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THE CAPITAL STRUCTURE DECISIONS OF FIRMS: IS THERE A PECKING ORDER?

Documento de Trabajo nº 0310

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Abstract

This paper considers the 'trade-off' and 'pecking order' theories, the two most influential approaches to understanding firms' capital structure decisions. The paper adopts two approaches to examining capital structures using firm-level panel data for firms in both Spain and the United Kingdom. First, debt ratios are examined and found to be decreasing in cash flow or profitability and increasing in the investment of the firm in both countries. Second, aspects of the two different financial systems are examined.

In Spain, a bank-based financial system, there is some modest evidence that such effects are weaker for larger firms and for firms with equity held by financial institutions. In the United Kingdom, a market-based financial system, the propensity to issue additional debt is compared to that for issuing new equity and found to be more sensitive to financial characteristics of the firm. The results are consistent with the pecking order approach and generally inconsistent with the tradeoff approach suggesting behaviour consistent with the existence of a hierarchy of finance faced by firms in Spain and the United Kingdom.

Key words: capital structure; pecking order.
JEL Classification: G32.

1 Introduction

The capital structure decisions of firms have important consequences at both the micro- and macro-level. At the micro-level, considerable research effort has gone into examining the determinants of capital structure (see Harris and Raviv, (1991) for a review). Moreover, within firms themselves substantial resources go into setting capital structure policies. At the macro-level, several authors have maintained that corporate debt increases the vulnerability of an economy to a downturn, with interest in this area having been further heightened by marked increases in corporate indebtedness in the late-1990s (see IMF (2003) for a discussion). This view of an important role for debt in influencing the macroeconomy dates back to Fisher (1932) with the more recent literature on financial frictions in macroeconomic models also emphasising its role in the business cycle (eg. Bernanke *et al.* (1999)).

How do companies determine their capital structures? The two most influential theories of capital structure are the tradeoff and pecking order theories. The first, the tradeoff model, argues that companies trade off the benefits of additional debt (tax deductibility of interest expenses, reduced agency costs of free cash flow) against the costs (bankruptcy risk) and at the margin equate the two. The second approach, the pecking order model, argues that adverse selection issues in raising funds by different methods dominate other considerations in the tradeoff model such that a hierarchy of funds results. Firms will use internal funds first, then debt and only when such options are exhausted will they resort to using new equity finance.

The paper first highlights the financial deficit of firms. Separate work (Benito and Young, 2001, 2002; Benito, 2002) considers the behaviour of each component that makes up the financial deficit. In this paper, the behaviour of corporate indebtedness itself and its response to certain components of the financial deficit is considered, focusing on the different implications under the pecking order and tradeoff models for how debt responds to the cash flow and investment components of the financial deficit. At this point the study draws on previous work by Fama and French (2002) in contrasting the empirical implications of the two central models of capital structure, but relaxing the assumption of exogeneity of the key regressors, controlling for firm-specific fixed effects and presents independent evidence on this subject for firms operating in two different financial systems. The Spanish financial system has been categorised as "bank-based" whilst that of the United Kingdom as "market-based" (eg. Demirgüç-Kunt and Maksimovic (1999, 2002)). Does empirical support for either model depend on the nature of the financial system? This is a further question considered in the paper.

Broadly reflecting the different nature of the financial systems in Spain and the United Kingdom, as well as the nature of the samples available, the analysis then examines different

features of these two financial systems. In the case of the Spanish bank-based system a distinction is made between those firms where banks own equity in the firm and those where banks do not own equity. This allows us to assess whether such a direct ownership stake helps overcome asymmetric information that may give rise to the existence of the pecking order. In the case of UK firms, use of public markets including new equity issues is relatively more common. The pecking order model predicts that as well as being relatively rare, such new equity issues should be less responsive to certain financial characteristics than the use of additional borrowing. Under the pecking order model at the margin companies are more likely to respond to variations in financial characteristics by varying their borrowing than by issuing new equity. For the UK firms, this additional prediction of the pecking order model is therefore considered.

The remainder of the paper is organised as follows. Section 2 summarises the two main theoretical approaches and their empirical predictions. Section 3 presents data description for the company-level panel datasets. Section 4 presents estimation results for company debt ratios, whilst section 5 considers a number of extensions. Conclusions are presented in section 6.

2 Economic background

This section summarises the tradeoff and pecking order models of capital structure.[1] Under the tradeoff model, companies equate the marginal benefit of an additional unit of debt with the associated marginal cost, holding constant the firm's assets and investment plans. The key benefits of debt that the literature emphasises are the tax deductibility of its servicing cost and the mitigation of agency costs. The main cost of additional debt is bankruptcy risk and the costs associated with such bankruptcy. These costs would include the direct costs of re-organisation in the event of insolvency as well as indirect costs that arise when companies get into financial difficulty. This has important empirical implications, in particular for the relation between debt, profitability and investment.

Under the tradeoff model, debt or leverage increases in the profitability of the firm. This reflects three forces. First, bankruptcy risk is lowered when cash flow/profitability increases. An increase in cash flow or profitability which thereby lowers bankruptcy risk should lead to an increase in debt as the firm is better placed to exploit the tax benefits of interest deductability. Second, the asymmetric tax treatment of profits versus losses is such that greater profitability implies a higher expected tax rate which also increases the benefit of debt. Third, under agency models (eg. Jensen, 1986) additional cash flow is the

[1] See also Fama and French (2002), Shyam-Sunders and Myers (1999) and Harris and Raviv (1991) for a comprehensive review of models of capital structure.

prime source of agency costs. Debt helps offset these agency costs as the firm is committed to paying out excess cash in the form of interest payments. Again, this implies a positive relation between firms' debt ratios and cash flow or profitability.

The second key prediction is that under the tradeoff model, leverage varies inversely with the rate of investment. This is largely due to agency considerations. Firms with higher investments (for given cash flow) have less need for debt as a means of constraining the interests of managers which may diverge from those of shareholders, particularly for firms with large amounts of free cash flow.[2]

Under the pecking order model, developed by Myers (1984) and Myers and Majluf (1984), there is a strict ordering or hierarchy of sources of finance. This results from adverse selection issues which arise when the firm has more information about its value than providers of funds. These adverse selection issues are absent when retained earnings are used as the marginal source of funds and are greater for equity than debt finance. Providers of finance therefore require a risk premium which is greater for equity than debt finance. The result is that firms will have a preference for internal sources of funds followed by debt and then, when such sources are exhausted, equity finance will be used.

An implication of the pecking order approach is that firms do not have a target level of leverage and their actual level of debt essentially responds to the difference between investment and retained earnings. The pecking order model implies that leverage is decreasing in company cash flow or profitability and increasing in investment, *ceteris paribus*.[3] The availability of internal funds, through cash flow or current profitability, implies that firms have less need to make recourse to external debt, implying a lower debt ratio. Moreover, for a given level of cash flow the amount of debt will be increasing in the investment being undertaken by the firm. The important observation is that both of these predictions are in contrast to those described above for the tradeoff model. However, in a refined (ie. non-static) pecking order model capital structure decisions are influenced by future as well as current financing costs. In this context, firms may wish to maintain a capacity for additional debt with larger expected investments implying lower current indebtedness. This implies the importance of controlling for investment opportunities.

A consideration of the relation between debt and growth opportunities is also of interest in its own right. A case for expecting a positive relation (particularly when the debt ratio is measured at book values) could be expected, especially under the pecking order

[2] Free cash flow is defined as that level of cash flow, after interest and taxes, in excess of the level necessary to finance profitable investments.

[3] It is assumed that dividends are sticky and do not respond to any shortfall of internal funds relative to investment. See Benito and Young (2001, 2002) for evidence supporting persistence in dividends for UK firms.

model. As growth opportunities increase the demand for funds, this may mean that for given availability of internal funds, additional external funds are required including additional debt. Despite some weaknesses, the most common proxy for growth or investment opportunities has been the Tobin's Q ratio. Under the tradeoff model however, an inverse relation between the debt ratio and Tobin's Q could arise since companies with a high level of Tobin's Q, which may reflect a high level of intangibles, may face greater costs of financial distress. The resale value of the company, *ceteris paribus*, is lower and this will discourage high levels of debt under the tradeoff model. The model of Myers (1977) also shares this prediction of an inverse relation between debt and Tobin's Q. It is argued that many corporate assets–and growth opportunities in particular–can be considered as a real option, the value of which depends on discretionary future investment by the firm. Such discretionary investment may be related to the capital structure of the firm as shareholders may perceive that future profits will be used to pay existing debtholders. Debt can then reduce the market value of the company in circumstances when the firm decides to forego investment opportunities.[4] The *a priori* relation between the corporate debt ratio and Tobin's Q is therefore ambiguous. Indeed, prior research has recorded both positive and negative relations between debt and growth opportunities (Harris and Raviv, 1991, p.336).

One further model which is worth noting is the tax discrimination or 'new view' model of taxation and corporate finance, originating in the work of King (1977) and Auerbach (1979) (see also Auerbach, 2001). This model also gives rise to a hierarchy of funds in a similar manner to Myers and Majluf (1984) but based solely on tax considerations (in particular the differences in the tax rates that apply to dividend income and capital gains) and the fixed costs associated with issuing new equity as well as certain institutional and legal constraints. Rather than consider the tax discrimination/hierarchy of finance model as a separate model, this is considered as being a particular instance of the hierarchy of finance model and no attempt is made to distinguish it from the hierarchy of finance approach discussed by Fama and French (2002) and Shyam-Sunders and Myers (1999).[5]

3 Data Description

3.1 The Data

The paper employs two firm-level data sets. The Spanish data are derived from the Annual Central Balance Sheet Database (Central de Balances, CBA) of the Bank of Spain. This

[4] Such an inverse relation could also come about if there is a tendency for companies to issue equity when the share price and company valuation is high relative to the replacement cost of the capital stock.

[5] Benito and Young (2001) discuss the tax discrimination model further and its implications for the financial policies of UK firms, in particular their dividends.

consists of a voluntary, large-scale survey of non-financial companies in Spain. Its coverage of the non-financial sector is around 35 per cent of total value added in each year, including micro-firms (with less than 10 employees) and is used extensively by the Bank of Spain at an aggregate level, in examining developments in the Spanish corporate sector.[6] This study selects on a minimum of 10 employees in either the manufacturing or retail sectors. Gross outliers are also removed from the data. The data are then selected on a minimum of five consecutive observations per company. The resulting data consist of 6,417 companies over the period 1985 to 2000.

The UK data employed refer to the company accounts of 1,784 quoted non-financial companies over the period 1973 to 2000.[7] These data were collected from the Datastream database of accounts of companies listed on the London Stock Exchange. Banking and finance sector companies are omitted since their chosen capital structures are heavily influenced by regulatory requirements. For the analysis of debt ratios, where estimation involves the use of lags as instruments for the variables, the data are again selected on the availability of at least 5 time-series observations per company. Whilst also of interest in their own right the results for the UK sample offer an interesting comparator for the Spanish firm results. These two samples cover two quite different financial systems. As noted aove, a number of studies have categorised the Spanish financial system as 'bank-based' and that operating in the United Kingdom as 'market-based' (eg. Demirgüç-Kunt and Maksimovic (1999, 2002)). The stronger linkages between banks and firms in the United Kingdom and the greater availability and use of public equity markets in the United Kingdom will be explored further below.

Summary statistics for the Spanish and UK samples on the main variables are presented in Tables 1 and 2, respectively. Among the Spanish firms the mean debt-to-assets ratio for the sample period 1985 to 2000 is 0.342, similar to that for companies in several of the G7 countries examined by Rajan and Zingales (1995). The high degree of variation across companies in the debt ratio, examined further below, is reflected in the standard deviation of 0.290. Mean book leverage remains stable through the 1990s for this sample of companies. The mean value of debt issues increased slightly in the late 1990s from 3.1 per cent in 1996 to 4.8 per cent in 2000. But unlike the national accounts data which has a broader coverage of small firms there is not a notable increase in the indebtedness of our sample of Spanish companies from the Central de Balances.[8]

[6] Further details of the data are provided in Banco de España (2001).

[7] Data on new equity issuance is only available for a subset of this sample period, up to 1991.

[8] Some variation in the coverage of the Spanish data over time should also be acknowledged. More specifically coverage of smaller companies increased up to 1990. The median number of employees of the Spanish sample was 100 in 1985, declining to 53 by 1992. Since 1993 it has remained stable at 47 employees.

For the UK firms, the mean debt-to-assets ratio, or book leverage, over the period is 0.204, with the large degree of variation across companies indicated by the standard deviation of 0.154.[9] Mean debt issues by companies (ie. the change in outstanding debt over the year dividend by assets, $\Delta B/A$) are approximately twice as large as mean equity issues (N/A) during the early sub-periods and then become relatively smaller towards the end of the available sample period. Debt issues are also almost twice as common for companies to undertake than net equity issues. Mean cash flow CF/K, profitability π/K, investment I/K, and Tobin's Q all follow familiar patterns given the cyclical behaviour of the economy, most notably with declines in cash flow, profitability and investment associated with the sub-periods that include the recessions of the early 1980s and early 1990s.[10]

It is sometimes suggested that support for the pecking order model can be derived from the fact that net new equity issues are rare among quoted companies. Table 2 provides evidence on this point for the sample of quoted UK firms. Over the full sample period, the median company does not issue new equity. The proportion of companies issuing equity increases during the sample period from 17.1 per cent in 1974 to 68.5 per cent in 1989. The value, which averages 2.1 per cent of assets during the sample period, reaches a peak of 6.7 per cent in 1987. This supports the notion that the majority of quoted companies tend not to issue equity after the initial public offering. Although the majority of firms do not issue equity, a substantial minority of companies do undertake new equity issues and these cannot be fairly described as 'rare'. Moreover, conditional on issuing equity such issues are quite large, averaging 5.7 per cent of total assets. This suggests that whilst companies are reluctant on a year-on-year basis to raise new equity finance, when such issues are made they are quite significant and are by no means rare.

Figure 1 illustrates the median and mean rates of debt and equity issues over the period 1973-1991 for which such data are available for the UK sample. Consider equity issues first. As noted above, the typical or median firm over the full sample period does not issue new equity. Considered separately for each year, this characteristic of the median firm holds up to 1986 from which point the median firm's new equity issue becomes positive, but remains low, never exceeding 0.3 per cent of its assets. The mean value of equity issue is rather higher however, throughout the sample period. The mean value of issues varied around 1 to 2 per cent up to 1986 when it increased to 3.5 per cent and peaked at 6.9 per cent in 1987 then declining but remained around 2.5 per cent by 1991. The higher rates of

[9] The mean debt ratio here is not dissimilar to that reported for the smaller, cross-sectional UK sample of Rajan and Zingales (1995) of 0.16. In their sample, UK firms on average have the lowest levels of leverage among the G7 countries, along with Germany.

[10] The procyclicality of these variables is seen most clearly by examining the annual averages. For instance, the mean company investment rate by year for the 1979 to 1983 period are 0.163, 0.148, 0.117, 0.120 and 0.134, whilst those for 1989 to 1993 are 0.245, 0.215, 0.152, 0.126 and 0.127, respectively.

issuance during the mid- and late-1980s may in part be associated with increases in merger activity during this period.

The median company's debt issue, measured as the change in outstanding debt normalised on total assets, exceeds its new equity issue through most of the sample period and also increased notably during the late-1980s. The mean values are somewhat more volatile, the overall mean being 2.1 per cent. Rates of debt issue of around 1 to 2 per cent up to the mid-1980s then increased significantly reaching 5.1 per cent in 1989, before declining in 1990 and 1991 as the economy entered recession. The figures in Table 2 also indicate that mean rates of debt issue and book leverage increased in the late-1990s.

An inspection of how the borrowing decisions of firms fits into their broader financial decisions is presented in Figure 2 for both the Spanish and, separately, the UK firms. The mean financial deficit of the samples of firms during their respective sample periods alongside the mean rates of investment in fixed assets and working capital, dividend distributions, and cash flow all normalised on fixed capital stock of the firm are shown. The financial deficit is defined as cash flow less fixed and working capital investment and dividends distributed and represents the amount a company has to borrow through financial liabilities or the surplus it has available to invest in financial assets. Under the pecking order model, variations in the financial deficit will largely be met by variations in debt levels. Figure 2 shows that whilst cash flow declines notably in the recession in Spain of 1993, this was largely accompanied by reductions in investment in working capital and to a lesser extent in fixed capital. Dividends remained stable throughout, showing only a modest tendency to decline in the recession; such stability is assumed in the pecking order model. The financial deficit thereby declined in the recession as companies felt inclined to repair their balance sheet rather than take on additional liabilities and invest.

Looking at the components of the financial deficit for UK firms, the reduction in cash flow during the recessions of the early 1980s and early 1990s is clear. Also clear is again the remarkable stability of the dividend payout. There is modest evidence of reductions in the payout in the early 1980s and early 1990s but despite attempts to repair the balance sheet, dividends remain remarkably and experienced a trend increase during the period. Benito and Young (2001, 2002) show that dividends of UK firms respond to financial pressure but that the response is slow. In contrast investment is highly cyclical. The mean rate of (real) investment falls from 24.5 per cent in 1989 to 12.6 per cent in 1992. The most cyclical component of the financial deficit is investment in working capital, which includes inventories and liquid assets.

An additional aspect of the estimation analysis considered below for UK firms examines the (discrete) decisions to employ additional debt and equity finance. This will focus on

the implication of the pecking order model that the propensity for a firm to borrow more should be more sensitive to financial characteristics than its decision to issue new equity. At the margin, the firm is more inclined to use additional borrowing than equity in response to variations in cash flow, for instance.[11]

4 Estimation and Results

4.1 Estimation strategy

4.1.1 Debt ratios

The basic estimation framework for examining firms' debt ratios is a dynamic fixed effects panel data model of the following form:

$$\frac{B}{A}_{it} = f_i + \beta_1 \frac{B}{A}_{it-1} + \beta_2 \frac{CF}{K}_{it} + \beta_3 \frac{I}{K}_{it} + \beta_4 Q_{it} + \beta_5 \ln S_{it} + \psi_t + \varepsilon_{it} \qquad (1)$$

where i indexes firms i=1,2..N and t indexes years, t=1,2..T. B/A is the book leverage of the firm (debt relative to total assets, A). Graham and Harvey (2001) found, on the basis of interview evidence with US executives, that managers focus on such book values in setting debt policy.[12] Equation 1 is based on the discussion in Section 2, which is itself based on that in Fama and French (2002), whilst additional controls for firm-level fixed effects. CF/K is the firm's (post-tax and interest payments) cash flow, I/K its fixed investment (both normalised on the replacement cost of the firm's capital stock, K).[13] Q is Tobin's Q as a proxy for investment opportunities. In the case of the Spanish sample a measure of Tobin's Q is not available as most companies are not quoted and this is omitted.[14] lnS is log real sales of the firm.[15] f_i are firm-specific fixed effects that control for unobserved time-invariant characteristics, which may include factors such as the riskiness of the sector in

[11] Sample statistics for UK firms stratified according to whether they issued debt and/or equity are presented in Appendix Table A.3.

[12] Use of book leverage also follows many studies including Fama and French (2002) and McKay and Phillips (2002).

[13] Results obtained below are qualitatitively very similar when these two variables are normalised on total assets. This is not surprising particularly given that the analysis controls for fixed effects. Use of fixed capital stock K, as the denominator, as well as being intuitively appealing particularly in the case of fixed investment, also avoids any spurious correlation which might exist when the dependent variable and regressors are normalised on the same term.

[14] Alonso-Borrego and Bentolila (1994) construct a measure of Q for quoted firms present in the Central de Balances data but this reduces the sample size considerably to, in their case, 68 firms. For such a sample size, asymptotic properties of GMM estimation are unlikely to hold.

[15] The log sales term fits the data better than alternative non-linear functions of real sales that were considered.

which the firm operates, with ψ_t as aggregate effects common across companies to control for macroeconomic influences, including such factors as nominal interest rates and inflation.[16] ε_{it} is the error term assumed serially uncorrelated but possibly heteroskedastic. Other details of the estimation approach are described below.

The specification above follows from the discussion in section 2. In addition, scale is also likely to matter, not least since it tends to be related to the degree of diversification of the firm and the volatility of its earnings and hence serve as an inverse proxy for the likelihood of distress. It may also be the case that size is related to the severity of informational asymmetries between insiders in the firm and capital markets with these arguably being lower for large firms, in which case an inverse relation between the debt ratio and scale might be expected.[17] In Equation (1) β_1 indicates the speed of adjustment, and in particular under the tradeoff model where a target debt ratio exists, $(1-\beta_1)$ indicates the speed of adjustment towards that target ratio. The discussion below will focus on the contrasting predictions of the two models discussed previously. In particular, under the static tradeoff model, $\beta_2 > 0$ and $\beta_3 < 0$, whilst under the pecking order approach, $\beta_2 < 0$ and $\beta_3 > 0$.

Fama and French (2002) estimate similar models to (1) for US firms, with the present analysis relaxing two restrictions present in that study and providing evidence for two different country samples. The first concerns the inclusion of fixed effects which control for unobserved heterogeneity at the firm-level that is constant over time. This will be useful in controlling for factors such as governance and sectoral characteristics to the extent that these do not vary over time for individual firms and may be correlated with the regressors of interest. This is important since, strictly, the pecking order approach offers a theory of the marginal financing decision rather than a theory of debt ratios *per se*. Employing fixed effects methods that exploit time-series variation in the data at the firm-level is therefore more appropriate compared to the cross-sectional tests of Fama and French (2002). This point also helps motivate the study of the marginal decision to employ additional debt versus new equity financing also considered below.

The second consideration is to allow for the endogeneity of these regressors. It should be clear from the discussion in the previous section, that the regressors are far from exogenous in the reduced-form equation for the debt ratio. However, the studies referred to above impose such a restriction. Frank and Goyal (2002) acknowledge this point stating that endogeneity would give rise to unstable estimates, rather than attempting to deal with

[16] The composition of the firm's debt may also be affected by profitability and investment opportunities but this issue is not considered here, which instead focuses on the overall level of debt.

[17] This would also be consistent with results of Estrada and Vallés (1998) who find evidence of a relation between firm size and external financing costs.

the issue directly. The present paper relaxes the strict exogeneity assumption employing the GMM-System estimator proposed by Arellano and Bover (1995) and examined in detail by Blundell and Bond (1998). This estimator is an extension of the GMM estimator of Arellano and Bond (1991) and estimates equations in levels as well as in first-differences. Where there is persistence in the data such that the lagged levels of a variable are not highly correlated with the first difference, also estimating the levels equations with a lagged difference term as an instrument offers significant gains, countering the bias associated with weak instruments (see Blundell and Bond, 1998). Several variables display high levels of serial correlation. The estimation method requires the absence of second order serial correlation in the first differenced residuals for which the test of Arellano and Bond (1991) is presented, (labelled M_2).[18]

4.2 Estimation results

Spanish firms

Estimation results for company debt ratios of the Spanish firm data are presented in Table 3. Recall that under the static tradeoff model, a positive relation between debt and cash flow or profitability is expected and a negative relation between debt and investment, whilst the predictions under the pecking order model are the reverse.

The results largely conform to the predictions of the pecking order model and conflict with those of the tradeoff model.[19] Higher cash flow is estimated to imply lower levels of debt as companies have less recourse to debt finance when cash flow is high, controlling for investment. In column 1, the cash flow term, CF/K_{it} attracts a coefficient (robust standard error) of -0.076 (0.010). Further, under the pecking order model, a higher level of investment increases the need for debt finance, given cash flow. This also finds support with the investment term attracting a significant coefficient (robust standard error) of 0.152 (0.020). These two central implications of the pecking order model therefore find support. This is stronger evidence in support of the pecking order approach than obtained for US firms by Fama and French (2002), who found an inverse relation between the debt ratio and profitability but also a negative relation between debt and investment. The estimates are quite well-determined and suggest a rate of adjustment of debt to its target ratio of around

[18] In view of evidence of Blundell *et al.* (2000) that a standard Sargan test applied to this estimator over-rejects the null hypothesis, particularly where the number of time-series observations is relatively large as it is here, this test statistic is not reported.

[19] The same broad pattern of results favouring the pecking order model's implications were also obtained in OLS models that did not control for fixed effects. Since there is a strong a priori case in favour of these GMM models with fixed effects and in order to conserve space, the OLS results are not presented.

50 per cent after two years.[20] This seems plausible *a priori* and is significantly greater than the estimate of 7 to 17 per cent per year, acknowledged as "suspiciously slow" by Fama and French (2002). In each specification aggregate effects are also estimated to be significant. There is no suggestion that the GMM estimates presented in column 1 are subject to second-order serial correlation, the key condition for the validity of the instrumentation strategy.

The specification in column 2 replaces the cash flow term with a profitability measure, π/K_{it}. The term is also negatively signed, with a coefficient (robust standard error) of -0.089 (0.026). This provides further support for the pecking order model that the availability of internal funds should imply lower debt ratios, in contrast to the trade-off model prediction that high profitability or cash flow should imply that companies can "sail closer to the wind", affording higher debt ratios and the associated tax benefits as the likelihood of bankruptcy is lower. Also note that the use of lagged values of the regressors in place of the contemporaneously dated variables in Table 3 does little to alter the pattern of results obtained. For instance, in an otherwise equivalent model to that in column 1 but substituting lagged values for the cash flow, investment and company sales terms, the lagged cash flow term attracts a coefficient (robust standard error) of -0.025 (0.005) whilst the lagged investment term obtains a coefficient (robust standard error) of 0.020 (0.004).

Table 3 also presents estimates for net book leverage $(B-C)/A_{it}$, and a gross leverage measure based on long-term debt, B^{LT}/A_{it}. The results previously reported are robust to these alternatives, with the following points standing out. First, the inverse relation between the debt ratio and cash flow becomes slightly stronger where net debt is used, the point estimate increasing (in absolute terms) from -0.076 to -0.104. Employing the profitability measure in place of cash flow, again increases the economic and statistical significance of this term. Second, the positive relation between the debt ratio and investment also remains when the net debt measure is employed. The estimates for the net debt ratio imply that a 10 percentage point increase in cash flow is associated with a reduction in net debt of 0.01, whilst a 10 percentage point increase in investment increases the net debt ratio by 0.015, which represent appreciable effects. The case for using a net debt measure is based on the observation that companies with high levels of cash reserves can pay down debt if they so choose and on a net basis are less indebted. Nevertheless, companies which raise debt finance to fund particular investment projects may hold such funds as cash reserves for a time with their lower net debt level being a temporary phenomenon unrelated to their main financial policies. Generally, it is difficult to state a strong *a priori* preference for one measure over the other. In the present context, the fact that the results and the support for

[20] The addition of the second lag of the dependent variable improved the performance of the models and are therefore presented throughout.

the pecking-order predictions are robust to this consideration is the key finding. Third, the results for the long-term debt ratio, B^{LT}/A_{it} are also similar in nature to those reported above. The profitability term retains its significance, with a coefficient (standard error) of -0.087 (0.025), and the investment term is again positively signed and statistically significant in contrast to the implication of the tradeoff model. The key feature of the results therefore is that they provide evidence in favour of the two central predictions of the pecking order model, that debt ratios should be declining in cash flow and profitability and increasing in the investment of the firm.

In several of these specifications the coefficient on the investment term is close to being equal in magnitude but opposite in sign to that on the cash flow term. This would suggest that it is the gap or difference between cash flow or profitability and investment that drives variation in debt, a notion quite consistent with the pecking order model. This implies testing the restriction: $\beta_2 + \beta_3 = 0$. For example, in the specification for column 2 in Table 3 this hypothesis is at the margin of rejection at the 5 per cent level, producing a t-statistic of 2.028 (p-value=0.043). In other specifications this restriction is not rejected, however. For example in the case of those results shown in column 4, the associated p-value is 0.650.

UK Firms

Estimation results for company debt ratios of UK firms are presented in Table 4. The results again largely conform to the predictions of the pecking order model and conflict with those of the tradeoff model. Higher cash flow implies lower levels of debt as companies have less recourse to debt finance when cash flow is high, controlling for investment. In column 1, the cash flow term, CF/K_{it} attracts a coefficient (robust standard error) of -0.140 (0.021). Further, under the pecking order model, a higher level of investment increases the need for debt finance, given cash flow. This also finds support with the investment term attracting a significant coefficient (robust standard error) of 0.046 (0.016). These two central implications of the pecking order model therefore find support. This is again stronger evidence in support of the pecking order approach than obtained by Fama and French (2002), who found an inverse relation between the debt ratio and profitability but also a negative relation between debt and investment.

The estimates in column 1 point to a significant positive role for Tobin's Q. This is inconsistent with Myers's (1977) underinvestment argument but consistent with investment opportunities leading to greater demand for (external) funds. The finding of a positive relation between the company's debt ratio and Tobin's Q is also inconsistent with the prediction under the tradeoff model that a high level of Tobin's Q, reflecting a high level of intangibles, implies greater costs of financial distress and hence a lower optimal debt ratio. The scale of the company, as measured by the log real sales term, lnS_{it}, is found

to be positively related to debt, a result in keeping with the extant literature (eg. Rajan and Zingales, 1995). There is no suggestion that the GMM estimates presented in column 1 are subject to second-order serial correlation, the key condition for the validity of the instrumentation strategy.

The specification in column 2 replaces the cash flow term with a profitability measure, π/K_{it}. The point estimate and significance of the term is very similar to that of the cash flow term and is again negatively signed, with a coefficient (robust standard error) of -0.131 (0.022). This provides further support for the pecking order model that the availability of internal funds should imply lower debt ratios, in contrast to the trade-off model prediction that high profitability or cash flow should imply that companies can afford to exploit further the associated tax benefits of debt as the likelihood of bankruptcy is lower. The final specification reported for book leverage omits the lagged dependent variable, B/A_{it-1}. In the previous specifications this has been highly significant, with a coefficient (standard error) in the column 1 estimates of 0.644 (0.041) for instance. The main rationale for its inclusion is as picking up adjustment towards a target debt ratio, which exists in the tradeoff model. The estimates in column 1 to 3 are quite well-determined and suggest a rate of adjustment of debt to its target ratio of around 35 per cent per year. This seems plausible *a priori* and is significantly greater than the estimate of 7 to 17 per cent, acknowledged as "suspiciously slow" by Fama and French (2002). However, under a strict interpretation of the pecking order model no such target ratio exists suggesting the lagged dependent variable should be omitted. The results, including the significance of the M_2 serial correlation statistic when the lagged dependent variable is omitted, are not favourable to this specification however.

Table 3 also presents estimates for net book leverage $(B-C)/A_{it}$, and a gross leverage measure based on long-term debt, B^{LT}/A_{it}. The results previously reported are generally robust to these alternatives, with the following points standing out. First, the inverse relation between the debt ratio and cash flow becomes stronger where net debt is used, the point estimate increasing (in absolute terms) from -0.140 to -0.216. Employing the profitability measure in place of cash flow, again provides very similar results. Second, the positive relation between the debt ratio and investment also becomes stronger when the net debt measure is employed. The point estimate of the investment term increases from 0.033 to 0.092. Levels of statistical significance of these two variables also increase notably for the net debt ratio specifications. The estimates for the net debt ratio imply that a 10 percentage point increase in cash flow is associated with a reduction in net debt of 0.022, whilst a 10 percentage point increase in investment increases the net debt ratio by 0.011, by no means small effects. The case for using a net debt measure is based on the observation that companies with high levels of cash reserves can pay down debt if they so choose and on a net basis are less indebted. Nevertheless, companies which raise debt

finance to fund particular investment projects may hold such funds as cash reserves for a time with their lower net debt level being a temporary phenomenon unrelated to their main financial policies. Generally, it is difficult to state a strong *a priori* preference for one measure over the other. In the present context, the fact that the results and the support for the pecking-order predictions are robust to this consideration is the key finding. Third, the results continue to indicate a positive association between the debt ratio and growth opportunities according to the Tobin's Q measure. Fourth, the results for the long-term debt ratio, B^{LT}/A_{it} are slightly weaker than those reported above, but the key results for interpretation in terms of the pecking order and tradeoff model predictions remain intact. The M_2 test statistic of second order serial correlation is insignificant at the 10 per cent level.[21]

5 Further Experiments

5.1 The role of banks

An important hypothesis from the literature on information asymmetries is that governance and ownership mechanisms may develop that help mitigate any information asymmetries between the firm and providers of funds and as such may help attenuate the hierarchy of finance. One suggestion in this context is that the hierarchy of funds should be less pronounced among companies whose banks have a larger direct involvement in the company. Such providers of funds may be less subject to an information asymmetry. Data from the Central de Balances data also allow a consideration of this hypothesis. The survey data include information on whether financial institutions own equity in the firm. This is the case for 366 of our sample of companies (3,561 observations). For this hypothesis, Table 5 reports the results from the estimation of equations which add interaction terms between the cash flow and investment terms and an indicator for bank ownership of equity. The results indicate that whilst the relation between debt and cash flow is not significantly different between those firms with and those without direct participation of banks, there is evidence of a significantly weaker relation between debt and investment for firms with equity held by banks, at least in the case where the gross debt measure is used. However, the result depends on the measure of indebtedness that is used.[22]

[21] The difference in the nature of the two samples (quoted firms in the UK compared to largely small or medium sized firms in Spain) cautions against a direct comparison of estimates for the two samples. Instead, the main focus here has been on providing independent evidence on the validity of the pecking order versus tradeoff models for these two countries.

[22] Using a tighter definition for bank involvement (ie. increasing the necessary threshold of equity ownership) did not change the pattern of results.

The dataset considered thus far has a large number of relatively small firms. An interesting question concerns whether their behaviour in terms of debt adjustment may be different to that of larger firms. Firms have a number of means of adjusting their debt available to them, including the reduction or omission of a dividend payment and repaying debt by reducing their cost base through any number of means including employment reductions and lower wage settlements (see Benito and Young, 2002; Benito and Hernando, 2002). It may be that larger firms face higher costs of adjusting their debt by these means. If this is the case we might expect different behaviour for the debt ratio variable among larger firms. Higher adjustment costs would in the first instance reveal itself through greater persistence in debt ratios for larger firms. A further possibility is that providers of funds to larger firms face less severe asymmetries of information. Estimates of the direct costs of raising equity finance cited by Carpenter and Petersen (2002) also suggest that these are typically smaller for larger firms. This might also imply that the pecking order model might apply with less force for larger firms.

The possibility that there exists a difference in the behaviour of larger firms is considered in Table 5 where the sample is restricted to the 1,381 companies that have 100 employees or more. First, in terms of persistence in the company debt ratios, the point estimates on the lagged dependent variables offer some evidence that this is slightly higher for larger firms, at least for the gross leverage B/A_{it} measure. This is consistent with adjustment costs incurred in employing balance sheet adjustment mechanisms such as dividends being greater for larger firms. Second, there is some evidence that the positive relation between the debt ratio and investment is weaker for larger firms. This would be consistent with the notion that the hierarchy of finance should be less severe for larger firms. For instance, comparing column 1 of Tables 3 and 5 indicates that a point estimate on the investment term I/K_{it}, of 0.152 for the whole samples compares to that of 0.109 for the larger set of firms. It may therefore be the case that larger firms face a less pronounced financial hierarchy, for instance experiencing lower costs in financing investment by issuing equity.

5.2 The propensity to use new debt and equity finance

Is the propensity to issue debt more sensitive than that of equity to the availability of internal funds relative to investment, as suggested by the pecking order model?[23] The issue

[23] Shyam-Sunders and Myers (1999) develop a test of the pecking order model in which debt issues (the change in outstanding debt) is regressed on the financing deficit (investment, plus dividends plus change in working capital less cash flow after interest payments and taxes). A slope coefficient of 1 is said to be supportive of a strict interpretation of the pecking order model in which debt is used by the firm that experiences a financial debt with equity used rarely if at all. Chirinko and Singha (2000) critique this test

is addressed by estimating random effects probit models for both debt and equity issues at the company level for the UK sample for which new equity finance data are available. The random effects probit model takes the following form.

$$y_{it} = 1\left\{\alpha_i + \gamma_1 \frac{C}{K}_{it} + \gamma_2 \frac{I}{K}_{it} + \gamma_3 Q_{it} + \gamma_4 \ln S_{it} + \chi_t + \epsilon_{it} > 0\right\} \tag{2}$$

where $1\{A\}$ is an indicator variable for the event A such that y_{it} is binary denoting the issue of debt or, considered separately, equity by the firm.[24] α_i denotes the unobserved company-specific component that is assumed random across companies with $\alpha_i \sim N(0, s_\alpha^2)$. $\epsilon_{it} \sim (0, s_\epsilon^2)$ represents random error and is assumed to be independent of α_i. α_i and ϵ_{it} are also assumed orthogonal to the regressor set. χ_t are a set of time effects in the form of year dummies to control for aggregate movements in the propensity for firms to issue debt or equity. The within-company correlation ρ, indicates the proportion of the total variance that is accounted for by the panel variance component, α_i. Under the testable restriction that $\rho = 0$, the model collapses to the pooled cross-sectional probit model. Estimation is by maximum likelihood. Further discussion is provided by Arulampalam (1999) (including the likelihood function). A normalisation is required for estimation, with $\sigma_\epsilon^2 = 1$ adopted here.

An indicator of a net issue of equity is directly available from company accounts or at least was available until the introduction of the cash flow standard FRS1 and FRS1(Rev) which became compulsory in March 1992, and restricts the sample period accordingly. These figures are net of share repurchases. For debt issues, the change in outstanding debt is used. In order to focus on a long-term debt issue, the change in long-term debt (repayable in more than one year) is also considered.

Estimates from random effects (RE) probit models of the propensity to issue debt and equity are presented in Table 6. Two specifications are presented for each of four dependent variables, total debt issue, any equity issue, an increase in long-term debt and an equity issue equal in value to at least 2 per cent of the market value of the firm. The second specification in each case replaces the cash flow term CF/K_{it} with the profitability term π/K_{it}.

The propensity to issue debt is estimated to be declining in the cash flow of the firm, with a coefficient (standard error) of -2.925 (0.143). The other key result from the previous analysis of debt ratios is also confirmed in these probit models for debt as an increase in

and partly for this reason the present paper focuses on the *relative* sensitivity of debt and equity issues to relevant financial characteristics, in particular cash flow and investment.

[24] Formally, the decisions to issue debt and equity would be taken jointly and could be modelled as such. This lies beyond the scope of this paper however, which instead focuses on the relative sensitivity of each decision to financial characteristics.

borrowing is found to be increasing in the investment of the firm with a coefficient (standard error) on the I/K_{it} term of 3.066 (0.151). The propensity to take on additional debt is also estimated to be increasing in Tobin's Q and in the scale of the firm. As before, considering the profitability term in place of the cash flow term gives a (slightly) stronger inverse relation with the propensity to issue debt.

In Table 7 the associated marginal effects are presented, employing the correction to the standard marginal effects expression suggested by Arulampalam (1999) for RE probit models. These marginal effects are appropriate for evaluating the relative sensitivity of borrowing and equity issues to financial characteristics, in particular cash flow (or profitability) and investment. Under the pecking order model we expect debt issues to be the more sensitive of the two and this is confirmed in the results. The marginal effect associated with cash flow is -1.105 in the RE probit model for debt issues and a statistically insignificant -0.078 in the corresponding model for equity issue.[25] The finding that increases in cash flow are associated with a lower probability of taking on additional debt and issuing equity are consistent with the notion that these activities are undertaken when internal funds are low. The profitability term is also insignificant in the model for equity issues but is highly significant in the debt issues equation. The marginal effect suggests that a 10 percentage point increase in profitability reduces the probability of issuing additional debt by -0.12, compared to a mean probability of debt issue of 0.55, quite a large effect.

The propensity for a firm to increase its borrowing is also found to be more sensitive to the firm's investment than is its propensity to undertake an equity issue. This also confirms the intuition of the pecking order model. The associated marginal effect for the propensity to issue additional debt is 1.018 compared to 0.467 for the propensity to undertake an equity issue. A 10 percentage point increase in investment is therefore estimated to increase the propensity to issue debt by 0.10 and to issue new equity by 0.05.

Table 6 also reports that this pattern of results is further supported when considering specifically long-term debt. One possible objection to the analysis of equity issues is that companies issue equity for reasons unrelated to their financial policies, for instance as part of their remuneration policy in the form of employee or executive share ownership schemes. This could plausibly weaken the tendency for equity issues to be associated with financial distress such as a low level of cash flow. In the light of this we consider an alternative threshold amount for equity issuance, set at 2 per cent of equity value. The use of such a 2 per cent threshold is also employed in a study of equity issuance among US firms by Auerbach and Hassett (2002). The results, also reported in Tables 6 and 7, suggest a stronger relation between the propensity to issue equity of this amount and cash flow and

[25] Note that these marginal effects represent the change in the predicted probability associated with a 100 percentage point change in the financial ratio.

investment. However, the effects remain weaker than those estimated in the case of debt issuance.

In sum, the pattern of the results, and in particular the greater sensitivity of the use of debt than equity as a response to any shortfall between cash flow and investment, confirms this prediction of the pecking order model.

6 Conclusion

This paper has examined the capital structure decisions of firms. The two main candidate models which have attempted to resolve the 'capital structure puzzle' have been the tradeoff and pecking order theories. Each relaxes conditions under which the Modigliani and Miller (1958) theorem was derived. The tradeoff theory views companies setting a level of debt where the marginal benefit of debt, in the form of tax deductibility of interest payments and possible mitigation of agency costs, exactly offsets the marginal cost of debt in the form of bankruptcy costs. The pecking order theory instead views these considerations as of secondary importance being dominated by adverse selection issues arising from the fact that managers have greater information about the value of the firm than outside providers of funds. The resulting premium that such suppliers of finance demand is especially strong where equity finance is concerned such that firms have a strict ranking of preferred source of funds: internal funds, followed by debt and then equity.

This paper has aimed to discriminate between these two approaches examining how chosen debt ratios are related to other financial characteristics of firms. In particular the two approaches offer contrasting implications for the relation between debt and cash flow and investment of the firm. The paper has confronted these predictions, employing company-level data using unbalanced panel data for firms from two different financial systems. Whilst the Spanish financial system has been categorised as bank-based, that for the United Kingdom has been described as market-based. The results provided significant evidence in favour of the pecking order model, in that debt ratios are estimated to be significantly inversely related to the cash flow and profitability of the firm and vary positively with its investment. These results are consistent with debt being issued in response to the shortfall between cash flow and investment under the pecking order model. High cash flow or profitability implies that companies are less likely to resort to more expensive external funds, implying lower book leverage under the pecking order model. The fact that these results have been obtained in countries representing examples of two different financial systems suggests that the pecking order model may have wide applicability.

This negative relation with company profitability is inconsistent with the tradeoff model and the prediction under the agency costs of free cash flow argument of Jensen

(1986). The former suggests that greater profitability should lead to a higher debt ratio as the probability of bankruptcy is lower and the firm can afford to exploit further the tax benefits of debt. Agency models which predict a positive relation between debt and free cash flow (ie. positive relation with cash flow and negative relation with investment) do not receive empirical support here. The results also suggested a positive relation between debt and investment consistent with the pecking order model but inconsistent with the standard tradeoff model prediction of an inverse relation between leverage and investment due to higher investment implying lower levels of free cash flow and hence less need to commit funds to debt interest payments.

Further analysis of the capital structure decisions of firms focused on particular features of the two financial systems. In Spain, banks play a more significant role as a source of finance. It has been suggested that an advantage of this bank-based financial system is that banks are can be effective at monitoring firms and overcoming asymmetric information issues. This might suggest a weaker role for the pecking order model where banks have a direct ownership stake in a company. Some evidence consistent with this hypothesis was presented.

In the case of the United Kingdom, a feature of the market-based system is the greater availability and use of new equity finance. However, the pecking order model indicates that it should be borrowing which at the margin responds more significantly than equity issues to relevant financial characteristics. This additional hypothesis has also been examined by examining the propensity for a company to issue debt and equity in a particular year as a function of its financial characteristics, most notably its cash flow and investment. The results from random effects probit models suggested a significantly larger responsiveness to these variables of debt than equity, also consistent with pecking order behaviour.

The results therefore strongly favour the pecking order model. Nevertheless, in broad terms issues of equity seem to be more common than a strict interpretation of the pecking order model would suggest. In certain years during the sample period, a majority of quoted UK firms have been observed to be net issuers of equity and, although not generally the case, in some individual years such equity issues were more common than increases in debt. This might point to a broader interpretation of the pecking order model which emphasises the hierarchy of funds itself rather than the relative frequency of use of different sources of funds as in Myers (2001). This point notwithstanding, the empirical implications of the pecking order model have found support suggesting behaviour consistent with the existence of a pecking order or hierarchy of finance faced by firms in both Spain and the United Kingdom, representing two rather different financial systems.

Finally, what do these results imply for the causes and consequences of the increase

in corporate indebtedness up to and beyond the late-1990s? First, the results point to important positive effects from investment to a company's level of debt. As corporates increased investment rates during this period, particularly in information and communications technology equipment–whilst cash flow and profitability remained quite stable–firms had increasing recourse to debt finance. Second, the finding of a robust positive relation between debt ratios and Tobin's Q in the case of UK firms suggests that increase in market valuations and perceived growth opportunities was a factor in encouraging firm's to take on additional debt during this period. Third, the results suggest that increases in debt were not a means to economising on agency costs of free cash flow. The notion that debt plays an important role in economising on such costs would imply much more benign, indeed positively beneficial, consequences of corporates increasing their indebtedness associated with an increasing alignment of management and shareholder interests. Instead, the results point towards risks associated with increasing corporate indebtedness.[26] The existence of a pecking order implies that any significantly adverse shock could have its effect on the economy amplified owing to a wedge between the costs of internal and external funds, leading firms to require a higher rate of return following some adverse shock and foregoing investment.

[26] Note this does not preclude other factors such as lower nominal interest rates and a more stable macroeconomic environment, as also being relevant factors.

Table 1: Summary statistics–Spanish firms

		1985-88	1989-1992	1993-96	1997-2000
B/A	book leverage	0.378 (0.300)	0.335 (0.289)	0.332 (0.283)	0.331 (0.289)
$(B-C)/A$	net leverage	0.244 (0.408)	0.212 (0.399)	0.218 (0.378)	0.206 (0.392)
$\Delta B/A$	debt issue	0.057 (0.338)	0.068 (0.326)	0.035 (0.264)	0.046 (0.251)
$(\Delta B > 0)$	any debt issue	0.463	0.496	0.440	0.459
CF/K	cash flow	0.365 (0.573)	0.287 (0.554)	0.203 (0.462)	0.295 (0.504)
π/K	profitability	0.187 (0.237)	0.168 (0.242)	0.129 (0.215)	0.149 (0.213)
I/K	fixed investment	0.244 (0.468)	0.237 (0.492)	0.193 (0.431)	0.237 (0.457)
$\Delta W/K$	working capital	0.759 (3.904)	0.598 (3.800)	0.330 (3.190)	0.524 (3.353)
fd/K	financial deficit	0.739 (3.926)	0.647 (3.810)	0.380 (3.205)	0.545 (3.205)
S	real sales (Emn)	51.784 (249.201)	44.188 (241.294)	39.453 (232.767)	43.823 (282.619)
observations		11,484	16,320	16,848	14,099

Note: Table reports means (standard deviations in parentheses, where applicable). Real sales are in 1995 prices.

Table 2: Summary statistics–UK firms

		1973-76	1977-80	1981-84	1985-88	1989-1992	1993-96	1997-2000
B/A	book leverage	0.162 (0.128)	0.145 (0.113)	0.150 (0.118)	0.157 (0.125)	0.185 (0.138)	0.177 (0.134)	0.210 (0.170)
$(B-C)/A$	net leverage	0.101 (0.172)	0.087 (0.155)	0.075 (0.167)	0.060 (0.179)	0.079 (0.199)	0.059 (0.193)	0.096 (0.230)
$\Delta B/A$	debt issue	0.017 (0.066)	0.018 (0.059)	0.016 (0.066)	0.019 (0.079)	0.024 (0.082)	0.009 (0.075)	0.025 (0.099)
N/A	new equity issue	0.007 (0.026)	0.008 (0.029)	0.012 (0.042)	0.034 (0.099)	0.032 (0.100)	n.a.	n.a.
$(\Delta B > 0)$	any debt issue	0.537	0.551	0.549	0.538	0.579	0.509	0.526
$(N > 0)$	any new equity	0.208	0.263	0.336	0.560	0.635	n.a.	n.a.
$(N \geq 0.02)$	new issue $\geq 2\%$	0.122	0.125	0.122	0.213	0.190	n.a.	n.a.
CF/K	cash flow	0.197 (0.133)	0.165 (0.107)	0.145 (0.110)	0.234 (0.172)	0.240 (0.175)	0.251 (0.182)	0.264 (0.193)
π/K	profitability	0.143 (0.125)	0.114 (0.103)	0.089 (0.104)	0.165 (0.162)	0.168 (0.163)	0.174 (0.169)	0.186 (0.180)
I/K	fixed investment	0.158 (0.149)	0.151 (0.139)	0.128 (0.141)	0.188 (0.194)	0.185 (0.191)	0.149 (0.156)	0.156 (0.175)
D/K	dividends	0.042 (0.041)	0.039 (0.035)	0.043 (0.061)	0.063 (0.105)	0.072 (0.081)	0.083 (0.117)	0.091 (0.116)
$(D = 0)$	dividend omission	0.023	0.014	0.025	0.020	0.025	0.023	0.024
$\Delta W/K$	working capital	0.226 (0.326)	0.176 (0.292)	0.098 (0.322)	0.193 (0.459)	0.102 (0.428)	0.146 (0.513)	0.101 (0.512)
fd/K	financial deficit	0.190 (0.294)	0.166 (0.277)	0.099 (0.320)	0.161 (0.420)	0.069 (0.413)	0.093 (0.486)	0.036 (0.471)
Q	Tobin's Q	1.103 (1.196)	1.018 (0.983)	1.306 (1.727)	2.300 (2.434)	2.201 (2.178)	2.763 (2.829)	2.716 (3.170)
S	real sales (£mn)	265.2 (1,096.4)	297.1 (1.331.3)	400.8 (1,977.4)	469.7 (2,015.3)	496.0 (1,894.2)	540.4 (2,003.1)	589.5 (2,287.3)
observations		3,810	4,109	3,208	2,827	2,743	2,655	1,852

Note: Table reports means (standard deviations in parentheses, where applicable).
New equity issuance data are only available up to 1991.
Real sales are in 1987 prices.

Table 3: GMM estimates for debt ratios–Spanish firms

	B/A_{it}		$(B-C)/A_{it}$		B^{LT}/A_{it}	
B/A_{it-1}	0.334 (0.011)	0.333 (0.011)				
B/A_{it-2}	0.129 (0.008)	0.129 (0.008)				
$(B-C)/A_{it-1}$			0.442 (0.015)	0.438 (0.015)		
$(B-C)/A_{it-2}$			0.092 (0.011)	0.090 (0.011)		
B^{LT}/A_{it-1}					0.339 (0.016)	0.334 (0.016)
B^{LT}/A_{it-2}					0.069 (0.012)	0.068 (0.012)
CF/K_{it}	-0.076 (0.010)		-0.104 (0.015)		-0.034 (0.008)	
π/K_{it}		-0.089 (0.026)		-0.107 (0.015)		-0.087 (0.025)
I/K_{it}	0.152 (0.020)	0.137 (0.024)	0.157 (0.028)	0.133 (0.036)	0.087 (0.020)	0.104 (0.024)
lnS_{it}	0.020 (0.005)	0.017 (0.005)	0.018 (0.007)	0.018 (0.007)	0.004 (0.005)	0.004 (0.005)
year effects	yes	yes	yes	yes	yes	yes
M_2	0.289	0.351	0.551	0.473	0.680	0.728
Instruments	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1
firms	6,417	6,417	6,417	6,417	6,417	6,417
observations	45,917	45,917	45,917	45,917	45,917	45,917

Notes: Estimation by GMM-SYSTEM estimator using the robust one-step method (Blundell and Bond, 1998; Arellano and Bond, 1998). Asymptotic robust standard errors reported in parentheses. M_2 is a test of second-order serial correlation in the first-differenced residuals (Arellano and Bond, 1991). Instruments as stated.

Table 4: GMM estimates for company debt ratios–UK firms

	B/K_{it}			$(B-C)/K_{it}$		B^{LT}/K_{it}	
B/A_{it-1}	0.644 (0.041)	0.617 (0.042)					
$(B-C)/A_{it-1}$				0.686 (0.034)	0.653 (0.036)		
B^{LT}/A_{it-1}						0.627 (0.083)	0.617 (0.087)
CF/K_{it}	-0.140 (0.021)		-0.338 (0.026)	-0.216 (0.030)		-0.068 (0.036)	
π/K_{it}		-0.131 (0.022)			-0.214 (0.033)		-0.088 (0.025)
I/K_{it}	0.046 (0.016)	0.033 (0.016)	0.042 (0.018)	0.109 (0.023)	0.092 (0.023)	0.035 (0.016)	0.032 (0.017)
Q_{it}	0.007 (0.001)	0.006 (0.001)	0.016 (0.002)	0.007 (0.002)	0.007 (0.002)	0.005 (0.002)	0.005 (0.002)
lnS_{it}	0.008 (0.003)	0.010 (0.003)	0.023 (0.004)	0.005 (0.003)	0.009 (0.003)	0.014 (0.005)	0.015 (0.004)
year effects	yes	yes	yes	yes	yes	yes	yes
M_2	0.626	0.712	0.000	0.962	0.869	0.106	0.107
Instruments	t-2..t-4; Δt-1	t-2..t-4; Δt-1	t-2..t-4; Δt-1	t-2..t-4; Δt-1	t-2..t-4; Δt-1	t-2..t-4; Δt-1	t-2..t-4; Δt-1
firms	1,784	1,784	1,784	1,784	1,784	1,784	1,784
observations	19,420	19,420	19,420	19,420	19,420	19,420	19,420

Notes: Estimation by GMM-SYSTEM estimator using the robust one-step method (Blundell and Bond, 1998; Arellano and Bond, 1998). Asymptotic robust standard errors reported in parentheses. M_2 is a test of second-order serial correlation in the first-differenced residuals (Arellano and Bond, 1991). Instruments as stated.

Table 5: Additional Experiments for Spanish sample

	Bank participation interactions			Large firms		
	B/A_{it-1}	$(B-C)/A_{it-1}$	B^{LT}/A_{it-1}	B/A_{it-1}	$(B-C)/A_{it-1}$	B^{LT}/A_{it-1}
B/A_{it-1}	0.336 (0.011)			0.400 (0.018)		
B/A_{it-2}	0.130 (0.008)			0.135 (0.014)		
$(B-C)/A_{it-1}$		0.442 (0.015)			0.434 (0.023)	
$(B-C)/A_{it-2}$		0.092 (0.011)			0.097 (0.020)	
B^{LT}/A_{it-1}			0.339 (0.016)			0.378 (0.031)
B^{LT}/A_{it-2}			0.069 (0.012)			0.062 (0.024)
CF/K_{it}	-0.073 (0.010)	-0.100 (0.015)	-0.035 (0.008)	-0.089 (0.016)	-0.096 (0.024)	-0.036 (0.013)
I/K_{it}	0.151 (0.020)	0.145 (0.027)	0.087 (0.020)	0.109 (0.026)	0.082 (0.042)	0.029 (0.031)
lnS_{it}	0.019 (0.005)	0.017 (0.007)	0.006 (0.005)	0.033 (0.011)	0.028 (0.018)	0.013 (0.011)
BANK X CF/K_{it}	-0.003 (0.034)	-0.020 (0.040)	0.009 (0.018)			
BANK X I/K_{it}	-0.099 (0.047)	-0.015 (0.075)	-0.015 (0.040)			
year effects	$\chi^2(13)$ =50.67	$\chi^2(13)$ = 23.40	$\chi^2(13)$ = 117.44	$\chi^2(13)$ =27.38	$\chi^2(13)$ =53.93	$\chi^2(13)$ =34.32
M_2	0.249	0.556	0.685	0.136	0.490	0.760
Instruments	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1	t-2..t-5; Δt-1
firms	6,417	6,417	6,417	1,381	1,381	1,381
observations	45,917	45,917	45,917	10,691	10,691	10,691

Notes: BANK is an indicator for equity stake in the company by a bank. See also Table 3.

Table 6: Propensity for debt and equity issues by UK firms

	Debt issue		Equity issue		Long-term debt issue		Equity issue (≥2%)	
CF/K_{it}	-2.925 (0.143)		-0.293 (0.214)		-2.728 (0.176)		-1.141 (0.200)	
π/K_{it}		-3.066 (0.151)		-0.137 (0.222)		-2.861 (0.186)		-1.008 (0.210)
I/K_{it}	2.696 (0.093)	2.618 (0.093)	1.785 (0.103)	1.783 (0.103)	2.341 (0.088)	2.304 (0.088)	2.545 (0.091)	2.537 (0.091)
Q_{it}	0.181 (0.011)	0.181 (0.012)	0.090 (0.017)	0.082 (0.016)	0.135 (0.013)	0.135 (0.013)	0.097 (0.015)	0.087 (0.015)
$ln(S)_{it}$	0.104 (0.008)	0.109 (0.008)	0.419 (0.017)	0.420 (0.017)	0.257 (0.011)	0.262 (0.011)	0.165 (0.012)	0.167 (0.012)
year effects	yes	yes	yes	yes	yes	yes	yes	yes
log-likelihood	-9513.582	-9518.363	-6835.282	-6836.024	-8220.314	-8222.321	-5485.325	-5490.206
ρ	0.080 (0.009)	0.079 (0.009)	0.486 (0.015)	0.488 (0.015)	0.199 (0.013)	0.196 (0.013)	0.227 (0.017)	0.229 (0.017)
firms	1,751	1,751	1,751	1,751	1,751	1,751	1,751	1,751
observations	15,421	15,421	15,421	15,421	15,421	15,421	15,421	15,421

Notes: Maximum likelihood estimates for random effects probit model are shown.
Standard errors in parentheses.
ρ is the proportion of the total variance that is accounted for by the company-specific component.

Table 7: Marginal effects for debt and equity issuance

	Debt		Equity		Long-term debt		Equity $\geq 2\%$	
CF/K_{it}	-1.105		-0.078		-0.869		-0.207	
π/K_{it}		-1.159		-0.036		-0.911		-0.183
I/K_{it}	1.018	0.990	0.467	0.466	0.746	0.734	0.461	0.459
Q_{it}	0.068	0.068	0.024	0.022	0.043	0.429	0.018	0.016
$ln(S)_{it}$	0.039	0.041	0.110	0.110	0.082	0.083	0.030	0.030

Note: The table reports marginal effects of a unit change on the probability of observing y_{it}=1 evaluated at the means. The marginal effects are calculated as $\frac{d[prob(y=1|x)]}{dx_k} = \phi\left(\overline{x}\beta\sqrt{1-\rho}\right)\left(\sqrt{1-\rho}\beta_k\right)$where $\phi(\cdot)$ is the standard normal density function, $\overline{x}$ is the vector of mean characteristics, β the vector of coefficient estimates with $\beta_k$the coefficient estimate on regressor x_k(see Arulampalam (1999)).

A 1 unit change in a financial ratio represents a change of 100 percentage points.

Data Appendix

Spanish firms

The structure of the panel in terms of the number of time-series observations per company is shown in Table A.1.

Table A.1: Structure of the panel.

No of records	5	6	7	8	9	10	11	12	13	14	15	16	Total
Companies	1,277	937	692	575	438	317	349	347	372	368	273	522	6,417

Variable definitions

Variables are defined as follows.

Debt (B/A)
Total borrowing divided by total assets. Net debt $(B-C)$ subtracts cash and equivalent from the numerator. Long term debt (B^{LT}) is defined as total loan capital repayable in one year or more.

Investment (I)
Net purchases of new fixed assets.

Cash flow (CF)
Profit before tax plus depreciation of fixed assets.

Profits (π)
Earnings before interest and taxes.

Capital stock at replacement cost (K)
This is given by the sum of fixed assets at replacement cost (calculated by the Central de Balances (CBA) of the Bank of Spain) and working capital less provisions.

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

UK Firms

The structure of the UK firm panel in terms of the number of time-series observations per company is shown in Table A.2.

Table A.2: Structure of the UK firm panel

No of records	5	6	7	8	9	10	11	12	13	14	15	16	
Companies	175	152	186	182	130	134	103	98	95	67	66	51	
No of records	17	18	19	20	21	22	23	24	25	26	27	28	Total
Companies	38	32	36	20	18	17	24	15	26	31	29	59	1,784

Variable definitions

Variables are defined as follows (Datastream Item numbers in parentheses).

Debt (B/A)

Total borrowing repayable in less than 1 year (DS309) plus total loan capital repayable in one year or more (DS321) divided by total assets (DS339+DS389). Net debt $(B - C)$ subtracts cash and equivalent (DS375) from the numerator. Long term debt (B^{LT}) is defined as total loan capital repayable in one year or more (DS321).

New equity (N/A)

Net equity issued for cash and acquisition (DS406). This is only available up to 1991, until the introduction of the cashflow standard FRS1 and FRS1(Rev) which became compulsory in March 1992. Figures are net of share repurchases.

Investment (I)

Owing to changes in company accounts definitions in 1991, a different method for calculation is used pre- and post-1991. Up to 1991, investment is calculated as Total new fixed assets (DS435) less sales of fixed assets (DS423). From 1991, this is calculated as total payments for fixed assets of the parent (DS1026) plus those of any subsidiaries (DS429).

Cash flow (CF)

Profit after tax and preference dividends (DS182) plus depreciation of fixed assets (DS136).

Profits (π)

Earnings before interest and taxes (DS175+DS172+DS153).

Capital stock at replacement cost (K)

Capital stock is measured on a replacement cost basis. The procedure employed uses a perpetual inventory method as has been used in a number of company accounts panel data studies. $K_{t+1} = K_{it}(1-\delta)\frac{P_t}{P_{t-1}} + I_{it}$ where δ is the rate of depreciation assumed to be 0.08 and P is the price of investment goods. I is investment. For the company's first observation, the replacement cost is assumed equal to the historic cost total of net fixed assets (DS339), adjusted for inflation.

Tobin's Q (Q)
$Q = \left(\frac{mv+B-C}{K}\right)$

where mv is market capitalisation of the company at December 31 in year t (Datastream Item mv); B is book value of outstanding debt (DS321); C is book value of cash and equivalent (DS375).

Real Sales (S)
Total company sales (DS104), deflated by the GDP deflator.

The data were checked for outliers. Gross outliers were removed with the remaining series being winsorised at the 1st and 99th percentiles.

Appendix Table A.3: Summary statistics by Debt and Equity Issuance–UK firms

			Debt issue		Equity issue		Equity issue ($\geq 2\%$)	
			yes	no	yes	no	yes	no
debt and equity	B/A	book leverage	0.284 (0.219)	0.148 (0.168)	0.245 (0.201)	0.189 (0.191)	0.190 (0.120)	0.151 (0.123)
	$(B-C)/A$	net leverage	0.189 (0.249)	0.021 (0.242)	0.142 (0.241)	0.099 (0.246)	0.119 (0.154)	0.076 (0.175)
	$\Delta B/A$	debt issue	0.090 (0.105)	-0.044 (0.060)	0.043 (0.117)	0.022 (0.091)	0.036 (0.086)	0.016 (0.066)
	N/A	new equity issue	0.030 (0.225)	0.016 (0.065)	0.067 (0.277)	0.000 (0.002)	0.104 (0.131)	0.001 (0.003)
	$(\Delta B > 0)$	any debt issue	1	0	0.616	0.513	0.641	0.536
	$(N > 0)$	any new equity	0.416	0.318	1	0	1	0.255
financial	CF/K	cash flow	0.129 (0.074)	0.131 (0.072)	0.135 (0.068)	0.113 (0.062)	0.201 (0.136)	0.190 (0.144)
characteristics	π/K	profitability	0.172 (0.103)	0.173 (0.105)	0.187 (0.097)	0.164 (0.101)	0.142 (0.126)	0.131 (0.134)
	I/K	fixed investment	0.189 (0.175)	0.111 (0.116)	0.204 (0.195)	0.137 (0.137)	0.274 (0.241)	0.142 (0.137)
	D/K	dividends	0.017	0.022	0.010	0.026	0.055 (0.048)	0.047 (0.046)
	$(D = 0)$	dividend omission	0.035	0.037	0.035	0.028	0.015	0.021
	$\Delta W/K$	working capital	0.081 (0.309)	0.076 (0.212)	0.105 (0.286)	0.076 (0.192)	0.308 (0.486)	0.141 (0.334)
	fd/K	financial deficit	0.097 (0.350)	0.044 (0.218)	0.120 (0.314)	0.066 (0.198)	0.353 (0.479)	0.110 (0.300)
other	Q	Tobin's Q	1.803 (2.099)	1.638 (2.122)	1.874 (1.921)	1.253 (1.638)	1.904 (1.905)	1.405 (1.737)
characteristics	S	real sales (£mn)	477.1 (1,855.2)	365.4 (1,747.7)	587.2 (2,007.2)	238.6 (1,379.9)	638.1 (2,087.8)	531.6 (2,521.1)
	observations		10,821	9,117	5,850	10,172	2,363	13,653

Notes: see Table 1.

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Figure 1: Debt and Equity Issues by UK firms

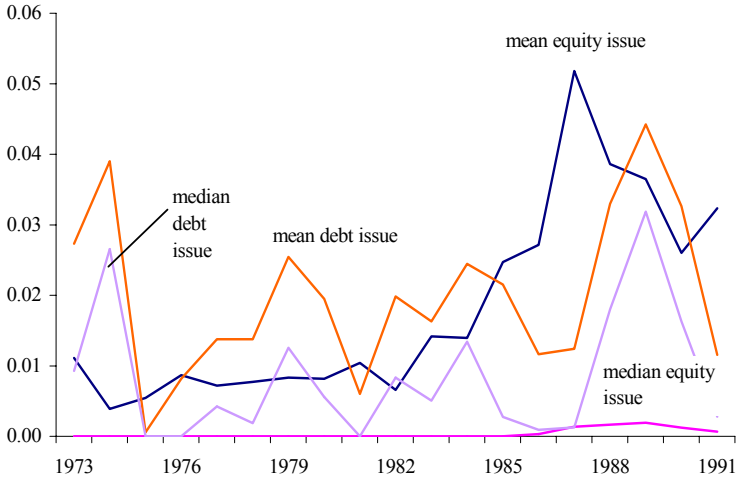

Figure 2: The Financial Deficit and its components
UK firms

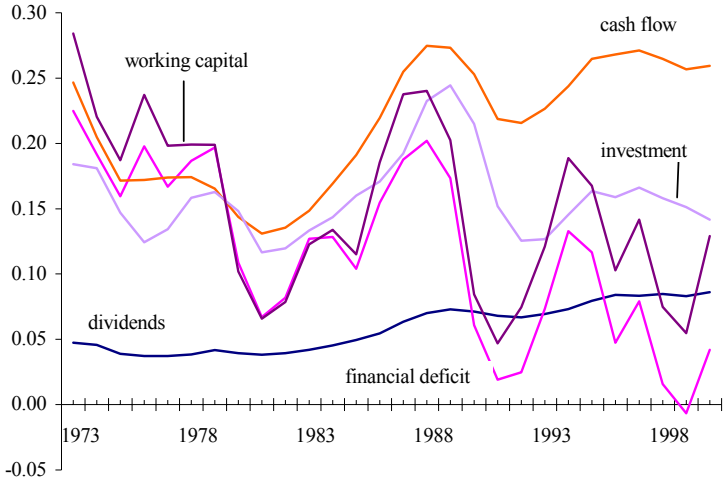

Figure 2: The Financial Deficit and its components
Spanish firms