

EVA® - The Economic Value Added and Brazil's Reality

Is the WACC Calculation Reasonable for our Industries?

By

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1. Introduction

The concept of value and its creation and the notion that companies generate value for their shareholders only by earning returns on invested capital that exceed the cost of that capital is definitely not new (*Adam Smith, 1776 - John Stuart Mill, 1848 - Alfred P. Sloan, 1919 - Franco Modigliani and Merton Miller, 1961*).

However, only in recent years the Economic Value Added (EVA ®, developed and trademarked by Stern Stewart & Co., from New York) has emerged as the leading performance measure used by nearly all large corporations worldwide - not to mention the increasing curiosity it risen in medium size Brazilian corporations - for measuring the effectiveness of their financial management and also as a very useful tool for capital budgeting and investment analysis.

We can see this new theory of corporate performance as a measure of how much wealth the company generates after taking into account the opportunity cost of the capital that finances its operations. Simply put, EVA measures the difference between the return on capital employed and its cost, and determines, after all, a monetary figure that tells how much wealth a company has created in a given period of time.¹ Mathematically, it can be written as

$$EVA = \left(\frac{NOPAT}{CAPITAL} - WACC \right) * CAPITAL$$

where NOPAT is net operating profit after taxes but before interest, CAPITAL is the invested capital – and NOPAT over CAPITAL is, consequently, Return on Invested Capital (ROIC) - and WACC is the firm's weighted average cost of capital.

EVA differs from most other methods of corporate performance measurement because it charges profit for the cost of all the capital a company employs, including equity. Therefore, it can be considered a further step in orthodox performance measurement, since not only the earnings are considered in the analysis but also the company's effort to generate those earnings.

Reviewing the illustrated formula above, we can figure out how important the positive spread is, between the parenthesis, to guarantee that value is being added to the enterprise, which is good news for shareholders. And a positive spread means acceptable return on capital employed, greater than the firm's weighted average cost of capital. The formula breaks down EVA into two main components. First, the ROIC, considered to be a firm's homework or every company's obligation to better use their assets and wisely squeeze from them the best return. Second, the capital cost in the quest for value creation, focus of our attention in this paper. Like never before, the WACC has been considered very important and related to the value creation. So, its accurate analysis has become crucial to several professionals, from

¹ For a deep and complementary source of EVA measurement, review STEWART III, G. Bennett in ***The Quest for Value : The Eva Tm Management Guide***. New York, USA. Harper, 1990.

the four corners of the world, since EVA seems to be turning into a global pattern to the academic, corporate and investment communities as well as to the specialized media (EHBAR, 1999).²

The aim of this paper, after recognizing WACC as a variable of strong importance to value creation, is to demonstrate that it can't be used as originally defined in under developed countries like Brazil, which have unusual ways to finance their corporations.

The Brazilian market is unique. The uncertainties of a turbulent economy lead us to a total incapacity to forecast the future in a long run, and simply block the creation of a developed credit market. For these reasons, the WACC theory, created under the reality of a developed market, cannot be fully used in such economies. My final goal in this research is to show that the WACC used to calculate the EVA in value-based management implementations in Brazilian companies might not be the most reasonable form as it balances only long-term creditors sources of capital and shareholders one, because they are considered the sole sources of capital to finance long-term or fixed assets.

Moreover, it is my intention to compare the formal WACC calculation with another that recognizes short-term financing capital as an additional source to finance long-term or fixed assets. This comparison is supposed to be the basis to develop and illustrate a methodology for a "yellow-green"³ way to calculate Brazilian company's weighted average cost of capital that truly recognizes the real source of capital and its assets applications.⁴

2. The Cost of Capital

A company could be financed only with shareholders capital. In such case, the cost of all capital employed would be the rate of return expected by its owners due to the investment risk they are bearing. Many corporations, however, obtain a considerable part of its resources from creditors.

Normally, we can assume that the overall cost of capital is the company's cost of using funds provided by lenders and shareholders. More exactly, a company's cost of capital is the cost of its long-term sources of funds: debt, preferred stock, and common stock (or simply equity in private companies). And the cost of each source reflects the risk of the assets invested by the company. A company that invests in assets of little risk in producing a related income will be able to bear lower costs of capital than another one that shows in its balance sheet assets of higher risk to producing the same related income.

The global risk of an investment is based on the economic risk, which reflects the level of uncertainty of the project in its basic objective or the business risk arisen from the operating activities held in the company, and on the financial risk, which is generated by the option to finance part of the project with third party credit. There are many reasons that lead a firm to use creditors capital as a source of financing its activities, but, certainly, the lower cost compared to shareholders capital is a very strong one.

It is real because shareholders bear a higher risk compared to lenders since their capital is tied up in the business for considerable much longer period of time, carrying forward, for this reason, all the uncertainties of a long tenor. Moreover, if the company goes bankruptcy, other creditors, like

² Al Ehbar states that some of the most prominent Wall Streets financial institutions, including Goldman Sachs and Crédit Suisse First Boston, formally adopted EVA as the most important tool to analyze and value corporations and to recommend or not their stocks to their clients.

³ Yellow and Green are the dominant colors in the Brazilian flag.

⁴ Actually, this comparison and the new weighted average proposed in this paper don't make references to the also important changes needed for the CAPM model. The shareholders cost of capital calculation in Brazil will be the key point of future discussion, in terms of Brazilian Free Risk Rate, Brazilian Market Premium and Brazilian based Beta Index, for our different industries.

employees, the government, suppliers and financial institutions⁵ are entitled to be paid. It is reasonable, therefore, to agree that the market must reward shareholders with a greater rate of return than it does with creditors, when it reflects the hierarchy of the risk associated with its seniority over the other source.

Thus, as each long-term financing source has a different cost, a company's overall cost of capital must reflect the weighted average cost of each component, along with the relative amounts of capital of each source that are employed in the business.

The Cost of Equity

Traditionally, long-term finance can be obtained from internal and external sources. Internal sourcing includes funds derived from the company's trading and other operations, from the sale of redundant fixed assets and from the sale of investments. The related income is recognized in the company's income statement and is accrued, in the balance sheet, at the Retained Earnings line. On the other hand, the orthodox view on external sourcing is that funds are obtained either from issuing shares or by taking long-term loans.

In this paper, the difference between external and internal source of equity and, within the external source, the difference of Ordinary and Preference Shares is irrelevant. As a result, these different external sources and the internal one will be treated only as "Equity Capital".

Cost of equity is more difficult to be defined, as share capital carries no explicit cost like interests paid in ordinary loans do. But shareholders do expect a certain rate of return when they invest in a business. So, the shareholder's cost of capital can be defined as the opportunity cost that the investor could expect to earn from alternative investments in assets of comparable risks.

However, determining the cost of equity as an expectation hardly leads us to a quantifiable number. But, there are many models to determine the cost of equity capital and one of the most significant, and broadly used, is the capital asset pricing model (CAPM), which is based on the idea that the investor's required rate of return is the compensation for both i) the time value of money, and ii) faced risk.

Mathematically, this can be written as: Cost of equity capital = Risk free rate + (Beta Index x Market Risk Premium).

Risk-Free Rate

In order to measure the relationship between risk and expected return, we need to recognize the zero risk point. Although there is no investment that is really zero-risk, government bonds provide a good proxy for the risk-free investment because when governments default, all other economic relationships become distorted. So, the risk-free rate refers to the long-term return from debt securities regarded as free from credit risk, for example US treasury bonds, or the return on guaranteed local currency sovereign bonds in any other country, or even other country sovereign bonds in US Dollars, like the average strip yield of the Long-term Brazilian Brady Bond.

⁵ According to the Brazilian Law, if the company is liquidated, the creditors receive their promised interest and principal before the preferred shareholders who, in turn, receive their promised dividends before the common shareholders.

To the risk-free rate, the shareholders' risk reward for investing in the shares of the company firm must be added. This risk reward has two components: i) reward for investing in the stock market as a whole, and ii) the reward for investing in the particular company in question.

Market Risk Premium

The market risk premium (MRP) represents the reward for investors for taking the risk of putting their money in stocks in general. The MRP is determined for a country's economy as a whole, and is a result of the analysis of the historical volatility of common stocks and long-term government bonds. This represents the excess return of the market over the risk-free investment through a long period of time.

Over 1926-1996, in the United States, the volatility of investing in common stocks was significantly higher than that of long-term government bonds. The arithmetic average of this value is about 6% in the US market, although this number is being updated every year in different studies.⁶

Beta coefficient

The MRP described in the section above is a very broad measure that considers the stock market as a whole. However, not all companies (investments) have comparable risk. For this reason, investors would demand more return for investing in a risky venture than in a company with more predictable earnings.

On the other hand, the volatility of the return of a specific company does not accurately measure the value by which an investor must be rewarded, as part of this volatility can be mitigated by investing in a diversified portfolio of companies. When we have an investment portfolio, the volatility of returns caused by the fluctuations in the whole market will be the only remaining source of risk. All assets are exposed to this risk, some more than others. Thus, the only risk investors bear by investing in an individual company is the additional risk relative to the market, a non-diversifiable or systematic risk, which the investor must face when this new investment is added to the portfolio. And the market is assumed to reward investors because of this systematic risk.

To determine the systematic risk for a specific company, we need to measure the company's returns relatively to the overall return on all assets in the economy or, simply, the market. The measure of relative return is called beta coefficient, which represents a standardized measure of the relative risk of a particular company or its industry. It reflects the market risk and cannot be diversified away.

The beta coefficient is an adjustment to the market risk premium, based upon the risk perception for the company in question. Therefore, if we can expect from a company the same return of the general economy, so its beta coefficient would be 1, the default beta of the whole market. In the same way, companies expected to be more risky than the average will have a beta coefficient of greater than 1, and

⁶ Actually, in a recent study of Stern Stewart & Co. (PETTIT, Justin et al. *The Equity Risk Measurement Handbook*. Stern Stewart & Co. Research. EVALuation, Vol. 3 No. 3, 2001), using the last fifty years data, it was verified that the volatility of stock returns versus bond returns has decreased. It was shown that the resulting risk of holding equities has generally declined, at the same time that the risk of investing in government bonds has increased, thus reducing the premium between the two. It's believed that stock market investors today expect about a 5% premium over long-term government bonds. But, studying deeply long-term government bonds, they verified that these government papers are not truly risk less and needed, for this reason, to be adjusted. Consequently, their study estimates the market risk premium over the long bond to be about 5% over an unadjusted government long bond and, when adjusted for the systematic component in bond returns, the market risk premium (MRP) over the truly risk less (zero-beta) interest rate becomes 6.5%, rate that will be used later in this paper.

companies with less risk will have a beta coefficient of less than 1. Stern Stewart & Co. used a sample of 1,000 publicly traded non-financial companies from the United States and Canada, with at least 6 years of financial data, and concluded that the most of the unleveraged beta – which is the leveraged beta without the capital structure risk – is in a range between 0.8 and 1.2 in these markets.

The Cost of Debt

Debt may be long-term or short-term, and includes current liabilities, accrued expenses and loans. Current liabilities have no explicit cost, as they don't have, for example, a rate of interest. The same happens to accrued expenses. It is easier, then, to figure out the cost of loans, as they carry an explicit interest rate paid to the lender.

The cost of interest bearing debt, or only debt, is the cost associated with raising one more dollar by issuing debt. There are two key points related to third party source of capital i) the rate at which a firm can raise money often depends upon its leverage, and it changes with every additional unit of debt raised. The cost of debt, therefore, is the incremental cost of debt (and not the cost of the existing debt), and it is known as the marginal cost of debt. The necessity to consider the incremental cost of raising debt is also reinforced by the fact that i) the existing debt may have been contracted earlier when interest rates were different, and ii) interest paid on debt is a deductible operating expense that reduces the tax liability. Thus, cost of debt should be considered net of tax, where the difference between the nominal rate and the real one, after tax adjustment, is known as tax benefit.

When a firm's WACC is being calculated, theoretically, it needs to seek and use long-term financing in its formula for a number of reasons, such as: i) it needs to invest in fixed assets and keep them in a long run; and ii) long-term financing can help to spread business risk.

And why not use short-term funds? Short-term funds (very often bank overdrafts) are only temporary in nature. Indeed, in most countries, overdraft facilities can be withdrawn by a bank on demand (without any notice).

A company that has used its overdrafts to finance the purchase of, for example, fixed assets will not be able to repay its overdraft on demand and will be in breach of its banking terms. Besides, the interest rates on overdrafts can change quickly and significantly, which could cause pressure on the company's profitability.

The general rule is that permanent assets should be financed with permanent finance, long-term assets should be financed with long-term finance and short-term assets should be financed with short-term finance. That's why the WACC theory uses long-term financing in its mathematical calculation. However, the WACC theory (including CAPM Method) was developed taking into consideration more stable economies, and driven to developed capital markets, and with financial institutions willing to bear long run risks of lending money. Definitely, It's not the Brazilian scenario, full of uncertainties, and with a clear lack of long-term culture, including tenors to providing funds.

3. The WACC – Weighted Average Cost of Capital

As described above, a key component to calculating EVA - in a firm's seek for value creation - is the computation of the WACC. As already stated, the assets of a company are generally financed by either debt or equity. The WACC, as the name indicates, is the average of the cost of each of these sources of financing, weighted by their respective usage in the given situation.

To calculate the cost of capital, we need first to determine the cost of each source of capital we expect the company to use, and then the relative amounts of each source of capital we expect the

company to employ. In other words, the weighted average cost of capital (WACC) is the weighted average of the marginal after-tax cost of debt and equity capital, based upon the capital structure employed by the company.

The following illustrative example of a Brazilian Construction Company of Special Trade Contracts in Water and Sewer Management leads to a better understanding of the procedure for estimating the weighted average cost of capital of a company which employs three sources of capital (as of June'2001):

- 1) 3,715,000 ordinary shares of R\$ 1.00 each;
- 2) R\$ 455,000.00 long-term credit line, on which the interest rate is 9.75% per annum and which was borrowed from BNDES⁷;
- 3) R\$ 1,100,000.00 of short-term loans, with an average marginal cost of 30.96% per annum, borrowed from different local commercial banks.

It will be assumed that corporation tax currently stands at 34%⁸

We could tabulate the capital employed as:

TABLE 1

CAPITAL EMPLOYED	(R\$)	% OF TOTAL
3,715,000 ordinary shares of R\$ 1.00	3,715,000	70%
9.75% Long-term credit line with BNDES	455,000	9%
30.96% Short-term loans, on average.	1,100,000	21%
TOTAL CAPITAL EMPLOYED	5,270,000	100.00 %

It would be necessary to separately estimate the cost of each of the three elements of the capital employed. However, as stated above, the short-term source must be, theoretically, eliminated from WACC calculation, as it does not represent – once again – appropriate capital source to be financing fixed assets. So, the two remaining elements will be calculated.

Eliminating the Short-term source of capital, we have:

⁷ **BNDES** - Brazilian Development Bank, one of the world's largest development banks. The institution is engaged in Social Development, providing subsidy rates long-term loans in the country.

⁸ The nominal income tax rate in Brazil, for companies with annual profits over R\$ 240,000.00

TABLE 2

CAPITAL EMPLOYED	(R\$)	% OF TOTAL
3,715,000 ordinary shares of R\$ 1.00	3,715,000	89%
9.75% Long-term credit line with BNDES	455,000	11%
TOTAL CAPITAL EMPLOYED	4,170,000	100.00 %

Estimating the Cost of Capital for Business Risk

TABLE 3 Real Term Brazil Risk Free Rate

COD	SIGN	ITEM	(%)	FORMULA
a (1)		Brazil Market Risk Premium	12.85	
b (2)	-	US Inflation	3.10	
c	=	Real Term Brazil Risk Free Rate	9.46	$c = (1 + a) / (1 + b) - 1$

SOURCE:

(1) *Financial Times* - Average strip yield of the Long-term Brazil Brady bond

(2) *Ibbotson Associates* - % Change over Year of the Consumer Price Index - Forecast Annual Average 1999 to 2024.

TABLE 4 Cost of Capital for Business Risk

COD	SIGN	ITEM	(%)	FORMULA
d (1)		US Market Risk Premium	6.50	
e	=	Brazil Market Risk Premium	6.50	
f (2)	*	Industry Beta (unlevered)	1.26	
g	=	Real Term Brazil Risk Free Rate	8.19	$g = e * f$
h	=	Cost of Capital for Business Risk	17.65	$h = c + g$

SOURCE:

(1) *Stern Stewart & Co.* "The Equity Risk Measurement Handbook" - EVALuation Report, Volume 3 - March, 2001.

(2) *Ibbotson Associates* - Full Information Industry Betas, November 1997. Construction, Special Trade Contracts - Pure Play Analysis.

Estimating the Cost of Debt

We can see in the financial reports of this specific company short-term debt financing fixed assets. However, for the reasons already mentioned, we will not consider these effects in the WACC calculation. The original amount of this kind of loan will be removed from capital employed, treated as a non interest bearing liability, and its related financial expenses will be considered in the Income Statement. Let's see what happens to the WACC calculation using only the other two remaining elements.

TABLE 5 Short –Term Financing

COD	SIGN	ITEM	(%)	FORMULA
i		Pre-Tax Cost of Short-term Borrowing	0.0	
j (1)	-	Brazilian Inflation	0.0	
k	=	Real Term Pre-Tax Cost of Short-term Borrowing	0.0	$k = (1 + i) / (1 + j) - 1$
l (2)	-	Marginal Corporate Income Tax Rate	34%	
m	=	<i>After-Tax Cost of Short-term Borrowing</i>	0.0	$m = k * (1 - l)$

SOURCE:

(1) IBGE - Instituto Brasileiro de Geografia e Estatística - INPC: Índice Nacional de Preços ao Consumidor Amplo (used by the Brazilian Central Bank). It is being considered “zero” because short-term debt is out of the calculation.

(2) 34% is the real Income Tax for Brazilian companies with annual revenues over R\$ 240,000.00.

TABLE 6 Long –Term Financing

COD	SIGN	ITEM	(%)	FORMULA
n		Pre-Tax Cost of Long-term Borrowing	9.75	
o (1)	-	Brazilian Inflation	6.50	
p	=	Real Term Pre-Tax Cost of Long-term Borrowing	3.05	$p = (1 + n) / (1 + o) - 1$
q (2)	-	Marginal Corporate Income Tax Rate	34%	
r	=	<i>After-Tax Cost of Long-term Borrowing</i>	2.01	$r = p * (1 - q)$

SOURCE:

(1) IBGE - Instituto Brasileiro de Geografia e Estatística - INPC: Índice Nacional de Preços ao Consumidor Amplo (used by the Brazilian Central Bank). % of change expected.

(2) 34% is the real Income Tax for Brazilian companies with annual revenues over R\$ 240,000.00.

Estimating the Cost of Equity

Notwithstanding, the cost of capital for business risk above defined reflects the risk in the assets regardless of how the assets were financed. When we recognize the usage of debt in the company (and the unleveraged beta in the formula), we must adjust the cost of capital for business risk and calculate a premium over this rate, to compensate shareholders for the financial risk. In other words, due to leverage or the company's decision to use debt in its capital structure, the variability of its profits and its stock markets returns is increased, determining, consequently, an even higher return for shareholder to bear this additional risk. Once more, short-term financing source will not be considered.

TABLE 7 Cost of Equity

COD	SIGN	ITEM	R\$ or (%)	FORMULA
s		Amount of Short-term Debt	0.0	
t		Amount of Long-term Debt	455,000	
u		Amount of Shareholders Capital	3,715,000	
v		Total Capital Employed	4,170,000	
w		Debt/Equity	12.25%	$w = (s + t) / u$
x		Debt/Total Capital Employed	11%	
y		Equity/Total Capital Employed	89%	
z		Cost of Equity	18.83%	$z = h + (h - p)^* (1 - q)^* w$

Estimating the company's weighted average cost of capital

From TABLE 1, we can see that:

70.00% of the company's capital employed came from shareholders' investment;
 30.00% of the company's capital employed came from debt and, *from this amount*;
 09.00% of the company's capital employed came from long-term funding.

So, when the short-term funding is not considered a source of capital, the new percentage will be (TABLE 2):

89.00% of the company's capital employed came from shareholders' investment;
 11.00% of the company's capital employed came from long-term debt.

The company's Real Term WACC can now be estimated as:

(Amount of Long-term Debt/Total Capital Employed x *After-Tax Cost of Long-term Borrowing*) +
(Amount of Shareholders Capital/Total Capital Employed x *Cost of Equity*)

(from our tables: $WACC = [(t/v) * r] + [(u/v) * z]$)

(11% x 2.01%) + (89% x 18.83%)

17.00% per annum, real term.

4. Brazil's Financing Reality

There are three different ways in which companies finance their activities: i) debt (short and long terms), ii) stock issuing (or capital increase, for private companies) and iii) self or internal financing, when the firm uses its own profit internally.

The importance of capital structure became a widely discussed issue after the article of Modigliani and Miller (1958), which says that the way the firm finances its activities is irrelevant, in a world without taxes and bankruptcy costs, to determine its market value.

The discussion over how relevant (or irrelevant) the capital structure is was the beginning of modern capital structure theory as an attempt to best explain the different ways to finance a business and how the availability of adequate forms of funding would affect corporate investment decisions.

In the real world, there are taxes and, for this reason, one of the most discussed points that determine the company's capital structure is the tax benefit, arisen from debt usage and the consequent idea that there is a best capital structure for each company, with a certain leverage degree, that generates value to its shareholders.

Given the importance of researching the relationships among the development of the financial system, the capital structure of companies and national economic growths, many studies were recently carried out worldwide in order to analyze the financing standards of foreign and Brazilian corporations. In this section of this paper, we present the empirical results and outcomes of some important researches that give basis to our theory that Brazilian companies don't have access to a developed credit market for long tenor financing, having to use, though, both short and long term debts to finance all their activities, fixed assets included.

Singh (1995), from the International Finance Corporation (IFC), studying samples of large companies in 10 different developing countries, from 1980 to 1990,⁹ verified the existence of a different financing pattern, when compared to corporations from developed countries. The results indicate that, within the period studied, internal financing formed, for several years, a major source of funding for Brazilian companies, followed by equity issuance that was also, on average, an important source of funding throughout the same period. Long-term financing contributed with only 7.7% of the capital used to finance business growth.

Using the same methodology, Claudia Zonenscain (1998), economist from the Brazilian national Bank for Social Development (BNDES), seeks to analyze the financing standards of Brazilian

⁹ The sample included the following countries: Brazil, Korea, India, Jordan, Malaysia, Mexico, Pakistan, Thailand, Turkey and Zimbabwe. For each country, the largest 100 companies were analyzed, except in Jordan (38 companies), Thailand (67), Turkey (45) and Zimbabwe (48).

companies between 1989 and 1996. The sample consisted of the 216 most actively traded companies in the Brazilian stock market, and the results showed a positive correlation with Singh's research.

Notwithstanding, only large companies were analyzed in both papers and the high rates of Brazilian short-term loans and the absence of long term financing lines for everybody seem to explain why these large corporations, with access to other sources of financing, like stock issuing in developed markets, seem to prefer a lower leverage ratio than medium and small size companies, with no choice but short-term debt to finance growth.

When we see the research of Gomes and Leal (1999), for example, also studying a group of publicly traded Brazilian companies of different sizes (144 corporations, from 1995 to 1997), we verify an empiric result according to the pecking order, proposed by Myers (1984), that suggests that capital needs are met first with internally generated cash flows, then with debt. In the last position, according to this theory, companies choose additional equity issues.

Going further, one year later, Sônia Pereira (2000), analyzing the relation between value creation and leverage of different size Brazilian companies, studied a group of 319 also publicly traded firms in 1992, 1995 and 1998, and verified that, although there is positive correlation between value and leverage in Brazilian corporations, the leverage ratio of 27% is considerably lower than the one companies from stable economies (leverage ratio than 50% less, on average, of companies from the G7 countries).¹⁰ Results also lead to the pecking order theory, as the sample seems to be more representative. The difference in leverage ratio, when compared with the other researches (27% to 7.7%), is due to the short-term debt considered in this last analysis.

Researches lead us to verify that the pecking order is a fact even in Brazil, when samples include all size of corporations. Smaller companies are more leveraged because internal sources are commonly not sufficient to generate growth. But, this leverage is generally a consequence of short-term financing due to higher cost of issuing equity and the lack of long-term credit lines. Larger corporations are entitled to special long-term credit lines from BNDES and have easier (and cheaper) access to developed stock markets if equity issuing is wanted.

5. Most Reasonable Brazilian WACC Calculation

For everything stated before, we would use the example given before to re-calculate a most adequate WACC for this specific Brazilian company.

Recalculating the same example, but then considering short-term funding as a reality in Brazil for financing fixed assets, we must proceed to the following changes in order to develop a more reasonable weighted average cost of capital:

- 4) 3,715,000 Ordinary Shares of R\$ 1.00 each;
- 5) R\$ 455,000.00 long-term credit line, on which the interest rate is 9.75% per annum and which was borrowed from BNDES¹¹;
- 6) R\$ 1,100,000.00 of short-term loans, with an average marginal cost of 30.96% per annum, borrowed from different local commercial banks.

¹⁰ To analyze leverage, the author defined a "Debt Coefficient", which is the sum of short and long term debt, plus short and long term debentures, divided by company's total amount of resources employed (Equity, plus short and long term sum of Debt).

It will also be assumed that corporation tax currently stands at 34%

We could tabulate the capital employed as:

TABLE 8

CAPITAL EMPLOYED	(R\$)	% OF TOTAL
3,715,000 ordinary shares of R\$ 1.00	3,715,000	70%
9.75% Long-term credit line with BNDES	455,000	9%
30.96% Short-term loans, on average.	1,100,000	21%
TOTAL CAPITAL EMPLOYED	5,270,000	100.00 %

It would be necessary to separately estimate the cost of each of the three elements of the capital employed, now including short-term debt.

Estimating the Cost of Capital for Business Risk

TABLE 9

Real Term Brazil Risk Free Rate

COD	SIGN	ITEM	(%)	FORMULA
a (1)		Brazil Market Risk Premium	12.85	
b (2)	-	US Inflation	3.10	
c	=	Real Term Brazil Risk Free Rate	9.46	$c = (1 + a) / (1 + b) - 1$

SOURCE:

(1) *Financial Times* - Average strip yield of the Long-term Brazil Brady bond

(2) *Ibbotson Associates* - % Change over Year of the Consumer Price Index - Forecast Annual Average 1999 to 2024.

TABLE 10 Cost of Capital for Business Risk

COD	SIGN	ITEM	(%)	FORMULA
d (1)		US Market Risk Premium	6.50	
e	=	Brazil Market Risk Premium	6.50	
f (2)	*	Industry Beta (unlevered)	1.26	
g	=	Real Term Brazil Risk Free Rate	8.19	$g = e * f$
h	=	<i>Cost of Capital for Business Risk</i>	17.65	$h = c + g$

SOURCE:

(1) Stern Stewart & Co. "The Equity Risk Measurement Handbook" - EVALuation Report, Volume 3 - March, 2001.

(2) Ibbotson Associates - Full Information Industry Betas, November 1997. Construction, Special Trade Contracts - Pure Play Analysis.

Estimating the Cost of Debt

In this model, we will consider the existence of short-term financing for fixed assets in the company's balance sheet and this will be an element of the firm's capital structure.

TABLE 11 Short –Term Financing

COD	SIGN	ITEM	(%)	FORMULA
i		Pre-Tax Cost of Short-term Borrowing	30.60	
j (1)	-	Brazilian Inflation	6.5	
k	=	Real Term Pre-Tax Cost of Short-term Borrowing	22.63	$k = (1 + i) / (1 + j) - 1$
l (2)	-	Marginal Corporate Income Tax Rate	34	
m	=	<i>After-Tax Cost of Short-term Borrowing</i>	14.94	$m = k * (1 - l)$

SOURCE:

(1) IBGE - Instituto Brasileiro de Geografia e Estatística - INPCA: Índice Nacional de Preços ao Consumidor Amplo (used by the Brazilian Central Bank). It is being considered "zero" because Short-term debt is out of the calculation.

(2) 34% is the real Income Tax for Brazilian companies with annual revenues over R\$ 240,000.00.

TABLE 12 Long –Term Financing

COD	SIGN	ITEM	(%)	FORMULA
n		Pre-Tax Cost of Long-term Borrowing	9.75	
o (1)	-	Brazilian Inflation	6.50	
p	=	Real Term Pre-Tax Cost of Long-term Borrowing	3.05	$P = (1 + n) / (1 + o) - 1$
q (2)	-	Marginal Corporate Income Tax Rate	34%	
r	=	After-Tax Cost of Long-term Borrowing	2.01	$r = p * (1 - q)$

SOURCE:

(1) IBGE - Instituto Brasileiro de Geografia e Estatística - INPC: Índice Nacional de Preços ao Consumidor Amplo (used by the Brazilian Central Bank). % of change expected.

(2) 34% is the real Income Tax for Brazilian companies with annual revenues over R\$ 240,000.00.

Estimating the Cost of Equity

There is a need to adjust the cost of capital for business, now considering two different sources of debt, with different amounts and marginal interest rates.

TABLE 13 Cost of Equity

COD	SIGN	ITEM	R\$ or (%)	FORMULA
s		Amount of Short-term Debt	1,100,000	
t		Amount of Long-term Debt	455,000	
u		Amount of Shareholders Capital	3,715,000	
v		Total Capital Employed	5,270,000	
w		Debt/Equity	42%	$w = (s + t) / u$
x		Debt/Total Capital Employed	29.5%	
y		Equity/Total Capital Employed	70.5%	
z		Cost of Equity	17.85%	$z = h + [h - ((k*(s / (s + t))) + (p * (t/ (s + t))))] *$

Estimating the company's weighted average cost of capital

From TABLE 8, we can see that:

70.00% of the company's capital employed came from shareholders' investment;
30.00% of the company's capital employed came from debt and, *from this amount*;

09.00% of the company's capital employed came from long-term funding.
21.00% of the company's capital employed came from short-term funding.

The company's Real Term WACC, now using all sources of debt, can be estimated as:

(Amount of Short-term Debt/Total Capital Employed x *After-Tax Cost of Short-term Borrowing*) +
(Amount of Long-term Debt/ Total Capital Employed x *After-Tax Cost of Long-term Borrowing*) +
(Amount of Shareholders Capital/ Total Capital Employed x *Cost of Equity*)

(from our tables: $WACC == [(s/v) * m] + [(t/v) * r] + [(u/v) * z]$

$(21\% \times 14.94\%) + (9\% \times 2.01\%) + (70\% \times 17.85\%)$

15.80% per annum, real term.

The cost of capital is more than just one element in the EVA measurement. It is a cost of doing business, and, like any other cost, must be monitored and minimized. When management is able to reduce it, EVA is increased in the same way value is created when and they are able to optimize assets use by generating revenue as much as possible from the capital tied in the business.

So, when we compare both results, it's clear that there is a significant difference in the real term weighted average cost of capital when we include Short-term debt in the formula. WACC can be minimized.

As stated previously, theoretically, equity is more expensive than debt as shareholders must bear the company's business risk. Besides, debt is tax-deductible and the present value of corporate income taxes not paid - as debt works as tax shield - when debt source of capital is used instead of equity finally increases a company's intrinsic market value (STEWART III, 1990). It happens, though, in a optimum capital structure, when the company uses leverage wisely, meaning that the operating profits are enough to pay interest expenses.

As the cost of capital has different important applications, such as i) As the benchmark for evaluating the rate of return earned on capital; ii) as the hurdle rate for project acceptance; iii) as the discount rate to PV calculation for free cash flow projections or EVA cash flows, is clear that the difference of 1,2 % in the WACC, in this example, could modify important aspects and change important operating decisions.

Therefore, in the search of a real weighted average cost of capital for Brazilian companies, whenever the corporations financial reports identify short-term sources of capital financing permanent assets, the above suggested adjusted must be applied.

6. Future Research

This proposed change in WACC is really a drop in the ocean. Broadly, it shows why one should not use the WACC, as it was defined in a developed market, in Brazil and, maybe, in any other under development country, also with no long run horizon and, consequently, with no developed credit market. The WACC must be different and, among several reasons, the most clear seems to be: there is a need to recognize that Brazilian companies do finance their fixed assets also through short-term in balance financing due to the lack of a developed credit market in the country, full of the expected uncertainties of an emerging market.

Within the boundaries of this kind of countries, it is not common to find a long-term culture. And the financial markets follow this bias, as they are part of the whole society. So, it seems to be very important not only to consider the rates and amount of short-term source of capital in the WACC calculation - and do not treat this as an expense in the income statement - but also always remember that short-term interest rate in Brazil is around 55% p.a. while the long-term credit (for few companies, with special credit lines), with federal government aid, is around 10% p.a., which is just the opposite of what happens world-wide.

This is the heart of this specific research, but it brings deeper issues, such as: to measure the real value added of companies from these scenarios, we do must re-think the entire WACC calculation, what includes the CAPM methodology. It happens because, in this model, we cannot use the beta coefficient, defined and almost daily measured in the USA where we have the most developed and stock market world-wide, different culture, and consumers reactions to market variations. So, a deep research is needed in Brazil, involving all economy sectors and the largest companies, even knowing that it is about a very difficult, long, important and expensive research, as long as, stated above, Brazil doesn't have anything close to a developed stock market. Certainly, we just cannot understand the market by analyzing BOVESPA Index movements, due to the total lack representation BOVESPA has concerning the whole economy. In other words, it wouldn't be correct to assign BOVESPA a risk index of 1.0, considering it as an overall market, in other to and estimate the excess return on the market over the risk-free investment and to compare to the return of each industry.

A different model must be created, maybe by analyzing the ROIC of each pure play of all representative industries of the Brazilian economy, compared to the overall ROIC of the whole list.

It is also important to study the correlation between these representative company's returns, in a long run historical series, and the Brazilian zero risk pattern or the Brazilian Long-term Treasury Bond. Such research would be crucial to define our national Market Risk Premium, obviously different from other countries, as far as Brazil had, during the 20th century, its own history, with its own civil wars, economic and political crisis and periods of overwhelming growth during the "economic miracle" years, that uniquely affected national GDP and the average strip yield of the Long-term Brazilian Bonds.

7. Conclusion

The weighted average cost of capital is an important component of any EVA calculation, as also of capital budgeting and project evaluation decisions. A good mathematical understanding and application of the concept is essential for any financial analyst. It also helps understand the implications of a company's capital structure and when used with EVA, can assist managers in maximising shareholder value.

The weighted average cost of Capital theory is a balance of creditors and shareholders capital, using the amount of each source tied up in the business and its real cost. Among different methodologies, the CAPM methodology is the most used to define shareholders cost of capital. The lender's capital is calculated using the marginal cost of Long-term financing, as its considered an amount of capital that will be used to buy Long-term or fixed assets. Short-term source of borrowed capital is considered part of a firm's operation, being, for this reason, treated as an operating expense.

Notwithstanding, it is not the reality for all size Brazilian corporations. As we could see above, Short-term capital is widely used as a source to finance Long-term and fixed assets, due to the undeniable lack of long run culture in the country. This scenario is enough to prevent the existence of developed credit market, and the great part of the capital available to finance Brazilian Corporations is short-term. Long-term capital does exist, but it is available for a few numbers of companies as it is a subsidy of the government.

Furthermore, short-term debt is more costly as long-term credit lines have a kind of subsidy. It is unusual because longer periods are more uncertain than shorter ones and creditors, as a result, should request a greater return to face their risk. But, as we could see, in certain capital structures, even this more expensive short-term financing could generate a lower total cost of capital, when its tax benefit is recognized. Liquidity, although, is extremely important to bear short-term financing of fixed assets, as the company needs to fulfill (and renegotiate) annual different compromises with its creditors.

8. References

EHRBAR, AL. *EVA – Valor Econômico Agregado – A Verdadeira chave para Criação de Riqueza.* Qualitymark (Versão em Português).

GOMES, G. e LEAL, R. *Determinantes da Estrutura de Capital das Empresas Brasileiras com Ações Negociadas em Bolsa de Valores .* Banco Nacional de Desenvolvimento Social (BNDES) e COPPEAD/UFRJ, 1999.

MODIGLIANI, F.; MILLER, M. *The cost of capital, corporate finance, and the theory of investment.* American Economic Review, v. 48, 1958.

MYERS, S. C. *Capital structure puzzle.* *Journal of finance*, v.39, n.3, 1984.

PEREIRA, Sônia B. *Análise da Relação entre Valor e Alavancagem no Mercado Brasileiro.* 2000 (working paper).

PETTIT, Justin et al. *The Equity Risk Measurement Handbook.* Stern Stewart & Co. Research. EVALuation, Vol. 3 No. 3, 2001.

PETTIT , Justin . *Corporate Capital Costs: A Practitioner's Guide.* *Journal of Applied Corporate Finance*, Vol. 2 No. 1, 1999.

STEWART III, G. Bennett. *The Quest for Value : The Eva Tm Management Guide.* New York, USA. Harper, 1990.

YOUNG, S. David and, O'BYRNE, Stephen F. *Eva and Value-Based Management: A Practical Guide to Implementation.* McGraw-Hill, 2000.

ZONENSCHAIN, Claudia N. *Estrutura de capital das empresas no Brasil.* BNDES/PNUD,1998.