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Evidências empirícas sobre a relação entre EVA e Retorno Acionário nas empresas brasileiras

Empirical evidence on the relationship beween EVA and Stock Returns in brazilian firms

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RESUMO

Este artigo fornece evidências empíricas sobre a relação entre Valor Econômico Adicionado (EVA) e retornos acionários de empresas brasileiras. A relação entre essas variáveis têm sido motivo de controvérsia nos últimos anos, com alguns autores encontrando associações significativas entre elas, enquanto outros não encontrando nenhuma. A hipótese de que o EVA afeta os retornos acionários é testada através de regressão linear, utilizando-se modelos alternativos. A amostra é composta de empresas negociadas na mais importante bolsa de valores brasileira. Uma comparação entre os resultados deste estudo com os de estudos anteriores mostram que resultados significativos dependem da determinação das variáveis apropriadas (retornos acionários versus preços das ações), bem como da correta relação dinâmica entre a variável dependente e a independente.

Palavras-chave: Valor Econômico Adicionado, EVA, MVA, retornos acionários, empresas brasileiras.

ABSTRACT

This paper provides empirical evidence on the relationship between Economic Value Added (EVA) and stock returns in Brazilian firms. This relationship between these variables has been subject to controversy in recent years, with some authors finding significant associations between them while others find none. The hypothesis that EVA affects stock returns is tested through linear regression, using alternative models. The sample is comprised of companies that are traded on the most important Brazilian stock exchange. A comparison of the outcomes of our study with those of previous studies shows that significant results depend on determination of the appropriate variables (stock returns versus stock prices), as well as of the correct dynamic structure between the dependent and the explanatory variable.

***Key words**: Economic Value Added, EVA, MVA, stock returns, Brazilian firms.*

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1 INTRODUCTION

The concept of economic profit or residual income appeared originally in the economic literature more than two centuries ago, in Hamilton (1777) and later on in Marshall (1890). Since the beginning of the 1990's, the concept has seen a revival, with the launching of the value-based metrics *EVA*® and *MVA*®[1]. These have attracted considerable attention, not only as measures of corporate performance and the basis for management bonus systems, but mainly as indicators of shareholder value created or destroyed. In addition, they offer an alternative to the DCF-NPV method for company valuation. It is not a purpose of this paper to join the extensive debate on the alleged advantages and pitfalls related to the use of these kinds of metrics by companies, as this have been the subject of extensive and detailed discussion in the recent literature, *e.g.* Mäkeläinen (1998), Bromwich and Walker (1998) and many others.

The purpose of this paper is to investigate empirically the relationship between a company's *EVA* and its market value, reflected in its stock price or in its stock return. The sample used for the empirical analysis is made up of companies operating in Brazil and traded in the leading Brazilian stock exchange. A number of empirical studies focus on the relationship between *EVA* and stock returns, some of which are summarized in this paper. The results of these studies has been controversial and inconclusive. Analysis of these studies and comparison of their results with those observed in the present study suggest that obtaining significant results depends upon finding the appropriate variables involved, *i.e.* levels *versus* changes, and the correct timing between the dependent and the explanatory variable. The results obtained here seem significant, and it is believed that they offer a contribution to the debate on the subject.

The paper begins with a review of the theory that associates the concept of *EVA* with the market value of a company. A brief discussion of previous empirical works on the subject follows. Finally, the hypothesis that *EVA* affects the market value of a company, which can be observed by its impact on the stock price, was empirically tested. Several model specifications were tested, both in terms of variables on their levels and on log differences, through linear regression.

2 THE UNDERLINING THEORY

A large amount of material covering theoretical and practical aspects of *EVA* is available. An extensive collection of references can be found in the Internet.[2] *EVA* is a measure of the real profits obtained by the companies. Basically, *EVA* is the operating profit after tax minus the cost of capital. Instead of focusing on profit alone, *EVA* reflects the cost of the capital necessary to generate such profit. According to Stewart (1990), the implementation of *EVA* in a company permits assessment of the value created (or destroyed) for the shareholder each year. It also serves as a basis for bonus systems and as a managerial instrument for fostering maximization of shareholder value. In addition, various authors, *e.g.* Storrie and Sinclair (1997:5), Shrieves and Wachowicz (2000), and Damodaran (2002) have demonstrated that the present value of *EVA* is equivalent to the *NPV* (net present value) of *DCF* (discounted cash flow) for the purpose of company valuation.

The most relevant aspect of *EVA* for the present paper is its relationship to stock price. In theory, the two variables tend to move up or down walk together, with stock price following *EVA* much more closely than other metrics or ratios, such as *EPS*, *ROE*, operating margin, etc. This would occur because *EVA* would reveal to investors what really interests them, the net return on capital. This argument is put forward by Mäkeläinen (1998) as follows. The higher a company's expected *EVA*, the greater its market value and, consequently, its stock price. Specifically, a real growth in profitability, *i.e.* the growth of *EVA*, pulls a stock price up. That would be the reason why companies like Intel, Microsoft and Nokia have their stock traded at prices several times their book values. Stock returns reflect expectations about future *EVA*. These expectations involve high levels of uncertainty and are subject to constant revision, causing price volatility. For this reason it is difficult to observe, in the short-term, the underlying connection between *EVA* and stock price. Long-term observations may be relevant in this regard.

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[1] EVA and MVA are trademarks of Stern Stewart & Company.

[2] A comprehensive website on *EVA* can be found in www.evanomics.com

The relation between stock price and EVA can be better understood if another variable, MVA, is introduced. EVA is intended to measure what has happened with the shareholders' wealth. In accordance with this measure, if a company gets a higher return than the cost of capital this increases its value and vice-versa. For companies traded on a stock market STEWART (1990) defined another measure that evaluates if the company has created shareholder value. If the total market value of a company is greater than the capital invested, the company has created value. If the opposite has occurred, the company has destroyed shareholder value. This difference between the market value and the book value of a company is called MVA - Market Value Added. It can be written as:

$$(1) \qquad MVA = TMV - TBK$$

where TMV is the total market value of a company and TBK the total book value of the capital employed, *i.e.* the sum of the book values of equity and debt. Equation (1) can thus be rewritten as:

$$(2)\ MVA = (MVE + MVD) - (VBE + BVD)$$

where MVE is the market value of equity, MVD is the market value of debt, BVE is the book value of equity and BVD the book value of debt. Adopting the simplifying hypothesis that the market value and the book value of debt are equal, *i.e.* $MVD = BVD$, equation (2) becomes:

$$(3)\quad MVA = MEV - BVE \qquad \text{or}$$

$$(4)\ MVE = BVE + MVA$$

In other words, the market value of a company's equity is equal to the sum of the book value of equity and MVA.

Stewart (1990) defines the connection between EVA and MVA as follows: the *Market Value Added* is equal to the present value of all future and present EVA.:

$$(5)\ MVA = \sum_{i=0}^{\infty} \frac{EVA_i}{(1+WACC)^i}$$

where WACC is the weighed average cost of capital of the company. Substituting for MVA in (4), a new definition for the market value of the company's equity is found:

$$(6)\ MVE = BVE + \sum_{i=0}^{\infty} \frac{EVA_i}{(1+WACC)^i}.$$

This relationship between EVA and the market value of equity suggests that EVA affects the market value of the stock. Various authors have studied this relationship using varying methods with differing and often conflicting results, as discussed below.

Mäkeläinen (1998) states that the market values of the companies are largely based on expectations regarding future cash flows. Changes in current stock returns would thus reflect changes in future cash flows and in expectations about EVA. Consequently, current EVA can adequate explanation of current stock returns. However, a change in current EVA could imply in expectations with regard to future EVA. In this case, EVA might have some explanatory power. At the same time, the change in future EVA certainly should be visible in indicators other than EVA. Consequently, such indicators might offer nearly as much explanatory power as EVA; and it could be understood that the explanatory level for all indicators might be low.

It seems clear that EVA must affect changes in the stock price. The problem is to establish the dynamics of the relationship. Given the impossibility of foreseeing the future, future EVA is forecast based on the past EVA behavior rather than current EVA. This is analogous to what happens with cash flows forecasts for company evaluation purposes. Financial statements and annual reports are published once a year. Therefore, for most of the year, the market determines day-to-day stock prices with no knowledge of the corresponding current EVA. The calculation of EVA depends on official accounting values, which will only be available months after the close of the fiscal year. This fact is relevant for the purpose of empirical analysis. If this is taken into account, one would expect the current market value of a company as measured by its stock price to be related to the past behavior of EVA rather than current EVA.

Wallis (1973:34) demonstrates how the forecast level of a variable is a function of past values of the variable, using a mechanism that demonstrates how expectations are formed. The adaptive expectations hypothesis has been used quite successfully in empirical work. It was first applied in the mid-fifties by Cagan (1956), in his study of hyperinflation and by Nerlove (1958), in connection with the dynamics of agricultural supply. The hypothesis states that expectations are adapted in proportion to past forecasting errors. The forecast level of a variable in the next period x_{t+1}^* is given by the forecast of its current level x_t^* amended by some proportion of the current forecasting error ($x_t - x_t^*$). Thus

(7) $x_{t+1}^* = x_t^* + (1-\gamma)\cdot(x_t - x_t^*)$ or

(8) $x_{t+1}^* = \gamma x_t^* + (1-\gamma)\cdot x_t$ where $0 \le \gamma < 1$.

Examining the way in which expectations depend on actual past values by repeated substitution, we have

$$\begin{aligned}(9)\ x_{t+1}^* &= (1-\gamma)\cdot x_t + \gamma x_t^* = \\ &= (1-\gamma)x_t + \gamma[(1-\gamma)x_{t-1} + \gamma x_{t-1}^*] = \\ &= (1-\gamma)x_t + \gamma(1-\gamma)x_{t-1} + \gamma^2[(1-\gamma)x_{t-2} + \gamma x_{t-2}^*] = \\ &= \ldots = \\ &= (1-\gamma)\sum_{j=0}^{\infty}\gamma^j x_{t-j}.\end{aligned}$$

The expression developed in (9) means that the forecast level of a variable in the next period is given by an infinite distributed lag on the observed variable, with geometrically declining coefficients.

So, if we postulate a behavioral relationship

(10) $y_t = \alpha + \beta x_{t+1}^*$ then, by substituting in for x_{t+1}^*, we get

$$(11)\quad y_t = \alpha + \beta(1-\gamma)\sum_{j=0}^{\infty}\gamma^j x_{t-j}.$$

This is equivalent to the distributed lag function introduced by Koyck (1954). The effect of the remote expectation terms dies away, because coefficient γ^j goes to zero as *j* increases, since $0 \le \gamma < 1$.

We can now return to the relationship between the stock price and *EVA*. Substituting x_{t+1}^* by EVA_{t+1}^* as the forecast level of *EVA* for the next period, x_t by EVA_t and y_t by the share price P_t, we can rewrite (10) and (11) as:

$$(12)\quad P_t = \alpha + \beta EVA_{t+1}^*$$

$$(13)\quad P_t = \alpha + \beta(1-\gamma)\sum_{j=0}^{\infty}\gamma^j EVA_{t-j}.$$

Taking the first difference, *i.e.* $\Delta P_t = P_t - P_{t-1}$ on both sides of (13), we have

$$(14)\quad \Delta P_t = \beta(1-\gamma)\Delta EVA_t + \beta(1-\gamma)\gamma\Delta EVA_{t-1} + \beta(1-\gamma)\gamma^2\Delta EVA_{t-2} + \ldots$$

Equation (13) states that the stock price is a distributed lag function of present and past *EVA*. Equation (14) means that the change in the stock price is a distributed lag function of present and past changes in *EVA*. These two equations are the basis for the model specifications, which are to be tested empirically.

3 PREVIOUS STUDIES

Several empirical studies support the theoretical relationship between *EVA* and the market value. Lehn and Makhija (1996) analyzed the *EVA* and the *MVA* of 241 American companies and concluded that both metrics correlate positively with stock returns. The correlation was found to be low and slightly superior to those carried out with traditional performance measures, such as *ROA*, *ROE*, and *ROS*.

O'Byrne (1996) explored market value divided by equity as the dependent variable and *EVA* as the independent variable in a regression, finding that *EVA* explains 31% of the market value, whereas the change of *EVA*, that is, (EVA_t - EVA_{t-1}), explains 55% of the change in the market value. Dodd et al. (1996) tested the correlation between the stock valuation and different measures of profitability including *EVA*, the non-adjusted residual income, *ROA*, *EPS*, and *ROE*, finding that *ROA* provides the best explanation for stock valuation with a R^2 of 24.5%. The R^2 for other indicators are: *EVA* 20.2%, residual income 19.4%, *EPS* and *ROE* approximately 5-7%. It can be observed that these R^2 values are quite low.

Biddle et al. (1997) investigated the assertion that *EVA* has greater association with stock valuation and market value than net profits and conclude that profits are more strongly associated with stock returns and market values than *EVA*.

Telaranta (1997) studied the correlation between residual income and stock prices in Finland, concluding that residual income significantly explains market movements, but with low explanatory levels, and that it is not superior to other accounting indicators. Stark and Thomas (1998) analyzed the relationship between residual income and market value of companies in the UK, concluding that the degree of interaction is low and that it can only be observed when R&D expenses are included as an additional explanatory variable.

Other empirical inquiries on the subject can be found in Uyemura et al. (1996), Milunovich et al. (1996), and Grant (1996), among others. In short, most of the studies surveyed conclude that the relation between the *EVA* and stock returns exists, but that this relationship is statistically weak.

4 MODEL SPECIFICATION

Based on this previous research on the relationship between EVA and stock returns, we believe that previous studies may not have adequately identified the variables involved and the correct explanatory timing of the relationship. To explore this possibility, we specified several alternative models, with the objective of determining the relevant dependent and explanatory variables, and the correct timing or sequencing of their occurrence. The following alternative linear models were specified:

$$(15) \qquad P_{it} = \alpha + \beta \cdot EVA_{it} + u_{it} \qquad \beta > 0$$

$$(16) \qquad P_{it} = \alpha + \beta \cdot EVA_{it-1} + u_{it} \qquad \beta > 0$$

$$(17) \qquad \Delta P_{it} = \alpha + \beta \cdot \Delta EVA_{it} + u_{it} \qquad \beta > 0$$

$$(18) \qquad \Delta P_{it} = \alpha + \beta \cdot \Delta EVA_{it-1} + u_{it} \qquad \beta > 0,$$

In these equations, P is the stock price, subscript i $(i = 1, .., n)$, indicates *i-th* company, the subscript t indicates the period of time (year), log is the natural log operator, Δ is the first difference operator, meaning that $\Delta P_t = P_t - P_{t-1}$. α and β are parameters to be estimated and u_{it} is the error term. It is assumed that the relationship between the stock price and *EVA* is positive. It is hypothesized that equations (15) e (17), relating the current stock price and current *EVA*, and current change in stock price with change in *EVA*, respectively, should both be rejected, as a result of inappropriate timing or sequencing of the relationship. Equations (16) and (18), are intended to test whether the best explanation of the impact of *EVA* on the stock price is variable levels or variable changes, and whether the hypothesis with respect to sequencing – that is, that the current price is influenced by past *EVA* – is correct.

5 EMPIRICAL ANALYSIS AND RESULTS

The empirical part of the work was developed using a sample of public companies listed in the Brazilian market. Unfortunately, published data on *EVA* by Brazilian companies are not abundant. It was possible to obtain data relative to six Brazilian companies, which have disclosed their *EVA* for at least a four-year period (1996-1999).[3]

Stock returns were obtained by taking Δlogs on average annual stock prices. The regressions were carried out as pooled regressions. The source for *EVA* data is the Brazilian business magazine Exame, and Stern & Stewart's website. The source for stock prices is Brazilian Economatica's[4] database. The models specified as equations (14) through (18) were estimated by OLS[5]. The results obtained are below, where the figures between parentheses are the *t* statistics (Student).

$$(19) \quad P_{it} = \underset{(7.44)}{123.83} + \underset{(0.70)}{0.12} \cdot EVA_{it} \qquad R^2 = 0.03$$

$$(20) \quad P_{it} = \underset{(6.83)}{155.51} + \underset{(1.05)}{0.23} \cdot EVA_{it-1} \qquad R^2 = 0.11$$

$$(21) \quad \Delta P_{it} = \underset{(3.62)}{33.86} - \underset{(-1.81)}{0.24} \cdot \Delta EVA_{it} \qquad R^2 = 0.25$$

$$(22) \quad \Delta P_{it} = \underset{(4.10)}{29.87} + \underset{(4.54)}{0.61} \cdot \Delta EVA_{it-1} \qquad R^2 = 0.78$$

As expected, the results presented in equations (18) and (19) are weak. The t-test on the $\hat{\beta}$ estimates of these two equations indicates that null hypothesis should not be rejected, *i.e.* that the $\hat{\beta}$ parameters) are equal to zero, with a level of 10%[6]. Besides, their correlation coefficients (R^2) are quite low. Equation (20) is slightly more significant, but the negative $\hat{\beta}$ estimate violates one basic assumption, since the impact of *EVA* on the stock price should be positive.

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[3] These companies are Souza Cruz, Embraer, Pirelli, Pão de Açúcar, Ericsson, and TAM.

[4] Brazilian firm specializing in corporate accounting and market data.

[5] Assuming that EVA is predetermined with respect to the share prices, ordinary least squares (OLS) should produce unbiased and consistent estimates.

[6] For more details on tests of hypothesis presented in this section (t, F, and Durbin-Watson tests), see GREENE (2002).

Besides, as mentioned earlier, equations (19) and (20) are likely to be spurious regressions, since they involve I(1) variables *P* and *EVA*. Therefore, the regressions represented in (19), (20) and (21) should be disregarded.

On the other hand, the results show that equation (22) is robust. Here, the t-test allows the rejection of the hypothesis that $\hat{\beta}$ is equal to zero at the 0.5% level. Besides, the $\hat{\beta}$ estimate is positive, and the regression's R^2 is high, meaning that the regression explains 78% of the variations in stock returns. Moreover, the F statistic of 20.64 tells us that the hypothesis of no relationship between dependent and explanatory variables has to be rejected. The Durbin-Watson statistic of 2.39 points out that the hypothesis of 1st order autocorrelation should be rejected at the 1% level.

Hence, the result expressed in (22) supports the theory that *EVA* affects the stock returns, but the relationship is not straightforward. More specifically, stock returns are significantly influenced by changes in *EVA* lagged by one year.

6 CONCLUSIONS

In summary, it seems clear that the basic objective of our study, which was to capture the relationship between *EVA* and stock prices, has been fulfilled, at least with respect to a relatively small sample in the Brazilian stock market. The most relevant result is the demonstration of the dynamics of the explanatory process, in which the dependent variable is stock return and the independent variable is the one-year lagged change in *EVA*. This result is consistent with the hypothesis that stock returns are influenced by the past behavior of *EVA*. This outcome may explain why some previous empirical studies found little or no relation between stock returns and *EVA*.

The main shortcoming of the study is the small sample size used. Unfortunately, only a small number of companies operating in Brazil have used and published, in the period studied, the *EVA* methodology.

7 REFERENCES

Biddle, G.C., Bowen, R.M. e Wallace, J.S. (1997). Does EVA Beat Earnings? Evidence on Associations with Share Returns and Firm Values, *Journal of Accounting and Economics*, vol. 24, 301-336.

Bromwich, M. and Walker, M.(1998) .Residual Income: Past and Future, *Management Accounting Research*, vol. 9, 391-419.

Cagan, P. (1956). The monetary dynamics of hyperinflation. In: FRIEDMAN, M. ed. *Studies in the quantity theory of money*. Chicago: The University of Chicago Press. p. 177-251.

Damodaran, A.(2002). Economic Value Added (*EVA*), Obtido 07.08, 2002, in: http://www.stern.nyu.edu/~adamodar/New_Home_Page/lectures/eva.html

Dodd, J. L. And Chen, S. (1996). "EVA: A new panacea?", *Business and Economic Review, Vol 42; Jul-Sep, 26-28*. Obtido a partir de http://research.badm.sc.edu/research/bereview/be42_4/eva.htm.

Economatica. Obtido 06. 15, 2002, http://www.economatica.com.br.

EXAME Magazine. Obtido 02. 07, 2002, de http://www.exame.com.br

Greene, W. H. (2002). *Econometric Analysis*. 5th ed. Upper Saddle River, N.J.: Prentice Hall. 1026 pags.

Hamilton, R. (1777). *An Introduction to Merchandize*, Edinburgh. 357 pags

Koyck, L. M. (1954). *Distributed Lags and Investment Analysis*. Amsterdam: North-Holland. 452 pags.

Lehn, K. and Makhija, A.K. (1996). EVA and MVA: As Performance Measures and Signals for Strategic Change. *Strategy and leadership*. Vol. 24 May/June. 34-38.

Mäkeläinen, E. (1998). *Economic Value Added as a Management Tool*, MSc Thesis, Helsinki School of Economics and Business Administration, Finland. 220 pags.

Marshall, A. (1890). *Principles of Economics*, MacMillan Press Ltd., London. 334 pags.

Nerlove, M. (1958) *Distributed Lags and Demand Analysis*. Washington, DC. US Department of Agriculture, Agriculture Handbook, No. 141, 98 pages.

O'byrne, S. F. (1996). EVA® and Market Value. *Journal of Applied Corporate Finance*, Spring. 9(1), p. 116-125.

Shrieves, R. E. and J. M. Wachowicz, J.M. Free Cash Flow (FCF), *Economic Value Added (EVA)*, and Net Present Value (NPV): A Reconciliation of Variations of Discounted-Cash-Flow (DCF) Valuation. Obtido 01. 20, 2002, In: http://web.utk.edu/finrev/WP/eva.pdf.

Stark, A.W. and Thomas, H.M. (1998). On the Empirical Relationship Between Market Value and Residual Income in the U.K., *Management Accounting Research*, vol. 9, 445-460.

Stern Stewart & Co. 12. 20, 2001, de _http://www.sternstewart.com/index2.shtml.

Stewart, G. B. (1990). *The Quest For Value: the EVA^{TM} management guide.* New York: Harper.

Storrie, M. and Sinclair, D. (1997). Is EVA^{TM} equivalent to DCF?, *CPS Alcair Global Review*, Volume III, Number V, Spring, 5-6.

Telaranta, T.(1997). *On Residual Income Variables and Shareholder Wealth Creation. Master's Thesis*. Helsinki School of Economics and Business Administration, Helsinki. Obtido 11. 07, 2001, In: http:// www.evanomics.com/evastudy/evastudy.shtml.

Wallis, K. F.(1973). *Introductory Econometrics*. London: Gray-Mills. 220 pags.