The relationship between capital structure and ownership structure: New evidence from Jordanian panel data

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Abstract

Purpose – The study aims to investigate the comparatively under-researched relationship between ownership structure and capital structure in an emerging market. It is also one of the first studies to apply both single and reduced-form equation methods using a panel data approach.

Design/methodology/approach – The study applies econometrics modelling using both single equation and reduces equation models for panel data.

Findings – The results demonstrate that Jordanian firms follow the same determinants of capital structure as occur in developed markets, namely: profitability, firm size, growth rate, market-to-book ratio, asset structure and liquidity. In addition, institutional ownership structure is found to be determined by: assets structure, business risk (BR), growth opportunities and firm size. Finally, the results reveal that assets tangibility, firm size, growth opportunities and BR are considered to be joint determinants of ownership structure and capital structure.

Practical implications – The practical implication of the study is that investors and managers should consider both capital structure and ownership structure when they take their investment decisions.

Originality/value – This is the first study of the interaction between institutional ownership and capital structure in Jordan where there are differences, as regards institutional and financial structures, relative to those in developed markets.

1. Introduction

The relationship between firm's ownership structure and financial policy is notable in the financial literature. Leland and Pyle (1977) and Jensen (1986) are considered to be amongst the first scholars to address this issue. In addition, there is empirical evidence of a relationship between capital structure and institutional ownership. Chaganti and Damanpour (1991), Jensen *et al.* (1992), Grier and Zychowicz (1994), Moh'd *et al.* (1998) and Brailsford *et al.* (2002) are among those who recognize such a relationship between capital structure and institutional ownership structure. This relationship has been fairly neglected in the emerging markets, especially in Jordan. Therefore, this study aims to investigate the interaction between capital structure and ownership structure in emerging markets by using data from Jordan.

The paper is organised as follows: section 2 discusses the institutional ownership and capital structure, while section 3 demonstrates the determinants of capital structure and ownership structure. In sections 4 and 5, the data and the methodology are discussed. In section 6, the statistical results are presented and discussed, while section 7 covers the conclusions of the study. Finally, section 8 concludes the study.

2. Capital structure and institutional ownership

Institutional investors are considered to be the major players in financial markets and their influence in corporate governance has been increasing as a result of the privatization policy adopted by different countries. Accordingly, one can argue that institutional investors are of central importance in many corporate governance systems.

Institutional owners play a key role in monitoring the firms in which they hold equity. Owners (shareholders) of the firm have different rights; such rights include the election of the board of directors, who will act as an agent to monitor the performance of the firms' managers. Institutional activism arises when the owners (shareholders) are disappointed with the performance of the board of directors (Gillan and Starks, 2002). Chidambaran and John (2000) argue that large shareholders play an important role in transmitting information to other shareholders. Large shareholders can obtain private information from management and transmit that information to other shareholders.

In the modern corporate finance literature, the capital structure debate is closely related to the work of Modigliani and Miller (1958, 1963). Modigliani and Miller (1958) suggest that, in a world without friction, there is no difference between debt and equity financing as regards the value of the firm. Thus, financing decisions add no value and are therefore of no concern to the manager. Evidence would suggest that this does not hold in reality. Thus, it is important to investigate what determines firms' capital structure. Much research in corporate finance has been devoted to explaining the conditions under which capital structure does affect a firm's value. However, empirical research on this issue has been largely restricted to the USA and other developed countries which have similar institutional characteristics. The capital structure decision in developing countries has not received the same attention in the literature. However, Booth et al. (2001) analyse data from ten developing countries: India, Pakistan, Thailand, Malaysia, Zimbabwe, Mexico, Brazil, Turkey, Jordan and Korea. They state that:

In general, debt ratios in developing countries seem to be affected in the same way and by the same types of variables that are significant in developed countries. However, there are systematic differences in the way these ratios are affected by country factors, such as GDP growth rates, inflation rates and development of capital market (Booth et al., 2001, p. 118).

2.1 The relationship between capital structure and institutional ownership

Institutional investors have considerable experience in collecting and interpreting information on firms' performance. Agency theory suggests that an optimal capital structure and ownership structure can minimize agency costs (Jensen and Meckling, 1976; Jensen, 1986). Thus, a relationship between capital structure and ownership structure is expected to be found in the relevant data. Empirical studies in this field find mixed results. Chaganti and Damanpour (1991), Grier and Zychowicz (1994), Bathala et al. (1994) and Crutchley and Jensen (1996) find a negative relationship between institutional ownership and leverage. On the other hand, Leland and Pyle (1977), Berger et al. (1997) and Chen and Steiner (1999) show that managerial ownership and leverage are positively related. In addition, Tong and Ning (2004) claim that firms with high leverage ratios provide a negative signal that the firm faces a future of financial difficulties. Therefore, institutional investors prefer firms with low leverage ratios.

The capital structure variable used is the leverage measure: total debt divided by total assets (LEV). Two variables are used to capture the ownership structure: the first is the natural logarithm of the number of shares owned by institutional investors (IO), and the second is the percentage of institutional ownership from the subscribed shares (PIO) (Tong and Ning, 2004). These indices are therefore an absolute (size) measure and a proportion measure, respectively.

3. The determinants of capital structure and ownership structure

3.1 Dividends

Bhaduri (2002) suggests that if a firm can credibly signal its quality to outsiders, it can avoid an information premium and so may gain access to external sources of funds, mainly the equity market. John and Williams (1985) and Miller and Rock (1985) argue that a firms with a reputation for paying a constant stream of dividends face less asymmetric information when entering the equity market. Thus, if dividend payments represent a signal of sound financial health and hence of higher debt-issuing capacity, one would expect a positive relationship between dividend payments and leverage.

In addition, firms with a reputation for paying a stream of dividends will be monitored by the capital market (Short et al., 2002). Institutional ownership may act as alternative monitoring device, and so this will reduce the need for capital markets as external monitoring system (Zeckhauser and Pound, 1990). Thus, according to agency theory, there is a positive relationship between dividend payments and institutional ownership (Jensen, 1986; Zeckhauser and Pound, 1990; Short et al., 2002). However, the existence of institutional ownership mitigates the need for dividends to signal good performance (Short et al., 2002). Therefore,

signaling theory suggests a trade-off between dividends and institutional ownership, i.e. a negative relationship. This study uses the dividend payout ratio (DPO) to analyse the dividend policy effect on the firm's capital structure and ownership structure.

3.2   Profitability

According to the pecking order theory in the presence of asymmetric information, a firm would prefer internal finance over other sources of funds, but would issue debt if internal finance was exhausted. The least attractive alternative for the firm would be to issue new equity. Profitable firms are likely to have more retained earnings. Thus, a negative relationship is expected between leverage and past profitability (Donaldson, 1961; Myers, 1984; Myers and Majluf, 1984).

It is expected that institutional investors will prefer to invest in profitable firms. This is because the more profitable the firm is, the lower the likelihood of default and of having to face financial difficulties and bankruptcy. Therefore, a positive relationship is expected between profitability and institutional ownership. However, Tong and Ning (2004) find that there is limited evidence that institutional investors prefer to invest in a profitable firms. They find that profitability (measured as the return on equity) is negatively related to average shares held by institutional investors. The return on equity is used as an index for firm profitability in this study (return on equity ratio (ROE)).

3.3   Business risk

BR is considered to be one of the key factors that can affect the capital structure of the firm. Bhaduri (2002) states that:

Since debt involves a commitment of periodic payment, highly leveraged firms are prone to financial distress costs. Therefore, firms with volatile incomes are likely to be less leveraged (Bhaduri, 2002, p. 202).

Thus, according to the bankruptcy theory, there is a negative relationship between BR and capital structure.

Institutional investors tend to invest in firms with low BRs because firms with high volatility in their returns are likely to have a high probability to default and to become bankrupt. Therefore, a negative relationship is expected between firm's BR and the firm's institutional ownership. The current study uses the standard deviation of return on assets as an indicator for firms BR.

3.4   Asset structure

According to the agency cost theory, the shareholders of a leveraged firm have an incentive to invest sub-optimally (Titman and Wessels, 1988). However, the more tangible the firm's assets are, the more such assets can be used as collateral. Collateralized assets can restrict such opportunistic behaviour. Therefore, a positive relationship between tangible assets and debt is expected (Bhaduri, 2002; Huang and Song, 2006; Jensen and Meckling, 1976; Rajan and Zingales, 1995; Titman and Wessels, 1988).

In addition, agency theory suggests that the optimal capital and ownership structures may be used to minimize agency costs (Jensen and Meckling, 1976; Jensen, 1986). Thus, a negative relationship between asset tangibility and ownership structure is expected. This is because tangible assets can act as collateral for higher levels of debt. Therefore, institutional investors prefer to invest in firms with low tangible assets. The current study uses the fixed assets to total assets ratio as indictor of firms tangibility (TANG).

3.5   Liquidity

Liquidity ratios have both a positive and a negative effect on the capital structure decision, and so the net effect is unknown. First, firms with high liquidity ratios may have relatively higher debt ratios due to their greater ability to meet short-term obligations. This argument suggests a positive relationship between a firm's liquidity and its debt ratio. Alternatively, firms with more liquid assets may use such assets as sources of finance to fund future investment opportunities. Thus, a firm's liquidity position would have a negative impact on its leverage ratio. A further argument for a negative relationship is provided by Myers and Rajan (1998) who argue that when agency costs of liquidity are high, outside creditors limit the amount of debt financing available to the company. Thus, a negative relationship between debt and liquidity would be expected.

Similarly, the effect of asset liquidity is an ambiguous signal to institutional investors. A high liquidity ratio may be considered to be a negative signal because it indicates that the firm faces problems regarding opportunities for its long-term investment decisions. Hence a high liquidity ratio may be considered to be a negative signal for institutional investors. However, a high liquidity ratio may be considered to be a positive signal from the firm, because it indicates that the firm can easily pay its

obligations and hence faces lower risk of default. Thus, high liquidity would be a positive signal for institutional investors. Whatever, in order to measure the effect of liquidity, the study uses the ratio of current assets to current liabilities as a proxy for the liquidity of the firm's assets (LIQ).

3.6 Growth

Agency problems are likely to be more severe for growing firms, because they are more flexible in their choice of future investments. Thus, the expected growth rate should be negatively related to long-term leverage.

Moreover, firms with high-growth opportunities provide a positive signal about the firm's future performance. Hence institutional investors prefer to invest in high-growth firms rather than lower ones. In addition, Hovakimian *et al.* (2004) suggest that high-growth firms may bring more capital gains to institutional investors than lower growth ones. This is because institutional investors, as taxpayers, would prefer to invest in capital-gain stocks to delay tax payments and to avoid double taxation. Thus, a firm's growth opportunities is considered to be a positive signal for institutional investors. The study uses market-to-book ratio (MB) as an indicator of the growth opportunities of a firm.

3.7 Size

There is considerable evidence that the size of a firm plays an important role in the capital structure decision. Large firms tend to be more diversified and less prone to bankruptcy. Therefore, a positive relationship is expected between a firm's size and its leverage (Titman and Wessels, 1988; Bhaduri, 2002).

Institutional investors prefer to invest in large firms in the belief that they have a low risk of bankruptcy. This is because large firms have the required resources and ability to minimize the risk of their stock investment. Therefore they are less subject to financial distress and bankruptcy risk (O'Brien and Bhushan, 1990; Tong and Ning, 2004). The natural logarithm of total assets is used as a proxy for firm size (ln SIZE).

4. Data

The current study investigates the interaction between capital structure and ownership structure in emerging markets using Jordanian non-financial companies. The data for this analysis are drawn from the Jordanian Shareholding Companies Guide (1999, 2000, 2001, 2002 and 2003). From this data set, firms that have maintained their existence and reported their annual accounts without any significant gaps for the period from 1994 to 2003 were selected. Screening for data consistency on the basis of this criterion led to the selection of a sample of 86 non-financial Jordanian firms. The data set is therefore composed of a panel of 86 firms observed over a ten-year-period. However, due to missing observations, the total number of observations used in the models estimated was 743.

The Amman Stock Exchange (ASE) is considered to be one of the most up-to-date emerging markets with a market capitalization of 76.8 per cent of the country's GDP at the end of 2001. Foreign ownership represents 40 per cent of the listed stocks. The ASE share price index rose by 30 per cent in 2001, hence the ASE may be considered to be at the fore in terms of stock exchange share performance.

5. Methodology

The generally accepted theoretical causal relationships and the empirical modelling of capital structure and ownership structure that have appeared in the literature are such that both structures share approximately the same set of causal variables. However, it may be argued that the determinants of ownership structure are a subset of the determinants of capital structure. However, this would still leave the capital structure equation under-identified. Alternatively, it may be argued that capital structure and ownership structure are jointly determined rather than simultaneously determined, that is, they are not truly interdependent. This state of affairs is probably the result of current theoretical shortcomings. Whatever, the approach used in this paper is not to develop and estimate a true simultaneous model but, after estimating all-encompassing models, to estimate reduced-form models. Reduced-form models capture both the direct and indirect influences, which may, in any case, be the essence of our current theoretical understanding of the relationships. The all-encompassing models are an attempt to examine the interdependencies although it is recognized that these are subject to simultaneous equation bias as well as being under-identified. However, they do give an idea of the relative statistical strength of the influences.

In addition, the study investigates the relationship between capital structure and ownership structure using both pooled and panel regression analyses of the following forms: (Equation 1) where Y_{it} = (1) LEV = the leverage measure: total debt/total assets of

firm i in year t. (2) IO = the natural logarithm of the number of shares owned by institutional investors. (3) PIO = the proportion of institutional ownership in the firm. α = intercept coefficient of firm i. β' = row vector of slope coefficients of regressors. X_{it} = column vector of financial variables for firm i at time t, this vector is made up of this following: X_1 (DPO) = dividend payout ratio: dividend per share/earnings per share. X_2 (ROE) = return on equity ratio: net income/owners equity. X_3 (BR) = σ_{ROA}, the standard deviation of the firm's return on assets: net income/total assets. X_4 (TANG) = fixed assets ratio (tangibility): fixed assets/total assets. X_5 (LIQ) = current ratio: current assets/current liability. X_6 (MB) = market-to-book ratio: market value per share/book value per share. X_7(ln SIZE) = size: the natural logarithm of total assets. ε_{it} = residual error of firm i in year t.

6. Statistical results

In this section, the empirical analysis of the relationship between ownership and capital structure is presented and discussed. Table I shows the descriptive statistics of the variables.

From Table I, the following points emerge:

- *Low debt ratios*: On average firms use only 30 per cent debt financing in their capital structure; one explanation is that Jordanian firms tend to minimize the probability of bankruptcy by reducing debt financing.
- *Very low dividend payments*: On average Jordanian firms paid 0.064 Jordanian Dinars per share, and the maximum payment was less than 1 Jordanian Dinar. This may indicate that any dividend is considered to be a signal of a good performance.
- *A high percentage of institutional ownership*: On average 68.18 per cent of owners are non-individual owners (institutions). Hence one can expect that the institutional ownership play a key role in monitoring and governing the firm.
- *Low profitability of Jordanian firms*: On average, returns of only 1 per cent come from shareholders' equity investment.

The first regression analyses estimated all-encompassing equations involving all of the variables, including those that are jointly determined. The results for the capital structure equation are reported in Table II and those for the ownership structure equation in Table III. As discussed above, two measures are used to capture ownership structure (IO and PIO), and so both of these are included as independent variables in the estimated models in Table II. In turn, this means that two separate equations are used to estimate ownership structure, as shown in Table III. Given that the data set is a panel, all the specified equations are estimated first using the data pooled across the years, then using a fixed effects model and finally using a random effects model. The latter two techniques enable time-invariant inter-firm heterogeneity to be controlled. In order to distinguish the preferable set of results statistically, the results of the Lagrange multiplier and Hausman tests are presented. If the Lagrange multiplier test gives a significant result, then the panel results are preferred over the pooled results, i.e. firm heterogeneity has a significant effect. If the Hausman test gives a significant result then the fixed effect results are statistically preferred to the random effects results. Finally, all the models presented in Table II and Table III were re-estimated as reduced-form equations and the results are presented in Table VI and Table V, respectively.

In Table II - Table V, the Lagrange multiplier test is statistically significant for all models which indicates the preference of the panel models over the pooled models. This means that there are differences between Jordanian firms that are important in determining capital structure and ownership structure in addition to differences between the independent variables included in the models. The Hausman test is not statistically significant for the capital structure models and for the institutional structure models that used the number of shares held by institutions (IO) as the dependent variable. This indicates that for capital structure and for IO institutional structure, the random effects model is preferred over the fixed effects model. From this it can be concluded that the means of these differences between firms are normally distributed, that is, random in nature. However, when the dependent variable is the percentage of shares owned by institutions (PIO), the Hausman test gives a significant result. This means that the firm-specific factors that determine differences between the percentage of shares held by the institutional owners of Jordanian firms are not randomly determined.

Taken as a whole, Table II results indicate a negative relationship between the size of institutional ownership and the proportion of debt in capital structure. Most of the other variables are highly significant and have consistent signs across the three sets of results. The strongest exception is the DPO for which there is no statistical influence on capital structure. It would be reasonable to conclude that the impact of liquidity (LIQ) is just about significant, given that the Hausman test indicates that the random effects model is preferred. Finally, BR would appear to be negatively related to the level of debt given its significance in the pooled model. Note that it cannot be included in the panel model as, by its nature, it varies across firms but not across time and so becomes a part of the inter-firm variation accommodated in the panel techniques.

Table III results, taken as a whole, strongly reinforce Table II results regarding a negative relationship between capital structure (LEV) and the magnitude of ownership structure. The results will be discussed as a whole across both institutional ownership

proxy variables IO and PIO, and again across all pooled and panel analyses. However, it is worth noting that the tests, as discussed earlier, indicate that the random effects model is preferred for the IO measure and the fixed effects model is preferred for the PIO measure.

Again the DPO is not significant. The effects of the ROE variable is consistently negative and significant for the IO models, as it is for the (preferred) fixed effects model of the PIO measure. The impact of BR is negative and probably significant. It can be concluded that tangibility (TANG) is negative and significant, while MB is positive and on balance significant. The size of the firm (ln SIZE) and liquidity (LIQ) are most likely both to have a positive and significant effect.

The joint determinants of capital structure and ownership structure are analysed using reduced-form models. The reduced-form equations for the analysis are:(Equation 2) (Equation 3)

The results are provided in Table IV and Table V.

The results for the reduced-form equations in Table IV show that the estimated effects on leverage (LEV) of the independent variables are the same in terms of signs as in Table II and much the same in terms of levels of significance. The main difference is the (preferred) random effects model for liquidity (LIQ) for which the probability level of significance has fallen from 8.6 to nearly 12 per cent; hence conclusions regarding liquidity depend on the level of significance that one is willing to accept.

Similarly, the estimated coefficients of the reduced-form equations reported in Table V are generally in line with the estimates presented in Table III. Again the DPO is not significant in any model. There is slightly stronger evidence of a negative effect as regards BR. The results for asset tangibility (TANG) are negative and significant as in Table III. The size of the firm (ln SIZE) is again likely to have a positive and significant effect, but liquidity (LIQ), although again positive, does not have such overall evidence of significance. However, although the signs of the estimated coefficients for ROE are the same as in Table III, there is little evidence of significance. The results for MB are much the same as in Table III and again suggest a significant positive effect.

7. Discussion of the results

7.1 The determinants of capital structure and ownership structure

The above analyses show that the following are the main determinants of firms' ownership and capital structure:

7.1.1 Dividend policy (DPO)

The results indicate that there is no significant relationship between dividend policy and leverage. In addition, the results show that there is no relationship between institutional ownership and dividend payments. Therefore, there is no evidence that Jordanian institutional investors consider the dividend policy of the firm when deciding on the extent of their investment decisions in Jordanian firms.

7.1.2 Profitability (ROE)

The results indicate that there is strong evidence of a negative relationship between profitability and leverage. This indicates that the Jordanian firms prefer internal financing rather than debt financing. This result is in the line with the pecking order theory of capital structure. Other studies in the financial literature reveal the same result, for example: Rajan and Zingales (1995) and Booth et al. (2001). However, there is only limited evidence that institutional investors consider the profitability of the firm when deciding the extent of their investment in it. The only significant results are found in Table III but with a negative sign, and the reduced-form equations in Table V provide no evidence of statistical significance. It is worth noting that Tong and Ning (2004) also find significant negative relationship between the average number of shares held by institutional investors and return on equity. They conclude that there is limited evidence that institutional investors prefer firms with high profitability ratios.

7.1.3 Business risk[1](BR)

The results indicate that there is strong evidence of a negative relationship between BR and the debt ratio. Debt financing involves a commitment to periodic payment. Firms with a high debt ratio tend to face high financial distress costs. Thus, firms with volatile incomes are likely to be less leveraged. This result is in the line with the bankruptcy theory of capital structure. In addition, there is evidence of a negative relationship between institutional ownership and the BR of the firm. Institutional

investors tend to invest in low BR firms, because firms with higher volatility in their returns are likely to have a higher probability of default and to become bankrupt.

7.1.4   Asset structure (TANG)

There is strong evidence of a positive relationship between asset tangibility and leverage. This means that firms with more fixed assets can use such assets as collateral. This result is in the line with the agency theory of capital structure. Other studies in the finance literature find the same result (Bhaduri, 2002; Huang and Song, 2006; Jensen and Meckling, 1976; Rajan and Zingales, 1995; Titman and Wessels, 1988). In addition, there is strong evidence of a negative relationship between institutional ownership and assets tangibility. Therefore, institutional investors consider tangible assets as an indication of the debt capability of the firm. Hence institutional investors prefer to invest in firms with low tangible assets.

7.1.5   Liquidity (LIQ)

The study finds some evidence that liquidity may play a role in determining firms' capital structure. According to trade-off models of capital structure there is a positive relationship between the liquidation value of the firm and its leverage. Thus, expected liquidation values are higher for firms with more liquid assets, which implies that firm's debt is positively associated with asset liquidity (Harris and Raviv, 1990). In addition, there is some evidence of a positive relationship between ownership structure and the asset liquidity of the firm. Thus, a high asset liquidity ratio could be considered by institutional investors to be a positive signal because it indicates that the firm can easily pay its obligations and hence face a lower risk of default.

7.1.6   Growth rate (MB)

The study finds that there is a strong significant positive relationship between the potential growth rate, as indicated by the market to book variable, and leverage. This contradicts the expected negative sign predicted by the agency theory. This means that Jordanian firms with high-growth opportunities prefer debt financing as a way to finance their investment opportunities. In addition, one can argue that such firms have a low probability of bankruptcy and hence have better access to debt financing than low growth firms. The result is consistent with Bhaduri (2002). In addition, evidence is found of a positive relationship between firms' growth opportunities and institutional ownership. This may be because high-growth firms bring more capital gains to institutional investors than lower growth firms. Tong and Ning (2004) find the same result when they use the average sales growth rate as an indicator of growth rates.

7.1.7   Size (ln SIZE)

The results show that there is a strong significant positive relationship between firm size and leverage. This means that large Jordanian firms, being more diversified, are less likely to be susceptible to financial distress. This result is in the line with the bankruptcy theory of capital structure. Other studies in the financial literature find the same result (Bhaduri, 2002; Booth *et al.*, 2001; Rajan and Zingales, 1995). In addition, there is strong evidence of a positive relationship between institutional ownership and firm size. Large firms have the required resources and ability to minimize the risk of their stock investment and hence are less subject to financial distress and bankruptcy risk. The evidence suggests that institutional investors would prefer to invest in large firms.

7.2   The relationship between ownership structure and capital structure

The results indicate that there is strong evidence of a negative significant relationship between leverage of the firm and the institutional ownership. This means that institutional owners have a significant effects as regards monitoring the firm's managers and hence reducing the agency problems. Chaganti and Damanpour (1991), Grier and Zychowicz (1994), Bathala *et al.* (1994) and Crutchley and Jensen (1996) find the same result. The result is consistent with agency theory and so institutional investors would prefer to invest in firms with low leverage ratios. However, Tong and Ning (2004) find only limited evidence that institutional investors in the USA prefer to invest in firms with low debt ratios[2].

8.   Summary and overall conclusions

This study investigated the interaction between ownership structure and capital structure using data relating to Jordanian non-financial firms. Firms selected for the study had to have maintained their identity and reported their annual accounts without any significant gaps for the financial years 1994-2003. There were 86 non-financial firms selected as a sample for this study. The study estimated both interdependent and reduced-form equations using pooled and panel regression analysis in order to investigate the determinants and the joint determinants of capital structure and ownership structure.

The results show that the Jordanian firms are subject to the same determinants of capital structure as firms in developed markets, namely: profitability, firm size, growth rate, MB ratio, asset structure and liquidity. In addition, the structure of institutional ownership was found to be determined by: asset structure, BR, growth opportunities and firm size. Moreover, the results reveal that asset tangibility, firm size, growth opportunities and BR are considered to be joint determinants of ownership structure and capital structure.

Myers (1984, p. 575) asked the question "how do firms choose their capital structures?". His answer was "we do not know". We can argue that our results support the view that capital structure is still a puzzle because there is still no clear theoretical explanation of how firms choose between the different methods of financing. In addition, our paper addresses another puzzle: that of the relationship between capital structure and ownership structure. What is clear is that theoretical puzzles still remain and that empirical results are not yet sufficiently consistent to resolve them.

Notes

1. The BR variable is the standard deviation of the ROA, i.e. different for each firm but constant throughout the period analysed. Because of the lack of variation through time, the BR variable cannot be included the panel effects models. Thus, only the pooled model can be used to model the effects of BR.
2. The pooled model in Table II shows mixed results: a negative relationship between the number of shares owned by institutions and a positive relationship between percentage of institutional ownership and the leverage of the firm. This would indicate mixed evidence of institutional investors preferring firms with a higher leverage ratio. This result is inconsistent with agency theory that predicts a negative relationship. It can be argued that the institutional owners can act as managers in the board of directors in the firm, and hence the institutional ownership is the same as managerial ownership. Accordingly, this result is consistent with Leland and Pyle (1977), Berger *et al.* (1997) and Chen and Steiner (1999) who show that managerial ownership and leverage are positively related. Alternatively, the Hausman test rejects the pooled model in favour of the panel data models, both of which indicate a negative relationship.

Table I *Descriptive statistics*

Table II *OLS regression results of the capital structure model*

Table III *OLS regression results of ownership structure models*

Table IV *The reduced-form equation of the capital structure model*

Table v *The reduced-form equation of the ownership structure models*

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