Capacity of Future Earnings ´Prediction of EVA® in the Brazilian Public Companies

Andrei Aparecido de Albuquerque[1] & Mauricio Ribeiro do Valle[2]

[1] Federal University of São Carlos, Brazil

[2] University of São Paulo, Brazil

Correspondence: Andrei Aparecido de Albuquerque, Federal University of São Carlos, Brazil. E-mail: andrei@dep.ufscar.br

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Abstract

This article aimed to verify empirically whether EVA® provides incremental information for the future profit forecast of Brazilian publicly-traded companies. We used the technique of multiple linear regression with panel data unlike previous studies which using cross-sectional regressions. The results obtained allow rejecting the hypothesis that EVA® provides incrementally useful information to profit forecast of Brazilian publicly-traded companies. In this work only the variables level of cash flow and accruals level showed statistical significance in the regression model. Furthermore, both represent the dismemberment of earnings per share (EPS) therefore, the results demonstrate that only the EPS is a relevant indicator to the future profit forecast.

Keywords: economic value added – EVA®, profit forecast, future profit, Earnings per Share (EPS)

1. Introduction

Over the past decades there has been increasing recognition of the development of performance measures linked to the value-based management and to the value generation to shareholders. These measures are offered by different consultants and among them we can mention: the Economic Value Added (EVA®) from Stern Stewart, the Equity Spread from Marakon, the Cash Flow Retun on Investment (CFROI) from Holt Value and the Cash Value Added (CVA) from the Boston Consulting Group (Brown, 2006).

From these measures, one that has received great attention both in the press and in the academic literature is the Economic Value Added – EVA®. Basso, Alves and Nakamura (2002) claim EVA® is one of the performance measures more discussed in academia and more adopted by companies. This measure has the distinction of consider the opportunity cost of capital and incorporates a series of adjustments on the traditional accounting numbers for your calculation.

Much has been discussed about EVA®; however its proponents (Joel M. Stern and G. Bennett Stewart III, founders of Stern Stewart & Company) claim that it is a better measure of value generation than more traditionals from the accounting, as the profit.

In order to empirically test this claim, several studies have verified the effectiveness of EVA® comparing it to other financial measures in evaluation of the return of stocks of companies in which the results are alternated; some indicate the superiority of the EVA® in correlation with stock returns, among then the studies from Chen and Dodd (1997), Kleiman (1999), Feltham, Isaac, Mbagwu, & Vaidyanathan (2004) and Silveira, Okimura and Sousa (2004), others indicate a weak or no relationship with EVA® and stock returns, as studies from Biddle, Bowen and Wallace (1997), Turvey, Lake, Duren, & Sparling (2000) and Farsio, Degel and Degner (2000).

A study that works a different approach to this issue is of Machuga, Pfeiffer Jr. and Verma (2002), which it was developed using a sample of North American companies in the period 1981–1996. The authors have assumed that, despite the popularity of the new performance measures, earnings per share (EPS) remains the indicator of central interest in the evaluation of shares. They made such consideration based on the evaluation model of Feltham-Ohlson which considers the profits as basic itens. Thus, for that any measure can be useful as an input for evaluation, it should contain information about future profits. From this perspective, the authors sought to verify and establish the predictive utility of EVA® with the future profits forecast. They found an incremental ability of EVA® to predict future profits, i.e., this indicator has shown a potential informational beyond the

provided by the traditional measure of profit.

This theme can be considered relevant to the evaluation of companies, and since that proven their incremental usefulness the EVA® becomes an important measure for corporate profit forecast. By this reason, in this study, we intend to use in Brazil the model employed in research of Machuga, Pfeiffer Jr. and Verma (2002). Thus we shall verify whether similar results will be obtained in the Brazilian stock market, i.e., wheter in Brazil the EVA® also offers incremental ability to future profit forecast. It is relevant to mention that this study option meets the suggestions from research of Sharma and Kumar (2010) which argue the need to expand studies about EVA® in countries with developing economy, as is the case of Brazil.

Thus, the purpose of this work is to verify empirically whether the EVA® provides incremental information for the future profit forecast of Brazilian publicly-traded companies. With this purpose, the problem that guiding this research can be summarized in the following question: Could the EVA® (Economic Value Added), as a measure of performance, provide incremental information for the future profit forecast of Brazilian publicly-traded companies? A positive answer to this question can represent a new use for this performance measure, which also could encourage its use for this purpose.

2. Theoretical Background

In this section we discuss the issues regarding the defining and calculation of the measure of EVA® and relevant itens about the research empirical in this topic.

2.1 Economic Value Added – EVA®

The Financial Management has as the primary objective the maximizing shareholder wealth. Since the interest in identifying the generation of wealth by corporations, important economic evaluation models and performance measures are developed, and managers are increasingly aware that the objective of value maximization is the only one way that can ensure the long-term continuity of a company (Assaf Neto, 2003).

From this perspective is that arises all guidance for value creation measures. According to Assaf Neto (2003, p. 91), "many of them are simple adaptations of concepts and traditional formulations to a new need to measure the performance of companies". That is the case of the concept of EVA®, which, according to authors such as Bao and Bao (1998), Farsio, Degel and Degner (2000) and Assaf Neto (2003), is an estimate of economic profit or residual profit. The Stern himself (1999, p. VII) explains that the EVA®, in its most fundamental form, is "the simple notion of residual profit".

Young (1999), as well as several other authors (e.g., Kramer & Pushner, 1997; Biddle, Bowen, & Wallace, 1997; Feltham et al., 2004; Damodaran, 2004, etc.), states that the EVA® is calculated by the difference between the net operating profit after tax and the capital cost which is usually reflected by the weighted average cost capital (WACC). This makes the EVA® seems "a measure that reflects the excess of the opportunity cost of an investment decision, i.e., the value created by the investment" (Assaf Neto, 2003, p. 93).

Thereby the EVA can be understood as the excess return on invested capital, and its calculation method may be expressed according to Equation 1, which is mentioned by authors, as Chen and Dodd (1997) and Damodaran (2004).

$$EVA® = (Return\ On\ Invested\ Capital - Capital\ Cost) \times Invested\ Capital \quad (1)$$

In this formulation the return on invested capital is calculated dividing the operating profit after Income Tax by the invested capital and the capital cost is the WACC.

An alternative calculation, presented by Ehrbar (1999), O'Byrne (1999), Assaf Neto (2009) and Bahri, St-Pierre and Sakka (2011), is the calculation of EVA® from the difference between net operating profit after tax (NOPAT) and the product of WACC by capital invested according to Equation 2.

$$EVA® = NOPAT - (WACC \times Invested\ Capital) \quad (2)$$

A third way of calculating the EVA® is presented by Assaf Neto (2009) and can be seen in Equation 3. Angonese, Santos and Lavarda (2011) also employed this way of counting in their study.

$$EVA® = Net\ Profit - (Ke \times Net\ Equity) \quad (3)$$

In this option, EVA® is obtained from the difference between the net profit and the share capital of the shareholder, i.e., the own capital cost (Ke) multiplied by net equity.

Despite these forms of alternative calculations do the use of accounting information, the EVA® differs from traditional accounting measures on two factors.

The first factor is that this measure considers the own capital cost in its calculation. In this sense, Ehrbar (1999, p. 1) states that EVA® is a measure of corporate performance that differs from most others because it contain an "exaction on profit by the cost of all capital that a company uses". O'Byrne (1999) also states that the EVA® differs from accounting profit because it recognizes both the third-party capital cost and the own capital cost. Bonacim and Araújo (2009) argue about the importance of overcoming the opportunity cost inclusively in public entities.

The second factor is that in the calculation of EVA® are considered adjustments on traditional accounting numbers, which in the view of authors as Machuga, Pfeiffer Jr. and Verma (2002) and Keef and Roush (2003), this is the most important differential of this measure.

The following subsections are devoted to these two key differentiators of the measure of the EVA®: own capital cost and adjustments in the financial statements.

2.2 Own Capital Cost

As already mentioned the EVA® differs from traditional accounting measures by considering the total cost of capital, that is, the third-party capital cost and own capital cost.

Traditional accounting numbers cling to the explicit costs of capital, i.e., the debt cost or the third-party capital cost. With all the importance given by companies to the creation of shareholder value, it becomes extremely important to know the shareholder capital cost or own capital cost. Mendes-da-silva and Saito (2014) argue about the importance of consideration of the own capital cost in the analysis of companies to the capital budgeting process. And more specifically, Bruno Júnior et al. (2014) argue about the importance of cost of capital to determination of EVA® in a big company, showing that it is very relevant variable for this measure.

As Damodaran (2004), own capital cost is the rate of return required by investors to make a patrimonial investment in a company. Once the return on the investment in companies is uncertain, the shareholder runs risks depending on the nature of the company's operations and its capital structure (Sanvicente & Minardi, 1999).

Despite the widespread recognition that the own capital cost is an information of great importance, there is no way to observe it directly in the market, demanding the need to adopt a model to estimate it. In that same field of study, Hann Ogneva and Ozbas (2013) reported the possibility of reducing the capital cost with the business diversification by companies, thus adding more one important factor in its analysis and/or evaluation. According to Assaf Neto (2003), own capital cost is one of the most difficult measures to calculate; however this hurdle rate must be estimated somehow.

In this work, we not aim to discuss the concept of own capital cost, since it is widespread in academia, but it is worth mentioning the most widely used models for its mensuration. Basso, Alves and Nakamura (2002) found that among 72 Brazilian companies surveyed, the Capital Asset Pricing Model (CAPM) is the method that most executives dominate, followed by the dividend discount model and finally the Arbitrage Pricing Theory (APT).

According to Marcon (2002), there is no a consensus in academia about what would be the best method because they all have limitations, mainly to adapt them to emerging markets. Copeland, Koller and Murrin (1995, p. 378) comment that "the calculation of capital cost in any country can be a challenge, but in emerging markets this difficulty is even greater".

The academic researches on own capital cost in Brazil give great emphasis to the problems faced in the mensuration of its value. As demonstrated by Sanvicente and Minardi (1999) and Assaf Neto (2003), there is empirical evidence that the mensuration of the own capital cost in Brazil and in other emerging countries is hampered due to large fluctuations of variables needed to the use of the CAPM. The methodology proposed by the authors referred to the adoption of variables for the CAPM from a country whose economy is stronger and more stable, such as the United States, adjusted by the company's financial risk under evaluation and by a measure of country risk. According to Assaf Neto (2009, p. 399), "as emerging countries (South America, Central America and parts of Europe and Asia) have a higher level of uncertainty, it is necessary to charge a premium by investments in these markets as a way to remunerate the called country risk".

In this study, to calculate the own capital cost, we used the methodology suggested by Assaf Neto (2003), in which uses the standard equation of CAPM with the variables of the reference economy, in this case from the United States. Based on this formulation, we made adjustments in order to enable a better mensuration of the own capital cost in emerging countries like Brazil. As increment in the conciliation of betas from Americans sectors with Brazilian sectors, we also used subsectors of companies which were providing by the Economática® to calculate the CAPM.

2.3 Adjustments on the Accounting Statements

For the evaluation of companies, the main tool for obtaining information is the Accounting Statements. According to Assaf Neto (2003), for the evaluation of companies, the major concern is whether the accounting statements actually represent the fair value of the companies, since these statements are prepared in the light of accounting principles generally accepted. It is known that the preparation of the accounting statements is accomplished under the hand of many factors which influence its outcome, presented both in the internal and external environment of companies. Therefore, there are indagations about the accounting standards mainly by the absence of adaptation of traditional registration procedures to the new reality faced by organizations.

Thus adjustments in the accounting statements aim to better matching of financial information to the new reality of business by eliminating certain problems of accounting principles and allowing the construction of more precise measurements regarding to the real economic and financial situation of organizations.

In this work are considered the main adjustments mentioned by Assaf Neto (2003) and also used in measuring the EVA®, in which they are the following: on balance sheets – Deferred Income and Participation of Minority Shareholders; and in the Statements of Operations for the Year – Non-Operating Income and Inflation. An overview of other possible accounting adjustments to be considered for the calculation of EVA® in Brazil can be obtained in the work of Basso, Oliveira and Kayo (2008).

2.4 Empirical Studies

Several researches have been conducted to verify empirically the relationship between EVA® and stock returns, among them: Chen and Dodd (1997), Biddle, Bowen and Wallace (1997), Kleiman (1999), Turvey et al. (2000), Feltham et al. (2004), etc. Results from these researches are alternated in favorable and unfavorable to the EVA®.

In group of researches that present favorable results to the EVA® in relation with stock returns we can cite: Lehn and Makhija (1996); Chen and Dodd (1997); Kleiman (1999); Feltham et al. (2004); Silveira, Okimura and Sousa (2004); Ferguson, Rentzler and Yu (2005); and Sharma and Kumar (2012). While the studies that present unfavorable results to the EVA® in relation with stock returns we can cite: Biddle, Bowen and Wallace (1997); Kramer and Pushner (1997); Turvey et al. (2000); Farsio, Degel and Degner (2000); Griffith (2004); Salvi (2007); Ismail (2011); and Arabsalehi and Mahmoodi (2012).

Medeiros (2009) questions the variables used in the previous researches, and assesses the relationship between EVA® and stock returns using a sample of Brazilian companies; testing different combinations of variables and time sequence of occurrence. The author concludes that stock returns are affected by the past behavior of economic value added (EVA®) and this result may explain why some studies find a weak or no relationship between these variables.

In contrast to these researches which have focused on matching the EVA® with changes in shareholder value (stock returns), the study of Machuga, Pfeiffer Jr. and Verma (2002) centred on the association between EVA® and future profits and then in its use by financial analysts to make forecasts of earnings per share. The authors established the first goal of its study as being: "provide empirical evidence on the ability of adjustments of the EVA® and earnings to explain and forecast the changes in future profits" (Machuga, Pfeiffer Jr., & Verma, 2002, p. 62). They also claim to have modeled the relation in form of changes to mitigate the potential bias of the omitted variables correlated, considering that any omitted variables are stable over time.

In the same aforementioned research, the authors used the North-American companies with information about EVA® available in the database of Stern Stewart Management Services in 1997; and with sufficient data for calculations of all variables needed in the Compustat. After attended these requirements, they managed to select 6,391 firm-years; from this initial sample, they excluded all firm-years which had absolute value of its change in component of cash flow, EVA® or accrual normalized by price-scaled greater than 1.0, avoiding the increase of the number of outliers in linear estimation. Also they excluded all firm-years with negative earnings per share, since they believe that the market has different responses for profitable and low-profit companies. Thereafter these eliminations, the study counted with a final sample of 4,382 firm-years from 1981 to 1996, ranging of 232 to 362 companies per year.

Machuga, Pfeiffer Jr. and Verma (2002) have subdivided their sample into two subsamples (companies with changing profit below zero in *t*-1 and changing profit above zero in *t*-1) to apply their regressions and, for analysis of the coefficients. Machuga, Pfeiffer Jr. and Verma (2002, p. 68) used the intertemporal average that "is the average of the coefficients estimated in 16 annual cross-sectional regressions for the years 1981–1996", while the *t*-statistics are calculated by the "ratio of the means and standard errors of the 16 annual estimates of regression coefficients" and the probability values are two-tailed. They obtained as results of the regression of

profit forecast that the level of cash flows and accruals of the previous year are useful for explaining changes in profits for all firm-years. Their results are also consistent with previous researches because companies that had changes in the previous year profit below zero tend to have positive earnings changes in year *t*, which it was not the case with companies that had changes of profit above zero in *t*-1.

From these results, we stand out even though both cash flows as accruals are significant to explaining changes in future profits for underperforming companies. The coefficient for returns from previous years is more significant for companies with good performance. Regarding to variables relates to the main issue of Machuga, Pfeiffer Jr. and Verma (2002)'s work, the coefficients indicate that the accounting adjustments of the VA® are incrementally useful to explaining changes in profits beyond which are the cash flows, accruals and stock returns in the previous year.

The next section is intended to explore the details of the methodology employed here in this research.

3. Methodology

In this section are defined the methodological aspects of this research, the selection and data collection, the definition of the sample, the variables used in the research and its measuration, as well as the analysis procedures applied.

3.1 Specification of the Research

In this study we want to analyze whether the EVA® provides incremental information to future profit forecast. Thus our work can be classified as an explanatory study because, according to Richardson (1999), this type of study focuses in analisys of the causes or consequences of a phenomenon.

Regarding the procedure adopted for data collection, this research can be classified as *ex-post-facto*. According to Gil (1999, p. 69), this type of research is by definition "be a systematic and empirical investigation in which the researcher has no direct control over the independent variables", because they have already occurred or because they are inherently not manipulable.

3.2 Data Selection, Data Collection and Sample Definition

To perform the empirical tests, we collected the accounting information of Brazilian companies from 1995 to 2006. The using of data from previous periods to this is not advisable because it is periods with high inflation rates. The utilization of data from previous periods to this is not advisable because it is periods with high inflation rates. Moreover, with the enactment of the Brazilian Law 11,638/2007 (Brasil, 2007), the financial statements have undergone a strong change in their shapes, which causes different adjustments to the calculation of EVA® and would result in a reduction of the sample by having to use periods after this law to ensure uniformity of information. Another relevant fact is the advent of the global financial crisis of 2008, which the periods (before and after crisis) tend to have a different profile on interpretation of forecasts. For this reason, we opted for the above mentioned period, by having a greater number of years and be free of the effects of the law change and the global crisis.

We performed the data collection by using the database of Economática®. Thus, the data used in this research are from a secondary data source. We excluded the companies in the year which they have had a negative net equity, due to the fact that, in this condition, the calculation of the own capital cost is impaired. Since the variables of the model are all defined in terms of changes (or variation) from one year to another – which will be described in detail below –, we selected only companies with enough information to calculate all the variables needed for the empirical model.

Following the same selection criteria established by Machuga, Pfeiffer Jr. and Verma (2002, p. 64), we also excluded from the data all the years in which companies have had any of the change variables greater than 1.0, and also we excluded firm-years with negative earnings per share (EPS). This measure was intended to increase the potential of comparability of results.

As already mentioned, all variables of the empirical model are calculated in terms of variation from one year to another. Thus the statistical tests were only performed since 1998, because only from this year onward all change variables from the previous year (variation from 1996 to 1997) were able to be calculated, as will be specified later.

Thus, the tests were performed between 1998–2006. For application of the panel we used only companies that presented data for at least five years, thus the number of companies used were 149 firms in the period, which resulted in a final sample of 1,044 observations. It is worth mentioning that, once in this research we applied tests with panel data, the aggregation of firm-years in a single block is allowing more consistent analysis of

results, because we use different observations to the same company over time. So, we not employed a subdivision of the sample according to the profit change in year earlier as the authors of the American study did (Machuga, Pfeiffer Jr., & Verma, 2002).

3.3 Empirical Model of the Study

In order to achieve this objective we applied the same assumption used by Machuga, Pfeiffer Jr. and Verma (2002), being expressed in this research as follows: EVA® provides incrementally useful information to future profits forecast of publicly-traded companies. Medeiros (2009) also uses a year ahead in its forecast models to measure future profits.

To test this hypothesis, thereby examining the predictability of future profits with the use of EVA®, we developed a multiple linear regression model as specified by the authors above-mentioned and will be defined in more detail in the next section.

3.4 Definition of Variables

The multiple regression model used in this study is the same developed and applied by Machuga, Pfeiffer Jr. and Verma (2002), expressed in Equation 4.

$$\Delta EPS_t/P_{t-1} = \alpha_0 + \alpha_1 \Delta CF_{t-1}/P_{t-1} + \alpha_2 CF_{t-1}/P_{t-1} + \alpha_3 \Delta AC_{t-1}/P_{t-1} + \alpha_4 AC_{t-1}/P_{t-1} + \alpha_5 \Delta EVAA_{t-1}/P_{t-1} + \alpha_6 EVAA_{t-1}/P_{t-1} + \alpha_7 SAR_{t-1} + \varepsilon_t, \quad (4)$$

In which:

P_{t-1} = share price on March 31 of year *t*-1. This variable was obtained directly from the database Economática®, being the share price adjusted for earnings.

$\Delta EPS_t = (EPS_t - EPS_{t-1})$ in which EPS_t is earning per share (EPS) of year *t* ended on December 31.

SAR_{t-1} = size-adjusted return for year ended on March 31 of year *t*.

$\Delta CF_{t-1} = (CF_{t-1} - CF_{t-2})$ in which CF_{t-1} is cash flow from operations for year *t*-1 ended on December 31.

$\Delta AC_{t-1} = (AC_{t-1} - AC_{t-2})$ in which AC_{t-1} is the accrual component of earnings for year *t*-1 ended on December 31.

$\Delta EVAA_{t-1} = (EVAA_{t-1} - EVAA_{t-2})$ in which $EVAA_{t-1}$ is the difference between EVA® and EPS for year *t*-1 ended on December 31.

3.5 Statistical Tests

To verify the incremental usefulness of EVA® in future profits forecast, we applied the technique of multiple linear regression. According to Gujarati (2000, p. 4), regression analysis refers to the study of the dependence of a variable, the dependent variable, with respect to one or more variables, the independent (or accompanying) variables, in order to estimate and/or predict the average (of the population) or the average value of the dependent in terms of known values (in samples) of the independents. The regression analisys of this study are conform specifications of the empirical model described above.

We applied the procedure of panel data which, according to Wooldridge (2006), mitigates the effects of multicollinearity, common when using cross-section data. This last procedure was used by Machuga, Pfeiffer Jr. and Verma (2002), who reported the presence of multicollinearity in their results.

Thus we performed a multiple linear regression on the set of all companies for the period under analysis (from 1998 to 2006). The tests were performed in statistical software Stata and underwent correction of heteroskedasticity and autocorrelation by the Newey-West method for regression with fixed effect.

As Machuga, Pfeiffer Jr. and Verma (2002), we performed the identification procedure of the incremental utility of EVA® on profits forecast, verifying the calculated coefficients for the variables of the model related to this measure (α_5 e α_6) and to its respective significance. In the following topic we presented the main results.

4. Results and Discussion

Initially, in Table 1, we can check the descriptive statistics (mean, standard deviation, median, minimum and maximum values) obtained from the data of the whole sample, i.e., presented for the total sample comprised of 1,044 observations (or firm-years).

Table 1. Descriptive statistics of the analysis variables (period 1998–2006)

Variables	Mean	Standard Deviation	Median	Minimum	Maximum
$\Delta EPS_t/P_{t-1}$	0.0704	0.5646	0.0004	-1.5884	11.8576
$\Delta CF_{t-1}/P_{t-1}$	0.0313	0.2652	0.0003	-0.9608	0.9965
CF_{t-1}/P_{t-1}	0.2346	0.3815	0.0970	-1.3584	2.6401
$\Delta AC_{t-1}/P_{t-1}$	-0.0164	0.2639	0.0000	0.9870	0.8814
AC_{t-1}/P_{t-1}	-0.1410	0.3259	-0.0163	-2.1078	1.5805
$\Delta EVAA_{t-1}/P_{t-1}$	0.0063	0.1967	0.0000	-0.9603	1.0626
$EVAA_{t-1}/P_{t-1}$	-0.2111	0.8287	-0.0093	-6.0537	5.8709
SAR_{t-1}	-2.4238	29.2767	-0.3338	-324.5180	461.7275

Source: Research data.

Firstly we can see that the average values obtained in our study, in absolute terms, are close to those presented in the American study (Machuga, Pfeiffer Jr., & Verma, 2002). The exception is the variable SAR, which in our study has an average well above to the found in previous study. Since this variable refers to the variation in stock returns, their higher values may be due to the profile of Brazilian market be more unstable than of the USA.

Also in Table 1, we added standard deviation, median, minimum and maximum values determined by the variables; in the American study (Machuga, Pfeiffer Jr., & Verma, 2002), this variables are not reported. The results indicate a high dispersion of the analysis variables, especially the variable SAR which showed the highest standard deviation (29.2767). The high oscillation of this variable can be considered as natural, since it is made up of stock returns. The second largest standard deviation was presented by variable $EVAA_{t-1}$, although the variation is much lower than that presented by SAR, being 0.8287 for the full sample.

In research of Machuga, Pfeiffer Jr. and Verma (2002, p. 65), the change variable of CF was 0.0120, while in our study was 0.0313. The variable level of CF in previous research showed the highest mean value (0.1206), in our study this variable was also the highest average (0.2346), showing a similarity between the works.

As the American study (Machuga, Pfeiffer Jr., & Verma, 2002) in which the accrual variables showed negative means, this research with Brazilian companies also obtained results in this profile. The change variable of AC presented average of -0.0164 in our research and -0.0082 in previous, while the variable level of AC here was -0.1410 and in previous was -0.0564. Thus, there were also similarities between the researches' results.

The average of change variable EVAA in this study was 0.0063, while in the American study was 0.0031. In turn the level of EVAA in this study presented an average of -0.2111, which is negative and is much higher (in magnitude) than the previous study (0.0386). Ivanov, Zaima and Leong (2014) expose about the possibility of abnormal returns for companies with negative EVA®, signaling that this aspect can bring some benefit to organizations in such situation.

To verify the relationship among variables, we determined the respectives coefficients of the Pearson's correlation. In Table 2 we present the coefficients obtained.

Table 2. Pearson's correlations for variables analyzed (period 1998–2006)

	$\Delta EPS_t/P_{t-1}$	$\Delta CF_{t-1}/P_{t-1}$	CF_{t-1}/P_{t-1}	$\Delta AC_{t-1}/P_{t-1}$	AC_{t-1}/P_{t-1}	$\Delta EVAA_{t-1}/P_{t-1}$	$EVAA_{t-1}/P_{t-1}$	SAR_{t-1}
$\Delta EPS_t/P_{t-1}$								
$\Delta CF_{t-1}/P_{t-1}$	-0.0655	1.0000						
CF_{t-1}/P_{t-1}	-0.0438	0.4822	1.0000					
$\Delta AC_{t-1}/P_{t-1}$	-0.0174	-0.7507	-0.3023	1.0000				
AC_{t-1}/P_{t-1}	-0.0570	-0.4188	-0.7976	0.4855	1.0000			
$\Delta EVAA_{t-1}/P_{t-1}$	0.0562	0.0593	0.1127	-0.0536	-0.3306	1.0000		
$EVAA_{t-1}/P_{t-1}$	-0.0193	0.0950	-0.0541	-0.0971	-0.1033	0.5332	1.0000	
SAR_{t-1}	0.0066	0.0478	0.0225	-0.0250	-0.0107	-0.0400	-0.0274	1.0000

Source: Research data.

Likewise as occurred in research of Machuga Pfeiffer Jr. and Verma (2002), about the Pearson's correlations, we verify that exist a potential for multicollinearity in models employed; however, in the previous study, multicollinearity was not a concern immediate, since all inferences were measured on averages and standard errors of the annual coefficients. Also, Gujarati (2000), Sartoris (2003) and Wooldridge (2006) point out that multicollinearity is a characteristic of the sample data. The presence of multicollinearity does not invalidate the linear regression model and its impact is no different from cases in which it has a small sample size. However, to try to overcome the problems of this characteristic, in this research we employed the regression analisys with panel data, which mitigates the effects of multicollinearity.

The highest correlation found was -0.7976 between level of CF and level of AC. The reverse signal makes sense and is due to the complementarity factor that the accrual index gives for the variable CF, remembering that this is the difference between profit and cash flow. These results are consistent with previous researches which show indexes of -0.8445 (companies with change of profit below zero) and 0.8894 (companies with change of profit above zero). The second highest correlation was between change of CF and change of AC, with value of -0.7507, the same way as the previous relationship. And the third highest correlation was between change of EVAA and level of EVAA, with value of 0.5332, very close to the correlation of 0.5161 reported for these same variables by Machuga, Pfeiffer Jr. and Verma (2002, p. 65) in sample of companies with change of profit below zero in the previous year, and correlation of 0.5026 for those companies with change of profit above zero.

As specified in section 3.5 (Statistical tests), we applied multiple linear regression for panel data, corrected for heteroskedasticity and autocorrelation by the Newey-West method. In Table 3, these results can be checked.

Table 3. Results from the regressions of profit forecast

$R^2 = 0.0697$		F = 11.97	
Number of Observations = 1044		Prob > F = 0.0000	
$\Delta EPS_t/P_{t-1}$	**Coefficient**	**Standard Error**	**P-value**
$\Delta CF_{t-1}/P_{t-1}$	0.0000467	0.1173469	1.000
CF_{t-1}/P_{t-1}	-0.7332097	0.1509228	0.000
$\Delta AC_{t-1}/P_{t-1}$	0.1644081	0.1249506	0.188
AC_{t-1}/P_{t-1}	-0.9400926	0.1632104	0.000
$\Delta EVAA_{t-1}/P_{t-1}$	0.1032468	0.0889977	0.246
$EVAA_{t-1}/P_{t-1}$	-0.0447331	0.0385086	0.245
SAR_{t-1}	0.0008279	0.0007530	0.272

Source: Research data.

In the application of multiple regression is necessary to check whether the dependent variable is related to the set of independent variables, i.e., we should test the regression as a whole (Gujarati, 2000, p. 236). The regression applied in this study was statistically significant, being verified by the *F* of significance (Prob> F – *F* statistic for the regression as a whole) obtained, which was less than 0.05 (α). According to Gujarati (2000, p. 243), we must consider that the regression is significant as a whole if *F* is smaller than 0.05.

From results of Table 3, we verify that the levels of cash flows and accruals (α_2 and α_4) of the previous year are useful in future profits forecast, which we can see in the significance (*P*-value) by these coefficients. These results are similar to results from Machuga, Pfeiffer Jr. and Verma (2002); however in their study, they did not report results of your sample in the set of all companies, but divided into subsamples.

The change variables of cash flows and accruals (α_1 and α_3) did not show statistically significant at level of 5%. In results of Machuga, Pfeiffer Jr. and Verma (2002) – American study –, these coefficients showed significant only for companies with change of profit below zero in *t*-1.

The variable SAR (α_7) did not show statistically significant in tests of the companies from our research; results also contrary to those reported in the American study, in which this variable was significant in its two divisions.

Finally, the variables EVA® of this study, represented by the coefficients α_5 and α_6, also not presented statistically significant. We found that the level of EVAA (α_6) – variable that was significant in the study of

Machuga, Pfeiffer Jr. and Verma (2002) – for companies with change of profit below zero in the previous year, presented the most insignificant result of variables EVA® in our study (α_6 = -0.0447331). The change of EVAA (α_5) for companies with change of profit above zero in the previous year – which was significant in tests of Machuga, Pfeiffer Jr. and Verma (2002) – not presented statistically significant in our study.

With these results, it is not possible to prove the incremental usefulness of EVA® in future profits forecast of publicly-traded companies in Brazil. In contrast, Machuga, Pfeiffer Jr. and Verma (2002, p. 67) state that EVA® is incrementally useful in predicting of change in profits, providing information beyond that contained in cash flows, accruals and stock returns in the previous year. They also found statistical significance in the change of EVAA (α_5) to companies with change of profits above zero in *t*-1 and in the level of EVAA (α_6) for companies with change of profit below zero in *t*-1.

5. Final Considerations

Much has been discussed about the proposal that the EVA® is a measure that has the highest relationship with stock returns than traditional accounting measures, although academic researches in this area have alternate results. Some studies claim the superiority of EVA® in relation to stock returns compared to traditional accounting measures, while others studies say no exist relationship or there is a weak relationship between EVA® and stock returns.

Machuga, Pfeiffer Jr. and Verma (2002) work a different view of this issue. They test the capability to future profit forecast of EVA® in companies from the United States in the period 1981-1996. In this work we seek to apply in an emerging economy the model developed in this American research. Thus we seek to verify the capability of future profit forecast of EVA® in Brazilian publicly-traded companies, with the addition of panel data analysis to mitigate the multicollinearity effect. The aim of this study was to verify empirically whether the EVA® provides incremental information for the future profit forecast of Brazilian publicly-traded companies. To do so, we applied a model of multiple linear regressions using information from these publicly-traded companies in the period 1998-2006.

We opted for the methodology developed by Assaf Neto (2003) to calculate the EVA® measure, which it was used as research model. We identified that the average EVA® calculated for publicly-traded companies in Brazil was negative, in the period of this research, indicating that these organizations were not able to generate profits enough to cover the cost of capital return on their investment, thus destroying value in its operations. Ivanov, Zaima and Leong (2014) found evidence of potential abnormal return for companies with negative EVA®, thus indicating a potential line for future research.

Multiple linear regressions were applied with panel data for the full sample. Results from these tests allowed to us reject the hypothesis that EVA® provides incrementally useful information to future profit forecast of publicly-traded companies in Brazil. Differing from the results of the American study and not allowing claim that this measure of value generation has incremental utility for profits forecast. Therefore, this research helps in the discussion of the usefulness of EVA®, specifically testing its shed predictive value that could be expected by users and analysts, which was not confirmed by the empirical results.

In this work, the variables that showed statistical significance were the level of cash flows and the level of accruals per share. These same variables are dismemberment of earnings per share. Thus, the findings of this research follow the same proposal that Machuga, Pfeiffer Jr. and Verma (2002) bring in their justification: despite the popularity of the new measures, the earnings per share (EPS) remains the basis of valuation models. That is, only the EPS presented as useful for future profit forecast.

The realization of tests in each sector is a suggestion for future researches which can examine whether specific characteristics affect the profit forecasts. Another suggestion is to perform tests with longer periods of forecast, i.e., more years ahead, checking whether in long-term EVA® provides incremental information for profits forecast. Another suggestion for future researches is the verification of the required adjustments for calculation of EVA® with the enactment of the Brazilian Law 11,638/2007 (Brasil, 2007) and the incorporation of the same new tests in later periods to that enactment.

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