# Equity Betas, Accounting Fundamentals and Market Efficiency in Brazil

**Autores**
**GUALTER RAMALHO PORTELLA**
Tribunal de Contas da União

**DIONES GOMES DA ROCHA**
Tribunal de Contas da União

## 1. Introduction

Market-based studies have long revealed a positive association between accounting numbers and share returns (Ball and Brown, 1968; Foster, 1975; Brown 1970). Although the evidenced association was not as strong as the advocates of the so-called "mechanistic hypotheses" predicted (Watts and Zimmerman, 1986), it spurred further investigation on the association of accounting numbers and equity risk.

As documented in those early studies, accounting earnings is just one among other alternative sources of information to capital markets and the information content of accounting income announcements decreases as the number of alternative sources of information increases. Nevertheless, despite this limited influence of accounting data on stock returns, it is of interest to investigate, within an EMH semi-strong context, whether share systematic risk is related to accounting fundamentals.

This might be of particular interest when asset pricing models apparently do not seem to refer to companies' fundamentals. Beta technology is all defined in terms of returns derived from capital markets figures. However, company risk comes from the business it is engaged in, its financial and investment decisions, the industry sector conditions and the global economy.

Therefore, since equity betas reflect underlying economic conditions and financial statements capture companies' operating, investing and financing activities, it is plausible to predict some association between equity betas and accounting variables.

In fact, some studies such as Ball and Brown (1969), and Beaver, Kettle and Scholes (1970) have investigated this issue. The remarking characteristic of these studies was that the choice of some accounting variables relied on conventional wisdom while others had a finance theory reason to be chosen. This lack of consistency in choosing the variables made it hard to interpret the reasons why some accounting variables were related to equity betas while others were not.

The aim of this study is twofold. First, it will present an integrated approach on how financial statements capture company risk and test the derived accounting variables against equity betas. The setting for this test is the Sao Paulo Stock Exchange. Because Brazilian markets are claimed to be pervasively irrational and inefficient by a considerable portion of home analysts, journalists and even academics, the second aim of this work is to assess, through the association between equity betas and the accounting fundamentals, the semi-strong form of efficiency of the Brazilian capital market.

The assumption underlying this investigation is that although capital markets might not be efficient at all times, a certain level of efficiency can be identified if equity risk reflect fundamentals.

## 2. Fundamental Risk and Residual Income Model

Equity investors commonly face two types of risk: (1) price risk and (2) fundamental risk. The first arises when market prices of a given stock deviate from its intrinsic value – true market value – as perceived by a given investor. These deviations might steam from transitory market inefficiencies. The second is the risk related to the underlying operating, financing and investment activities conducted by the invested company. This is a more permanent kind of risk. This paper deals with the latter.

In order to possibly set the grounds for the relation between equity betas and accounting fundamentals, which capture companies' fundamental risk, let us recall that in the no-tax CAPM world the firm cost of capital, $K_F$, is expressed as:

$$K_F = \frac{V_0^E}{V_0^F} \cdot K_E + \frac{V_0^D}{V_0^F} \cdot K_D \tag{2.1}$$

where $V_0^E$ is the value of equity, $V_0^F$ is the value of the firm taken as a whole, i.e. the value of net operating assets (NOA), $V_0^D$ is the value of debt, $K_E$ is the cost of equity and $K_D$ is the cost of debt.

One should notice that equity and debt are only needed to the extent that the company cannot finance its operating assets with accruals and accounts payable. In other words, the only assets that need to be financed by equity and debt are the ones that are not backed by operating liabilities. This is the definition of net operating assets (NOA).

Companies often retain part of the cash generated by operating activities in the form of marketable securities or bank certificates while waiting for the right moment to reinvest in operating assets. This extra-cash is temporarily lent in the capital market before being distributed or plowed back. In this situation, the company is a finance provider and receives interest. Therefore, in order to arrive at an appropriate cost and value of debt, interest expense must be netted against interest income resulting in a net financial expense (NFE) while debt and financial investment must compensate and produce a net financial obligation (NFO) figure.

Popular as it is, expression (2.1) conveys the incorrect notion that the capital cost of the firm and business risk are defined by equity and debt capital cost (Penman, 2001, pp. 684-710). To make this point clearer, let us first rewrite expression (2.1) in terms of business risk, $\beta_F$:

$$\beta_F = \frac{V_0^E}{V_0^F} \cdot \beta_E + \frac{V_0^D}{V_0^F} \cdot \beta_D \tag{2.2}$$

Rearranging expression (2.2) yields

$$\beta_E = \beta_F + \frac{V_0^E}{V_0^D} \cdot \left(\beta_F - \beta_D\right) \tag{2.3}$$

According to Miller and Modigliani (1958), firm value and its cost of capital are independent of the firm's capital structure. This is the same of saying that business risk, $\beta_F$, stands for itself and is not a function of the way the firm finances its operations. The reasoning behind is that cost of equity increases the more the company gets leveraged and, therefore, making up for the boost in the use debt, which is theoretically less expensive than equity. As investors notice the expansion in debt and realize the increasing risk it represents for shares, equity beta, $\beta_E$, increases and offsets any possible decrease in the firm's cost of capital, $K_F$, due to the heavier use of debt.

The firm's cost of capital – also known as the cost of operations – is commonly presented as in expression (2.1) because it is seldom directly observable in capital markets. Only companies that finance their net operation assets (NOA) entirely with equity would allow for a direct observation of their cost of operations in the capital market.

It follows from this discussion that it is theoretically sound to write expression (2.3) showing that in fact equity risk is influenced by operating risk, financial leverage – $\frac{V_D}{V_E}$ –, and the difference between business risk and debt risk – $(\beta_F - \beta_D)$. For a complete decomposition of expression (2.2) into expression (2.3), see Appendix 1.

To link accounting numbers and equity beta, as shown in expression (2.3), it is necessary to bring on the residual earnings model, as developed by Ohlson (1995). Under a single-period payoff condition, the model starts from the definition that the efficient equity price is given by $P_0 = (E[d_1]+E[p_1])/(1+K_E)$, where $P_0$ is the current price, $E[d_1]$ is the expected dividend one year ahead, $E[p_1]$ is the expected price one year ahead, and $K_E$, as defined above, is the equity cost of capital.

Adopting a clean surplus income approach, the expected dividends one year ahead can be written as $E[d_1] = E[\text{comprehensive income}_1] - (E[B_1] - B_0)$. Where $E[B_1]$ is the expected book value at one year ahead and $B_0$ is the book value at present time. Therefore, substituting for $E[d_1]$ in the efficient equity price equation yields

$$P_0 = \frac{E[comprehensive\ income_1] - (E[B_1] - B_0) + E[p_1]}{1 + K_E} \tag{2.4}$$

$$= \frac{E[comprehensive\ income_1] + B_0}{1 + K_E} + \frac{E[p_1] - E[B_1]}{1 + K_E} \tag{2.5}$$

$$= \frac{E[comprehensive\ income_1] - (1 + K_E - 1)B_0 + B_0(1 + K_E)}{1 + K_E} + \frac{E[p_1] - E[B_1]}{1 + K_E} \tag{2.6}$$

Expression (2.6) then collapses into

$$= B_0 + \frac{E[comprehensive\,income_1] - (1 + K_E - 1)B_0}{1 + K_E} + \frac{E[p_1] - E[B_1]}{1 + K_E} \tag{2.7}$$

Expression (2.7) states that the efficient price is attained by forecasting next year's residual income – the second term of equation – and premium, which is defined as the difference between $E[p_1]$ and $E[B_1]$ (see Penman, 2001, pp. 169-170). This expression can be extended to multiple period forecasts. In each case, three pieces are needed, together with an estimate of the equity cost:

a. Present book value

b. Residual income forecasts to the horizon

c. Premium forecast at the horizon

Although the model appears to be circular in the sense that in order to calculate the premium at horizon one must forecast price at horizon, which is exactly what the model tries to express, one should remember that premium is the excess over book value and, therefore, under the assumptions of the model, premium is entirely captured by the expected stream of residual income in perpetuity. Consequently, as current book value is already given, the application of the model focuses on the value drivers of residual income.

Then the analyst's task is to understand the past value drivers of the company and, incorporating new information, estimate the behavior of the variables that influence these drivers. Since the past drivers of residual income are captured by the companies' financial statements, it is plausible to assume that equity risk, $\beta_E$, is influenced by the analysis of financial accounts performed by the equity analyst.

In the next section, as the residual income drivers are pinpointed, the choice of the accounting variables used in the statistical test will be motivated and explained.

## 3. Residual Income Drivers and the Choice of Accounting Variables

The second term of expression (2.7), which represents residual income, can be restated as follows:

$$E\left[comprehensive\ income_1\right] - \left(1 + K_E - 1\right)B_0 = \left\{ROE - \left(1 + K_E - 1\right)\right\}B_0 \qquad (3.1)$$

$$\text{Re}\,sidual\ Income = \left(ROE - Cost\ of\ Equity\ Capital\ \right)B_0$$

Where ROE is return on equity. Given that the Cost of Equity Capital, to a great extent, is not controlled by management, the firm should concentrate on both generating a higher ROE and increasing its equity investments. By now, let us focus on Return on Equity. One should notice that ROE can be rewritten as in the following expression

$$ROE = RNOA + \frac{NFO_0}{B_0}\left(RNOA - NBC\right) \qquad (3.2)$$

Remember that in section 2 the notion of Net Operation Assets (NOA) was introduced. Accordingly, operating assets should be netted against operating liabilities so that the financing needs of the company were known. In the same line of reasoning, financial assets and financial liabilities should cancel out to produce a Net Financial Obligation (NFO) if liabilities are higher than assets – it is assumed for the purpose of this work that the typical firm will show a Net Financial Obligation.

Net Borrowing Cost (NBC) is the cost of NFO and is expressed as the ratio $\frac{NFE_1}{NFO_0}$. Recall that $NFE_1$ is the Net Financial Expense as defined in section 2 of this paper. RNOA is

the Return on Net Operating Assets and is expressed as $\frac{OI_1}{NOA_0}$. $OI_1$ is the Operating Income. This number should be free of any effects of financial activities, which means that both financial expenses and tax shields should be removed in order to arrive at the Operating Income figure. For a proof for expression (3.2), see appendix 2.

Expression (3.2) shows that the drivers of ROE are Return on Net Operating Assets (RNOA) and Financial Leverage multiplied by the difference between RNOA and NBC, which some authors call Operating Spread (see Lundohlm, 2004). The first term of expression represents operating risk while the second term represents financial risk. These are the fundamental determinants of equity risk.

The break down of these determinants is attained by employing a Dupont analysis. Figure 1 illustrates the point and shows the drivers of ROE.

**Figure 1**
Profitability analysis showing fundamental risk determinants

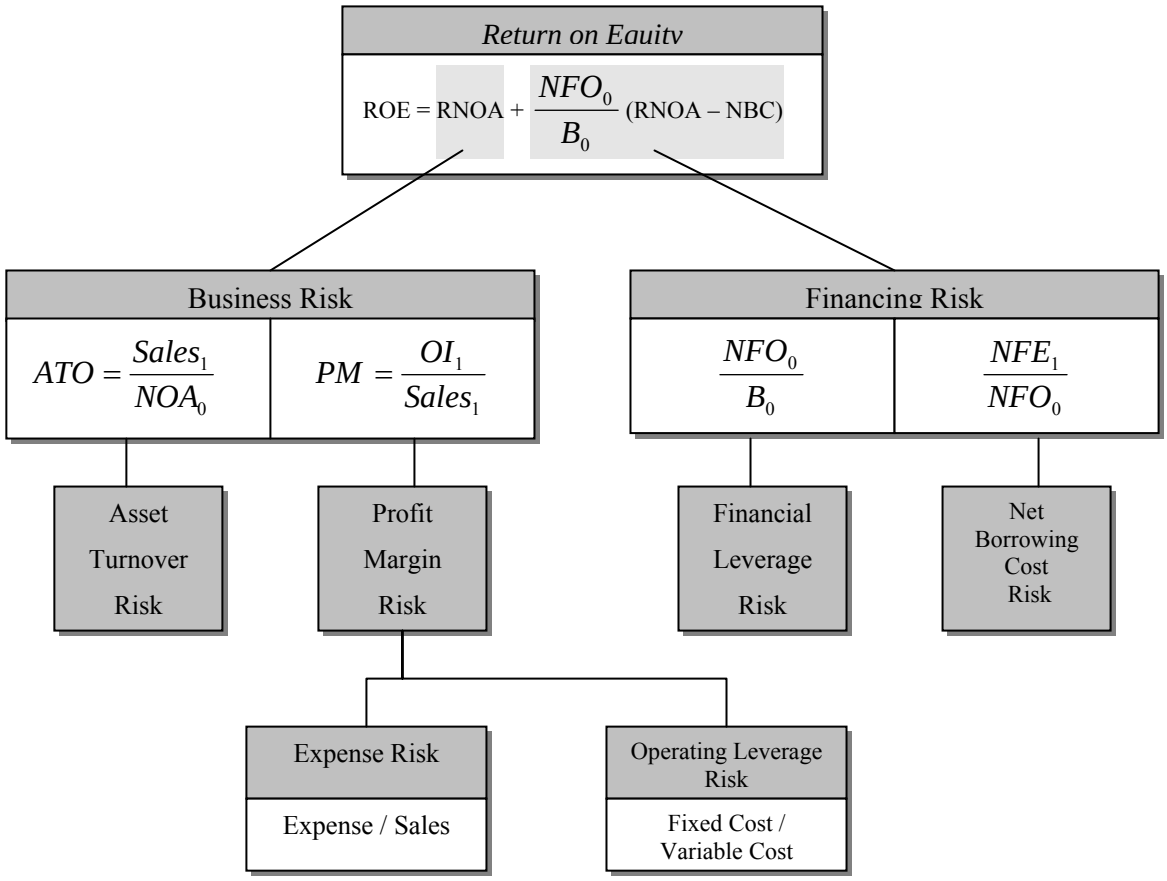


Figure 1 makes it clear the two determinants of fundamental risk: (1) business risk and (2) financial risk. The first one, also know as operating risk, is driven by variation in Asset Turnover (ATO) and Profit Margin (PM), as the classical Dupont analysis shows. The second one is driven by variation in Financial Leverage (FLEV) together with changes in Operation Spread (OPSPREAD).

Asset Turnover risk represents the probability that sales fall due to a decrease either in price or in units sold. If the company is not able to eliminate part of its Net Operating Assets in response to the sales fall, it might face a reduction in its Return on Net Operating Assets.

This reduction negatively affects the intrinsic value of the company, which, in turn, is reflected in the company's market price. Businesses that require large fixed capital or inventory investments are more prone to bear this type of risk.

Profit Margin risk is the risk that profit margins squeeze for a given level of sales. In other words, it is the risk that more cents will be spent in, for example, labor and material costs for each dollar of sales.

Another factor that influences Profit Margin risk is the structure of fixed and variable costs of the company, which is referred to as Operating Leverage. A company with a heavier proportion of fixed costs will be more susceptible to sales volatility. As sales decrease, profit margins will drop and hurt Return on Net Operating Assets.

Financial Leverage and Operating Spread need to be interpreted together in order to make sense of financing risk. Financial leverage can harm Return on Equity as long as Return on Net of Operating Assets decreases and/or Net Borrowing Costs rise. However, when Operating Spread is positive, financial leverage favorably affects Return on Equity. Given that Return on Net Operating Assets is driven by Profit Margin (PM) and Asset Turnover (ATO), the discussion of the factors affecting financial risk is confined to Financial Leverage and Net Borrowing Costs.

Recall form expression (3.1) that residual income is also influenced by the level of investment in Equity, $B_0$. Considering a given level of Financial Leverage, growth in Equity is driven by growth in Net Operating Assets because the firm will strive to maintain the same proportionality between Equity and Debt so that its overall cost of capital is unchanged.

The level of Net of Operating Assets deployed by the firm, in turn, is determined by the level of sales. The risk of Net Operating Assets growth is that sales do not rise as expected. Sometimes it is not possible to quickly adjust Net Operating Assets to lower than expected levels of sales. The point here is the same presented in the paragraph regarding Asset Turnover risk. As a consequence, companies that show a higher level of Net Operating Assets investment will bear higher risk.

Following the Residual Income Model, it is theoretically sound to predict that the drivers shown in Figure 1 are related to equity risk since they express the fundamental risks of the firm. This work relies on these drivers in order to test accounting variables against equity betas and speculate on the Brazilian capital market efficiency.

More specifically, Profit Margin, Asset Turnover, Return on Net Operating Assets, Financial Leverage, Operating Leverage and Change in Net of Operating Assets are the variables chosen to test the correlation. Another candidate variable – Operating Spread – was left out of tests due to the fact that Economatica® information system does calculate borrowing costs in a gross form, not taking into account that companies have financial assets that offset not only financial liabilities but also the cost of capital of these liabilities for the firm. More importantly is the fact that, during the data gathering phase, it was noticed that data on borrowing cost for many firms were missing, which led to distrust on the reliability of the borrowing cost figures.

## 4. Data

The sample to test the correlation hypothesis between accounting variables and equity betas was made up of non-financial companies contained in the Economatica® information system that fulfilled the following criteria:

a. Listed on Sao Paulo Stock Exchange; and

b. Presented figures on Equity Beta, Return on Net Operating Assets, Profit Margin, Asset Turnover, Change in Net Operating Assets, Operating Leverage and Financial Leverage for the 1995-2004 period.

The sample was comprised of 62 listed companies that fulfilled the above criteria. The choice for the 1995-2004 time frame was motivated by the fact that this was a period of moderate inflation and stable monetary and fiscal policies in Brazil.

The equity beta figures provided by Economatica® information system are based on a 60-month frame, which makes the numbers reasonably free from short-term bias. The numbers for Return on Net Operating Assets, Profit Margin, Asset Turnover, Change in Net Operating Assets and Operating Leverage were not directly retrieved from Economatica®. For example, in order to arrive at a Return on Net Operating Assets figure, data for Income Before Taxes plus Interest Expense were divided by Capital Employed numbers. A complete explanation on variables designing is presented together with the methodology employed.

## 5. Methodology

In order to assess the correlation between accounting variables and equity betas, the Spearman's rank correlation is applied. This has been the standard approach to assess this type of correlation since the early studies of Ball and Brown (1969) and Beaver, Kettler and Scholes (1970). This study concentrated on assessing the correlations on individual company level as well as on portfolio level. The point here is that these previous studies showed that working with portfolio variables increases the likelihood of finding associations.

Ten portfolios of firms were formed for each calendar year ranking companies on descending order for each accounting variable. This procedure produced nine portfolios of six firms and one of eight.

A description of each variable design is presented below, together with the predicted signal of its correlation with beta:

a. Return on Net Operating Assets (RNOA), as already explained above, was computed from two variables retrieved from Economatica®. These two variables – Income Before Taxes plus Interest Expense and Capital Employed – were taken as surrogates for Operating Income, as defined in section 2, and Net Operating Assets, respectively. Given the variables descriptions provided in the information system's manual, this seemed to be a reasonable assumption. It is expected that this variable shows a negative correlation with beta because the higher the RNOA, the lower the equity risk;

b. Profit Margin (MARGIN) was calculated from Income Before Taxes plus Interest Expense and Sales figures. As with RNOA, the prediction is for a negative association between Profit Margin and beta;

c. Asset Turnover (ATO) was derived from Sales and Capital Employed numbers offered by Economatica®. Since RNOA can be expressed as the multiplication of MARGIN by ATO, it follows that a negative association is expected between ATO and beta;

d. Financial Leverage (FLEV) was directly retrieved from Economatica® without requiring any additional computations. It is simply Gross Financial Obligations over book value of Equity. As we discussed above, the more appropriate measure of leverage would be given by a Net Financial Obligation figure. However, taken into account the difficulties in deriving these numbers from Economatica® FLEV

as it is presented was accepted as a surrogate. It is predicted a positive association between FLEV and beta;

e. Operating Leverage (OPLEV) is specified as in Penman (2001, pp 393-394) where OPLEV is equal to percentage change in Operating Income over percentage change in Sales. Remember that, in this work, Income Before Taxes plus Interest Expense was taken as a proxy for Operating Income. It is also predicted a positive association between OPLEV and beta;

f. Change in Net Operating Assets (ΔNOA) is simply the monetary change in Capital Employed, which is taken here as a surrogate for Net Operating Assets. It is predicted a positive association between beta and ΔNOA.

## 6. Results and Findings

Table 1 shows the results of Spearman's rank correlation between equity betas and the accounting variables just explained above. The results confirm the predicted signals for all accounting variables, evidencing that the model discussed in sections 2 and 3 may be used as a framework for assessing equity risk.

It is noticeable that almost all the accounting variables related to operating risk, as illustrated in Figure 1, are statistically significant both at portfolio level and company level, Operating Leverage (OPLEV) being the only exception. The explanation for the low correlation and lack of statistical significance of OPLEV might be the difficulty in disentangling variable from fixed expenses using outside financial information, i.e. companies' annual reports.

Financial Leverage (FLEV), on the other hand, shows low correlation and no statistical significance at portfolio level while at company level its statistical significance increases although its correlation gets even lower. This low performance of FLEV is no surprise given that, as discussed in section, this accounting ratio should not be interpreted alone. Its contribution to risk always depends on Operating Spread.

None of the variables chosen taken alone was expected to show high correlations with equity beta because, according to the analysis of profitability presented in Figure 1, each is a piece of the fundamental risk picture. For instance, RNOA, a summary of business risk, can be broken down into ATO and MARGIN. That is why RNOA alone shows a higher correlation than either ATO or MARGIN.

| Table 1 | | | |
|---|---|---|---|
| Association between equity betas and six accounting variables | | | |
| Variables | Portfolio Level | Company Level | Predicted Signal |
| RNOA | -0,485<br>(0,000)** | -0,307<br>(0,000)** | - |
| MARGIN | -0,288<br>(0,002)** | -0,201<br>(0,000)** | - |
| ATO | -0,412<br>(0,000)** | -0,235<br>(0,000)** | - |
| FLEV | 0,104<br>(0,152) | 0,081<br>(0,022)* | + |
| OPLEV | 0,019<br>(0,424) | 0,014<br>(0,367) | + |
| ΔNOA | 0,226<br>(0,012)* | 0,132<br>(0,000)** | + |
| Spearman's rank correlations (one-tailed test) appear in top row whereas p-values are shown in bottom row.<br>* significant at 5% level<br>** significant at 1% level | | | |

## 7. Conclusion

This work used the residual income model in order to test the association between accounting variables and equity betas. As stated on section 1, previous studies did not rigorously rely on finance theory to define the accounting variables to be tested. This difference in approach is the main feature of the present paper.

Another feature of previous works, besides investigating the association of accounting variables and stock market betas, was to test whether accounting variables could be used to predict next period's equity beta better than market beta. To accomplish the task, researchers typically estimated a cross-section regression such as the following for a given period (Zimmerman and Watts, 1986, pp. 124):

$$\hat{b}_i = c_o + c_1 w_{1,i} + ... + c_5 w_{5,i} + u_i \qquad (6.1)$$

Where $\hat{b}_i$ is the market model estimate of equity beta for firm i in a given period and $w_{j,i}$ is firm i's jth accounting variable in that given period.

With these estimates of equity beta in hand, researchers predicted equity betas for the subsequent periods. Then, these predictions were compared to equity betas predictions

obtained from a pure market model in order to see each one was more accurate. The results did not make it apparent that accounting data could be used to improve the market model estimates of equity beta for listed companies. Nevertheless, these studies show that accounting variables can be used to estimate risk of unlisted companies.

It is expected that the use of accounting variables chosen from a more formal framework will improve further the estimates of equity beta for unlisted companies. However, this paper does address the accuracy issue described in the above paragraph, leaving this question open for future research.

As to the efficiency of the Brazilian capital market, this study shows a reasonable association between accounting variables, chosen from a more formal company risk framework, and equity beta, meaning that fundamentals are reflected on prices.

## APPENDIX 1

$$\beta_F = \frac{V_0^D}{V_0^F}\beta_D + \frac{V_0^E}{V_0^F}\beta_E \tag{2.2}$$

Rearranging (2.2),

$$\frac{V_0^E}{V_0^F}\beta_E = \beta_F - \frac{V_0^D}{V_0^F}\beta_D$$

$$\frac{V_0^E}{V_0^F}\beta_E.V_0^F = \beta_F.V_0^F - \frac{V_0^D}{V_0^F}\beta_D.V_0^F$$

$$V_0^E.\beta_E = \beta_F.V_0^F - V_0^D\beta_D$$

$$\frac{V_0^E.\beta_E}{V_0^E} = \frac{\beta_F.V_0^F}{V_0^E} - \frac{V_0^D\beta_D}{V_0^E}$$

$$\beta_E = \frac{\beta_F.V_0^F}{V_0^E} - \frac{V_0^D\beta_D}{V_0^E}$$

Since $V_0^F = V_0^D + V_0^E$, it follows that

$$\beta_E = \beta_F.\frac{V_0^D + V_0^E}{V_0^E} - \frac{V_0^D\beta_D}{V_0^E}$$

$$\beta_E = \beta_F.\left(1 + \frac{V_0^D}{V_0^E}\right) - \frac{V_0^D\beta_D}{V_0^E}$$

$$\beta_E = \beta_F + \frac{V_0^D}{V_0^E}.\beta_F - \frac{V_0^D\beta_D}{V_0^E}$$

$$\beta_E = \beta_F + \frac{V_0^D}{V_0^E}(\beta_F - \beta_D) \tag{2.3}$$

## APPENDIX 2

$$ROE = \frac{NI}{B_0}$$

Where NI is Net Income and Bo is Equity Book Value. The above expression can be rewritten as follows,

$$ROE = \frac{NI}{B_0} = \frac{OI - NFE}{NOA - NFO}$$

Where OI is Operating Income, NFE is Net Financial Expense, NOA is Net Operating Assets and NFO is Net Financial Obligations. Rearranging the above expression gives,

$$ROE = \frac{OI}{NOA - NFO} - \frac{NFE}{NOA - NFO}$$

Recalling that RNOA multiplied by NOA yields Operating Income (OI) and that Net Borrowing Costs (NBC) multiplied by NFO gives NFE, the expression above is further arranged,

$$ROE = \frac{RNOA \times NOA}{NOA - NFO} - \frac{NBC \times NFO}{NOA - NFO}$$

$$ROE = \left( \frac{NOA}{B_0} \times RNOA \right) - \left( \frac{NFO}{B_0} \times NBC \right)$$

Recalling that NOA = NFO + $B_0$, yields,

$$ROE = \left( \frac{B_0 + NFO}{B_0} \times RNOA \right) - \left( \frac{NFO}{B_0} \times NBC \right)$$

$$ROE = RNOA + \frac{NFO}{B_0} \times RNOA - \frac{NFO}{B_0} \times NBC$$

$$ROE = RNOA + \frac{NFO}{B_0}(RNOA - NBC) \qquad (3.2)$$

## Bibliography

Modigliani, F., and M. H. Miller, "The Cost of Capital, Corporate Finance and the Theory of Investment", American Economic Review 48 (June 1958). Pp. 261-297.

Ball, R., and P. Brown, "An Empirical Evaluation of Accounting Income Numbers", Journal of Accounting Research 6 (Autumn 1968), pp 159-178.

Ball, R., and P. Brown, "Portfolio Theory and Accounting", Journal of Accounting Research 7 (Autumn 1969), pp 300-323.

Beaver, W., P. Kettler, and M. Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures"", Accounting Review 45 (October 1970), pp 654-682

Foster, G., "Earnings and Stock Prices of Insurance Companies", Accounting Review 50 (October 1975), pp. 686-698.

Lundholm, R., and R. Sloan, "Equity Valuation and analysis with eVal CD-ROM", McGraw-Hill/Irwin, New York, First Edition, 2004.

Ohlson, J. A. Earnings, Book Values and Dividends in Security Valuation. Contemporary Accounting Research Spring, vol. 11, no. 2, 1995, pp.661-687.

Penman, S. H., "Financial Statement Analysis and Security Valuation", McGraw-Hill/Irwin, New York, First Edition, 2001.

Watts, R., and J. Zimmerman, "Positive Accounting Theory", Prentice-Hall, Englewood Cliffs, New Jersey, 1986.