Investment Funding Sources
An Empirical Study with BM&F Bovespa Largest Firms

Amanda Almeida Paiva, MSc., Mariane Cortat Campos Melo, MSc.

Faculty of Economics, Administration and Accounting, University of Brasília (UnB), Brazil. email: mariane.cortat@gmail.com

Abstract

This study aims to investigate the preferred funding resources by open capital companies as a strategy to increase investment policies. Taking Gordons' stock growth model as a starting point, the authors employed a linear regression data panel model with seven cross-sections in the research. Data indicates equity as a favored source of investment, especially for the impact on net worth on the trimesters prior to investment. These results explain the negative relationship found between profit retention, current net worth and investment.

Keywords: Data panel model, linear regression, investment, financing, BM&F Bovespa.

Introduction

Several theoretical current of thoughts on Finance and Economics search for evidence of an optimum, or even ideal, capital structure for organizations. Modigliani and Miller's (1958) theory postulates that capital structure is irrelevant for value creation; furthermore, in perfect markets, this premise would still be valid, for the firm would only be changing its cash flow allocation proportion between its own and third parties capital (Berk & Demarzo, 2009). Regarding an operational profit approach, Modigliani and Miller (1958) postulated that there was no dependency between investment and its capital sources, since what generates value for companies are its rentability and the risk associated to management decisions.

Modigliani and Miller (1963) posit tax insertion in organizational context, in order to investigate the advantages of a possible fiscal benefit that the corporate income taxes presents over employing a third party capital, for the rates over this capital can be deducted from corporate income taxes, resulting in real growth in cash flow, increasing a company's worth and its financial leverage (Ross, Westerfield & Jaffe, 2002). It is noteworthy that it is not possible to compare worth between a leveraged and a non-leveraged company for, according to Berk and Demarzo (2009), the leveraged company has advantages over financial investment options and bonds issuing.

Another aspect of the model, now closer to a tax framework, is the direct relationship between bond index and capital cost, since third party capital participation becomes less costly for the decrease in income taxes, maximizing the company's worth, especially when its capital structure is formed exclusively from third party capital (Assaf Neto, 2003). In this context, firms employees are capable of equalizing between third party and self-capital, maximizing shareholders welfare, which is the point of interest for this study.

Following a lack of a clear capital investment strategy, companies loose efficiency – several Brazilian companies, for instance, have suffered losses regarding assets or even

product cycle. In order to investigate how to mitigate these losses, this study tests resources available to shareholders and managers and how these variables influence capital allocation decisions. Examples of such variables are bankruptcy costs (Stiglitz, 1972), agency costs (Jensen & Meckling, 1976) and asymmetric information incorporation (Myers & Majluf, 1984). Therefore, the empirical question for this study is what is the best investment allocation of a company's capital regarding investment decisions – more specifically, what are the main investment resources employed by brazilian open capital companies. The main theoretical background is formed by Trade-off theory and Pecking Order theory.

Literature Review

Usually, firms finance their activities through retained earnings, issued shares and bond issuing. In this context, issued shares appears as the least favored shareholders' option; therefore, disadvantages of going public should be greater than the gains, since stock issue is rarer, has greater cost and are more common in unrest. This study features firms which employ all these investment strategies – open companies, with public balance sheets. Regarding firm worth, it is positively related to dividend payments and stock earnings (Leal & Saito, 2003).

Investment policy can be influenced by several factors, the most important being financing strategies. For Merikas, Bruton and Vozikis (1993), the way a firm grows and how it develops determines (or should determinate), its financial police; in a cyclic view, a companie's financial policies influences how fast it can grow; therefore, the growth rate and risk involved are crucial management inputs for investment decisions, risk being one of the most considered factor in determining firm worth.

For Miller and Modigliani (1961), investors observe a firms' investment policies when evaluating stock options, defined as the positive net present value projects present in a firms' portfolio. If dividends are low, the firm can finance projects through investment retention – borrowing from shareholders and remunerating then in the future. On the other side, if higher dividends are paid, the firm will be able to finance new projects with the investments made by new investors, paying lower dividends in the future – each monetary unit saved means a capital gain. The current dividend value does not change in any scenario; however, opportunity cost of investment for a new project, for example, is affected. Finally, based on Residual Theory, the authors recommend that dividends pay distribution reaches the amount needed to finance the projects analyzed.

The Public Limited Company law, number 6404/1976 and, later, 10303/2001, establishes in Brazil a minimum dividend pay to be delivered to shareholders. This reality is not restricting to Brazil; in other countries, corporate culture and judicial traditions may differentiate, but usually there is a legal restriction regarding minimum dividends pay. In the Brazilian case, this bill of law protects minor shareholders against possibly harmful management practices enforced by managers or controllers.

The base theory behind investment decisions postulates that an investor decision may have two steps: (i) where to invest and (ii) the best moment to realize profit. If these decisions happened in the context of a perfect market, Fisher's separation theorem postulates that investment decisions rely sorely on investment cash flow and return rates – personal preferences, including the perceived most favorable moment for consumption, would not play any role (Lameira, 2001).

Contrary to Miller and Modigliani (1961), there is a current based on the premise of imperfect markets, leading firms to considerate alternative financing when making investment decisions. Some authors argue that the firm needs to raise funds and divide then

between capital and dividends, without using third party resources (McCabe, 1979). However, empirical research investigating allocation decisions among dividends versus investments haven't been able to provide conclusive evidences. Dhrymes e Kurtz (1967) report that the most important issue in firms is the decision on how to raise funds from possible sources (profit, bonds, stock issuing), and also on how to spend resource raised, enabling possible investment directives. Contrary to the authors, Higgins (1972) shed light on the necessity of empirically testing of the relationship between these (and other) variables, considering time lags.

Connecting the theoretical review with neoclassical theory on investment, it is possible to state that there is no meaning to the expression "investment decision", since economic agents seek to maximize their utility function. Investment theory establishes a clear connection between optimal capital structure and Firm Theory. The neoclassical postulates are, according to Gordon (1962), the following:

i. Individuals acquire financial assets, while firms acquire;
ii. Each firm aims to increase its stock values in the financial market;
iii. A firms' worth is independent from its financial (meaning capital structure, for example) decisions;
iv. Investment opportunities are, in general, are independent of investment opportunities and other management decisions; and
v. The economic value of an investment is given by the total estimated profit minus interest rate, considering time needed to acquire the assets.

Usually, before decisions regarding how firms should employ their capital and define their investment policies are made, it is necessary to access their market value, guiding the policies towards the primary organizational objectives. Gordon's classic model (1962), also known as the dividend discount model, posits a mathematical equation to calculate the expected stock return rate, based on the expected value of future dividend comes from the discount rate that balances its current worth with the expected future dividends flow, as presented:

$$\Sigma \frac{\quad}{(\quad)} \qquad (\ )$$

Applying the premise of possible dividend flow representation, calculated from the expected flow for the next period, and admitting that dividends growth rate for next periods is constant, equation (1) derivates in equation (2), where *g* is the expected constant dividends growth rate.

$$\Sigma \frac{(\ (\quad)\ )}{} \quad \frac{\quad}{} \qquad (\ )$$

From (2), it is possible to calculate the cost of private owned capital, which is given in equation (3):

$$\frac{\quad}{} \qquad (\ )$$

Gordon suggested, in 1993, to employ the expected profit rate growth in place of the expected dividend rate growth, being applicable only when the relationship between stock and dividends is constant over time, a premise which rarely holds. Gordon and

Gordon (1997), in recognition of the weakness of this condition, try to enrich Gordon's Model, aggregating a new approach based on a specific period of time.

Several authors agree that a firm cannot expect a high or low constant growth across time; however, there is a concentrated time frame where there can be abnormal growth. After this time, shareholders would accept to receive the value of their equity return rate. From these assumptions, equation (4) is derived, considering a different growth rate of the future dividends growth.

$$\Sigma \frac{\quad}{(\quad)} \quad \frac{\quad}{(\quad)} \qquad (\ )$$

At last, Gordon and Gordon (1997) recommends that the time frame employed should be, at least, the time frame usually employed in economic forecasting, being at least 5 years; however, the authors suggest a time frame from 5 to 10 years, although it is possible to considerate a shorter period, such as Botosan and Plumlee (2001), who analyze a 3 year time frame.

Gordon's model was used as a base model in other to conduct a preliminary company evaluation because of the variables involved, the same used in this study. Therefore, data from the companies was collected based on a 10 year time frame, which will go beyond value studies and will focus on the investment sources used by the firms in the sample. In the next session, the research model will be presented.

Research Model

Panel Data approach was chosen as the research model. This approch, also known as longitudinal data, allowed to combine temporal and transversal data (cross-section) in the model created for this manuscript. Panel Data can be employed in two basic models, according to Hill, Griffiths and Judge (2010): through fixed effects and random effects models. The most appropriate model is a direct result of data avaiable and the estimation objectives; in both models, it is crucial to choose a specification, being it statistical or dynamic.

In the case of fixed effects models, known also as least square dummy variable, there is a generalization of a constant-intercept-slope multi model for Data Panel, adding a dummy variable to account for ommited variables effects, which remain constant over time, making it possible to correlate individual effects with the other regressor freely.

This model is based in an estimation of the regression model itself with binary variables for each unit of analysis, such as the adition of these variables causes the intercept of each regression equation to change for each unit of analysis, showing the heterogenous nature among then, making the Ordinary Least Squares estimator efficient and consistent. This is a direct result of the chosen estimation technique, for an estimator desinged for mathematical optimization seeks to identify the best fit to data set, maximizing the sum of the residues of the regression equation, increasing the fit between model and data.

A prerequisite for the Ordinary Least Squares model, and also a fundamental factor of this study, is randon error distribution, following that data distribution approaches a normal distribution and it is independent among itself. As a guarrante, Gauss-Markov Theorem, even indirectly, allows the employment of the Least Square estimator as an unbiased estimator of minimal linear variance of the criteria variable.

The final condition is that the model must be linear in its parameters, assuming that

the variables are linearly related among thenselves. It this condition is violated, estimation should happen with a non-linear estimatior, leading to non-alleatory effects, which is not the case for this study.

According to Gujarati (2000), Data Panel regression models follows equation (5), presented bellow,

( )

Where *i* represents the last unit of the transversal temporal cut, while *t* represents the last measured period of time. As a reminder, when *i* and *t* assume the same value, the panel will be equilibrated.

The fixed model effects, presented before, can be explained by equation (6):

( )

Where represents the interpects to be estimated to each unit taken from the sample.

As presented, the fixed model effect differentiates from the randon effect model for the intercept is different for each unit; therefore, is random, being calculate as equation (7):

com ( )

In which is a completely unknown paramenter, represent the average intercept for the population and is the non-observable random error, representing the difference in behaviors of the individuals in the sample and unrelated to the antecedents variables of the model.

Based on the postulates presented, the basic estimated model was composed of the first lagged diference in 1 period of the Investment as a dependent variable, with independent variables Loan, Profit Retention, Net Worth lagged up to two periods of time. The second step was the calculation of several regression models, in order to minimize Schwarz Information Criteria. The final model employed is presented in equation (8)

( )

In which:

: Investment variable variation in time ;

: constant;

: slope coefficient multiplied by the variation of the variables Loan and Financing in ;

: slope coeficiente multiplied by the variation of the variable Profit Reserve in t;

: slope coeficiente multiplied by the variation of the variable Profit Reserve in

: slope coeficiente multiplied by the variation of the variable Net Worth in

: slope coeficiente multiplied by the variation of the variable Net Worth em

: slope coeficiente multiplied by the variation of the variable Net Worth in ;

: slope coeficiente multiplied by the variation of the variable Investment in ;

and

: stocastic error.

Data

Sample was selected considering the period from the 2005 last trimester to 2016 first trimester, from the 10 biggest firms regarding market value and that trade in the BM&F Bovespa stock market. The chosen time frame was based on available data, considering organizations time of existence and when it went public.

Data set is arranged as panel with the variables Investment, Loans and Financing or Bonds, Net Worth and Profit Reserves, presented by firms in its digital balance sheet. Data is organized in trimesters, and were obtained from the website *Fundamentus*, which provide data on open capital companies operating in the brazilian stock market. The companies in the sample initially were: Ambev, ItauUnibanco, Petrobrás. Banco Bradesco S.A., CVRD (Vale do Rio Doce Company), Cielo, Santander, Telefônica Brasil, Banco do Brasil S.A. and Itaú S.A.

After preliminary analysis, three companies, Ambev, ItauUnibanco and Cielo, were removed from the sample due to data absence in the Investment and Loans and Financing variable, or data regarding periods outside the chosen time frame.

The population is considered finite and discreet. Sample used was composed of 266 observations. The data panel begins at 12/31/2006 and ends at 05/31/2016. It is worth
reminding that, following the empirical model equation, on the calculation of the first time difference, the last data period measured is lost (2016 first semester), diminishing the data size from 260 to 259 observations.

Empirical Analysis

Before model estimation, data was subjected to unitary root test. Since data will be employed in a Data Panel, Levin, Lin and Chu's Method was chosen, for it evaluates the presence of a unitary root process. The null hypothesis in this model cannot be rejected for any of the variables involved, all of them being integrated in first order.

Therefore, the model was estimated for the first difference, avoiding that the temporal effect present in the variables is mistaken for dependency relations.

Table 1: Unitary Root Test

Variable		P Value
Investment	Level	0.8635
	1ª Difference	0.0000
Loan	Level	0.0000
	1ª Difference	0.0000
Profit Retention	Level	0.8479
	1ª Difference	0.0000
Net Worth	Level	0.9754
	1ª Difference	0.0000

As discussed in section 3.1, the minimization of Schwarz's Information Criteria was employed as the main strategy, which obtained the smallest value of1,1490. Estimated values for equation (1) are presented in Table 2.

Table 2: Regression Results

Variable	Beta	Standard Error	T statistic	P Value
Constant	0.0806	0.0295	27.269	0.0069
DLF (-1)	-0.3848	0.1384	-27.800	0.0059
LPR	-0.4554	0.1550	-29.375	0.0036
LPR (-2)	-0.4533	0.1969	-23.022	0.0222
LNT	-0.3325	0.0939	-35.410	0.0005
LNT (-1)	0.6768	0.1122	60.338	0.0000
LNT (-2)	13.453	0.1370	98.226	0.0000
LIN (-1)	-0.2940	0.0834	-35.231	0.0005
	R^2	0.685171		
	Adjusted R^2	0.675873		
	Schwarz Criteria	-1.149.017		
	F-statistic	7.368.432		
	Prob (F-statistic)	0		

The Adjusted R^2 was of 0,6758, indicating a good fit between model and data obtained. When jointly analyzed with the T statistics, the possibility of multicolinearity is averted.

Standard errors were estimated with a White matrix in Cross-Section, robust to heteroscedasticity, and the T test of significance also indicates to reject the null hypothesis of the global significance. Evidence of serial self-correlations were absent.

In general lines, the proposed model can be considered robust in relation to the classical regression model postulates, enabling hypotheses testing and inferences regarding
the average behavior of the variables in the chosen sample, with the necessary caution applied.

Evidences obtained show that Investment, in certain periods of time, is partly explained by the lagged variation in one time period of the Loan and Financing, Profit
Retention of current and two-period lagged, and Net Worth variation in the period and two-lagged periods. Therefore, there is some favorable evidence for a firm's own capital as
the primary source of investment policies, especially for the raise in the NT in the period three trimesters prior to investment.

Loans and Financing and Profit Retention presented a negative relationship with current investment level, as well as with NT variation in *t*. During investment period, a
firm should use capital, which generates resource allocation in its balance sheet. This obvious relation explains the negative relationship between PR, NT and current
investment; however, the negative value obtained for loans needs further investigation.

Lagged Investment in one trimester presented a negative relationship with current investment. This result indicates that, in the same fiscal year, firms evaluate their investment decisions each trimester, producing a negative relationship which needs to be further investigated.

Closing Remarks

The present study aimed to evaluate the dinamyc between investment decisions and its sources in Brazilian group of open market firms, listed in the BM&F Bovespa

stock market. A Data Panel model was estimated with Least Ordinary Squares and a White Covariance Matrix, robust to heteroscedasticity.

Results found can be considered robust, even though further empirical studies should be conducted regarding some relationships between variables. Apparently, the firms in the sample studied evaluate their investment decisions each trimester, generating an inverse relationship between current and lagged investment.

The lagged Net Worth in one and two periods of time is positively related to investment, indicating there is a certain preparation level of a firm's own capital prior to investment, being current Net Worth and Profit Retention negatively related. This points to the consumption of capital between these cycles, with balance recomposition when investment levels are low. A deeper investigation of the apparent relationship between NT formation and consumption and the investment level seems to be promising. Additionally, the unexpected result found for the variation in bond levels requires a additional research agenda.

References

Assaf Neto, A. (2003). *Finanças corporativas e valor*. Atlas.

Berk, J., & Demarzo, P. (2009). *Finanças Empresariais:* Essencial. Bookman Editora.

Botosan, C. A., & Plumlee, M. (2000). Disclosure level and expected cost of equity capital: An examination of analysts' rankings of corporate disclosure and alternative methods of estimating expected cost of equity capital. *Available at SSRN 224385*.

Brasil. Lei n. 6404, de 15 de dezembro de 1976. *Available at* http://www.planalto.gov.br/ [accessed in 10 mai. 2016].

Brasil. Lei n. 10303, de 31 de outubro de 2001. *Available at* http://www.planalto.gov.br/ [accessed in 08 mai. 2016].

Dhrymes, P. J., & Kurtz, M. (1967). Investment, dividend, and external finance behavior of firms. In: *Determinants of investment behavior*. NBER, 427-485.

Gordon, J. R., & Gordon, M. J. (1997). The finite horizon expected return model. *Financial Analysts Journal*, 53(3), 52-61.

Gordon, M. J. (1962). *The investment, financing, and valuation of the corporation*. RD Irwin.

Gordon, J. (1993). The pricing of risk in common shares. *International Review of Financial Analysis*, 147-153.

Gujarati, D. N. (2000). *Econometria básica*. São Paulo: Makron Books.

Hill, C., Griffiths, W., & Judge, G. (2010). *Econometria*. 3. ed. São Paulo: Saraiva.

Higgins, R. C. (1972). The corporate dividend-saving decision. *The Journal of Financial and Quantitative Analysis*, 1527-41.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, 3(4), 305-60.

Lameira, V. J. (2001). *A estrutura de Capital das Sociedades Anônimas*. Forense-Universitária.

Leal, R. P. C., & Saito, R. (2003). Finanças corporativas no Brasil. *RAE eletrônica*, 2(2), 1-15.

McCabe, G. M. (1979). The empirical relationship between investment and financing: a new look. *Journal of Finance and Quantitative Analysis*, XIV(1), 119-35.

Merikas, A., Bruton, G. D., & Vozikis, G. S. (1993). The theoretical relationship between the strategic objective of sales growth and the financial policy of the entrepreneurial firm. *International Small Business Journal*, 11(3), 59-67.

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: a

correction. *The American economic review*, 53(3), 433-443.
Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review*, 48(3), 261-297.
Miller, M. H. (1977). Debt and taxes. *The Journal of Finance*, 32(2), 261-275.
Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. *The Journal of Business*. XXXIV(4), 411-33.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics*, 13(2), 187-221.

Myers, S. C. (1984). The capital structure puzzle. *The journal of finance*, 39(3), 574-592.

Ross, S.A., Westerfield, R.W., & Jaffe, J. (2002). *Corporate finance*. McGraw-Hill Education.

Stiglitz, J. E. (1972). Some aspects of the pure theory of corporate finance: bankruptcies and take-overs. *The Bell Journal of Economics and Management Science*, 458-82.