UNDERINVESTMENT PROBLEM: ROMANIAN EVIDENCE

Claudiu Boțoc[1]
Cosmin Enache[2]

ABSTRACT: This paper aims to provide Romanian firm-level evidence concerning the investment decisions - financial leverage - growth opportunities relation. Using traditional panel data techniques on a sample of 67 companies listed at Bucharest Stock Exchange, we found that increasing debt and firm size have a negative impact on investment decisions, while the sales growth is a catalyst for further investments.Our results confirm agency theories of corporate leverage and could offer guidance for portfolio investors, which should target small(er) listed companies which are growing and have low(er) levels of debt.

Key words: Investment Rate, Financial Leverage, Growth Opportunities, Endogeneity

JEL Codes: G31, G32

Introduction

In the neoclassical framework of Modigliani and Miller (1958), under the assumption of perfect markets, the capital structure of a firm is completely irrelevant when it comes to investment decisions. However, later developments in the literature challenged this idea, given that the frictionless market hypothesis is too strong for the real economy. For instance, firms are taking investment decisions facing internal financial constraints, imperfect information, and limited access to credit.

A commonly accepted wisdom in corporate finance is that debt reduces the investments. This assertion was formerly known as the underinvestment effect. In an uncertainty environment, investment decisions concerning projects financed by debt give rise to agency problems between managers, shareholders and creditors (Jensen, 1986). On the one hand, an agency problem between the shareholders and the creditors could appear: due to the cost of debt, the shareholders could be reluctant to approve debt financing of an investment, considering that the future profits would be directed rather to the creditors (Firth et al., 2008). On the other hand, an agency problem between the managers and the shareholders could appear: pursuing the goal of firm's growth, the managers would be sometimes inclined to engage in not so profitable investment projects (Okuda & Nhung, 2012).

In the literature, there are several empirical studies that documented a negative relation between debt financing and investment decisions (see next Section for details). However, these results are obtained using sample of firms from big or developed economies, like US (Lang et al., 1996), Canada (Aivazian et al., 2005) or China (Firth et al., 2008). For small and developing economies, the empirical evidence is scarce.

From a macroeconomic perspective, for a developing country, the firm investment decisions are of utmost importance, since private investment is one of the main drivers of economic growth (see, for instance Barro & Sala-i-Martin, 2004). From a microeconomic perspective, a firm from a developing country is facing significant constraints when it comes to finance an investment project. Internal financial resources are constrained by the overall growth opportunities and external

[1] West University of Timişoara, Romania, *e-mail: claudiu.botoc@feaa.uvt.to*
[2] West University of Timişoara, Romania, *e-mail: cosmin.enache@feaa.uvt.to*

financial resources are constrained by the limited access to credit or the underdevelopment of the financial market. These constraints add up to the potential agency problems that could arise in the investment process.

Given that, to the best of our knowledge, there is no empirical evidence concerning the investment decisions – financial leverage – growth opportunities relation in Romania, this paper aims to fill a gap in the literature by providing on firm-level evidence on this matter. Our main intent was to highlight the investment behavior of listed Romanian firms in the presence of debt and potential agency problems. This could be interesting for shareholders (if there is some agency problem, they need to strengthen their control on managers), for potential creditors (such as commercial banks, in order to adjust their corporate credit policy) and for potential investors in firm's shares (in order to manage better their financial market investments).

Using traditional panel data techniques for a sample of 67 companies listed at Bucharest Stock Exchange, we found that increasing debt and firm size have a negative impact on investment decisions, while the sales growth is a catalyst for further investments.

The rest of the paper is structured as follows. In the next section is discussed the literature on the determinants of investment decisions, with an emphasis on the role of financial leverage and growth opportunities. Section 3 presents the data and the empirical methodology. In Section 4 are discussed the main results and in the Section 5 were undertaken some robustness checks. Section 6 concludes.

Literature review

Investment decision has been discussed in numerous studies, since it represents a main issue in corporate finance. Specifically, many authors considered that from investment-financing-dividend relation, investment decision is the first that has to be implemented.

In their seminal paper Modigliani and Miller (1958) stated that in frictionless markets, i.e. perfect capital markets, absence of taxes and asymmetric information, investment decision alone determines value of the firm while financing decision and dividend decision are irrelevant (Modigliani and Miller, 1958). That is, capital structure does not affect investment policy (the irrelevance proposition).

Irrelevance proposition of Modigliani and Miller has challenged several authors that attempted to highlight that in real world their assumptions do not hold. In other words, previous findings state that capital markets are inefficient, information is asymmetric and there are agency problems between managers, shareholders and creditors. Therefore, empirical literature outlined two modern investment theories, respectively underinvestment theory and overinvestment theory.

Underinvestment theory, also known as over-hang problem, was proposed by Myers (1977) who argues that debt financing could affect negatively investment policy due to agency problem between shareholders and creditors. He stated that debt financing reduces firm incentives to invest in projects with positive net present value because the benefits are rather received by creditors, either partially or fully (Myers, 1977). Underinvestment theory is based on the liquidity effect because a higher leverage triggers underinvestment irrespective of the nature of growth opportunities and reduces firm value. This negative effect could be improved by lowering leverage and by recognizing future growth opportunities (Aivazian et al., 2008).

Overinvestment theory was supported first by Jensen (1986) and later by Stulz (1990) who claimed that there is an agency problem between managers and shareholders. According to this theory, managers are interested in enlarging the firm scale and therefore are willing to invest in several projects, even with negative net present value (Jensen, 1986). In this approach, the investment decisions are facing financial constraints due to the availability of free cash flow which could be supplied through debt financing. This theory holds for firms with low growth opportunities (Stulz, 1990).

There are several empirical studies that found support for both underinvestment and overinvestment theories irrespective of which variables are used to measure investments, leverage and growth. Using a sample out of 670 US industrial firms over the period 1970-1989, Lang et al. (1996) found support for underinvestment theory. They pointed out a strong negative relation between leverage and investment, but only for firms with low growth (Lang et al., 1996). Furthermore, they distinguished between firm's core and non-core business in order to address endogeneity issue between leverage and growth opportunities and found that the impact do not differ significantly.

Aivazian et al. (2005) examined whether financing decision affect firm investment decision inducing underinvestment or overinvestment incentives by using a sample out of 863 Canadian industrial companies over the period 1982-1999. They found that leverage is negatively related with investment, with higher impact for the case of low growth firms (Aivazian et al., 2005). They were first who analyzed in-depth leverage-investment relation by using a methodology that dealt with the endogeneity problem, i.e. two-stage least square estimation. Because Lang et al. (1996) endogeneity approach has its limitations, tangibility ratio was used as an instrumental variable. Overall, the results were robust to different methodologies (pooling, fixed effects, random effects, two-stage least square), as well as for different samples (manufacturing) or variables (industry-adjusted). These results suggested that leverage has a disciplining role for firms with low growth opportunities, i.e. there are some agency problems between managers, shareholders and creditors.

The hypothesis which states that debts constrain investment was also confirmed by Ahn et al. (2006). Using a sample of 8674 diversified firms over the period 1982-1997, their results suggested that higher leverage appears to impose a greater constraint on investment in the high q segments of diversified firms than in the low q segments as well as significantly less negative for core than for non-core segments (Ahn et al., 2006). Recently, Firth et al. (2008) focused their study on a sample of Chinese companies during 1991-2004 and revealed three main findings. First, they found support for underinvestment theory even when banks are state owned. Second, unlike firms with high growth opportunities and good performance the negative impact is weaker for firm with low growth opportunities and poor performance. Third, the negative relation is weaker for firms with a higher level of state shareholding. Regarding other firms investments determinants, the sensitivity of investment to cash flow as well as sales was found to have a positive and significant effect on investment.

Other researchers have focused to understand the relation between investment behavior and uncertainty. For instance, Baum et al. (2008) used a panel of U.S. firms and three proxies for uncertainty, i.e. own uncertainty, market uncertainty, and the relations between intrinsic and extrinsic uncertainty. They found that increases in firm-specific and CAPM-based measures have a significant negative effect on investment, while market-based uncertainty has a positive impact (Baum et al, 2008).

Data and methodology

In order to test investment rate – financial leverage – growth opportunities relation we have collected data from Bucharest Stock Exchange for Romanian companies listed on the regulated market. We have decided to restrict the sample to listed companies because, in contrast with private companies, the listed ones follow the same financial reporting transparency rules, have to meet some specific minimum capital requirements and also have an incentive to report fair performance for attracting new shareholders. Moreover, according to national regulations, only the listed companies have to follow a strict code of corporate governance. Not least, when it comes to finance an investment, the listed companies have an easy access to equity financing, as an alternative to debt financing. The availability of data restricted the period of analysis to 2001-2011. Our initial sample consisted in 80 listed companies. Given that listed companies which are financial intermediaries (financial firms and credit institutions) are running under different regulations and

undertake mostly financial investments, these companies were excluded from the sample. This leaves us with a basic panel of 67 firms and 670 firm-year observations for a period ranging from 2001 to 2011.

For industrial firms, investments are mainly represented by noncurrent assets such as plant, property and equipment. Therefore, we used ratio of variation in noncurrent assets[3] to total assets from previous year as a proxy for investment rate (IR). Our first variable of interest is financial leverage (DR), which could be measured through several proxies. Because of data availability, we used ratio of book value of total debt to total assets as a proxy, which does not distinguish between short-term and long-term debt. Financial leverage may induce either under-investment or under-investment problem, depending on debt-growth relation and therefore we hypothesized a negative relation between investments and financial leverage. The second variable of interest is growth opportunities measured as 1 year growth rate in sales (SGR). We used this measure instead of traditional Q Tobin measure because Q Tobin is market based and in emerging markets, such as Romanian one, variations in stock prices tend to reflect market-level information rather than firm-specific information. The negative relation between investments and financial leverage has different consequences for firms with high growth and low growth. High growth means easily access to capital markets, i.e. leverage is not a constraint for investments, while low growth will limit investments.

We followed previous studies in order to control for firm size (SIZE) and used ratio of sales to total assets as a proxy which from another viewpoint reflect the strength of corporate governance (Byrne & O'Connor, 2012). It's noteworthy that for both variables of interest financial leverage as well as for control variable size we used contemporaneous values instead of lagged values. The motivation for such selection is related to the fact that in our model we did not use market-level variables and thus there are no delayed effects, i.e. the gap between the time when financial statements are reported and when are included in stock price.

Our investment model is estimated using traditional panel data methods as described in Baltagi (2008). The model includes investment rate as dependent variable, two variables of interest (financial leverage and growth opportunities) and one control variable (size). Specifically, the model is expressed as follows:

$$IR_{i,t} = \alpha + \beta_1 \times DR_{i,t} + \beta_2 \times SGR_{i,t} + \beta_3 \times SIZE + \varepsilon_{i,t} \qquad (1)$$

where "IR" reflect investment rate; "DR" reflect financial leverage; "SGR" reflect growth opportunities; "SIZE" reflect sales-to-assets ratio; "ε" is the error term; variables are subscripted for firm i at time t.

In terms of estimation procedure, we employed several panel analysis techniques which are reported in detail in the next section.

Results

Descriptive statistics for the variables entering the analysis are reported in Table no. 1. The mean for investment rate is 15.8% while for financial leverage and growth opportunities is 40.2% respectively 16.8%.

[3] Noncurrent assets from current year minus noncurrent assets from previous year.

Table no. 1

Descriptive statistics

	IR	DR	SGR	SIZE
Mean	0.158	0.402	0.168	0.966
St. dev	0.555	0.258	0.431	0.641
Minimum	-0.498	0.005	-0.914	0.033
Percentile 25	-0.012	0.208	-0.049	0.564
Median	0.036	0.374	0.121	0.843
Percentile 75	0.142	0.548	0.298	1.249
Maximum	8.971	1.698	3.511	7.572

Source: Authors' calculations using Stata 12

According to these results it could be noticed that public Romanian companies make low investments, there is no significance reliance on debt (financial leverage is lower than 50%) and have low growth opportunities. Furthermore, investment rate and growth opportunities present volatility since standard deviation is higher than the mean.

In order to account for the potential sample heterogeneity due to different firm sizes, a model with individual effect was considered. Moreover, given that our period of analysis includes the years of recent financial crisis, time effects were included in our estimations as well. Therefore, in our estimations we considered that $\varepsilon_{it}=\mu_i+\lambda_t+u_{it}$ [2] (where μ_i is the individual firm effect, λ_t is the individual time effect, and u_{it} is an idiosyncratic error component).

The first step of our estimation procedure was to estimate the empirical model considering that both firm and time effects are fixed (i.e. $Cov(X_{it},\mu_i)\neq 0$ and $Cov(X_{it},\lambda_t)\neq 0$). The results are shown in column1 of the Table no. 2.

The validity of the individual fixed effects was checked using two F-tests. The null hypothesis of the first F-test was that all $\mu_i=0$ and could not be rejected (F=0.87). The null hypothesis of the second F-test was that all $\lambda_t=0$ and was rejected (F=2.49). Therefore, only time effects seem to be valid.

Moreover, the modified Wald test for groupwise heteroskedasticity indicated the presence of heteroskedasticity ($\chi^2(67)=97013.3$) and the Wooldridge test for autocorrelation pointed out that there is some serial correlation in the residuals (F(1,66)=8.85).

Next, we estimate the empirical model in (1) as a two-way random effects model, assuming $Cov(X_{it},\mu_i)=0$ and $Cov(X_{it},\lambda_t)=0$. The results are given in column 2 of Table no. 2. The low value of the Breusch-Pagan LM test for the validity of random effects pointed out that the firm effects are not needed. However, the time effects are appropriate also in this estimation, given the high value of the employed F-test (F=21.43).

In order to decide which estimator is more consistent, a Hausman test was employed. The null hypothesis of the Hausman test is that both estimators are efficient, and the alternative is that only fixed effects estimator is efficient. The low value obtained for the Hausman test lead to the rejection of the null (both estimators are consistent), indicating that random effects estimator is consistent and fixed effects estimator is not.

Next, given that is important to deal with the autocorrelation problem adequately before the standard errors of the estimated coefficients to be computed (Beck and Katz, 1995), we changed the estimation method, using Prais-Winsten panel corrected standard errors procedure. The practical advantages of this procedure come from the fact that it fits linear models when the residuals are not independent and identically distributed (i.i.d.), allowing to correct heteroskedasticity, cross-sectional dependence and autocorrelation (Hoechle, 2007). Moreover, it gives the possibility to keep time effects in the estimated equation. We assumed the existence of panel-level

heteroskedasticity and first-order autocorrelation in the residuals. The estimation results are given in column 3 of Table no. 2.

As expected, there is an inverse relation between financial leverage (debt ratio) and the investment ratio. This result supports the agency theory concerning the investment-financing nexus, and stand in contrast to the irrelevance proposition of Modigliani and Miller (1958). A possible explanation for this negative relation is related to the pecking order theory of capital structure, i.e. a negative relation between debt ratio and profitability (Boțoc C., 2013).

Regarding our second variable of interest, the sales growth rate, it has a significant and positive impact on investment rate. Increasing sales lead to more profits, and therefore to a higher level of intern financial resources which could be used in further investments.

Our results regarding the investment ratio – financial leverage – growth opportunities relation are in line with previous empirical studies of Aivazian et al. (2005), Ahn et al. (2006), and Firth et al. (2008).

A particular result is the inverse relation between firm size and investment rate (unlike Aivazian et al., 2005). One the one hand, a possible explanation for this unusual result is related to sales policy adopted by companies. In order to increase sales in a recession when investments are limited, managers have a propensity to expand the period when accounts receivable are collected. Therefore, current increase in the company size is directly correlated with an increase in the cash conversion cycle and indirectly correlated with a decrease in the investment rate. On the other hand, for listed companies which experienced a decrease in size, the inverse correlation with investment rate could be explained if the managers react to the losses in overall competitiveness of the company (which determined size reduction) undertaking new investments as a measure to improve future productivity and to catch-up with the competitors.

Table no. 2

Investment rate estimations

VARIABLES	(1) OLS Fixed Effects	(2) OLS Random Effects	(3) Prais-Winsten PCSEs
Debt Rate (DR)	-0.26*	-0.18**	-0.19**
	(0.151)	(0.082)	(0.089)
Sales Growth Rate (SGR)	0.31***	0.34***	0.32***
	(0.054)	(0.050)	(0.059)
Size (SIZE)	-0.19***	-0.15***	-0.17***
	(0.053)	(0.035)	(0.037)
Constant	0.42***	0.32***	0.36***
	(0.109)	(0.079)	(0.096)
Observations	670	670	670
Number of firms	67	67	67
Firm Effects	Yes	Yes	No
Time Effects	Yes	Yes	Yes
R^2	0.10	0.12	0.11
F-test	5.69		
Wald-χ^2		89.67***	60.11***
F-test for all μ_i=0	0.87		
F-test for all λ_t=0	2.49***	21.43**	19.20***
Rho			0.18
Hausman Test		3.90	
Breusch-Pagan LM Test		0.68	
Wald heteroskedasticity Test	97013.3***		
Wooldridge Autocorrelation Test	8.85***		

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations using Stata 12

Robustness check

In order to do a robustness check, first we use two alternative possible methods of estimation and second we accounted for potential endogeneity between debt rate and investment rate.

As an alternative estimation method, we employed a feasible generalized least squares in presence of AR(1) disturbances and heteroskedasticity. It should be mentioned that N<T is required for this method to be feasible. Otherwise, the method tends to produce optimistic standard errors estimates. Given that in our sample the number of firms considerably exceeds the number of time periods (N>T), the obtained results should be carefully considered. However, the estimated coefficients are statistical significant and have the same signs as in our baseline estimation (see Table no. 3 column 2).

Also, we used Driscoll-Kraay estimation procedure (Driscoll and Kraay, 1998), which produces robust estimates in the presence of heteroskedasticity, autocorrelation and cross-sectional dependence. A minor disadvantage of this method is that it does not allow us to keep the individual time effects. The results are given in Table no. 3 column 3. However, as in the previous alternative estimation, the coefficients are statistical significant and have the same signs as in our baseline model.

Not least, we tried to account for the potential endogeneity between the debt rate and the investment rate. As pointed out in several empirical studies (Aivazian et al., 2005, Firth et al., 2008), leverage decisions tend to be influenced by expected investment opportunities. In order to overcome this potential problem we employed a two-stage least square regression, and use an instrumental variable for the debt rate. The most appropriate instrument for the debt rate suggested by the literature (see Aivazian et al., 2005) is Tangible Assets Ratio, the ratio of the sum of fixed assets and inventories to total assets. The results (see Table no. 3 column 4) highlight the robustness of our baseline model, the estimated coefficients being almost identical regarding statistical significance, sign and magnitude.

Table no. 3

Robustness check

VARIABLES	(1) Baseline Model Prais-Winsten PCSEs	(2) GLS	(3) Driscoll-Kraay SEs	(4) 2SLS IV Regression
Debt Rate (DR)	-0.19**	-0.06*	-0.20*	-0.18**
	(0.089)	(0.035)	(0.096)	(0.082)
Sales Growth Rate (SGR)	0.32***	0.17***	0.35**	0.34***
	(0.059)	(0.025)	(0.135)	(0.050)
Size (SIZE)	-0.17***	-0.07***	-0.13*	-0.15***
	(0.037)	(0.017)	(0.067)	(0.035)
Constant	0.36***	0.17***	0.30**	0.32***
	(0.096)	(0.034)	(0.122)	(0.079)
Observations	670	670	670	670
Number of firms	67	67	67	67
Firm Effects	No	No	No	Yes
Time Effects	Yes	Yes	No	Yes
R^2	0.11		0.09	0.12
F-test			2.41	
Wald-χ^2	60.11***	85.67***		89.67***
F-test for all μ_i=0				
F-test for all λ_t=0	19.20***	24.32***		
Rho	0.18			

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations using Stata 12

Conclusions

Our analysis highlighted the determinants of the investment rate for a sample of listed companies from Bucharest Stock Exchange. We found that the investment rate is negatively correlated with the debt rate and the firm size and positively influenced by the growth opportunities. These results have some implications for shareholders, for potential investors in firm's shares and for potential creditors.

First, the negative relation between debt and investment provides support for the agency theories of corporate leverage. An increasing debt ratio seems to act as a restriction mechanism for the managers when it comes to undertake new investment projects.

Second, our results could prove useful for the potential stock exchange investors which favor portfolio (long-term) investments rather than speculative (short-term) investments. For these investors, an increasing investment rate could be considered as an indicator of future growth and could act as a signal to buy the shares of the respective company. Based on our results, a portfolio investor on Bucharest Stock Exchange should target small(er) companies which are growing and have low(er) levels of debt.

Not least, there are some implications of our findings for potential creditors, such as commercial banks. Given the negative relation between debt and investment, banks should focus their investment credits offers to listed companies with low levels of debt, since these are more likely to undertake new investment projects. This result could also be an indicator that for the already indebted companies the cost of supplementary debt necessary to finance further investments is prohibitive.

Finally, it's noteworthy that there are some limitations in our study. First, a causal link between investment rate and variables of interest can only be suggested and not definitively established, since our study is a co-relational one. Second, due to lack of data we did not perform a robustness check through market-level variables or through taking in account industry effects. However, previous empirical studies point out that the results are robust to different methodologies, as well as different samples or variables measures.

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