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An empirical investigation on the determinants of capital structure: the UK and Italian experience

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This article investigates the empirical determinants of capital structure choice by analysing security issues made by companies in the UK and Italy between 1992 and 1996, and examines how companies actually select between financing instruments at a given point in time and in different financial contexts. A descriptive model of choice is developed and then estimated using Logit and Probit estimation procedures, and using data of two samples, which are assumed to be representative of a particular financial environment. The results provide evidence of interesting differences between the two financial markets, generally supporting the idea of the UK market being more testable and in principle more consistent with the main prescriptions of the more recent developments of capital structure theory; on the whole, the results provide support for positive effects of size and profitability, and negative impact of liquidity conditions and bankruptcy risk on the financial leverage of companies. This, together with the negative effect displayed by the available reserves which are taken as a proxy of internally generated funds, lends support to the pecking order theory of capital structure. It is also suggested that firms in well developed financial systems (UK) may have long-term target leverage ratios, while in less efficient markets (Italy) an optimal debt level does not seem to be a major concern. Finally, for both markets, the results are consistent with the notion that the tax advantage of debt financing plays a relevant role in capital structure decisions.

I. INTRODUCTION

The important question facing companies in need of new finance, is whether to raise debt or equity; in spite of the continuing theoretical debate on capital structure, there is relatively little empirical evidence on how companies actually select between financing instruments at a given point in time and in a given context; it is fair to say that empirical work has unearthed some stylized facts about capital structure choice, but this evidence is somehow fragmented and mainly based on firms in the USA, and it is often not completely clear how these facts relate to different theoretical models. Very few studies focused their analysis on the UK and other European countries. On the whole, despite the growing theoretical work, which has successfully identified a large number of potential determinants of capital structure, the existing empirical studies provide little evidence on the determinants of the firm's financial structure; just a relatively small number of general principles has been identified.

This article investigates the empirical determinants of capital structure decisions of firms, and tries to provide some contributions that may help to fill the existing gap between theory and empirical evidence. The models that will constitute the theoretical framework refer to that part of the theory which deals with the determination of

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the relative amount of debt and equity, taking these securities as exogenous.[1]

A descriptive model of the choice between equity and long-term debt is developed. The coefficients of the model are estimated using Logit analysis; first this econometric procedure was applied to a sample of 87 issues of debt and equity made by UK companies in the period 1992–1996. The model was then tested on a different sample, based on 63 issues made by Italian companies within the same period, 1992–1996, providing an opportunity to control for the influence of the explanatory variables in two different environments, the UK and the Italian markets, and thus gain some insight into how the structure of a specific financial market may affect the financing decisions of firms. In both cases, UK and Italian tests, the ability of the model was tested by assessing how the model would classify the observed samples.

This article will try to capture some of the relevant features of corporate borrowing behaviour. It sheds some light on a number of interesting questions such as whether companies behave as though they have target debt ratios; whether they have similar targets for the composition of their debt; whether liquidity conditions of the company and its economic and financial performance affect their choice of instruments; and whether debt ratios are influenced by other factors such as operating risk, company size and the composition of the company's assets. Furthermore, having estimated the coefficients of the model in two different markets, there was a chance to check the relevance of a specific financial environment on capital structure decisions.

The article is organized as follows: the remainder of the introduction reviews some of the most relevant recent studies on capital structure; Section II introduces and explains the model and the data employed; Section III presents and comments the empirical results obtained; Section IV tests the models and provides a conclusion.

Previous studies

The works of Baxter and Cragg (1970), Martin and Scott (1972) and Taub (1975), may be regarded as the first empirical studies that investigated directly the debt/equity choice; these studies are very similar, with respect to the method of investigation, to this article.[2] On one hand, from a purely statistical and theoretical point of view, they can be considered to be slightly unsatisfactory,[3] essentially because the explanatory variables used in the regressions, selected partly on prior grounds and partly by trial and error, turned out to be too numerous (many of the independent variables were highly collinear) and their statistical relevance appeared to be negligible; this is why the results of the three studies are often difficult to interpret. On the other hand, in spite of this aspect, these first studies provided very useful information. For instance, they all found that companies which are small, that have high P/E ratios and have high leverage, are more likely to issue equity. However, their evidence about coverage ratios and risk was weak, conflicting and nowhere significant.

It is also worth noting that Martin and Scott found that high payout, low profitability and a high proportion of fixed asset, all tended to indicate a debt issue. Finally, Taub's tax variable was never significant and yielded the 'wrong' sign.[4]

Other authors focused their attention on issue timing, and whether companies try to maintain target debt ratios. If one considers Bosworth (1971) and Taggart (1977) for the USA, and Brealey *et al.* (1976), Marsh (1982) for the UK, it is found that market conditions play a highly significant role in determining the probability that a firm will issue debt, thus indicating that equity issues are more likely to follow market rises, as well as (see Scholes, 1972; Smith, 1977) they will tend to follow periods of unusually high residual returns on the company's shares. Korajczyk *et al.* (1991) also found that a firm's stock price experiences significant abnormal rises on average prior to its issuing equity. In addition, they found that equity issues are clustered after earnings announcements and that the extent of the price drop at the announcement increases insignificantly with time since the last earnings announcement. Finally, Taggart, Bosworth and also Marsh, offered evidence that companies in aggregate tend to keep to a target debt ratio. Other studies, by Ang (1976), confirm these results at the level of the individual firm, while Brealey *et al.* (1976) provided consistent but less direct, evidence on this matter.

On a general basis, one may say that much of the most recent empirical research, has tended to concentrate on cross-sectional variations in leverage at firm or industry

[1] Another part of the theory concentrates on the fundamental design and modelling of securities. Interesting approaches may be found in Harris and Raviv (1990): Financial contracting theory, Working paper no. 82 Kellogg School, Northwestern University.

[2] Baxter and Cragg (1970) and Taub (1975) use Logit and Probit analysis, while Taub employs multiple discriminant analysis to examine debt-equity issues.

[3] All these studies are characterized by a considerable data mining; this is perfectly understandable, but it makes their results difficult to interpret since clear evidence on the resultant model's stability and predictive power is not provided. This is why it is hard to detect the statistical relevance of the independent variables used in their regressions.

[4] This may reflect the fact that there was virtually no variation in tax rates during the period he considered.

level. Perhaps the most basic stylized facts concerning industry characteristics and corporate capital structure, are (i) that firms within an industry, facing similar conditions and risk characteristics, have similar leverage ratios, and (ii) that industries tend to retain their relative leverage ratio rankings over time.

Other empirical studies shed light on some specific characteristics of firms and industries that appear to determine leverage ratios and provide direct evidence on the likely determinants of the debt ratio. This research programme includes the works of Scott (1972), Carleton and Silberman (1977), Ferri and Jones (1979), Bradley *et al.* (1984), Castanias (1983), Titman and Wessels (1988), Long and Malits (1985) and Marsh (1982). The combined evidence of these studies supports the view of the positive association between leverage and fixed assets, operating risk, non-debt tax shields, growth opportunities, firm size, the negative association between leverage and volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and uniqueness of the product. Castanias also found a negative correlation between leverage and default probability.

However, if it is accepted that on the whole these studies reached consistent conclusions on certain characteristic variables, it must also be accepted that when analysing the correlation between leverage and each single independent variable in the various contexts, they have reached conflicting conclusions on the presence of the significant effect of some other firm-specific variables. For instance, Bowen *et al.* (1982) and Kim and Soresen (1986) provided evidence on the negative relationship between the non-debt tax shield and leverage; however, Bradley *et al.* (1984), Titman and Wessels (1988), Homaifar *et al.* (1994) did not provide such support. In addition, there are also conflicting results on the relationship between size and leverage; Ferri and Jones (1979), Kim and Sorensen, and Chung (1993) concluded that there was no systematic association between firm size and capital structure (they found no simple linear relationship). On the other hand, in the same studies, Homafair *et al.* and Titman and Wessels reported results that are consistent with the notion that larger firms have higher debt ratios.

On the whole, the empirical studies have identified a general tendency to try to determine and maintain a well defined long-term target debt level, of course the pattern displayed by the actual debt level over time is not steady in the short-run, but fluctuates around the target level in response to timing considerations and capital markets conditions. It is in fact expensive to retire either debt or equity once issued. In addition, the evidence is consistent with the notion that the final capital structure adopted by firms is a function of the variables that 'theory' suggests should be important, such as operating risk, company size, asset composition and liquidity considerations. Yet it is true that in reaching these conclusions, researchers had to piece together scattered, weak, and sometimes conflicting evidence, and to take a certain amount of licence in interpreting results.

II. MODEL SPECIFICATION AND DATA SOURCE

The model

When requiring new finance, firms may decide both to raise short-term debt and thus draw down liquid funds, and to sell new long-term securities. This article tries to model the choice between equity and debt in those cases in which firms resort to the long-term capital market.[5] Since empirical investigation shows that in several instances the sales of bonds and stocks tend to occur at discrete intervals and in relatively large amounts, the actual choice of instrument is of great interest.

This article examines two samples, the first consists of UK companies and the second consists of Italian companies, which make debt or equity issues, and it attempts to explain their issue behaviour in the two different financial environments. This model is built in such a way that it assumes that firms issue only one security at a time, either debt or equity, at a given point in time. This characterization may at first appear not completely realistic, since in principle firms might be willing (for some reasons) to issue both securities at the same time. The decision to opt for a dichotomous choice to model their financing decision, relies on the necessity to discriminate those companies that decided to resort to a particular financing option (say debt) from those which opted for the other financing instrument (say equity), in order to gain some indication of the factors that could account for the particular decision they made. Furthermore, this model does not ex ante rule out the possibility that a company which has just raised funds by issuing one security, decides to issue the other security; in both the samples for instance, there are companies that for the same year appear in both sides of the sample (debt and equity) indicating that they have made an issue of both debt and equity in the same fiscal year.

The article will then try to test the existence of a target debt level, by assuming that companies needing new finance will issue equity if they are above their target,

[5] Even though other long term financing instruments exist, debt and equity represent two clear-cut 'extreme' ways to raise new finance, which determine the actual capital structure of companies.

and debt if they are below.[6] Since in the real world flotation costs are usually high and significant, the adjustment process to offset deviations from the target cannot be carried out instantaneously; this explains why one observes infrequent 'lumpy' issues, which make actual debt ratios fluctuate around their assumed target.[7] It is now important to identify what this target level is. However, since it is unobservable, one can do this only by looking at past behaviour or by turning to the theory of capital structure for help.

It is therefore assumed that a company's choice of financing instrument will depend on a well defined set of characteristic variables; first the difference between firms' current and target debt ratios is considered. Since target ratios are unobservable, one needs to focus on their likely determinants. Theory predicts that the overall target will be a function of bankruptcy risk and tax, and that the composition of debt will depend on the company's size, asset composition and forecasts about future economic performances. Besides the target leverage variable and its proxies, it is also assumed that the final decision on which security will be issued, is likely to be influenced by some other factors; for this reason, the empirical model has been extended to embrace some other characteristic variables, liquidity variables, profitability variables, tax variables and timing and market condition variables, which both theory and previous empirical evidence have shown to play a significant role in the debt/equity choice.

Analytically, it will be assumed that a company's choice of financing instrument is a function of the difference between its current and target debt ratios in the following way:[8]

$$Pr(Z_{jt} = 1) = Pr(D^*_{jt} - D_{jt} < 0) \qquad (1)$$

where $Pr(Z_{jt} = 1)$ is the probability that company j will issue equity at time t given that it will make an issue of either equity or bonds, and D^*_{jt} and D_{jt} are the company's target and actual debt ratios respectively. Since one may not directly observe D^*_{jt}, one needs to concern oneself with its determinants. A model of the following form is therefore assumed:

$$D^*_{jt} - D_{jt} = \underline{B}'\underline{x}_{jt} + u_{jt} \qquad (2)$$

where $\underline{x}_{jt}$[9] is a vector of explanatory variables, $\underline{B}'$ is the corresponding vector of coefficients, and u_{jt} is a stochastic error term. The model then becomes

$$Pr(Z_{jt} = 1) = Pr(\underline{B}'\underline{x}_{jt} + u_{jt} < 0) \qquad (3)$$

If one considers a random sample composed of n companies at time t, and supposes that the first r issue equity while the remaining $n - r$ issue debt, the logarithmic likelihood function can be characterized as

$$\sum_{j=1}^{r} \log_e[Pr(\underline{B}'\underline{x}_{jt} + u_{jt} < 0)] + \sum_{j=r+1}^{n} \log_e[1 - Pr(\underline{B}'\underline{x}_{jt} + u_{jt} < 0)] \qquad (4)$$

The value of this likelihood function depends on the vector of parameters $\underline{B}'$; the vector of maximum likelihood estimators $\hat{\underline{B}}'$ in which this article is interested, may be obtained by estimating the parameters $\underline{B}'$ using the Logit model (or, with another transformation, the Probit model).[10]

Logit and Probit analysis

The Logit and Probit models provide a way of quantifying the relationship between the characteristics of the company and the probability of issuing one of the two financing instruments.

In this model, Y (the dependent binary random variable) represents a dichotomous issue of either equity or debt; when equity is issued, Y equals 1 whereas when debt is issued Y equals 0. The question of interest hinges on the value of the parameter P, the probability that Y equals one (or $P = P(Y = 1)$). Y is assumed to depend

[6] This model could be effectively expanded to specifically account for the intertemporal features that the model itself embodies; the adjustment process towards the target debt ratio, and in general the whole decision-making process, could be set in an intertemporal context (decisions today, effects tomorrow), and put in a forward looking model. This, of course, implies a dynamic programming framework. The main cost of this modification would be a more complicated theoretical model, since it would have to consider an adjustment process, which involves lags in adjusting to changes in the optimal debt ratio; firms cannot immediately eliminate the effects of random events which take them away from the long-run target. A partial adjustment model needs to be developed to investigate the role of the adjustment process. In addition, the empirical work would be more complex. In fact, in order to be able to consistently estimate the dynamic model, the sample would need to be enriched with an incredible number of data points (time series points) relative to each observation in the samples. It goes without saying, that the results from this modification could be extremely informative.

[7] This pattern assumes that if companies have long-term debt targets, they should plan security issues in order to minimize both flotation costs and the costs of deviating from the target ratio.

[8] Here a similar analysis is followed to that developed in Marsh (1982).

[9] The vector $\underline{x}_{jt}$ comprises all the independent characteristic variables which are believed to ultimately determine (or at least influence) the probability of an equity issue.

[10] Since the two models are essentially the same in their nature, in what follows only the logit model will be used; Probit model results have been computed and are available on request.

on K observable variables $x_k, k = 1, \ldots, K$. That is, the exogenous variables, it is assumed, account for the variation in P.[11] One can indicate this relationship by writing $P = P(Y = 1|X_1, \ldots, X_k)$, or simply $P = P(Y|X)$, where X denotes the set of K independent variables.

In specifying the relationship between Y, the endogenous variable, and X, the Logit model is given by

$$P(Y = 1|X) = \exp\left(\sum b_k x_k\right) \Big/ \left[1 + \exp\left(\sum b_k x_k\right)\right] \quad (5)$$

The remaining unknowns are then the parameters b_k, $k = 1, \ldots, K$; this set is denoted by b.

It is assumed that the data are generated from a random sample of size N, with a sample point denoted by i, $i = 1, \ldots, N$. This assumption requires that the observations on Y be statistically independent of each other, ruling out serial correlation.[12]

The Logit model is typically estimated using maximum likelihood estimation (MLE); for the general case, exact (small sample) properties of the MLE (unbiasedness, efficiency, normality) cannot be established. But it can be shown that, under conditions typically encountered, those properties hold approximately, with the quality of the approximation improving as the sample size grows. That is, the MLE exhibits the asymptotic (large sample) properties of unbiasedness, efficiency and normality. While for some special cases, exact results have been obtained, Probit and Logit models are not among them. Still for these models the large sample properties seem to hold reasonably well, even in moderate-sized samples on the order of $N - K = 100$.

Sample and data

Two different samples are utilized, one based on the UK market and the other based on the Italian market; the UK sample is made of British companies listed in the London Stock Exchange, while the Italian sample comprises Italian companies from the Milan Stock Exchange.

The UK sample. All the data concerning the British sample were taken from DATASTREAM database. To start a list of all the companies comprised in the FTSE All Share Index, which had made an issue in their life were considered. Once the two lists of all equity issues and debt issues were available, in order to have a random sample, the two lists were rearranged in alphabetical order,[13] in order not to have the companies grouped or sorted according any criterion whatsoever. Then attention was focused on the years 1992–1996.

These procedures gave us a list of British companies, taken from the FTSE All Share Index, ordered by name, which had made a cash issue of either equity or debt within the years 1992–1996. This list comprised more than 1360 entries; the first 135 companies of this list were used to build the random sample. Of course attention was restricted to fairly important cash issues, so that the assumed statistical effect is expected to be larger; for this reason equity and debt issues whose proceeds were greater than £50 000 000 were considered.

Having now defined the random sample,[14] the next question was to identify those characteristics that were intended for introduction in the final regression. Since many additional variables characterizing each company were needed, the sample tended to shrink a lot due to the non-availability of data. This is often the case when studying company data. The non-availability of at least one of the explanatory variables, led to the exclusion of the company from the sample. The great difficulty in retrieving the necessary data was due to the fact that all the explanatory variables had to be found for a specific point in time; the research then was to find, for example, the total asset, the beta, the payout ratio and so on, of a certain company at the date that company made its issue.

Summing up it may be said that a sample of 87 issues was selected from the population of all cash issues of equity and quoted debt made by UK quoted companies between 1992 and 1996. Issues were included in the sample if:

(1) the net proceeds exceeded £50 000 000;
(2) they were simple cash issues of debt and equity. Preferred, convertible and multiple issues were excluded, since these share some of the characteristics of both debt and equity, and would thus only cloud our analysis;
(3) a complete history of accounting data for the years of the issues was available.

[11] One of the variables will be assumed to be the constant term. By convention, that variable is x_1. Thus, there are $K - 1$ exogenous variables, from variable x_2 through variable x_k.

[12] An assumption analogous to homoscedasticity or constant variance in OLS regression is not needed here since it is implicit in Equation 5 above.

[13] Originally the two lists came with the companies ordered and grouped by industry; by rearranging the sample we tried to avoid possible industry-specific or company-specific features.

[14] It has to be noted, however, that there is a potential for a sample selection bias; once the two mentioned lists of debt were obtained and equity issues alphabetically ordered, the main sample started to be constructed considering a comparable number of debt and equity issues. A bias could be introduced by the fact that, when all the possible issues were considered a larger number of equity issues than debt issues were found. In fact, trying to maintain a comparable number of issues, for the equity side one reached the letter H of the alphabet, while for the debt side one had to go further down the alphabet.

Table 1. *Debt and equity issues by year: UK sample*

Calendar year	Equity issues	Debt issues	Total issues
1992	8	9	17
1993	12	9	21
1994	11	7	18
1995	11	6	17
1996	10	4	14
All years	52	35	87

The Italian sample

It has not been possible to follow the procedure just illustrated to make up the Italian sample. We had to use another Financial Information Provider 'BLOOMBERG'[15] database, since much specific information about companies listed in the Italian market was not available in DATASTREAM; it was ensured that the procedures used by Datastream and Bloomberg in the aggregation and the processing of the accounting and financial data were homogeneous.

For the Italian case, the only way we had to find debt and equity issues, was to go through every single issue of a specific financial journal *Il Bollettino delle Estrazioni*,[16] a technical financial and economic paper in which every important financial event taking place daily in the Italian market is recorded. Considering the same year span used for the UK sample, all the companies listed in the Milan Stock Exchange that had made a new issue of long-term debt or equity were considered. A considerable number of observations were gathered.[17] Next step was to make a selection so as not to have too many similar companies in the sample, especially on the same side; a reasonable balance of the kind of companies (industrial, financial or utilities for example) on the two sides was sought.[18]

After having organized the data in two lists (debt and equity issues), for each company those financial features, which would then be used as explanatory variables were collected; again, these variables were considered on the date the company made the issue. Roughly the same variables were selected as before, because of course one had to test the same corporate feature. As in the UK example, all firms that had any missing observations for any variable in the model during the period were dropped.

Summing up, a sample of 63 issues was selected from the initial population of 125 observations taken from the Italian stock market. In this second sample issues were included if:

(1) the net proceeds exceeded £25 000 000;
(2) they were simple cash issues of debt or equity;[19]
(3) a complete set of accounting and financial data for the years of the issues was available.

Table 2. *Debit and equity issues by year: Italian sample*

Calendar year	Equity issues	Debt issues	Total issues
1992	4	4	8
1993	8	5	13
1994	6	7	13
1995	5	5	10
1996	8	11	19
All years	31	32	63

The two samples just introduced have several important differences, not only because they have been built following different procedures, but mainly because they refer to two countries whose economic, financial and institutional features deeply differ; in the author's view, to the extent that UK and Italy have different institutional structures, they increase the ability to discriminate among alternative theories. Instead of being concerned only with the accounting homogeneity[20] of the two samples, it is interesting to consider the major institutional differences across countries and their likely impact on financing decisions; although UK and Italy may be considered fairly homogeneous in their level of economic development, their institutions,

[15] The authors wish to thank Dr Giovanni Boninsegni Chief Financial Adviser of the Risk Management and Research- Asset Allocation Unit of the Banca Regionale Europea S.p.a. A special thanks goes to Dr Francesco Mantica, Financial Analyst, Director of the Research Centre, at Cassa Lombarda S.p.a. for excellent research assistance, also many thanks for their helpful comments and suggestions on earlier drafts and trials. It goes without saying that all interpretations and possible errors remain mine.

[16] This fortnightly journal is an official paper supervised and controlled by the Bank of Italy and the Consob.

[17] In the case of the Italian market there were not many chances to rearrange the records in order to have a random sample, simply because the financial data available were not so numerous as in the UK case. Just consider that the companies listed in the Milan Stock Exchange are around 200, and of these one had to choose only those that in the considered years (1992–1996) had made a cash issue; for this reason one had to collect and use for the regressions almost all the data one managed to retrieve.

[18] Originally a higher number of equity issues than debt issues were collected; as said before only important issues were considered, this led to the exclusion of several equity issues which appeared to be an important characteristic of small/medium-sized companies.

[19] It is also worth noting that there was a considerable amount of hybrid issues such as convertibles or warrant debentures; it could be interesting to study why and in what circumstances several Italian companies chose to resort rather often to these financing instruments.

[20] An interesting study by R. G. Raghuram and L. Zingales carries out a comparison between the determinants of capital structures choice in the USA and in the other industrialized countries (G-7); among other things the authors point out that by controlling for the differences in accounting procedures a substantial consistency of the correlation between firm leverage and characteristic factors emerges.

the tax and bankruptcy code, the market for corporate control and the role historically played by banks and securities markets are fairly different.

III. EXPLANATORY VARIABLES AND EMPIRICAL RESULTS

One can ideally divide the explanatory variables into four groups. The first consists of variables that measure deviations from target debt levels. These variables should give an idea about the importance of target debt levels in capital structure decisions (if for example an optimal capital structure is in some ways pursued by companies). For the target debt ratio, simple estimates were used, such as historical averages together with a second group of variables, which in this model have the sole function to act as proxies for the target ratios. These variables, which include company size, risk and asset composition were selected either on theoretical grounds, or because previous empirical studies claim they are important determinants of debt ratios. The model has also been expanded to embrace a third group of variables reflecting liquidity considerations, on the grounds that such variables are persistently claimed to be important determinants of the choice of financing instruments. Finally, the last class of variables has been introduced in order to test other possible relevant determinants of corporate capital structure; again, as theory has often suggested,[21] the role of the profitability of the firm, and other variables such as the payout ratio, the number of directors and the price earning ratio were considered.

Deviations from target ratios. This article considers long-term debt issues. Therefore the focus was on the determination of long-term debt ratios.[22] The deviation from the target is defined as the difference between the target and the ratio's current value.[23] The latter is taken as the ratio that the company would have immediately after making the issue if it chose to raise debt. This presumably is the figure the company would be concerned with, since it takes full account of the effect of the size of the proposed issue on the debt ratio. As far as target ratios are concerned, historical averages over the past nine years[24] were taken as the estimate of the target. In the estimation, the variable is DEVTARG, and measures the deviations from the target leverage.[25]

Proxies for the target ratios. The nine-year averages provide only crude and somewhat misleading estimates of actual target levels; to combat this three further determinants of the debt ratios have been included: (1) company size, (2) operating risk and (3) asset composition, which are meant to act as proxies for the true but unobservable target ratios.

(1) The size of the firm should be positively related to the leverage ratio. The rationale for this theory is the evidence provided by Warner (1977) and Ang *et al.* (1982) that the ratio of direct bankruptcy costs to the value of the firm decreases as the value increases. This suggests that the impact of the direct costs of bankruptcy on borrowing decisions of large firms is negligible. It is also argued that larger firms are more diversified (Titman and Wessels, 1988), have easier access to the capital markets, and borrow at more favourable interest rates (Ferri and Jones, 1979). Also, Chung (1993) argues that larger firms have lower agency costs associated with asset substitution and underinvestment problems, which mostly arise from the conflicting interests of share- and bondholders. A further reason for smaller firms to have lower leverage ratios is that smaller firms are more likely to be liquidated when they are in financial distress (e.g. Ozkan, 1996). The above discussion

[21] For the profitability argument see Myers (1984), while for further research on the payout ratio see Martin and Scott (1974).

[22] These debt ratios as calculated using book values, while the theory of capital structure suggests that they should be measured in market value terms. It is also true that in empirical work there is a tendency to use book value rather than market value (which carries a certain amount of valuation), mainly because book values are generally easier to retrieve for all companies and are more accurate – (stable). Also, the survey evidence from Stonehill *et al.*(1973) strongly indicates that corporate treasurers tend to think in terms of book rather than market value ratios, and as Myers has also pointed out, there may be some theoretical justification for the use of book values, since these are related to the value of asset in place and do not normally include the capitalized value of future growth opportunities. For further developments, see also Marsh (1982), who experiments with quasi-market values, and obtains very similar results to those obtained using book values, although the market value ratios provided slightly less explanatory power.

[23] Marsh (1982), also tested his model with the inclusion of the current and target ratios as separate variables. The author shows that it is rather difficult to disentangle their separate effects since the two are highly correlated. The more sensible solution seems to be to combine them as one has done in a single deviation-from-target variable. Marsh (1982) tested the logit model using both variables defined separately, and although the correlation between the two was 0.8, it is encouraging to note that both variables had the predicted sign and appeared to be significant.

[24] In the UK sample, for all the 87 companies average leverage variables have been calculated using nine year averages; in the Italian sample instead, due to the non-availability of some data for some fiscal years, for 19 out of 63 variables the eight year average was considered, while for five observations, the seven year average was considered.

[25] In the model, leverage is calculated as the ratio of long-term debt to the sum of long-term debt and book value of equity. Long-term debt is calculated by subtracting current liabilities and shareholders' funds from total liabilities.

leads one to predict a positive relationship between firm size and the leverage ratio.

In the model, company size is measured by firms' total assets; this LNTOTASS is the variable which represents the natural logarithm of total assets.

(2) The risk position of a company is a potentially important determinant in the capital structure decisions of managers; the leverage ratio should be negatively related to the risks faced by the firm, as primarily determined by the variability and uncertainty of its sales and costs. The risk measurement is the beta[26] or systematic risk of the company, defined as the ratio of the covariance of the return of the company with the market, and the variance of return of the market. A negative relationship is expected between the beta and the financial leverage. Risk taking companies will tend to issue equity rather than debt if in need of new finance. The variable in the model is BETA.

(3) The higher the proportion of assets in place, the higher one would expect a company's long-term debt ratio to be. Therefore a measure of asset composition was included in the model. This was taken as the ratio of fixed to total assets. However, a high value in the fixed to total asset ratio may imply a low portion of the firm's current asset or in general the more liquid asset with respect to the long-term stock; this aspect may lead to an opposite relationship between asset composition and leverage. The variable in the estimation is ASSETCOMP.

Liquidity. Liquidity ratios are used mostly to judge a firm's ability to meet its short-term obligations. The liquidity ratio may have varied effects on the capital structure decision working in opposite directions. First, firms with higher liquidity ratios might support a relatively higher debt ratio, due to a greater ability to meet short-term obligations when they fall due.[27] From these effects one should expect a positive relationship between a firm's liquidity position and its debt ratio. However, firms with greater liquid assets may use these assets to finance their investments. If this happens there will be a negative relationship between the firm's liquidity ratio and its debt ratio. Moreover, the liquidity of the company's assets can show the extent to which these assets can be manipulated by shareholders at the expense of bondholders. As a measure of the liquidity position of the companies under examination, the 'Current Ratio' was tested, defined as the ratio of current asset to current liabilities, the 'Cash Flow Margin' defined as the ratio of cash inflows earned for ordinary operations, plus depreciation, plus tax equalization, plus overseas tax, to total sales, and the 'Available Reserves', that part of the total capital reserves of the company which can be freely disposed of. In the estimation the variables are respectively named CURRATIO, CFMARG and LNAVRES.[28]

Profitability. Myers (1984) pointed out that firms prefer retained earnings to be their main source of financing investment (the Pecking Order Theory of capital structure). The second preference is debt financing, and last new equity issues, which might be due to the significant transaction costs of issuing new equity. It is suggested that the observed capital structure of firms will reflect their cumulative requirement for external financing. In this sense, the profitability of a firm gives the ability of the firm to use retained earnings over external finance and one should expect a negative association between the profitability of a firm and its debt ratio.[29]

Another theory[30] maintains that one could also expect a positive relationship between leverage and profitability, essentially because leveraging up increases the 'debt tax shield' and thus the gain from leverage is surely higher for more profitable firms with a higher marginal tax rate. In addition, a highly profitable firm will be characterized by a positive financial leverage,[31] and this presumably creates an additional incentive to resort to debt financing; this interpretation predicts a positive relationship between leverage and profitability. The measure of profitability is 'Pre-tax Profit Margin', the ratio of pre-tax profit to total sales, named PRTPFMG in the regression.

Other variables. The 'Payout Ratio' was included in part because Martin and Scott (1974) found it to be a useful discriminator in their analysis, in part because it could have some explanatory power in the analysis of the debt-equity issue; if one assumes that companies attempt to minimize transaction costs in their joint financing and dividend policy decisions, one could reasonably expect a positive association between the payout ratio and debt issue. In

[26] For the UK sample, the beta of each company was calculated against the FTSE 100 Index, whereas for the Italian market against the MIB 30 Index; in both cases, in the regressions the average beta over the last month prior the issue was considered.

[27] Even if the profitability ratio of a company is satisfactory, the company may find it difficult to survive for very long when there are insufficient funds to meet its immediate obligations.

[28] In the model the natural logarithm of the available reserves was used.

[29] An unusually profitable firm with a slow growth rate will end up with an unusually low leverage ratio compared to the industry average in which it operates. On the other hand, an unprofitable firm in the same industry will end up with a relatively high debt-to-equity ratio.

[30] The Traditional theory, Modigliani–Miller Theory and the subsequent 'Compromise theories'.

[31] Here we refer to the well-known factor underlying financial capital structure, which denotes the use of fixed-income securities, namely debt, to increase returns on common stockholders' equity.

the regression this variable is called PAYOUT, and is defined as current ordinary dividends divided by profit after tax.

The 'Number of Directors' instead was thought to be a simple but interesting way to assess the validity of agency predictions on the agency problem existing between shareholders and directors. On the one hand, one could expect leverage to be negatively related to the number of directors, essentially because directors may be pursuing the goal of creating 'financial empires' so they tend to favour equity issues, which make the company bigger. On the other hand, agency theory suggests a positive relationship between leverage and the number of directors in order to mitigate the conflict between shareholders and managers, because increases in the proportion of the firm financed by debt increases the managers' share of the equity, and, this also reduces the 'free' cash available to the directors.[32] In the estimation the variable is DIRECTORS, and accounts for the number of executive and non-executive directors.

The 'Reinvested Earnings' variable (REINVEARN in the model), is an indicator of internally generated funds. This variable, together with the 'Available Reserves' variable, might prove interesting in assessing the validity of the Pecking Order Theory.

Another indicator of the relative amount of external financing is the 'Borrowing Ratio' (BORROWRATIO); it is measured as the ratio of long-term, short-term and current liabilities (plus value of leases) to equity.

The last variable, the price/earnings (P/E) ratio (defined as the ratio of the stock price to earnings per share) is meant to measure the price that investors are prepared to pay for each dollar earning.[33] With the P/E variable one introduces a timing and market condition variable in the model, since the P/E ratio is meant to capture the market assessment of a company.[34] The P/E ratio variable should identify the tendency for equity issues to follow periods of strong share price performance. It is referred to as P/ERATIO.

Tax considerations. Finally, one might also expect tax to be an important determinant of debt ratios. However, at least for companies in a tax paying position, the tax deductibility of interest affects all companies in the same way at a given point in time, and cannot therefore explain cross-sectional differences between companies. Since both the samples span five years, during which there were several changes in tax rates, one could introduce a variable which would reflect the tax incentive of debt financing at the time each issue was made. However, since to a large extent one shall identify any such effect through the profitability variable that captures the tax benefit of debt, a separate tax variable has not been included.

Empirical results

In this section logit estimation of the model set out above is performed, using the data from the two samples. First the model for the UK is estimated, and then an identical regression is carried out using the Italian data.[35]

It is clearly not convenient to include all of the variables listed in the previous section in the final predictive model. If this was the case, the model would become truly 'bulky' and so very difficult to deal with. Furthermore, such a model would be highly multicollinear.[36] To decide on the final profile of variables, a number of logit/probit analysis runs were carried out using all the variables presented, but including in any one run only one variable per category. Any variables which were not significant in any of the runs were excluded from the final models.[37]

In the regression, b_k, measures the effect of exogenous variable K on the average value of the dependent variable. The average value of a dichotomous variable is equal to the probability that it assumes the value one. In general[38] it might be said that the effect of a change in the independent variable on the probability of the response $Y = 1$ (equity issue) is clearly related to, though not completely

[32] Since the measure includes executives and non-executives directors, in interpreting the results and comparing them to the agency predictions, one has to note that the non-executives may act in the interest of shareholders in that they monitor executives' behaviour. This may change the supposed sign of the relationship between leverage and number of directors.

[33] In general this variable may indicate that investors think the firm has good growth opportunities or that its earnings are relatively safe and therefore more valuable.

[34] The P/E variables may sometimes be misleading; a high ratio may indicate that investors believe that the company has good growth opportunities or that its earning are relatively safe and therefore more valuable, but it may also indicate temporarily depressed earnings. Sometimes financial analysts tend to use the ratio based on estimated earnings rather than on actual earnings which may reflect year-to-year fluctuations in profitability that may not be permanent and therefore have a little effect on value.

[35] As has been mentioned before, logit and probit models yield very similar results: the logistic distribution is similar to the normal except in the tails, which are considerably heavier. Therefore, for intermediate values of $\beta'\chi$ (say, between -1.2 and $+1.2$) the two distributions tend to give similar probabilities. One should expect different predictions from the two models, however, if the sample contains (1) very few responses (Y's equal to 1) or very few non-responses (Y's equal to 0) and (2) very wide variation in an important independent variable, particularly if (1) is also true.

[36] Several variables such as payout and profit margin, and the various measures of liquidity, are all likely to be highly correlated.

[37] This is to say that the results we are about to illustrate are the most significant and robust results that have been obtained among the several regressions that have been performed.

[38] If the model was linear (e.g. linear probability model), it would measure the effect on $P(Y = 1)$ of a unit change in X_k; in Logit, the nonlinearity of the relationship between $P(Y = 1)$ and each X, means that the interpretation of the impact of a change in X_k on $Pr(Y = 1)$ is less straightforward.

Table 3. *Logit estimation results/model 1. UK sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–87
Included observations: 87
Convergence achieved after four iterations

Variable	Coefficient	Std. Error	*T*-statistic	Prob
C	−6.318801	2.203541	−2.867567	0.0053
DEVTARG	−0.024052	0.017345	−1.386689	0.1694
LNTOTASS	0.471954	0.153762	3.069389	0.0029
BETA	2.180145	1.206424	1.807113	0.0745
CFMARG	−0.096585	0.050154	−1.925749	0.0577
PRTPFMG	−0.003432	0.03374	−0.101707	0.9192
PAYOUT	−0.28185	0.427324	−0.65957	0.5114
Log likelihood		−42.17		
Obs with Dep = 1		52		
Obs with Dep = 0		35		

Table 4. *Logit estimation results/model 1. Italian sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–63
Included observations: 63 after adjusting endpoints
Convergence achieved after six iterations

Variable	Coefficient	Std. Error	*T*-statistic	Prob
C	6.468309	2.885941	2.241317	0.029
DEVTARG	0.110746	0.055017	2.012925	0.0489
LNTOTASS	−0.741584	0.245901	−3.015778	0.0038
BETA	1.328416	0.981746	1.353116	0.1815
CURRATIO	−0.508897	0.997152	−0.510351	0.6118
PRTPFMG	−0.079974	0.041616	−1.921707	0.0597
PAYOUT	0.152816	0.349477	0.43727	0.6636
Log likelihood		−24.81727		
Obs with Dep = 1		31		
Obs with Dep = 0		32		

determined by, b_k. The sign of b_k determines the direction of the effect, and the effect tends to be larger the larger is the coefficient. So, qualitatively, the interpretation of b_k is the same as in the linear regression model.

First some of the most relevant estimation outputs are presented, then comment is passed on any single variable. Tables 3–6 show the estimation results for two partial models applied to the UK and the Italian samples, whereas Tables 7 and 8 show logit estimations of the most extensive models.

As one can see from the regression output, the majority of the estimated coefficients have the expected signs and are rather significant. It is interesting to note that the coefficients correspond to B', the vector of coefficients in Equation 3; positive values indicate that an increase in the variable concerned would increase the probability of an equity issue. In the case of logit analysis, B' can be interpreted as the vector of the 'elasticities' of the odds in favour of an equity issue.[39]

Deviations from target ratios. UK sample: In all the trials, this variable had the predicted negative sign but was never very significant its *t*-test ranging from 0.649–

Table 5. *Logit estimation results/model 2. UK sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–87
Included observations: 87
Convergence achieved after four iterations

Variable	Coefficient	Std. Error	*T*-statistic	Prob.
C	−6.577163	2.383092	−2.759928	0.0072
DEVTARG	−0.02985	0.0155	−1.925848	0.0577
LNTOTASS	−0.049489	0.18036	−0.274391	0.7845
LNAVRES	0.583304	0.204926	2.846419	0.0056
BETA	1.5837	1.238256	1.278976	0.2046
BORROWRATIO	1.115473	0.738588	1.510277	0.135
PRTPFMG	−0.099487	0.040962	−2.428776	0.0174
P/ERATIO	−0.007821	0.034177	−0.22885	0.8196
Log likelihood		−36.15438		
Obs with Dep = 1		52		
Obs with Dep = 0		35		

[39] The first time this model was estimated for the UK, a sample of 60 observations was employed; it is important to underline that the results obtained on that occasion have not been radically changed once the sample was extended to 87 observations.

Table 6. *Logit estimation results/model 2. Italian sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–63
Included observations: 63 after adjusting endpoints
Convergence achieved after seven iterations

Variable	Coefficient	Std. Error	*T*-statistic	Prob.
C	6.861474	3.085835	2.223539	0.0303
DEVTARG	0.115225	0.058665	1.964125	0.0546
LNTOTASS	−0.779215	0.274275	−2.840993	0.0063
ASSETCOMP	−0.018071	0.022335	−0.8091	0.4219
BETA	1.301883	0.990029	1.314995	0.194
CFMARG	−0.024305	0.031036	−0.783125	0.4369
PRTPFMG	−0.063478	0.056882	−1.115958	0.2693
P/ERATIO	0.000262	0.015417	0.016965	0.9865

Log likelihood −24.29147
Obs with Dep = 1 31
Obs with Dep = 0 32

Table 7. *Logit estimation results: model 3. UK sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–87
Included observations: 87
Convergence achieved after four iterations

Variable	Coefficient	Std. Error	*T*-statistic	Prob.
C	−6.419569	2.725106	−2.355713	0.021
DEVTARG	−0.01808	0.018472	−0.978794	0.3307
LNTOTASS	−0.024892	0.227986	−0.109184	0.9133
LNAVRES	0.590645	0.223415	2.643716	0.0099
BETA	0.981724	1.296187	0.757394	0.4511
PRTPFMG	−0.077345	0.046779	−1.653438	0.1023
CFMARG	−0.089771	0.056931	−1.576851	0.1189
PAYOUT	−0.384351	0.437912	−0.877691	0.3828
DIRECTORS	0.160525	0.148894	1.078118	0.2843
P/ERATIO	0.006887	0.035983	0.191409	0.8487

Log likelihood −35.37552
Obs with Dep = 1 52
Obs with Dep = 0 35

Variable	Mean All	Mean $D = 1$	Mean $D = 0$
C	1	1	1
DEVTARG	0.053079	−6.883782	10.35927
LNTOTASS	13.17354	13.86988	12.13898
LNAVRES	11.40221	12.29958	10.06896
BETA	0.908253	0.962654	0.827429
PRTPFMG	8.832644	7.021538	11.52343
CFMARG	12.44659	10.67038	15.08551
PAYOUT	0.577218	0.578404	0.575457
DIRECTORS	9.482759	10.78846	7.542857
P/ERATIO	19.2708	18.5325	20.36771

Table 8. *Logit estimation results: model 3. Italian sample*

LOGIT // Dependent Variable is ISSUE
Sample: 1–63
Included observations: 63 after adjusting endpoints
Convergence achieved after eight iterations

Variable	Coefficient	Std. Error	*T*-Statistic	Prob.
C	5.681706	3.484839	1.630407	0.1089
DEVTARG	0.147859	0.070541	2.096071	0.0409
LNTOTASS	−0.814412	0.299419	−2.719976	0.0088
ASSETCOMP	−0.039712	0.036049	−1.101617	0.2756
BETA	2.624657	1.241558	2.114003	0.0392
CFMARG	−0.077256	0.042158	−1.832515	0.0725
PAYOUT	0.362232	0.79743	0.454249	0.6515
P/ERATIO	−0.007123	0.030979	−0.229939	0.819
REINVEARN	−0.371105	0.209301	−1.773068	0.082
PRTPFMG	0.17551	0.179033	0.98032	0.3314

Log likelihood −19.52404
Obs with Dep = 1 31
Obs with Dep = 0 32

Variable	Mean All	Mean $D = 1$	Mean $D = 0$
C	1	1	1
DEVTARG	−2.498889	−0.779355	−4.164688
LNTOTASS	9.05469	7.845506	10.22609
ASSETCOMP	15.63889	15.15355	16.10906
BETA	1.004127	1.19	0.824062
CFMARG	8.091587	1.687419	14.29563
PAYOUT	0.47814	0.415106	0.539203
PERATIO	28.21714	32.14129	24.41562
REINVEARN	−21.38365	−44.38484	0.89875
PRTPFMG	−17.12048	−40.34129	5.374688

1.94.[40] The evidence thus seems to indicate that UK companies behave as if they had target gearing ratios in mind, and they tend to adjust towards those targets; thus companies which are below their long-term debt targets are more likely to issue debt. One possible explanation for this adjustment would emphasize that the costs of being far away from the target debt ratio are significant so that firms wish to reach their target ratios as quickly as possible.

Italian sample: For Italy things seem to be totally different. In all the runs the coefficient obtained was positive, thus indicating a tendency of the Italian companies to diverge from target ratio. Furthermore, the statistical relevance of the coefficient is not negligible; this evidence seems to suggest that companies do not appear to behave as if they had optimal target ratios in mind, but they adjust their leverage ratio in response to other circumstances.

It seems clear that, at least as far as the Italian evidence

[40] As is known, the *t*-statistic is a test statistic for the hypothesis that a coefficient has a particular value. The *t*-statistic to test if a coefficient is zero (that is, if the variable does not belong to the regression) is the ratio of the coefficient to its standard error. Since the final models presented here were developed by eliminating the weakest variables, any test of significance should be treated with caution, since the results are, strictly speaking, conditional upon the above models being known to be correct.

is concerned, our understanding of the economic underpinnings of this variable is flawed.[41]

Proxies for target ratios

(1) Size. In both samples, the evidence also indicates that size of firms has a positive effect on their leverage ratios suggesting that large firms can better support higher debt ratios than small firms. In fact in the majority of the regressions one obtained a negative sign for the size coefficient. It is noteworthy, that, for the UK case, these coefficients were never significant, and also that especially when the available reserves variable was not introduced, one identified a significant positive coefficient. In the Italian case instead, one identified a stronger statistical response (*t*-test ranging from 2.71–3.015); in Italy then, the positive association between size and leverage appears to be more relevant than in the UK. Especially for Italy, even on a univariate analysis, one identified that the average size of companies that issued debt is considerably greater than the average size of those companies that issued equity. Medium sized Italian firms seem to have a clear preference for equity financing, while very large, in relation to the market, firms tend to resort to debt financing.
This evidence may reflect several features. First, large firms might have better access to financial markets to raise long-term debt (this is surely true as far as Italy is concerned). Second, as discussed earlier, the ratio of bankruptcy costs to the firm value is higher for smaller firms since these costs include fixed costs, which can be negligible for large firms. Since bankruptcy risk increases with borrowing, small firms borrow less than large firms. Finally, the negative coefficient of the size variable is in line with the prediction that small firms are more vulnerable to a liquidation risk when they are in financial distress since banks are generally tougher against small firms.

(2) Risk. As expected, leverage and risk are negatively correlated. In all the trials and in both markets, the coefficient of the beta of the company was always consistently positive[42] and very often statistically relevant. Risk taking companies, as predicted by great part of financial theory, are more likely to issue equity rather than debt, because of the uncertainty about the future economic and financial performance, which makes the fixed interest payments steep.

(3) Asset composition.
UK sample: When the influence of asset composition on the financing decisions of companies was tested, conflicting evidence was found. In each trial this coefficient had a different sign and was never significant. More interesting appeared to be the borrowing ratio variable which, as expected, displayed the predicted positive sign.[43]
Italian sample. Italian managers appear to be more concerned about asset composition than their English counterparts; the coefficient of this variable was always negative, though never significant. Again, companies with a strong asset stability (e.g. real estate/property) may obtain and support higher levels of external finance.[44] Also, the approach put forward by the 'Static Trade-off Theory', as well as the general prescriptions suggested by the 'Pecking Order Theory'[45] may apply.

Liquidity. A negative coefficient for the liquidity variables 'net cash flow margin' and 'current ratio', was found in both samples, while a negative coefficient for the 'reinvested earnings' was found in the Italian sample. The positive effect of the liquidity measures on firm's borrowing decisions is consistent with the expectation that the ability of a company to meet its short-term payments is rather important. Furthermore, in line with agency predictions, firms with a large positive liquidity position will tend to issue debt to reduce the 'free cash' available to managers.

Testing the other variable, 'Available Reserves', for the UK sample, very interesting results arose. The coefficient was always positive and highly significant in almost all the regressions in which it was included. This could mean that firms which have accumulated high capital reserves seem to be willing to employ them to fund new investments. The positive sign of the coefficient, might again be taken as evidence for the Pecking Order Theory, which predicts that internal finance is preferred over external finance. Also, this negative effect of the reserves on firms' borrowing decisions

[41] This is not to say that there are no potential explanations of the pattern in Italy; for instance, as we noted in the theoretical introduction of the present work, the costs of adjustment might be so high and relevant in the Italian market to be regarded as one of the crucial variables driving capital structure decisions, rather than optimal capital structure considerations. This consideration might also account for the very common short-run view typical of the Italian economic agents, as opposed to a more long-term oriented (budgets, economic and financial planning, etc.) behaviour which seems to characterize the Anglo-Saxon world.
[42] In magnitude, the coefficient of the beta is the highest of all the variables tested.
[43] That is to say, the higher the borrowing ratio the more likely a company is to issue equity.
[44] This finding is also consistent with the widespread Italian practice of assessing companies using equity methods rather than financial methods.
[45] Firms with comparatively little tangible assets relative to firm value, being more subjected to information asymmetries, may benefit from debt financing policies.

might also be due to potential conflicts between debtholders and shareholders of firms.[46] As noted earlier, the liquidity of firms' assets can be taken as evidence to show the extent to which these assets of companies can be manipulated by shareholders at the expense of debtholders. Here the positive effect of the liquidity position of the firm on its leverage ratio is not realized.

Profitability. From this study emerges some evidence that the profitability of firms exerts a positive influence on firms' borrowing decisions. In the UK sample, the coefficient of the profitability variable was always negative and rather significant, its t-statistic being 2.57 in the best case. Also for the Italian sample a negative coefficient for this variable was observed.[47] As noted before this behaviour is in contrast with that predicted by the Pecking Order Theory. Anyway, the positive effect of profitability on firms' leverage might be due to the tax advantage of debt – as was discussed earlier[48] – profitable firms may reveal a high demand for interests tax shield. As was hoped, this variable seems to have picked up the supposed tax effect. Also, more profitable firms, may be seen by debtholders as less risky (i.e. probability of bankruptcy is low). As a result, these firms can get more debt relatively easy.

Payout ratio

UK sample. In these tests, the payout variable was always accompanied by a negative coefficient. Apart from one case this coefficient was barely significant. This seems to suggest that companies with high payout ratios are more likely to issue debt than equity. This is not easily explainable, in that it is a phenomenon that goes against many theoretical predictions; it could be that the cost of dividends together with 'sticky dividends policies' tend to create a disincentive for equity financing.

Italian sample. In this case instead, a positive coefficient was obtained but which was never remotely statistically significant on a multivariate basis. It is anyway true that Italian companies enjoy a higher degree of freedom than UK companies as far as dividends policies are concerned;[49] this, together with the high cost of external financing imposed by the financial system may account for the positive coefficient we have found.

Number of directors. A negative association was expected between the number of directors and the probability of an equity issue; instead, for both markets, a positive coefficient (very small though) that was never statistically significant was almost always obtained.

Price earning ratio

UK sample. One could have reasonably expected a negative relationship between the P/E ratio and the leverage ratio of company; for a firm it may appear more convenient to issue equity when the assessment of the company's shares by the market is positive; instead, the evidence is deeply conflicting (the coefficient of the P/E ratio displayed a different sign in every run, and it was never significant) thus making almost impossible to draw any meaningful interpretation.

Italian sample. Even if this variable is highly celebrated by the Italian financial press when assessing the performance of the Italian companies, thus leading us into expecting a more consistent and statistically strong behaviour, the P/E ratio variable showed a pattern not dissimilar to what was found for the UK, since its coefficient displayed a different sign in every run, and since its statistical relevance was negligible.

IV. TEST

This section assesses the ability of the models in Tables 5 and 6, by testing how they would classify the observed samples.

To assess the goodness of fit of the logit model,[50] an indicator of the predictive ability of the estimated models was used, a 2×2 matrix of the 'hits and misses' (1 for a correct prediction, 0 otherwise) of a particular prediction rule. For example, predictions could be made according to the estimated P_i terms, so that if $P(Y = 1)$ is greater than 0.5 one predicts the case to be a 1 (equity issue), while if $P(Y = 1)$ is less than 0.5 one predicts that Y will be 0 in that case (debt issue).[51] These predictions can then be compared to the actual values of Y for each case.

Tables 9 and 10 show these results. Each number represents the estimated probability that the observed company

[46] See the agency argument.

[47] Especially for the UK market, the profitability variable was still among the most statistically relevant also in model 3, which includes several variables.

[48] See 'Tax consideration'.

[49] The negative stock price response to variation in dividends policies does not seem to be a major determinant phenomenon in the Italian market.

[50] See Amemiya (1985) *Advanced Econometrics*, Aldrich (1984) and Greene *Econometric Analysis* (1997) for a thorough discussion.

[51] It is noteworthy, however, that this kind of measure may suffer from an important inefficiency; if the sample is unbalanced, (it has many more 1s than 0s, or vice versa – as the UK sample) the proposed prediction rule may fail very often the prediction of the fewer scores. If the UK sample for instance is considered, the number of debt issues ($Y = 0$) is considerably less than the number of equity issues ($Y = 1$). By setting the threshold value at 0.5, the adopted prediction rule may fail rather often to predict when $Y = 0$. One could of course increase the threshold so as to increase the prediction of a debt issue, and thus would increase the number of correct classifications of observations that have $Y = 0$, but at the same time one would also increase the number of times that we incorrectly classify as 0s observations that have $Y = 1$.

Table 9. *Estimated Probability: UK sample*

Modified: 1–87 //				lmod3.forecast issuef	
Code	Issue	Prob.	Code	Issue	Prob.
AOT	D	0.015691	BKLY	E	0.841838
ASDP	D	0.332203	BG	E	0.955593
AtBKCO	D	0.896891	BG	E	0.048867
BTEM	D	0.238096	BICC	E	0.937823
BLND	D	0.154987	BICC	E	0.920541
BLND	D	0.873374	BCI	E	0.08852
BUO	D	0.688054	BWTH	E	0.620954
CTM	D	0.083693	BPB	E	0.954755
303323	D	0.044674	BA.	E	0.960263
ENSW	D	0.399248	BA.	E	0.934345
FNU	D	0.948772	BAIR	E	0.052692
FIVO	D	0.122782	BT	E	0.750567
FHOT	D	0.347039	BT	E	0.651877
GRNT	D	0.055324	BT	E	0.737498
GAA	D	0.592831	BTR	E	0.935976
GREW	D	0.844465	BTR	E	0.946046
HWY	D	0.134901	BTR	E	0.975539
MRST	D	0.389494	BTR	E	0.978711
NCCW	D	0.237183	BABL	E	0.798646
K:REGH	D	0.005417	CBRY	E	0.859682
329880	D	0.097844	CBRY	E	0.799002
SHFT	D	0.051189	CBRY	E	0.894632
WTB	D	0.955517	CRN	E	0.735747
YNGBA	D	0.50358	CPG	E	0.674399
AUSR	D	0.37945	CPG	E	0.816489
BEN	D	0.287896	CKSN	E	0.876051
BOOHW	D	0.684073	CRI	E	0.669955
BAERO	D	0.898857	CRI	E	0.659183
BRGR	D	0.017328	COWE	E	0.888493
CHLGR	D	0.003964	DALG	E	0.694821
EURTU	D	0.922746	DKN	E	0.333464
HFUR	D	0.096344	DVSG	E	0.494104
A&A	D	0.106591	EMAPO	E	0.905528
LIPRK	D	0.504154	EMI	E	0.905758
PEZOCH	D	0.811198	ECC	E	0.921114
AGG	E	0.655689	ENTO	E	0.427308
AIRT	E	0.79977	FKI	E	0.410601
AIRT	E	0.870248	FLXT	E	0.064472
ADS	E	0.714882	GKI	E	0.49579
ALLD	E	0.934583	GLXO	E	0.984268
ASDA	E	0.966822	GMET	E	0.991069
BAB	E	0.70587	GREW	E	0.901818
BBA	E	0.510137	HNS	E	0.95872
BZR	E	0.662631			

will make that issue. The summary of the predictive ability or the estimated models for the UK sample and the Italian sample is then given in Tables 11 and 12 respectively.

V. CONCLUSION

This article has investigated the determinants of firms' borrowing decisions. The theory and the existing empirical evidence have been analysed jointly in order to develop

Table 10. *Estimated Probability: Italian sample*

Modified: 1–63 //				lmod3.forecast issuef	
Code	Issue	Prob.	Code	Issue	Prob.
AUP	D	0.001346	APM	E	1
BR	D	0.705468	AZA	E	0.851326
BDSS	D	0.410785	ASIT	E	0.023643
BDSS	D	0.476991	BPL	E	0.064401
BDSS	D	0.183917	BN	E	0.160993
BPM	D	0.911235	BO	E	0.976969
BPN	D	0.76213	CARB	E	0.995045
BAV	D	0.093443	CRO	E	0.0188
BNA	D	0.999691	BCAG	E	0.463211
COMR	D	0.09007	FMC	E	0.998544
COMR	D	0.09007	FL	E	0.12552
CROCIE	D	0.171946	F	E	0.146944
CROCIE	D	0.008802	FN	E	0.963813
CIT	D	0.999999	FN	E	0.958344
ENI	D	0.018946	FINC	E	0.037598
ENI	D	0.010351	GRA	E	0.999958
IFIL	D	0.700628	IFL	E	0.390134
IMI	D	0.051337	IFSC	E	0.849324
IMI	D	0.051337	FAS	E	0.998675
IMI	D	0.834109	MB	E	0.637274
IMPGL	D	0.84934	MI	E	0.982825
MB	D	0.054529	M	E	0.425069
MB	D	0.208426	OL	E	0.995969
MB	D	0.059894	R	E	0.793292
M	D	0.80779	R	E	0.137608
OT	D	0.996928	SA	E	0.358278
OL	D	0.247202	SCII	E	1
PARFIN	D	0.313344	SIM	E	1
PARFIN	D	0.080874	SPF	E	0.825053
ISPT	D	0.007758	STEF	E	0.456557
ISPT	D	0.008438	UNI	E	0.854871
SPF	D	0.30284			

Table 11. *Predictive value of Logit model 3. UK sample*

	Actual outcome		
Predicted outcome	Debt	Equity	Total
Debt	13	9	22
Equity	22	43	65

Notes: Per cent correctly predicted: 64.37%. Type I error = Prob. (debt predicted when actually equity): 17.31%. Type II error = Prob. (equity predicted when actually debt): 62.86%.

Table 12. *Predictive value of Logit model 3. Italian sample*

	Actual outcome		
Predicted outcome	Debt	Equity	Total
Debt	10	13	23
Equity	22	18	40

Notes: Per cent correctly predicted: 44.44%. Type I error = Prob. (debt predicted when actually equity): 41.94%. Type II error = Prob. (equity predicted when actually debt): 68.75%.

a descriptive model of the choice between equity and debt.

The primary objective was to try to strengthen the so often weak relationship between theoretical models and empirical specifications of those models; the descriptive model here developed, has been estimated using two different samples representative of two different financial environments; UK and Italy.

In this research of the determinants of firms' capital structure, some results that throw some light on a number of important issues were obtained. The results suggest that firms in well developed financial markets (UK) may have long-term target leverage ratios and they thus tend to adjust to those targets; however, in less efficient markets (Italy for example) other variables seem to be more important than the search for optimal leverage ratios. The results provide support for a positive effect arising from size of firms in both countries, possibly reflecting the better access of large firms to financial markets, the relatively low proportion of bankruptcy cost to the value of firms or the flexibility of banks to larger firms when they are in financial distress. Evidence also indicates that profitability has a positive impact on leverage, confirming that the tax advantage of debt financing has nonetheless its relevance in England as well as in Italy. It is also suggested that internal finance is preferred to external finance, in accordance to the Pecking Order Theory. Again, both for UK and Italy some evidence emerges that there is a positive relationship between leverage ratio and the liquidity of firms, lending support to agency theory and to the liquidity considerations, which are often regarded to play an important role in corporate borrowing decisions.

Other variables such as the payout ratio, the number of directors and the P/E ratio have not displayed a steady and consistent pattern, confirming the controversial and ambiguous findings of previous studies over these characteristics. In general this article seems to confirm the most important and widespread prescriptions of the theory of capital structure, but at the same time it stresses the fact that further research to identify the fundamental determinants of capital structure is still called for.

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