FINANCIAL POLICY DETERMINANTS: EVIDENCE FROM A NESTED LOGIT MODEL*

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Abstract

How do managers set financial policy? The aim of this paper is to document the driving factors of the financial policy choice and to evaluate the relevance of two alternative theories, the trade-off theory and the pecking order theory. We use a database of 3,659 firms, over the period 1991-2002; our study relies upon the estimation of two qualitative variable models, a multinomial logit model and a nested logit model. We show that trade-off models are more pertinent than pecking-order models so as to explain the financial policy choice of a firm, but none of these models are sufficient to explain all our results.

Keywords: Financial policy, pecking order theory, trade-off theory, qualitative variable models.

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1. Introduction

How does a CEO or a CFO set financial policy? Since the seminal papers by Modigliani and Miller (1958 and 1961) and the debate that followed, it's well known that all their results about the capital structure and dividend policies and the firm's value are valid only under strong hypotheses (no taxation on firms or on investors, no transaction or bankruptcy costs, no imperfections on the capital market, that is no agency costs and no information asymmetries). A vast amount of literature has been published since 1958, a large part of it focused, both from an empirical and a theoretical point of view, on the understanding of the consequences of the rejection of one hypothesis of Modigliani and Miller and the driving factors of capital structure. In spite of several papers on the subject, the question is not settled yet (Myers, 1993; Opler and Titman, 1996). To address how firms manage their financial policy, we document in this paper the determinants of financial choices. We focus on flows (financial policy) rather than stocks (capital structure), because the capital structure of a firm is the result of many outdated choices. Moreover, we focus on the financial policies which affect the external funds available for the firm, since the determinants of the internal funds available are extensively studied by others (Opler, Pinkowitz, Stulz and Williamson, 1999; see also Couderc, 2005) and are, to a large extent, independent of the will of the firm.

The first contribution of this paper is to study these financial choices using a qualitative variable model framework. Polychotomous qualitative variable models, such as the multinomial logit, allow an analysis of a choice between more than two alternatives. We thus avoid reducing artificially the choice of a financial policy to a binary choice. To our knowledge, only a few papers use this class of models in such a research design, such as Denis and Mihov (2003), focusing on the choice between different types of debt, Gaud, Hoesli and Bender (2005), about the debt-equity choice or Helwege and Liang (1996), about all external types of financing. In addition to financial policies identified by these studies, we also consider the financial policies aiming at reducing the quantity of external funds available for the firm, such as share buy-backs and reduction of indebtedness.

Our second contribution is to implement a nested logit model in order to model the financial policy choice as a two-step process: first, the firm chooses the level of external funds relatively to the one it used in the preceding period. It's a three-alternative choice: the desired level can be higher, stay the same or be lower than the actual level. In a second step, the firm chooses the best financial policy in order to raise, stabilize, or give back funds to bondholders, banks or shareholders. We use our results to assess the relevance of the two main theories about the financial policy choices, the trade-off theory and the pecking order theory.

We propose a brief and partial survey of theoretical and empirical studies devoted to our subject in section 2. The sample selection and the variables' definition are presented in section 3. We then turn to the empirical results in section 4 and section 5 concludes.

2. Determinants of financial policy: theory and evidence

Modigliani and Miller (1958), as well as the neo-classic theory of investment (Jorgenson, 1963 or Tobin, 1969) refer to a representative firm; the optimal level of investment can be determined without considering financial variables: for each firm, the cost of capital is set on an efficient financial market; this cost determines a minimal level of profitability, given the firm-specific risk. Above this minimal level of profitability, all the investments of the firm are financed by the bond or stock market.

Given the existence of moral hazard and asymmetries of information, concurrence between firms on financial market is not perfect. Two alternative theoretical models currently prevail in the literature in order to explain the consequences of such imperfections: the trade-off model that considers the optimal financial policy as an adjustment process towards a target leverage ratio and the pecking order model, that considers the optimal financial policy as a function of the capacity of the firm to generate internal financing and on market conditions. In the latter model, the target leverage ratio is less important (section 2.1). These two concurrent models have been extensively tested, aiming at validating one or the other. Because of the vast number of empirical studies on the subject[2], we only present in section 2.2 the empirical studies which use qualitative choice models.

2.1. The trade-off theory (TOT) and the pecking order theory (POT)

The TOT, especially in its static version, assumes that a firm chooses a mix of external financing sources in order to maximize its value (and thus the shareholders' wealth). Its choice is based upon an implicit targeted optimal capital structure, which is a function of the marginal cost of each source of external funds. For example, among the main determinants of marginal costs and benefits of debt, one can find the existence of debt tax shields (Modigliani and Miller, 1963; Miller and Scholes, 1978), of financial distress costs (Stiglitz, 1972 and Titman, 1984) and of agency costs (Jensen and Meckling, 1976; Stultz, 1990; Hart and Moore, 1995). Financial policy therefore consists in an optimization process under constraints; a firm increases (resp. decreases) its leverage ratio when it is lower (resp. higher) than the optimal leverage ratio. In the dynamic version of the trade-off model (Leland, 1998), temporary deviations between the observed leverage ratio and the targeted ratio are allowed, due to the existence of adjustment costs. Thus, optimal financial policy consists in making adjustments when the costs of deviation (caused by a non-optimal financial structure) exceed the adjustment costs. The TOT postulates that the target leverage ratio is function of the size of the firm, its perspectives of growth, the magnitude of transaction costs and the degree of assets' specificity; the leverage ratio should come back progressively to the target.

The POT was first introduced by Myers and Majluf (1984) and Myers (1984). This theory relies upon the existence of information asymmetries between insiders (e.g. managers …) and external investors (e.g. bond and stockholders). To protect themselves from managerial discretionary decisions and from adverse selection risk (because of such information asymmetries), external investors require an additional risk premium, function of the magnitude of the information asymmetries. This magnitude is related to the type of financing involved (bondholders are less subject to managerial discretion than stockholders, for instance), the financial health, the quantity of information revealed by the manager and some firm-specific determinants (corporate governance mechanisms, ownership structure …). Because of these costs, a maximum debt ratio exists, the debt capacity of the firm (Myers and Majluf, 1984), but no targeted leverage ratio.

If such information asymmetries exist, a manager can lower the informational costs and thus lead to a change in the firm's financial policy. The firm can indeed minimize these costs by choosing sources of funds that are least affected by these costs. In consequence, according to the POT, firms always prefer internal financing over debt issuance and debt issuance over equity issuance, because information costs related to these sources of funds are different. Furthermore, the manager can have incentives to stockpile cash or liquid assets. This financial slack provides flexibility and therefore allows the firm to avoid information asymmetry costs (but the managerial discretion is increased, since the liquid assets can be spent by the manager without control; Jensen, 1986).

2.2. Empirical evidence

Both theories have been widely tested. No dominant model emerges from these studies, probably because several empirical results can be interpreted as supportive for both frameworks. Among the numerous existing empirical studies, we detail only studies using a qualitative variable model approach.

Empirically, much emphasis has been placed on analyzing the determinants of the leverage ratio. Titman and Wessels (1988, US), Rajan and Zingales (1995, G7), Miguel and Pintado (2001, Spain), Ozkan (2001, UK), and Gaud, Jania, Hoesli and Bender (2005, Switzerland) test several assumptions in order to understand which theory has the greatest relevance. The positive impact of firm size, growth opportunities, marginal tax rate and tangibility ratio on observed leverage ratios is viewed as being in accordance with to the trade-off theory, whereas the negative impact of profitability as representing adequaly to the pecking

[2] See the survey by Harris and Raviv (1991).

order theory[2]. Hovakimian and al. (2001), comparing the characteristics of U.S. firms which issued equity between 1976 and 1993 to those which increased their use of debt financing, also find evidence to support the TOT. They use a partial adjustment model in order to test the dynamic version of the TOT. They find that when firms adjust their capital structures, they tend to move toward a target leverage ratio, in line with the trade-off theory predictions. The target leverage ratio may change over time as the firm's profitability and stock price change. These results are confirmed by Remolona (1990) and Gaud, Hoesli and Bender (2005), who establish that implicit target ratios are different across countries and speed of adjustment is higher in the United States than in Europe, and than in Japan.

Another group of studies is devoted to the debt-equity choice[3]; Marsh (1982) uses a logit model to show that the existence of a gap between the leverage ratio and the target ratio is a key determinant of debt-equity choice. In particular, he concludes that the issuance of shares is more probable when the leverage ratio is higher than the implicit target ratio. These initial results were confirmed by several studies, in particular Mackie-Mason (1990) and Jung and al. (1996). Market performance is also found to positively impact the probability of a share issuance. Hovakimian (2004) and Hovakimian and al (2004) add that the debt-equity choice is driven by two additional factors, the evolution of the stock price and the operational performance of the firm. Helwege and Liang (1996) examine the financing choices of the US firms which became public in 1984: they use logit models to determine the variables influencing the choice between internal and external funds and the choice of the external financing source. They conclude that the probability of obtaining external funds is not correlated with the lack of internal funds (a result in contradiction with the POT) and that the external financing is inertial: the firms which raised external funds recently are those which are the most likely to raise again external funds). Their results are confirmed by De Haan and Hinloopen (2003), with the same methodology and by De Jong and Veld (2001). These two studies focus on Dutch companies.

Some evidence support the POT. First, Gaud, Hoesli and Bender (2005) mitigate all the previous results by noting that the targeted debt ratio seems to become a key factor for explaining financial choices only when it crosses an upper threshold, but except this case, the theoretical predictions of the POT are essentially validated for all the firms under the threshold: when possible, firms use first their available internal funds, before issuing debt and then shares. Other studies supporting the POT exist. Gardner and Trzcinka (1992) use a simple logit to test the assumption of Myers (1977) concerning the relation between the growth opportunities of a firm and its level of debt. Jordan and al. (1998) follow the same logic to model the consequences of the financial policy on the structure of the capital of the company. Klein and Belt (1994) test on US firms the choice between internal and external financing and model the probability of choosing a financing by issuing shares or debt. They show that the firms which experience the strongest growth and which are the most efficient are those which will raise the more external funds. Last, Shyam-Sunder and Myers (1999) report that a pecking order model clearly outperforms a target-adjustment model in explaining the time-series variation in leverage ratios.

3. Sample selection and variable definition

3.1. Sample selection and variable definition

Our data is drawn from two sources. Yearly accounting data is from the Osiris database[4]. Market data comes from Datastream. The initial sample from Osiris covers 10,240 firms according to the following criteria of inclusion: net sales greater or equal to USD 1 million, number of employees greater or equal to 50, availability of the data for a minimum time period of four years and no major events in the life of the firm such as merger or acquisition or bankruptcy. We drop, in keeping with common practice, banks, financial institutions and insurance companies, defined according to the Fama and French (1997) classification. We also drop 22 firms with no reported sector or partially or totally owned by the government. After merging the data from both databases, we obtain data for 7,241 firms. When the variables resulting are not expressed in the same currency, we use OECD exchange rates. To guarantee the consistency of our data, we exclude from the sample the firms reporting non-credible values after a checking by hand and those for which we have two different and irreconcilable values for the same variable in the two databases[5]. This procedure leads us to eliminate 1,943 firms. We do not keep observations relative to more or less than 12 months years (changes in the date of beginning or ending of the "accountancy year"). Finally, we drop out of the sample all the firms coming from countries with less than 100 firms in the sample, as well as the Canadian firms (the Osiris data

[2] See also Gaud, Jania, Hoesli and Bender (2005), on Swiss firms, Miguel and Pintado (2001) on Spanish firms, Rajan and Zingales (1995) on G7 firms and Ozkan (2001) on UK firms.

[3] Two important studies on the subject, but not relying upon the qualitative variable models are Jalilvand and Harris (1984) and Bayless and Chaplinsky (1991).

[4] Osiris is a database provided by the Bureau Van Dijk. It gathers the financial statements of more than 24 000 firms over an average time period of 15 years. These statements are available "as is" or on a standardized basis. For details about the standardization procedures, see Bureau Van Dijk, (2003). We use the DVD version (October 2003) of the base.

[5] These robustness checks have been performed on all the variables included in both databases: number of existing shares, market capitalization, P/E ratio…

for these firms is far too incomplete), corresponding to 1,639 firms.

The final database thus includes 3,659 firms, over a minimum time period of 4 years and a maximum time period of 11 years (1991-2002). The firms in the sample belong to the following countries: France (254 firms), Great-Britain (733), Germany (343) and the United States (2,329 firms).

We use the standard definitions of variable. The size of a firm is the natural log of the size of its balance sheet. The profitability of the firm is approximated with its gross margin rate. We consider the gross margin rate and not the net margin rate, because the former is a better proxy for operating performance. The availability of internal funds is measured by the ratio cash flow on total assets. A higher value for this ratio means that the firm has a higher capacity to generate financial slack and to rely upon internal financing. The leverage ratio is defined as the ratio of the total financial debt on total assets. For one given firm and year, the target leverage ratio used in our regressions is defined as the median leverage ratio of its industry peers[6]. Finally, investment rate and Tobin's q are computed as usual. The former variable accounts for the firm's need of funds and the latter accounts for the market valuation of the firm and its growth opportunities. Table 1 provides the variable definition. For each variable, we provide its calculation mode starting from the data items from Osiris (OS_000) or Datastream (DS_000). In order to minimize the impact of outliers, the items used to define our variables were winsorized at 1% both sides[7].

[Please insert Table 1 here]

3.2. Financial policiy definitions

We identify six mutually exclusive financial policies. Financial policy 1 refers to a situation in which the firm has the same quantity of external funds at the end of the year than at the beginning. Financial policies 2, 3 and 4 provide to the firm more external funds. Financial policies 5 and 6 reduce the amount of external funds available[8]. Here are the six financial policies:

Financial policy 1 (NO_CHG): The financial policy implemented by the firm at year n doesn't change the capital structure of the firm.

Financial policy 2 (SHR_ISS): The financial policy consists in issuing new shares without changes in the firm leverage ratio.

Financial policy 3 (DEBT_ISS): The leverage ratio of the firm increases, while the firm doesn't issue shares.

Financial policy 4 (SHRDEBT_ISS): The leverage ratio and the number of outstanding shares are increased.

Financial policy 5 (DEBT_REDUC): The firm reduces its leverage ratio and doesn't change its number of outstanding shares.

Financial policy 6 (SHR_BB): The firm buys back its shares without changing its leverage ratio.

Table 2 summarizes the frequencies of each financial policy, by country and year.

[Please insert Table 2 here]

The frequencies of the financial policies are about stable during the time period and these financial policies are nearly uniformly frequent across the four countries of the study, with the notable exception of the shares buy-backs, three times more frequent in the United States (6 % of the observations) than elsewhere.

4. Empirical results

We first justify our methodology (4.1) and then present our empirical results (4.2).

4.1. Methodology

We empirically examine the determinants of the choice of financial policy. Our econometric research design should provide information about the reason why firms choose a particular financial policy. Our methodology must fulfill the following requirements. First, the chosen methodology must explain a qualitative choice between more than two outcomes (here, we basically have 6 different alternatives). Second, the methodology must be able to take into account both firm-specific as well as alternative-specific variables and must allow different decision-making processes. It should be possible to test two main structures, a one-step decision process (i.e. the firm decides one financial policy out of the six different available financial policies) and a two-step decision process (i.e. the firm first chooses the level of external funds and then the financial policy in order to achieve its goal). The third requirement is that the methodology must allow for a comparison of the predictive power of the two decision processes.

According to these constraints, we decide to implement two logit models. These models estimate why a firm chooses a financial policy or another. The

[6] We define the industry peers as the firms belonging to the same sector, following the Fama and French (1997) classification. Alternative definitions of industry peers have been tested (industry identified by the three-digit SIC code, for instance), the main results do not change.

[7] Descriptive statistics are provided in section 4.2, below.

[8] All the figures are considered on a *net* basis. Many firms have borrowed money and have paid back some debts in the same time. We consider only the net change over the year. Moreover, the changes in the number of outstanding shares or in the leverage ratio lower than 5% are not taken into account. Namely, a firm with no change in its leverage ratio and an annual increase of the number of outstanding shares of 2% is supposed to have followed the financial policy 1 (no changes). This is because numerous factors can affect these variables, without any significance for the corporate financial policy: after the exercise of a bulk of stock-options by the CEO, the total number of outstanding shares will be slightly increased. It means nothing for the financial policy of the firm.

first model we implement is a multinomial logit model, which is typically used when the choice set is broader than two outcomes. Here we have 6 different outcomes, corresponding to the 6 different financial policy outlined in section 3.2.

To model the two-step decision process, (a sequential choice), the use of a nested logit model is natural (Ben-Akiva and Lerman, 1976). However, we do not strictly assume that the choice of the financial policy is a sequential process. In this model, we only require that some variables affect groups of decisions. The tested nesting hierarchy, as represented in figure 1, is largely intuitive[9]. In a first step, the firm decides to raise external funds, to give back funds to share or bondholders or to do nothing. At this stage, the right-hand side variables only determine the desired level of funds, without indication of the financial policy that will be implemented in order to achieve the firm's goal. Thereafter, conditional on this first choice, the effective financial policy is chosen, based upon alternative-specific variables. Hence, different variables are driving the first- and second-step decision.

[Please insert Figure 1 here]

In order to compare the two models, we must be aware that neither of the two models is a constrained version of the other. But several standard methods making use of the likelihood function can be employed. One can focus on the comparison between the predicted outcome and the actual outcome. The comparison can also rely upon the usual goodness-of-fit measures.

4.2. The determinants of a financial policy: empirical results

After a discussion of the summary statistics, the results of each model are analyzed. Table 3 provides usual descriptive statistics of the variables.

[Please insert Table 3 here]

For all countries, the leverage ratios are lower than usual figures, since we don't have taken into account all types of debt, but only the long term debt bearing interest. The only relevant point is that French firms are larger and more leveraged than firms from other countries. Turning to the gap between real leverage ratio and target ratio, one can note that French firms have, on average, a higher debt than their target, whereas it is the opposite in all other countries.

We first implement a multinomial logit model in order to assess the financial policy determinants. Our model is supported by the data, since the pseudo-R^2 is .221 and the count-R^2 is above 50%[10]. Moreover, the Hausman and Mc Fadden (1984) tests don't reject the IIA hypothesis for all alternatives. Additional usual robustness checks don't allow us to reject the model[11], and several alternative specifications were tested[12], without major changes in our results. We present in table 4 the marginal effects of each independent variable on the left-hand side variable, when other variables are at their medians. These marginal effects are more suitable for direct interpretation; the marginal effect of a variable represents its implicit effect on the probability that the considered financial policy is chosen. For instance, the negative marginal effect of MARG of – .032 for the financial policy SHR_ISS (share issuance) means that a 1% increase of the gross margin rate decreases by 3.2% the probability of a share issuance, for a firm which has median size, median investment rate, etc.

We also provide the predicted probabilities to choose a financial policy rather than another, according to the value of a variable considered independently of the others (see figures 2 to 7). The first graph shows the influence of the variable SIZE on the probability of choosing one particular financial policy. Large firms have a higher probability to choose the "no change" financial policy and a lower probability to proceed to an increase of their indebtedness (DEBT_ISS). The influences of SIZE, MARG and TOB on the predicted probabilities are quite linear. On the contrary, the evolutions of the probabilities are much atypical with regard to the three other variables. By analyzing at the same time the predicted probabilities and the marginal effects, one can draw some remarks.

Larger firms (SIZE) are more likely to do nothing, to issue shares or to issue at the same time shares and bonds. But the size is not a significant determinant for the increase of indebtedness. This can make sense, because all the firms included in the panel are already quite large and listed on a stock market, so even the smallest firm in the sample doesn't suffer from insufficient signaling. We observe that the profitability of firms (MARG) has a positive impact on the probability of issuing debt rather than equity or both, in line with tradeoff models, but contradictory with the pecking order theory. These results are coherent with those of Hovakimian and al. (2004) and Gaud and al. (2005). Thus, debt financing has specific advantages as disciplinary strength and/or tax shield for profitable

[9] However, alternative nesting hierarchies have been tested, grouping the alternative by the nature of the external funds involved, for instance. In this case, one inclusive value was significantly above 1, indicating a specification issue.

[10] The count-R^2 is the number of correct predictions over the total number of predictions. The perfect model will have a count-R^2 of 1. When we account for the number of correct classifications which can be obtained by a naïve model, we obtain an adjusted count-R^2 of .345.

[11] For instance, the LR-tests don't reject at 1% the non-nullity of the coefficients. Wald tests reject all combination of alternatives (Minimal value of χ^2 for the Wald tests: 381.511, with 64 degrees of freedom).

[12] These specifications involve alternatively different definitions of variables and/or winsorizations, inclusion of firm-specific dummies, inclusion of interaction terms, *etc*. The results are not presented here and are available on demand.

firms. The CASH coefficient is positive for the DEBT_ISS policy. An increase of the margin rate or of the availability of internal funds gives incentives to the firm to increase its indebtedness, maybe because of a rise of the target. It seems that firms use their internal funds and their margin rate as a kind of "collateral" to borrow more funds (see and Hovakimian and al., 2004 and Couderc and Jestaz, 2004 for a theoretical model). CASH doesn't influence the share-oriented financial policies; this result is in contradiction with the pecking order theory. Supporting the trade-off theory, the GAP[13] variable is highly significant and negatively correlated with the probability of an increase of the leverage ratio (DEBT_ISS and SHRDEBT_ISS financial policies), and the probability of a reduction of indebtedness (financial policy 5) is increasing with the gap. But this gap also reduces the probability of issuing shares and increases the probability of shares buy-backs. In other words, firms don't actively manage their share issuances or buy-backs in order to adjust their leverage ratio, because the amount of outstanding equity seems to change procyclically with the GAP variable. This perfectly supports the idea of an implicit target leverage ratio, but no trade-off between equity-oriented financial policies and debt-oriented financial policies emerges. To sum up, firms act as if they have a target indebtedness rate, and adjust their leverage ratio in order to attain the desired level.

The probability of the financial policies 2 to 4 (increase of the level of external funds) is correlated with high investment rate (INV), whereas firms with a low investment rate are more likely to reduce external funds, either by share buy-backs or decrease of indebtedness. More precisely, one can note that the predicted probabilities of financial policies 2, 3 and 4 increase with the investment rate, but something like a pecking order seems to appear (see figure): while the investment rate increases, the likelihood of the DEBT_ISS financial policy increases first, followed (for higher investment rates) by the predicted probability of financial policies SHR_ISS, then SHRDEBT_ISS.

Tobin's q coefficients (TOB) are coherent with previous results and common intuition: firms tend to issue shares when Tobin's q is high, and to buy-back shares when Tobin's q is low. This result is consistent with the market timing hypothesis, a high valuation of the firm by the stock market increases the probability of equity issuance (but doesn't change the probability of increasing indebtedness), low valuation reduces the probability; these results are consistent with those of Jung and al. (1996).

[Please insert Table 4 here]

[Please insert Figures 2 to 7 here]

One of the drawbacks of the multinomial logit model is related to its limitation concerning the alternative-specific variables. It doesn't allow us to take into account the different proximity which can exist between two of the financial policies. Nevertheless, it is allowed to think that the financial policies SHR_ISS, DEBT_ISS and SHR_DEBT_ISS are part of a coherent group (financial policies aiming at increasing the level of external funds), just as the financial policies DEBT_REDUC and SHR_BB (decrease of external funds). Some of our results commented above support this hypothesis: the coefficients for the INV, GAP, or TOB are clearly different across these two groups of financial policies.

Table 5 presents the results of the implementation of the nested logit model. Coefficients for the inclusive values are reported at the bottom of the table. This model highlights the relevance of the nested logit approach to analyze the financial policy choices: usual tests support the nesting hierarchy and the specification[14]. Moreover, the count-R^2 is higher than it was in the multinomial logit model, indicating that the nested logit model better fits to the data. The inclusive values parameters that are highly significant and within the [0-1] range, which indicates that the tree structure is indeed relevant[15]. This means that the proximity of the alternatives within nests is higher than across nests. The two-step nesting hierarchy seems to fit well with the data: the firm first decides to raise, stabilize or reduce the level of external funds available and, in a second step, chooses the way to achieve its goal.

The first step is obviously influenced by firm-specific variables (i.e. the right-hand side variables of the previously estimated model). We present the variables interacting with two nest-specific dummies. This allows variables to play a different role across nests. For instance, SIZE influences negatively the probability for a firm to choose the nest "Decrease in the external funds available" (DEC_SIZE, coef:: –.074, significant at 1%) rather than doing nothing and positively influences (INC_SIZE) the probability of choosing the "increase the level of external funds" nest. The coefficients are strongly coherent with those presented in table 4: the investment rate is positively correlated with the probability of an external funds increase, and negatively with a decrease. The same logic can be followed for the GAP and TOB variables. To cap it all, the probability of issuing bonds, shares or both is positively correlated with size, low margin rate, low investment rate, high Tobin's q, negatively correlated with higher GAP and independent from the cash flow to total assets ratio.

[13] A high gap value means that the firm has a over-optimal leverage ratio.

[14] A LR-test against the constant-only model indicates that the model is significant (p-value=0.00). The LR-test for the nested structure against the non-nested structure supports the use of the nested logit model with our data (p-value =0.00).

[15] The inclusive value for the NO_CHANGE nest is non significant, because it is a degenerate nest. Its value is arbitrarily constrained to 1.

In a second step, the firm chooses the way to achieve its goal in terms of quantity of external funds. At this step, all the firm-specific variables have been taken in account, and the choice of the firm can only be influenced by some alternative-specific variables. Among the potential pertinent variables, one can think about the facial cost of the financial policies or about the corporate governance consequences of each financial policy. Due to data limitations, we focus on the facial cost of the financial policies. Within each nest, the choice of the firm strongly depends on the apparent cost of the policy. The coefficient is negative and significant at 1%; this means that the alternatives with higher facial costs are less likely to be chosen by the firms. To say it differently, firms don't believe in the Modigliani-Miller theorems.

[Please insert Table 5 here]

5. Conclusion

The aim of our paper is to provide additional evidence about the determinants of the choice of a financial policy, using a database of 3,659 firms over the time period 1991-2002. We test the relevance of pecking order and trade-off models. We implement two qualitative choice models, a multinomial and a nested logit models.

We show that the choice of a financial policy is influenced by several factors, both economic (investment rate) and financial (Tobin's q). To cap it all, firms with high profitability rely mainly upon internal funds. Firms don't issue or buy-back shares in order to offset the deviation from their target leverage ratio; these financial policies are also independent from the quantity of internal funds generated by the firm. Shares issues and buy-backs are influenced by the market conditions, confirming the market timing hypothesis. Finally, the trade-off theory is largely supported by our results (existence of a target leverage ratio, use of internal funds as a "collateral" to borrow more). But the different facial costs of the financial policies also play a significant role in the choice of the firms. The implementation of a new empirical strategy to test the relative relevance of the pecking order and the trade-off theories allow us to provide more evidence in favor of the trade-off theory than of the pecking-order theory. According to our results, as well as results provided by other studies, a better understanding of the financial policies determinants should be to develop a broader and more flexible model, able to consider these financial choices as complex and probably non-linear functions of financial variables.

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Appendices

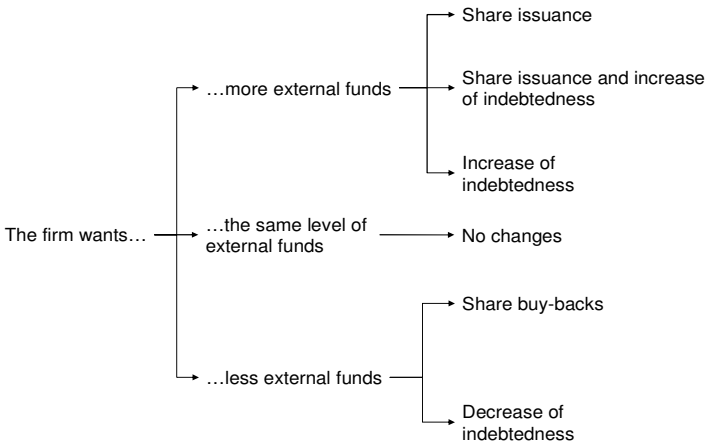

Figure 1. Nesting hierarchy

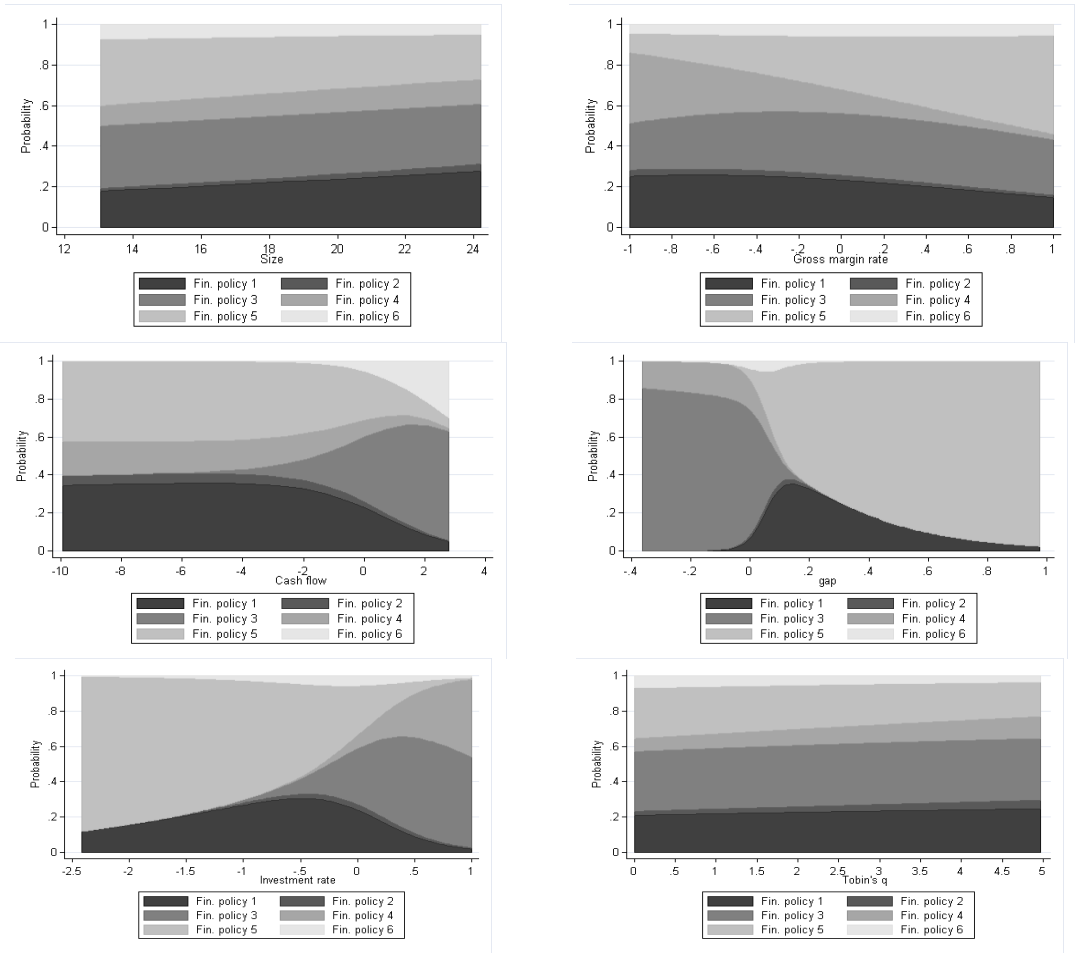

Figure 2 to 7. Predicted probabilities

Table 1. Variables' definitions

Variable	Definition	Osiris and Datastream items
Size (SIZE)	ln(Total assets)	ln(OS_13077)
Gross margin rate (MARG)	EBIT on Total operating revenue	$\frac{OS\_13024}{OS\_13004}$
Cash flow on total assets (CASH)	$\frac{\text{Net income+Amortization and depreciation}}{\text{Total assets}}$	$\frac{OS\_(13045+13019+13020)}{OS\_13077}$
Leverage ratio	$\frac{\text{Long term debt bearing interest}}{\text{Total assets}}$	$\frac{OS\_14046}{OS\_13077}$
Gap between actual and target leverage ratio (GAP)	DEBT – Median indebtedness rate for the year and sector	
Investment rate (INV)	$\frac{\text{Capital expenditures}}{\text{Total assets}}$	$\frac{OS\_05003}{OS\_13077}$
Tobin's *q* (TOB)	$\frac{\text{Market capitalization}}{\text{Total assets}}$	$\frac{DS\_MV}{OS\_13077}$
Facial interest rate (INT)	$\frac{\text{Interest expenses}}{\text{Long term debt bearing interest}}$	$\frac{OS\_13026}{OS\_14046}$
Dividend yield (DIV)	$\frac{\text{Dividend}}{\text{Share price}}$	$\frac{DS\_DIV}{DS\_MV}$
Facial cost of each financial policy (COST)	Financial policy 1 (NO CHG)	0
	Financial policy 2 (SHR ISS)	DIV
	Financial policy 3 (DEBT ISS)	INT
	Financial policy 4 (SHRDEBT ISS)	DIV+INT
	Financial policy 5 (DEBT REDUC)	– INT
	Financial policy 6 (SHR BB)	– DIV

Table 2. Financial policies by year and country

Financial policy	NO_CHG	SHR_ISS	DEBT_ISS	SHRDEBT_ISS	DEBT_REDUC	SHR_BB	Total
Germany	275	21	695	137	565	19	1,712
France	262	35	528	142	546	18	1,531
G.-B.	779	90	1,735	476	1,446	132	4,658
U.S.	2,795	414	4,051	1,674	3,661	859	13,454
1991	266	23	377	90	382	76	1,214
1992	252	29	397	118	365	36	1,197
1993	265	42	408	129	395	33	1,272
1994	297	43	404	192	386	28	1,350
1995	328	50	513	216	403	57	1,567
1996	314	41	584	194	432	49	1,614
1997	319	35	589	236	442	57	1,678
1998	277	57	670	288	498	69	1,859
1999	419	63	753	268	541	137	2,181
2000	417	62	773	268	584	167	2,271
2001	464	64	769	266	741	193	2,497
2002	493	51	772	164	1,049	126	2,655
Total	4,111	560	7,009	2,429	6,218	1,028	21,355

Notes: Data come from Osiris and Datastream. Filters are detailed in the text. NO_CHG: The financial policy implemented by the firm at year *n* does not change the capital structure of the firm. SHR_ISS: The financial policy consists in issuing new shares without changes in the firms leverage ratio. DEBT_ISS: The leverage ratio of the firm increases, while the firm doesn't issue shares. SHRDEBT_ISS: The leverage ratio and the number of outstanding shares are increased. DEBT_REDUC: The firm reduces its leverage ratio and doesn't change its number of outstanding shares. SHR_BB: The firm buys back its shares without changing its leverage ratio.

Table 3. Descriptive statistics (median values)

	All panel	Germany	France	Great-Britain	United States
Employees	1,215	1,738	3,210	1,197	1,000
Net margin rate	4.7%	3.2%	4.7%	5.7%	4.6%
Leverage ratio	29.5%	19.7%	42.6%	21.1%	32%
Facial interest rate	3.0%	2.7%	2.6%	2.6%	3.3%
SIZE	18.79	18.98	19.65	18.6	19.0
MARG	5.9%	4.7%	7.0%	7.1%	5.5%
CASH	7.3%	8.1%	7.9%	8.9%	6.6%
GAP	4.9%	1.5%	- 1.1%	3.8%	3.1%
INV	6.4%	6.2%	6.8%	5.6%	6.6%
TOB	1.4	1.1	1.1	1.5	1.4

Notes: Data come from Osiris and Datastream. Filters are detailed in the text.

Table 4. Multinomial logit – Marginal effects

Financial policy	NO_CHG	SHR_ISS	DEBT_ISS	SHRDEBT_ISS	DEBT_REDUC	SHR_BB
Variable				Coefficient (Std error)		
SIZE	.087***	.073***	.062	.055**	– .053***	– .059**
	(.014)	(.025)	(.126)	(.021)	(.010)	(.026)
MARG	.023***	– .032***	.005*	– .071***	.029***	– .004
	(.005)	(.010)	(.003)	(.006)	(.003)	(.010)
CASH	– .014*	– .003	.013***	– .004	– .083***	.024**
	(.008)	(.003)	(.005)	(.003)	(.022)	(.012)
GAP	.015***	– .007*	– .020***	– .049***	.032***	.007*
	(.002)	(.003)	(.002)	(.003)	(.008)	(.003)
INV	– .025***	.013**	.080***	.123***	– .058***	– .025**
	(.003)	(.007)	(.004)	(.006)	(.003)	(.011)
TOB	.052	.223***	.131	.242***	– .137***	– .109***
	(.060)	(.056)	(.017)	(.027)	(.014)	(.039)
Log likelihood		– 25,466.250				
Pseudo-R^2		.221				
Veall and Zimmerman R^2		.535				
Count-R^2		.56				
Nb. Obs		21,355				

Notes: ***, ** and * indicate significance at the 1%, 5% and 10% level respectively. Data come from Osiris and Datastream. Dummies for countries, years and sectors are not reported. Marginal effects computed at the median of each independent variable. Hausman tests don't reject (at 5%) the IAA hypothesis for all alternatives.

Table 5. Nested logit – Regression results

Variable	Coefficient	(Std. Err.)
	Alternative	
COST	– .114***	(0.036)
	Nest	
INC_SIZE	.014**	(0.007)
DEC_SIZE	– .074***	(0.013)
INC_MARG	– .544***	(0.158)
DEC_MARG	.731***	(0.162)
INC_CASH	– .035	(0.086)
DEC_CASH	– .032	(0.086)
INC_GAP	– .323***	(0.105)
DEC_GAP	1.293***	(0.113)
INC_INV	2.779***	(0.088)
DEC_INV	– .585***	(0.073)
INC_TOB	.0815***	(0.017)
DEC_TOB	– .032*	(0.018)
	Inclusive value parameters	
INC_	.742***	(0.225)
NO_CHANGE	1	(n.s.)
DEC_	.498***	(0.096)
Log likelihood		– 32,185.144
Count-R^2		.64
LR-test against the constant-only model		χ^2 (17) = 10,672.18
LR-test of homoscedasticity		χ^2 (2) = 38.07
Nb. obs.		125,646

Notes: ***, ** and * indicate significance at the 1%, 5% and 10% level respectively. Data come from Osiris and Datastream. Dummies for countries, years and sectors are not reported.