-construction companies).

3 A preliminary look at the data

In this section we first provide, primarily in graphical form, a preliminary analysis of the variables involved in the analysis (investment, employment and indicators of firms' financial position) for the sample of Spanish non-financial companies used, and its evolution over the period 1997-2014. Then we assess, on the basis of a preliminary bivariate descriptive analysis, whether investment rates and employment growth of firms with different degree of financial soundness differ. The analysis is based on the sample of non-financial corporations responding to the Integrated Central Balance Sheet Data Office Survey (CBI), which includes the data reported to the Annual Survey (CBA) and the data from the accounts filed with the mercantile registries (CBB). It has a wide coverage of the non-financial corporation sector, since it includes, on average, data for 450,000 firms per year, whose gross value added accounts for around 45% of total value added generated by all Spanish non-financial corporations in the latest years of the sample period. We apply standard cleaning methods (we delete those observations with very extreme values in the variables of interest or in the explanatory variables), and restrict the sample to those companies with at least three consecutive annual observations in the final sample[4]. This produces an unbalanced sample of around 140,000 companies with between 3 and 18 annual observations per company, resulting in a sample with around 435,000 observations over the period 1999-2014.

Summary statistics on the main variables of interest are presented in Table 1, both for the entire sample period and three subsample periods distinguishing the pre and post crisis years (before 2008, 2008-2012, after 2012). The investment rate presents a mean value close to 10 %; however, there are great differences by subperiods: while before 2008 the mean value is 13.5 %, from 2008 it drops to around 6 %, in a context of a substantial downward revision in growth expectations. The same pattern can be observed in other procyclical variables, such as employment and cash flow, while, as expected, net indebtedness shows less variation over time and, debt burden is much higher on average in the period 2008-2014 than in previous years.

The first panel of Figure 1 displays the cross-sectional variation (through percentiles 25, 50 and 75 of the distribution) of the investment rate. As can be seen, the investment rate reached its highest level in 1999-2000 and thereafter a downward trend is observed for all percentiles, with a larger drop in 2008-2009 (especially in the highest percentile), reflecting the slowdown in economic growth in Spain. Since 2009 the median value of the investment rate remains close to 0%. At the same time, median sales growth rate recorded negative values from 2008, with minimum values in 2009 and a recovery afterwards. The percentiles 25 and 75 of the employment growth showed a declining trend between end-nineties and 2008, and some recovery afterwards, matching the double-dip recession observed in Spain during the crisis. The median employment growth rate remained at zero over the entire sample period.

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4. The requirement of using firms with at least three consecutive observations is not strictly required by the generalized method of moments (GMM) procedure used in the paper, as time dummies are still available as instruments for the earlier cross-sections. Nevertheless, this choice follows many previous studies using this type of data and estimator. For instance, Bond et al. (2003) require at least six consecutive annual observations for the firms included in their final samples. Similarly, Arellano and Bond (1991), Guariglia (1999) and Nickell and Nicolitsas (1999) use samples with at least seven, four and six, respectively, consecutive observations. Using the complete sample, which includes companies with less than three consecutive observations, led to problems with the validity of instruments and second-order autocorrelation problems in the econometric specification, which might be linked to the large sample size. Since companies excluded are, on average, in a weaker financial situation, the potential bias due to their exclusion, if existed, would be positive (that is, the contractive impact of financial pressure on investment and employment would be larger than here estimated).

The return on assets ratio (net profit plus financial revenue over total assets) shows a downward trend since the late nineties, specially marked between 2008 and 2012, in line with the recessionary phase registered in these years. This ratio reached its minimum level in 2012, and a recovery in the different percentiles has been observed afterwards. As for indebtedness, defined as the ratio of outstanding debt minus cash and its equivalent to total assets[5], an increasing trend is observed in the upper part of the distribution up to the late 2000's, and a generalised decline in all percentiles afterwards (see sixth panel of Figure 1).

The burden of debt, defined as the ratio of interest payments to gross revenue and financial income, measures the firms' capacity to meet interest payments with the results it generates, and, therefore, it reflects the impact of changes in interest rates, company profitability and its indebtedness. As can be seen, this ratio showed a downward trend in the second half of the nineties, in line with the reduction observed in interest rates, and increased slightly afterwards in years 2000-2001, when a reduction in profitability was recorded. From the start of the crisis period and up to 2012, a sharp upward trend is observed for this indicator, mainly driven by the significant contraction of firm revenues observed during this period. From 2013 onwards, a quick reversion of this upward trend is observed, thanks to the reduction in interest rates and the recovery in firm revenues.

In left-hand-side panels of Figure 2 we compare how investment in physical capital differs across firms which, according to alternative indicators, present a different degree of financial soundness. The charts show the median investment level in different corporate groupings, defined on the basis of their financial position, proxied by different indicators: profitability, net indebtedness and interest debt burden. Each panel presents the median investment rate for firms between the percentiles 0-25, 40-60 and 75-100 of a given financial indicator (return on assets, the indebtedness ratio or the interest debt burden). The first group includes those companies with the soundest financial situation (weakest, in the case of profitability) while, analogously, the third one those in the weakest (soundest, in the case of profitability) financial position.

First panel of Figure 2 reveals a clear relationship between the level or profitability and the investment rate: firms with higher return on assets show higher investment in physical capital. In contrast, before the crisis corporate investment rate does not seem to show a monotonic relationship with indebtedness levels, and it is only after the inception of the crisis that a negative relationship between both variables can be observed. The reasons that might help to explain the absence of clear relationship between the debt level and the investment rate at the company level in the first years of the sample period could be the result of two opposite effects: on the one hand, firms with higher indebtedness may have difficulties in gaining access to additional credit to finance new investment projects; but, on the other hand, companies with higher levels of investment might be those firms that have been more successful in attracting external funds to carry out their investment projects and take advantage of their growth opportunities. Finally, panel 5 of Figure 2 compares the behaviour of firms facing different degrees of financial pressure, according to the interest debt burden indicator. As already pointed out in Hernando and Martínez-Carrascal (2008), the relationship between investment and debt burden seems to be non-linear: there are no marked differences between investment levels of companies which show a low debt burden ratio or an intermediate one, while, instead, firms with a comparatively high financial burden in relation to their capacity to generate funds display lower investment rates. In other words, it seems

5. Debt includes trade credit, since no information on this variable for most of the companies in the sample up to 2008. This measure of indebtedness captures the importance of debt for firms once adjusted for liquidity at disposal.

that debt burden conditions investment decisions only when it exceeds a certain threshold. Firms for which interest debt burden is equal to zero, hence without costly debt, are those that show the lowest investment rate; this result is probably linked to some specificities of these companies with no costly debt, less capital intensive than others, that voluntarily show low investment rate in spite of the fact that financial position does not pose a break on their indebtedness possibilities and hence on their capital expansion.

Similarly, right-hand-side panels of Figure 2 compare how employment growth differs across firms subject to a different degree of financial pressure. As can be seen, the charts 2, 4 and 6 show a clear (positive) relationship between employment growth and financial soundness: firms with higher profitability, lower debt burden and, from the start of the crisis, lower indebtedness, show, on average, higher employment growth. In addition, the relationship between financial pressure and employment seems to be non linear, especially when the later is measured by means of indebtedness and debt burden. Moreover, the difference in employment growth across the different groupings seems more marked in the recent recessionary period, suggesting a larger role of financial factors in explaining employment dynamics during these years.

In summary, the descriptive analysis seems to point towards several conclusions. First, there seems to be a clear link between firms' real decisions and financial pressure; second, this impact might be not linear (it becomes more intense when financial pressure exceeds certain threshold). And, third, differences in employment growth and, less clearly, investment rates for firms showing different degree of financial pressure seem to have intensified in the recent crisis.

4 Estimation results

The model estimated for fixed investment is an error-correction model which specifies a target level of the capital stock and allows for a flexible specification of the short-run investment dynamics, in which we add different financial indicators as potential explanatory variables. The specification adopted, which has been favoured, among others, by Bond et al. (2003), is the following[6]:

$$(I/K)_{it} = \alpha_i + \beta_1 (I/K)_{it-1} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 (k-y)_{it-2} + X_{it}^{'}\gamma + \\ + \theta_t + \varepsilon_{it} \quad (1)$$

where *i* indexes companies *i*=1, 2...N, *t* indexes the year t=1, 2...T, Δ denotes a first difference, *I/K* is the investment rate, *y* is the log of real sales, *k* is the log of real fixed capital stock, α_i are company-specific fixed effects, θ_t are time effects that control for macroeconomic influences on investment rate that are common across companies, and ε is a serially-uncorrelated, but possibly heteroskedastic error.

The labour demand equation is derived from a quadratic adjustment cost model, and takes the following form (see Nickell and Nicolitsas, 1999, for derivation of the specification):

$$n_{it} = \phi_i + \lambda_1 n_{it-1} + \lambda_2 k_{it} + \lambda_3 w_{it-1} + \lambda_4 \Delta w_{it} + \lambda_5 \xi_{it} + X_{it}^{'}\eta + \Psi_{it} + \mu_{it} \quad (2)$$

where i indexes companies *i*=1,2..*N* and *t* indexes year t=1,2..*T*. *n* is (log) average company employment during the year, *w* is the (log) average real wage at the company, *k* denotes (log) real fixed capital stock. ξ is a demand shock proxy which consists of the growth in log real sales and ψ_t represents a set of common time effects (year dummies) which will control for aggregate effects including aggregate demand.[7] μ_{it} is a serially uncorrelated but possibly heteroskedastic error term.

The estimation method consists of the GMM system estimator proposed by Arellano and Bover (1995) and examined in detail in Blundell and Bond (1998). These models control for unobservable firm-specific fixed effects, the estimator being an extension of the GMM estimator of Arellano and Bond (1991) that estimates equations not only in first differences but also in levels.[8] Apart from the biases that would arise if fixed effects were not controlled

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6. We have chosen an ECM specification, that usually display reasonable long-run and short-run properties (see Bond et al., 2003), instead of a more structural models – such as Q models-. Although these structural models would be more appropriate from a theoretical point of view, because they control for expectational influences on the investment decision, they may be significantly affected by measurement errors and have often failed to produce significant and correctly signed key parameters. In any case, a Q model is not available here since most of the Spanish firms are not quoted such that the usual Q variable could not be constructed, and Tobin's Q calculated at sectoral level is non-significant when included in the specification here presented.

7. The demand shock variable is not considered in the analysis of Nickell and Nicolitsas (1999), but it was included in a similar specification by Bentolila and Saint-Paul (1992) and Benito and Hernando (2007), amongst others.

8. The use of the GMM system estimator is especially justified in the case of autoregressive models with high persistence in the data, so that the lagged levels of a variable are not highly correlated with the first difference, which results in finite sample biases associated with weak instruments in the first-difference estimator (see Blundell and Bond (1998)). Blundell and Bond (1998) show that in these circumstances also including the levels equations in the system estimator offers significant gains, countering the bias. They also show that in autoregressive distributed lag models, first differences of the variables can be used as instruments in the levels equations provided that they are mean stationary. The high levels of serial correlation displayed by several variables included in the models and the fact that they can be regarded as mean stationary favour the use of a GMM system estimator rather than the first-difference estimator.

for, it is also necessary to take into account that most current firm-specific variables are endogenous. In order to avoid the bias associated with this endogeneity problem, a GMM estimator is used, taking lags of the dependent and explanatory variables as instruments.

The estimation method requires the absence of second order serial correlation in the first difference residuals, for which the Arellano Bond (1991) test, labelled M_2, is presented. If the underlying model's residuals are white noise, then first-order correlation should be expected in the first-differenced residuals. This hypothesis is tested by means of the Arellano-Bond (1991) test, labelled M_1.

4.1 Basic results

Estimation results for fixed investment are presented in Table 2. First column reports the results obtained when estimating the basic equation, without any financial indicator. As expected, sales growth has a positive effect on investment, and the error-correction term is negative and highly significant. We find insignificant persistence levels in investment rates, a result that is in line with those reported in previous studies (see for example Bond et al., 2003, Martínez-Carrascal and Ferrando, 2008, or Hernando and Martínez-Carrascal, 2008). The absence of second order serial correlation and insignificant values of the Sargan test at conventional confidence levels (95%) indicate that there are no problems with the model specification and the validity of instruments used.

We then consider augmenting the basic specification with financial variables, one at a time. Column 2 in Table 2 reports the results including the cash flow term in the baseline investment equation. A positive (and significant) coefficient is obtained, showing the expected relationship between investment rates and profitability, which might be either capturing the relevance of internal funds for investment or acting as a proxy for investment opportunities. Likewise, when indebtedness is included as a regressor in the specification a well-determined negative effective is found (see column 3), indicating that investment projects may be postponed or cancelled when the firm is facing high levels of debt. Similarly, the interest debt burden ratio turns out to be negative and highly significant (see column 4), suggesting that financial pressure of debt servicing plays an important role in influencing firm investment levels of firms and indicating that monetary policy has an impact on firms' investment rates through the induced changes in debt servicing costs. When including several financial indicators at a time, p-values associated to the validity of the instruments decrease significantly, and in some cases point towards some problems with their validity. In any case, in these specifications, cash flow is the only one that persistently remains significant when combined with other financial pressure indicators, while the coefficient and significance for indebtedness and debt burden decline substantially, being both of them non significant (see columns 5 to 8 in Table 2).

Table 3 shows the estimation results for the employment equation. Column 1 reports the results of the baseline specification without financial variables. As expected, capital stock is positively related to employment, while wage growth has a negative impact on firms' employment and the positive coefficient on the sales growth term indicates that at the company-level employment is procyclical. Then, when adding financial variables to the specification, we obtain results consistent with those reported by Benito and Hernando (2007) and Hernando and Martínez-Carrascal (2008) for Spanish firms. First, the profitability indicator shows a strong positive link with employment, being its estimated coefficient (0.376) highly significant (see column 2). Instead, as expected, leverage and debt burden indicators are found to have a significant negative impact on labour demand, indicating the response of

companies to financial pressure by reducing employment levels (see columns 3 and 4)[9]. The significance of the debt burden indicator, which has a quantitatively larger impact on employment than indebtedness, is robust to the addition of a control for cash flow (column 6), indebtedness (column 7) or both of them (column 8). This result reinforces the perception of the important role of the borrowing ratio to explain employment behaviour and provides evidence in favour of a monetary policy effect on employment at the company-level, through the induced changes in the costs of debt servicing. Indebtedness, instead, loses significance when combined with debt burden (see columns 7 and 8).

Overall, these results indicate that financial pressure appears to have a relevant effect on firms' capital expenditures and employment levels when it is proxied by cash flow, indebtedness and debt burden. While profitability and debt burden seem to be the most distinctive financial features to determine employment, in the investment equation profitability seems to be the most relevant one.

4.2 Analyzing non-linear effects along the cycle

The descriptive evidence presented in Section 3 suggests that firms' financial position affects business activity and employment levels in a non-linear fashion, and points towards the existence of some threshold beyond which the impact of firms' balance sheet conditions becomes more intense. Likewise, it also suggests that the impact of firms' financial position on investment rates and their employment levels might have intensified during the recent crisis, in a context in which credit access tightened and credit institutions applied more strict criteria to loan approval. To study these hypothesis, equations (1) and (2) are modified in order to allow a different impact of financial indicators on firm' investment and employment decisions in the crisis period (years 2008-2012) and during non-crisis years, and allowing a differential impact of financial conditions depending on the relative level of the corresponding financial indicator. More precisely, for each financial indicator we test whether the companies facing a high financial pressure – i.e. those firms in the upper quartile of the distribution defined in terms of that indicator (or the lower quartile, in the case of the profitability indicator)– are more sensitive to their financial conditions, and whether this sensitivity was changed during the recent crisis. More precisely, we estimate the following specifications:

$$\begin{aligned}(I/K)_{it} = {} & \alpha_i + \beta_1 (I/K)_{it-1} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 (k-y)_{it-2} + \gamma_1 F_{it}^{'} D_{0-75}^{F} * D_{no\_crisis} + \\ & \gamma_2 F_{it}^{'} D_{75-100}^{F} * D_{no\_crisis} + \gamma_3 F_{it}^{'} D_{0-75}^{F} * D_{crisis} \\ & \gamma_4 F_{it}^{'} D_{75-100}^{F} D_{crisis} + \theta_t + \varepsilon_{it}\end{aligned} \tag{3}$$

and

$$\begin{aligned}n_{it} = {} & \phi_i + \lambda_1 n_{it-1} + \lambda_2 k_{it} + \lambda_3 w_{it-1} + \lambda_4 \Delta w_{it} + \lambda_5 \xi_{it} + \eta_1 F_{it}^{'} D_{0-75}^{F} * D_{crisis} + \eta_2 F_{it}^{'} D_{75\text{-}100}^{F} D_{crisis} + \\ & \eta_3 F_{it}^{'} D_{0-75}^{F} * D_{no\_crisis} + \eta_4 F_{it}^{'} D_{75\text{-}100}^{F} * D_{no\_crisis} + \Psi_{it} + \mu_{it}\end{aligned} \tag{4}$$

9. The significance of firm' financial ratios in this employment equation could also be partly the result of a potential negative impact on job supply of a worsening in firm financial position (see Benmelech et al 2012), that might have a positive impact on wages and hence a negative impact on employment levels. In any case, this channel is likely to play a larger role for large corporations, for which there is public information on their balance sheets and profit and loss accounts, than for SMEs, which are more opaque and are the ones that prevail in the database used.

where D_{0-75}^{F} and D_{75-100}^{F} are dummy variables for observations below the 75th percentile and above the 75th percentile, respectively, of the distribution of the financial variable *F*[10]. When the financial indicator is profitability (GR/A), the lower quartile of this indicator represents the higher financial pressure. In these case, the dummies are replaced by D_{0-25}^{F} (for observations below the 25th percentile) and D_{75-100}^{F} (for observations above the 75th percentile). D_{crisis} is a dummy variable that takes value 1 for the crisis period (2008-2012), while D_{no_crisis} takes value 1 in the remaining years

Tables 4 and 5 show the results obtained when estimating equations (3) and (4), respectively. They ccorroborate the existence of threshold effects, and point towards a more relevant impact of financial pressure on firms' capital expenditures and labour demand during the recent crisis[11]. As can be seen, indebtedness and debt burden appear to have a negative impact on investment and employment in both subperiods, but only once the indicator reaches a certain threshold. Likewise, although the difference is not statistically significant, the magnitude of the estimated coefficients for indebtedness and (less markedly) debt burden indicators when they impact on firms real decisions (that is, when they surpass the 75th percentile) is larger, in absolute terms, for the crisis period than for the remaining years, suggesting that financial weakness can be particularly harmful for firms in a period of economic and financial distress such as that registered between 2008 and 2012. These results differ somewhat from those presented in Fernandes et al (2014), who find that debt burden exerted a significant impact on employment decisions in the euro area only during the crisis years. Finally, employment seems positively linked to profitability, both in the crisis period and in the expansionary times, although during the recessionary period the link falls short of significance for low profitable corporations. Instead, in the investment equation a positive coefficient is obtained for profitability for most corporate groupings, although these coefficients are rather imprecisely estimated, being all of them non-significant, except that estimated for the crisis period for companies with low profitability -below the 25th percentile-).

Therefore, these results indicate that there was a larger impact of financial pressure on firm investment and employment in Spain during the recent crisis, which operated through two channels. First, the share of firms surpassing the thresholds of financial pressure upon which it becomes relevant to determine both productive factors increased during these years (the share of companies surpassing these thresholds was, on average, more than 10 pp higher between 2008 and 2012 than in the previous years, according to both indebtedness and debt burden indicators). And, second, the impact that financial pressure has on firm investment and employment was larger during these years than in the previous expansionary period.

10. The main drawback of the previous approach is that the thresholds are arbitrarily chosen. To avoid this strong assumption, the non-linearity might be specified as a non-linear continuous function of financial variables, but also in this case the choice of the specific functional form is arbitrary.

11. When two thresholds are allowed instead of only one (splitting the sample in three groups instead of only two - companies below the 50th percentile, those between the 50th and the 75th percentile and those above the 75th percentile- similar results are obtained (that is, financial pressure appear to be relevant only for companies showing a financial pressure level above the 75th percentile).

5 Conclusions

This paper investigates the influence of firm' financial position on corporate employment and investment rates, focussing on two issues: first, the potential existence of non-linearities in the impact of firm' financial position on both productive factors, and, second, on the existence of differences in this impact over the business cycle. For this purpose, we use firm-level data for the period 1999-2014 contained in the Integrated Central Balance Sheet Data Office Survey (CBI), a large firm-level panel dataset with a good coverage of the Spanish corporate sector where, differently from other samples often used for this type of studies, small and medium size companies prevail.

After confirming that financial position is an important determinant of firms' capital expenditures and their employment levels, our results corroborate the two hypothesis tested. First, we find that debt burden exerts a negative impact on employment and firm investment only when it surpass a certain threshold (60% of gross operating profit plus financial revenue). Similarly, indebtedness restrains firms' capital expenditures and employment only for highly leveraged firms. Second, the results point towards a more intense impact of an excessive financial pressure on firms' capital expenditures and labour demand during the recent crisis, which suggests that the role of financial factors in explaining investment and employment dynamics is likely to be larger in recessionary periods.

These results imply that firm financial pressure had a larger role in explaining investment and employment dynamics in Spain during the recent crisis not only because the share of firms showing a degree of financial pressure over which it exerts a contractive impact on both variables increased substantially (on average, by around 10 percentage points), but also because the impact of an excessive level of financial pressure on investment and employment was larger during this period.

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TABLES

Table 1: Sample means (standard desviation)

	1998-2007	*2008-2012*	*2013-2014*	*1998-2014*
Investment rate	0.135	0.065	0.059	0.092
	(0.250)	(0.197)	(0.156)	(0.217)
Employment	8.067	4.116	3.686	5.278
	(4.007)	(3.338)	(3.255)	(3.756)
Sales growth	-0.004	-0.115	-0.049	-0.060
	(0.273)	(0.378)	(0.359)	(0.340)
Wage growth	0.007	0.006	-0.016	0.003
	(0.242)	(0.318)	(0.307)	(0.288)
Cash flow	0.090	0.027	0.027	0.052
	(0.116)	(0.150)	(0.153)	(0.141)
Net indebtedness	0.413	0.501	0.495	0.456
	(0.326)	(0.514)	(0.514)	(0.421)
Interest debt burden	0.247	0.494	0.423	0.384
	(0.322)	(0.654)	(0.568)	(0.543)
Nº observations	172404	189769	72096	434269
Companies	65262	76293	53005	140021
% SMEs	98.6	97.8	97.7	98.6

Notes : See Data Appendix for the definition of the variables.

Table 2: Fixed investment

Variable	*Baseline especification*	*Profitability*	*Indebtedness*	*Interest debt burden*	*Profitability and indebtedness*	*Profitability and interest debt burden*	*Indebtedness and interest debt burden*	*Profitability, indebtedness, and interest debt burden*
$(I/K)_{it-1}$	0.145	0.109	0.137	0.113	0.119	0.063	0.112	0.055
	(0.120)	(0.111)	(0.109)	(0.088)	(0.105)	(0.097)	(0.083)	(0.092)
Δy_{it}	0.044**	0.043**	0.044**	0.078***	0.044**	0.083***	0.074***	0.082***
	(0.022)	(0.021)	(0.021)	(0.016)	(0.021)	(0.016)	(0.016)	(0.016)
Δy_{it-1}	0.045***	0.029***	0.049***	0.043***	0.033***	0.035***	0.044***	0.035***
	(0.008)	(0.009)	(0.008)	(0.005)	(0.009)	(0.006)	(0.005)	(0.005)
$(k-y)_{it-2}$	-0.044***	-0.036***	-0.048***	-0.039***	-0.040***	-0.038***	-0.040***	-0.038***
	(0.010)	(0.008)	(0.009)	(0.007)	(0.008)	(0.006)	(0.006)	(0.006)
$(GR/A)_{it-1}$		0.160***			0.138**	0.176***		0.185***
		(0.058)			(0.059)	(0.064)		(0.061)
$(D/A)_{it-1}$			-0.036***		-0.021		-0.014	-0.005
			(0.014)		(0.015)		(0.011)	(0.011)
idb_{it-1}				-0.013***		0.006	-0.011**	0.008
				(0.004)		(0.007)	(0.005)	(0.007)
Companies	140021	140021	140021	140021	140021	140021	140021	140021
Observations	434271	434271	434271	434271	434271	434271	434271	434271
Sargan	0.140	0.121	0.094	0.105	0.066	0.054	0.051	0.030
AR1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR2	0.159	0.248	0.133	0.137	0.185	0.398	0.120	0.420

Notes: All equations are estimated by GMM-SYSTEM estimator. Sargan is a Sargan Test of over-identifying restrictions, distributed as chi-square under the null of instrument validity (p-value reported). *ARj* is a test of *j*th-order serial correlation in the first-differenced residuals (p-values reported), distributed as standard normal under the null hypotheses. Asymptotic robust standard errors reported in parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. Industry and time dummies are included. See data appendix for description of the variables.

Table 3: Employment

Variable	*Baseline especification*	*Profitability*	*Indebtedness*	*Interest debt burden*	*Profitability and indebtedness*	*Profitability and interest debt burden*	*Indebtedness and interest debt burden*	*Profitability, indebtedness, and interest debt burden*
n_{it-1}	1.000***	0.999***	0.996***	0.995***	0.996***	0.995***	0.992***	0.993***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
k_{it}	0.007**	0.001	0.009***	0.007**	0.002	0.005*	0.008***	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Δw_{it}	-0.773***	-0.733***	-0.756***	-0.708***	-0.727***	-0.670***	-0.701***	-0.665***
	(0.075)	(0.073)	(0.075)	(0.073)	(0.073)	(0.070)	(0.074)	(0.070)
w_{it-1}	-0.020	-0.011	-0.023	-0.011	-0.014	-0.010	-0.013	-0.002
	(0.016)	(0.015)	(0.017)	(0.015)	(0.016)	(0.015)	(0.017)	(0.016)
Δy_{it}	0.376***	0.381***	0.347***	0.346***	0.360***	0.364***	0.322***	0.347***
	(0.058)	(0.047)	(0.054)	(0.055)	(0.045)	(0.045)	(0.052)	(0.044)
$(GR/A)_{it-1}$		0.471***			0.510***	0.466***		0.500***
		(0.067)			(0.066)	(0.080)		(0.080)
$(D/A)_{it-1}$			-0.036*		-0.029		-0.027	-0.020
			(0.021)		(0.019)		(0.020)	(0.019)
idb_{it-1}				-0.087***		-0.029**	-0.086***	-0.023*
				(0.013)		(0.014)	(0.013)	(0.014)
Companies	140021	140021	140021	140021	140021	140021	140021	140021
Observations	434271	434271	434271	434271	434271	434271	434271	434271
Sargan	0.177	0.127	0.155	0.133	0.128	0.178	0.179	0.073
AR1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR2	0.700	0.418	0.380	0.270	0.216	0.337	0.128	0.201

Notes: All equations are estimated by GMM-SYSTEM estimator. Sargan is a Sargan Test of over-identifying restrictions, distributed as chi-square under the null of instrument validity (p-value reported). AR*j* is a test of *j*th-order serial correlation in the first-differenced residuals (p-values reported), distributed as standard normal under the null hypotheses. Asymptotic robust standard errors reported in parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. Industry and time dummies are included. See data appendix for description of the variables.

Table 4: Fixed investment. Non-linear effects. Sub-periods

Variable	*Profitability*	*Indebtedness*	*Interest debt burden*
$(I/K)_{it-1}$	0.061	0.039	0.092
	(0.120)	(0.124)	(0.094)
Δy_{it}	0.063***	0.051**	0.078***
	(0.024)	(0.024)	(0.016)
Δy_{it-1}	0.037***	0.060***	0.045***
	(0.011)	(0.010)	(0.006)
$(k-y)_{it-2}$	-0.045***	-0.061***	-0.041***
	(0.010)	(0.012)	(0.007)
$(GR/A)_{it-1}$ <p25*year<2008&>2012	0.065		
	(0.133)		
$(GR/A)_{it-1}$>p25*year<2008&>2012	0.253		
	(0.164)		
$(GR/A)_{it-1}$ <25*year≥2008&≤2012	0.456***		
	(0.164)		
$(GR/A)_{it-1}$>p25*year≥2008&≤2012	-0.042		
	(0.163)		
$(D/A)_{it-1}$ <p75*year<2008&>2012		0.040	
		(0.078)	
$(D/A)_{it-1}$>p75*year<2008&>2012		-0.039**	
		(0.019)	
$(D/A)_{it-1}$ <p75*year≥2008&≤2012		0.121	
		(0.106)	
$(D/A)_{it-1}$>p75*year≥2008&≤2012		-0.052**	
		(0.024)	
idb_{it-1} <p75*year<2008&>2012			0.034
			(0.075)
idb_{it-1}>p75*year<2008&>2012			-0.010*
			(0.005)
idb_{it-1} <p75*year≥2008&≤2012			-0.013
			(0.080)
idb_{it-1}>p75*year≥2008&≤2012			-0.013***
			(0.005)
Companies	140021	140021	140021
Observations	434271	434271	434271
Sargan	0.127	0.055	0.095
AR1	0.000	0.000	0.000
AR2	0.492	0.562	0.242

Notes: See notes to Table 2.

Table 5: Employment. Non-linear effects. Sub-periods

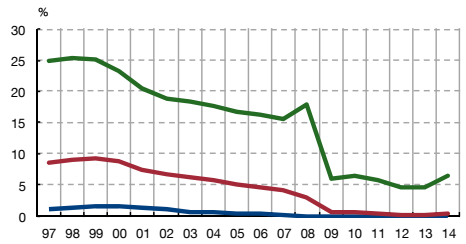
Variable	*Profitability*	*Indebtedness*	*Interest debt burden*
n_{it-1}	0.999***	0.997***	0.997***
	(0.005)	(0.005)	(0.005)
k_{it}	0.002	0.008**	0.005
	(0.003)	(0.004)	(0.004)
Δw_{it}	-0.745***	-0.805***	-0.710***
	(0.074)	(0.078)	(0.075)
w_{it-1}	-0.013	-0.033*	-0.010
	(0.016)	(0.018)	(0.016)
Δy_{it}	0.365***	0.334***	0.332***
	(0.048)	(0.056)	(0.057)
$(GR/A)_{it-1}$ <p25*year<2008&>2012	0.395*		
	(0.218)		
$(GR/A)_{it-1}$>p25*year<2008&>2012	0.426***		
	(0.082)		
$(GR/A)_{it-1}$ <25*year≥2008&≤2012	0.176		
	(0.205)		
$(GR/A)_{it-1}$>p25*year≥2008&≤2012	0.784***		
	(0.131)		
$(D/A)_{it-1}$ <p75*year<2008&>2012		0.081	
		(0.073)	
$(D/A)_{it-1}$>p75*year<2008&>2012		-0.053*	
		(0.030)	
$(D/A)_{it-1}$ <p75*year≥2008&≤2012		0.013	
		(0.058)	
$(D/A)_{it-1}$>p75*year≥2008&≤2012		-0.086***	
		(0.032)	
idb_{it-1} <p75*year<2008&>2012			0.118
			(0.138)
idb_{it-1}>p75*year<2008&>2012			-0.076***
			(0.022)
idb_{it-1} <p75*year≥2008&≤2012			-0.055
			(0.115)
idb_{it-1}>p75*year≥2008&≤2012			-0.092***
			(0.016)
Companies	140021	140021	140021
Observations	434271	434271	434271
Sargan	0.366	0.207	0.121
AR1	0.000	0.000	0.000
AR2	0.202	0.192	0.154

Notes: See notes to Table 3.

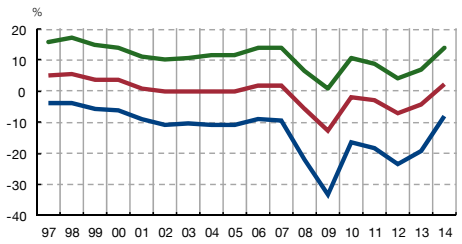
PERCENTILES DISTRIBUTION

FIGURE 1

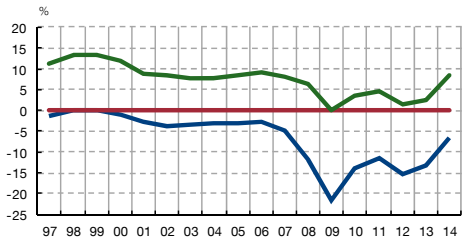
1.1. INVESTMENT RATE



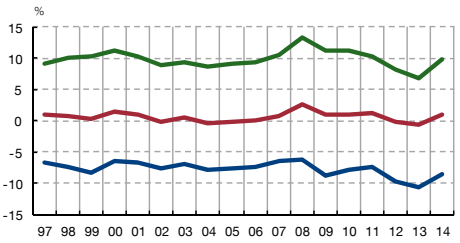
1.2. SALES GROWTH



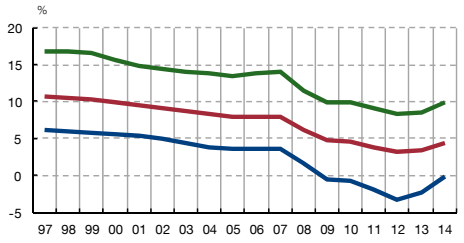
1.3. EMPLOYMENT GROWTH



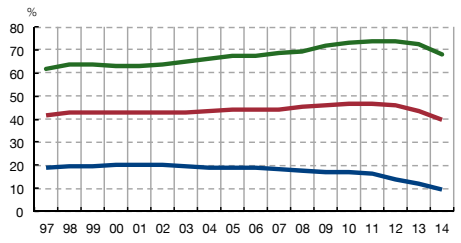
1.4. WAGE GROWTH



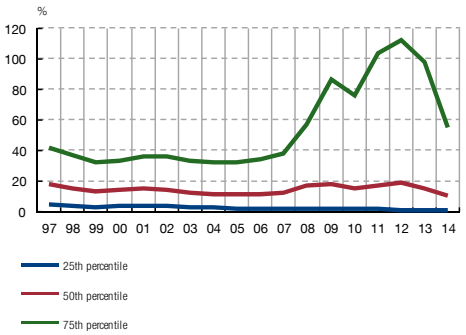
1.5. PROFITABILITY



1.6. NET INDEBTEDNESS RATIO



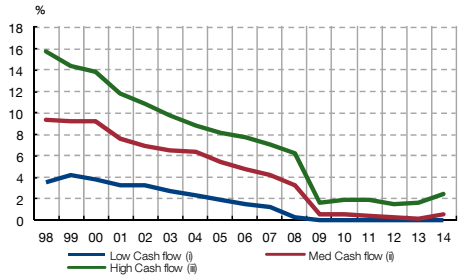
1.7. INTEREST DEBT BURDEN



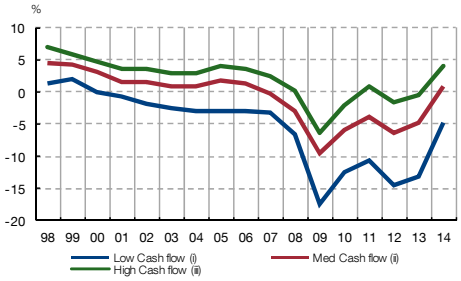
FINANCIAL POSITION AND LEVEL OF ACTIVITY

FIGURE 2

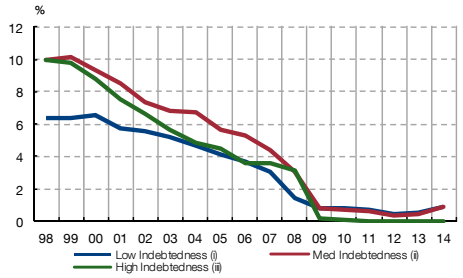
1.1. INVESTMENT RATE - CASH FLOW



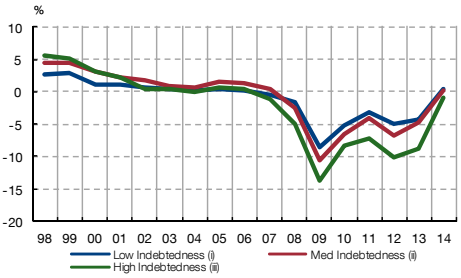
1.2. EMPLOYMENT GROWTH - CASH FLOW



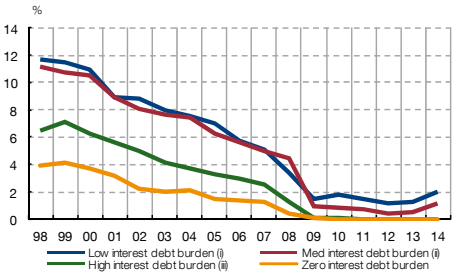
1.3. INVESTMENT RATE - NET INDEBTEDNESS



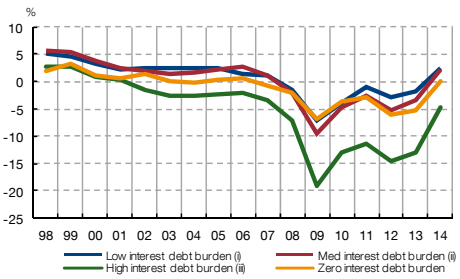
1.4. EMPLOYMENT GROWTH - NET INDEBTEDNESS



1.5. INVESTMENT RATE - INTEREST DEBT BURDEN



1.6. EMPLOYMENT GROWTH - INTEREST DEBT BURDEN



SOURCES: Banco de España.

i. Firms between the percentiles 0-25
ii. Firms between the percentiles 40-60
iii. Firms between the percentiles 75-100

APPENDIX

Investment rate (I/K)
Purchase of fixed assets over capital stock.

Employment (n)
Average number of employees during the year.

Capital stock (k)
Fixed assets at replacement cost.

Sales (y)
Total company sales, deflated by the GDP deflator.

Wages (w)
The average company wage is given by direct employment costs (not including social security contributions) divided by the employment head count and deflated by the GDP deflator.

Gross revenue over total assets (GR/A)
Gross operating profit plus financial revenue divided by total assets.

Net debt over total assets (D/A)
Total outstanding debt less cash and its equivalents divided by total assets.

Interest debt burden (idb)
Interest payments divided by gross operating profit plus financial revenue.

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