COST OF EQUITY: AN EMPIRICAL STUDY IN A SMALL BRAZILIAN COMPANY

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Abstract: Cost of equity is a crucial information that enters business decision. For publicly traded firms, calculating the cost of capital is predicated typically an information from the stock market. However, privately firms do not have market based information available. Thus, owners and managers have difficulty in determining the capital cost for these organizations. This paper aims at presenting an alternative for the beta calculation of private and small sized companies. The exemplification of this calculation is made for the Brazilian industrial company ARTE POLIESTER. For such, 9 years (2008 to 2016) data are obtained from companies listed on the Brazilian stock exchange, belonging to the industrial economic sector from the IQ Capital (S&P) database. Having the accounting beta defined, the estimation of the industrial company's cost of equity can be made by Capital Asset Pricing Model (CAPM).

Keywords: private companies, accounting beta, CAPM.

INTRODUCTION

The cost of equity can be defined as an opportunity cost equal to a return on alternative investments with similar level of risk [1].The cost of equity on its own or in combination with the cost of debt is used as a discount factor with which expected future cash flows are discounted. Valuation of investments in companies, projects, securities or assets need to be performed for various purposes, e.g., investment decision-making, capital budgeting, litigation issues or regulation requirements. Given the broad range of situations in which present value computation might or needs to be employed, there is also a broad range of situations which require cost of equity application.

According to the literature CAPMis the most popular model of cost of equity estimation [2]. CAPM has as reference the risk relation (obtained by beta) and the return. Its components are: a) risk-free rate; b) beta; and c) market portfolio return. Thus, the research issue of this study is how to calculate the beta and henceafter the privately companies' CAPM.

This way, it aims at presenting an alternative accounting beta calculation for these companies. For such, a sample with 34 publicly industrial companies is identified in the Brazilian Stock Market. The regression of their accounting data (2008-2016), based on literature [3], is considered as econometric equation for the accounting beta calculation of the privately held company of the same sector and, from its accounting beta value, the private company's CAPM is calculated.

The structure of this paper is as follows: Section II studies the literature. Section III explains the smallcompanies in Brazil. The model employed as well as the econometric techniques are discussed in Section IV. Results discussion is in Section V and,at last, the conclusions.

II. LITERATURE REVIEW

Among the methods of cost of equity calculation, CAPM demonstrates the expected return of an asset through the beta, the risk-free rate and the market return premium [4] [5] [6]. The mathematical formula of CAPM is expressed as in equation 1:

$$E_{ri} = R_f + \beta \times [R_m - R_f] \quad (1)$$

Where:
$E(_{ri})$ = return rate of an asset i
R_f = risk-free rate
β = systematic risk component of the asset i
R_m = market return rate

Interpreting the model, the expected return rate of a certain asset shall exceed the risk-free rate added with the product of the systematic risk (β) of the asset by the market risk premium, which is the difference between ($R_m - R_f$).Beta measures the asset variation in relation to the market oscillations [7], and the beta estimate comes from three questions: a) the estimation period, b) the expected return interval and c) the index representing the market asset. It results in the systematic risk component of the asset, being calculated according to equation 2:

$$\beta = \frac{COV_{R_i, R_m}}{\sigma^2_{R_m}} \quad (2)$$

Where: β = beta R_i = return of the asset R_m= return of the market portfolio	σ^2 = squared standard deviation or market return variance COV = covariance between the return of the asset and the market return

The complexity of small sized companies' CAPM calculation comes from the fact that there are no shares of these companies negotiated in the stock market, hence having no market beta.

Forcalculation alternatives, there are, in the literature, some models, such as: i) accounting beta which uses financial indexes extracted from accounting reports; ii) leveraged and deleveraged betas, where the publicly firm's deleveraged beta is considered and re-leveraged for the privately company, according to its capital structure; and iii) Ebitda (earnings before interest, taxes, depreciation and amortization) beta, which is calculated by the regression of company's operating earnings and the operating earnings from the companies of the sector to which it belongs[8].

Among the approach alternatives found, this study uses the accounting beta through the econometric regression – based on literature variables as in table I.

TABLE I
Accounting Beta

LIQ = liquidity	$LIQ = \frac{CA}{CL}$	CA = current assets CL = current liabilities
ROE = return on equity	$ROE = \frac{NI}{NE}$	NI = net income NE = net equity
PVAR = profit variation	$PVAR = \frac{(NI_t - NI_{t-1})}{NI_{t-1}}$	NI_t = net income for the current year NI_{t-1} = net income for the previous year
GROWTH = asset growth	$GROW = \frac{TA_t - TA_{t-1}}{TA_{t-1}}$	TA_t = total assets for the current year TA_{t-1} =total assets of the previous year
LEV = leverage	$LEV = \frac{CL + NCL}{TA}$	CL = current liabilities NCL = non-current liabilities TA = total assets
TAN = tangibility	$TAN = \frac{TAN}{TA}$	TAN = total tangibility TA= total assets

III. SMALL AND MICRO COMPANIES

Small and micro sized companies move the employment and the economy of Brazil, becoming fundamental for the income distribution and social change [9]. It is possible to classify companies according to their varied features, such as:

a) ownership (public or private), b) control (family or professional) c) capital (public or private), d) sector of activity (industrial, commercial, services) and e) size (micro, small, medium or large). Tables II and III present the classifications, according to the Brazilian Service for Support to Micro and Small Enterprises (Sebrae) and the National Bank for Economic and Social Development (Bndes), respectively.

TABLE II
Classification of Companies by Number of Employees

Size	Services/Commerce	Industry
Micro company	up to 09 employees	Up to 19 employees
Small company	10 to 49 employees	20 to 99 employees
Mediumcompany	50 to 99 employees	100 to 499 employees
Large company	over 100 employees	over 500 employees

Source: Sebrae – Small and Micro Company Work Yearbook (2015).

TABLE III
Classification of Companies
Annual Gross Operating Revenue

Size	Annual Gross Operating Revenue[1]
Micro company	Less than or equal to R$ 360 thousand
Smallcompany	Greater than R$ 360 thousand and less than or equal to R$ 3.6 million
Mediumcompany	Greater than R$ 3.6 million and less than or equal to R$ 300 million
Large company	Greater than R$ 300 million

Source: Bndes 2017.
R$: Reais – Brazilian currency

There is a predominance of small sized companies in the international scenario, accounting for 95% of all establishments worldwide [10]. The economic infrastructure conditions, the access to venture capital and the government support for trade differ from country to country. In countries such as Brazil, small and micro enterprises (SMEs) can play an important role in the industrial decentralization[11]. Table IV presents some statistics of SMEs ´ participation in the national economy, with data collected in the period from 2011 to 2015.

TABLEIV
SME's
Brazilian Economy Participation

Description	Year	SME´s Brazil	Source
Number of companies	2015	98.5%	Sebrae[2]
Total jobs with a formal contract	2013	52.1%	MTE[1]
Total wages	2013	41.4%	MTE[1]
Gross Domestic Product (GDP)	2011	27.0%	Sebrae[2]
Exporting companies	2014	59.4%	Funcex[3]

Source: Sebrae - Report number 60 - January/2017.
Note 1: MTE - Ministry of Labor and Employment.
Note 2: Sebrae - Brazilian Service for Support to Micro and Small Enterprises.
Note 3: Funcex – Foundation Center of Foreign Trade Studies.

IV. METHODOLOGY

This study has a quantitative character and uses the multiple linear regression technique. The sample is compound by 34 publicly held companies belonging to the industrial economic sector of the Brazilian Stock Exchange.

The accounting data are from the IQ Capital database. The information statistic treatment is performed by Stata 13. This paper is divided into 4 steps, as follow:

STEP 1: Obtaining of market betas and annual accounting indexes – Table I – from January, 2008 to December, 2016, for a sample with 34 industrial publicly held companies with shares dealt at Brazilian Stock Exchange.

STEP 2: Performing the crosssectional multiple linear regression, having the beta of the sector of these publicly held companies as the dependent variable and the described indexes as the independent variables, resulting the equation:

$$\beta_i = \alpha + \delta_1 LIQ_i + \delta_2 ROE_i - \delta_3 PVARL_i + \delta_4 LEV_i + \delta_5 GROWTH_i + \delta_6 TANG_i + \varepsilon_i \quad (3)$$

STEP 3: Using the accounting indexesfrom the small companyARTE POLIESTERINDÚSTRIA ECOMÉRCIO LTDA – Table I -, for the company's accounting beta calculation - January, 2008 to December, 2016.

STEP 4: After estimating the private company's beta, its costs of equity is calculated by means of CAPM, as in equation 1. The risk-free rate (R_f) is the one of reference in Central Bank of Brazil of7.00% per annum – December, 2017, and the return rate (R_m) from Brazilian Stock Market index (Ibovespa) of 12.61% per annum - January, 2005 to December, 2017.

V. RESULTS ANALYSIS

A cross sectional regression presented on Table V, with correction of heterocedasticity problems and residual autocorrelation, calculates the accounting beta.The independent variable profit variation (PVAR) is significant at 5% level while the return on equity (ROE) is significant at the 10% level. After the tests, the model is presented without independent variables current liquidity and tangibility. On top of that, the F test result evidences the significance of all the model.

TABLE V
Multivariate Regression – Beta

Initials	Coefficient	Robust default error	Statistics t	p-value
ROE	0.3176	0.17	1.85	0.066
PVAR	-0.0535	0.02	-2.19	0.030
LEV	0.4493	0.27	1.62	**0.108**
GROWTH	0.1336	0.16	0.83	**0.410**
CONS	0.2296	0.12	1.87	0.062
F(4.193)	9.87			
Prob > F	0.0000			
R^2	0.0469			

For the equation of this study, the determination of the privately held company's accounting beta is given by:

$$\beta_a = 0.2296 + 0.3176 * ROE_i - 0.0535 * PVARL_i + 0.4493 * LEV_i + 0.1336 * GROWtH_i + \mu \quad (4)$$

TABLE VI
Accounting Indexes

Variable	Arte Poliester
ROE	1.2516
PVAR	-0.2392
LEV	0.4006
GROWTH	0.1074

When estimating the beta through the equation 4 and including the financial indexes of the company ARTE POLIESTER, presented on Table VI, the value of 0.8342 is obtained:

$$\beta_a = 0.2296 + 0.3176 * (1.2516) - 0.0535 * (-0.2392) + 0.4493 * (0.4006) + 0.1336 * (0.1074) = 0.8342 \quad (5)$$

The small company´scost of equity obtained through the equation 1 (CAPM) is 11.6798%:

$$CAPM = 7.00 + 0.8342 * [12.61 - 7.00] = 11.6798 \quad (6)$$

Where
R_f=Risk-free = 7.00%
β = Small company systematic risk = 0.8342
R_m=Market return = 12.61%

The decision for a model of cost of equity calculation involves the analysis of the scenarios on which it will be applied, and of the assets which will absorb the resources and, depending on the scenarios and on the assets the rates used may be different [12]. In this sense, authors say that CAPM is better estimated with local data, when determining risk-free rate, market premium and the company's beta [13].

CONCLUSIONS

This paper aims at describing and applying an alternative of beta attainment for privately held companies. A challenge in evaluating those companies is to define the systematic riskwhich allows determining the equity cost.

This work develops an econometric modelaccording to literature, relating beta to the accounting variables, from stock public companies in the industry. Beta of the privately held company is obtained by applying the regression equation for the segment, the financial indicators of indebtedness, income, growth and return on equity, based on its accounting reports.

With the accounting beta defined, the equity cost estimate of the small industry company is achieved through the Capital Asset Pricing Model (CAPM).The company ARTE POLIESTER, object of evaluation, has an accounting beta of 0.8342 whereas the publicly held companies of the same sector –

industry – show for the same period from January, 2008 to December, 2016 the beta of 0.4752, indicating that the referred firm is more sensitive to the systematic risk than the companies whose shares and dealt in the stock market.

This work has no intention of exhausting the subject, on the contrary, it hopes to contribute for the discussion of such relevant theme, in decision-making by privately held companies, mainly in not yet mature markets, like the Brazilian one, with few publicly held organizations and where private entities find difficulty in determining their opportunity costs.

For the evolution of this theme, the following possibilities of beta calculation are suggested: a) via econometric regression - use other accounting determinants, b) theprocedure of beta deleveraging of US companies and leveraging of the Brazilian company, according to its capital structure,and c) via ebitda –equation of the covariance of the studied company´s returns and companies of the sector.

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